

TOUR:

PERTH ELECTRIC RAIL SYSTEM TOUR — SATURDAY 30 MAY 1992

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Perth Electric Tramway Society

1. NORTHERN SUBURBS RAILWAY [NSR] PROJECT

The Tour Group departed the Rose and Crown Hotel Guildford on an articulated Transperth Mercedes Bus and travelled direct to Joondalup, the first stage terminus of the Northern Suburbs line then under construction. On board the bus we travelled with an Officer from Transperth Project Department, Mr Len Wallace, who was to be our guide for the tour of the project.

The NSR project (first stage) started at Perth and ended at Joondalup, a distance of approximately 26 kilometres with a further 2 - 3 kilometres to Currambine (second stage) being completed in 1993.

At Joondalup we saw the construction work for the new station where an interlocking system of concrete wall slabs was being erected. The slabs were of various sizes, according to their height in the walls [the larger slabs were at the bottom and the smaller ones at the top], and were held in place by a long steel rod attached at the middle of each slab and laid onto a sand pad. As each row of slabs was completed, sand was poured onto the rods and out from the wall for approximately 15 to 20 metres and compacted so that the bed of that layer of sand was at the level necessary for the next row of rods. The process was then started again for the next row of slabs. From the rail side, each row of slabs was laid so that it overlapped the row below, much like a brick wall and created a tunnel effect with the rail level and station at the bottom and the busway and stands at the top.

Various stations were designed to be bus/train interchanges, including Joondalup, the others being Whitfords, Warwick, Stirling and Glendalough (pronounced Glendalock). The general plan adopted was that the buses would arrive and depart on one level — either at ground level with the railway in a tunnel or cutting, or with the bus transfer level on a bridge structure above the railway. Glendalough, however, has the railway on a bridge over Scarborough Beach Road with the bus station below at road level.

At Joondalup the buses entered on the eastern side of the complex from the main road which crossed the line by a bridge at the southern end of the station. The busway then ran parallel to the line until the station was reached where, at the north end, it crossed over to the western side by another bridge. The road then turned back towards the south to the bus stands from where the buses would depart to the main road.

From Joondalup we then followed the railway — which runs in the median strip of the Mitchell Freeway — towards Perth, pausing at each of the new stations being built to compare the different styles of architecture and facilities to be provided.

There are eight stations in all, being — from the North — Currambine, Joondalup, Edgewater, Whitfords [another of the major interchange stations and provided with a siding for turning trains back to the city], Warwick, Stirling, Glendalough and Leederville.

Stirling, Whitfords and Currambine were to be provided with points and signals for crossing trains from the Up to Down [or vice versa] tracks and with facilities to terminate trains. Currambine, when completed and commissioned in late 1993 was provided with stowing and cleaning facilities; it is utilised to stow 6 sets of trains overnight. Previously, trains had to run empty to Claisebrook EMU Depot for cleaning and stowing.

When full electric operation commenced on the Fremantle-Midland and Perth-Armadale lines in 1991-92, 21 sets of trains were available to traffic of the full 43 sets acquired for the total project, the other 22 sets coming onstream when the NSR was opened. Although the new sets could be used for trials and in passenger service, a maximum of 21 sets only were available to traffic.

When the NSR opened in December 1992, trial and free public trains were operated between Perth and Joondalup, partly for Driver and partly for Train Control training, but also to allow the residents of the area to experience train travel for the first time ever.

When the tour group arrived at West Perth, an inspection of the Roe Street Tunnel was provided. This tunnel allows the Up and Down NSR line to cross underneath the Up and Down Fremantle line. It is about 200 metres long, around 8 metres deep at its deepest point, and runs underneath both the Fremantle line and Roe Street [hence the name].

Tunnel construction was carried out by driving concrete piles into the ground. These piles were interlocked to form a wall on each side of the two lines, and also a middle wall. Once complete, the earth from between the walls was dug out, and long screw rods drilled horizontally through the outer walls into the earth to secure them. A concrete base was then constructed using several pours of concrete to build up the floor to a thickness of about 1 metre. Onto the floor were fixed rubber insulation pads to secure the rail to the concrete base.

After the inspection of the tunnel, we travelled to Perth Station where we left the bus and went to Sinatra's Tavern for lunch.

Following lunch, we boarded a chartered EMU for a run to Armadale on the South West Railway. Armadale is some 30 kilometres from Perth and is the terminus of the electrified line. Three storage sidings are provided for stowing but as yet this does not occur. Trains are permitted to travel at 110 km/h for much of this line and the high speed run was very quiet and comfortable.

2. EMU RAILCAR DEPOT, CLAISEBROOK

On return from Armadale we alighted at Claisebrook, where the party was split into two groups, one going to the EMU Depot and the other travelling up to Westrail Centre to view the Control Room from where the entire Suburban Area Signalling is controlled.

At the EMU Depot, we were met by Mr John Churchman, Foreman of the EMU Depot who took the party under, into and over [yes, even onto the roof] of a car which had been lifted up on jacks for our inspection. The group toured the cabs of the new trains, saw the equipment provided for the servicing of the trains and also how the isolation of the power for each road through the shed is carried out.

Also shown were new sets being fitted out with seats and other passenger facilities, the specially toughened glass which is used for all windows in the trains, and the control equipment, transformers, etc, [fitted under the cars] used to convert the 25 000 volt power supply to the voltage required for the equipment such as driver's two way radios, airconditioning and lighting.

The traction motors (6 fitted to each two-car set) are chopper controlled and allow a top running speed of 110 km/h; this is permitted on both the Armadale and Currambine lines. Sets can be coupled through an automatic coupling which houses connections for power and the Westinghouse air braking system. Trains can be run in 6-car sets but usually operate with 2 or 4 cars each.

During the peak periods, trains on the Armadale [SWR] and the NSR are of 4 cars while the Midland—Fremantle lines are run with trains of 2 cars only. The system has been designed, and the track layout at Perth set out, for trains to run from Midland to Fremantle and back and from Armadale to Currambine and back.

3. WESTRAIL TRAIN CONTROL CENTRE

After the tour of the EMU Depot, the party travelled to the Train Control Centre at Westrail Centre. The Control Room is split into two sections:-

- the Equipment Room; and
- the Control Room.

The Equipment Room is where the computer system is located. The whole system is called "Deep Thought"

but has been nicknamed "Deep Throat" because at times it appears that anything that goes in there doesn't come back out again.

There are 3 systems provided to operate the signalling as follows:-

- the signalling control processor (SCP);
- the interlocking control processor (ICP);
- the panel control processor (PCP)

Each system is provided with a back-up so that, in the event of the failure of one, the other can continue the operations uninterrupted.

An Uninterruptable Power Supply (UPS) is also provided in the Equipment Room, with the emergency power being supplied from a Standby Power Plant located in the basement of the Building.

Normal power for the Control Room only is supplied from the same source as the Overhead Power Supply. This is subject to an agreement with SECWA [the controlling body for the generation and distribution of power within WA] that in the event of a dispute causing shut downs of power throughout the state, power for Westrail's EMU system [and the hospitals located throughout Perth] will continue to be supplied. However in the event of a breakdown in the supply lines between Claisebrook Distribution Terminal and the Westrail Building, then the standby plant automatically switches on so that power for the computers is maintained.

The SCP is provided to maintain the integrity of the Controllers' actions when routes are called, or points are set either normal or reverse, or when signals and/or routes are blocked to traffic for any reason, such as a power isolation for maintenance work, etc.

If the Controller calls for an incorrect route, or from one signal to another on routes which cannot connect (eg on parallel lines), then the SCP provides a response on the VDU which tells him and why the intended action cannot be completed (eg "Unavailable - Signals do not connect"). If the operation by the Controller is accepted by the system, then an "OK" response is provided on the VDU.

The ICP ensures that the interlocking (ie points properly set as required and conflicting routes not set or called over an already set route) is correct. If the system permits the operation to proceed, acceptance is given to the Controller via the SCP.

The PCP is used to update the information displayed to the Controller on the Mimic Display Diagram provided on the wall between the Control Room and the Equipment Room.

The mimic display diagram shows the Controller the position of every set of controlled points and whether they are free to be moved or locked in either normal or reverse, and the condition of all automatic or controlled signals (ie at Stop or Proceed). The routes

that have been called and set and the position of every train and its gauge is shown.

When a route is called (or some other function such as moving a set of points etc), and the command is accepted by the SCP, then the instruction will be sent to the next stage of the system, the ICP. If the ICP is in a state or condition to accept the command, then the instruction is sent to the station or interlocking via modem and micro-wave depending on where the station is located. As a backup, a landline link is also provided. Stations such as Perth, Claisebrook, East Perth and Belmont Park, all within 5 kilometres of the Control Room, are served by landline, whereas Armadale, Midland, Fremantle and Currambine are served by microwave link. Stations on each line are served by landline from the nearest microwave receiving tower.

If the condition of the equipment in the field also permits the operation of the points and/or signals, then the signalling relays in the Relay Room will operate and the command is carried out. After the points or signals have been set to the required position, then a repeat of the new setting will be sent by return to the ICP in the Control Room. The ICP then updates the PCP which then updates the Mimic Diagram. As a general rule, the time taken between the command being entered by the Controller into his VDU and the updating of the mimic diagram to show that the command has been carried out, is about 6 seconds, for all stations on the system.

Each station or relay room within the system also is provided with two processors, each running together (although only one is on line at a time) so that a constant backup is provided.

In the Control Room itself, there are three Controllers on duty between 0600 and 2100 hrs, two between 0500 and 0600 hrs and 2100 and 2340 hrs and one between 2340 and 0500 hrs Monday to Friday. There are two

between 0600 and 2240 Saturday and Sunday and one outside those times on the weekends.

Each position (ie one for each Controller) is provided with a VDU with mouse and keyboard. Each position mainly controls certain areas, but is capable of controlling all stations if required. The left looks after Midland to Fremantle, excluding Claisebrook and Perth, and Belmont Park to Armadale. The right looks after the NSR from Perth (exclusive) to Currambine and the centre looks after Claisebrook and Perth.

Each position is in radio and telephone contact with all drivers and station staff as necessary.

Also in the Control Room is the Electric Control Operator whose task is to monitor the overhead power supply, take immediate action in the event of disruption to power and arrange for power isolations when maintenance work needs to be carried out on the wire, track or buildings and other structures that fall within metres of the overhead.

He is supplied with a VDU, mouse and keyboard, and from the VDU can switch off or on any of the circuit breakers at the track distribution cabins situated at Claisebrook, Cannington and Gosnells (Armadale line); Bassendean (Midland line), Claremont (Fremantle line) or at Perth or Edgewater on the NSR. The Claisebrook EMU Depot can also be isolated from the main system as well.

Power from SECWA is received at Claisebrook and Edgewater with Claisebrook supplying the Midland—Fremantle and Claisebrook—Armadale lines and Edgewater supplying the NSR from Perth to Currambine.

All present on the tour were extremely impressed with the operations of both the EMU Depot and the Control Room.

TOUR:

THE PROSPECTOR RAILCAR TOUR — WEDNESDAY 3RD JUNE 1992

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The tour was arranged to show delegates and visitors some of the Avon Valley, and also to travel a section of line over which passenger trains normally do not run. It began at Midland, and went to Moondyne in the Avon Valley, Leighton Marshalling Yard (near Fremantle) and finished at Esplanade Station, Fremantle.

The Prospector is a Standard Gauge passenger train which runs between East Perth Terminal and Kalgoorlie. It completes the approximately 450 kilometre journey in 8 hours, although an express service also operates, taking just over 6 hours.

Our train departed Midland and headed east through open country and vineyards in the Swan Valley before entering the Avon Valley near Brigadoon, some 32 kilometres east of Perth. The Prospector railcars are permitted to travel at 100 km/h over this section, but the driver held back to about 80 km/h to permit a good view of the flowing Swan/Avon River, which was building up in water level as the result of the winter rains.

On the way to Moondyne (named after Moondyne Joe, the bushranger) we passed through Jumperkine, the first of the three crossing loops en route to Avon Yard, the last being Toodyay West which is also the junction for the Miling Line.

At Moondyne, while the driver was preparing the train for the return journey, the opportunity was taken to show delegates the dual gauge pointwork typical of all the crossing loops in the valley. The railway, which was opened in 1966, was constructed in both standard and narrow gauge track to permit the SG passenger, freight, iron ore and grain trains to operate and also the NG trains that previously operated on the now closed Eastern Railway between Midland and Northam via Spencer's Brook.

After leaving Moondyne, we were given our packed lunch and while partaking of the comestibles, the train returned to Midland but instead of entering the Suburban system, we turned left and proceeded towards Forrestfield, the major marshalling yard in Perth. All SG passenger trains are serviced here as well as all narrow and standard gauge freight trains. The driver told us that when we left Forrestfield, we would be able to get some high speed travel over the section to Cockburn Junction, where the line splits into a separate dual gauge single line to Kwinana to the left

and separate narrow and standard gauge lines to Robb Jetty, from where the line again becomes dual gauge to Fremantle.

Owing to nearly all souvenirs on the train having been sold, it was decided to stock up at Forrestfield and while doing so, a standard gauge grain train was permitted to depart ahead of our train, meaning we would have to travel at only 60 km/h until Cockburn Junction was reached. Here the grain train would head to the left towards Kwinana, while we would head right towards Fremantle. Unfortunately, the maximum speed beyond Cockburn Junction is only 70 km/h so we did not get the high speed run we were looking forward to.

After passing through Robb Jetty, we travelled through the stopping places of South Beach, Fisherman's Harbour and Esplanade, built for the special trains that ran during the America's Cup defence held in 1987.

While travelling between Esplanade and Fremantle, we passed Fisherman's Harbour, the Round House (the colony's first gaol), and also the former Fremantle Municipal Tramway's Depot at the end of High Street. Only the facade remains, the building now consisting of town houses and a restaurant.

At Fremantle, the line becomes double line dual gauge again and heads parallel to the harbour until the east end of it where the line crosses the Swan River and passes North Quay and the industrial areas of North Fremantle. The Signal Boxes originally located at Fremantle and North Fremantle were closed when the new signalling control system was commissioned for the electric rail services.

We left the main line (from here it was narrow gauge only until Perth Terminal) and entered Leighton Yard, the first passenger Prospector train to do so. Leighton Yard is right on the ocean and serves the North Quay, oil depots and the grain silos at the harbour.

After a quick walk round for the benefit of the "Gunzels" on board, we departed for Esplanade where we alighted and headed off for the meal and drink houses that abound in the City.

We all agreed that it was a thoroughly enjoyable day.