



Mercury arc rectifier

## Powering MOTAT's trams

A tram ride through Western Springs Park is a favourite with all our visitors and is a great way to travel between our two museum locations, MOTAT Great North Road and the Aviation Hall at Motions Road. The trams run regularly during opening hours and for some special events. Tram rides are provided as a free service for the community. The operational trams have been meticulously restored and are maintained at MOTAT in our Tram Workshop.



When the MOTAT tramway opened in December of 1967, the 550 volt D.C. traction power was provided by the rotary converters at the Pt Chevalier substation that supplied power to the Point Chevalier trolley bus route. Pictured here is a trolley bus passing the Auckland Electric Power Board's brick substation building in Great North Road – in the distance can be seen Motions Road, where today, MOTAT's trams turn off Great North Road to head along to the Zoo and MOTAT Aviation.

1971 Photo G C Stewart



Once the 300m of track had been laid inside the grounds, Auckland Regional Authority trolley bus overhead linesmen came onsite to erect the overhead for the tramway and in this image, are connecting up the feeder cable from the “mains” to the overhead wire. Auckland Streamliner tram No.253 can be seen in the background.

1967 Photo Paul Gourley Collection







Image taken opening day of the tramway, showing the feeder cable above the tram connected to the running wire. The box fixed to the wooden traction pole on the far right has the knife switch installed that controls the feed from the trolley bus system.

December 1967 Photo Graham Stewart



From 1980 onwards with the closure of the Auckland trolley bus system, MOTAT had its own traction power supply installed, using a mercury arc rectifier, the power now coming direct from the supplier, Vector. Outside the MOTAT Main Entrance are these 11kv A.C. fused switches controlled by Vector.

2022 Photo Paul Gourley



When the museum's new traction supply was set up in 1980, it was protected by a large oil-filled circuit breaker. To maintain absolute protection, this oil-filled circuit breaker was replaced in early 2023 by modern solid-state fused switch unit, which included a reliable metering system for power consumption charges.

2023 Photo Paul Gourley





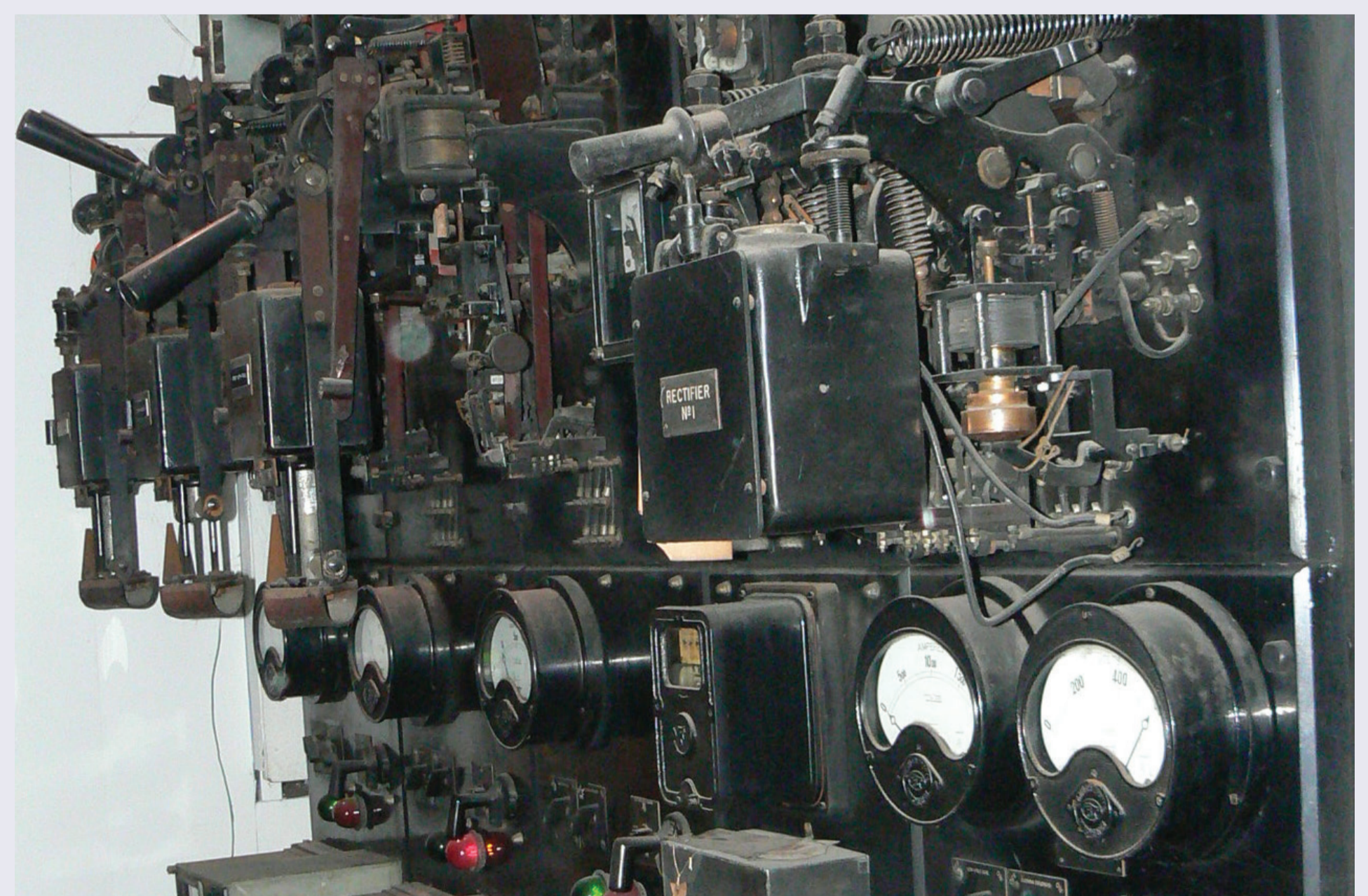
Beside the building that houses the tramway's rectifier unit are the two transformers. The front one steps Vector's 11kv A.C. supply down the originally specified 6.6kv A.C. incoming. The grey transformer behind, converts the 6.6kv A.C. to a lower voltage for the mercury arc rectifier to put out 600v D.C. for the trams.

2023 Photo Paul Gourley



MOTAT's mercury arc rectifier was originally built in the 1950s to power a large section of Auckland's trolley bus network. It was installed in the Auckland Electric Power Board's substation on the corner of Dominion Road and Mt Albert Road in Mt Roskill. Like many of Auckland's AEPB substations, there was a section dedicated to traction, firstly the trams and later the trolley buses. This entire traction set from Dominion Road was transferred to MOTAT and installed in time to take over the supply from the Auckland trolley bus system when it closed in 1980. These eight mercury arc bulbs provide ample power to comfortably run ten trams at once, most of which are big four-motor cars.

2019 Photo Paul Gourley



The switchboard for the Mercury Arc Rectifier controlling the feed out to the tram line, is divided into two sections – Inner Museum within the museum grounds and the Outer Museum running end-to-end from the MOTAT1 site to the MOTAT2 site. This switchboard was from the Dominion Road substation traction set acquired by MOTAT.

2019 Photo Paul Gourley







Remote control switches to the high-speed circuit breakers on the switchboard, located in an anteroom beside the switchboard room, that safely enables isolation or enlivening of the power on each feed section. Lockout keys and locks ready for isolation requests that come in from time-to-time which are governed by a strict protocol.

2019 Photo Paul Gourley



Positive knife switches contained in tramway pillar boxes for the Outer Museum Line, showing feeder cable to both overhead contact wires.

2023 Photo Paul Gourley

## TIMELINE

550v D.C. Traction Power Supply to the MOTAT Tramway

**24 November 1967**

Internal tramline energised for the first time fed from the Point Chevalier Substation.  
Courtesy of the Auckland Regional Authority.

**7 August 1977**

Trolley bus operation to Point Chevalier ended. MOTAT now fed from the trolley bus supply at Kingsland Substation.  
Courtesy of the Auckland Regional Authority.

**25 November 1978**

Motorway construction through Newton Gully required cutting of the Kingsland feeder cable to MOTAT. The supply now came from the Herne Bay trolley bus substation, via Richmond Road, Ponsonby Road and Great North Road, a fair distance from the substation. After the closure of the trolley bus system in late September 1980, the traction supply was continued to MOTAT.  
Courtesy of the Auckland Regional Authority & Auckland Electric Power Board.

**19 December 1980 to present day**

MOTAT's own traction substation was commissioned using the Mercury Arc rectifier, switching equipment and transformers from the former traction set at the Dominion Road/Mt Albert Road substation. Supply of the original 6.6kv and now 11kv A.C. power to MOTAT from Vector (formerly the Auckland Electric Power Board).

