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SIGNALLING RECORD SOCIETY OF VICTORIA INC



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## MINUTES OF MEETING HELD FRIDAY 19 SEPTEMBER, 2014, SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS

Present: – Glenn Cumming, John Dennis, Michael Formaini, Ray Gomerski, Chris Gordon, Judy Gordon, David Jones, Keith Lambert, David Langley, Steve Malpass, Andrew McLean, Michael Menzies, Alex Ratcliffe, Colin Rutledge, Laurie Savage, Brian Sherry, Peter Silva and Andrew Wheatland.

Apologies: – Wilfrid Brook, Jon Churchward, Brett Cleak, Steven Dunne, Bill Johnston, Greg O'Flynn, David Stosser and Bob Whitehead.

The President, Mr. David Langley, took the chair & opened the meeting at 20:11 hours, following the completion of the Annual General Meeting.

Minutes of the July 2014 Meeting: – Accepted as read. Andrew Wheatland / Colin Rutledge. Carried.

Business Arising: – Nil.

Correspondence: – Letters to Trevor Wyatt and David Ward at Metro Trains seeking permission for the Signal Box tour on Saturday 20 September 2014.

The invoice for the "Signalling Record" for 2013 was received from the SRSUK and payment was sent. Steve Malpass / Laurie Savage. Carried.

Reports: – Glenn Cumming reported on final plans for the signal box tour on the Pakenham Line tomorrow.

General Business: – Keith Lambert provided details about various works in the Metropolitan District. A summary of the discussion follows: –

- Spion Kop Junction on the RRL lines is scheduled to be commissioned on the last weekend in November 2014.
- The new stabling sidings at Calder Park are scheduled to be commissioned in mid-December 2014. These sidings will replace the sidings at St. Albans.
- St. Albans will be straight railed in early 2015. The Down platform will be relocated to the Down side of the level crossing.
- Grade separation works at Main Road St. Albans, Burke Road Gardiner and Blackburn Road Blackburn will commence in 2015.
- It is proposed to energise the overhead on the West end of No.8 Road at Spencer Street.
- The signal box at Ringwood will be relocated as part of the station upgrade project.
- 20 sets of points in the inner metropolitan area will be removed. The points leading to the Milk Dock at Flinders Street will be first with removal scheduled for next week.

*(Front cover) The JZA715 'train describer' system in Metrol became operational in December 1983. Thirty one years later it is still controlling the inner core of Melbourne's train network. In this time it has been relocated once, and had two replacement hardware systems. The cover photo shows the Metrol panels as they were originally commissioned, in fact probably during pre-commissioning testing being operated by Ericsson engineers. The panel in the foreground can be recognised as the Clifton Hill panel. The original compact, and low, mountings of the VDUs is shown (they were later removed from the cabinet, brought closer to the signaller and raised). The black and white VDU behind the signaller displays the timetable, and the rectangular array of keys below it is the telephone concentrator.*

- The date for the commissioning of the new signalling between Richmond – Camberwell has now been moved back to January 2016.

David Langley tabled a diagram that he had prepared for the Spencer Street – North Melbourne made from combining the various diagrams published recently in “[Somersault](#)”.

Colin Rutledge described recent testing at Flyover Junction on the RRL lines near South Dynon. New turnouts have been provided in the aftermath of the recent derailment of the XPT.

Designs of dual gauge turnouts were discussed.

Colin Rutledge spoke about the name of Waurn Ponds given to the new passenger platform close to the existing cement sidings at Waurn Ponds. It was noted that the next crossing loop along the line is Warncoort. Does this give rise to the potential for confusion in safeworking messages e.g. train orders? Who remembers the saga of the adjacent crossing loops of Miakite Loop and Myamyn Loop on the Portland Line? This was solved by renaming Miakite Loop to Chrome Loop.

Colin Rutledge noted that the performance of the axle counters installed on the RRL lines had not met expectations with some reports of a failure to count. The axle counter heads are being changed out.

Colin Rutledge reported that the junction for the RRL lines at Deer Park is being commissioned tonight.

Keith Lambert noted that special speeds are being imposed on Xtrapolis trains at level crossing approaches.

Syllabus Item: - The President introduced Member Colin Rutledge to present the Syllabus Item.

Colin presented a selection of images from his collection taken when travelling around the United Kingdom.

Colin visited many of the preserved tourist railway lines in the UK during his travels and it surprised nobody that the display of images concentrated on railway signalling equipment in service on these lines.

A wide range of scenes were viewed featuring many locations where volunteers have gone to considerable effort to install authentic railway signalling equipment for operation.

Also included in the presentation was a selection of images showing the recent derailment of the XPT and the dual gauge turnouts at Flyover Junction on the RRL lines.

The presentation was thoroughly enjoyed by those present at the meeting.

At the completion of the Syllabus Item, The President thanked Colin for the entertainment & this was followed by acclamation from those present.

Meeting closed at 23:00 hours.

The next meeting will be on Friday 21 November, 2014 at the Surrey Hills Neighbourhood Centre, Bedford Avenue, Surrey Hill, commencing at 20:00 hours (8.00pm).

## SIGNALLING ALTERATIONS

*The following alterations were published in WN 34/14 to WN 40/14 and ETRB A circulars. The alterations have been edited to conserve space. Dates in parenthesis are the dates of publication, which may not be the date of the alterations.*

- 12.07.2014**     **Minyip** **(TON 214/14, WN 34)**  
On Tuesday, 12.5., the Down end points were booked out of service. TON 213/14 was cancelled.
- 08.08.2014**     **Benalla – Oaklands**  
At 0001 hours on Friday, 8.8., the Staff and Ticket System Benalla – Oaklands was replaced by the Phoenix Train Order System. Train Orders will be issued by Junee control.
- St James, Yarrawonga, Warragoon, Sanger, and Wangamong became siding locations. Location, yard limit, and shunt limit signs were provided at each of these locations. The main line points were equipped with mechanical switch stands that show a green arrow when the points are set (but not necessarily locked) for the main line and a red dumbbell otherwise. The points remain secured by large Master Key locks. Begin and End Train Order Working signs were provided at Benalla and Oaklands.
- Five large Master Keys are provided for use on the line and all trains must carry a Master Key.
- The Phoenix Train Order System is computer assisted. Except when a failure occurs, all train orders are prepared on a computer. The computer tracks the occupancy of each section and prevents the issuing of conflicting train orders. Train orders are dictated to staff in the field who manually fill out the order and repeat it back. As part of the generation of the train order, the computer generates a unique security code for each train order. This is dictated to and recorded by the field staff. The Train Controller is prohibited from recording the security code. When the train order is fulfilled, the field staff dictate the security code

back to the Train Controller who enters it into the computer. If the security code matches that originally generated, the computer releases the section and another train order for the section may be issued.

Train movements are normally authorised using a 'Proceed Authority'. This authorises a train to proceed from one named location to another, possibly authorising the train to shunt at the originating, terminating or intermediate locations.

- 14.08.2014 Lah** (TON 216/14, WN 34)  
On Thursday, 14.8., the siding was booked into service for track machines. The siding remains booked out for the operation of trains. TON 257/12 was cancelled.
- 14.08.2014 Brim** (TON 217/14, WN 34)  
On Thursday, 14.8., the siding was booked into service for track machines. The siding remains booked out for the operation of trains. TON 68/11 was cancelled.
- 14.08.2014 Galaquil** (TON 218/14, WN 34)  
On Thursday, 14.8., the siding was booked into service for track machines. The siding remains booked out for the operation of trains. TON 266/11 was cancelled.
- 14.08.2014 Goyura** (TON 219/14, WN 34)  
On Thursday, 14.8., the siding was booked into service for track machines. The siding remains booked out for the operation of trains. TON 2050/04(?) was cancelled.
- 18.08.2014 Warrnambool** (TON 225/14 & 226/14, WN 34)  
On Monday, 18.8., Nos 3 and 4 Roads were booked out of use between the Up end points and 267.103 km (No 3 Rd) and the Turntable Rd (No 4 Rd).
- 24.08.2014 Digital Train Radio System** (SW 272/14, WN 34)  
The Metro Digital Train Radio System was switched on as from the first train on Sunday, 24.8., and the existing Urban Train Radio System (UTRS) was disabled. The cabs of all EMUs will be progressively fitted with DTRS equipment.
- 24.08.2014 Diggers Rest** (SW 262/14, WN 34)  
On Sunday, 24.8., the Down stopping control section for Old Calder Highway was increased by 9 seconds. This is to increase the approach time to allow the level crossing equipment to operate and M237 to clear by the time a Down stopping train has traversed three quarters of the platform.
- 25.08.2014 Calder Park Sidings** (SW 237/14, WN 34)  
Between Friday, 22.8., and Monday, 25.8., a main line crossover was installed at 26.287 km, and a turnout to the future Calder Park Stabling sidings at 26.420 km. The turnouts have no moving parts and have not been commissioned.
- 31.08.2014 Manor Junction** (SW 137/14 & 138/14, WN 34)  
Between Thursday, 28.8., and Sunday 31.8., the junction to the new RRL lines at Manor Junction was commissioned. The single line section Werribee – Little River (on both the East and West Lines) was replaced by Werribee – Manor Junction – Little River.  
Points MNJ101 (East Line at 39.225 km) and MNJ103 (West Line at 39.312 km) were provided. Both of these points are high speed points (80 km/h), and the diverging route is towards Werribee (i.e. on the existing line).  
Down Automatics G1179 and GG1179 were fitted with '80' indicators. Down Automatics G1281 and GG1281 were redressed as Home signals and renumbered MNJ6 and MNJ18 respectively. Up Homes MNJ8 (East Line) and MNJ20 (West Line) were provided on the new signal bridge at 39.695 km. All these Homes are fitted with '80' indicators. Down Automatics G1349 and GG1349 were provided on the new signal bridge at 39.695 km. Up Automatics G1418 and GG1418 that had previously been converted to uncontrolled Homes (see SW105/13) were converted back to Automatic signals and were equipped with '80' indicators.  
Control levers LTR10 (East Line) and LTR12 (West Line) were provided on the Geelong corridor VDU to control movements between Manor Junction and Werribee. If the control lever is Up, a route may be set over the single line towards Werribee. If the lever is Down, the Signaller at Werribee can set a route for a Down train towards Manor Junction.  
Operating Procedure 54 (Werribee – Geelong: Defective Signals) was reissued. SW 36/08 was cancelled. SWs 105/13 (failure of signals at Manor Junction), 168/13 (temporary access gates), and 133/13 (signals at Manor Junction) have been cancelled.  
Diagram 84/14 (Werribee Racecourse – Little River) was replaced by 111/13.
- 31.08.2014 Spencer St** (SW 279/14, WN 35)  
On Sunday, 31.8., circuit alterations were made to remove the signalling restriction on Home 529. SW 228/14 was cancelled.



On Monday, 15.9., the new station at Waurm Ponds was commissioned. A 180 metre platform was provided at 84.902 km. A 380 metre Holding Siding was provided on the Down side of the line on the Down side of the Anglesea Rd overpass. The Train Order section Marshall – Moriac BP was abolished and replaced by the Track Block section Marshall – Waurm Ponds, and the Train Order section Waurm Ponds – Moriac BP. Waurm Ponds is defined as a Train Order terminal station. Waurm Ponds



Intermediate Siding was renamed the Waurn Ponds Cement Siding.

All points and signals are controlled from the Geelong Signalling Centre.

The following signals were provided: Down Distant WPD4, Down Homes WPD6, WPD14, WPD22, Up Homes WPD10, WPD24, WPD26, and Up Distant WPD28. Post WPD22 also has a Dwarf for movements to the siding. Posts WPD6, WPD14, WPD22, WPD24, & WPD26 can display a calling-on aspect. All signals are two position light signals. TPWS was provided at all Home signals.

Points 25 and Hayes Derailer/Wheel Crowder 25 were commissioned on the siding. Points 25 will auto-normalise after the passage of a train.

All track circuits at Waurn Ponds are operated by axle counters.

Down Stopping trains are not to exceed 50 km/h to Ghazeeopore Rd and a board to this effect is provided at the Down end of the platform. The 'End' and 'Commence Train Order Working' were provided opposite WPD26.

The Up and Down Location boards for the Waurn Ponds Cement Siding were abolished. The Approach Section indicator board (Maximum speed for shunting trains – 15 km/h) at 87.681 km, and the 'Trains to shunt at Waurn Ponds to stop here' board at 87.863 km were abolished.

The existing Annett Locks and Master/Annett Key Exchange Apparatus (duplex locks) at the Waurn Ponds Cement Siding was retained. The Up end points & duplex lock, and the Down end duplex lock are detected and displayed on the VDU. If these duplex locks and the Up end points are not detected normal, Down Home WPD22 and Up Distant WPD28 will be held at their most restrictive aspect.

Corridor Master Keys 12 and 13 were relocated from South Geelong to North Geelong C and North Geelong Yard.

The instructions concerning the operation of North Geelong Yard, Geelong, South Geelong and Marshall were consolidated.

Operating Procedure 60 (North Geelong Yard) was reissued to include procedures for arriving and departing trains; the Master Key securing box; and the East Yard. SW 54/09 and TON 323/08 (East Yard procedures) were cancelled. Operating Procedure 60B (North Geelong Yard – Driver in Charge operations, issued as SW 180/09) was cancelled.

Operating Procedure 61 (Geelong) was reissued to include procedures for arriving and departing from the locomotive depot, and for operations in the passenger yard. SW 317/06 was cancelled. Operating Procedure 63 (SW 175/13) was cancelled.

Operating Procedure 62 (South Geelong) was reissued to include procedures for operations in the goods siding and defective signals. Procedures 62 (SW 317/06) and 62A (South Geelong – switching in and out - SW 33/12) were cancelled.

Operating Procedure 63 (Marshall) was issued and includes procedures for defective signals. Procedure 64A (Marshall - SW 36/08 (or SW 150/05?)) was cancelled.

Operating Procedure 64 (Waurn Ponds) was issued and deals with procedures for defective signals, issuing of train orders; and axle counter resets.

Operating Procedure 131 (Train Order Territory) was reissued and SW 128/13 was cancelled.

Diagrams 90/14 (Waurn Ponds) and 96/14 (Moriac – Winchelsea) replaced 40/13 (Waurn Ponds – Winchelsea).

**(16.09.2014) Gheringhap (SW 154/14, WN 37)**

Operating Procedure 83 (Gheringhap) was reissued. The requirement to include the DICE codes on the Train Order was removed and a table of DICE codes added to the Procedure. SW 231/13 was cancelled.

**(16.09.2014) Meredith (SW 151/14, WN 37)**

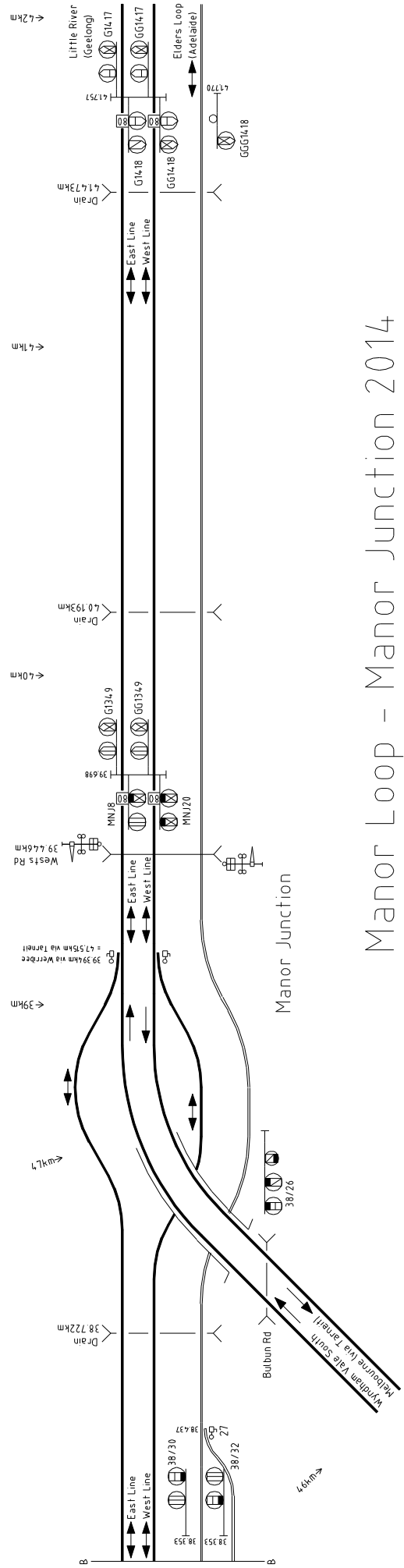
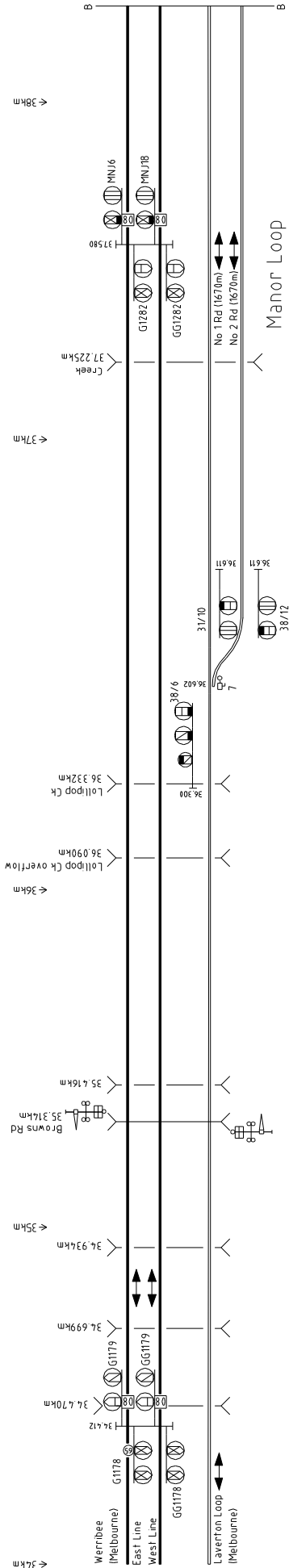
Commencing forthwith the Up Distant Post 6 was fixed at caution. Up trains in possession of a Train Order through Meredith must approach Up Homes Posts 3 & 5 with caution until they can be confirmed as being at proceed.

**20.09.2014 Deer Park Junction (SW 157/14, WN 37)**

On Saturday, 20.9., the junction to the new RRL lines was commissioned.

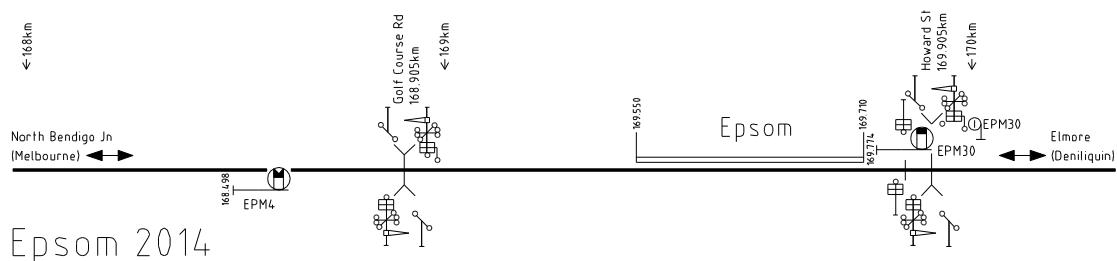
A '65' indicator was provided on Down Automatic MW179 for moves to the Down RRL line. A '65' indicator and route indicators were provided on Down Home DPK919. Up Home DPK918 was provided to control moves from the Up RRL line. Points 819 & 821 and Crossover 820 were commissioned. These points will remain secured for the Ballarat line.

Diagram 86/14 (Ardeer to Rockbank) replaced 10/14.



Manor Loop - Manor Junction 2014

- 21.09.2014 Manor Junction** (SW 158/14, WN 37)  
On Sunday, 21.9., Down Home MNJ36 was provided for moves from the Down RRL line towards Geelong. In addition, Up Home MNJ20 (West Line) now applies to moves to the Up RRL line. Both these signals are equipped with TPWS.  
Diagram 98/14 (Werribee Racecourse – Little River) replaced 84/14.
- 21.09.2014 Preston** (SW 274/14, WN 35)  
On Sunday, 21.9., the pedestrian booms on the Up side of Murray Rd (12.583 km) were replaced by automatic wickets equipped with magnetic latched emergency gates. Diagram 29/14 (Northcote – Reservoir) replaced 107/12.
- 23.09.2014 Spencer St** (SW 301/14, WN 38)  
On Tuesday, 23.9., Crossover 014 (leading between No 8 South Track and the City Circle Viaduct) was booked out and secured normal. This is in conjunction with the 'Signalling Strategy/Junction Rationalisation Project'
- 23.09.2014 Flinders St** (SW 301/14, WN 38)  
On Tuesday, 23.9., the Parcels Dock and No 1 West Roads were booked out. Points 038, 041, 043, & 048 and Crossover 040 were secured normal. In addition, routing trains between the City Circle Loop/Burnley Loop and Tracks 6 to 12 was prohibited, and Points 227 and 471 were secured normal.
- 24.09.2014 Melbourne Yard** (SW 171/14, WN 39)  
On Wednesday, 24.9., the security gate at the Down end of the Arrival Yard (MYD603) was commissioned and interlocked with the signalling.
- 29.09.2014 Spencer St** (SW 307/14, WN 38)  
On Monday, 29.9., the theatre route indicator on Home 520 was replaced. The route indicator now displays '7' for routes to No 7 Track; '8' for routes to Nos 8 or 8A tracks; and 'M' for routes to the Up East Suburban line.
- 29.09.2014 Deer Park Junction** (SW 174/14, WN 39)  
On Monday, 29.9., the junction for the new RRL line to Manor Junction was commissioned. A theatre route indicator was provided on Down Home DPK919. After the commissioning was completed the points were secured for the Ballarat line. The alterations are shown on Diagram 86/14 (Ardeer to Rockbank) which had been issued with SW 157/14. SW164/14 is cancelled.
- (30.09.2014) Riddells Creek – Woodend** (SW 177/14, WN 39)  
Diagram 108/13 (Riddells Creek – Woodend) replaced 36/11. The alterations were the extension of the platforms at Riddells Creek, Gisborne, and Macedon (SW 11/14) and the relocation of signals at Gisborne (SW64/14).
- 01.10.2014 Epsom** (SW 173/14, WN 39)  
On Wednesday, 1.10., signal heads were fitted to the masts at 168.498 km (Up side of Golf Course Rd), and 169.774 km (Up side of Howard St).
- 03.10.2014 Epsom** (SW 175/14 & 176/14, WN 39)  
On Friday, 3.10., Epsom station was provided and the signalling was brought into use. A 160 metre long platform was provided on the Down side of the line at 169.630 km, just on the Up side of Howard St. The new station is located behind the Bendigo Pottery with the platform opposite the site of the former Epsom station. The station was formally opened on Sunday, 11.10. (Bendigo Advertiser), and services commenced on Monday, 12.10.



The station is located in the North Bendigo Junction – Hunter BP section. A 'proceed and return' Train Order can be issued between North Bendigo and Epsom. A return Train Order to Epsom cannot be issued if any other Train Order is in force for the section North Bendigo Junction – Hunter BP, or if a Train Order is in force for an Up train in the Hunter BP – Echuca section.

Two position (light) Down Home EPN30 was provided at 169.774 km between the platform and Howard St. Two position (light) Down Distant EPN4 was provided at 168.498. Both of these signals will normally show proceed. EPN30 is controlled by a 5P keyswitch located at Howard St.



A qualified signaller must attend Epsom at least 30 minutes before any Down train departs from Bendigo. For a Down train that terminates at Epsom, the signaller must restore EPN30 to stop using the keyswitch. The Train Controller can then issue a Train Order for the return train movement to proceed to Epsom. The suggested wording of the Train Orders is "Proceed from North Bendigo Junction to Epsom Platform and return". For a Down Through train the signaller must clear EPN30 using the keyswitch.

Operating Procedure 108 (Epsom) was issued. Operating Procedure 131 (Train Order Territory) was reissued and SW 146/14 was cancelled.

Diagram 114/14 (Epsom – Goornong) replaced 58/13 (Elmore – Goornong).

**05.10.2014 Caulfield – Oakleigh – Dandenong (SW 304/14, WN 40)**

On Sunday, 5.10., a Sigview train number server was commissioned at Oakleigh for use between Caulfield and Dandenong. The train number function is integrated into the Sigview train control systems at Caulfield and Dandenong. The existing Train Number Transmitter between Caulfield – Oakleigh – Dandenong will remain operational for a short period.

**05.10.2014 Hallam (SW 302/14, WN 39)**

On Sunday, 5.10., magnetic automatic pedestrian wickets were provided on the Up side of Hallam South Rd (37.546 km). The emergency gates are magnetically latched. Amend Diagram 85/13 (Dandenong – Hallam).

**09.10.2014 Deer Park Junction – Manor Junction (SW 179/14 & 180/14, WN 40)**

On Thursday, 9.10., the Up and Down RRL lines between Deer Park Junction and Manor Junction were brought into use. Platforms were provided at Tarneit (29.526 km) and Wyndham Vale (40.260 km). All platforms are 160 metres in length. The lines are worked by Automatic Block Signalling using axle counters. The RRL Train Controller at Centrol works Deer Park Junction and the RRL lines to Home NMJ36 (exclusive) at Manor Junction. Home NMJ36 and Manor Junction are operated by the Geelong Corridor Signaller.

All signals are equipped with TPWS. All trains operating between Deer Park Junction and Manor Junction must be equipped with TPWS.

Road/rail access sites are provided at 25.200 km, 30.200 km, and 37.200 km. The Track Force Protection Coordinator must obtain permission from the Train Controller before accessing the running lines, and must ensure that Track Force Protection, a Track Warrant, or Absolute Occupation is in place.

*Deer Park Junction*

Illuminated '65' indicators were provided on Down Automatic MW179 and Down Home DPK919. Up Home 918 was provided. Points 819 & 821 and Crossover 820 were brought into use. (These alterations were notified in SW157/14 & SW174/14).

*Wyndham Vale South*

A turnback facility and track machine siding is provided at Wyndham Vale South. There is 290 metres of standing room in the Holding Track between the clearance point with the Down line and Down Home WVS903. Down trains can be signalled into the Holding Track towards Down Home WVS903 while the Turnback Track is occupied, or an Up train is being signalling from the Turnback Track to the Up Track. There is 379 metres of standing room in the Turnback Track between Homes WVS902 and WVS911. Trains must not be stabled or left unattended in the Turnback Track. The dead end extension of the Turnback Track is a Maintenance Siding and has a standing room of 80 metres.

Points 800, 801, & 802 and Derail/Crowder 804 were brought into use. Points 800 and Derail/Crowder 804 automatically normalise after the passage of a train.

*Manor Junction*

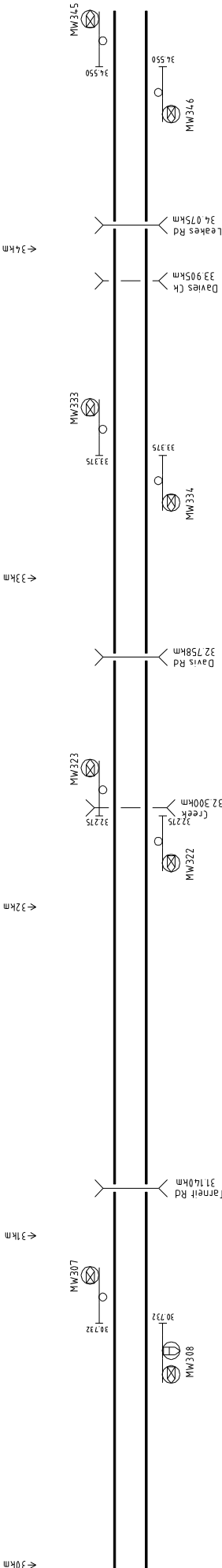
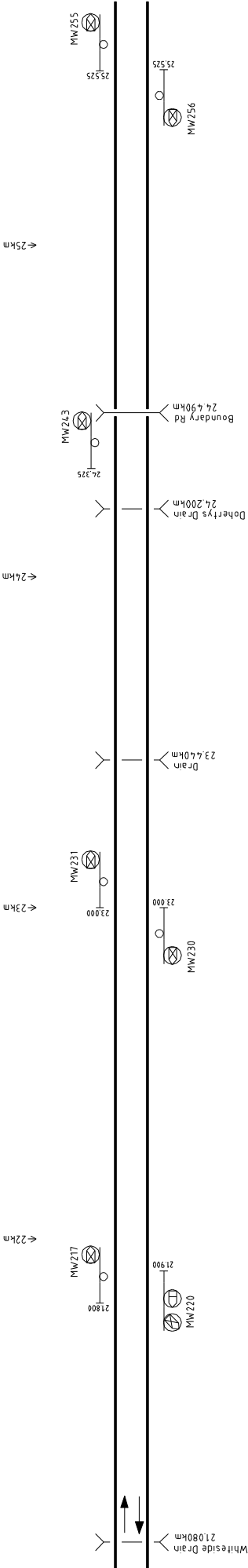
Down Home MNJ36 and Up Home MNJ20 were provided. Points MNJ101 and MNJ103 were brought into use. (These alterations were notified in SW137/14 & SW158/14.)

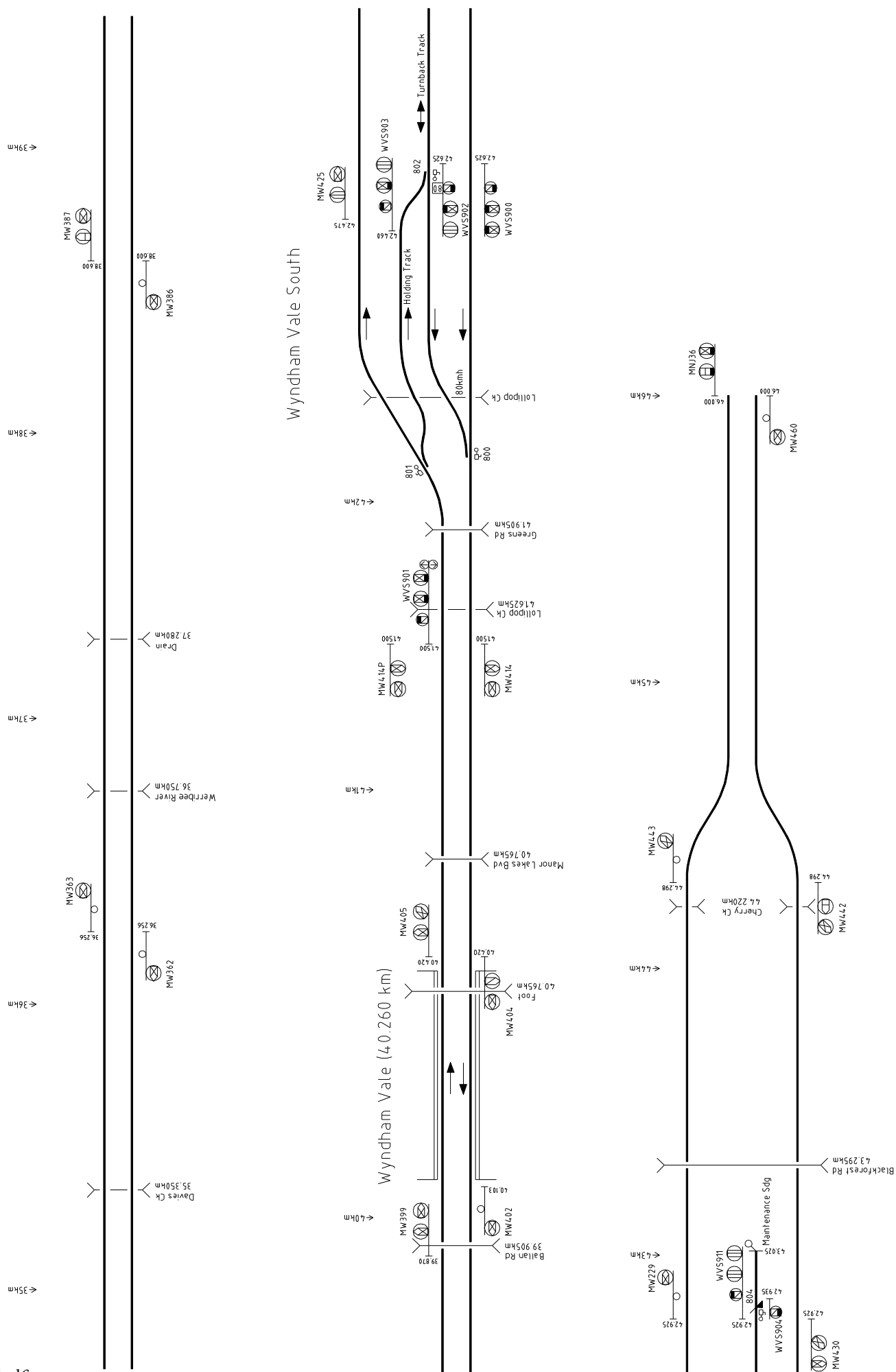
New Operating Procedure 55 (Deer Park Junction – Manor Junction) was issued.

Signalling Diagrams 86/14 (Ardeer – Rockbank), 26/14 (Tarneit), 120/14 (Wyndham Vale), and 94/14 (Werribee Racecourse – Little River) were provided.



Deer Park Jn - Manor Jn 2014





## METROL

Andrew Waugh

With the impending commissioning of the new Metrol system it is time to look back at the old system which has been in service for just over 31 years – almost forever in terms of computer systems. When it was commissioned, around the beginning of 1984, it was world leading technology and it pointed the way to the modern computer based signalling systems of today. This history will focus on the JZA715 system which was used by the Area Controllers to signal trains. For reasons of space, other aspects of Metrol will only be mentioned in passing.

### Before the Underground

When construction of the Melbourne underground loop commenced in 1971 the inner area of Melbourne was worked from no less than 13 signal boxes that dated from 1885 to 1968.

The Flinders St yard was worked by five signal boxes. Four of these dated from the first decade of the 20<sup>th</sup> century when Flinders St had been extensively rebuilt. Three of these boxes (A, B, and C) retained their McKenzie and Holland No 6 Pattern rocker frame. The fourth (Flinders St E) had a 'new' A Pattern tappet frame installed in 1919 when power signalling was provided. The final box at Flinders St, D Box, dated from 1966 and was constructed as part of the Princess Gate project (more commonly known as the Gas and Fuel building). D Box contained a OCS panel working a relay interlocking.

The Spencer St area was also worked by five signal boxes. The country side of Spencer St was worked from two boxes, No 1 Box and South End, which dated from 1887 and 1885 respectively. Both boxes contained McKenzie and Holland rocker frames. Viaduct Junction and Franklin St signal boxes were a complete contrast. Both contained McKenzie and Holland Style A power frames and had been provided in 1924 when the new suburban platforms had been opened. The final box in the Spencer St area, No 1 Auxiliary, dated from 1928 and worked the northern connections to the Special Yard. This contained an A pattern tappet frame.

Moving further north were the power boxes at North Melbourne Junction and South Kensington. Both contained McKenzie and Holland Style A power frames and had been provided in 1928.

To complete the inner area, mention must be made of West Tower which controlled the Melbourne Goods Yard to the west of the passenger lines. Containing a geographical relay interlocking it was brought into use in 1968 with the reconstruction of the goods yard. It does not come further into our story except as a fringe box.

The construction of the Underground loop would mean significant track alterations at all five signal boxes at Flinders St and Viaduct Junction signal box. Given the age of these boxes it is not surprising that the decision was taken to replace these boxes with new relay interlockings controlled from a central control centre.

In February 1972 MURLA<sup>1</sup> brought out Robert Dell, who had retired in 1970 as the Chief Signal Engineer of London Transport, to prepare a report on the signalling for the new Underground. The first recommendation of the resulting report was for the establishment of a central signalling centre at Flinders St, probably in Batman Avenue, to control all signalling between North Melbourne and Richmond stations. It was intended that this would eventually control the entire suburban area. A train describer was described as 'practically essential' to the efficient running of the Traffic Control Centre. Trains would be described to the Centre from the fringe boxes (Clifton Hill, Burnley, Caulfield, Windsor, and North Melbourne). Initially, the signalmen would manually control the routing of trains, but it was proposed that LT style program machines be installed to automatically route the trains in the network. A concern was raised in the report about the vulnerability of the central control centre to disruption (e.g. by fire) and it was recommended that the controlled area would be divided into five areas, with each area having its own emergency controls. The report included diagrams and illustrations of the proposed control room. The room was circular with the train controllers situated on a raised dais in the middle of the room. In front of them would be five signalmen, on their left the (future?) Western lines signalmen and on the East the Eastern lines signalmen. The circular walls of the control centre would support a large mimic panel showing all staff the status of the network. Although the stylish circular control room didn't eventuate, it is interesting how closely the final Metrol installation reflected the ideas in this report.

The provision of the new control centre was jointly funded by the Victorian Railways and MURLA. This joint funding is, no doubt, the reason why the Metrol scope was largely restricted to those boxes that were directly affected by the Underground work. Even the two signal boxes on the country side of Spencer St were not replaced – even though they were actually the oldest boxes in the central area.

### Construction of the Metrol building

The site selected for the construction of Metrol, as the central signalling centre was named by 1977, was on Batman Avenue about 150 metres from St Kilda Rd. The selected location was to cause a significant, and unexpected, problem in construction.

As already mentioned, the Dell report supported the location of the signalling centre in the Flinders Street railyard, and this choice was supported by subsequent consultants. Several alternative sites were considered in the railyards, but the best site was along the Batman Ave

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<sup>1</sup> The Melbourne Underground Rail Loop Authority (MURLA) was the statutory body set up to construct the underground outside the railway boundary.

frontage. VicRail<sup>2</sup> officers were 'aware of the implications of city planning', and took care to consult with Meldon Properties p/l who had an option to redevelop the Flinders St station area<sup>3</sup>. No mention was made of consulting with either the MMBW or the Melbourne City Council who were responsible for the city planning scheme. However, the building was to be situated so that a future extension of Russell St across the rail yards would not be hindered. There is a hint that to satisfy this requirement the engineers decided on a building that occupied a small ground area, but which consequently required a taller building.

In May 1975 the Premier had instructed VicRail in a letter that "Whilst Government Departments being Crown, are not bound by planning schemes or interim development orders, it is the Government's policy that they confer with the appropriate responsible authority in respect of any planning or works which they are contemplating within a regional planning area.' VicRail consequently took the view that it was not required to obtain building permits for works on their land. The required consultation appears to have taken the form of a complete set of drawings for Metrol being sent to the MMBW in June 1976, and to the Melbourne City Council in July 1976 as the relevant planning authorities. The MMBW restricted their comments to the sewerage and plumbing aspects of the design. The Town Clerk of the MCC responded with "...no problem is envisaged regarding the proposal" and asked that approval be sought for the footpath crossing and drainage works.

The Metrol building was to be erected by contract. Tenders to erect the building were called in January 1977. Fifteen firms submitted bids, and on 24 May 1977 VicRail obtained an Order-in-council to award the contract to the lowest cost bidder, Prentice Builders p/l. At this time the

cost (for the building alone?) was estimated at \$7.6 million. The planned opening date of the Loop was December 1979, and this depended on Metrol being operational as Metrol would control the services (e.g. ventilation, fire, security) for the underground tracks<sup>4</sup>. Work commenced immediately and by the end of June 1977 the site had been cleared of the old buildings and the foundations had been poured. The steel frame for the five story building commenced to be erected in late November 1977. By March 1978, to use the words in the VicRail annual report, "the building had advanced to the stage where its overall size and location could be seen by all passing the area or occupying buildings overlooking the yards."

At the beginning of June 1978, the Melbourne City Council's Strategic and City Planning committee wrote to VicRail asking about the building and whether they intended to apply for a permit. That VicRail had not applied for a permit for the building became public knowledge on 7 June when 'The Age' published a letter from an architect, Mr Peter Williams, criticising the size and location of the building. The problem was that the building contravened the planning scheme that controlled the height of buildings adjacent to the Yarra River. Both the MMBW and the Council immediately issued statements that they had not issued permits for the construction, and they considered that permits were required. This, of course, was true, but they both omitted to say that they had been aware of the size of the building for over a year and neither had raised any objections or requested the railways to apply for permits.

On 9 June, the Premier, Richard Hamer, directed the railways to cease work on the building. He subsequently instructed that the building be redesigned to have a lower height, and the government made a policy decision that all government agencies would be required to obtain planning permits for their buildings in future.

In mid June, VicRail sent sketches of the proposed redesign to the MMBW and Council. These sketches showed a three story building. In acknowledging the receipt of the sketches, both organisations re-iterated the need for VicRail to obtain formal planning permission to build the centre. On 19 June, VicRail responded "The Victorian Railways Board now forwards application form for permit; however by so doing the Board does not concede that a permit is necessary. It does so in the special circumstances of this case in order to minimise the consequences of delay which would otherwise ensue."

The required permits were issued. The existing steel framework was dismantled and construction resumed. However, at the time it was expected that this redesign would cause an eight to ten month delay in completion of the building, and this, in turn, would delay the opening of the Underground Loop from December 1979 to at least October 1980.

The erection contract with Prentice Builders p/l was cancelled and it appears that construction of the building was continued by VicRail itself. This was probably

<sup>2</sup> The Victorian Railways Commissioners were replaced by the Victorian Railways Board, trading as VicRail, on 8 May 1973. The Board, in turn, was replaced as the relevant authority by the Metropolitan Transit Authority (MTA) on the 1 July 1983. The rail division of the MTA was known as Metrail. On 1 July 1989 the MTA was amalgamated with the State Transport Authority to form the Public Transport Corporation (PTC) which traded at 'The Met' in the metropolitan area. The metropolitan rail portions of the PTC were then corporatized into Bayside and Hillside trains in the late 1990s, and then franchised in 1999 to (respectively) National Express Group and Connex Melbourne. National Express went into receivership in December 2002 and the metropolitan rail network was brought back into one organisation under Connex in April 2004. In 2009 the metropolitan rail network was refranchised to Metro Trains Melbourne.

<sup>3</sup> Much of the information in this section is taken from contemporary reports in *The Age*, a section in the Annual Report for 1978/9, and an article signed by A.G. Gibbs, Chairman of the VicRail Board published in the VicRail 'Rail Ways' of August 1978 p120-1. The cover of this issue, showed a picture of a mockup of the Metrol operating floor which still showed a floor to ceiling mimic panel, but also showed large banks of VDUs.

<sup>4</sup> *The Age* 19770113p2



because reletting or varying the contract would have delayed the building even further.

The financial mess resulting from the redesign lasted for about two years. There were drawn out negotiations with the Prentice Builders for payment for the completed work, their costs, and compensation for the loss of their contract. There were also drawn out negotiations with MURLA over who would pay for the additional costs related to rebuilding the Metrol building. The MURLA negotiations were not finally resolved until around June 1980.

And, of course, the opening of the loop was delayed. That this was at least partially caused by the delay in completing the Metrol building is shown by the close association of the occupation of the building (September 1980) and start of trial operations in the Loop (December 1980). However, it should not be assumed that the earlier completion of the Metrol building would have allowed an earlier opening of the loop – other delays may have been involved as well.

### **Development of the 'Train Describer'**

Tenders were called in 1977 for the "design, manufacture, supply, installation, testing, training of MetRail personel, commissioning in stages, and supply of testing and maintenance aids for a train describer systems which was capable of expansion to cover the entire network." The contract was eventually let to the Swedish firm L.M. Ericsson, not to one of the established UK railway signalling contractors as might be expected.

L.M. Ericsson primarily supplied telecommunications equipment, and was (and remains) one of the major international suppliers of equipment for telephone networks. The Australian subsidiary, L.M. Ericsson Australia, was an important supplier to the PMG and later Telecom. Since the early '60s the standard local telephone exchange installed in Australia had been an L.M. Ericsson crossbar design manufactured in Australia by STC, TEI, and Ericsson (the first two companies under license). Interestingly, in the early '70s Ericsson was developing their new digital telephone exchange to replace this relay based crossbar design. In September 1977 Telecom announced that it had chosen this system, the AXE, for all new local exchanges.

As far as is known, L.M. Ericsson had not previously supplied signalling equipment to any Australian (or UK) railway. However, L.M. Ericsson had long been a supplier of signalling equipment in northern Europe. This had commenced in 1915 when power signalling equipment had become difficult to obtain from the German companies that traditionally supplied the Swedish railways. After the First World War, Ericsson established a relationship with the UK Westinghouse Brake and Signal which gave it access to US power signalling technology. Initially, this equipment was imported from the UK, but Swedish manufacture subsequently replaced this. Ericsson's target market was the railway systems in northern Europe – primarily Sweden, Norway, and Denmark. Given the background and expertise in the company, it is not surprising that Ericsson appeared to focus on relay based (not mechanical) signalling systems

and was an early mover into electronic and computerised signalling systems.

Ericsson supplied their first CTC system in 1938 to the Swedish railways for the Stockholm – Saltsjon line (16 km with 7 remote interlockings). This used telephone technology for transmitting control and indications. In the '50s Ericsson developed a new relay based CTC system where the function was selected by keying in an address (telephone technology again). This allowed a large indication panel to be controlled from a small central desk. Electronic (transistorised) systems were developed during the '60s. When integrated circuit technology became available in the very late '60s, it was quickly adopted into Ericsson's CTC products and in 1970 they introduced the JZA700 family of remote control systems. This system was considered very economical as it combined the control and transmission systems into one system. It was sold in many countries and was also manufactured by Ericsson subsidiaries in Australia and Italy. (In Australia, the JZA700 telemetry system was used in the Brisbane resignalling, and the NSW North Coast and Junee – Albury CTC systems as well as in Metrol.)

In the '50s Ericsson realised that the control area of a CTC panel was limited by the capacity of the signaller, and began to work on support systems such as train describers and automatic route setting systems in conjunction with the Danish State Railways. These systems quickly became extremely complex, and in the late '60s Ericsson's took the next step and moved to computers. The first product was based on an Ericsson developed computer, the UAC1605, which used components from their telephone exchanges. Programs were developed for the UAC1605 that performed the control and indication functions (JZA 410/411), train describer functionality (JZF 20/21), and automatic routing based on a traffic plan (JZK 20/21). A typical system used three computers – two managed the control and indications and one performed the train describer and performed the automatic routing. In all cases the actual vital interlocking was the responsibility of a conventional relay interlocking. The first JZA410 was installed in Stockholm in 1971. This controlled all movements in the Stockholm greater area and controlled about 2350 signalling functions. A similar JZA411 system was installed in Copenhagen in 1972 to control the S-bahn network (1450 functions). The Copenhagen system provided fully automatic operation. These systems used a conventional mimic panel to display the network status and keysets to set routes. No further systems of this type appear to have been installed, but the similarity with the Metrol system should be noted.

The next development appears to have been the JZM750. This was an even greater departure as it was a full computerised interlocking. It used PDP-11 computers for the signaller's interface (including VDU displays) and train describers, and Ericsson UAC1610 computers for the vital interlocking. Two small systems are known to have been installed in Sweden. One was in Gothenburg (560 functions) was commissioned in 1978 and was based on the PDP 11/05. The second was installed at Arlov (Malmo)

in 1981 was even smaller (397 functions) and was based on the PDP 11/34.

The system used in Metrol, the JZA715, appears to have been developed in the late '70s. The first JZA715 system in service was not Metrol. Instead it was a smaller system (1200 functions) installed in Oslo S, Norway, and commissioned in 1979. As this was less than two years after the commencement of the Metrol contract it is likely that the JZA715 was already under development when the Metrol requirements were released. This conclusion is further reinforced by contemporary news reports in 1978 that Metrol was to be based the PDP 11/34 – the same system used at Oslo.

The recommendation to accept L.M. Ericsson's tender was made on 19 October 1977. Ericsson's tender was selected because it used "advanced technologies" (i.e. it was computer based) and was capable of performing tasks such as automatic route setting and driving passenger information displays which had been intended to be separate systems. From a broader risk perspective, Ericsson could demonstrate that it had already delivered similar systems (Stockholm and Copenhagen). Ericsson was also well established in Australia and would have had a good commercial reputation. The contract acceptance and start date for the Metrol project was 17 January 1978.

Delivery of the Metrol system was divided into six components. Parts 1 and 2 were the core signalling functions dealing with the remote control and indications, and the train describer itself. These components were accepted by MetRail in January 1982, subject to a set of corrections which did not affect commercial operation of the system. Pre-commissioning testing, bug fixes, and operator training then commenced. However, the system was not brought into service due to "industrial difficulties". Official commissioning of the system did not occur until 5 January 1984.

In the meantime, work continued on the remaining four components. Parts 3 and 5 dealt with the passenger information system control and the automatic train reporting. These were delivered and accepted in March 1984, but testing showed that the functions were not sufficiently flexible to deal with rapid changes to train schedules. Fixing this limitation required extensive software modifications and this appears to have significantly delayed the delivery of the rest of the system.

The automatic route setting function, Part 4, was delivered and accepted in November 1984, but could not be commissioned until the basic route storage (contained in Parts 3 & 5) was in service. However, a test operation at North Melbourne Loop Junction and East Richmond around the end of 1984 was successful with roughly 700 trains correctly routed over 24 hours.

Parts 3 and 5 were finally commissioned on 7 December 1985. 'Route storage (complete)' was subsequently commissioned on 21 December 1985. Part 4 (automatic route setting) was then dependent on the preparation of train running plans by MetRail. At the end of November 1986, this part was expected to be commissioned in February 1987.

Publicity from Ericsson in 1982 identified a number of other JZA715 installations on order. These included Doboj, Yugoslavia (1000 functions); Olskroken (Goteborg), Sweden (1200 functions); Broadmeadow, Australia (1250 functions); Barcelona, Spain (400 functions); and Oslo F, Norway (1000 functions). It is not known how many, if any, of these systems were actually delivered. All of these systems were considerable smaller than Metrol (which was 2950 functions).

It does appear, however, that the North Coast CTC system at Broadmeadow, and the Junee – Albury CTC (1984) system at Albury were simplified variants of the JZA715. The Junee installation used two PDP-11/23 computers driving black and white monitors that were only used to display train descriptions. Field communications was by a JZA700 communications system. The Ericsson JZA715 control system is still type approved in NSW, albeit not for new work.

### Opening the Loop and Metrol

Resignalling of the Melbourne inner city area was a drawn out process and was related to track alterations and bringing into service of components of the Underground Loop project.

It appears the first causality was No 1 Auxiliary Box at Spencer St which was abolished around 1975. Control of the Special Yard was initially transferred to a control panel in No 1 Box.

Flinders Street E was next. The mechanical box was abolished on 28 February 1976 as the site of the box was required for the Burnley group lines and the ramps to the Underground. A new Flinders Street E Box was provided behind the site of the old box. The new box contained an OCS panel working a geographical relay interlocking.

Viaduct Junction was abolished on 20 November 1978 with the opening of the additional two viaduct tracks between Flinders St and Spencer St. Viaduct Junction was replaced by a new 'Spencer St No 2' box situated at the north end of Platforms 13/14 at Spencer St. This had a NX panel – the first in Victoria. At the other end of the viaduct, the mechanical frame at Flinders St A box was abolished on the same day. The box itself remained open, however, as it contained the replacement unit lever panel which worked a geographical relay interlocking housed in an adjacent relay room (the panel had been partially brought into service on 5 November 1978 during stageworks).

Operation of the Underground itself depended on the commissioning of the Control and Monitoring System (CMS) which was to be located at Metrol. This supervised the following Underground services: traction power, signalling power, general power and lighting supplies, station air conditioning, switching of public address and CCTV systems, station and tunnel drainage systems, tunnel air exhaust systems, fire protection systems, and security systems. The CMS for the Underground services was a conventional industrial control system supplied by Leeds and Northrup Australia p/l.

Metrol was brought into service on 13 September 1980 when the train controllers were transferred to the building from Control. On the previous day the control system

telephones over the metropolitan network had been switched over from the venerable Western Electric Selector system to the new Sepac system.

The Caulfield and Burnley Loops, and Museum station, were formally transferred to VicRail from MURLA on 14 November 1980. The signalling system was brought into service at the beginning of December, and the first crew training train ran on 4 December 1980, after the resolution of an industrial dispute involving Guards and Signalmen. Regular services commenced on 26 January 1981 on the Burnley and Caulfield Loops. The only Underground station open at this time was Museum (now Melbourne Central).

From the driver's point of view the final signalling was in place in these two loops. However, the signalling was not controlled from Metrol. Instead it was controlled in a traditional way by the Signalmen at Spencer St No 2 and Flinders St E boxes. The system of control was modified to Lever Locking and Track Control in mid-March 1981, but this probably reflected a change in operating procedure rather than technology.

The City Circle Loop was opened for Sunday only services over the Christmas/New Year period 1981/2. The first services were provided on 6 December 1981. The signalling system had not been commissioned at this time and a single train was operated, incredibly, under the Train Staff and Ticket System. The junctions at each end of the City Circle Loop were operated from Spencer St No 2 and Flinders St D boxes. This limited service finished on 31 January 1982.

The pride of the railways, and Ericsson, in the new Metrol system was shown by the visit of King Carl Gustaf XVI of Sweden to Metrol in mid April 1982 as part of a royal visit to Melbourne. The MURLA annual report recorded that he 'evidenced a keen interest in both the equipment and its operational procedure.' At this stage the JZA715 system was not actually operational.

During 1982 work continued with alterations to track and signals near Swanston St and this led to the closure of the remaining two mechanical boxes at Flinders St. A unit lever panel was provided in Flinders St B box on 20 December 1981. The B Box mechanical frame remained in service until 27 March 1982 although with only 6 of the 149 levers working. The new B Box panel then took over completely. A new unit lever panel (and relay interlocking?) was then provided in Flinders St D box on 29 April 1982. Finally, the mechanical frame at Flinders St C box was replaced by a unit lever panel on 18 June 1982. The site of C box was required for the ramp to the Northern Loop, and the new panel was quickly transferred to one end of the former B box on 4 July 1982 and C box was demolished. Although the B and C box panels were now physically located in the one building, they retained their separate identity. The relay rooms for the new B and C geographical relay interlockings were located in the Metrol building.

The Clifton Hill Loop was opened for regular traffic on 31 October 1982. Full signalling was now provided and trains were worked under the Lever Locking and Track Control system between No 2 Box Spencer Street and Flinders Street D Box.

Parliament station was opened for traffic on 22 January 1983.

According to a contemporary report in *The Age*, the JZA715 system at Metrol was brought into use on Boxing Day (26 December) 1983. This probably represents the beginning of operational testing. Testing the system involved switching control over to Metrol for gradually increasing periods of time. Official commissioning of Parts 1 and 2 of the JZA715 system took place on 5 January 1984. This date probably marks the beginning of normal operation of the inner area by Metrol.

It appears that this early operational period was a bit rocky. On 27 January 1984 *The Age* reported that the system had failed almost daily, leaving passengers stranded for up to 45 minutes. It is known that a Block & Signal Inspector was rostered to be in attendance at Metrol on each shift every day at this period. At the time, the manager of Metrol confirmed that software had caused many of the early problems, but he was now confident that everything had been sorted out. He told *The Age* that "unfortunately it's the sort of system that can only be tested under actual operating conditions.". He also denied that all recent delays had been caused by the train describer system.

Commissioning of the signalling portion of Metrol meant that the signallers at the five boxes at Flinders Street and at Spencer St No 2 Box were withdrawn. The panels, however, were not removed, but remained intact for emergency use just as Robert Dell had recommended a decade earlier.

North Melbourne Junction was not within scope of Metrol. However, a new relay interlocking at this signal box was brought partially into use on 18 April 1982 to work the connections to the stabling sidings. The power frame was not abolished until 20 May 1983 when the panel was brought fully into use. Control of some signals at North Melbourne was transferred to Metrol on 29 January 1984. At North Melbourne, the demarcation line between North Melbourne signal box and Metrol was the platforms. A separate geographical relay interlocking was provided at the southern end of the platforms to control the junctions to the Underground ramps. It was (and is) possible to work the junctions to the Underground locally using the maintainers panel in the relay room, but remote control from Metrol was provided from the start. The signal arrangements for the Northern loop were brought into service 1 April 1984 and regular service in the Northern Loop commenced on 1 May 1984.

This left Franklin Street signal box as an island in the Metrol controlled area. A unit lever panel had been brought into service at this signal box on 3 November 1983, although the power frame continued to signal part of the layout. Resignalling was completed on 24 March 1984 when the power frame was abolished and the panel brought fully into use. Franklin St remained staffed until 18 October 1986 when control was transferred to Metrol.

For the sake of completeness, for it has no signalling significance, Flagstaff, the final underground station, opened on 27 May 1985.





(Above) From Batman Avenue, Metrol was a fairly typical '70s three story commercial building. The ground floor contained office accommodation for the staff responsible for planning and organising the operation of the suburban network. The second floor, hidden behind the red brick, was the machine room for the computers, communications equipment, and workshops. The third floor contained the operating floor which was located right in front of the camera. It can be seen how the redesign achieved the goal of reducing the bulk of the building below the tree line. Today, Metrol is gone, as are all the trees in this view, and Batman Avenue. In their place is the massive bulk of Federation Square. (Below) The other side of Metrol looked out over the extensive, and now vanished, Flinders Street railyard, the connections to which were controlled from Metrol. Construction of the Federation Square complex required the demolition of the Metrol building and the relocation of Metrol to Transport House in Collins St. (Both photos: Andrew Waugh)

