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SOCIETY CONTACT INFORMATION

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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 SATURDAY 16 FEBRUARY 2019, AT THE DIAMOND VALLEY RAILWAY, ELTHAM LOWER PARK, ELTHAM.

- Present: – Graeme Dunn, Judy Gordon, Bill Johnston, Chris King, Tony Kociuba, Keith Lambert, David Langberg, David Langley, Neil Lewis, Bruce McCurry, Laurie Savage, Roderick Smith, David Stosser, Andrew Waugh, Rob Weiss and Andrew Wheatland.
- Apologies: – Glenn Cumming, Michael Formaini, Chris Gordon, Phillip Miller, Brian Sherry and Peter Silva.
- Visitors: – Jim Gordon, David Isherwood, Patrick Kethers, Shaker Mohammed and David Rendell.
- The President, Mr. David Langley, took the chair & opened the meeting @ 12:00 hours, and welcomed everybody to the Diamond Valley Railway. David thanked the S & T Department at the Diamond Valley Railway led by Bruce McCurry for the invitation to visit.
- General Business: – The February 2019 meeting consisted entirely of a visit to the Diamond Valley Railway at Eltham Lower Park in Eltham.
- Members enjoyed a tour of inspection of the signalling facilities at the Diamond Valley Railway including the Meadmore Junction “A” Signal Box, the Diamond Valley “B” Signal Box, the workshops and the member’s club rooms.
- The opportunity was taken to travel by train around the layout to view the signals in action and to view the expansion of the railway since our previous visit in 2013.
- An enjoyable time was had by all.
- No other business was transacted during the meeting.
- At the conclusion of the visit, the President thanked the Diamond Valley Railway for their hospitality, especially DVR & SRSV members Chris King, Tony Kociuba and Bruce McCurry for their assistance during the day.
- Meeting closed at approximately 16:00 hours.
- The next meeting will be on Friday 15 March, 2019 at the Surrey Hills Neighbourhood Centre, Bedford Avenue, Surrey Hill, commencing at 20:00 hours (8.00pm).

MINUTES OF 2018 ANNUAL GENERAL MEETING HELD FRIDAY 16 MARCH, 2018, AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS, VICTORIA.

- Present: – Glenn Cumming, Graeme Dunn, Vance Findlay, Michael Formaini, Ray Gomerski, Chris Gordon, Judy Gordon, Bill Johnston, David Jones, Keith Lambert, David Langberg, David Langley, Neil Lewis, Andrew

(Front cover). It has been some time since we included a photo of a somersault signal in Somersault, so here is a photograph of the Down Home at Kerang taken on 20 June 2016. The photo is taken from the track side to show the arrangement of the lever plate, rodding, ladder, and platform. The home is a standard 20 foot lattice mast which is still complete with its finial. The lean to the rear is not, however, standard! The one unusual feature of the mast is the provision of a Reid’s reverser. Similar reversers were provided on home signals at other plunger locked locations (for example, Barnes and Boort), but they were not common. Those at Barnes were not track controlled, instead they were driven by the flashing light power supply. If the power supply failed, the home would drop back to danger. The signal is no longer track controlled – if it ever was – as there are no longer any station staff at Kerang to reclear the signal after the passage of a train. Photo Andrew Waugh

McLean, Phillip Miller, Noel Reed, Colin Rutledge, Laurie Savage, Brian Sherry, Peter Silva, Rod Smith, David Stosser, Andrew Wheatland and Ray Williams.

Apologies: – Ken Ashman, Phil Barker, Robert Bremner, Wilfrid Brook, Jon Churchward, Brett Cox, Steven Dunne, Graeme Henderson, Chris King, Steve Malpass, Adrian Ponton, Alex Ratcliffe, Stuart Turnbull and Andrew Waugh.

The President, Mr. David Langley, opened the 2018 Annual General Meeting at 20:05 hours.

Minutes of the March 2017 and May 2017 Annual General Meeting: – Accepted as published. Phillip Miller / Graeme Dunn. Carried.

Business Arising: – Nil.

President's Report: – The President, David Langley, presented the President's Report to the meeting.

Every time I think of what to say I am reminded of past President's reports that were very brief and usually were along the lines of – "We've had a good year". But then I think we can't be having that and so it's with great pleasure that again I present the President's report for the year 2017.

Six well attended meetings were held during the year – February's meeting being an evening visit to Puffing Billy to inspect some more of the signalling arrangements under the guidance of member Andrew Wheatland. March was the Annual General Meeting and ordinary meetings, including a syllabus item, were held in May (the now seemingly annual "Where is it" quiz hosted by Keith Lambert), July (the 27th annual screening of some more of the late Stephen McLean's slides presented by Glenn in the absence of Rod Smith, this was the November 2016 screening held over), September (Glenn Cumming presented some slides from Western Australia) and November (the 28th annual screening of some more of the late Stephen McLean's slides again presented by Glenn in the absence of Rod Smith).

The excellent year for the society is due in no small way to the committee. Our Secretary Glenn continues to manage the paperwork, memberships and tours in the professional manner to which we have become accustomed, similarly the Treasurer Peter Silva has presided over the accounts and other money matters. Vice-President Bill is ever ready to step, or is it sit, in the Presidents chair on my absence but lately has become a driving force in the Archives project to which we are very grateful, and thank you to our two committee members Wilfrid Brook and Colin Rutledge both of whom have contributed to the discussion on committee matters.

The Signalling Record Society's journal continued the high standard of previous years and was again published six times this year. Unfortunately I have to note yet again that the list of contributors is short and I cannot but wonder why. Surely there are some budding authors amongst the membership who could put fingers on keyboard and produce something. What about the challenge of seeing who is the first to submit a couple of pictures from their collection and a few words for a caption – it is that simple and would make the editors job just that bit easier.

Tours don't run themselves, they require decisions on an itinerary that is possible and entertaining, plus the business of bringing together the various details that the day requires – i.e. permission to visit and travel arrangements. None of this happens automatically and we are very fortunate to have a tours organiser extraordinaire in Glenn who goes that extra distance to make the days enjoyable. We must also not forget the officials in the two railway departments who give their permission for our visits and the various staff members in the signal boxes, who are always welcoming and happy to answer the many questions that are posed. Special thanks are due to our members on the inside David Ward and Keith Lambert for making the visits possible. Gentlemen the day would not be the same without your efforts both before and during the day. Of course, the day would not be the success that they always are without the members support so thank you one and all. The tours officer will always welcome your comments regarding these days and suggestions for future tours.

Finally, I would like to thank once again, the members for their support of the societies activities and for bringing to the meetings the little bits of news that otherwise would go unreported and thus become unrecorded history.

I move the report. David Langley, President. David Langley / Phillip Miller. Carried.

Treasurer's Report: – The Treasurer, Peter Silva, presented the Treasurer's Report for the year ended 31 December 2017.

Financially, 2017 was a satisfactory year for the Society with an Operating Surplus of \$699.52. There were no significant changes in operating costs during the year and none are currently foreseen for 2018.

While work continues on establishing the SRSV Archive at Seymour, there was no Capital Expenditure on the project during the year. As a consequence, there have been no expenses recorded against the AREA Grant.

Members will note that this year the Treasurer's Report is not accompanied by an independent report by Jon Churchward but instead is accompanied by a certification by two members of the committee. This complies with the requirements of the *Associations Incorporation Reform Act 2012* for a Tier One association (an organisation with an annual income less than \$250,000).

The *Associations Incorporation Reform Act 2012* also provides for a majority of members at a general meeting to vote to have the financial statements reviewed prior to submission to the Annual General Meeting.

In considering whether or not to exercise this option, members should be aware that the *Act* explicitly requires that any such review be conducted by:

...an independent person who is a member of, and holds a current practising certificate from —

- CPA Australia; or
- the Institute of Chartered Accountants in Australia; or
- the Institute of Public Accountants; or
- approved by the Registrar...

Initial inquiries by the Secretary indicate that the cost of such a review could be \$4,000 and this would require a Membership Fee increase of around \$40 per year.

I will close this report with my thanks to Jon Churchward for the many, many years of support he has given the society in providing his annual review of the financial statements.

Peter Silva, Treasurer. Peter Silva / Colin Rutledge. Carried.

Phillip Miller asked about plans for spending the grant from the AREA. The Treasurer outlined the plans of the Committee to purchase a plan scanner and computer. Research for a suitable scanner is underway.

Tours Report: – The Tours Officer, Glenn Cumming, presented his report.

I am pleased to report that the SRSV conducted one signal box tour during 2017.

The tour for the year was held on Saturday 16th September 2017.

The locations visited this year were Kensington, Newmarket, Craigieburn and Upfield.

A variety of signalling equipment was viewed and the signalmen at each location were friendly and co-operative.

As expected, this tour was well attended and this justified the effort required to arrange this tour. A number of SRSV members travelled from interstate to attend this tour.

Thanks to all members & friends who participated & helped to ensure the success of the tour. A pleasant day out was enjoyed by all.

Special thanks must go to David Ward, Keith Lambert and Chris Gordon at Metro Trains Melbourne for allowing the SRSV to visit areas not normally open to the general public. Their assistance is very much appreciated. My thanks to these gentlemen for their assistance.

The Tours Officer always welcomes suggestions & comments regarding the conduct of SRSV tours, especially ideas for future tours.

Glenn Cumming, Tours Officer. Glenn Cumming / Laurie Savage. Carried.

Membership Report: – The Membership Officer, Glenn Cumming, tabled the Membership Report.

Type	2017	2016	Movement
V	62	61	+ 1
K	28	28	–
N	2	2	–
KL	2	2	–
VH	3	3	–
Total	97	96	+ 1

Analysis of Movement

Additions: – Mark Bau (V), Brett Cox (V), David Langberg (V), John Hosking (K)

Non – Renewals: – Sean Kelly (V), Yuri Sos (V), Brett Cleak (K)

Transfers: – Nil

Glenn Cumming, Membership Officer. Glenn Cumming / Andrew Wheatland. Carried.

Editorial Report: – In the absence of the Editor, Andrew Waugh, the Secretary tabled the Editor's Report for 2017.

Publication of "Somersault" has been challenging this year due to the other time commitments of the Editor, and I would like to offer my apologies for the late delivery of some of the issues this year.

None-the-less, we are currently up to date, and I would like to thank Bob Taaffe for submitting a lengthy article that allowed me to catch up.

In this vein, I'd like to encourage members to submit material for publication – even one or two pages can help.

Andrew Waugh, Editor. Glenn Cumming / Ray Williams. Carried.

SRSV President David Langley urged all SRSV Members to assist the Editor wherever possible.

Archives Report: – Colin Rutledge presented the Archives Report for 2017.

Progress with our Archives at Seymour has continued in 2017.

Activities in 2017 have concentrated on putting some order into the collection.

A significant amount of sorting of plans has been completed with more to be done.

Sorting of the Plan and Section drawings has unearthed many duplicates and a decision on how to dispose of the duplicates will need to be made.

A load of rubbish was removed and some other material has been disposed of.

Planning for the digitisation of the archives collection has continued. Some decisions have been made and the search for suitable scanning equipment needs to be done.

The need to scan, sort, classify and index the entire collection still needs to be done.

Thank you to all of the members who have assisted this year and we look forward to your assistance in the future.

Colin Rutledge, Archives Coordinator. Colin Rutledge / Michael Formaini. Carried.

Elections: – The Vice-President, Bill Johnston, chaired the meeting for the election of the new Committee.

No written nominations were received.

The following verbal nominations were received at the meeting: –

President: – David Langley, nominated by David Stosser and seconded by Phillip Miller.

Vice President: – Bill Johnston, nominated by Colin Rutledge and seconded by Andrew Wheatland.

Secretary: – Glenn Cumming, nominated by David Stosser and seconded by Noel Reed.

Treasurer: – Peter Silva, nominated by Bill Johnston and seconded by David Langley.

Committee member: – Colin Rutledge nominated by Andrew Wheatland and seconded by Laurie Savage.

Committee member: – David Langberg nominated by David Langley and seconded by Colin Rutledge.

There being no further nominations, all nominees were declared duly elected to the position.

The President noted the retirement of Wilfrid Brook from the SRSV Committee after many years of service as Secretary and Committee member and thanked Wilfrid for his contribution.

Moved Phillip Miller, seconded David Stosser, that the Secretary write to Wilfrid Brook thanking him for his service to the SRSV Committee. Carried.

General Business: – Phillip Miller suggested a future visit to the Box Hill Miniature Steam Railway Society on a Friday night or a Saturday afternoon when trains are running.

Meeting closed @ 20:40 hours.

The March 2018 Annual General Meeting was followed by the March 2018 Ordinary Meeting.

SIGNALLING ALTERATIONS

The following alterations were published in WN 1/19 to WN 8/19, 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.

(01.01.2019) Broadford (SW 481/18, WN 1)

Effective forthwith Broadford is not to be switched in as a Double Line Block Post. The closing lever, No. 17, was secured reverse. All the main line signals will be at proceed except for Post 19 (Up Distant) which will be at caution. SW 472/18 is cancelled.

06.01.2019 Ararat (TON 2/19, WN 2)

From Sunday, 6.1., the broad gauge signaller managing the Train Staff & Ticket working for the Wendouree – Ararat section, and based in the Ararat station office, will be in attendance:

Monday - Friday	0530 hours to 1730 hours
Saturday.....	0615 hours to 1645 hours
Sunday	0745 hours to 1800 hours

The standard gauge signaller managing access to the yard and the Maryborough Corridor, and based in the former Freight Office in Ararat Yard, will be in attendance:

Monday.....	0700 hours to 1700 hours & 2000 hours to finish
Tuesday, Wednesday, & Friday	0700 hours to 1700 hours
Thursday.....	0130 hours to finish & 0700 hours to 1700 hours
Saturday.....	0130 hours to finish
Sunday	2300 hours to finish

(08.01.2019) Book of Rules, Section 36 (SW 1/19, WN 2)

Effective forthwith version 19.01 replaced 18.01. Omitted images from Rule 4, Clauses D & F, and Rule 12 Clause B were added. SW 480/18 is cancelled.

(08.01.2019) Echuca (TON 2/19, WN 2)

Effective forthwith the signal box will be attended by a V/Line Network Services employee

	Monday - Friday	0500 hours to 2000 hours	
	Saturday.....	0600 hours to 1000 hours & 1900 hours to 2100 hours	
	Sunday	0800 hours to 1000 hours & 1930 hours to 2130 hours	
(08.01.2019)	Broadford		(TON 2/19, WN 2)
	Effective forthwith the signal box will be switched out		
(08.01.2019)	Murchison East		(TON 2/19, WN 2)
	Effective forthwith the location will be attended by a V/Line Network Services employee		
	Monday, Wednesday, Friday.....	1630 hours to 2130 hours	
	Tuesday, Thursday.....	1730 hours to 2130 hours	
08.01.2019	Caulfield		(SW 34/19, WN 1)
	On Tuesday, 8.1., the Caulfield Sigview control panel will be altered to reflect the removal of Points 608, 610, 613, 633, 652, & 662 and Dwarfs CFD709 & CFD710. Point levers have been provided on the Sigview panel for the removed points to allow synchronisation with the interlocking in the event of a system shutdown or restart. The interlocking data was not updated.		
09.01.2019	Kerang		(SW 2/19, TON 4/19, WN 2 & 3)
	On Wednesday, 9.1., the cabinet on the platform containing the signal push buttons (for Posts 2, 4 & 7) and the repeaters (for Posts 2 & 8) was abolished. The platform quadrants for Posts 1 & 7 were disconnected.		
	The main points leading to No 2 Road were temporarily secured out of use. The plungers at Points C & H were secured in by signal maintenance padlocks.		
	Interlocking modification were made to:		
	<ul style="list-style-type: none"> allow Posts 2 & 4 to be operated from the push buttons at Wellington St. enable Post 7 to be permanently at proceed when the plunger at Points H is detected normal. Control for Post 7 from the key switch at Points H is only effective when the plunger at Points H is out. 		
	Kerang will be defined as an intermediate Train Order Station and will only be available for follow on movements.		
10.01.2019	Hawksburn – Malvern		(SW 33/19, WN 1)
	Between Monday, 7.1., and Thursday, 10.1., the following signals on the Up and Down Caulfield Local lines between Hawksburn and Malvern were equipped with TPWS: D178, D183, D191, D192, D201, D206, D213, D220, D225, D230, D237, D242, D249, D252, D259, D262, D271, D276, D285, & D288.		
11.01.2019	Newport Workshops		(SW 60/19, WN 3)
	On Friday, 11.1., the Newport Workshops Garden Platform Road was booked out of service due to out of service rolling stock preventing routine inspection of the line. Baulks were fixed to the track at the Up end of the Garden Platform Road.		
14.01.2019	Caulfield		(SW 34/19, WN 1)
	Between Saturday, 2.1., and Monday, 14.1., the ironwork associated with Points 608, 610, 613, 633, 652, & 662 was removed. The decommissioned Dwarfs CFD709 and CFD710 were removed.		
	Diagram 79/18 (Caulfield) replaced 45/18.		
18.01.2019	Upfield		(SW 58/19, WN 3)
	On Friday, 18.1., control of the Coburg, Gowrie, and Upfield interlockings was temporarily transferred to Metrol for testing.		
20.01.2019	Swan Hill		(SW 4/19, WN 3)
	Between Thursday, 17.1., and Sunday, 20.1., the following alterations took place:		
	<ul style="list-style-type: none"> The Oil Wharf Siding was abolished. The main line points at 345.453 km, point lever, and hand locking bar were abolished. The siding track will be removed. TON 337/11 is cancelled. The GEB Siding was abolished. The main line points at 347.057 km, point lever, rodded connections, derail block, and Annett lock were abolished. 		
	The E Pattern Annett Key was retained in the signal control equipment.		
	Amend Diagram 128/11 (Swan Hill)		
20.01.2019	Epping		(SW 51/19, WN 3)
	Between Saturday, 19.1., and Sunday, 20.1., Points 28, 30, & 34 were equipped with SPX Mk3 clamp lock points.		
(22.01.2019)	Book of Rules, Section 20 – Double Line Block		(SW 6/19 & 71/19, WN 4)
	SW 745/18 was cancelled. Rule 23 (Failure of Instruments or Bells) clauses a), b), and c) have been amended again. Clauses d) and e) continue to apply.		
	(a) Failure of Instruments: Driver to be Advised		
	If any failure of the instruments or bells occurs so that bell signals cannot be sent or received, no train is allowed to enter the section until the Driver has been verbally advised of the failure, the name of the next		

attended signal box in advance, and the time the previous train arrived complete at that signal box. The Driver must acknowledge receipt of the information prior to departing.

(b) Line Clear

A Signaller must not permit a second train to depart until permission has been received from the Train Controller.

(c) Advice to Train Controller

The Signaller must advise the Train Controller when a train is required to enter the section. The Train Controller must confirm that the previous train has cleared the section ahead before giving permission for the train to depart. The Signallers must maintain the TRB using the information obtained from the Train Controller. The Train Controller must record all train running information on the Train Control Graph.

(22.01.2019) Upfield (SW 72/19, WN 4)

The transfer of signal control to Metrol was deferred, and SW 66/19 and SWP 21/19 were withdrawn.

The key switch to transfer signal control must remain switched to 'Local'. If the "Sigmaps" are reset due to a power failure, control of the signalling will revert to Metrol. In this case, the Upfield Signaller can take local control after conferring with the Train Controller and/or the Metrol Signal Technician.

23.01.2019 Kerang (SW 8/19, WN 4)

On Wednesday, 23.1., the platform quadrants for Signals A & J were restored to use. A new signal control cabinet was provided adjacent to the quadrants with controls and indications for Signal M (Post 2), controls for Signals P & R (Posts 4 & 7), and indications for Signal J (Post 8).

No 2 Road was restored to use, and the signal maintenance padlocks were removed from the plungers on Points C & H. The temporary alterations for Signals M (Post 2), P (Post 4), & R (Post 7) were removed and these signals will again track cancel after the passage of a train when operated from the local push buttons.

Kerang will again be an Intermediate Train Order Station when a Signaller is not in attendance and an Attended Train Order Crossing Station when a Signaller is in attendance.

Amend Diagram 54/13 (Pyramid – Kerang).

(29.01.2019) Eaglehawk (SW 11/19, WN 5)

The pedestrian crossing at the Up end of Eaglehawk platform (170.050 km) has been abolished. The platform has been extended 97 metres at the Up end of the existing platform. The platform extension is not yet in service.

Amend Diagram 46/17 (Eaglehawk – Raywood).

(29.01.2019) Elsternwick (SW 85/19, WN 5)

Due to problems with the operation of the ground frame and crossover, the crossover will not be available for terminating suburban trains (either revenue or non revenue) in either direction. It will be available for infrastructure vehicles within an Absolute Occupation.

If it is necessary to terminate suburban trains at Elsternwick due to a service disruption, permission must be obtained from the Rail Safety Manager and a Train Services Officer (Signaller Specialist) must be in attendance to supervise the train movements.

04.02.2019 Flinders St – North Melbourne, Northern Underground Loop (SW 54/19, WN 3)

Between Saturday, 2.2., and Monday, 4.2., the following alterations took place:

- Homes 406, 408, 410, 414, 418, 424, 432, 438, 444, 446, 452, 456, 462, 466, 588, 590, & 592 were converted to LED (Siemens U2L LED)
- The train stops at Homes 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 588, 590, & 592 were replaced by JA Mk4 train stop mechanisms.

04.02.2019 Rockbank (SW 9/19, WN 4)

On Monday, 4.2., the northern boom arm at Troups Rd (27.828 km) was relocated to make way for the construction of a second track. Co-acting signals were provided for RBK710 and RBK712. Both co-acting signals are provided 5 metres in the Down direction from the signal gantry and are 3 metres tall.

Amend Diagram 10/17 (Ardeer – Rockbank).

04.02.2019 Ballan (SW 9/19, WN 4)

On Monday, 4.2., Points 7W were provided at 78.042 km facing Down trains. The points are equipped with dual control point machines and will be secured normal. The flashing light masts at the Occupation Crossing at 82.212 km were relocated to make room for the installation of a second track.

Amend Diagram 72/10 (Ballan – Gordon).

04.02.2019 Millbrook (SW 9/19, WN 4)

On Monday, 4.2., Points 7W were provided at 93.030 km facing Down trains. The points are equipped with dual control point machines and will be secured normal.

Amend Diagram 58/17 (Bungaree).

- 04.02.2019 Broadford** (SW 18/19, WN 5)
 On Monday, 4.2., Broadford was abolished as a double line block post. The new block section is Kilmore East – Seymour.
 Posts 1, 2, 7, 16, 17, 18, & 19 were abolished and the masts will be removed at a later date. The interlocking frame and all associated equipment were abolished.
 Amend Diagram 22/12 (Broadford – Tallarook).
 Broadford was deleted from Operating Procedure 5. SW 481/18 was cancelled.
- (05.02.2019) Ardeer – Rockbank** (SW 20/19, WN 6)
 Signalling Diagram 10/19 (Ardeer – Rockbank) replaced 10/17 as in service.
- (05.02.2019) Ballan – Bungaree** (SW 20/19, WN 6)
 Signalling Diagrams 4/19 (Ballan – Gordon) and 8/19 (Bungaree) replaced 104/18 & 58/17 respectively as in service.
- 11.02.2019 Flinders Street** (SW 59/19, WN 3)
 Between Saturday, 9.11., and Monday, 11.2., the point machines on Points 640 & 642 were replaced by a SPX Mk3 clamp locks.
- 11.02.2019 Richmond Junction** (SW 59/19, WN 3)
 Between Saturday, 9.11., and Monday, 11.2., the point machine on Points 681 was replaced by a SPX Mk3 clamp lock.
- 11.02.2019 East Malvern – Holmesglen** (SW 56/19, WN 3)
 Between Friday, 8.2., and Monday, 11.2., Automatic DG445 was replaced by a new post with the same number 80 metres in the Up direction.
 Diagram 67/18 (East Malvern – Glen Waverley) replaced 9/17.
- (12.02.2019) Melbourne Yard – Hollands Loop** (SW 22/19, WN 7)
 Hollands Loop has been abolished. The broad gauge track from the hand points on the Down side of Stop Board 6 to the points leading from the broad gauge turntable has been removed, and the two points secured to lie away from the removed track. The former FCL siding leading from Hollands Loop has been removed.
 Stop Board No 4 has been abolished.
 Amend Diagram 124/14 (Moonee Ponds Creek).
- (12.02.2019) Broadford – Tallarook** (SW 21/19, WN 7)
 Signalling Diagram 102/18 (Broadford – Tallarook) replaced 40/18 as in service.
- 12.02.2019 Avoca** (SW 14/19 & 15/19, WN 5)
 On Tuesday, 12.2., boom barriers were provided at the passive level crossings at Wardlaws Ln (216.148 km) and Porcupine Ln (217.941 km). Healthy state indicators, yellow whistle boards, and remote monitoring were provided. Operation is by axle counters.
 Amend Diagram 90/18 (Bung Bong - Avoca).
- 13.02.2019 Avoca** (SW 16/19, WN 5)
 On Thursday, 14.2., boom barriers were provided at the passive level crossing at Dawsons Rd (213.541 km). Healthy state indicators, yellow whistle boards, and remote monitoring was provided. Operation is by axle counters.
 Amend Diagram 90/18 (Bung Bong - Avoca).
- 16.02.2019 Metrol** (SW 99/19, WN 7)
 On Saturday, 16.2., the TCMS data was updated to show the transfer of Macleod interlocking to Epping.
- 18.02.2019 Ararat** (SW 24/19, 27/19, 28/19, TON 23/19, SN 312/19, WN 7 & 8)
 On Monday, 18.2., the Maryborough Link Line between the Maryborough line and the main line was commissioned. Signalling was not provided, and the points at each end are manually operated.
 Ararat will remain as an Unattended Train Order Terminal Station. Train Orders may be issued to the driver of a Down rail movement at Tatyoon Loop, Maroona, or Pyrenees Loop.
 Points 11U on the main line and 11D on the Maryborough line were commissioned. Both points are equipped with dual control point machines, but are currently manually operated using the 'hand mode' of the point machines. Points 11U are normally secured and clipped to lie for the main line, and Points 11D for Ararat yard. The key to both these points is held by the Ararat Yard Signaller. Authority to operate these points will be given by the ARTC Network Controller.
 Stop Boards 3 and 4 were provided are located 120 metres on the Down side of the mixed gauge diamond between Points 11U and 11D. Stop Board 3 is for trains from Maryborough and is lettered "Stop Board 3. Obtain train authority from ARTC Network Control and all clear from Ararat Yard Signaller" and "Start CTC". Stop Board 4 was provided for trains to Maryborough and is lettered "Stop Board 4. Obtain authority from Ararat Yard Signaller prior to proceeding" and "End CTC".

All trains passing over the Maryborough Link Line or operating to/from the Ararat Yard are restricted to 15 km/h to Grano St (273.528 km), on the Maryborough side of Points 11D, and then to 25 km/h to Stop Board 1 (271.500 km).

Points 11U will be maintained by ARTC, and the Maryborough Link Line and Points 11D by V/Line.

Diagram 78/18 (Ararat) replaced 64/18.

Operating Procedure 82 (Ararat) was reissued. SW 190/17 was cancelled.

SW 459/18 and SW 465/18 were cancelled.

When a train is to run to Maryborough, it must be brought to a stand at Tatyoon Loop (for moves from Melbourne) or Maroona (from Portland) and issued with a Train Order to proceed beyond Ararat. When the Train Order has been issued, the Driver will notify the ARTC Network Controller who will restore Home 265/6 at Ararat to Stop, signal the train to Ararat, inform the Ararat Yard Signaller of the time the train is expected to arrive, and give the Signaller permission to operate Points 11D. The Signaller must then reverse and lock Points 11D and go to Points 11U. The Signaller must inform the ARTC Network Controller when the arriving train has come to a stand at Home 265/6. The Network Controller must check that the grade release has not been provided to the V/Line Train Controller and that a release has not been provided on Points 7 or 27. They must then block these releases and the signalling between Maroona and Pyrenees Loop. After this the Network Controller will give permission for Points 11U to be reversed. The Signaller must reverse and lock Points 11U and tell the Network Controller when they have done so. The Network controller will then issue a Condition Affecting Network (CAN) for the Western Hwy and Alfred St level crossings and a Train Authority to the Driver to pass Home 265/6 at Stop using the following wording: "Pass Signal 256/6 at Stop. Proceed to Stop Board 4 Maryborough Link Line". The Driver will read both the CAN and the Train Authority back to the Controller and receive the OK. When the train is approaching Points 11U the Signaller can authorise the Driver to pass Stop Board 4. Immediately the last vehicle clears Points 11U the Signaller must restore and lock the points normal, leaving them in the motor position. The Signaller must advise the ARTC Network Controller that Points 11U have been restored to normal. Once the rear of the train has passed Stop Board 4, the Signaller must so advise the Driver, who must contact the Network Controller and cancel the Train Authority. The Signaller will proceed to Points 11D and when the train has cleared the points, advise the Driver that the train is clear of the ARTC main line, restore and lock the points normal in the motor position, and advise the ARTC Network Controller.

When a train is to run from Maryborough, the V/Line Train Controller must confirm with the ARTC Network Controller that there are no opposing movements planned to enter the Maryborough line at Ararat. The train must be held at Maryborough if an opposing train is planned. Otherwise the Train Controller can issue a Train Order to advance the train to Ararat. The Driver will contact the Ararat Yard Signaller when passing the Ararat Location Board. The Signaller, in turn, will contact the Network Controller who must confirm that there are no rail movements or occupancies between Pyrenees Loop and Maroona and no routes are set or stored for a movement and that releases have not been given for Points 7 or 27 or the grade crossing. The Network Controller must block the signalling between Pyrenees Loop and Maroona and the releases for the grade crossing and Points 7 and 27. The Network Controller can then give the Signaller permission to reverse Points 11D and advance the movement to Stop Board 3. The Signaller must reverse and lock Points 11D. The Signaller will then authorise the Driver to pass to Stop Board 1 and proceed to Stop Board 3. The Signaller will then go to Points 11U. When the train has come to a stand at Stop Board 3, the Signaller is to advise the Network Controller. The Network Controller must reconfirm that releases have not been given for the grade crossing or Points 7 or 27, and then grant the Signaller permission to reverse Points 11U. The Signaller will then reverse and lock Points 11U and inform the Network Controller. The Network Controller will issue a CAN for Western Hwy and Alfred St, and a Train Authority with the following wording "Pass Stop Board 3. Proceed to Maroona Signal 244/26". The Driver will write down both the CAN and the Train Authority, repeat them, and obtain an OK from the Network Controller. The Driver will then tell the Signaller that the Train Authority has been issued. The Signaller will then give permission to pass Stop Board 3. Once the train begins to move, the Signaller must operate the test switch for Alfred St. Once the movement has cleared Alfred St, the Signaller must cancel the test switch and inform the Driver that the train has cleared Points 11U. The Signaller must then restore and lock Points 11U normal, and so inform the Network Controller. The Signaller must then restore and lock Points 11D normal and so inform the Network Controller. When the train arrives in clear at Maroona the Driver must cancel the Train Authority.

18.02.2019 Fairfield – Alphington & Heidelberg – Rosanna (SW 100/19, WN 7)
Between Friday, 15.2., and Monday, 18.2., axle counter changes took place to support the provision of 'Full Counting Head Control' functionality.

18.02.2019 Macleod (SW 123/19, SWP 2/17, WN 7)
Between Friday, 15.2., and Monday, 18.2., Macleod signal box was closed. The control panel was abolished and control of the interlocking was transferred to the Hurstbridge panel at Epping signal box.
The illuminated letter 'A' was removed from Homes MCD104 and MCD111.

A new Westrace Mk2 IFPM was installed to interface with the existing geographic relay interlocking. The train control system interface changed from JZA to S2OE.

Point unit levers are not provided on the Epping TCMS for the Macleod interlocking. If a track route line is not shown, the points at Macleod are to be considered unlocked. If the points are not detected normal or reverse, a Signal Maintenance Technician must attend to operate the points. A caution order can then be issued to the Driver.

Points 7 auto normalise 10 seconds after the train movement has cleared the points. If it is necessary to hold the points reverse, the Signaller must set a route over the points reverse and apply a point block.

The train stabling gates are manually operated and are not detected by the signalling system. An indication, however, is displayed on the Epping control panel that shows whether the gates are open or closed. It is the responsibility of the rostered driver to manually open or close the gates.

The station limits of Macleod are from MCD102 to S563 (Down line) and from MCD113 to S488 (Up line).

18.02.2019 Heidelberg – Hurstbridge (SWP 2/17, WN 7)

On Monday, 18.2., Clifton Hill Group Operating Procedures 2, 3, 3A, & 4 were replaced by the following procedures: 2 (Heidelberg to Hurstbridge – Control of rail traffic movements); 3 (Heidelberg – Rosanna); 4 (Macleod); 5 (Greensborough – Hurstbridge (Single line sections)); 6 (Greensborough); 7 (Eltham); 8 (Diamond Creek); and 9 (Hurstbridge).

(19.02.2019) General Operating Procedures – Partial Counting Head Control (SWP 3/19, WN 8)

Operating Procedure 17 (Axle Counter Territory – Partial Counting Head Control) was issued.

This procedure prevents an axle counter miscount where road/rail vehicles are required to on/off track at an intermediate point in the axle counter sections between South Morang – Mernda, Caulfield – Clayton, Sandown Park – Pakenham East, and Dandenong – Greens Road (Cranbourne line).

1. Operating entirely within the Axle Counter Territory

If a road/rail vehicle convoy has six or less wheel flanges on one rail, *and operates entirely within the axle counter territory*, the road/rail vehicles will not be registered by the axle counters and will be invisible to the signalling system. A convoy with more than six wheel flanges can be divided into two or more convoys, each of less than six wheel flanges, and each convoy will not be detected provided they are at least two minutes apart.

2. Operating outside and inside the Axle Counter Territory

Road/rail vehicles that enter or leave an axle counter territory (i.e. travel from a conventional track circuit territory into an axle counter territory or vice versa) will be detected by the axle counters and signalling system normally. Such vehicles will operate the signalling normally and can be worked through the entire axle counter section under Absolute Block Working. They will operate level crossings normally.

Note that if a road/rail vehicle on-tracks outside an axle counter section, enters the axle counter section, and off-tracks within the axle counter section, the axle counter section will remain indicated as 'occupied' and will require to be reset.

(19.02.2019) General Operating Procedures – Full Counting Head Control (SWP 4/19, WN 8)

Operating Procedure 18 (Axle Counter Territory – Full Counting Head Control) was issued.

This procedure prevents an axle counter miscount where road/rail vehicles are required to on/off track at an intermediate point in the axle counter sections between Fairfield – Alphington, Eaglemont – Rosanna, and at Essendon.

If a road/rail vehicle convoy has six or less wheel flanges on one rail the road/rail vehicles will not be registered by the axle counters and will be invisible to the signalling system. A convoy with more than six wheel flanges can be divided into two or more convoys, each of less than six wheel flanges, and each convoy will not be detected provided they are at least two minutes apart.

Note that under Full Counting Head Control, the road/rail vehicles will not be detected when entering or leaving a axle counter territory provided the six or less wheel flanges on one rail separated by two minutes condition is maintained.

However, if the road/rail vehicles traverse the entire axle counter territory, the axle counter system will correctly count the axles and operate the signalling system correctly.

End£

THE RUDD-RHEA SIGNALING REPORT OF THE PENNSYLVANIA

Investigation made in 1905 established basis of Aspects and Fundamental practice

In 1903, the management of the Pennsylvania realised that the signaling in service on that road should be harmonized by establishing standards for aspects as well as for the type of protection afforded under various conditions of track layout and train operation. A committee of two was appointed to, investigate the system of signaling then in service on various railroads and to formulate standards and requisites for an ideal system of signaling, recommending such changes as were necessary to harmonize the signaling practice on the entire Pennsylvania system. A.H. Rudd, then assistant signal engineer of the Pennsylvania Railroad, and Frank Rhea, then engineer of maintenance of way, Logansport division of the Pennsylvania Lines West of Pittsburgh, were appointed by their respective general managers as a committee to make an investigation and prepare a report.

Mr Rudd and Mr Rhea made a detailed study of the signaling on numerous roads in the United States, and this data was combined with information which Mr Rudd had gathered during a recent trip on the important railroads of Europe. After several months of intensive work, a report was completed and submitted to the two general managers and to the Association of Transportation Officers of the Pennsylvania. Although several counter proposals, as to the system of aspects, were presented, the report, as prepared by Messrs. Rudd and Rhea, was adopted in 1906, and has been the basis of the standardization and development of signaling on the Pennsylvania System since that time.

On account of the plain statements regarding conditions, then existing in the signaling system, the Rudd-Rhea report was kept strictly confidential through the succeeding years since it was prepared, and now on this, the thirtieth anniversary of its completion in August, 1905, release has been given to make public the essential portions of the report.

The Rudd-Rhea report was an outstanding accomplishment in that it recommended and forced the adoption of many important practices which later were adopted so extensively as to be accepted as a matter of course, especially by the men of the younger generation, without realizing the efforts required years ago to establish these standards, on the other hand, certain practices established as being essential on the Pennsylvania in 1905 have not as yet been adopted on some roads. For example, some railroads still use white for clear. Likewise, the necessity for an operative distant signal is not appreciated as extensively as it should be.

In view of the fact that the subject of signal aspects is now again being studied so extensively on many roads, Railway Signaling is pleased to have the opportunity to present an abstract of the essential features of the Rudd-Rhea report, in order that those interested may have an opportunity to benefit from the record concerning the fundamental features of signal aspects and practices.

When studying the following abstracts of this report the readers should keep in mind that, in 1905, the standardization of signal aspects and practices was in its

The speed signalling system used in Victoria was based on the then standard system adopted in the US. This, in turn, was based on a 1905 report by Alexander Rudd and Frank Rhea of the Pennsylvania Railroad. In 1905 the PRR was so large that it was run as two separate companies – Lines East and Lines West (of Pittsburgh). This report was the basis of a unified signalling standard for the entire company.

Alexander Rudd was born around 1867 and graduated from Yale University in 1886. He entered the service of the PRR as a draftsman in the real estate department, transferring in 1888 to the signal department. In early 1892 he became Inspector of Signals on the New York Central & Hudson River, almost immediately being promoted to be a signal engineer, and, in 1893, Assistant Superintendent of Signals on the Hudson division of that railroad. He then became Foreman of Electric Signals on the Hartford division of the New York, New Haven & Hartford in August 1894, and was later promoted to Signal Engineer of the Hartford and Valley divisions. In April 1900 he became Signal Engineer of the Delaware, Lackawanna & Western. In March 1903 he returned to the PRR as Assistant Signal Engineer, Lines East. In 1904 he was sent with the Pittsburgh division superintendent Robert McCarty to Britain to study signalling systems. In August 1907 he became Signal Engineer of the Lines East, and in March 1920 became Chief Signal Engineer of the PRR. He retired from this role in 1937 and died, aged 82, in September 1948. Rudd also developed the PRR position light signal.

Frank Rhea was born in 1867 and graduated from the Western University of Pennsylvania in 1892. After graduation he joined Union Switch & Signal, and in 1893 was appointed signal foreman on the PRR at Broad Street station, Philadelphia. In 1894 he joined Bell Telephone as Superintendent of Construction. In 1896 he returned to the PRR as signal inspector on the Lines West. In 1901 he was appointed as Assistant Engineer on the Marietta division, and then on the Logansport division. It was in this role that he co-authored the Rudd-Rhea report. In September 1908, he became a commercial engineer in the railway engineering department of General Electric which, at that time, was manufacturing signals. His career then took a turn into commercial and government service. In the following years he served as district engineer in the Division of Valuation of the Interstate Commerce Commission, and then as a commercial engineer of the Bureau of Foreign and Domestic Commerce. In April 1919 he became a partner of Wheeler, Mechlin & Rhea who were advisory and purchasing engineers. In September 1920 he was appointed industrial trade commissioner for the Bureau of Foreign and Domestic Commerce and was located in China. In December 1924 he was appointed acting American commercial attache for Japan located in Tokyo. He returned to the US in 1925, and died in 1941.

This article was published in the US trade journal 'Railroad Signaling' in August 1935.

infancy. At that time interlocking and manual block signaling formed the major part of signaling work, on the Pennsylvania, the same as on certain other roads at that date, the signaling represented an aggregation of dissimilar devices which had been installed according to no particular standards. Aspects and indications were, in some instances, conflicting in meaning. As a general rule, lower-quadrant two-position semaphores were in use, semaphore blades were of various shapes, sizes and colours. Fish-tail blades were used for distant signals, square-end blades for other purposes. The position aspect of the blades did not in all cases correspond with the colour aspects at night. On some home signal masts the blade for the through main route was longer and wider than those for diverging routes. The blades were located on the mast on the basis of top-arm to the right, so that the blade for the through route might be at the top in some places, but at the bottom or intermediate at others. Furthermore, the colours used for night aspects were fundamentally wrong, white being used for "clear," green for caution and red for "stop," this system having the defect that a broken red roundel resulted in the display of a false-clear night aspect.

Changes Recommended

The more important changes recommended in the Rudd-Rhea report were:

1. Discontinue the use of two-position, lower-quadrant signals, and adopt the three-position, upper-quadrant signal.
2. Eliminate the use of white for the "clear" aspect for night indications, and adopt green for "clear," yellow for "caution," and red for "stop."

For the "stop" aspect of dwarf signals at night, Mr Rhea recommended a dark red (photometric value 50 to 75), while Mr Rudd suggested the use of blue-purple. One reason advanced for the use of blue-purple was to prevent confusion with other signals and to eliminate chances of dwarf signals being mistaken for red lanterns carried by flagmen.

(Blue-purple was adopted for this aspect and was used for years on this road.)

3. The system of aspects and indications included in the report is reproduced in an accompanying illustration (unfortunately not present in the copy given to the editor). This system was based on the use of a one-arm, three-position upper-quadrant semaphore, with a marker light for all automatic block signals, except for the use of a two-arm signal for an approach signal for an interlocking.

The home interlocking signals were based on three arms each. The fundamental feature of the interlocking signals was "speed-signaling" in contrast to "route-signaling," the top arm directed train movements on the through high-speed track, the second arm governed for medium-speed movements over crossovers or turnouts, and the bottom arm governed low-speed movements.

General Principles and Requisites

The essential part of the report was given under the heading "General Principles and Practices," the portion of the report applying to wayside signals for directing train movements being given as follows:-

1. All interlocking and block signals must be of the regulation semaphore pattern, to consist of a mast with movable arm or arms points to the right. The position of the arm indicates how trains shall be governed, as follows:-

- (a) An arm in the horizontal position indicates "stop," inclined at an angle of 45 degrees above horizontal indicates "Caution"; inclined at an angle of 90 degrees above horizontal indicates "Proceed." At night these indication will be shown by coloured lights as follows: Red for "Stop", Yellow for "Caution," and Green for Proceed."

Two full-size lights and arms, and no more, are to be displayed on all signals except dwarf signals, the absence of either showing on the signal itself that it [is] improperly displayed.

Lights in vertical line and full-length arms "Stop" and "Stay" signals. Staggered lights and arms giving same aspect = "Stop" and "Proceed" signals. Colour of light always corresponds with position of arm.

- (b) The arm of a high or limited-high signal in the "Caution" position is a distant signal, is used in connection with a home signal for a high-speed or limited-high-speed route, and regulates the approach thereto. A high-speed signal inclined at an angle of 45 degrees above the horizontal indicating "Caution", proceed prepared to stop at next home signal. Inclined at an angle of 90 degrees above the horizontal indicates "Proceed at speed", high speed signal at 45 degrees and a limited-high-speed signal at 90 degrees indicates "proceed on the limited-high-speed route."
 - (c) The arm of a low-speed or dwarf signal in the "Caution" position indicates that movement is to be made against traffic, or into a siding where no other signal is provided, or with traffic, with the advance signal at "Stop," in the "Clear" position, it governs a movement with traffic, with advance signals "clear".
2. The construction must be such that any failure of part or parts controlling a signal shall cause it to display the "Stop" or "Caution" indication as necessary to protect the point where failure occurs.
 3. All semaphore arms must point to the right, as viewed from the track signaled in the direction movement is to be made.
 4. A separate mast must be used for each track signaled.
 5. Each signal must be placed, wherever practicable, on the right-hand side of the track signaled. Where this is not practicable a bridge or a bracket post may be used, but the latter must not be used where more than one track intervenes between it and the track signaled, and, when a bracket post is used, it must be placed to the right of the track signaled, and a short mast must be provided at night with an illuminated white disk displaying the letter "S".
 6. Advance signals must be used for block signals at interlockings which are block stations.

Use of High Semaphore Signals

1. High-speed or limited-high-speed semaphore signals must be used at interlockings to govern movements from main or running tracks in their right direction to main or running tracks in their right direction, except where low speed is required.
2. Low-speed semaphore signals must be used at interlockings to govern movements from main or running tracks in their right direction to all other tracks where low speed is required.
3. High semaphore signals must be used to govern trains at telegraph and controlled manual-block stations.
4. High semaphore signals must be used to govern trains at train-order stations which are not in block limits.
5. High semaphore signals must be used for automatic block signals.
6. High semaphores must be used for all distant signals.

Use of Dwarf signals

1. Dwarf signals must be used at interlockings to govern main or running tracks in their reverse direction, and all other tracks in either direction.
2. Dwarf signals may be used at interlockings to govern main or running tracks in their right direction at terminal points.

Use of Distant signals

1. Distant signals must be used to repeat the indications of all interlocked, telegraph-block and controlled-manual-block signals, except where the speed of trains is restricted to slow movements by local conditions, and must indicate "Proceed" for high-speed or limited-high-speed routes only, and the distant signal in every case must be controlled by the advance signal and all intervening signals.
2. When interlocking are absolute block stations, the interlocking must be so arranged that the cleared distant signal will indicate that the block is clear.
3. When interlocking are permissive block stations, the interlocking must be so arranged that the cleared distant signal will indicate the block signal is "clear" or "permissive" and if permissive that the track is clear a sufficient distance in advance to allow a train to be brought under full control.
4. Distant signals should not be used with train-order signals which are not in block signal limits.

Number of Arms and Lights

1. Three arms must be used on all high home interlocked signal masts, the top arm to govern the high speed route, the middle arm to govern all limited-high-speed routes, the low arm to govern all low-speed routes. Where there is no high-speed route, the top arm must be fixed in the horizontal position; and where there is no low-speed routes, the lower arm must be fixed in the horizontal position. One light of proper color shall be used at night to indicate the position of each arm on the signal mast. No more than the high-speed, the limited-high-speed, and the low-speed signal arms shall be

used on a home signal mas, our recommendations require dummy arms to be used throughout.

2. The arms must be used on all telegraph block, controlled-manual-block, and train-order signals, the top arm giving the right to proceed, and the lower arm to be fixed in horizontal position. One light of proper colour shall be used at night to indicate the position of each arm on the signal-mast.
3. One arm only shall be used on automatic signals excepting at the first automatic signal approaching an interlocking; and one light of proper colour shall be used at night to indicate the position of the arm. In addition there shall be a second light six feet below and two feet to the left in staggered position, to indicated an automatic signal.

The aspects for automatic block and power-operated distant signals are shown in the four aspects 15,16, 17, and 18, Exhibit 3. These results are accomplished by placing the lower staggered light six feet below and two feet to the left, and adding thereto a second arm on all signals of the "Stop" and "Proceed" type; thus making uniform and further enabling us to carry out the principle that one light or standard arm displayed alone on high-speed signals indicates "Stop". For regular automatic signals, aspects 15, 16, and 17 only will be used. For automatic distant signals, aspects 16, 17, and 18 will be shown. This makes all distant signals uniform, and classes them under their proper type.

4. No back light shall be used on any interlocking, telegraph, or controlled manual block, or train order semaphore signal.

Location of Signals

1. Interlocking home signals must not be placed in advance of the first fouling point or point of danger which they protect. When desirable, they may be placed in the rear of such fouling point. They must be located on the right-hand side of the track which they signal, or, if on a bridge, over the center of the right-hand inter-track space.
2. Telegraph and controlled manual block signals must be located on the right-hand side of the track which they signal, or, if on a bridge, over the center of the right-hand inter-track space. When connected with an interlocking, they must be located as advance signals.
3. Distant signals must be placed a proper distance in the rear of their home signals to allow the fastest train to stop before reaching the home signal, and must be located on the right-hand of the track which they signal, or, if on a bridge, over the center of the right-hand inter-track space.
4. Train-order signals must be located on the right-hand side of the track which they signal, or, if on a bridge, over the center of the right-hand inter-track space.

A train-order notice in block districts, when necessary, is to be provided by displaying an illuminated "O" on the home interlocking signal between the limited-speed signal and low-speed signal will indicate "Stop". When orders are to be delivered at a block station which is not an interlocking, the illuminated "O" will be displayed

below the lower arm, and the block signal will indicate "Stop".

All signal arms must be painted a colour which will show most conspicuously against the background. It is desirable to keep this colour as uniform as possible, but, where adverse conditions prevail, the most suitable colour should be used. The square end arm in present use should be continued.

Manually Operated Signals

1. All interlocking high and limited-high-speed signals, telegraph, and controlled manual block signals should be semi-automatic, and so arranged that they would indicate "Stop" as soon as the front end of the train passes.
2. All high- semaphore signals, mechanically operated, to be pipe-connected.
3. No high-speed interlocking signals should be worked through mechanical selectors.
4. Approach locking should be used in connection with all high-speed signals at interlocking.
5. All distant signals should be power-operated, semi-automatic.

Permissive Telegraph or Controlled Manual Block

Although provision has been made for the permissive telegraph, and controlled manual block, it is our belief that the permissive block under manual control should be abandoned as soon as practicable, for the reason that it is wrong in principle, and impossible to signal properly. All manual blocking should be made absolute.

It is the feeling of the committee that, with rearrangement to some points, it would be practicable to eliminate in the near future, permissive blocking, and that this end should be worked to as fast as possible, but where used it should be only for a freight following a freight. The block signal should be made semi-automatic, controlled with a track circuit at least three-quarters of a mile long, to permit trains to be brought under full control after passing the permissive signal. If the first train is inside of these limits, a block cannot be made permissive, and, if necessary to have a train enter the block, it will have to be done by a hand signal.

Automatic Signals

1. All automatic signals must be one-arm three-position provided with an additional light three feet below the regular semaphore lamp, and staggered two feet to the left, except at distant signals approaching an interlocking where two three-position signals will be used, with a light staggered two feet to the left, three feet below the top semaphore lamp, and three feet above the lower.
2. All automatic signals must be operated normally clear.
3. Track circuit must be used to control all automatic signals.
4. At each signal an indication must be given for at least two blocks in advance.

5. Track circuits must include all turn-outs up to the fouling point.
6. All switches in turnouts, and both ends of crossovers, must set signal to "Stop" when moved from their normal positions.

Spacing of Automatics

Your committee believes that one mile is the proper spacing of automatic signals of ordinary high-speed points; that there are some exceptional high-speed points where it will be advisable to extend the "Caution" indication over two miles. Usually at such points the movement in the opposite direction is slow, and it is frequently desirable to space signals closer, which, whenever conditions will warrant, should be one-half mile apart, thus enabling the signals to be kept in groups. There are special situations, however, of some extent where your committee feels that the signals in one direction should be a mile apart, and on account of the condition of grade in the opposite direction should be some regular distance greater than a half-mile, but less than a mile to provide properly for the traffic, and, therefore, we feel that the spacing of automatic signals should have special consideration for each installation. Particularly on single and double track where ordinary poles are used, when the location signals brings them at a curve, we think that it is very desirable to break the spacing sufficiently to give a good view in approaching the signal, even at the sacrifice of some irregularity in spacing.

With proper placing of signals, it is as a rule unnecessary to have more than two block indications. If it becomes necessary to provide more than three aspects, this can be done by the addition of another arm, which can be made, if desired, to indicate the condition of four blocks; but the committee believes that it would be better to keep the trains apart by extending the "Caution" indication over two blocks instead of one.

Although it has been stated that permissive automatics are necessary at some points, this is not concurred in by the committee. If it becomes necessary to provide for them, we would suggest that a yellow light be substituted for the red light in the staggered position for the night "Stop" indication, and the pacing of a letter "P" immediately above this staggered light, thus indicating the permissive signal by day with the arm in the "Stop" position and the letter "P" displayed, and the permissive indication at night by a red light above the yellow staggered light.

The rules requiring a train to stop for an interval when encountering an automatic signal indicating stop and then proceed, should be restored; the present rule to simply "stop and proceed" should be discontinued. This interval, we think, should be at least one-half a minute, but would recommend the old rule of one minute.

At night, when a signal light is extinguished, but the position of the arm can distinctly be seen, it is necessary to have this interpreted under Tule 27 as an imperfectly displayed signal, requiring train to stop, it would be well to revise the rule accordingly.

Supplementary Report

Realizing that arguments might well be presented for or against certain of the suggestions in the report, the committee prepared supplementary comments, which were attached to, and formed a part of, the complete report. This supplementary report gave detailed arguments on certain subjects such as, green vs. white for "clear," upper-quadrant vs. lower quadrant, normal-clear vs. normal-danger, and the use of electric locking controlled by track circuits. As several of these practices, as recommended in the report, have long since been adopted on practically all of the roads, some of the discussion as given in the report on these subjects is omitted in the following abstract. However, those discussions applying to certain fundamental practices are given herewith in extended abstract form, as follows:

1. Non-uniformity of indications

Fundamentally the square-end semaphore arm, horizontal, and a red light in addition, meant "Stop.". At present it may mean "Stop for orders"; "Stop, the block is occupied" (absolute telegraph block); "Stop, and proceed, the block is occupied" (automatic block); "Stop the route is not clear"; "Stop, and look to a cabin for order, flag or light"; "Stop here if you can, but if not, stop anyway at open drawbridge a thousand feet or so ahead"; "Stop, open switch."

The fish-tail arm was introduced to give advance information. In the horizontal position, with a green light, it may indicate "Caution, switch is open ahead"; "Caution, block signal is at 'stop'"; "Caution, block signal is at 'permissive'"; "Caution, automatic signal is at 'stop'"; and a green light may also mean, enter block permissive.

On the Lines West, a square-end arm, inclined downward 45 deg. means next signal is red; so does a fish-tail, in the horizontal position. On the Lines East, a square-end arm, inclined downward from 20 deg. to 45 deg. is taken as a permissive signal, while an angle between 30 deg. and 85 deg. is considered clear; in fact we have seen distant signals accepted as "clear" on a hot day when inclined 15 deg., and rejected on a cold day in the same position. As home signals are displayed "clear," they may indicate (except on the Lines West within automatic limits) that a block four miles long is clear, or that the route is set up (though there may be a train within one hundred feet or a signal at "Stop" within three hundred feet).

In each case it may be argued that the red light means "stop" and the green light "caution," and, if these indications are decided to be all that are necessary, a large part of our work has been useless; but we felt it necessary to provide for the different indications noted above, as far as possible, without undue complications, as will be seen in our recommendations.

2. Signals sticking in clear position

Such failures can never be entirely eliminated in any automatic system, but improved apparatus is constantly reducing the changes, and we believe the semaphore casting recommended is a further step in this elimination process.

3. *Broken glasses, white light where red should be displayed.*

Covered by recommendations that white light be eliminated as a clear signal.

4. *Signals over-run on account of light out*

Practically eliminated by the use of two lights on each signal, and the increased reliability obtained by improved burners protected with chimneys.

5. *Signal connections out of adjustment, resulting in wrong or indistinct indications*

Eliminated by power-operated signals and almost eliminated by use of pipe connections to home signals.

6. *Distant signal clear, home signal at stop*

An unusual case, but a possible one, closely related to defect No 2, with like remedy. Eliminated at interlocking by use of properly installed approach locking.

7. *Tail lights mistaken for dwarf signals*

Eliminated by use of different color or shade of light for dwarf signals in "Stop" position.

8. *Power-operated switches thrown under trains through detector bars being valueless at high pressures*

Eliminated with proper maintenance by use of electric locking.

9. *Operators changing route after a train has accepted clear signals*

Eliminated by use of approach locking.

10. *Clear signals given with switch locked in wrong position through breakage of connection*

Reduced to a minimum by use of electric locks on switch levers, or special arrangements of bolt locks.

Three-Position Signal

The square-end home signal with fish-tail distant arm underneath (the usual form of automatic block signal on the Lines East) is difficult to distinguish at any distance from a two arm home signal; the shape of the arm is not sufficiently distinctive, and colors are hard to maintain on a road using bituminous coal. At night, separate and distinct indications are given for "Stop," "Caution," and "Proceed." We, therefore, believe the reasons are sufficient to warrant a distinctive position for the "Caution" arm by day. The arm extended is the natural "Stop" signal; the "high-ball" is universally used for "come-ahead"; the logical and natural indication for "Caution" is half way between "Proceed" and "Stop"; lastly, to be consistent, the position for "Stop" should not be used for the position for "Caution."

The determining factor, however, which has led one of the committee to his decision, is the peculiar function of the three-position home signal at interlockings where, by its use, traffic may be facilitated and a bad practice removed, which now prevails over the system, except within automatic signal limits on the Lines West. This function would be of the greatest value at large terminals, and consists in displaying the home signal in the caution position when the route is clear and the next signal at "Stop," thus carrying the distant indication through

consistently, instead of, as is our practice, holding the distant at "Caution" and then displaying the home "Clear" with the advance at "Stop," instead of showing the home also in the caution position. It is true that this indication might be given with the home and distant two-position system, but another arm or arms would be required.

Location and Number of Arms

At the first interlocking installed, the old English system of top arm governing to track farthest to the right was employed, and is now used on one important line in this country. Any one of four arms may govern the high-speed route, depending on the locality. A longer arm is used for the main track, but at night a longer light has not been found practicable. This requires an engineman to carry a map of each place in his mind. The next development was the use of the top arm for the main running track, second arm for diverging to the right, third to the left, etc. In many cases there was no route to the right, and sometimes none to the left.

Speed-Signaling Developed

We developed various arrangements when we got to four-track working, preserving the feature of top arm for main route, and other arms as convenience or special conditions dictated, except that, until recently on the Pittsburgh division and for some time uniformly on the Lines West, two arms only were used, the lower governing to all diverging routes. Other roads, notably the Chicago & North Western, Erie, Delaware, Lackawanna & Western, introduced a dwarf signal at the foot of high posts, when needed to govern slow-speed routes, as into sidings or against traffic. This was move fully worked out on the Delaware, Lackawanna & Western; the top arm governing the main running track, second high arm to any other running track, and "route signal" (so called to distinguish it from the dwarf standing alone) to sidings and reverse direction tracks. Finally, this system has, within the last two years, been fully developed at some points on the Pennsylvania Lines East, establishing the principle of signalling speeds, instead of tracks.

The top arm governs the movement at the highest speed possible at each place; the second arm to all diverging high-speed routes, that is over No 15 and 20 cross-overs; and the low speed arm, or route signal, to all diverging routes over turnouts where low speed is required.

The committee endorses this scheme, but goes further and recommends that instead of one, two, or three arms only, the two high-speed and one low-speed arms shall always be provided, whether or not the routes exist, so as to differentiate between the different signals, and suggests further that in reality by use of three-position signals, six speeds are signalled.

Power Distant Signals

The use of power-operated distant signals is regarded as almost a necessity by nearly all signal engineers, and it should be insisted on in all cases. A pipe-connected distant signal is as expensive as a power-operated one, if located at any distance from the cabin; a wire-connected one, if located more than 1,200 ft. from the cabin, cannot be relied on, and must have inspection on each change of

temperature to keep it in proper adjustment. The connections are easily interfered with, and if back wire breaks, signal may get to "Clear," while if the front wire fouls, the lever may be put normal by stretching the back wire with the signal remaining at "Clear"; besides this, distant signals, to be effective with our high speeds under all conditions, must be located anywhere from 3,000 ft. to one mile from the cabin, and cannot be operated mechanically. Power-operated signals always give a uniform throw, and proper electric locking prevents a change of route, if by any possibility they should stick "Clear."

Use of Advance Signals

The use of advance signals at all interlockings is necessary if the remainder of recommendations for permissive signals and order notices are adopted, for two reasons:

1. The present method of indicating "orders" in block signal limits is crude; it requires an engineman to look to two different places for orders to proceed, and finally leads to confusion on a three or more track line.

The scheme is to stop a train at the home signal, then display an illuminated letter "O," and, after the engineman has acknowledged it, to clear the home signal, and allow the train to proceed to the cabin, or if route is not clear, to hold it at the home. If engineman should disregard the "O," and proceed past the cabin he would be held by the advance block signal, and it is, therefore, necessary. In automatic limits, the advance signal is generally now provided, and in such cases it would have to be made semi-automatic, and placed under control of the operator.

2. The proposed permissive cannot be given at the interlocking signal if there is a diverging route, and, as a matter of principle, should be given at the block signal only, although, as another matter of principle, it should not be given at all. This phase is, however, discussed later.

An engineman running 80 miles per hour, with mile blocks, must pass a signal every 45 sec., must be continually on the lookout, and must think and decide on the instant. With matters on the engine itself requiring constant attention, it is not far to expect him to attend to them, watch his track, switch lights, etc., and then take in the entire landscape hunting for signals, sometimes on the left of the track, and sometimes outside three or four tracks on the right. Signal should be located, whenever practicable, on the right-hand side of the track signalled. In the opinion of the committee, it should always be practicable.

Mr Rudd's recommendation is that a rule be made, requiring room for a ground post or bridge leg next to the main track, and that, without any exception whatever, sidings must be thrown out to proper centers, and no blind, bracket posts be allowed, and he further believes that signals on bridges, bracket posts, and ground posts should be as nearly as possible of equal height for further uniformity.

Permissive and Automatic Blocking

These subjects are so closely related that they will be discussed together. As an ideal system of blocking, your committee would recommend the manual-controlled block with continuous track-circuit protection, and blocks approximately one mile long. This would embrace all the

advantages of the automatics, while retaining the absolute block feature, policing the railroad every mile, checking the men in disregarding signals, and, in case of failure, removing the trouble at the earliest moment. The cost, however, would doubtless be considered prohibitive, but the fact remains that the absolute block, fully observed, is the only entirely safe way to handle trains.

Theoretically, the automatic block is absolute, yet we make it permissive for all trains alike after one minute, and lately we have gone still farther toward the permissive feature, by eliminating the one-minute wait; the next logical move would be to eliminate the stop, thus making the automatic system completely permissive. We hope the wait-a-minute rule will be re-adopted: (1) it gives a man time to look about and get his bearings; (2) it gives time for the block to clear, and a man can make better time through the block if he knows it is clear than if he is running on sight; (3) it is safer, as, if there is a breakdown, the flag has more time to get back.

Increase Waiting Time

Failures are few, and if all trains were run at equal speeds, we should recommend at least a five minute stop, but, with varying speeds, the blocks must be long enough so that the fastest light trains, and heaviest freight trains on grades, with low-braking power, can be stopped between signals, and this means that slow trains must follow in under the red automatics in order to get over the road; we must, therefore, recognize that the permissive feature is necessary in the automatic system, but let us make it permissive after a stop and wait of one minute, remembering that if two trains do get together they endanger not only themselves but fast trains on adjoining tracks.

The automatic gives definite notice that a train is in the block and generally within less than a mile; the telegraph block, as we use it, shows that none may be within 50 ft. or away four or five miles; the privilege is abused, the speed is entirely too fast "under the green," and on the Lines East, passenger trains are allowed to follow freights permissive under certain conditions. Finally, all depends upon the

operator; he may give a permissive signal to a passenger train, thinking it a freight, and the engineman, knowing that he generally receives this signal only when a freight is to take a siding with time to do it and 10 minutes beside, runs at his usual speed under such conditions. This danger could be eliminated by not allowing passenger trains to accept the permissive signal. Again the operator may leave his signal clear for three or four trains; this could be prevented by making the signals semi-automatic, as recommended. Lastly, he may give a clear signal with a train in the block; this can only be prevented by extending the track circuit clear through, and so arranging the circuits that signal shows "stop" until the train has passed a prescribed point, then may display green until another train enters, but cannot be cleared until the block is clear. This is the only reasonably safe way to operate, but if we go that far we might as well shorten the blocks, install automatics, and enforce discipline.

Final Conclusions

It is true, we have not had wrecks daily, but we have had good men and good luck. The change may come any time, and it would seem safe to provide against it. Trains are now stopping at signals westbound between Altoona and Gallitzin; this we think proves that they can stop and start anywhere, and the "permissive automatic" will not be needed. As to giving more than two block indications, we are opposed to it, and believe it would be better and safer on heavy descending grades to make the blocks so long that trains may release and recharge between signals, even if this requires signals two miles apart.

Our last conclusion is that spacing of block signals is a matter to be studied in each particular case; that no hard-and-fast rule can be laid down; and that sufficient expert work has not been done on this important matter in the past, with the result that at many places the blocks are entirely too short for fast running. They should be spaced to meet not only our present but our future needs as far as we are able to gage them.





Two more photographs from Kerang, also taken on 20 June 2016. Wellington St crosses the line at the Up end of Kerang yard and flashing lights were provided in December 1968. Most unusually, No 2 Track was provided with two light dwarf signals, N & Q protecting the crossing. (Left) This photo shows Dwarf Q and Home P on the north side of the crossing. Both signals are standard McKenzie & Holland K2 DC searchlight signals – but note the full size background and long hood which are very unusual for a dwarf signal. The mounting of the head is also unusual, being mounted directly on the end of the tubular steel post (normally the K2 mechanism is mounted on a bracket which is clamped to the side of the post – as seen in the background for Home P). The flashing light masts must have been replaced at some time, as they do not date from 1968, being of modern construction with galvanised posts and electronic bells. Below is the view towards Melbourne from Wellington St, with Down Home M on the right and Down Dwarf N on the right. The Up end plunger locked points can be seen in the middle distance, with the Down Home, illustrated on the cover, in the far distance. Both photos, Andrew Waugh.

