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EDITOR: Andrew Waugh, 28 Amelia St McKinnon, VIC, 3204

Phone (03) 9578 2867 (AH), (03) 9348 5724 (BH), email andrew.waugh@gmail.com

PRESIDENT: David Langley, P.O. Box 8, Avenel, VIC, 3664, Phone (03) 5796 2337

SECRETARY and MEMBERSHIP OFFICER: Glenn Cumming,

Unit 1/4-6 Keogh St, Burwood, VIC 3125. Phone (03) 9808 0649 (AH)

NSW CONTACT: Bob Taaffe, 63 Hillcrest Rd, Tolmans Hill, TAS, 7007, Phone: (03) 6223 1626

QUEENSLAND CONTACT: Phil Barker

PO Box 326, Samford, QLD, 4520, Phone: 0400 334403, email: signal01@bigpond.net.au

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MINUTES OF MEETING HELD FRIDAY 19 MARCH 2021, AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS, VICTORIA.

The SRSV meeting scheduled for Friday 19 March 2021 was held on site and was broadcast as an online meeting on the internet using the 'ZOOM' application.

Present: – (On site). Brett Cleak, Glenn Cumming, Graeme Dunn, Chris Gordon, Judy Gordon, Andrew Gostling, Bill Johnston, David Jones, Keith Lambert, David Langberg, David Langley, Neil Lewis, Andrew McLean, Roo Richards, Colin Rutledge, James Sinclair and Rod Smith. (17)

(Online). Ken Ashman, Phil Barker, Robert Bremner, Graeme Cleak, Michael Formaini, Phillip Miller, Eddie Oliver, Laurie Savage, Peter Silva, Bob Taaffe and Andrew Wheatland. (11)

Apologies: – Jon Churchward, Warren Doubleday, Michael Menzies, Steve Malpass, Brian Sherry, David Stosser and Andrew Waugh.

Visitor: – Floyd Bromley and Hugh Maguire.

The President, Mr. David Langley, took the chair and opened the meeting at 20:53 hours, following the 2021 Annual General Meeting.

Minutes of the February 2021 Meeting: – Accepted as published. Bill Johnston / Graeme Dunn. Carried.

Business Arising: – Nil.

Correspondence: – Letter to Surrey Hills Neighbourhood Centre confirming meeting dates for the remainder of 2021.

Invoice from Surrey Hills Neighbourhood Centre for the hire of the meeting room for 2021.

Payment sent to Surrey Hills Neighbourhood Centre for the hire of the meeting room for 2021.

Neil Lewis / Rod Smith. Carried.

Reports: – Glenn Cumming reported that SRSV membership renewal forms for 2021 are being prepared.

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

- Current works are in progress at Bell and Preston for the removal of four level crossings.
- Works are in progress at Hallam Road, Hallam.
- Planning has commenced for the removal of the level crossing at Ferguson Street, North Williamstown.

David Langley reported on recent changes to the signalling at Kerang including the removal of a mechanical home signal. A radio system for control of the new signals has been provided.

The location of the remaining mechanical signals in Victoria was discussed.

(Front cover). Up Home P and Dwarf Q at Kerang were recently abolished when the station was resignalled as a consequence of the provision of boom barriers at the level crossings in the town. The signals date from 1968 when the flashing lights at Williams St were provided, and they protected road users from moves along the main line or No 3 (now No 2) Road. The provision of a dwarf signal to protect against moves on a subsidiary road was unusual in Victoria and possibly unique. A further selection of photographs of the recently abolished signalling at Kerang can be found in this issue. Both signals are DC searchlight mechanisms from Westinghouse. The use of a full sized backboard for the Dwarf is also unusual. Photo Andrew Waugh

Andrew McLean reported on a recent rail journey to Ballarat and discussed some of the curve speed restrictions on the line.

Chris Gordon provided additional details about various projects in the Metropolitan District. A summary of the discussion follows: –

- An occupation is planned for July 2022 for the completion of the level crossing removal at Manchester Road, Mooroolbark.
- An occupation is planned for January 2020 for the completion of the level crossing removal at Hallam road, Hallam and Clyde Road, Berwick.
- The duplication of the Cranbourne Line is planned for completion in January 2022.

Brett Cleak discussed recent Communications Based Train Control (CBTC) system testing between Epping – South Morang. Recent testing has focused on multiple train operation and braking performance when trains are running close together.

Brett Cleak advised that the new East Pakenham Train Maintenance Facility includes facilities for testing of the new High Capacity Metro Trains with conventional signalling and the CBTC system.

It was noted that the Communications Based Train Control (CBTC) system will be installed between West Footscray – Westall through the new Metro Tunnel.

A brief explanation of the CBTC system was provided.

Phillip Miller asked who was supplying the CBTC system. Bombardier (now owned by Alstom) is the supplier of the CBTC for the current project.

Andrew Wheatland shared images of the recent signalling works at Kerang.

Rod Smith asked for additional details of the Shepparton and Warrnambool Line upgrades. A discussion of the various upgrade works and the locations of the new crossing loops followed.

Rod Smith reported that all trains in the Caulfield Underground Loop now run anti clockwise all day.

James Sinclair reported that three (3) High Capacity Metro Trains have been accepted and have carried passengers in service.

Meeting closed at 21:35 hours.

The next meeting will be on Friday 21 May, 2021 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 1/21 to WN 13/21, 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.

- 03.02.2021 Kerang (SW 11/21, WN 6)**
On Wednesday, 3.2., the Up end of No 2 Road from the Up side of Wellington St towards Post N and the cattle yard siding was removed. No 2 Road is not available for rail movements (see SW 223/19).
- (09.02.2021) Ararat (TON 78/21, WN 6)**
The broad gauge Signaller will be in attendance at the Station Office during the following hours:
Monday – Friday, 0530 hours to 2115 hours
Saturday, 0630 hours to 1630 hours
Sunday, 0730 hours to 1730 hours
- (09.02.2021) Swan Hill (TON 78/21, WN 6)**
The Signaller will be in attendance during the following hours:
Monday – Friday, 0545 hours to 1815 hours
Saturday, 0545 hours to 1515 hours
Sunday, 0545 hours to 1030 hours & 1130 hours to 1630 hours
Driver in charge working will be in force for the last passenger train each day.
- (09.02.2021) Glenbervie – Somerton (SW 147/21, WN 6)**
Diagram 99/20 (Glenbervie – Somerton) replaced 53/20 account the Glenroy Rd level crossing removal preliminary works.
- 09.02.2021 Chelsea (SW 149/21, WN 6)**
On Tuesday, 9.2., the relay interlocking was abolished. Down Home 4 and Up Home 18 were redressed as Automatics and renumbered F1035 and F1070 respectively. A banner indicator F1070BI was provided at 34.472 km to repeat Automatic F1070. The control panel was abolished.
Diagrams 71/20 (Cheltenham – Chelsea) & 69/20 (Bonbeach – Frankston) replaced 23/20 & 65/20 respectively. Caulfield Group Operating Procedure 5B (SW 253/03) was cancelled.

- (16.02.2021) Altona Junction – Laverton** (SW 168/21, WN 7)
Diagram 41/20 (Altona Junction – Laverton) replaced 133/12 account removal of the Aviation Rd level crossing.
- (16.02.2021) Maryborough - Yelta** (TON 86/21, WN 7)
The Train Operating Data has been updated to show the signage, crossing loop lengths, and platform lengths as in service. These alterations are already shown on the Signalling Diagrams.
- (16.02.2021) Wycheproof** (TON 89/21, WN 7)
The Turntable Rd (344.098 km) has been booked out of service due to turntable maintenance and establishment of an interface boundary. The points have been secured normal.
- (16.02.2021) Somerton** (TON 79/21, WN 7)
Track machines are permitted to stable on No 4 Road via the Down end of No 3 Road. Both No 3 and No 4 Roads remain booked out.
- (16.02.2021) Chelsea – Bonbeach** (SW 157/21, WN 7)
The Showers Ave (33.089 km), Golden Ave (34.111 km) and Wellwood Rd (34.341 km) pedestrian crossings have been closed account level crossing removal works. Barriers have been erected to prevent pedestrian access.
- 17.02.2021 Chinkapook** (TON 92/21, WN 8)
On Wednesday, 17.2., the siding was booked out of service due to the condition of 700 sleepers. The points to the siding at 439.265 km and 439.579 km have been secured normal.
- 17.02.2021 Kerang** (SW 13/21, WN 7)
On Wednesday, 17.2., the cabinet containing the push buttons and signal repeaters on the platform was abolished. The platform push buttons for Signals M, P & R and the signal repeaters for Signals M & J were abolished.
The platform quadrant levers for Signals A and J were secured reverse by Signal Maintenance padlocks. The plungers for Points C and H were secured normal.
Circuit alterations were made to allow Up Home M to be operated from Points C and Down Home P to be operated from Wellington St if required by a Signal Maintenance Technician.
Kerang was abolished as an Intermediate Train Order Station and will not be available for following on movements. SW 223/19 was cancelled.
Amend Diagram 78/19 (Pyramid – Kerang).
- 21.02.2021 Ringwood** (SW 154/21, WN 7)
On Friday, 21.2., a speed proving train stop was provided on the Up line at 26.487 km between Automatic H822 and Home RWD315. Up Automatic H822 does not now approach clear to Medium Speed Warning.
Amend Diagram 8/17 (Blackburn – Ringwood)
- 21.02.2021 Ringwood East** (SW 154/21, WN 7)
On Friday, 21.2., the insufficient Up approach time at Dublin St was corrected.
- 21.02.2021 Lilydale** (SW 154/21, WN 7)
On Friday, 21.2., flashing light mast No 12 at Maroondah Hwy was removed.
- (23.02.2021) Blackburn – Ringwood** (SW 178/21, WN 8)
Diagrams 7/21 (Blackburn – Ringwood) & 9/21 (Ringwood East – Croydon) replaced 5/17 & 121/12 respectively as in service.
- 26.02.2021 Cardinia Road** (SW 177/21, WN 8)
On Friday, 26.2., the new Cardinia Rd overpass (53.591 km) replaced the level crossing and pedestrian crossing at 53.616 km. The level crossing and pedestrian crossing protection equipment was removed. The axle counter sections were altered to remove the level crossing control and holding sections.
Diagram 11/21 (Narre Warren – Cardinia Road) replaced 71/18.
- 01.03.2021 Glenroy** (SW 182/21, WN 9)
On Monday, 1.3., the Glenroy Rd level crossing was reopened for road traffic and the level crossing protection equipment was reinstated. The pedestrian crossing on the north side of the crossing was also reinstated (with its protection equipment), but that on the south side of the crossing was permanently closed.
Amend Diagram 99/20 (Glenbervie – Somerton).
- (02.03.2021) Ararat – Maryborough** (TON 94/21)
The Train Operating Data has been updated to reflect as-in-service conditions.

- 02.03.2021 Pakenham East Depot (SW 179/21, SWP 1/21, WN 8)**
 On Tuesday, 2.3., the CBTC on the Test Track will be available for use. The CBTC test function release was commissioned. The data in the Pakenham East Ebilock was updated (note the Dandenong TCMS & Westtrace were previously updated.)
 When the test track is not in use for CBTC testing, the line is used as a through access track and the Home signals on it will only display low speed aspects.
 When the test track is in use for CBTC testing (Test Mode), all routes towards the test track are locked out. The Home signals will display normal speed aspects, and the maximum train speed will be 60 km/h. All movement requests will be given to the Signaller by the Yard Master. Axle counters cannot be reset to manage the risks associated with Immediate Reset and trains travelling above low speed.
 Before a test commences, the Yard Master will instruct the Signaller to route a train into the test track up to Home PKE760 (the first test run must commence from this signal). When the Yard Master informs the Signaller that the train is in position at the signal, the Signaller can select 'Test Mode'. The two test directions are in the Down direction from Home PKE760 to PKE764 and in the Up direction from PKE765 to PKE761 (it appears that the test direction is automatically set depending on the position of the test train). Homes PKE764 and PKE761 are approach operated (35 seconds) to a low speed aspect to allow movements to either PKE766 or the dead end for a turnback for a new test in the opposite direction. The test mode must be reselected after each test before a new test run can be commenced.
 After the test mode has been selected, the Signaller can transfer control to the Pakenham ATS (Automatic Train Supervision) operator. This is done by the Signaller selecting 'Offer release' in the drop down menu that appears after clicking the CBTC button on the VDU. This prevents routes from being set within the test track. The CBTC button will flash grey indicating that it is awaiting acceptance by the ATS operator. If the release is not accepted within 60 seconds, the release will automatically cancel. This is indicated by the CBTC button flashing red for a few seconds and then reverting to solid grey. If the release is accepted by the ATS operator, the CBTC button will change to solid green and the signal indications will change to light blue.
 When in test mode, the lights in PKE760, PKE761, PKE762, & PKE763 will be extinguished (indicated by a light blue signal symbol on the VDU) and the train stops will remain raised. SPAD and lamp out alarms will be suppressed.
 Once in CBTC mode, control of the train within the limits of the test track will be the responsibility of the Yard Master.
 The Yard Master will notify the Signaller upon completion of the CBTC testing. The ATS operator will relinquish control which will cause the CBTC button on the Dandenong VDU to flash red. The Signaller can then select 'Cancel Release' from the drop down menu. This will cause control of the test track to revert to the normal signalling mode.
 The Yard Master can request an emergency release of the CBTC mode, without control being first relinquished by the ATS operator. The Signaller will request 'Cancel Release' from the drop down menu. This will cause the CBTC button to change to flashing red, the Test Mode button to flash green, the signals to illuminate displaying Stop. After 150 seconds the CBTC mode and Test mode will return to normal operation.
 Caulfield Group Operating Procedure 21 (Pakenham East Depot) was amended by the addition of clause m (Test Track).
- 03.03.2021 Lara (SW 19/21, WN 9)**
 On Wednesday, 3.3., Home LAR32 (56.082 km) was renewed in situ as a tilt mast.
 An axle counter section was installed on the West line between 55.613 km and 56.100 km as a trial. This section is superimposed over the existing track circuit sections which will remain the primary train detection mechanism.
 Amend Diagram 32/11 (Lara).
- 05.03.2021 Swan Hill (TON 111/21, WN 10)**
 On Friday, 5.3., Goods Siding No 8 (345.300 km to 345.450 km) was booked out of service due to turnout condition and infrequent usage. The points leading to the siding have been secured to lie for Goods Siding No 9.
- 08.03.2021 South Kensington (SW 181/21, WN 9)**
 On Monday, 8.3., track panels were installed in the Up and Down Main Suburban lines between the platform and the Kensington Rd bridge for the future turnouts to the Western portal.
 Amend Diagram 11/19 (South Kensington).

08.03.2021 West Footscray (SW 181/21, WN 9)

On Monday, 8.3., track panels were installed in the Up and Down Sydenham lines at both ends of the station for the future turnouts for the turn back facility.

08.03.2021 Kerang (SW 20/21, 26/21 & 27/21, WN 9 & 10)

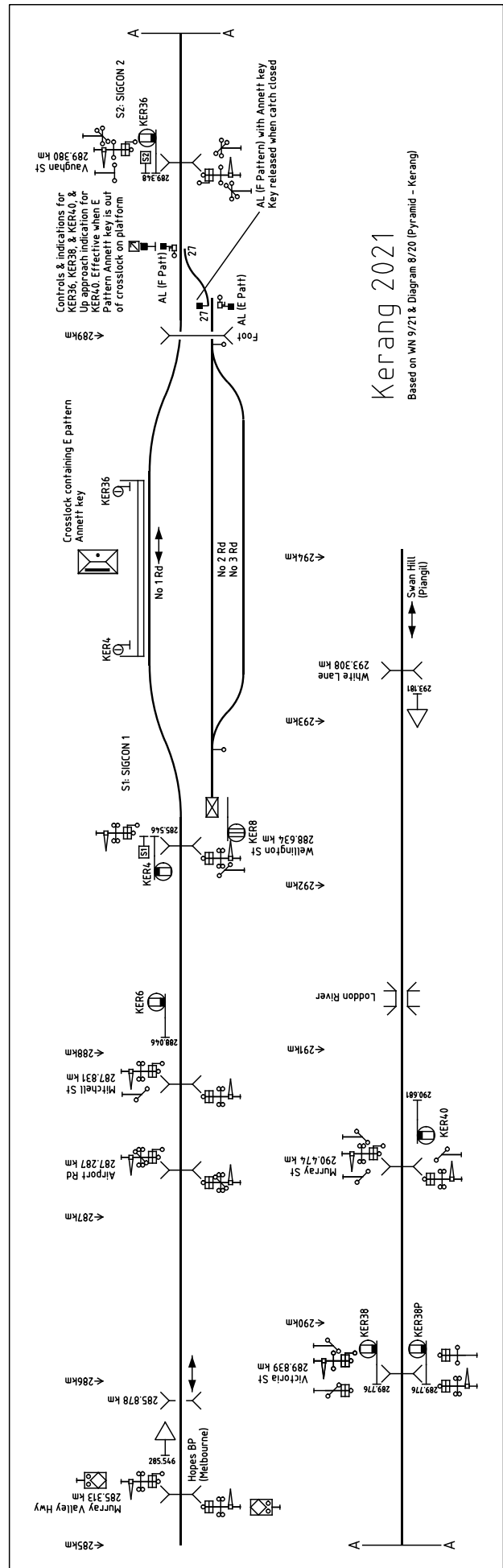
On Monday, 8.3., boom barriers were provided at Wellington St (288.634 km), Vaughan St (289.380 km), Victoria St (289.839 km), and Murray St (290.474 km). Operation is by axle counters. No local axle counter reset functions are provided and on or off-tracking road/rail vehicles is not permitted at any of these crossings. Healthy state indicators and yellow whistle boards were provided.

As a consequence of the provision of boom barriers, the signalling at Kerang has been replaced.

- Down Homes A (Post 1), M (Post 2), & R (Post 7), Up Homes P (Post 4), & J (Post 8), Up Distant D, Down Dwarf N (Post 3) and Up Dwarf Q (Post 5) were abolished.
- The Down Location Board was abolished.
- The signal quadrants and push buttons for Posts 1, 2, 4, 7 & 8 on the platform were abolished (see SW 13/21).
- The signal quadrant for Post 1 and the push buttons for Signals M, N, & Q at Points C were abolished.
- The push buttons for Signals N, P, & Q at Wellington St were abolished.
- The signal quadrant for Signal J and the push button for Signal R at Points H were abolished.
- The plunger lock, rotary detector and WSA lever were abolished at Points C & H.
- The Up Notice Board and Approach Section Indicator Board at the Up end of the platform were abolished.
- The Up end of No 2 Road was abolished from the Down side of Wellington St, together with Points C and the connection to the Cattle Yard Siding.
- No 4 Road was abolished
- The connections to No 5 Road and the Silo Road have been removed.
- The hand points leading to the former Webb Industry siding were abolished.
- The hand operated derail at the Down end of No 2 Road was abolished.

The following track and signalling alterations took place.

- No 1 Road was realigned between the Up end of the platform and Wellington St. The speed restriction through the curves



is now 50 km/h. A speed restriction notice board is provided 15 metres on the Down side of the footbridge.

- No 2 Road was altered to a dead end and is now accessible only from the Down end. It has a clear standing room of 496 metres. A friction buffer stop was provided on the Down side of KER8 at the Up end of No 2 Road.
- No 2 and No 3 Roads have been booked back into service.
- Down Home KER6 (288.046 km) & KER36 (289.348 km) & KER38 (289.776 km) with Co-acting KER38P, Up Homes KER8 (288.645 km), KER4 (288.662 km) & KER40 (290.681 km) were provided. Home KER8 is fixed at Stop. Home KER4 & KER36 are provided with notice boards ('SIGCON1' & 'SIGCON2' respectively) for the operation of the radio control equipment. Signal KER6 was provided with TPWS(TSS).
- Up and Down Location Boards are provided 2500 metres in the rear of the Home signals.
- Points H at the Down end of No 1 Road were equipped with a dual control point machine and renumbered 27D. A catch point with a dual control point machine was provided at the Down end of No 2 Road and numbered 27U. The dual control point machines are only available for hand operation. The point machine on Catch 27U is secured normal by an E pattern Annett lock fixed to the selector lever on the point machine. The E pattern Annett key is secured in a Crosslock in the control panel on the platform. The point machine on Points 27D is secured normal by an F pattern Annett lock fixed to the selector lever on the point machine. The F pattern Annett key is secured in an Annett lock fixed at the Catch points which is released when the Catch points are reverse.
- A signal control panel was provided in a locked box on the platform. The control panel is provided with control levers and indications for KER4, KER6, KER36, KER38, and KER40. A lever is provided to switch the signalling between attended and unattended mode. A crosslock is provided with an E pattern Annett key for Catch 27U. Normal and reverse indications are provided for Points 27D. A track occupancy indication is provided for the Up approach to Home KER40.
- A signal control panel was provided in a locked box opposite to Points 27U. This panel contains: control levers and indications for Homes KER36, KER38, & KER40; track indications for the Up approach to KER40; and normal and reverse indications for Points 27D. This panel can only be used when the Annett key has been removed from the control panel on the platform.
- 5P keyswitches are provided at each end of the platform to operate the Home signals protecting the level crossings. Alternatively, local radio control operation is provided to provide in-cab operation of these signals. The keyswitches and local radio control operation will only function if the signalling is in 'unattended' mode and the approach track circuit for the level crossing is occupied.

On Sunday, 7.3., (on completion of the above alterations) Kerang was again available as a Train Order Crossing Station. Nos 2 & 3 Roads were booked back into service. SW 1908/03, 223/19, 157/20 & 13/21 and TON 329/19 were cancelled.

Diagrams 8/20 (Pyramid – Kerang) and 8/21 (Lake Boga) replaced 78/19 & 66/19 respectively.

Operating Procedures 121 (Kerang) and 137 (Radio Controlled Signalling) were issued.

08.03.2021 Hallam (SW 185/21, WN 9)

On Tuesday, 8.3. (sic), the No 2 boom barrier was relocated and the No 4 flashing light mast was decommissioned.

11.03.2021 Werribee (SW 208/21 & 211/21, WN 11)

On Thursday, 11.3., the Cherry St level crossing was permanently closed to road traffic and a new road overbridge provided at 32.370 km. The pedestrian crossing will remain open. The active level crossing equipment at Cherry St will continue to function normally.

Amend Diagram 91/20 (Aircraft – Werribee).

15.03.2021 Malvern (SW 206/21, WN 10)

On Monday, 15.3., the following alterations took place:

- Down Automatic D285 was renewed in situ.
- Up Automatics D288 & F288 were relocated to a new cantilever signal bridge.

Diagram 1/21 (South Yarra – Malvern) replaced 89/20.

15.03.2021 Malvern – Caulfield (SW 206/21, WN 10)

On Monday, 15.3., the following alterations took place:

- Up Automatics CFD627 and CFD667 were relocated to a new cantilever signal bridge.
- Down Dwarf CFD770 was replaced by a new signal 4 metres in the Up direction. It is now on a short post.
- Up Dwarfs CFD771 and CFD781 were converted to LEDs.

- Up Home CFD773 was converted to a LED.

Diagram 3/21 (Caulfield) replaced 51/19.

- 16.03.2021 Glenbervie – Somerton** (SW 213/21, WN 11)
Diagram 17/21 (Glenbervie – Somerton) replaced 99/20 as in service.
- 17.03.2021 Culgoa** (SW 33/21, WN 12)
On Wednesday, 17.3., the siding was made available for the stabling of track machines between the Down end points (387.609 km) and Watchupga Rd (387.539 km). The siding remains booked out of service due to sleeper condition. The Up end points (387.400 km) were formally abolished to reflect the arrangements shown on Diagram 80/20 (Wycheproof – Warne).
SW 1096/03 is cancelled.
- 18.03.2021 Merinda Park** (SW 191/21, WN 10)
Between Thursday, 11.3., and Thursday, 18.3., the main line was slewed to a new alignment between 42.096 km and 42.608 km. A new station platform was provided on the Down (northern) side of the single line.
Diagram 13/21 (Lynbrook Loop – Cranbourne) replaced 75/20.
- 21.03.2021 South Yarra – Hawksburn** (SW 220/21, WN 11)
On Sunday, 21.3., the following signalling alterations took place:
- TPWS(OSS) was provided at Down Uncontrolled Home D134
 - Down Uncontrolled Home D153 was renewed in situ.
 - Automatics D117, & D131 and Uncontrolled Homes D153, D137/D137P, & D134 were altered to display Stop, Medium Speed Warning, Reduce to Medium Speed, and Clear Normal Speed.
- 24.03.2021 Werribee** (SW 233/21, WN 13)
On Wednesday, 24.3., the new pedestrian subway at Cherry St was opened and the pedestrian crossing was permanently closed. The active level crossing equipment at Cherry St will continue to function until it is decommissioned at a later date.
Amend Diagram 91/20 (Aircraft – Werribee)
- (30.03.2021) Lara** (SW 39/21, WN 13)
Diagram 86/20 (Lara) replaced 32/11 as in service.
- (30.03.2021) Keilor Plains – Sydenham - Clarkefield** (SW 232/21, WN 13)
Diagrams 73/20 (Keilor Plains – Sydenham) & 67/20 (Watergardens – Clarkefield) replaced 15/19 & 49/20 “as in service”.
- 01.04.2021 Laverton – Werribee** (SW 235/21 & 356/21, WN 14)
On Thursday, 1.4., the bi-directional operation of the East and West Lines between Laverton and Werribee was restored to use.
The restrictions on routing trains from Home LAV739 towards the West Line at Laverton and from Homes 4, 12, & 16 towards the East Line at Werribee were removed. The East and West Lines between Werribee and the MTM boundary remain out of use.
Homes 8, 20, 22, 24, 26, 28, & 30 at Werribee were commissioned. Automatics G1178 & GG1178 were restored to service. Homes 6 & 18 were not commissioned and remain secured at Stop.
At the former Cherry St level crossing (at which the protection equipment is still active, though the crossing is closed), circuit alterations were made to bypass the test switch to make protection equipment permanently active. The bells will be isolated.
Amend Diagrams 91/20 (Aircraft – Werribee) & 87/20 (Werribee Racecourse – Little River).
- (06.04.2021) Book of Rules, Section 36** (SW 50/21, WN 14)
Section 36 was reissued. The alterations concerned: removal of ‘Start RFR’ and ‘End RFR’ boards (Rule 1); deletion of Banner Indicators (Rule 4f); Ballarat corridor alterations (Rule 6h); removal of ‘Start TPWS’ and ‘End TPWS’ boards (Rule 12b & Rule 14d). SW 203/19 was cancelled.
- 06.04.2021 Werribee** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: ‘Start RFR’ (32.010 km); ‘End RFR’ (32.010 km); ‘Start TPWS’ (at Posts 24 & 28); and ‘End TPWS’ (at Posts 24 & 28).
Amend Diagram 91/20 (Aircraft – Werribee).
- 06.04.2021 North Geelong** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: ‘Start RFR’ (68.478 km at GLG62); ‘End RFR’ (at Post GLG68); ‘Start TPWS’ (at Post GLG62); and ‘End TPWS’ (at 68.000 km).
Amend Diagrams 12/20 (Corio – North Shore) & 140/16 (North Geelong – Moorabool).

- 06.04.2021 Geelong** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (at 72.864 km at Post GLG160); and 'End RFR' (at 72.864 km at Post GLG160).
Amend Diagram 36/20 (Geelong).
- 06.04.2021 South Geelong** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start TPWS' (at Post 8); and 'End TPWS' (at Post 2).
- 06.04.2021 Waurin Ponds** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start TPWS' (at Post WPD2); and 'End TPWS' (at Post WPD28).
- 06.04.2021 Warncoort Loop** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start TPWS' (at Post G1347); and 'End TPWS' (at Post G1412).
- 06.04.2021 Sunshine** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (at Post MW131); 'End RFR' (at 13.210 km opposite Post MW131); 'Start TPWS' (at Post SUN927); and 'End TPWS' (at Post SUN930).
Amend Diagram 70/19 (Ardeer – Rockbank).
- 06.04.2021 Ballarat** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (at Post 54); 'End RFR' (at Post 52); 'Start TPWS' (at Posts 24, 28, 46, & 50); and 'End TPWS' (at Posts 40, 44 & 50).
Amend Diagram 116/19 (Warrenheip – Ballarat East).
- 06.04.2021 Sydenham** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (24.040 km); 'End RFR' (at Post SDM702); 'Start TPWS' (at Post SDM718); and 'End TPWS' (opposite Post SDM702).
Amend Diagram 73/20 (Watergardens – Clarkefield).
- 06.04.2021 Sunbury** (SW 230/21, WN 12)
Between Friday, 2.4., and Tuesday, 6.4., the following signal posts will be increased in height: SBY18, SBY20, SBY22, SBY38 & SBY40 to improve sighting for HCMT trains.
- 06.04.2021 Bendigo** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (on the Down side of Thistle St); 'End RFR' (on the Up side of Thistle St); 'Start TPWS' (at Posts BGO08, BGO16 & BGO18); and 'End TPWS' (at Posts BGO22 & BGO24).
Amend Diagram 58/20 (Bendigo).
- 06.04.2021 Pakenham** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (at Posts PKM770 & PKM772); and 'End RFR' (at Posts PKM769 & PKM771).
Amend Diagram 73/18 (Pakenham – Pakenham East).
- 06.04.2021 Traralgon** (SW 41/21, WN 13)
Commencing Tuesday, 6.4., the following notice boards will be removed: 'Start RFR' (at Post TRG10); 'End RFR' (at Post TRG06); 'Start TPWS' (at Post TRG10); and 'End TPWS' (at Post TRG06).
Amend Diagram 106/14 (Traralgon).
- 12.04.2021 Kensington – Essendon** (SW 359/21, WN 14)
Between Tuesday, 6.4., and Monday, 12.4., the following signals were equipped with TPWS: KEN551, KEN596, KEN590, KEN451, E180, NTK553, E257, MPD552, MPD551, ESD549, ESD547, E298, ESD542, ESD544, ESD546, ESD535, ESD537, & ESD539. The Kensington Sigview was updated.
Amend Diagram 59/18 (Kensington – Essendon)
- 12.04.2021 Wallan** (SW 43/21, WN 13)
Between Wednesday, 7.4., and Monday, 12.4., the following alterations took place:
- Posts 1 (Down Distant, lever 10, 45.641 km); 3 (Down Home, lever 9, 46.739 km); & 4 (Up Home, lever 3, 47.318 km) were renewed in situ with LED signals on new masts. Note the Down Distant was a motorised semaphore arm.
 - Post 2 (Up Starting, lever 4, 46.518 km) was abolished. Lever 4 was abolished
 - The track circuit on the Up line extending from Wallan-Whittlesea Rd (47.244 km) to Post 2 was abolished and the indications were removed from the illuminated diagram.
- Diagram 62/20 (Donnybrook – Wallan) replaced 64/19.

End£

ROBINSON, GASSETT, & THE UNION SWITCH & SIGNAL CO

Andrew Waugh

As already mentioned, it is necessary to be cautious when reading Robinson's book about the invention of the track circuit as a key purpose of the book is to claim his priority in its invention and subsequent development. Nowhere is this caution more required than in the section that deals with Oscar Gasset, the key installation on the Fitchburg Railroad, and the founding of the Union Electric Signal Co. The fundamental problem is that it appears that Gasset succeeded where Robinson failed; Gasset turned the track circuit from a demonstration into a product.

Oscar Gasset

As briefly mentioned in the previous part, Robinson had most of the equipment for his Boston area demonstrations manufactured by a small jobbing manufacturing shop run by Oscar Gasset and Israel Fisher. The focus of the shop was the manufacture of electrical equipment and patent models.

Little is known about the life of either Gasset or Fisher. Israel Fisher was a machinist who made novelties and patent office models; even Robinson said he was a good and reliable workman.

Oscar Gasset was a clerk in the Boston post-office who spent much of his off time tinkering in the shop. Gasset was also an inventor interested in railway signalling – in 1874 he had patented¹ an automatic gate mechanism for railway/road crossings that looked like a Heath-Robinson drawing. Robinson had a very low opinion of Gasset, stating in his 1906 book that “[h]e never showed any signs of mechanical ability or originality” and was “rather light weight”.

Gasset became interested in Robinson's track circuit system and, according to Robinson, “became intensely anxious to become personally interested in some way”. Robinson did not take him seriously at first. Gasset, however, had “the excellent quality of being very persevering.” He also “had some wealthy and influential friends and relatives”. His uncle, Wendall Phillips², convinced Robinson to allow Gasset to be a promoter of the system. Robinson was clear that Gasset was not a partner or co-owner; “his interest and connection with the system being entirely contingent on his success as a promoter”. In hindsight, this may have been a miscalculation on the part of Robinson.

The Fitchburg installation

Gasset, in his role as a promoter of Robinson's system, landed a plum demonstration: a contract to equip 10 miles of the Fitchburg Railroad with automatic block signals. The contract for the installation was signed between

Gasset and the railroad on 7 June 1878. This was, as far as can be determined, the first use of the track circuit as an automatic block system.

The Fitchburg Railroad had been incorporated in 1842 to build a line from Boston west to the town of Fitchburg; the first section to Waltham being opened in 1843 and the complete line in 1845. At Fitchburg the railroad connected with the Vermont & Massachusetts Railroad (V&MRR) which had extended westward to Miller's Falls by 1848. The Fitchburg leased the V&MRR in 1874 and extended it westwards to Greenfield where it connected with the Troy and Greenfield Railroad. The Troy and Greenfield, in turn, extended westward through the celebrated Hoosac Tunnel to the New York Central at Troy. The Hoosac Tunnel was opened in 1875 and provided the western outlet from Boston to up state New York, and westwards towards the Great Lakes and Chicago. It can be surmised that traffic increased substantially on the Fitchburg after 1875, and this may have been the cause of the railroad's interest in automatic signals.

The actual location of the installation is not made clear in the sources. It is known that the automatic block signals commenced at Boston, covered 10 miles, and included Watertown Junction (just out of Boston). It is not clear if this was 10 route miles, or 10 track miles; in 1880 the Massachusetts State Railroad Commissioners stated that the installation covered five miles which would suggest 10 track miles on double track. If the installation was 10 route miles, it probably extended from Boston to Waltham³ along the original main line of the Fitchburg (this line is still in use today) instead of via the alternative Watertown loop

By late November 1878 some, at least, of the automatic signals had been installed as the Boston Globe reported on them⁴. Interestingly enough, the report states that the signals had been installed by the Union Electric Signal Co, though the company had not been formally organised at that time.

The installation appears to have been completed by late June 1879 as the Boston Globe reported on an inspection of the signals at Watertown Junction by the Massachusetts Railroad Commission. It was noted that ten miles of signals had been installed over the previous year with sections about a mile in length. The signals were reported “to be reliable and do the work expected of them.”⁵ The railroad took over responsibility for the maintenance of the signals in May 1880⁶.

Unlike Robinson's earlier track circuit installations, the Fitchburg installation was permanent, resulted in the

¹ Patent 157,123 “Improvement in gates for railway-crossings”, Oscar Gasset, application filed 1 December 1873 and granted 24 November 1874.

² Phillips would appear to be the noted abolitionist and advocate for the rights of Native Americans.

³ According to Employee Time Tables, the distance from Boston to Waltham was 10 miles via the main line but 10.9 miles via the alternative Watertown loop.

⁴ Railroad Gazette, 22.11.78 p569-70

⁵ Railroad Gazette, 27.6.79 p359

⁶ Report of the Massachusetts State Railroad Commissioners, printed in the Railroad Gazette 13.2.80 p85 & 7.

floating of a successful commercial company which became the Union Switch & Signal Company, and inspired other installations.

The formation of the Union Electric Signal Company and the departure of Robinson

The early work of installing the demonstration signals on the Fitchburg was funded entirely by Gasset, but it was always intended to establish a company to take over the installation.

This company was the 'Union Electric Signal Company'. Its early history is obscure and full of questions, possibly because neither Robinson nor the Union Switch & Signal Company were interested in laying out precisely what happened.

The articles of association of the Union Electric Signal Company were dated 28 December 1878. The purpose of the company was "to manufacture, contract for, put in operation and sell electric and other signals for railroads". The company was formally located in Hartford, the state capital of Connecticut. The capitalisation of the company was \$500,000 in 10,000 shares of \$50 par value⁷.

Robinson categorically stated that he founded the Union Electric Signal Co in 1878. It is quite likely that this is true, as the initial proposal was extraordinarily generous for him. This was that Robinson would subscribe to 9,830 of the 10,000 shares (worth \$491,500), with the remaining 170 shares (\$8,500) being divided between four others, one being Gasset. Robinson would sell his nine U.S. patents to the company for \$491,500, which he would use to pay for the shares he had subscribed for. The end result would be that Robinson would own 98.3% of the company without putting in any money. The remaining four shareholders would have put up the entire working capital (a mere \$8,500), but as they owned so little of the company they would have no control over it, nor would they see any of the profit.

Twelve days later, on 9 January 1879, the terms of the deal dramatically changed. Instead of receiving almost all the shares in the company for his patents, Robinson assigned his nine patents to the company for a straight payment of \$52,500⁸. Of this \$17,500 was paid at the time of the assignment, with the balance of \$35,000 to be paid at the rate of \$50 for every signal erected by the company. The company would receive a 30% discount (resulting in a purchase price of \$36,400) if the balance was paid to Robinson on or before 1 January 1880⁹. Robinson apparently did not receive any shares in the new company, or if he did, he had sold them by October 1879.

⁷ This capitalisation appears to have been purely nominal. It appears to have been common US practice to only sell enough shares to meet initial demands. The rest of the shares would be held in the company treasury and sold as needed to meet further cash demands.

⁸ This would appear to be equivalent to around \$1.2 to \$1.35 million today, if purchasing power is considered, or \$10 to \$16 million if wages are considered. <https://www.measuringworth.com/calculators/uscompare>. This was a significant amount of money, but not outrageous. Note that it appears to be more common for companies to purchase patents using shares rather than cash. This was an advantage for the

company as it did not cost actual money – just a future share of the profits (if any were generated).

No published sources give any reason for this abrupt volte-face, however there are hints. While Robinson owned the key track circuit patent, Gasset held the contract with the Fitchburg that the company was being set up to perform. Further, Gasset, as a promoter, must have had some agreement with Robinson to use his patents; consequently, the assignment of the patent rights may have been more about purchasing exclusive use of the patents rather than just use of the patents for this installation. Finally, as we shall see in the next instalment, while the Fitchburg installation used Robinson's track circuits, the actual signalling system owed a lot to Gasset and Fisher.

That Robinson held a weak hand is shown a punitive clause in the assignment. Robinson was required to assign any future patents on railway signalling that he obtained to the company for the actual cost of time and labour he spent on them, plus the patent expenses. It is hard to conceive of this requirement as anything but a means to encourage Robinson to leave the railway signalling field.

Having sold his patents, Robinson departed overseas in March 1879, and spent 15 months travelling in Europe, Egypt, and Palestine. It is notable that he did not stay in Boston until the Fitchburg installation was complete or even to bask in its success. He notionally remained a director of the company until October 1879 when he was disqualified and removed. As the only qualification for director was stock ownership, this would suggest that by this date Robinson had disposed of any shares that he had held, if he had held any.

The actions Union Electric Signal Company

Little is known about this company, partly because it only existed for about 16 months. It is known that J Gardiner Sanderson (Gasset's cousin) was manager of the company and Gasset was superintendent.

Almost the first action of the new company was to assume Gasset's contact with the Fitchburg Railroad and to reimburse Gasset and Fisher for the money they had expended in installing the signals. In March 1879 Gasset & Fisher's lease on their Boston workshops was transferred to the company and the machinery in it was purchased. This became the workshop of the new company, but the corporate offices continued in Hartford.

Around the end of 1878, Gasset met C.H. Jackson. Jackson was treasurer and manager of the Toucey & Buchanan Interlocking Switch Company¹⁰ and owned a factory that manufactured the interlocking equipment for Toucey & Buchanan. Jackson was looking for a means to

company as it did not cost actual money – just a future share of the profits (if any were generated).

⁹ Robinson was a creditor to the company for \$35,000 until they installed 700 signals. If the company failed before this, he would have probably lost any of the outstanding balance. Hence the attraction of the discount – it reduced his risk as it encouraged the company to pay out early.

¹⁰ Interlocking was very rare in the US in 1878. Toucey & Buchanan had been formed in May 1877 to install interlocking equipment, initially to the design of Messrs Toucey and Buchanan. In December 1877 the company purchased the US rights to Saxby & Farmer's patents. Apart from upfront cash,

implement what would now be known as approach locking – to hold a route once the train had passed the distant signal. Derailments had already occurred in the US when signalmen took the route away.

In October 1879 Jackson was appointed General Agent of the Union Electric Signal Company and was made a director of the company (to make room, Robinson was removed as director – note he was overseas – as he was ‘disqualified from serving as a director’). By this time Jackson was closely associated with all three signal companies (Toucey & Buchanan, Jackson Manufacturing¹¹, and the Union Electric Signal).

In November 1879 the Union Electric Signal Coy raised a loan to pay out Robinson and obtain the 30% discount in the purchase price of his patents. In February 1880 the capitalisation of the company was increased from \$500,000 to \$1,000,000. In March 1880 the company purchased the patents of Pope & Hendrickson (in exchange for stock), and in July 1880, Pope became a director of the company.

In this period, the company received the second contract for automatic signals. This involved the extension of automatic block signalling on the Eastern Railroad from Salem to North Beverly. This was brought into use in December 1880¹². A third contract does not appear to have been secured until mid to late 1881.

In February 1881 work commenced on the consolidation of the three companies into the Union Switch and Signal Company under the presidency of George Westinghouse¹³. In that month, George Westinghouse and Henry Snyder were elected directors of the Union Electric Signal Co ‘to fill vacancies in the board’ and Westinghouse became president of the company. Late in February, Westinghouse purchased 10,000 shares of stock in the Union Electric Signal company (50% of the company). At the same time, Westinghouse sold the company 4,102 shares in the Interlocking Switch & Signal Company (the new name of the Jackson Manufacturing Company).

In March 1881 all the patents owned by the Toucey & Buchanan company were assigned to George Westinghouse, and were then assigned by him to the Interlocking Switch and Signal Company.

In mid April 1881 the name of the Union Electric Signal Company was changed to the Union Switch and Signal Company, and the capitalisation was increased to \$1,500,000. The increase in capital was used to purchase

the Interlocking Switch and Signal Company (including the shares held by Saxby & Farmer). The two companies were formally consolidated on 1 May 1881.

What happened to Gassett?

With the formation of the Union Switch & Signal Company in 1881, Gassett drops out of the story. However, the patent record shows that he continued to develop railway signalling technology until 1884. As many of these patents were assigned to the Union Switch & Signal Company it is assumed that he continued to be associated with the company until at least that time.

Apart from the patents related to the mainstream development of automatic signalling (which will be considered in a subsequent part), Gassett’s inventions related to a number of themes:

- Approach locking.
- Mechanisms to apply block working to a single line where the track circuit was normally de-energised and was only energised when a train approached or was in the section. Patent 267979 of 1882 was notable in that it included an interlocking relay.
- An electric lock for the lever in an interlocking machine.
- A hydraulic and electric interlocking system.
- An electrically controlled pneumatic bell for a highway crossing.
- An application of track circuits to manual block working.
- Applications of track circuits and interlocking for diamond crossings of two railroads.

Gassett and Robinson

Robinson undoubtedly invented and developed the track circuit to the point where it was a practical invention. Equally, however, it is clear that Gassett and Fisher took the track circuit and developed a practical signalling system. Gassett also linked up with the nascent US signalling industry and consequently facilitated the take up of the system by entrepreneurs like George Westinghouse. The string of patents in the signalling field up to 1884 shows that Gassett was also an inventor interested in the signalling field. However, as we will see in the next section, Gassett was not honest in his dealings with Robinson and his invention.

Saxby & Farmer received a small royalty and shares in the US company. The deal also included future access to any patents Saxby & Farmer took out. This agreement had far reaching effects on US signalling and explains why US mechanical signalling was so reminiscent of early British practice.

¹¹ The Jackson Manufacturing Company had been set up in February 1879 to manufacture interlocking equipment for Toucey

& Buchanan, perway material, and, curiously, wheelbarrows. Jackson was president of the company.

¹² Railroad Gazette 19.3.80 p160.

¹³ Westinghouse, however, was almost certainly involved behind the scenes earlier. He was a witness to the agreement between the Toucey & Buchanan company and Saxby & Farmer in 1877.

KERANG



As reported in the Signalling Alterations section, Kerang was resignalled in March as a consequence of the provision of boom barriers at most of the town level crossings. Kerang was one of the last locations on the non-preserved railways to be signalled using VR standard plunger locking, and this series of photos have been included to illustrate the signalling at such a station.

(Left) Kerang once had five mechanical Home signals, but all but one had been removed by the end. The last survivor was the Down Home which was a lovely lattice mast signal, complete with finial. It had been provided with a reverser in 1968 in connection with the provision of flashing lights at Wellington St.

(Below) Both sets of main line points at Kerang were Y layout points secured with a plunger lock. The plunger – a hand operated facing point lock – is seen on the point timbers at the toe of the points. A rotary detector is provided to detect the points normal and the plunger in. The signal quadrant is used to clear the Home signal for moves into the crossing loop. This arrangement of equipment – Y layout points with the plunger outside the five foot, rotary detector, and W5a point lever – was common for modern plunger locked layouts.





Two views of the Wellington St level crossing (above) looking in the Down direction in 2019, and (below) in the Up direction from the platform in 1999. Both photos show the protecting Home and Dwarf signals. The approach section indicator (black cross on diamond) indicated the start of the controlling track circuit with a restricted approach distance. If the train did not exceed 35 km/h between the platform and the level crossing, the flashing lights would give the correct warning time. Close examination of the two photographs suggests that the flashing light masts have been renewed in the interval between the two photographs, and this was likely to be in preparation for the provision of boom barriers.





(Above) The platform signalling controls in 1999. The two ratchet quadrants work the Up and Down Home signals, and no doubt, have performed this function for well over a century. The flat plates adjacent to the two quadrants mark where quadrants have been removed – Kerang once had five mechanical Home signals. On the front wall of the station building is the locked cabinet containing the controls and indications for the three light Home signals. (Below) Kerang yard from the footbridge in 1999 showing well kept track, and that freight – at least wooden sleepers – was still being handled. The slew in the main line shows where the former No 2 Road was located – this was removed in 1991 well after it would have been too short to cross any trains.





The Down morning Swan Hill departing from Kerang in 2019 and just about to pass over the Down end plunger locked points. On the left is the remains of the former Koondrook branch, and the photo is taken standing on the location of the Stony Crossing line. (Below) The Down end plunger locked points. The McK&H electrical detector detects the position of the plunger and performs the function of the mechanical detector for the light signals. When the plunger is in, the adjacent departure Home signal can be cleared from the control on the platform, but not from the control at the points. When the plunger is out for moves into or out of No 2 Road, the reverse applies.





(Above) Another view of the Down end plunger locked points, showing the wire operated circuit controller at the left. This is essentially a dummy signal with the circuit controller at the top of the post taking the place of the semaphore arm. It allows the conventional mechanical plunger locking to be retained when converting the arrival Home signal to a light signal. At the right is the cabinet containing the manual controls for the adjacent flashing light signals and departure Home signal. In the background can be seen the last section of the Koondrook branch. (Below) a third view of the Down end plunger locked points showing the relationship with the signals and flashing lights at Vaughan St.





(Above) The flashing lights at Vaughan St were provided in 1975, although the flashing light masts in this view are replacements. The Up Home is the original lattice post with the mechanical arm replaced by a searchlight. The Down Home (Post 7) was provided with the flashing lights to allow shunting movements to work on the main line without operating the lights. (Below) The Up distant, provided in 1998, was situated immediately adjacent to the Murray St flashing lights, which had been provided in 1985. The distant signal only indicated if the main line was clear to the Up Home at Wellington St, and so would display green with the Home signal protecting that crossing at Stop.

