

SIGNALLING RECORD SOCIETY (VICTORIA)

SOMERSAULT

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Dead line for July 1981 issue is June 14th, 1981.
NEXT MEETING: May 29th, 1981.
VENUE: A.R.H.S. Library Room, Windsor Railway Station.

Minutes of March 1981 General Meeting

HELD AT: Power Signalling School, Caulfield.

PRESENT: J.McLean (Leader), J.Brough (Minutes Secretary), D.Langley (Editor & Archivist), G.Chapman, A.Cohn, G.Inglis, R.Jeffries, A.Jungwirth, K.Lambert, J.McCallum, S.McLean, P.Miller, G.O'Flynn, C.Rutledge, J.Sinnatt, P.Stoneham, A.Wheatland & C.Wurr. A welcome was extended to vistor - M.Stoneham and T.Penn.

MINUTES OF PREVIOUS MEETING: adopted as read (O'Flynn/Stoneham)

BUSINESS ARISING: Alan Jungwirth sought leave to amend his Notice of Motion that the May meeting now be held on the fifth Friday (29th) instead of the fourth (22nd). The motion, seconded by K.Lambert, was carried.

Moved Alan Jungwirth, seconded K.Lambert that the May meeting be held on Friday 29th. The motion was carried.

CORRESPONDENCE: 1. A letter was sent to the UK suggesting that the SRSUK be advised of any visit of Australian members so that they may be welcomed in England. Likewise a reciprocal arrangement would exist here to further relations between the two groups. The same letter indicated that the outstanding funds held in England be donated to SRSUK funds.

2. A letter was sent to England concerning the non-arrival of the November 1980 UK Newsletter.

GENERAL BUSINESS: The question of providing a blackboard for use at meetings was raised. Some discussion ensued but no real decision resulted.

SYLLABUS ITEMS: Colin Rutledge was thanked for his organising of tonights venue, enabling members to view and operate the various pieces of signalling equipment.

The next meeting will enable members to watch and listen as Stephen McLean shows some of his foreign signalling and safeworking slides.

Chris Guy has invited members to visit his house to view a well known signalling installation upon completion. Details to be announced soon.

MEETING CLOSED: at 2025 hrs after which members carried out a tour of inspection of the Power Signalling School at Caulfield Power Signal Construction Depot.

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SIGNALLING ALTERATIONS

- 18/1/1981 MOOROPNA. Disestablished as an electric staff station. The new section is now Toolamba to Shepparton. The home signals and plunger locking will be retained until further notice.
- 21/2/1981 FLINDERS STREET "C" BOX. New signalling diagram No 2/81 was issued and diagram No 57/80 was cancelled. Sidings "D", "E" and "EE", and "UU" lead were abolished. Nos 101, 107U, 109 and 156U points were spiked normal, and Nos 107D, 156D, & 110 catch points were abolished. No 168 points were also abol. Dwarf signals Nos 87, 124 and U111 were abolished and levers Nos 87, 101, 107, 109, 110, 124, 145, 149, 156 and 168 were sleeved normal. A connection from "KK" to Nos 9 & 10 Caulfield sidings was provided. Note: Siding "E" and dwarf signal U111 are shown on diagram 2/81 but should be deleted. Amend diagram 2/81 accordingly.
- WN 10/1981 FLINDERS STREET "B" BOX. The down home signal Post No 38B has been converted to a two-position light signal and relocated on the down end of No 12 platform at Flinders Street.

- 26/2/1981 PORTLAND. Flashing light signals were provided at Darts Road level crossing (400.126 Km). Trains may be held behind the down home signal, signal "A", at stop without activating the flashing lights. The signal will clear after 12 seconds of flashing light operation if the lever is reversed when the approach is occupied or immediately if the approach section is clear.
- 1/3/1981 BOX HILL. Signalling diagram No 49/80 was issued and diagram No 41/80 was cancelled. The signal box and mechanical interlocking frame were abolished and replaced by a control panel in the down side station building at Box Hill. Home signals Nos 1, 7 and 19 were renumbered 302, 304 and 305 respectively. Home signal No 3 was converted to an automatic signal No L483 and is controlled by a 5P key operated switch located on the down platform for use when the control panel is switched out. Home signals Nos 2, U3, 5, 45 and 46 were abolished together with Nos 13, 16, 17, 20, 22, 35, 36 and 37 points. Automatic signals Nos L473, L477, L486 and L492 were provided. No 3 road, the Back Platform Road, has also be abolished. Automatic signals Nos L483 and L486 are controlled by push buttons located on the control panel to control up and down movements across the Station St level crossing. The operation of the boom barriers is automatic for up and down movements. Closed circuit television monitors have been provided to enable the operator to monitor the crossing. Stopping and express push buttons, interlocked with signal No 305 are provided for up trains on both the up and centre lines.
- WN 11/1981 MELBOURNE UNDERGROUND LINE. Until the transfer of control of signalling to "Metrol", which will be advised at a later date, safeworking instructions in City Loop Operating Manual (1981), Sections 10 to 24 inclusive on pages 33 to 75 inclusive are not applicable to the operation of the Underground Loop tunnel sections between Flinders Street "E" and Spencer Street No 2 signal-boxes, nor the Viaduct Loop sections between Flinders Street "A" and Spencer Street No 2 signal boxes. The instructions applicable to the viaduct loop sections between Flinders Street "A" and Spencer Street No 2 signal boxes are contained in Weekly Notice No 48/1980. Instructions for the Underground Loop Tunnel sections between Flinders Street "E" and Spencer Street No 2 signal boxes are as follows. (Instructions then published and members can obtain a copy of these by writing to the Editor).
- 16/3/1981 BOWSER. The existing level crossing with flashing lights across the broad and standard gauge lines on the down side was replaced by a new crossing approximately 280 metres further out. As a result, the existing up broad gauge home and distant signals (Posts Nos 5 & 6), and the up standard gauge home signal No 31/8 were relocated 274 metres further out.
- 11/3/1981 ST ALBANS. Co-ordinated traffic lights were provided with the interlocked gates at Main Road. A push button is located on the block shelf for traffic light call and a lever lock is provided on No 2 lever.
- 12/3/1981 EAGLEHAWK. Flashing lights were provided at the Hopkins Avenue level crossing on the down side of Eaglehawk. Operation of the lights is automatic on both the Korong Vale and Swan Hill lines.
- 19/3/1981 KEON PARK. A notice board was installed at the down end of Keon Park platform to assist with the operation of the Settlement Road level crossing protection. The notice board is lettered "20 MPH MAXIMUM SPEED TO STAFF LOCKED POINTS AT FOWLERS SIDING".
- 21/3/1981 FLINDERS STREET "B" BOX. New diagram No 10/81 was issued and diagram No 2/81 cancelled. Ground disc signals 110B & 139, and top left hand disc on Post 83 (lever 73) were abolished. Points Nos 48, 62U, 63 and 64 were abolished. Levers Nos 43, 45, 57, 59, 60, 61, 63, 64, 68, 72, 73 and 74 were sleeved normal.
- 24/3/1981 NATHALIA. Disestablished as a staff and ticket station, the new section becoming Numurkah to Picola.
- 24/3/1981 TOTTENHAM. The crossover and associated signals at White City were booked out of service and will be removed at a later date.

- 24/3/1981 DOOKIE. Dis-established as a staff and ticket station, the new section becoming Shepparton to Katamatite.
- 24/3/1981 WAKOOL. The down end annett locked points, home signal and annett lock on up home signal lever were removed. The down end plunger locked points were moved 282 metres in a down direction.
- 24/3/1981 NORTH GEELONG. A three lever ground frame was installed to control the grade crossing for movements between the future loop line and the Freezing Works siding. A two position home signal was provided for the loop line, the lever being secured reverse by an annett lock, the key of which is retained by North Geelong "A" Box. The lead to the Freezing Works siding is controlled by the ground frame and is provided with a plunger and catch points. The Corio Quay South Access Road flashing lights are provided with automatic operation for the loop line and manual operation by push buttons for the siding.
- 26/3/1981 SOUTH DYNON. Dwarf signal No 172 was relocated to a new siding.
- 31/3/1981 BROOKLYN. A derail was added to the existing lever at Little Brooklyn stockyards for the protection of Sadliers Siding.
- 31/3/1981 TALLAROOK. The standard gauge/broad gauge diamond crossing at the down end of the yard was removed from service. Nos 29 & 30 points were spiked normal. This leaves the only access from the main lines to the goods yard via the up end crossover.
- 2/4/1981 BOX HILL. Automatic signal No L486 and the down side T.V. camera were relocated approx. one metre in the down direction.
- 5/4/1981 LARA. The control panel and diagram were relocated in the relocated station building.
- 6/4/1981 EUROA. The down end staff locked points were spiked out of use and will be removed at a later date. A baulk was placed on the stockyard siding.
- 7/4/1981 BROADFORD. Signalling diagram No 1/81 was issued and diagram No. 5/61 was cancelled. The connection from the goods siding to the up line was replaced by a new connection to the down line in lieu of the diamond crossing formerly in the down line. A new disc was provided on Post No 12, and ground disc 13 and right hand disc on Post 9 were abolished.
- 8/4/1981 TRAWALLA-BEAUFORT-MIDDLE CREEK. The staff balancing magazine formerly used on the Beaufort - Middle Creek section was placed on the Beaufort - Trawalla section.
- 8/4/1981 MOOROOLBARK. No 3 road and the down end extension of No 2 road have been removed from service.
- 9/4/1981 RUPANYUP. Dis-established as a staff and ticket station, the new section becoming Lubeck to Bolangum.
- WN 15/1981 COWWARR. Scotch blocks have been provided at both ends of No 2.

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Society News

The next meeting will have, as mentioned elsewhere, an illustrated talk by Stephen McLean and the subject of the talk will be Signalling and Safeworking in South-East Asia. Having seen these slides, members who attend will be treated to a collection of fascinating signalling slides.

Editors winge - the stock of articles has now reached a very critical low and at the present rate the next issue of Somersault may only have the Minutes and Signalling Alterations in it. Come on members, it's your publication, support it or it will die.

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- Plunger Locking

The instructions for the operation of plunger locks was published in Weekly Notice No 7 of 1909. The first locations to be provided with them were Bayswater, Croydon and Yarra Glen on Feb. 11th, 1909, followed by Carrum and the up end of Frankston on Feb. 18th. Only Bayswater and Yarra Glen remain so locked, the other locations receiving interlocking frames.

V.R. SIGNALLING HISTORY

No 13. MOORABOOL

When the Geelong to Ballarat line was opened on April 11th, 1862, the section between North Geelong and Meredith was double line and Steiglitz Road was the name given to the first station, being changed to Moorabool in 1864.



Originally the double line was worked on a sort of time interval system and only after 1883 was the more heavily graded part of the line provided with Winter's Block instruments to maintain a space interval between trains.

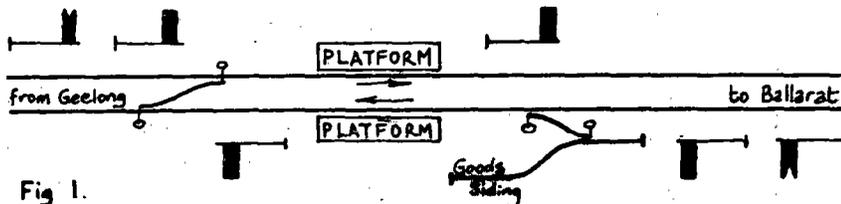


Fig 1.

Figure 1 shows the probable layout of Moorabool as a double line block post just prior to the singling of the line to Gheringhap on 21 11 1894, in order to prevent two trains crossing the Moorabool viaduct together. This section was worked by staff and ticket. Interlocked signal boxes were erected at both these stations and the Weekly Notice No 20 of 1894 gives the impression that the block sections had previously been North Geelong Station - Moorabool - Leigh Road (Bannockburn). Gheringhap was made a block post on this date working with Moorabool on the single line and Leigh Road on the double.

The Moorabool signal box had ten levers of which three worked points, one a lockbar and six worked signals. The crossover from the siding and the (assumed) crossover in the main line would both have been trailing and would not need lockbars, and so the tracks at the station at this time were probably as I have shown them in Figure 2. The single line system of safeworking between Moorabool and Gheringhap changed twice in a short time; on 18 11 1895 to Tyer's No 5 Tablet and on 21-4-1897 to Webb and Thompson's (large) electric staff, the first installation of the latter in Victoria.

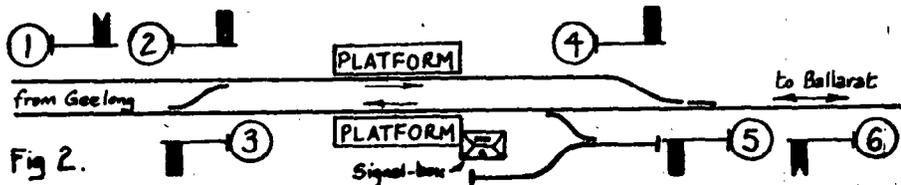


Fig 2.

Until 20-12-1903 all trains from Melbourne to Ballarat via Meredith had to reverse at North Geelong or Geelong in the absence of a loop line at North Geelong. This loop line came about in a curious way. The double line from Moorabool on the upside was converted to two single lines; the previous down line, now worked by Tyer's No 5 Tablet going to North Geelong "B" Box and the previous up line worked by large electric staff, diverging at the site of the present North Geelong "C" Box to a new signal box (North Geelong "A") between North Geelong Station and Lara.

From the details in Weekly Notice No 51 of 1903 and the fact that there were two levers working points, two for lockbars and nine for signals, I have assumed that the track layout at this time was as shown in Figure 3.

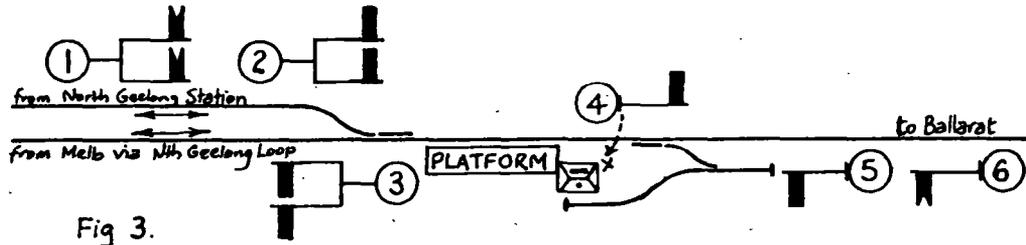


Fig 3.

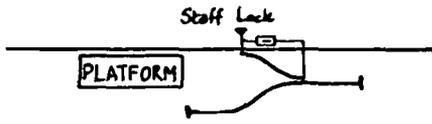


Fig 4.

However, this very interesting did not last for long, for on 12-6-1904, the loop line between North Geelong "A" and Moorabool was closed. Moorabool was disestablished as an electric staff and tablet station, and the single line (large electric staff) section became North Geelong to Gheringhap. The signals were all crossed and a "Woman-in-charge" appointed. On 4-12-1904, the interlocking, points and signals were removed with the exception of the goods siding which was staff locked. The effective layout at this time is shown in Figure 4.

Some time after this, a composite electric staff was placed in the instruments for the North Geelong "C" to Gheringhap section by which Moorabool was able to open as a telephone block post, but the only reference I have found is in the General Appendix, dated 1-12-1913. It cannot have lasted long as Moorabool was re-opened as an electric staff station on 13-1-1914 probably as a result of the traffic handled or expected via the Gheringhap to Marcona line.

The sections were North Geelong "C" - Moorabool - Gheringhap. A new interlocking frame of 30 levers was installed in the signal bay in the blue-stone building and a crossing loop with long dead ends at both ends provided. The goods siding was, once again, interlocked. The plan of the station at this time is taken from the VR Diagram No 22/1913 which I have shown in Figure 5. Four months later, Weekly Notice No 22 showed the working changed to miniature electric staff.

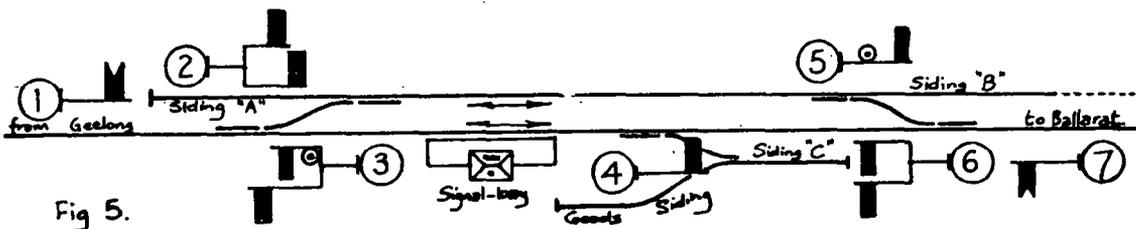
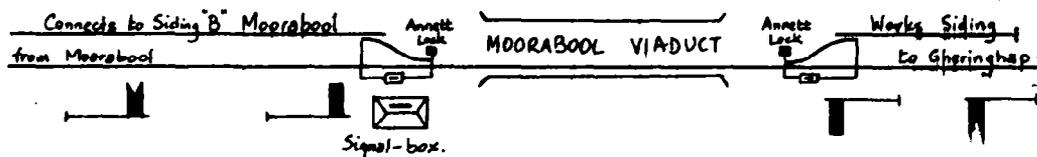


Fig 5.

The Moorabool viaduct again needed attention and while the intermediate piers were being added, a signal box was erected at the up end and upside of the viaduct and the electric staff section divided. This enabled the work train to use the bridge between main line trains and refuge on one of the two Annett-locked works sidings, the one on the up end being connected to the down end at Moorabool. This is as shown in Figure 6. The signal-box and sidings were there from October 1916 to February 1919. Until 16-6-1933, Moorabool was a full time staff station, but switching instruments provided then enabled long section working to take place between North Geelong "C" and Gheringhap. The switching hours became progressively less frequent and it came as no surprise on 21-12-1976 that all facilities were removed, the goods siding having already gone on 8-8-1967.

Figure 6. Moorabool Viaduct Signalbox



WEST SIDE SUNDAY MORNINGS IN THE NINETIES

by Jack McLean.

Although the west side of Melbourne was served by railways far earlier than the east side, the same cannot be said for stations. When Maidstone platform was closed in 1865, there were no stations between Footscray (the Albert Street station) and Keilor Road (Sydenham) which was a distance of 11 1/4 miles.

By 1895, there were five intervening stations - West Footscray, Tottenham, Braybrook Junction, the other Albion at 9 1/2 miles and St Albans, but potential passengers were few and I think it was the other Albion which in a whole year only sold 53 tickets. I wondered if it was the same person buying one ticket each week. Suburban trains had commenced running to Braybrook Junction and St Albans in 1888 and this may have been the reason for the installation of Winter's Block on the sections between Footscray Junction and Sunbury between 1888 and 1890, but the trains to these places were fewer than to Glen Waverley when it was opened, if that's any comparison.

Sabbath Observation was fashionable, at least on the surface, and it doesn't surprise me that there were NO Sunday trains on the Bendigo line beyond Footscray Junction, except for the two Bacchus Marsh Milk trains, in fact, there was still nothing north of Sunshine in 1918.....

The Sunday Milk trains at least made the block working of sufficient interest for the details to be published in the Weekly Notice, and the description in Weekly Notice No 12 of 1895 makes an interesting comparison with what we might see from the Tottenham Fish and Chip shop in 1981.

On and after Friday 20th September, (we are told) the signal box at Braybrook Junction will be switched out as a block station after the last passenger train has cleared the block sections until 6 15 am the following day. Signals to be left alight and stand at "all right" while the block is switched out. As West Footscray, the adjoining block station, also switches out during the above hours, arrangements must be made for West Footscray to switch out first, according to the prescribed instructions for "switching out stations". When West Footscray has switched out, the signalman at Braybrook Junction must notify St Albans of the fact before taking steps to switch out himself. After Braybrook Junction has switched out, St Albans and Middle Footscray must exchange the "Testing Signal" in order to see that all through connections are complete and advise each other if the instruments are working properly.

At 6 am next day, West Footscray will switch in and at 6 15 am, Braybrook Junction will also switch in again restoring the sections.

The above refers to week days only, Block to be worked on Sundays for the Milk train as at present, Braybrook Junction to switch in for this purpose.

There were interlocked gates across Albert Street and as these had to be operated for all trains, there was no point in Middle Footscray switching out.

St Albans was a block post for all trains, probably as it was the end of the suburban service, and it would be interesting to know if St Albans came on duty on Sunday mornings, when he had no trains, just to enable Braybrook Junction to switch in, or if, as seems more likely, Braybrook Junction didn't switch out on Saturday nights. The records which I have seen don't enable me to say.

Another reference to the block working appears in Weekly Notice No 13 of 1896, this time concerning the signal boxes at Footscray, of which there were three: Footscray Junction "A", Footscray Gate Box "B" (at Napier Street) and Middle Footscray sometimes called "C" at Albert Street. There were still two passenger stations at Footscray - Footscray Suburban at Napier Street on the Williamstown line and Middle Footscray between Nicholson Street and Albert Street on the Bendigo line.

Weekly Notice No 13 of 1896 states: "The Footscray Junction signal box will now be closed after the last up train has passed on Sunday mornings till 12 midnight, except during the hours of 11 am and 1 pm or later, and again from 6 30 pm and 8 30 pm, when the signalman must come on duty to pass the down and up Bacchus Marsh Milk train through, switching in for the occasion. This has equal reference to the Block Worker at Braybrook, who will require

V.R. SIGNALLING HISTORY

No 14. CANTERBURY

Following the takeover of the Melbourne, Hobson's Bay and United Railway Company, the Government wasted no time in extending the system and on April 3rd, 1882, the single line was opened from a new station at Hawthorn to Camberwell, the remainder of the line to Lilydale being opened on December 1st of the same year. The stations at that time were: Glenferrie Road, Auburn Road, Camberwell, Canterbury, Box Hill, Ringwood and Warrandyte (renamed Croydon on 1/8/1884). East Camberwell opened on May 4th, 1900, to enable passengers from the Ashburton to Deepdene trains to reach the city. Surrey Hills opened on August 8th, 1883, and Chatham on April 1st, 1927.

As a result of the head-on collision at Swan Street, the staff & ticket system of safeworking was introduced to the line and the 1883 Working Timetable shows staff stations to be: Camberwell, Canterbury and Box Hill (among others). A diagram dated December 1881, which was probably the arrangements on opening day twelve months later, has been reproduced as Figure 1.

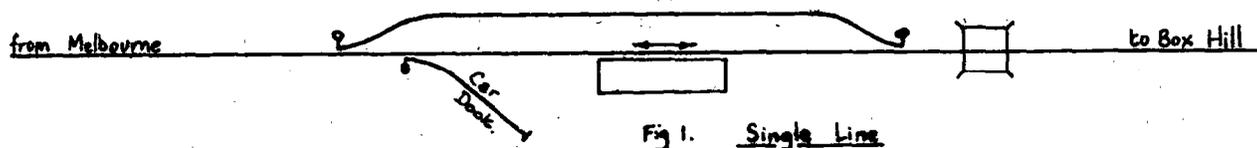


Fig 1. Single Line

Following its introduction to the V.R. in 1883, Winter's Block Telegraph instruments were possibly provided on the single line sections to assist in the safeworking of this busy suburban line but were certainly used following the duplication, opened on December 9th 1888, between Camberwell and Box Hill. An early photograph shows the up platform at Canterbury with a motely collection of VR portable buildings and also two signalwires heading the up direction. From this we can assume that there were only home and starting signals provided at this time, and that the distant signals only came with interlocking. The 1890 Working Timetable shows the block posts to be: Camberwell, Canterbury, Surrey Hills and Box Hill. Figure 2 shows the probable layout in use following the duplication.

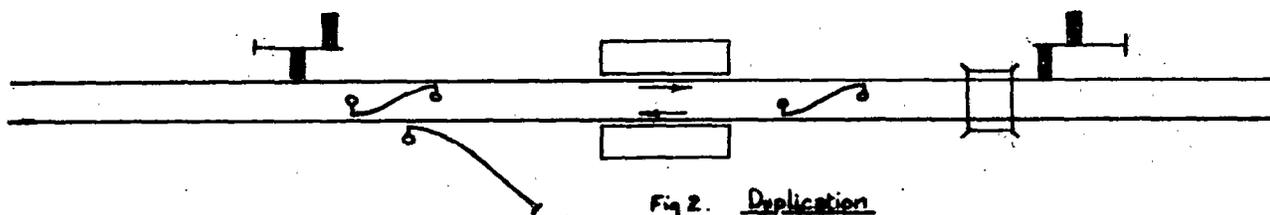


Fig 2. Duplication

The 20 lever rocker interlocking frame and signal box were provided on August 4th, 1890, being located on the north side of the line, remaining in use until 1966 when regrading works commenced.

At first only 14 levers were working but after the interlocked gates and wickets at Canterbury Road were connected up, there were 18 levers working with only two spare. This situation is shown in Figure 3.

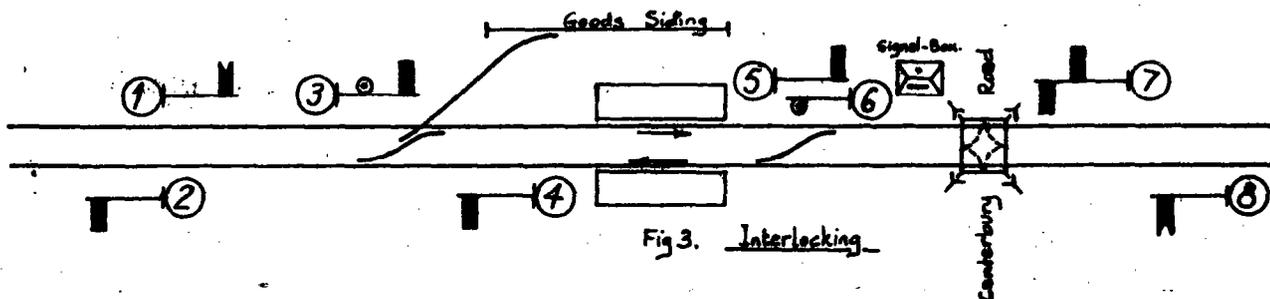


Fig 3. Interlocking

As part of the Outer Circle group of lines, Canterbury Junction, between East Camberwell and Canterbury, was opened on March 24th, 1891, to control the junction of the loop between the Box Hill line and the line to Fairfield. It is not known exactly what the arrangements at the junction were but

it is probable that the Canterbury Junction up distant was mounted on the same post as the Canterbury down distant. After very little use, the junction and the signalling were removed shortly after opening.

Bradshaw's Guide shows that local trains to Canterbury commenced running in about December 1897, probably Camberwell locals extended to cater for the spreading population. The 1898 General Appendix tells us that "Engines of down suburban trains terminating at Canterbury must first be run round, then pushed back clear of the crossover at the down end and drawn forward to the up platform whence trains to Melbourne must be started". A refinement to this procedure occurred on April 4th, 1901, when a lockbar and an additional up home signal arm were provided to enable up trains to depart direct to Melbourne from the down platform. The register still shows a spare lever at this stage and we can only assume that the set of points in the goods siding was altered to a catch point and worked by the lever working the points from the main line to the siding at this time, the former point lever then being used for the lockbar lever. The remaining spare lever was used on December 5th, 1901, to work a platform indicator, thus easing the confusion amongst intending passengers as to where the next Melbourne train departed from. The arrangements at this time are shown in Figure 4.

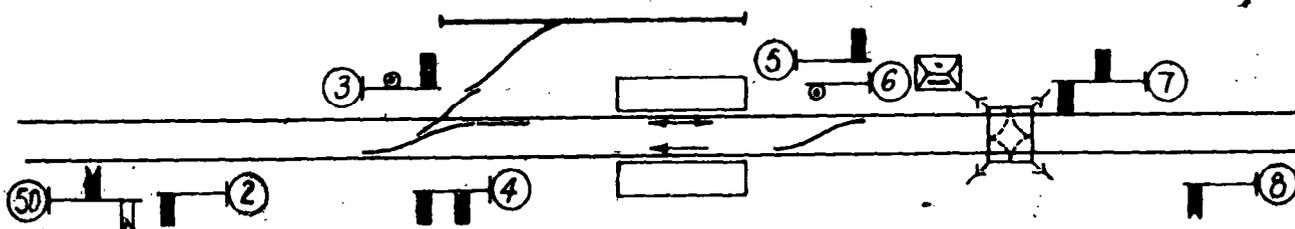


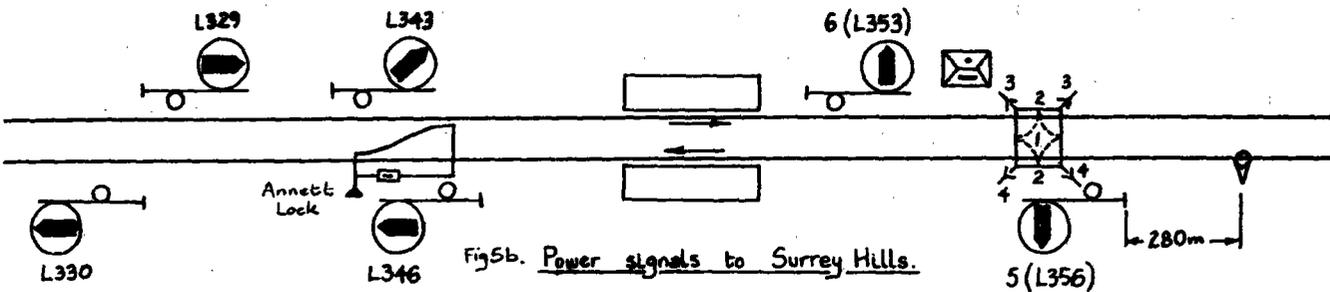
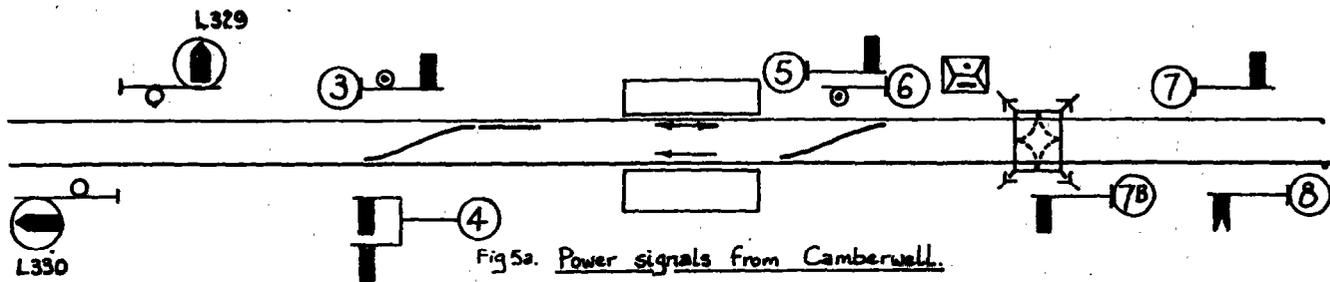
Fig 4. Alterations

The 1901 Working Timetable shows eight locals on Monday to Friday, three on Saturday and two on Sunday. This situation remained much the same until 1918 when the Working Timetable of that year shows that by now all of the Camberwell locals had gone and the number of Canterbury locals increased to 25, 28 and 10 respectively.

East Camberwell became a block post on 14/5/1902 and had a six lever frame. The switching hours became progressively longer and in 1918 was switched in from 6am til 10pm. The block rules prevailing at the time forbid Canterbury from accepting a second down train until the first was proceeding on its way to Surrey Hills. In the case of a local train, the second down train could not leave Camberwell until the local had commenced its journey back to Melbourne. With East Camberwell switched in, the second down could then leave Camberwell and proceed to East Camberwell whilst the local ran round at Canterbury prior to returning to Melbourne. This working permitted closer headways than otherwise possible.

Little is known about the working of goods trains at Canterbury and even the timetable does not give us much information. A clue to the goods train operation is given in the scheduling of the Box Hill goods in the 1916 Working Timetable which allowed about an hour to run from Camberwell to Box Hill and 45 minutes to return. The down journey was probably spent in climbing the rising grades and shunting at Surrey Hills, which with its goods yard layout would have made it very difficult to shunt there with an up train. Similarly, the layout at Canterbury would have been difficult to shunt with the down goods in the hour available in the section but the 45 minutes on the up journey would allow plenty of time in which to shunt at Canterbury. The goods siding was unused from January 1st, 1922, and was removed altogether on 30/5/1922.

Progress reached Canterbury in 1922 in the form of automatic colour light signalling provided on November 5th and this resulted in the closure of East Camberwell as a block post. The down distant and up starting signal were effectively replaced by automatic signals Nos L329 and L330 respectively. With the extension of the automatic signals to Surrey Hills on March 30th, 1927, all the mechanical signals were removed and the signal-box assumed the responsibilities of a gate box, the up end crossover being fitted with an annett lock in lieu of signal box control. The platform indicator appears to have been unused from this time although it may have remained insitu for a while as Jack McLean remembers having seen it whilst going to the silent matinees at "Hoyts Canterbury Rest and Most". Figure 5 shows the arrangements in use at this time.



Electrification between Flinders Street and Box Hill came on 17/12/22 and the Canterbury local train service was replaced by electric multiple unit suburban trains running through to Box Hill. The down end crossover and disc on post 6 were removed on 1/3/1923 whilst the up end terminating facilities last until the alterations of 1927.

Few changes occurred at Canterbury after the heady days of electrification and the only mention in the interlocking register is that normally open wicket gates, constructed of light tubular steel, were provided in lieu of the old slamming type on 6/8/1959 and this necessitated the provision of two more levers. This wasn't as easy as it sounds as the frame was reduced in 1927 and spaces 7 to 20 were boarded over, the signal levers becoming 5 & 6. With the provision of the extra levers, the signals came under the control of levers 7 & 8, whilst levers 5 & 6 became the additional wicket gates levers.

In connection with the grade separation works at Canterbury Road, Canterbury, the up and down lines were slewed to a temporary location west of the existing lines and a temporary island platformed station provided. This resulted in the closure of the signal box on 20/2/1966 and the provision of a gatekeepers box adjacent to the new road crossing which was protected by boom barriers in lieu of the interlocked gates. The gatekeeper had control of these booms as well as the up and down automatic signals protecting the crossing. The up line was relocated over the new overbridge on 15/9/1968, the down line following suit on 22/12/1968, with the subsequent closure of the level crossing and gatekeepers cabin. The bi-directionally signalled centre line between East Camberwell and Box Hill was brought in service on 19/12/1971.

These works ended manual control over the signals at Canterbury although the timing of trains to determine stopping from express trains for the approach control of signals at Surrey Hills and Mont Albert is done at Canterbury platform and thus Canterbury still retains a slim connection with the control of signals.

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Addenda: In the January/March 1981 issue of Somersault, the Diagram No 3 on Page 8 shows Dysart Wood Siding secured by an electric switch-lock. This is incorrect as the method of securing the siding was by the means of an Annett Lock, the key of which was kept at Goulburn Junction and later at Seymour "A" Box. The 1936 General Appendix has the instructions for the working of this siding on pages 880 and 881.

SOME NOTES ON THE EARLY HISTORY OF POWER SIGNALLING

by Colin Betts

This article has been reprinted from the Signalling Record Societies U.K. Newsletter, January 1972.

It is to the United States of America that one must turn for the early history of power signalling and in the records of the Patent Office of that country are to be found details concerning an invention devised in 1871 by Messrs. Schnabel and Henning of Germany for operating signals by hydraulic pressure. This invention was not, however, developed until 1880 by the American firm of Harvey Tilden and F.S. Gurber when two years later the first two installations were made, one at Wellington, Ohio, and the other at East Street, St. Louis, Illinois.

The Wellington plant was the work of the Union Switch and Signal Coy. which had been formed in 1881 by Mr. George Westinghouse who had become interested in railway signalling. It controlled the crossing of the Wheeling and Lake Erie Railroad with the Cleveland, Cincinnati, Chicago and St. Louis Railway. The installation was, however, short lived and abandoned shortly afterwards on the grounds of economy.

The East St. Louis plant was at Relay Station for the St Louis Bridge and Tunnell Railroad Company, and was situated immediately east of the portals of the Eades Bridge under which flowed the Mississippi River. St Louis had become an important centre for railways even before the Civil War where no less than four railroads terminated. The method of operation at the Relay Station installation, although novel, was nevertheless quite successful. In order to maintain a constant hydraulic pressure, the plant was operated by means of a steam driven pump and accumulator. To prevent freezing, 75% water and 25% pure alcohol was used. The plant remained in use until 1888 when compressed air was substituted for the liquid but this conversion was not altogether successful.

Although purely hydraulic systems had but a short life in America, being quickly superseded by pneumatic systems, they had considerable success on the European continent where, by 1886, a purely hydraulic system was successfully operating in Italy at Abbiategrosso, a place some 15 miles south-west of Milan on the old Italian Mediterranean Railway, having been installed under the direction of one Riccardo Bianchi, later to be the General Manager of the Italian State Railways. He had, in his early days, worked for a firm of Marine Engineers, John Penn of Greenwich, and was therefore familiar with hydraulic capstans and cranes. He applied the same principles to railway signalling, both controls and operation of points and signals being effected by water under pressure. Until quite recent times, a number of such installations remained in Italy.

This system was known as the 'Bianchi and Servettaz' as it was manufactured by the firm of Servettaz at Savona, who were also agents for the English crane makers, Tannett Walker & Co. The agents for the Bianchi and Servettaz system in this country were Saxby and Farmer who used the system for Tower Bridge. In France the agents were Trayvou & Cic where, in addition to purely hydraulic systems, there were hydro-pneumatic systems as well.

As early as 1876, however, in the U.S.A., Messrs. Prall and Burr had begun to apply pneumatic principles to railway signalling. Pneumatic systems have, as their basis, the utilisation of the power of air under pressure or, to put it another way, the power of air in motion. An early installation was that on the Pennsylvania Railroad at Mantua "Y" in West Philadelphia, with some measure of success. This plant, put in on a trial basis, used compressed air for both the control and operation of points, the air used for the control being cut off after the points had operated.

Meantime a certain John W. Thomas, Jr. had been experimenting using air under pressure at 80 lbs per square inch employing mechanical valves to conserve the use of air by re-using it after each operation. This installation was made at Nashville, Tennessee in 1882 on the Nashville, Chattanooga and St Louis Railway whose bridge across the Duck River had, thirty years previously, been the scene of the Battle of Nashville in 1864 during the Civil War. There were, however, certain disadvantages about high pressure systems due chiefly to condensation troubles and the freezing of valves in winter.

In 1883, the Union Switch & Signal Co. installed the first hydro-pneumatic plant at Bound Brook, New Jersey on the Philadelphia & Reading Railroad at the crossing of the Pennsylvania, Leigh Valley & Reading and, in the period 1884 to 1891, some 18 plants were installed having a total of 482 levers. The same company in the same year installed the first electro-pneumatic automatic semaphore signals on the Fitchburg Railroad in Massachusetts.

Prior to 1891, when the Union Switch & Signal Co. invented the electro-pneumatic valve, points were worked on hydro-pneumatic principles whereby the controls operated valves which admitted and released air to and from a normal and reverse pipe. These pipes were filled with water in the summer and some sort of anti-freeze mixture in the winter and operated an auxiliary valve near the switch.

In 1891, however, the U.S. & S.Co. were faced with the problem of installing a plant on the moveable drawspan at Drawbridge, Chicago, for the Chicago & Northern Pacific Railroad where there were obvious difficulties in applying hydraulic controls. This led to the invention of the electro-pneumatic valve and thereafter hydraulic installations decreased in number. Between 1891 and 1900, 54 electro-pneumatic plants were installed on 13 railroads with a total of 1864 levers whilst hydro-pneumatic plants dropped to 18 on seven railroads with some 482 levers.

In 1897, F.L.Dodgson devised a low pressure system whereby pressure at the controls was applied at 7 p.s.i. and the operating of points and signals at 15 p.s.i. The method used was that of initially compressing to a much higher pressure than that ultimately required which was expanded by passing the air through reducing valves which also had the effect of reducing the moisture content. This method was exhibited at the Paris Exposition of 1900 but, by that date, 22 plants had already been installed in America by the Pneumatic Signal Company, the biggest of which was the signal box at Grand Central Terminal, New York, having about 146 levers.

In the meantime considerable progress had been made in the application of electricity to railway signalling. Early experiments were carried out by Mr.J.D.Taylor, a train despatcher on the Baltimore & Ohio Southwestern Railroad, whose experiments were, as might be expected, concerned with train despatching devices. He subsequently interested himself in the application of electricity to railway signalling and the first all-electric plant were installed in 1889 on the company for which he worked at East Norwood near Cincinnati. By 1896 he had formed the Taylor Switch & Signal Co. and in 1901 when the 'dynamic indication' principle was devised, it had become apparent that low pressure power plants would henceforth be superseded by electric interlockings.

As to the history of individual installations, it has been difficult to obtain much information because it is the practice of American railroad companies to destroy their old files and there are now no survivors among employees who have any first hand knowledge of the installations. It has been verified by the Philadelphia & Reading Company that they had two low pressure installations, one at Wayne Junction having 56 levers and a 35 lever plant at Nicetown Junction. Both were taken out of service in 1911.

The Erie Railroad Company also had two installations - a 19 lever plant at Buffalo Passenger Yard and a larger plant of 59 levers at Grove Street, Jersey City, which was converted to electro-pneumatic operation in 1910. This company have kindly searched their files and produced the following letter addressed by the Superintendent of Signals of the Cincinnati, New Orleans & Texas Pacific Railway to the Erie Railroad Signal Engineer. It is dated 18th August, 1904, and indicates the contemporary viewpoint of that Company's attitude towards low pressure methods of railway signalling.

"Dear Sir,

Please advise what your opinion is of the low pressure pneumatic signal compared with the electrical pneumatic signal as used for electrical interlocking and what success you are having with the Grove Street low pressure interlocking."

In reply, the Erie Signal Engineer wrote:-

"Replying to yours of 18th August regarding low pressure pneumatic interlocking.

We have two of these plants in service at the present time, one at Jersey City and the other at Buffalo. While we have had no serious accidents with these plants, we have, however, had several cases where accidents might have happened had there been other trains passing through the interlocking at the time, on account of failures of the plant. The plants if watched carefully

cause very little trouble. However, I would not recommend the installation of any more of them in my district.

We have two of the Taylor all-electric plants in service and have had some very good success with them so far, they being put in service the 13th of last December. We have none of the electro-pneumatic so I can say nothing regarding a comparison between the low pressure pneumatic and the electro-pneumatic.

If the Company would furnish me with enough money to install, operate and maintain an electro-pneumatic plant, I would prefer it to either the electric or the low pressure."

On the New York Central Railroad there were a number of installations the largest of which has already been mentioned, namely the 142 lever frame at Grand Central Terminus. Most of the other plants were in the Buffalo area and until comparatively recently five low pressure plants were still in service around Buffalo. The largest of these was known as Signal Station 50 and was the first plant west of the Central Terminus, Buffalo. It consisted of a 40 lever frame of which nine were spares. Of 25 signals, nine were pneumatic and 16 electric, the latter having been installed in March 1941. This plant was taken out of service on 27th March 1957 in connection with a new Classification Yard at East Buffalo.

Signal Station 51 is the next plant west on the Niagra Falls Branch from the now defunct SS 50. It had a 32 lever frame of which 12 were spares. All the points were operated by the original point machines but of the 11 signals, five were converted to electric in 1928. Here at SS 51, the Erie Railroad crossed the N.Y.C. but since March 1954 until its closure in 1963 there had been no signaller (the Americans usually call them 'operators') there and, as with British practice, the N.Y.C. home signals were left in the clear position. When a crossing move was to be made on the Erie, the operator came down from SS 52 to work the plant.

Further west again where the four tracks from Buffalo revert to double track was SS 52, a 32 lever installation of which 27 were working levers. At the time of closure in 1961 no less than 18 of the original point machines were working. In addition there were two electric point machines installed on 11th June 1953.

Air for Signal Stations 51 and 52 was furnished from the Central Terminal power house, Buffalo, approximately two miles east. When trouble developed in the air line, a switch engine was provided to supply air. Periodic inspection was made in the autumn of each year for water in the pipe line which was then removed by the simple process of blowing down the pipe. If moisture only was present, alcohol was placed in the pipe to relieve the condition.

The District Signal Engineer of the N.Y.C. who was responsible for the maintenance of the two plants before closure stated that they were difficult to maintain because patterns for replacement castings and parts were destroyed and successors to the original manufacturers were unable to obtain replacements. All three plants were believed to have been originally installed by the Pneumatic Signal Company which later merged with the Taylor Signal Company to form the General Railway Signal Company.

Authors Note: This is the first part of an article written over ten years primarily intended to cover the history of low pressure signalling. Inevitably it was too specialised for general publication but it is hoped that members of the S.R.S. will find it of interest. The second part covers the history of low pressure in this country starting with the installation at Grately in 1901. With regard to the American low pressure towers SS 51 and SS 52 mentioned in this article, I was fortunate enough to get negatives from a signaller who had worked the towers and who went along and photographed them for me. For those familiar with, say, the low pressure equipment at Basingstoke "B" or Fleet, this is identical but if anyone wants prints I am happy to provide the usual service. Drop me a line and I will send you a note of what I have available in this field both here and in the U.S.A.

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immediately remind the signaller at "A" Box of the detention, and continue to remind him from time to time in all cases of excessive detention.

Angliss' Siding

See special instructions in the General Appendix for particulars regarding the working of Angliss' siding.

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From the 1913 Book of SignalsFootscray Junction "A" Box

Semaphore Post No	Particulars
1	Bracket Semaphore, two arms and one arm underneath:- Left-hand arm, down distant signal for Williamstown line. Right-hand arm, down distant signal for Bendigo line. Arm underneath, up distant signal, worked by Maribyrnong River Junction.
2	Two arms (co-acting), up starting signals.
3	Two discs:- Left-hand disc, from Angliss' siding to down Williamstown line towards Post No 5. Right-hand disc, from Angliss' siding to down Bendigo line towards Post No 9.
4	Bracket Semaphore, two arms and two discs underneath:- Left-hand arm, down home signal to Williamstown line to Post No 5. Right-hand arm, down home signal to Bendigo line to Post No 9. Left hand disc, from up line to down Williamstown line toward Post No 5. Right-hand disc, from up line to down Bendigo line toward Post No 9.
4A	Dwarf Bracket Semaphore, two Fog Arms, co-acting with the arms on Post No 4.
5	Ground disc signal, from down main line to Angliss' siding.
6	One arm, up home signal from No 1 road (down Williamstown line) to up main line to Post No 2.
7	Bracket Semaphore, four arms (co-acting) and disc underneath:- Top and bottom left-hand arms, up home signal from up Bendigo line to up main line to Post No 2. Top and bottom right-hand arms, up home signal from up Williamstown line to up main line to Post No 2. Disc, from No 3 road (down Bendigo line) to up main line toward Post No 2.
8	One arm, up home signal, Bendigo line, to Post No 7.
9	One arm, down starting signal, Bendigo line (controlled by Nicholson Street and Footscray "C" boxes).
10	Two arms:- Top arm, up home signal, Bendigo line, worked from "C" Box and controlled by Nicholson Street box. Bottom arm, up distant signal, Bendigo line.
15	Two arms (co-acting), down home signal, Williamstown line to Post No 17.
16	One arm and two discs below arm:- Arm, up home signal, Williamstown line, to Post No 7. Left-hand disc, from Siding "B" to main line toward Post No 7. Right-hand disc, from down line to up line toward Post No 7. (Both discs are controlled by Footscray "B" Box).
17	One arm, down starting signal (controlled by "B" Box).
18	Two arms:- Top arm, up home signal to Post No 16 (worked by "B" Box). Bottom arm, up distant signal, Williamstown line.

Notes:- 1. There are catch points in Siding "A" with a point indicator attached, and also catch points in Siding "B" and Angliss' siding.

2. The down starting signals on Posts Nos 9 and 17 are also the down home signals for "C" and "B" boxes respectively. When a detention occurs at either signal, such detention must, for the purposes of Regulation 75, be considered as being at a starting signal, and when in accordance with Reg. 75, it is the fireman's duty to go to the box, he may in every instance go to the box in advance, and the signalman at the box to which the fireman goes must

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