SOMERSAULT

JULY 2016
VOL 39, NO 4

SIGNALLING RECORD SOCIETY OF VICTORIA

SOCIETY CONTACT INFORMATION

Published by the Signalling Record Society Victoria Inc (A0024029F)

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: (07) 3289 7177, email: signal-1@bigpond.com

MINUTES OF MEETING HELD FRIDAY 20 MAY 2016, AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS, VICTORIA

Present: – Wilfrid Brook, Glenn Cumming, Graeme Dunn, Michael Formaini, Ray Gomerski, Chris Gordon, Judy Gordon, Andrew Gostling, Chris Guy, Bill Johnston, David Jones, Keith Lambert, David Langley, Neil Lewis, Bruce McCurry, Andrew McLean, Michael Menzies, Colin Rutledge, Laurie Savage, Rod Smith, David Stosser, Rob Weiss, Andrew Wheatland and Ray Williams.

Apologies: – Ken Ashman, Jon Churchward, Graeme Cleak, Steven Dunne, Chris King, Steve Malpass, Peter Silva, Alex Ratcliffe and Andrew Waugh.

Visitors: – Jim Gordon.

The President, Mr. David Langley, took the chair & opened the meeting at 20:09 hours, following the completion of the Annual General Meeting.

Minutes of the March 2016 Meeting: – Accepted as read. Graeme Dunn / David Stosser. Carried.

Business Arising: – Nil.

Correspondence: – Nil.

Reports: – Archives. David Langley reported that the repair to the floor had been completed. Glenn Cumming advised that he had received a phone call from V/Line indicating that V/Line would be writing to SRSV asking SRSV to vacate the rooms in Seymour. If that eventuates, SRSV will be seeking a new location to house the collection currently stored at Seymour.

General Business: – Glenn Cumming reminded the meeting that membership renewal forms had been sent and urged members to renew their membership.

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

- The "NX" control panel at Camberwell will be replaced by screen based equipment later in 2016.
- An absolute occupation for signalling works between Richmond – Camberwell is planned for the long weekend in June 2016.
- An absolute occupation for all lines between Caulfield – Moorabbin will commence in late June 2016 for grade separation of the level crossings at Ormond, Bentleigh and McKinnon. The Down and Centre lines will be returned to service in August 2016 with the Up line to follow in September 2016.
- Heidelberg – Rosanna will be duplicated including the tunnel.

Rod Smith asked what is happening with high capacity signalling. Chris Gordon replied that an Expression of Interest for potential suppliers opened last week. The specification requires in cab signalling.

(Front cover) For 62 years this magnificent signal box with its 74 lever rocker frame, seen here early in November 1969, controlled traffic through Essendon. On 16 November 1969 it was replaced by a panel in the station and boom barriers at Buckley Street level crossing. Essendon signal box was one of a few signal boxes around Victoria that was up on stilts, effectively becoming a three story building with the locking room being in the middle. The height of the box allowed the signalman a good view of the Down end of the yard over the island station building. Essendon was opened in 1907, and signal boxes of similar design were subsequently constructed at Ballarat A Box (1910), Box Hill (1911), and Mordialloc (1911). Fairfield (1913) and Sunshine (1914) were also three storey signal boxes, but they had the slightly later hipped roof with deep eaves on all four sides. Unfortunately, in its later years Essendon signal box succumbed to the advertising craze and sported a number of large adverts. Photo: David Langley

Colin Rutledge provided details about various works and projects around the Country District. A summary of the discussion follows: –

- The conversion of the Mildura Line to standard gauge will commence in June 2017 with the rebuild of the Ararat – Maryborough Line being done at the same time.
- The Korong Vale group of lines will be converted 12 months later.
- The proposed arrangements at Dunolly were described.
- The proposed arrangements at Maryborough were described.
- The Gheringhap – Maryborough stage of the project has been revised as dual gauge for this section of line.
- The new crossing loop at Rowsley will be commissioned next weekend.
- Details of proposed works on the Ballarat Line were provided.
- Ballarat Signal Box will be abolished next weekend with remote control from Centrol to be provided, including remote control of the interlocked gates at Lydiard Street.
- Future V/Line works will provide the opportunity to introduce the next generation of computer based interlockings to replace existing solid state interlockings and "Westrace" interlockings.
- A new dual gauge turnout will be installed at the down end of the North Melbourne flyover later tonight. This turnout is a new design and features switchable crossings.
- Level crossing closure times between Sunshine – Deer Park West Junction have become very lengthy due to the amount of rail traffic now operating on this section.

Syllabus Item: - The President introduced Member Chris Gordon to present the Syllabus Item.

Chris's presentation titled "How To Control An Interlocking" was a follow on from the earlier presentation on Computer Based Interlockings.

Chris described the wide variety of processes and systems from a variety of suppliers used in Victoria to control the various interlockings around the state.

The presentation was accompanied by a variety of images at different locations around Victoria showing the equipment being described.

An excellent presentation was thoroughly enjoyed by those present.

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

Meeting closed at 22:40 hours.

The next meeting will be on Friday 15 July, 2016 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 21/16 to WN 24/16, 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.

30.05.2016 Bacchus Marsh (SW 41/16, WN 21)

Between 2045 hours Friday, 27.5., and 0230 hours Monday, 30.5., the approach clearing of Up Homes BMH726 and BMH728 when No 1 Road is not occupied was removed. Down Departure Home BMH714 was altered to display Medium Speed aspects.

30.05.2016 Rowsley Loop (SW 41, 46 & 49/16, WN 21 & 22)

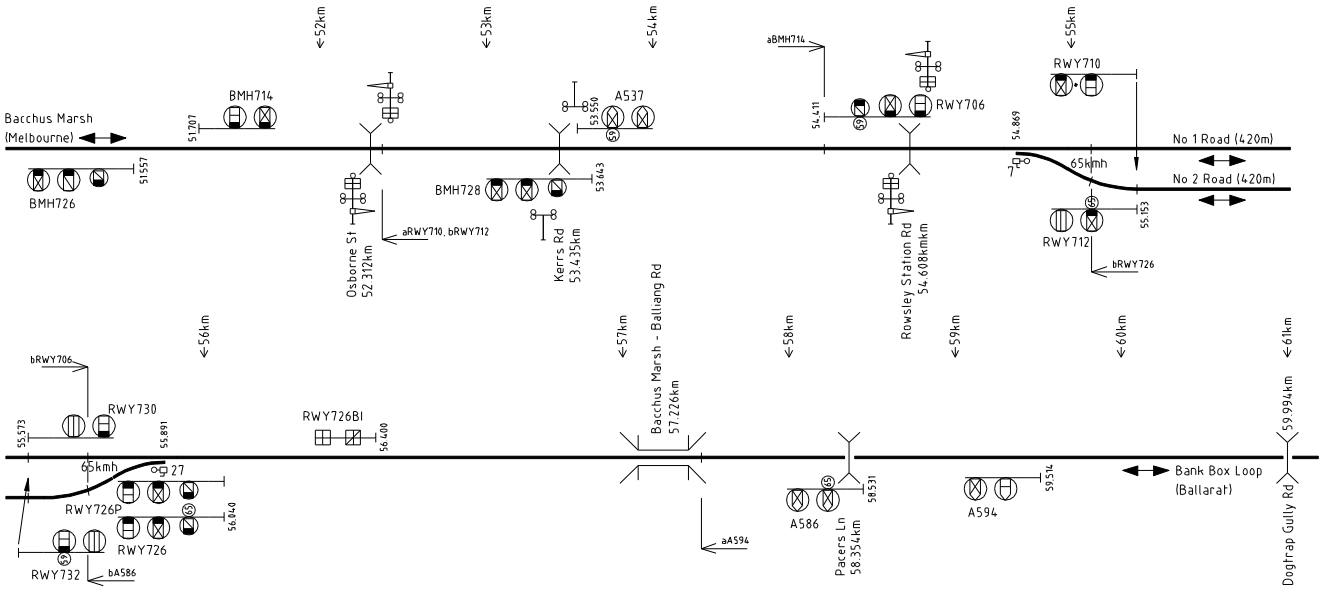
Between 2045 hours Friday, 27.5., and 0230 hours Monday, 30.5., Rowsley Loop (54.869 km) was commissioned. The single line ATC sections became Bacchus Marsh – Rowley Loop – Bank Box Loop. Rowsley Loop has 420 metres standing room. No 2 Road at Rowsley Loop is booked out of use and trains are not to cross there.

Down Automatic A537, Down Homes RWY706, RWY730 & RWY732, Up Homes RWY710, RWY712, & RWY726 (with co-acting signal RWY726P), Up Banner Indicator RWY726BI, and Up Automatics A586 & A594 were provided. Points 7 & 27 were provided, but secured normal. Both of these points are 65 km/h turnouts.

All Home signals at Rowsley Loop and Automatics A537 and A586 are provided with TPWS (TSS). In addition, over speed TPWS (OSS) will be provided on the approach to Homes RWY706 & RWY726 and Automatics A537 & A586.

The Flashing Lights at Rowsley Station Rd (54.608 km) were provided with boom barriers. They will continue to be worked using a Level Crossing Predictor and operation will be automatic for all trains.

Down Home A551 and Up Automatic A552 were abolished. The 'T' board for Up trains near Rowsley Station Rd was abolished.



Rowsley Loop 2016

Diagram 32/15 (Bacchus Marsh – Bank Box Loop) replaced 28/15.

If a Driver experiences poor wheel/rail adhesion resulting in longer than usual stopping distances while approaching Rowsley Loop, they must immediately inform the Train Controller. The Train Controller must not then allow opposing trains to approach Rowsley Loop at the same time. One train must be held at Bacchus Marsh or Bank Box Loop until the opposing movement is stationary in the loop. This operating restriction will remain in force until the track force has examined the track and determined that there is no contamination of the rail head that could affect braking.

30.05.2016 **Ballarat** **(SW 41/16, WN 21)**

After the passage of the last trains between Ballarat East and Deer Park West, and between Ballarat East and Wendouree on Friday, 27.5., the signal box was abolished. Control of the line between Deer Park West and Wendouree was transferred to Centrol.

The Sigview VDU for the section Deer Park West – Bungaree, the Phoenix VDU for controlling the local Ballarat area, the unit lever control panel for operating the Lydiard St gates, and the staff proving box were abolished.

(31.05.2016) **Bungaree Loop** **(SW 50/16, WN 22)**

Commencing forthwith, the special instructions dealing with the operation of Points 3 are cancelled. SW 14/16 is cancelled.

01.06.2016 **Warrenheip Loop** **(SW 48/16, WN 22)**

Between Saturday, 28.5., and Wednesday, 1.6., the Down end trailable point machine and banner were relocated to the Down side of the line. This is to improve the sighting of the point banner and to provide a better location for hand operation of the point machine. Amend Diagram 188/11 (Warrenheip Loop – Ballarat East).

02.06.2016 **Axle counter reset procedure** **(WN 22)**

On Thursday, 2.6., Metro General Operating Procedure 14 (Axle Counter Reset Requirements at new signalling installations on the MTM network) was issued.

04.06.2016 **Cheltenham** **(SW 143/16, WN 23)**

On Saturday, 4.6., Up Home 18 was renewed. The new post has LED heads.

06.06.2016 **Cardinia Road** **(SW 131/16, WN 21)**

On Monday, 6.6., the following alterations took place in preparation for duplication of Cardinia Road.

- Up Automatic D1722 was replaced by D1712. Up Automatic D1712 is situated 20 metres from the Up end of Platform 1 at 53.688 km. D1712 is equipped with TPWS (TSS).
- Track circuits AD1645T, BD1645T, CD1645T, D1721T, AD1800T, BD1800T, CD1800T, D1712T, & AD1712T were renewed as CSEE type.
- The panels at Pakenham and Centrol will be altered to reflect the change in track circuit name.

Diagram 3/16 (Narre Warren – Pakenham) replaced 29/13

(07.06.2016) **Deer Park West – Wendouree** **(SW 51/16, WN 23)**

Operating Procedure 67 (Deer Park West – Bungaree) was reissued to reflect the relocation of control to Centrol. SW 35/14 is cancelled. Operating Procedure 74 (SW 128/13) was cancelled.

(07.06.2016) Ballarat (SW 52/16, WN 23)
Operating Procedure 70 (Ballarat Train Staff Working) was issued to cover the management of the Train Staff at Ballarat. SW 66/10 is cancelled.

13.06.2016 Camberwell (SW 140/16, WN 23)
Between Saturday, 11.6., and Monday, 13.6., the existing NX panel was replaced with a VDU based Sigview control systems. The existing train number transmitter, CCTV displays, and communications equipment was relocated to the new operators desk.

14.06.2016 East Richmond (SW 142/16, WN 23)
Between Saturday, 11.6., and Tuesday, 14.6., Crossovers 228 and 291 were provided with M23A dual control point machines. The selector levers will be secured by signal maintenance padlocks and the points cannot be operated by Operations staff. The emergency pump handle provided in a cabinet adjacent to the Down Burnley Local line was secured out of use. Amend Diagram 83/12 (East Richmond – Glenferrie).

14.06.2016 Burnley (SW 142/16, WN 23)
Between Saturday, 11.6., and Tuesday, 14.6., Points 219D and 231D were provided with M23A dual control point machines. The selector levers will be secured by signal maintenance padlocks and the points cannot be operated by Operations staff. Circuit alterations were also undertaken. Amend Diagram 83/12 (East Richmond – Glenferrie).

End£

LETTERS TO THE EDITOR

From SRSV Member Rod Kent :-

In the late 1940's I caught the 8.02am train from Brighton Beach and travelled to Balaclava.

The 8.02am had to wait until the train from Sandringham arrived.

The trains were all Tait red rattlers. In those days there were Guards as well as Drivers. The Guard had a navy blue uniform with a blue tie. He also had a blue cap similar to the police force of today. On the uniform was a sliver badge with VR on it plus his registration number. His number was also on his cap.

In the Guards Van there was a 'dicky' seat with steps leading up to the seat. There were two small windows, one looking along the roof of the carriage and the other looking out of the rear of the train.

The Guard had red and green flags, a kerosene lamp which had a white, red and green light. He also had a silver whistle on a chain around his neck.

The whistle blew when he waved the flag for the departure home. As the Sandringham train was just ahead, the signal was often yellow but the train departed and mostly went to green.

I would have liked that mechanism because there were only about 30 departures a week.

Each time I was on the train I kept an eye on every signal to Balaclava.

I also watched the heavy pantograph about three feet in front of the window. I knew every join in the copper wire which sometimes produced a spark.

Coming into Elsternwick, the VR style signal was yellow, rarely green, because of the interlocked gates and trams. When the VR style signal went to green I was as happy as a boy of 9.

The experience burned into my brain the love of VR signals and that is why I have seven on my property which are all in working order.

ESSENDON

(Continued from Vol 39 No 2)

Power signalling northwards

On the Down side of Essendon block working with Winters block instruments still reigned supreme in the mid '60s, as it had done for nearly eighty years. Over this time the sections had been shortened as the train service increased; Glenroy had been established as a block post in 1902, and Pascoe Vale in 1929. By the mid '60s the length of the sections, and the grades Pascoe Vale – Glenroy and Strathmore – Essendon would have been limiting the service that could be provided. The minimum headway between Essendon and Broadmeadows, for electric trains, was five minutes on the Down and seven minutes on the Up. Freight was even slower: a Down Through Goods with a full load was timetabled 18 minutes from Essendon to Glenroy, and the Up wasn't much better at 10 minutes.

It is not surprising, then that three position automatic signalling was provided between Essendon and Broadmeadows on 15 November 1965 and the double line block sections Essendon – Pascoe Vale – Glenroy – Broadmeadows were abolished. At Essendon itself the provision of power signalling resulted in minimal changes, the Down Starting Post 56 (lever 66), and the Up Repeating E360 were abolished. Post 54 (the setback discs from the Down line) was replaced by an elevated searchlight dwarf, but remained worked by levers 21 to 23 to minimise locking alterations.

One curious feature of the new power signalling was the provision of an Up Home worked from Essendon situated on the Down side of Pascoe Vale Rd at Pascoe Vale station. The purpose of this signal was to allow the Signalman at Essendon to hold an Up goods at Pascoe Vale, at the foot of the grade, until it could get a clear run at the bank. The signalman was instructed not to place Post 2 at Pascoe Vale to proceed for an Up Goods unless the preceding train was closely approaching Post 6 at Essendon and that signal was at proceed. The home was worked by 'lever' 2 at Essendon. This was almost certainly a switch mounted on the block shelf, not a full sized lever located between the two gate wheels. The value of this signal would have to be questioned – using it would mean requiring the goods to come to a dead stand near the foot of the bank. The subsequent slow ascent of the bank would have done little for line occupancy!

Resignalling Essendon

The provision of power signalling northwards meant that Essendon itself was an island of mechanical signalling on the line. Plans were soon formulated to replace the signalbox with a panel situated in the station building. The opportunity was taken to drastically simplify the layout at Essendon and, essentially, to reroute the Up and Down main line around the island platform. Of course, almost all trains now ran through Essendon and there were very few shunting or terminating movements.

The first stage of alterations took place on 9 June 1969 with the abolition of No 5 Track, Siding A, and the Coal Stage Siding. (The coal stage itself, of course, would have been long gone and it is not known what use had been made of the siding since the withdrawal of terminating steam trains.) Baulks were provided at the Up end of No 5 Track and in siding A. Discs 59 & 61 on Post 40, Disc 37 on Post 45, Discs 65 & 71 on Post 46 and Discs 54 & 64 on Post 53 were abolished. Levers 13, 37, 54, 59, 61, 64, 65, & 71 were sleeved normal.

The track layout at the Up end was further simplified on 21 September 1969 when the connections from No 4 Road to the Carriage sidings were abolished. Points 47 were replaced by a single bladed catch, still worked by Lever 47. Points 42 were abolished, and Points 43D were spiked reverse. Discs 36 (Post 45) & 62 (Post 40) were abolished. Levers 36, 42, & 62 were sleeved normal.

On 5 October 1969, No 2 Road was abolished together with the associated signalling. Crossover 33 was abolished. Points 32D were spiked reverse, and Points 51 spiked normal. Homes 9 (Post 43), 69 (Post 52) & 70 (Post 40) and Disc 57 (Post 41) were abolished. Plunger 31 became a pilot lever. A fixed train stop was provided in the Up end lead towards No 2 Rd beyond Points 45. Levers 8, 9, 22, 33, 34, 50, 51, 57, 69, & 70 were sleeved normal.

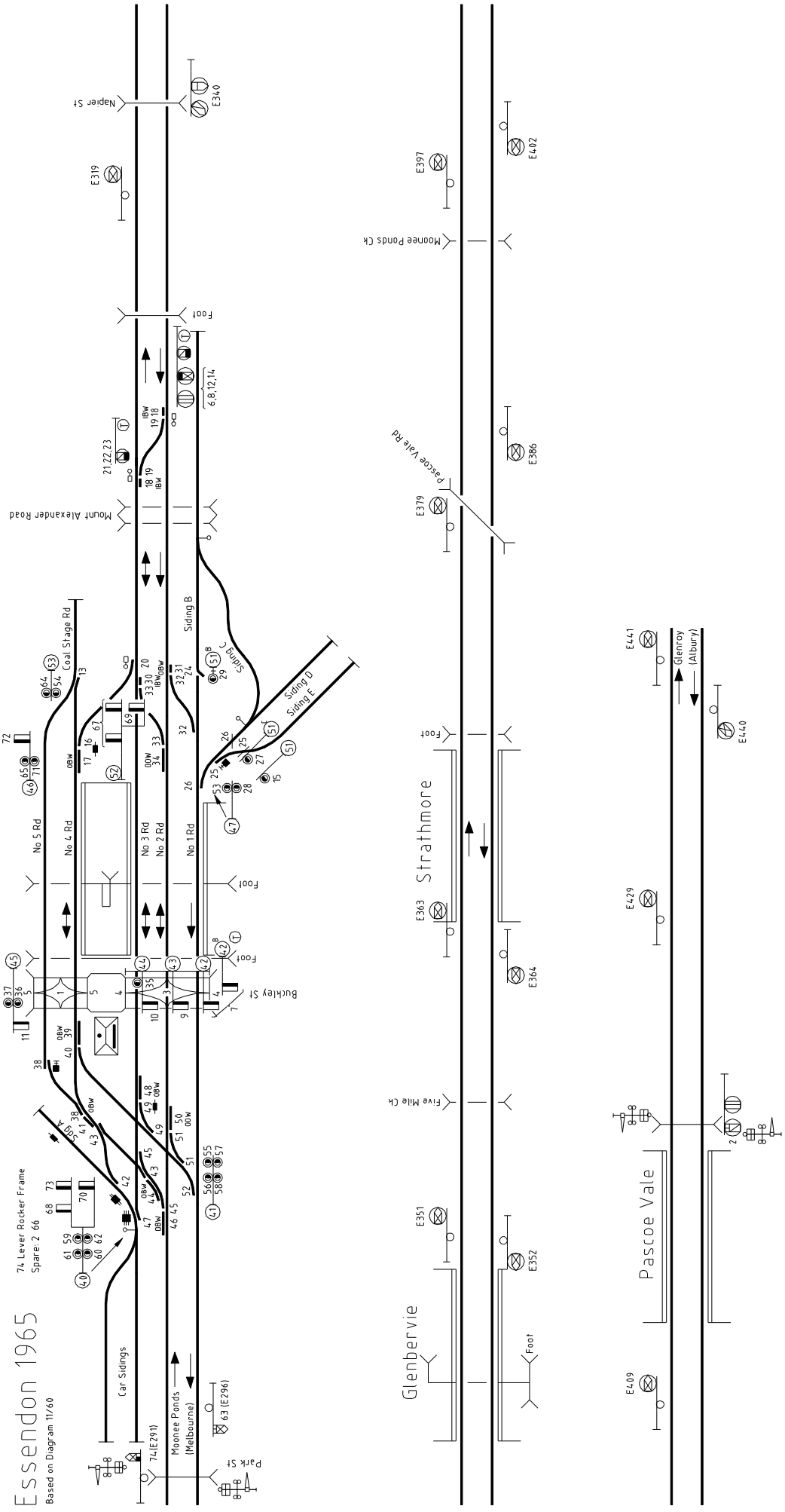
Circuit alterations were made on 2 November 1969 to allow the final remnant of No 5 Rd to be removed. Points 38U were spiked normal and Lockbar 41 abolished. Levers 38 & 41 became pilot levers. When the Homes on Post 40 were at stop, the normal speed warning aspect on E291 was approach operated and time delayed due to restricted overlap.

As mentioned earlier, Up Home Post 2 at Pascoe Vale was of dubious value, and on 5 November 1969 the control was removed and it was converted to an Automatic and renumbered E424. The telephone provided at the signal was removed. Responsibility for ensuring a clear run up Essendon bank was henceforward placed on the Train Controller:

> To avoid Up Goods trains being checked by signals approaching the grade at Glenbervie, the Signalman at Broadmeadows must obtain the permission of the Train Controller to allow the train to depart. The Train Controller is to allow a sufficient interval of time after the departure of the preceding train to ensure that the Goods train has a clear run to the Home Arrival signal at Essendon

Finally, on 16 November 1969 the signal box was replaced by a 23 lever unit level control panel located in a room off the station office. The relay room was located on the island platform close to Buckley Street.

The layout was drastically simplified. The Up and Down main lines were slewed to run around the island platform. Switchout facilities were provided and Illuminated letter 'A's were provided on Homes 8, 18, 24, and 36. No 1 Road became a loop off the Up line and crossovers were provided at each end to allow Down trains to run through No 1 Road. Sufficient crossovers


Essendon 1965
Based on Diagram 11/60
74 Lever Rocker Frame
Spare: 2 66
Car Sidings
Moonee Ponds (Melbourne)
74(E291)
63 (E296)
Park St
Mount Alexander Road
Napier St
E340
E319
Foot
6,8,12,14
21,22,23
18 19
19 18
IBW
Coal Stage Rd
No 5 Rd
No 4 Rd
No 3 Rd
No 2 Rd
No 1 Rd
Siding B
Siding C
Siding D
Siding E
Siding A
Buckley St
Foot
OBW
OOW
IBW
Moonee Ponds Ck
E397
E402
Pascoe Vale Rd
E379
E386
Strathmore
E363
E364
Five Mile Ck
E351
E352
Glenbervie
Foot
Glenroy
(Albury)
E441
E440
E429
Pascoe Vale
E409

were provided to allow Down trains to run through any platform, but Up through trains could only run through Nos 1 and 2 Roads. Up trains could originate, however, in No 3 Road. The two carriage sidings were retained, however access was only available from No 3 Road. The goods sidings and refuge siding were retained unchanged. Access to the refuge siding was worked from the panel. Access to the goods yard, however, was by a four lever ground frame electrically released from the panel. The two sets of interlocked gates at Buckley Street were replaced by boom barriers. A 5P keyswitch was provided to lower the boom barriers if it was necessary for a train to pass a signal protecting the level crossing at danger. The Down Controlled Automatic E291, an upper quadrant semaphore, was replaced by a searchlight signal with working A and B lights.

Dual control point machines were not provided. The instructions for emergency operation of the points during failure were:

Electrical Fitter available – The Electrical Fitter will arrange to release the points in accordance with the instructions pages 108-109 General Appendix.

Electrical Fitter not promptly available – A point handle for operation of the points by the Signalman or other qualified employee is provided in the cabinet at the base of the Control Panel. The handle is secured with a 5P padlock. The removal of the handle will secure all Signals at the Stop position, however, in the circumstances indicated hereunder, it may be possible for a Low Speed indication to be displayed.

Method of operation – Place all point levers in the proper position for the route required. Withdraw handle and proceed to defective points. Unlock 5P padlock securing the cover of the handle aperture and insert handle. Rotate handle until the points are operated to Normal or Reverse, as required, and continue winding until reaching the mechanical stop.

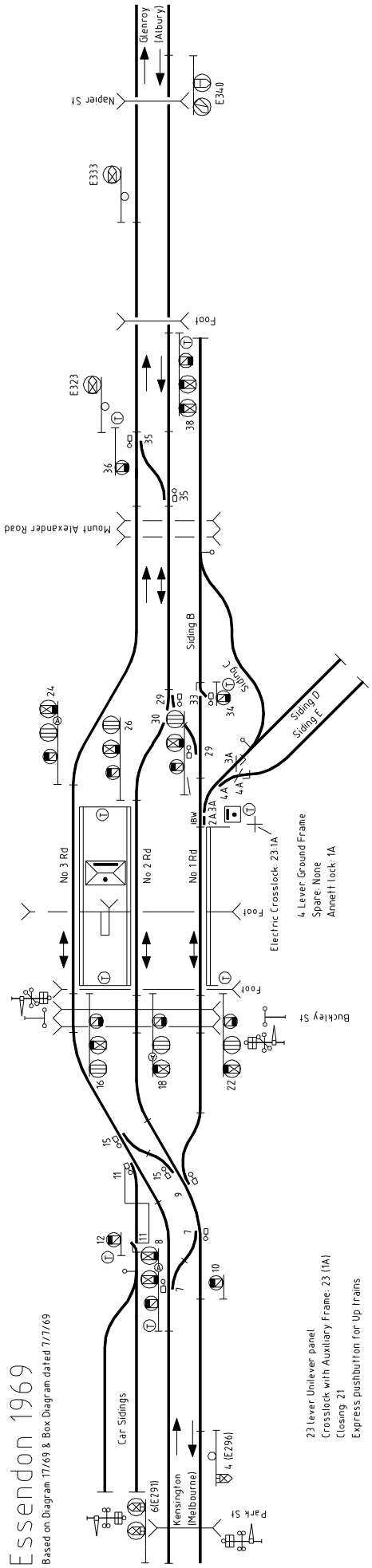
Each end of the double-ended points (Nos 7, 15, 29, and 35) must be operated independently.

Operation of Low Speed Indication – When the Signalman has operated the points as described above or has been advised by a qualified employe that the points have been so operated, he must then reverse the applicable Signal lever and press the low speed button. If the points in the route are correctly detected and electrically locked, the Low Speed Signal will clear for the movement.

Low Speed Signal fails to operate – In the event of the Low Speed Signal not functioning, the Signalman must arrange for all facing points over which the train is to travel, to be secured by means of a point clip.

A Caution Order must then be issued as authority to pass the Home Signal at the Stop position.

THE EMERGENCY POINT HAND MUST ONLY BE RESTORED TO ITS RECEPTACLE IN THE STATION OFFICE BY THE ELECTRICAL FITTER.



Essendon panel was switched in Mondays to Fridays 0615-1245 and 1545-2130. Two trains stabled at Essendon overnight and between the peaks. Four trains terminated at Essendon in the morning peak and three in the afternoon peak. The local goods service ran on Tuesdays and Fridays. It arrived at 0927. On Tuesdays it returned to the city at 1135, but on Fridays it was extended to Broadstore, departing at 1054 and refuging at Essendon on the return from 1428 and 1508. The parcels office was on Platform 1, and the Down parcels coach passed through at 2031 and the Up at 2122.

With the provision of the relay interlocking, the following 15 years saw little change at Essendon. On 30 April 1972 Post 22 was relocated 6 feet in the Up direction to improve sighting of the signal. The signal circuits were altered to allow more use to be made of the point handle on 16 December 1973. On 1 April 1974 a push button was provided in the microphone cabinet on No 2 platform to allow Up express trains to be identified for the correct operation of the Puckle St level crossing at Moonee Ponds when the panel was switched out. Point detection was added in the A light circuits of Homes 8, 18, 24, and 38 on 15 December 1976.

The decline in the eighties

The eighties and early nineties saw a slow reduction in facilities at Essendon as the nature of the railway changed. As late as 1978 the WTT showed that there was still one train in the morning peak that terminated and formed an Up service, and one set still stabled at Essendon overnight and a another between the peaks.

The first reduction was the shortening of Siding B to 100 metres in July 1981. Measurements on Google maps strongly suggest that this marks the removal of Siding B on the Mount Alexander Rd bridge. The refuge was probably unnecessary by this time as there were so few overtaking moves at Essendon by this time that any trains could have easily been refuged in No 1 Rd.

The goods sidings were removed on 3 April 1986 and the ground frame was abolished. The points to the goods sidings were abolished on 6 April 1986. The stub remnant of Siding B was retained at this time – perhaps there was still an occasional need to refuge a long train. My collection of Working Time Tables is patchy in this period, but it is thought that local goods service ceased in 1984.

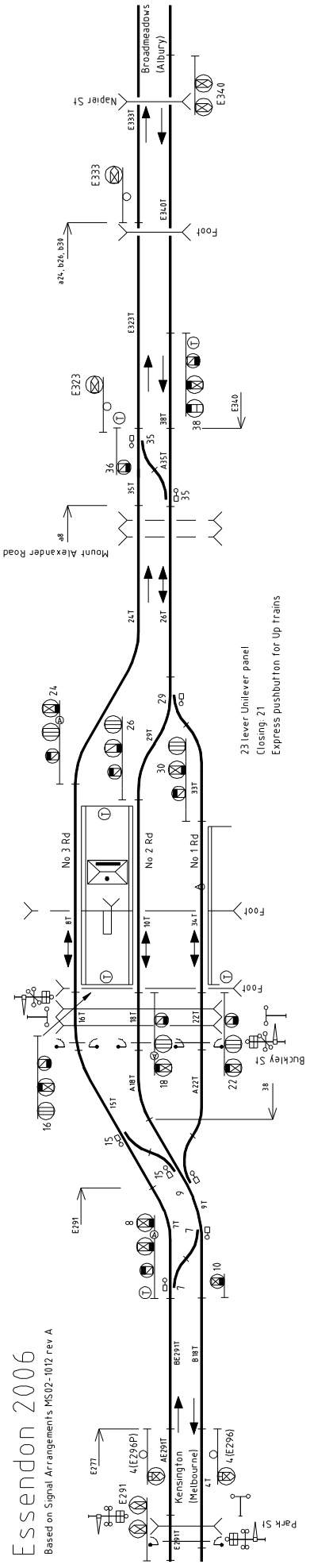
Siding A (the Car Sidings) was abolished on 27 November 1988 and Points 11 and Dwarf 12 were abolished. Apparently the siding was lifted without any reference to head office and without the Points being booked out. Subsequently, on 4 June 1989, the control on Automatic E291 was removed and lever 6 became spare.

On 2 June 1991 a co-acting signal provided on right hand side of line for Up Automatic E296.

Automatic pedestrian gates were provided on the Up side of Buckley St on 7 August 1991. This might have been the first time that pedestrians could legally cross the line on the south side of Buckley St.

The final remnants of Siding B were taken out of service on 7 August 1991. Points 29U were spiked reverse and Dwarf 34 was removed.

By 6 December 1998, the panel was only switched in Mondays – Fridays 0800-0830 and 1200-1220.



A LED illuminated letter 'A' replaced the incandescent illuminated letter 'A' on the Up Home 18 on 14 December 2000. The LED came from Blackburn.

Around 2000 a partial renewal of the signalling equipment south of Essendon was carried out. The most visible part of this renewal was the replacement of the upper quadrant semaphores between Newmarket and Essendon by light signals. This occurred sometime between 1998 and May 2001 – the exact day does not seem to have been recorded in the Weekly Notice. The original GRS train stops between Kensington and Essendon were replaced by JAE mechanisms over two days commencing 8 May 2002. The light units on Up Automatics E296 & E296P were replaced by Westinghouse RX8 210mm LED units on 2 June 2002. Interestingly, the underlying 25Hz signalling power supply, track circuits, and relays were retained.

The Train Number Transmitters to Kensington and Broadmeadows were changed to PC based equipment on 19 February 2005.

Additional track circuits 9T & 9AT were provided as part of the turnout fouling project on 5 March 2005.

The Sepac telephone used to communicate with Centrol was removed on 25 June 2006 as part of the decommissioning of the Sepac system. A reflection on the value of Essendon as a signalled location at this time was that no replacement direct Centrol phone was provided. By mid July 2007 the block hours were Monday – Friday 0715-0830.

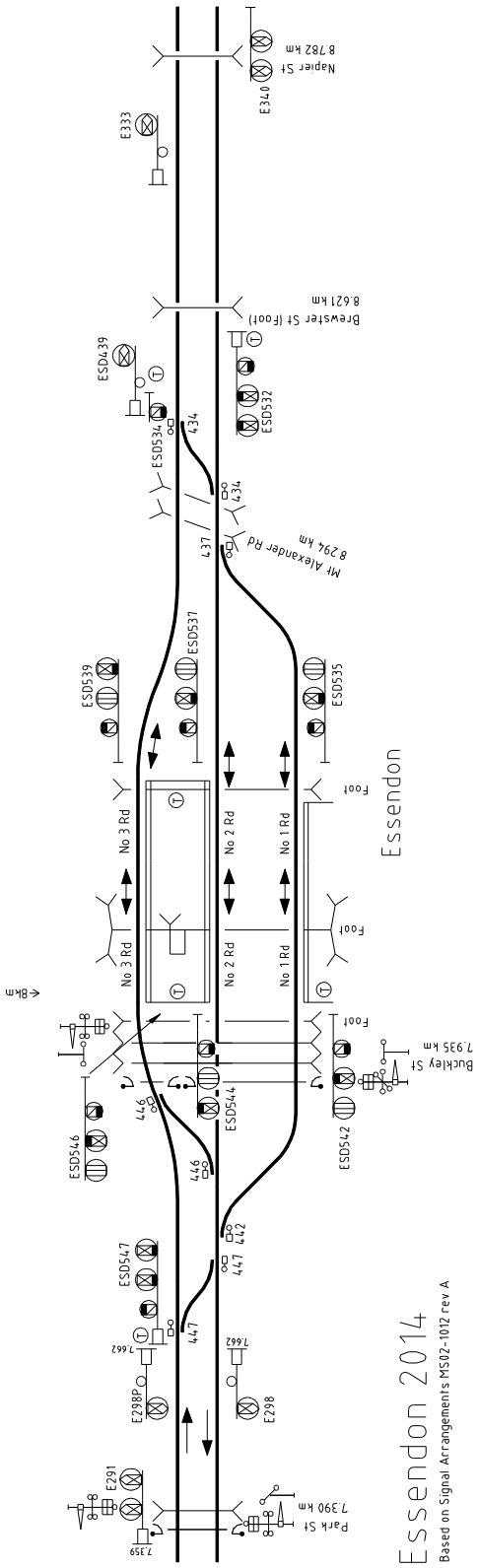
On 24 September 2006 automatic pedestrian gates were provided on both sides of Park Street.

Traffic light co-ordination was provided at Buckley Street on 19 April 2009. The flashing light lamps at the crossing were converted to LEDs at this time. In March 2014 this co-ordination required a special instruction to be issued to prevent the co-ordinated traffic lights from flashing amber. When an Up train was to be signalled from Nos 1 or 2 Platforms to the Up line, Points 29 (at the Down end of the platforms) had to lie for the track the train was departing from. Points 29 could not be moved to the opposite lay until Homes 18 or 22 displayed a proceed aspect. These special instructions remained in force until Essendon was resignalled.

Resignalling again

On 10 June 2014 the section between Kensington and Essendon was resignalled using computer based interlocking equipment. Essendon signal box was closed and all points and signals were controlled from a workstation at Kensington signal box. The relay interlocking and control panel was abolished. No track alterations were made. All signals were replaced with new LED masts, except for Dwarf 10 which was abolished. The switch out facilities were removed and none of the new signals were equipped with illuminated letter 'A's. The point motors were not renewed, but the emergency point crank was secured out of use.

A bug was quickly discovered in the configuration of the interlocking. If an Up train was signalled from No 2 Road, and a following train was signalled into No 1 Road, this would cause Up Home ESD544 to go to Stop in the face of the first train. A special instruction was issued at the beginning of July 2014 prohibiting the signalling of the second train into No 1 Road until the departure of the first train had put ESD544 to stop. On 19 July 2014 alterations were made to the Express/Stopping selection at Buckley St when Essendon was in 'partial fleeting' mode. The bug relating to ESD544 was fixed at the same time and the special instruction was cancelled.



Today Essendon is a shadow of its former importance. But, operationally, it is still the most important station between Kensington and Broadmeadows.

1890 BLOCK WORKING INSTRUCTIONS

(Continued from Vol 39 No 3)

BLOCK INSTRUMENTS.

From the diagrams and explanatory remarks herewith the different circuits may be traced and the uses of the various portions of the instrument better understood.

The plunger *A* (Figure 10) consists of the rod *a*, which working in a brass socket (not shown); the small spring *b*, which is the local circuit; the main, or line, spring *c*, to which is connected the line wire; the stud *d*, or top contact as the fitters term it, to which is connected the wire leading to the relays; and the bridge *e*, or battery contact, so called because it brings the line battery in circuit with the line when the plunger is pressed. These five pieces are all insulated from one another, being mounted on a wooden base.

The plunger is two distinct circuit closers, the rod *a* and spring *b* being similar to a simple press button, and the three remaining parts forming an open circuit key exactly the same in principle as the ordinary bell key.

The pole changer *C*, which is controlled by the switch lever *S*, consists of two bent springs (*f* and *g*), a rocking shaft (*s*), to which is attached a small piece of brass (*h*), and the stud *c*, to which is connected the carbon pole of the line battery; the zinc pole of battery being connected to *s* through the socket *z*. The different portions of the pole changer are insulated from one another.

The relays, which are fixed in the base of the instrument, do not differ in any great degree from ordinary relays. *B*, the one nearest the pole changer, is termed the bell relay. It is an ordinary bipolar relay, or rather, a relay with a non-polarised armature. It is used to bring into action a local circuit consisting of the bell coils and the line battery. It is affected by all currents received from the distant station, is wound with No 30 wire, and has a resistance of about 60 Ohms. The second relay (*P*) is termed the polarised relay, as its armature is polarised by a large permanent magnet (not shown). It moves in accordance with the direction of the last current sent by the distant station. Its use is to partly close one of two local circuits, consisting of the local battery and the electro-magnets, that control the movements of the "Train going to" needle. It is wound similarly to the bipolar relay.

The adjustment of polarised relay is different from the polarised relay as used on our telegraph lines, inasmuch as, when the armature has been moved to one side, it will remain there until a change takes place in the direction of the current from the distant station. It is termed a double current relay.

Both relays are in what is termed the main circuit. They are always connected to line, except when the plungers are pressed in.

Immediately above the relays are fixed the electro-magnets that control the needles of the dials.

The red, or "Train coming from" indicator (*R*) consists of two bar electro-magnets, the coils of which are connected up as if they were the coils of a horse-shoe electro-magnet. They have a combined resistance of about 12 Ohms. Between the poles P^1, nearest the dial, swings a small polarised armature *ra*, which is fixed rigidly to the small spindle carrying the pointer. In front of the opposite ends is pivoted the armature *m*, carrying the bell hammer *bh*. The coils of this electro magnet are in a local circuit, consisting of the line battery local contacts (*l*) of the bell relay, and the pole changer; so that every time a current is received from the distant station on the bell relay, the hammer strikes the bell once. The needle moves in accordance with the pole changer, and serves to record the position of the lever when the last signal was received from the distant station.

The black, or "Train going to," indicator (*T*) consists of two separate electro-magnets, *em* and em^1, one only being magnetised at a time, according to the position of the armature *P* on the polarised relay. A small polarised armature *ba* swings in front of one end of the electro-magnets and is similar to the red needle, except that its movements are not due to reversals of magnetism in the cores, but to the alternate magnetising and demagnetising of the electro-magnets *em* and em^1. Pivoted between the other ends of the electro-magnets is another polarised armature *x*, which moves between two stops *y* y^1. These are used for interlocking instrument for single line working, and they are also intended for interlocking and controlling the starting signal out of doors. The coils of the electro-magnets on the black needle dial have each a resistance of about 4 Ohms.

The small black press button *k*, which has been lately added to many of the instruments, is merely a simple circuit closer. It is placed in the local circuit controlling the "Train going to" needle. Its object is to prevent the black needle from moving at an improper time when sending a signal. This is accomplished by not pressing the button until the proper "Line clear" or "Train arrival" signal has been received. Consequently, the local circuit is never completely closed until the polarised relay has been corrected by the current from the distant station.

Before commencing to trace the various circuits existing in the instrument, it must be borne in mind that, as all the movements and indications are dependent upon the relative changes of polarity in the electro-magnets, it is very necessary that the instruments should be exactly alike, that is, so far as connecting up is concerned. It will be found that all the terminals have the same relative position in every instrument, and further, that if a current from the *z* pole of battery entering the line terminal of one instrument moves the relay armature into a certain position, so likewise will it do the same in any of the other instruments. If this were not the case, there would be no end of confusion.

In ordinary telegraph work, it does not matter much whether a certain wire goes to battery or register first. In a block instrument, it is often of vital importance. Therefore, those who have to interfere with the instruments should, before disconnecting any part in the interior of them see the way the wires are fixed, otherwise they may get into a helpless state of confusion.

Having briefly described the various parts of the instrument, and their particular duties, it will be well to see how they are connected in the several circuits.

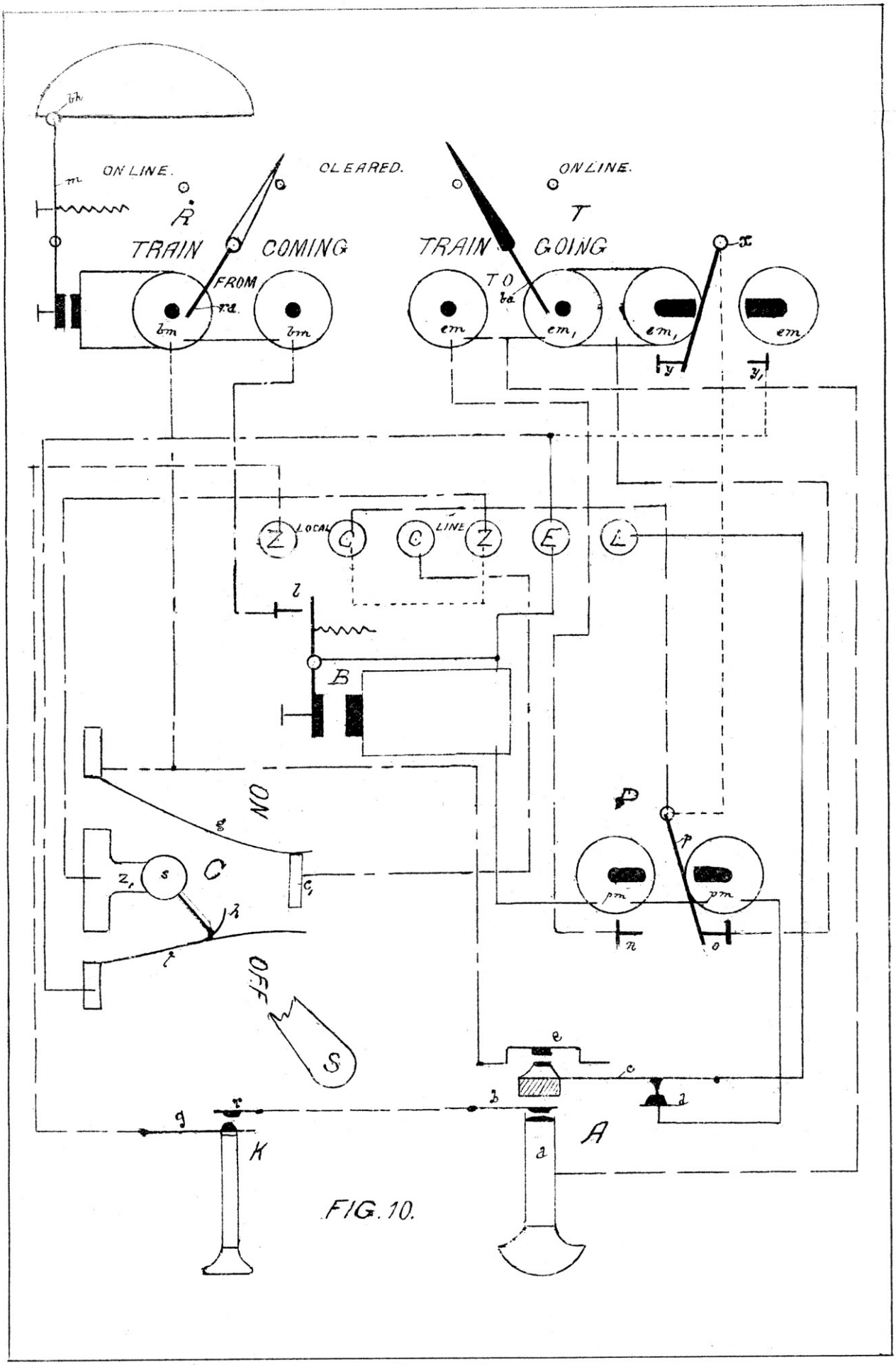

ON LINE.
CLEARED.
ON LINE.
TRAIN COMING FROM
TRAIN GOING TO
LOCAL
LINE
NO
OFF
S
K
A
B
C
P

FIG. 10.

To do this, it will be best to trace the course of the current in the various transactions of signalling. First with the levers at each end at "Off," the normal position.

You wish to send a signal to the distant station. Press the plunger in. Contact is made between *a* and *b*, broken between *c* and *d*, and made between *c* and *e*. Then commencing at the *C* pole of your own line battery, the circuit is as follows:- From *c* of line battery to stud e^1 in pole changer, to spring *g*, to bridge *e*, to spring *c* of plunger, to line. From terminal *z* of line battery, to socket z^1, to rocking shaft *s*, to stud *h*, to spring *f* of pole changer, to earth. You notice that your own relays are cut out of circuit At the distant station the current will traverse the following circuit:- Plunger at rest. From line to spring *c*, to stud *d* of plunger, to polarised relay coils, to bell relay coils, to earth. Then, as all currents received affect the bell relay, the points *l* are closed, and we have a local circuit closed – commencing at the *C* pole of line battery, to stud c^1, to spring *g* of pole changer, *bm* coils of red needle, turning the needle to "Cleared," and causing the hammer to strike the bell, then to front stop, to armature of bell relay, to earth terminal. *Z* of line battery to rocking shaft *s*, to spring *f* of pole changer, to earth terminal. Thus the line battery at the receiving station is made to do duty as a local.

Next, suppose that the distant station has asked you for "Line clear," and you wish to give it to him. You will first turn the switch lever to "On," that changes the pole of the battery next to line. Plunger pressed home. *C* of line battery to stud c^1, to spring *f* of pole changer, to earth. *z* of line battery, to shaft *s*, to spring *g* of pole changer, to bridge *e*, to spring *c* of plunger to line. At the distant station the signal is received as before, except the current being reverse the armature *P* of polarised relay will move across to the opposite contact screw *n*. The distant station, receiving the proper "Line clear" signal, will immediately acknowledge it. To do so he must press the button *K* and the plunger at the same time. Notice what takes place in his own instrument. First a local circuit is closed, causing the "Train going to" needle to move to "On line."

The circuit is as follows:- From *c* of local battery to armature *P* of polarised relay, to stop *n*, to left-hand electro-magnet *em* of black needle dial, to rod *a* of plunger, to spring *b*, to press button *K*, to *Z* of local battery. The current magnetises the electro-magnet *em*, and causes the needle to be attracted. At the same time, the armature *x* at back of the coils is attracted towards the stop y^1. The current is sent to line and received at the near station in just the same manner as before, but, as we placed the lever at "On" before the signal was sent to the distant station the position of the poles of our line battery are changed, so that on receiving the acknowledgement from the distant station the red needle will turn to "On line," the circuit being as follows:- *C* of line battery to stud c^1, to spring *f* of pole changer, to earth terminal; *Z* of line battery to shaft *s*, to spring *g* of pole changer, to coils of red needle dial (causing needle to turn to "On line"), to local points *l* of bell relay, to earth terminal.

Now trace what will happen at the distant station if the person there should turn his lever to "On" while the "Train going to" needle points to "On line." Trace the circuit, and we will find that the line battery is short circuited. *C* of line battery to stud c^1, to spring *f* of pole changer, to earth terminal. *Z* of line battery to carbon of local battery, to armature *p* of polarised relay, to polarised armature *x* at back of black needle coils, to stop y^1 to earth terminal; and, as we traced the *c* pole of line battery to same terminal, the battery is on short circuit so long as the "Train going to" needle is at "On line" and the lever at "On." Therefore, it is impossible for the person at the distant station to send signals to you, or you to make the bell ring at the distant end. That constitutes the interlocking for single line working. If we wish to use the instrument on a double line, it is only necessary to disconnect the wire connected to the stop y^1.

Supposing, now, we wish to signal the arrival of the train. The lever must be put to "Off" at the sending end, and the necessary signal sent to the distant station, the circuit being from *C* pole of line battery to stud c^1, to spring *g* of pole changer, to bridge *e*, to spring *c* of plunger, to line terminal. *Z* of line battery, to socket z^1 to *s*, to spring *f*, to earth.

Distant station acknowledges on receiving proper arrival signal, pressing in the plunger and press button.

The circuit sending the current to line is same as before, but the local circuit will be from *C* of local battery to armature *p* of polarised relay, to stop *o*, to coil em^1 of black needle coils, to rod *a*, to spring *b* of plunger, to press button *k*, to *z* of local battery. The electro-magnet em^1 being magnetised causes the needle to turn to "Cleared," and the armature *x* to move across to the stop *y*, thus disconnecting the *Z* pole of line batter from earth at that contact. Of course, the *Z* pole of line battery is still connected to earth, but through the pole changer, as the lever is at "Off."

It will be noticed that certain parts of the instrument do various duties. For instance, the line batter does two - firstly, as a line battery; and secondly, as a local battery. Now, before anyone can deal properly with a fault he must know the duties of every part of the instruments, otherwise a fault is only cured by stumbling over it.

Take the case were the signals cannot be got from the distant station. First, see if the distant station get your rings. If so, that proves the line, the line battery at the distant end, the main circuit between the line terminal, the plunger, and the earth at the distant station, and the earth, line battery pole changer, and that portion of the main circuit between the line terminal, the plunger, the pole changer at your end are all complete. If the bell relay at your end does not work it may be out of adjustment; if not, the fault may be the spring *c* does not make contact with the stud *d* in plunger – this spring sometimes gets strained – or perhaps there is a broken wire between plunger and relays to earth terminals. To test for either of these take a small piece of wire and touch the line terminal, and either of the two line battery terminals; then if you get no response the fault will be there.

If your bell relay works, then the fault will be found elsewhere, viz., the wire leading from bridge *c* of plunger to pole changer at the distant station. If your bell relay

works in obedience to signals sent by the distant station, but the bell will not ring, and the distant station gets your rings all right, then the fault is purely local, and will be found to exist either at the local points of bell relay, which may not be making good contact, the wires leading to or forming the coils of bell movement may be broken, or the coils of bell movement may be short circuited. If the fault cannot be found by inspection, recourse must be had to a galvanometer or a telephone receiver. Short circuits are only likely to occur in the old form of instrument, as care has been taken in the later patterns to avoid the trouble. Continuity of circuit in bell coils can be proven by closing the relay points and moving switch from "Off" to "On" a few times, when the needle should move in accordance with the switch. If needle moves, and bell armature does not, the armature may be out of adjustment, or the current is weak. Look for loose of dirty connexions about relay, pole changer, line battery, and all else pertaining to them.

Secondly, suppose signals cannot be exchanged with the distant station, see if the signals are received on your bell relay. If not, the fault is most likely wire broken between the springs c of each plunger, including the line wire, or the earth connexion may be bad or broken. At an intermediate block station – that is, a station with more than one instrument – the broken or bad earth wire may show itself as a cross the two instruments working together. Or the fault may be dead earth between the stations. Special note must be taken that an earth shows the same results as a break on a block line, as the main battery is only at one end at a time. To test for dead earth or break, put a galvanometer or telephone receiver in circuit between line and the line terminal, and notice if there is any effect on it when the plunger is pressed in.

If the signals are received on the bell relay, the fault is confined to your instrument, and it will most likely be found to exist in the line battery, pole changer, and the wires leading between them, as they are the only portions common to the main and the local circuit, that is assuming only one fault is on at a time.

Thirdly, the "Train coming from" needle fails to move in obedience to the lever. If the signals are received on the bell all right, the fault is in the needle. See that the inducing magnet has not fallen onto the armature spindle, also that the armature and needle are fixed rigidly to the spindle, and in their proper position to one another, viz., in line. See that the small pivots are not broken, and that there is sufficient end shake between the pivot holes. If all is correct mechanically, then the pole pieces of the electro-magnet may require adjusting. The armature is generally about one-sixteenth of an inch from the pole pieces, and it will be found that the needle works best when the pole pieces are separated from one another by about an eighth of an inch. Sometimes the needle will not work, owing to the inducing magnet becoming partially or wholly demagnetised. If so, care must be taken to remagnetise it, so as to give the proper polarity to the needle. If the needle works reversed, see that the line battery has been connected to the proper terminals, and that the right end of the inducing magnet has been placed next the needle armature.

Fourthly, if the "Train going to" needles fails to move in obedience to the signals received from the distant station, first see if the polarised relay armature has moved to the proper stop. If it has, test the local circuits by pressing in the plunger and press button, and move the armature of relay from stop to stop. If the needle does not move, try if each coil is magnetised by alternately touching them with a piece of iron. If no magnetism is in either of them, the fault will be in the local battery or some portion of instrument and circuit common to the two coils – that is; dirty contacts at the relay points, broken wire between the Z of the local battery, press button, plunger, contacts, and middle of the two coils, or between *C* of local battery and armature of polarised relay. If only one coil shows magnetism the fault will be found in the opposite coil, or in the wire leading from the coil to the corresponding stop of polarised relay. The most prevalent cause of "Train going to" needle failing is the breakage of the spring *b* in plunger and the wire leading to the spring. It should be remembered that want of magnetism in the coils may be due to a short circuit in the coil, and that a short circuit and a break show the same symptoms. If the magnetism of the coils is all right, the needles and armature must be examined as is the "Train coming from" needle.

Finally, if the polarised armature of the relay does not obey the signals from the distant station, the cause will be that the relay is out of adjustment, but that does not necessarily mean that the screws must be altered. There are no fluctuations in the current in ordinary working sufficient to throw the relays out of adjustment; therefore, the cause must be sought for elsewhere. Now, if the current has become weak, find out why. Do not alter the relay to suit the weak current. If careful examination is made, no doubt a loose connexion between earth and earth will be found to be the trouble.

In the latest type of instrument the pole changer is constructed as follows:- On a square ebonite base is screwed a circular brass ring cut into five pieces (*l*, *h*, *z*, *z*, *c*). (See Fig. 11.) Through the centre of the base is a brass stud. A brass lever *s* works on the stud, and to the lever are screwed two German silver springs *f* and *g*, which are insulated from one another, and the ends of which press on parts of the ring. This form of pole changer has given satisfaction. In its action the contact between the springs and ring is made by rubbing surfaces, thereby always ensuring good connexion. The ring requires to be occasionally wiped clear, and a very little oil or grease put on the surface; in fact, just rubbed with an oily rag. Care must be taken that the springs severally press on the ring with sufficient pressure. This is obtained by turning the screw in the centre of the switch to the right, or in the direction clock hands move.

In the bell relay the wire is wound on wooden bobbins, thus preventing the risk of contact between the wire and cores or short circuit of the wire, as the inside ends of the coil are brought out through the flanges of the bobbin.

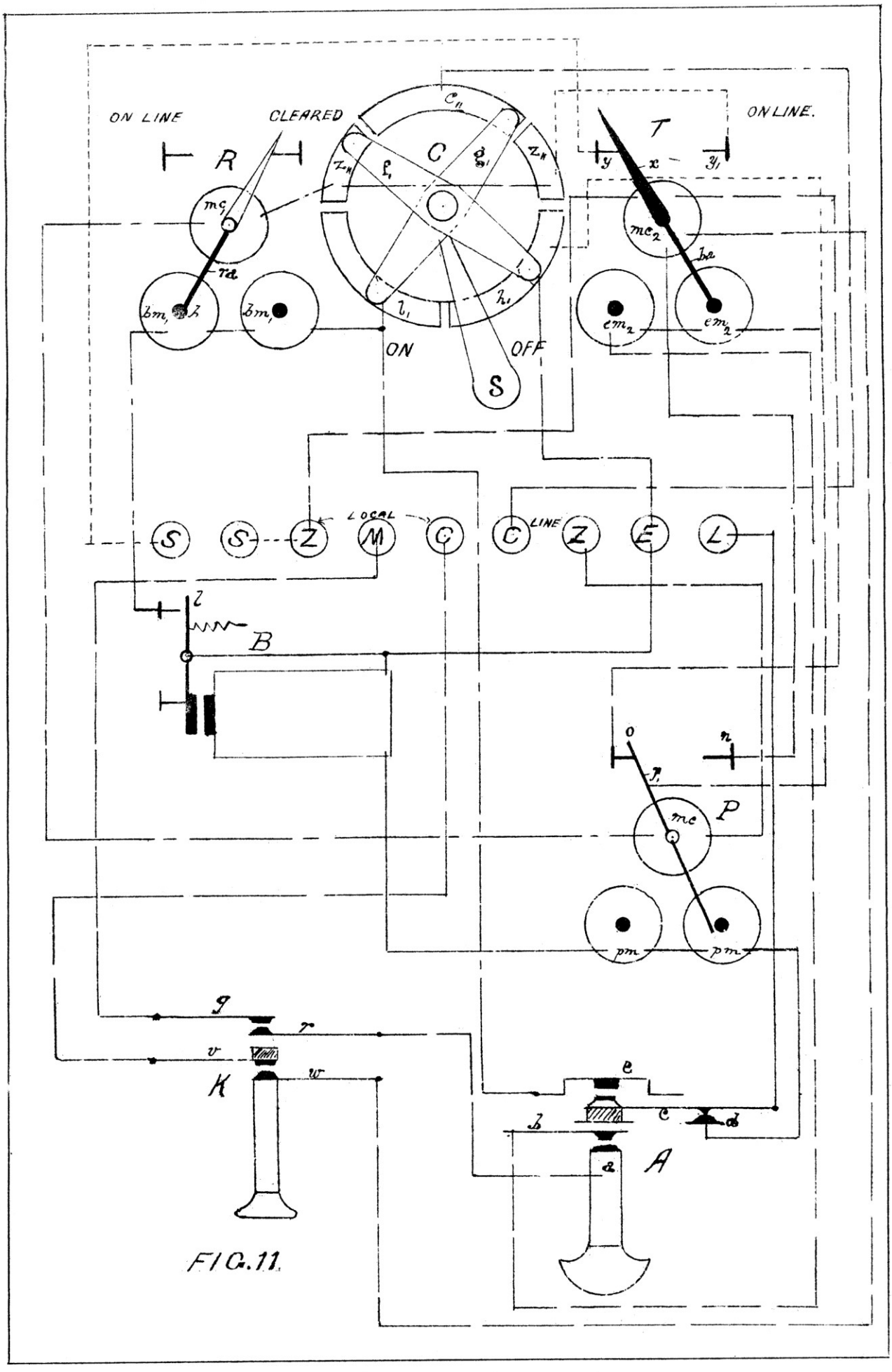

ON LINE
CLEARED
R
C
T
ON LINE.
ON
OFF
S
LOCAL
LINE
S
S
Z
M
C
C
Z
E
L
B
P
K
A

FIG. 11.

Second.- The stand carrying the armature is divided just about the middle, and the two portions insulated from one another. This arrangement allows of the contact screw working in brass instead of in an ebonite collet as heretofore. Also, the connexion between the bell coils and contact screw is made independent of the adjusting screw.

This polarised relay is a great improvement on the old form, requiring much less current to work it. This is due to an improvement in the shape of the pole pieces, which can be readily seen on inspection.

Like the bell relay, the coils are on wooden bobbins, thus getting rid of many cross contacts.

All the coils of the relay are wound with wire about No 30 gauge. They have twenty-two layers of wire on each, and measure about 30 Ohms resistance, i.e., the resistance of each block instrument, measured between the earth and the line terminals, is about 130 Ohms.

The coils on the "Train coming from" or bell movement are wound with No 26 wire, have about fourteen layers of wire on each, and a combined resistance of about 14 Ohms. The coils of the "Train going to" needle have about fourteen layers of No 25 wire, and measure each about 4 Ohms.

All the bobbins and cores in the instruments are of size, viz., 3/8 of an inch in diameter, and 2½ inches between the flanges. Each instrument requires a little over 3 lbs. of wire.

These instruments can only be worked on a double line as there is no armature fixed on the "Train going to" coils to perform the interlocking.

The only difference in the circuit arrangement of this pattern is that the local points of the bell relay are placed between the "Train coming from" coils and the earth terminal, instead of between the pole changer and the "Train coming from" coils in the old pattern.

We now come to a new departure in the block instruments altogether, viz., the abolition of permanent magnets, and the substitution of electro-magnets to do the work of polarising the several armatures. The use of electro-magnets to induce the necessary polarity in armatures of block instruments was first introduced by Mr. Tyers, a prominent telegraph engineer in England and the maker of various kinds of train signalling instruments. He always uses an electro-magnet where an armature is required to be polarised.

The idea to use them on our instruments suggested itself in consequence of the great difficulty we had in getting good permanent magnets. It was some little time before they could be arranged satisfactorily, but the difficulties were overcome, and all the instruments that are now being made are furnished with electro-magnets. The adoption of electro-magnets necessitated a re-arrangement of the various circuits as follows:-

The first thing to arrange was for the polarising of the armature of what we will still term the polarised relay. It was evident that this could only be done by bringing into action the line battery by the closing of the bell relay points, and as the current through the magnetising coil must always be in the same direction – as the polarity of the magnet must not alter – it was necessary it should be unaffected by any movement of the pole changer.

Next, as the "Train coming from" needle had to move when the distant station gave the acknowledgement, it was equally necessary that the coil for inducing magnetism to that needle armature should be in the same circuit as the coil for magnetising the armature of the polarised relay. Therefore, both the magnetising coils are placed in circuit between the line battery and the pole changer. By so placing them in this position of the circuit, no movement of the pole changer can affect the relative magnetism of the coils *mc* and mc^1.

To arrange for the magnetising of the "Train going to" needle would have been an easy matter, but that the new instruments were to have the interlocking arrangements put in for single line working, and also for the controlling of the starting signal. To do that, the whole of the circuits controlling the "Train going to" needle had to be re-organised, the needle being moved by reversals in the magnetism of the electro-magnet controlling the needle. The local battery, consisting of two parts, necessitated the magnetising coil being wound with two distinct wires in circuit with the two portions of the local battery.

The following is a short description of the several parts of the instruments as now constructed :-

The bell relay has been improved by affixing a spiral spring to the armature, also by putting a small contact spring on it, thus ensuring a better and longer contact in the bell circuit and a perfect adjustment of the armature.

The polarised relay has only had the magnetising coil fixed in lieu of the permanent bar magnet.

The "Train coming from" or bell movement has been made as a horse-shoe magnet with three poles, the spindle carrying the needle, and armature being carried through the centre of the magnetising coil, the bell armature and the needle armature now working at the one end.

The "Train going to" movement is constructed almost the same as the other, and having made the armature of the needle do the work formerly done by the two separate armatures, a perfect agreement is made between the indicating and interlocking portions of the instrument, whereas in the old form it is common fault for the "Train going to" needle to fail and the lock to work all right, or *vice versâ*. The pole changer and plunger have had no change made in them, except the addition of a contact spring on bridge of the plunger, to prevent the signalman from sending too quickly.

The press button consists of a double circuit closer – that is, it has for springs which make contact in two pairs.

The only circuits which it will be necessary to describe in the new pattern instrument are those in connexion with the "Train going to" dial.

Consider the circuits as if the starting signals was interlocked with the block instruments.

First, suppose that the distant station has given "Line clear" for a train. The black press button is first pressed, when the signal will be released.

The circuit being as follows: - *C* of local battery to spring *v*, to spring *w* of press button, to magnetising coil mc^2 of "Train going to" needle, to stop *n*, to armature *p* of polarised relay, to armature *ba* of "Train going to" needle, to stop *y*, to semaphore terminal *s*, to electro-magnet on semaphore releasing the lock, to semaphore terminal *s*, to *z* of local battery.

Then the plunger is pressed in, still keeping the button pressed, when the circuit is from *C* of local battery to spring *v*, to spring *w* of press button, to magnetising coils mc^2, to stop *n*, to armature *p* of polarised relay, to electro-magnet coils em^2 of "Train going to" needle (moving needle to "On line" and, at the same time, cutting out the semaphore electro-magnet, and locking the instrument for single line working), to spring *b*, to rod *a* of plunger, to spring *r*, to spring *q*, to middle of local battery.

Finally, the distant station signals the arrival of the train.

Acknowledge by pressing the button and plunger at the same time, when the needle goes to "Cleared," the circuit being from middle of local battery to press button, to plunger, to electro-magnet of "Train going to" coils, to armature of polarized relay, to stop, to magnetising coil, to *Z* of local battery.

Note that it is the opposite half of the local battery that is used this time. That will complete the description of the circuits, and, in conclusion, we shall see how far our block instruments come up to the standard of an ideal instrument.

First, it should indicate the state of the line at all times.

This instrument indicates the position of the last train signalled, viz., the dials show whether the last train signalled has "Cleared" the section, or whether it is still "On line." Now, some people jump to the conclusion that when a needle is pointing to "On line," it means and stands as a record of "Line clear," and they very naturally think there is a contradiction. Now, when a needle is pointing to "On line" it means that the last train signalled has possession of the line or section. To find out which is the last train, recourse must be had to the register book. Therefore, if a person is taught to read the indications that where a needle points to "On line" it means there is a train on the section, it is difficult to see how mistakes can arise. Beyond recording the position of the train, the instrument does not indicate the state of the line.

Second, none of its indications should be liable to alteration either by lightning or contact with other wires.

Ours fulfils this entirely, more especially those instruments which have the black button attached to them.

Third, all the alterations in its indications should be under the joint control of the signalmen at each end of the section.

The two last conditions are obtained in this manner – The press button must never be touched until a proper "Line clear" signal or a "Train arrival" signal has been received from the distant station. Consequently, the polarised relay, which is the key of the situation, is always corrected by the distant station's current before the local circuit at the receiving end is completed.

Other points of advantage over many other forms of instrument is this, that the indications are always made by the acknowledgements – that is, when you acknowledge "Line clear" the needle moves to "On line." Now, that is much better than if the needles moved to a position termed "Line clear," as the "Train on line" indication is dependent on such patterns of instruments on the departure signal being given at the proper time, which, of all signals, is the most neglected.

Block Working Certificates

Certificates of competency in absolute block working are issued to all competent persons employed in the Traffic Branch who may be required to take charge of the block instruments.

Every station-master, clerk, signalman, porter, &c., must pass an oral examination and hold one of these certificates before he is permitted to work the instruments.

The examination is conducted by an Inspector of the Traffic and of the Telegraph Branches, and to be successful an examinee has to satisfy the examiners that he thoroughly understands all regulations and instructions which bear directly or indirectly on block working, and that he has had sufficient practical experience to deal with any of the various circumstances under which he has to work his instruments and signals.

No person is examined until he has passed the probationary period of his service.

No person is allowed to work the block instruments who has not been certified competent to do so, and bears a certificate to that effect.

An officer is in attendance at the telegraph class-room, Flinders-street station, from 12 to 1 p.m. daily, for the practical instruction of those desiring to make themselves competent in the working of the block instruments.

Special Instructions Concerning Train Messages Transmitted by Speaking Instruments.

The first duty of Railway Telegraph officers is the prompt and accurate telegraphing of trains, and the proper recording of all "train messages." No other kind of work must be allowed to interfere with this most important duty.

All "train messages" and "Line clear" telegrams must be written out in full on "train message" forms, which will be supplied to every station from which trains require to be signalled. Each "train message" must be signed by the station-master or officer in charge of the station, and must be transmitted by wire without alteration or abbreviation.

"Train messages" and telegrams reporting accidents must take precedence over *all* other telegrams.

"Train messages," when completed, must be duly entered in the message book, and dealt with in the same way as other telegrams.

All block signals – those in the form of messages sent by Morse instruments, as well as signals sent by the instruments used only for absolute block working – must be entered in the train register book.

All "train messages" and other Railway telegrams must be written down, and not dictated to the operator verbally.

No "train message" is to be considered complete until it is acknowledged. Should an interruption occur to prevent an acknowledgement of a message being obtained, the message must be treated as if it had not been sent.

All "train messages" and acknowledgements must be recorded on the register tape at both sending and receiving station.

In the case of delay or accident to trains, stations must attend carefully to telegraph instruments, but must no on any account interrupt the offices working, or cause delay by asking unnecessary questions.

Nothing must be allowed to interfere with the train signalling. No excuse will be accepted for its omission, or for delay in replying to a call.

When an operator is satisfied that he has received a message correctly, *and not until then*, he is to give the acknowledgement signal which is the letters O.K., and the signal call of the office. The acknowledgement signal, together with the signature of the message for which it is given, must be recorded on the tape at both sending and receiving stations.

Telegraph operators must not, *from their own knowledge*, reply that the line is clear or otherwise, but must in all cases obtain a written telegram from the station-master or officer in charge.

In the event of an interruption to the wire, which prevents the receipt and transmission of train messages, the station-master must be at once informed, so that he may take the necessary steps to prevent delay to traffic.

The practice of giving "Line clear" half-an-hour or more in advance is against the regulations.

A view of the up end of Essendon in October or November 1969 looking north towards the signal box and interlocked gates. On the left is the impressive down home arrival bracket with the route set for a Down train to arrive into No 2 platform. Despite the use of McKenzie and Holland finials on Post 40, it is a standard lattice bracket post, and the dolls are not wooden. This photo was taken just before the abolition of the mechanical signalling, hence the down home signal post only has one disc left; the other three having been removed during the stage work for this resignalling. The crossover in the foreground is part of the new work and is spiked out of use. Photo David Langley