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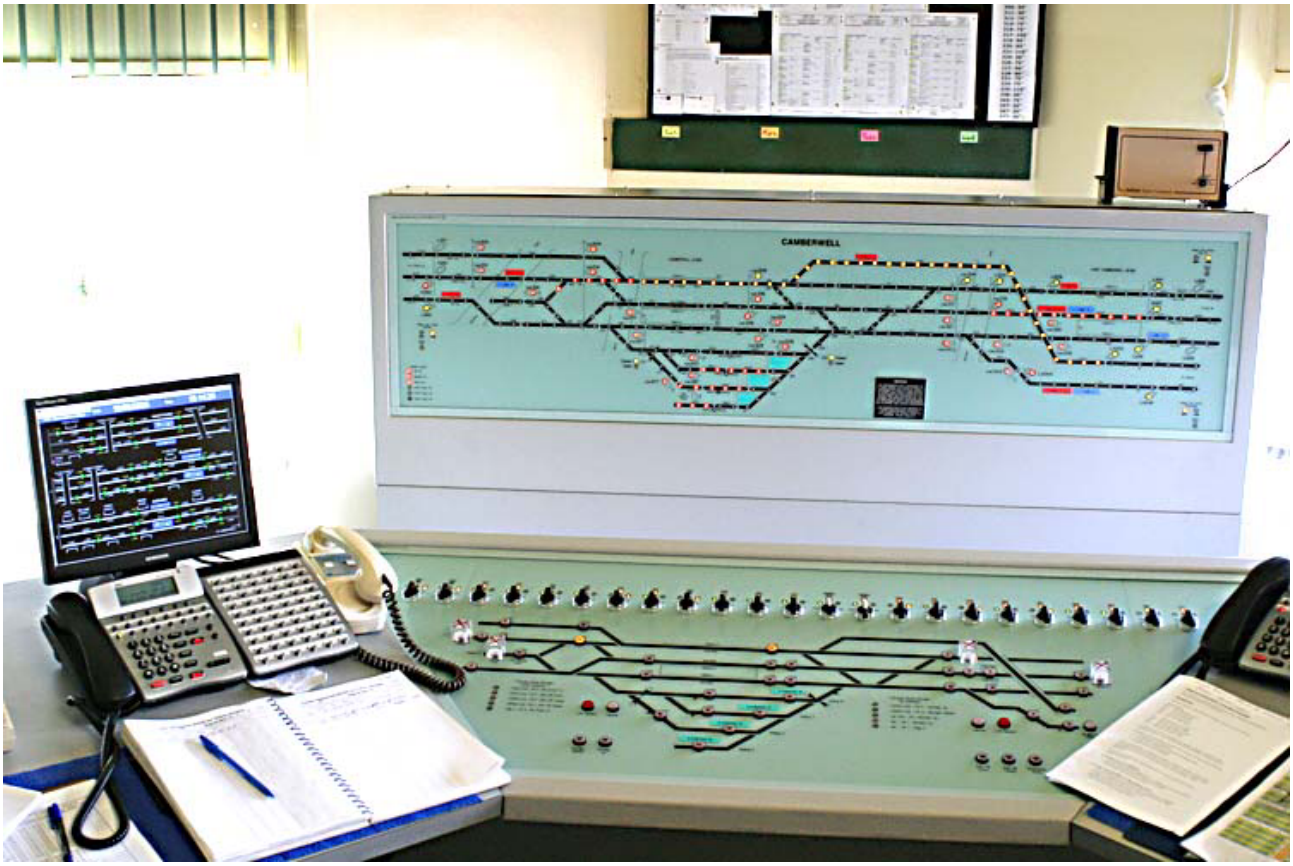

The new NX panel at Camberwell which was brought into service on 25 April 2004. NX panels are uncommon in Victoria; the only other panels being at Metrol and Epping (1989). The signalbox at the end of the island platform at Camberwell was provided in June 1924 when the yard was resignalled with three position signals. At this time the box contained a 32 lever GRS electro-mechanical frame. With this frame the points were worked by rodding from a conventional interlocking frame. A GRS unit lever frame was mounted above and behind the mechanical portion. It worked the signals, and contained the mechanical interlocking and electric controls. The mechanical portion of this frame was removed on 28 July 1963 when point machines were provided. The GRS frame was abolished on 8 November 1964 in connection with the extensive remodelling of the Camberwell in conjunction with the provision of a third track to Hawthorn and East Camberwell. A new relay interlocking replaced the GRS frame. The new relay interlocking was a route setting panel, the first in Victoria. It lasted just over 40 years; the GRS frame 39 years. Will the Westrac SSI last a similar length of time? Photo by Chris Gordon

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Signalling Alterations

The following alterations were published in WN 16/05 to WN 24/05 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 alteration.

02.04.2005 **Richmond Junction** (SW 58/05, WN 18/05)

On Saturday, 2.4., Down Home 394 (at the exit of the Burnley loop) was replaced by a new post located on the ramp wall 1 metre in the Down direction and fitted with Westinghouse 'Underground' LED heads. Down Home 354 (Down Burnley Through line) was also replaced by a new post 10 metres in the Up direction with Westinghouse LEDs.

24.04.2005 **North Geelong B** (SW 88/05, WN 18/05)

On Monday, 25.4., Crossover 12/13 at the Down end of the platforms was removed. Plunger 14 was abolished. Levers 12, 13, and 14 were sleeved normal.

30.04.2005 **Caulfield** (SW 79/05, WN 17/05)

On Saturday, 30.4., an indicator for Up Automatic F584 at Moorabbin was provided on the panel.

01.05.2005 **Dandenong** (SW 84/05, WN 17/05)

On Sunday, 1.5., additional track circuits were installed at Dandenong.

02.05.2005 **Parkdale** (SW 83 & 86/05, WN 17/05)

Pedestrian gates were provided at a new crossing at Antibes St (no distance given) on the Up side of Parkdale and Alameda St/Bethell Ave (25.815 km) at the Up end of Parkdale platforms. Diagram 19/05 replaced 23/90. This diagram also shows the alteration of Up Automatic F584, and Down Homes MRN 702 (Down line) and MRN 708 (Centre line) at Moorabbin to approach operated, time delayed, Medium Speed Warning aspects.

06.05.2005 **Franklin St** (SW 96/05, WN 18/05)

On Friday, 6.5., the V & S indicators on Up Home 516 were replaced with LED indicators for a four week trial.

06.05.2005 **Ararat** (SW 91/05, WN 18/05)

On Friday, 6.5., Dwarf 256/16 (Stabling Siding to platform) was relocated 10 metres in the Down direction. Diagram 14/05 will replace 6/04.

08.05.2005 **Sydenham** (SW 94/05, WN 18/05)

On Sunday, 8.5., the SSI and Sigview data were changed for an RFR signalling upgrade.

12.05.2005 **Glen Waverley** (SW 109/05, WN 19/05)

On Thursday, 12.5., Dwarfs 12, 14, and 16 were converted to LED heads. The Stop indication will be a purple light.

12.05.2005 **Bairnsdale** (SW 93/05, WN 18/05)

Between Tuesday, 10.5., and Thursday, 12.5., the signalling was altered to be operated by a Signaller and the motor operation of the points E and F at Bosworth Road Siding were commissioned.

A Signaller will attend Bairnsdale for all movements and will operate all the points and signals. All keyswitches at Bairnsdale, except the two at Bosworth Rd, were altered to be operated by an independent key held by the Signaller. The two keyswitches at Bosworth Road (which operate the boom barriers) were altered to be operated by a V5PSW key. Keyswitch 22 was provided in the safeworking office at Bairnsdale to operate Points G and the locking was altered so that when Home 3 displays a proceed aspect, Points G will be locked normal.

The instructions for the operation of Bairnsdale have been re-issued. Diagram 10/05 replaced 8/04.

15.05.2005 **Springvale** (SW 100/05, WN 19/05)

On Sunday, 15.5., additional track circuits were installed on main line turnouts as part of the turnout fouling project.

15.05.2005 **Pakenham** (SW 99/05, WN 19/05)

On Sunday, 15.5., additional track circuits were installed on main line turnouts as part of the turnout fouling project.

21.05.2005 **Glen Waverley** (SW 113/05, WN 20/05)

On Saturday, 21.5., Up Homes 18 and 20 and Down Home 10 were converted to Altsom Tri-colour LEDs.

22.05.2005 **Mount Waverley - Glen Waverley** (SW 115/05, WN 20/05)

On Sunday, 22.5., Up Automatics DG582, DG600, DG634, and DG660 were converted to Alstom Tri-colour LEDs.

(24.05.2005) **Narre Warren - Pakenham** (SW 116/05, WN 20/05)

Diagram 15/05 replaced 13/02. The new diagram reflects the provision of a underpass at Narre Warren - Cranbourne Road.

26.05.2005 **Flemington Racecourse** (SW 137/05, WN 22/05)

On Thursday, 26.5., Dwarf 68 was converted to LED.

27.05.2005 **Flemington Racecourse** (SW 122/05, WN 21/05)

On Friday, 27.5., hand operated Hayes derails were provided at the Up end of No 2 Track, 5 metres in advance of Ground Disc 73, and the Up end of No 3 Track, 5 metres in advance of Dwarf 68.

The Derails must be locked on the rail when trains are stabled in these roads while a Signaller is not on duty. Signallers must lock them on the rail before ceasing duty and off the rail when commencing duty. When ceasing duty, Points 26 must be set reverse and sleeved if trains are stabled in No 4 Track. Trains must not be stabled in No 1 Track while no Signaller is on duty.

27.05.2005 **Darebin** (SW 122/05, WN 21/05)

On Friday, 27.5., Up Automatic S318 was converted to reverse stagger.

30.05.2005 **Upper Ferntree Gully - Upwey** (SW 119/05 & 128/05, WN 21/05 & 22/05)

On Monday, 30.5., the following alterations were carried out.

At Upper Ferntree Gully, Up Home 36 was replaced by a new post 80 metres further out and a new Controlled Automatic, Post 38, was provided in the rear. Automatic 38 will display Clear Normal Speed, Normal Speed Warning, Reduce to Medium Speed, and Stop. Up Home 36 will be approach cleared to a Medium Speed aspect for moves to No 2 Track if the lever controlling Departure Home 18 is reversed (the approach of a train will place a call on the Hill Top Road boom barriers, immediately in advance of Home 18, but Home 18 will not clear until the train closely approaches it). A speed proving train stop was provided in No 2 Track in the rear of Up Departure Home 18.

Down Arrival Home 10 will be approach cleared to a Medium Speed aspect for moves to No 1 Track if lever 22 (working the Down Departure Home) is normal.

At Upwey, Down Arrival Home 40 will be approach cleared to a Medium Speed aspect if lever 44 (working the Down Departure Home) is normal. A new Down Controlled Automatic, Post L1251, was provided in the rear of Home 40 and will display Clear Normal Speed, Normal Speed Warning, and Stop. Speed proving train stops were provided in the Down track in the rear of Home 44.

Exactly the same arrangement was provided in the Up direction for Up Arrival Home 46 and Up Departure Home 42. The new Controlled Automatic is numbered L1286.

Diagram 25/05 (Heathmont - Belgrave) replaced 45/99. Note that Up Home 36 at Upper Ferntree Gully is located on the right hand side of the line.

31.05.2005 **Spencer Street** (SW 121/05, WN 20/05)

From Tuesday, 31.5., an Absolute Occupation will be in force over all of No 3 Track.

04.06.2005 **Westall** (SW 131/05, WN 22/05)

On Saturday, 4.6., additional track circuits (7 & A30) were installed as part of the turnout fouling project.

05.06.2005 **Deer Park - Deer Park West** (SW 120/05, WN 22/05)

On Sunday, 5.6., the North line between Deer Park and Deer Park West will be taken out of service. Points 11 at Deer Park West will be clipped normal. Crossover 9 at Deer Park will be restored to service. Blocking Jacks will be supplied to the signalbox at Sunshine to prevent a train being signalled over the North line. SW 117/05 is cancelled.

05.06.2005 **Camberwell** (SW 127/05, WN 22/05)

On Sunday, 5.6., the through routing and storage facility were commissioned.

05.06.2005 **Ringwood** (SW 129/05, WN 22/05)

On Sunday, 5.6., the Westrace interlocking was reprogrammed so that the operation of RWD302 towards RWD304 will require Crossover 205 (between Up and Down Lilydale lines at the Down end) normal.

05.06.2005 **Oakleigh** (SW 130/05, WN 22/05)

On Sunday, 5.6., additional track circuits (8, 12, & A40) were installed as part of the turnout fouling project.

(07.06.2005) **Sunshine** (SW 132/05 & SW 142/05, WN 22/05 & WN 23/05)

Diagram 17/05 replaced 13/96 as in service. Note that points to the GEB Siding near Post 762 are secured by an E pattern Annett Lock instead of the Staff lock shown. The Annett key is normally kept in a duplicate lock in a cabinet at the points and is electrically released from the signalbox. Amend Diagram 17/05.

(07.06.2005) **Baxter - Stony Point** (SW 133/05, WN 22/05)

Diagram 16/05 replaced 26/84 as in service.

10.06.2005 **Spencer Street** (SW 138/05, WN 24/05)

On Friday, 10.6., the Main Goods Lines were slued further west (towards Wurunderji Way) to allow for the future construction of Platforms 15 and 16. Up Automatic 724, Down Home 721, and Up Home 726, were relocated to the new alignment. Up Automatic 724 and Up Home 726 were converted to LED heads. A co-acting signal is provided for Up Home 726 and is situated between the Up and Down lines.

Diagram 29/05 (Flinders Street to North Melbourne) replaced 47/04.

10.06.2005 **Richmond Junction** (SW 140/05, WN 23/05)

On Friday, 10.6., the A and B heads of Down Home 354 (Down Burnley Through) were lowered, the low speed light replaced by a 90 dot Westinghouse LED unit and the illuminated letter A to a an Alstom 2 row LED unit. The illuminated letter A on Down Home 394 (Burnley Underground Loop) was similarly replaced by an Alstom 2 row LED unit.

11.06.2005 **Corio - North Geelong - Geelong** (SW 113/05, WN 22/05)

From 0100 hours Saturday, 11.6., the East and West Lines between Corio and North Geelong and the Up and Down lines between North Geelong and Geelong were placed under Absolute Occupation. North Geelong B was abolished, and the interlocking frame and panels at Geelong A was abolished, but the signalbox remained in use as the base for the signallers. The Track Block system between North Geelong B and Geelong A was abolished. Corio was switched in and will be attended for all movements.

At North Geelong A the crossovers at the Up end and the connection to the Loop Line were temporarily taken out of use. Homes 1, 2, 5, 6, 47, 48, 49, and U49 will be temporarily out of use. Crossovers 9 and 11 and Points 13 were placed in the hand operating position and clipped. All signals on the Down side of Homes 48/49/U49 were abolished (Posts 4, 7, 10, 11, 51, and G2322) except Ground Discs 9, 9B, 9C, and 9D which were secured at stop. Points 28 (to Sidings A) and 42 (to Grain Sidings) were disconnected from the signalbox and will be clipped for all movements. Levers 1, 2, 4-6, 8-13, 39-43, 45, 47-51 and 53 were sleeved normal. A Signaller will be in attendance until the Absolute Occupations are issued and thereafter for all movements

At North Geelong B the signalbox was abolished. Posts 25, 26, 26B, 27, 27B, 28, 31, 32, 33, 34, 35, 37, and 39 were abolished. Points 21 (Up line to Ballarat Siding), 22 (Down line to X), and 24 (single compound in Up line), and Crossover 28 (Down line to Grain Sidings) were disconnected from the signalbox and will be clipped for all movements. Points 31, 33, 35, 36, and 38 (all in sidings on Up side of line) were fitted with WSa levers. Catches 34, and 36 and Points 37 were abolished. A Signaller will be in attendence until the Absolute Occupations are issued.

At Geelong A the interlocking frame and the panels were abolished, but the box remained in use as the base for the signaller. Posts 14, 16, 16B, 17, 17B, 18, 19, 19B, 78, 112, 116, 118, G2398, and G2365 were abolished. Posts 57, 58, 64, 92, 96, 122, 124, 126, and 128 were temporarily out ouf use. Points 26, 35-39, 73-76, 123, 127, and 129 were disconnected from the signalbox and clipped for all movements. A Signaller will be in attendence.

Passenger and freight trains will run between Geelong and South Geelong, however the signalling system will not be in operation. Train movements will be in accordance with Rules 62 and 63 of Section 34, Book of Rules. The Signaller at Geelong will ensure that the points are in the correct position for the movement and issue a Caution Order to pass Home 130 at Stop (this Order will be issued to the Signaller at South Geelong who will hand it to the Driver). No movement must pass the Up end of the platforms at Geelong unless accompanied by the Signaller Geelong.

The references to North Geelong A, North Geelong B, and Geelong A signalboxes are to be deleted from Operating Procedure 4, Section 32, Book of Rules. These three boxes are to be deleted from the Book of Signals.

When fully commissioned, Automatic Block Signalling will be in force North Geelong - Geelong on both the East and West lines (with bi-directional signalling on the West line), and between Geelong - South Geelong. The Track Block System will be in force South Geelong - Marshall. Diagrams 24/05 (North Shore - North Geelong & Fyansford) and 26/05 (Geelong) will replace 02/03 and 26/04 respectively.

13.06.2005 **Corio - North Geelong A - Geelong A - South Geelong** (SW 114/05, WN 22/05)

From 0900 hours on Monday, 13.6., the Absolute Occupation on the West Line between Corio and North Geelong A and the Up Main between North Geelong A and Geelong will be cancelled. This line will then be worked by Train Staff (without Tickets) with the section Corio - Geelong Station. The section will extend from Homes 6 or 18 or Dwarf 10 at Corio to Home 58 at Geelong A. An employee holding the Staff will accompany all trains on this single line section, however trains must not be permitted to enter the section without the permission of the Signaller at Geelong. Movements to or from the Loop line must be in possession of the Train Staff for the single line section. Movements to or from the Phosphate Sidings at North Shore and the Grain Sidings (East Yard) at North Geelong will cross through the area of Absolute Occupation. All such movements must be accompanied by the Track Force Co-ordinator in charge of that

area of Absolute Occupation.

During this period the Signaller at Geelong will be relocated to the Geelong Signalling Centre (a building 70 metres on the Down side of Geelong A box). Operation of the line between Geelong and South Geelong will be as shown in S113/05.

15.06.2005 **Spencer Street** (SW 154/05, WN 24/05)

From Wednesday, 15.6., baulks were provided 2.5 metres in advance of the buffers on Nos 4 South, 5 South, 6 South, and 7 South Tracks. A 'Limit of Shunt' sign is attached to a pole on each baulk.

17.06.2005 **Spencer Street** (SW 160/05, WN 24/05)

From Friday, 17.6., Platform 4 North will be closed to passengers.

17.06.2005 **Flinders Street** (SW 163/05, WN 24/05)

On Friday, 17.6., the heads on Down Home 576 (No 5 Track) was lowered 1 metre and offset 600mm due to erection of scaffolding for the concourse rehabilitation.

18.06.2005 **Kensington** (SW 156/05, WN 24/05)

On Saturday, 18.6., additional track circuits were provided on the main line turnouts as part of the turnout fouling project.

(21.06.2005) **Spencer Street** (SW 161/05, WN 24/05)

A baulk has been provided in No 8 Track 2.5 metres in advance of the buffers. The restriction on routing trains towards the buffer stops in No 8 Track (SW 132/04) is cancelled.

(21.06.2005) **Heathmont - Belgrave** (SW 167/05, WN 24/05)

Diagram 31/05 (Heathmont - Belgrave) replaced Diagram 25/05.

23.06.2005 **Bluescope Westernport Siding (Long Island Line)** (Correspondence)

On Thursday, 23.6., Flashing Lights were provided at the MSD S-bend level crossing (within the Coil Steel Plant). Dwarf A was provided to allow shunting without operating the flashing lights. Dwarf A is controlled from keyswitches. Operation is via SCX-1.

26.06.2005 **Regional Train Control (Centrol)** (SW 129/05, WN 24/05)

Between 0100 hours Saturday, 25.6., to 2359 hours Sunday, 26.6., Regional Train Control (Centrol) was relocated from Level 1 Transport House to Level 11, 628 Bourke Street. The nominal arrangement of the new rooms are: 4, Bendigo RFR (Watergardens to Bendigo); 5 South West (Geelong) and Eastern (Traralgon); 7, Western (Ballarat); 9 North Eastern (Seymour & Goulburn Valley) and Bendigo (non RFR), however, the rooms may be switched out.

All Sepac telephones in the field will be decommissioned. These will be replaced by: new telephone handsets known as 'Station phones' at the following stations and signalboxes:

Bendigo: Sydenham (Watergardens), Diggers Rest, Sunbury, Clarkefield, Gisborne, Woodend, Kyneton, Castlemaine, Bendigo Panel, Bendigo SM,

Geelong: Footscray Control Room, Newport signalbox, Newport SM, Werribee, Lara Panel, North Geelong A, North Geelong B, Geelong SM, South Geelong signalbox

Traralgon: Caulfield signalbox, Caulfield SM, Springvale, Dandenong panel, Dandenong SM, Pakenham, Moe SM, Morwell signalbox, Traralgon safeworking room, Traralgon SM

Wodonga: Broadmeadows signalbox, Somerton signalbox, Donnybrook, Wallan, Kilmore East, Broadford, Seymour panel, Seymour SM

Ballarat: Melton signalbox, Bacchus Marsh signalbox, Bacchus Marsh SM, Ballarat panel, Ballarat SM

Stony Point: Frankson signalbox

The Station phone handsets will have speed dial buttons preprogrammed to ring the train control rooms and an 'Urgent' button which will ring a separate urgent phone in each control room. The normal telephone keypad will be disabled.

The following locations which were equipped with Sepac telephones were not equipped with the new phones: St Albans signalbox, Geelong A signalbox, Oakleigh, Berwick, Moe Bank Engine Sdg, Moe equipment room, Hernes Oak Loop, Albion Junction, Essendon, Jacana Junction, Wodonga Operations, Wodonga A signalbox, Rockbank Loop, Parwan Loop, Bank Box Loop, Bungaree Loop, Frankston SM.

At locations not equipped with the Station phones, existing standard telephones, non urban train radio, or mobile phones will be used to communicate with train control.

The following alterations have not been published in the Weekly Notice and have been contributed by correspondents.

01.06.2002 **Berrybank**

Flashing lights were provided at Berrybank Road (152.366 km). Operation is via HXP-3.

03.05.2003 **Horsham**

Boom Barriers were added to the flashing lights at Hazel St (328.245 km). Operation is via HXP-3.

07.10.2003 **Marshall**

Boom Barriers were added to the flashing lights at Barwon Heads Rd (78.805 km). Operation is via HXP-3.

10.10.2003 **Bacchus Marsh**

Flashing lights were provided at Kerrs Road (53.642 km). Operation is via HXP-3.

08.11.2003 **Pyrenees Loop**

Flashing lights were provided at Park Road (267.066 km). Operation is via HXP-3.

08.11.2003 **Great Western Loop**

Flashing lights were provided at Garden Gully Road (267.066?? km). Operation is via HXP-3.

25.11.2003 **Inverleigh**

Flashing lights were provided at Barwon Park Road (104.100 km). Operation is via HXP-3.

25.11.2003 **Wingeel**

Flashing lights were provided at Wingeel Road (117.890 km). Operation is via HXP-3. There is a 50 km/h speed restriction on Up trains departing from No 2 Road.

02.12.2003 **Nagambie**

Flashing lights were provided at Avenel - Nagambie Road (116.867 km). Operation is via HXP-3.

(14.10.2004) **Avenel**

Flashing lights were provided at Aerodrome Road (114.940 km). Operation is via HXP-3 for broad and standard gauge.

16.12.2004 **Marshall**

Boom Barriers and Pedestrian Gates were added to the Flashing lights at Marshalltown Rd (79.436 km).

20.12.2004 **Inverleigh**

Flashing lights were provided at Harvey Road (92.151 km). Operation is via HXP-3.

31.01.2005 **Inverleigh**

Flashing lights were provided at Railway St (100.343 km). Operation is via HXP-3. Keyswitch provided adjacent to Up end points to start flashing lights for shunting movements. Notice boards lettered 'Shunting Moves Shall Not Enter Crossing Until Flashing Lights Operating' provided on each side of crossing. Notice board lettered 'Stopping Movements shall not exceed 25 km/h up to Winchelsea Rd level crossing' provided for Up trains adjacent to Up end points.

12.02.2005 **Chiltern**

Boom Barriers were added to the flashing lights at Beechworth Rd (270.920 km). Operation is via HXP-3 on the broad gauge and track circuits on the standard gauge.

01.04.2005 **Kerang**

Flashing lights were provided at Airport Road (287.287 km). Operation is via HXP-3.

03.04.2005 **Avenel**

Boom Barriers were added to the flashing lights at Bank St (116.126 km). Operation is via HXP-3 on the broad gauge and standard gauge.

09.05.2005 **Nagambie**

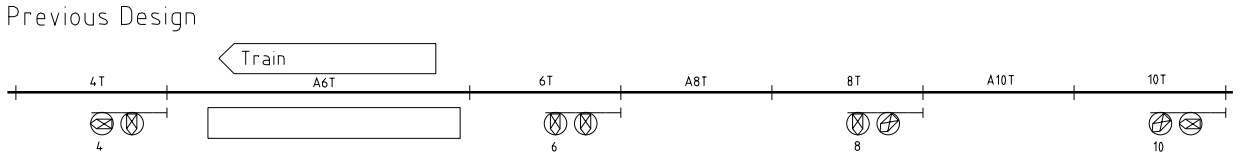
Flashing lights were provided at Nagambie - Locksley Road (122.554 km). Operation is via HXP-3.

Approach Clearing, Time Delayed Operation of Signals

Chris Gordon

On the 5th June 2001 there was a rear end collision at Footscray, where a following suburban train passed signal W217 showing Medium Speed Warning (Red over Yellow) at Line Speed instead of Medium Speed. Signal W223 was at stop, with a 225m overlap provided the train was unable to stop within that distance and collided with the preceding train in the platform.

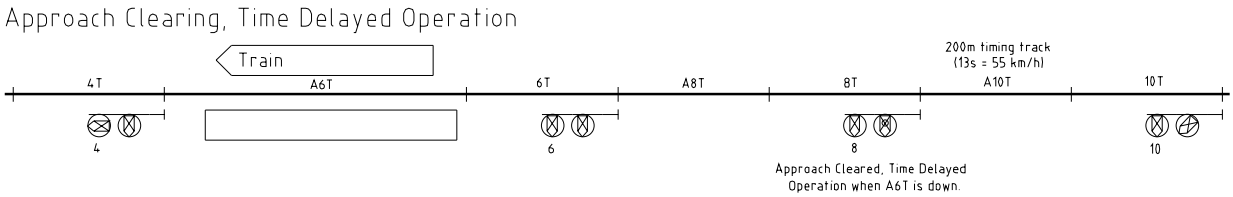
Medium Speed is 40 km/h, a suburban train travelling at this speed should stop in 75m, and generally a standard 100m overlap is provided for medium speed.



As a result of this accident and the accident at Epping (see next section on diverging/converging overlaps) a design change was made to signals approaching locations where trains can stop for extended periods of time (ie station platforms).

The new design will extend the medium speed overlap of signal 8 to include A6T (ie the platform), so will hold signal 8 at stop in addition to signal 6. A SPAD at signal 8 at line speed will now have sufficient distance to stop and avoid a collision with a train stationary in the platform.

Once A6T picks up then signal 8 will clear to R/Y.



collided head on with a down suburban train on points 22 heading into the yard.

A distance of 155.3m was provided between signal EPP121 and the fouling point of points 22, which again is over the standard 100m medium speed overlap, but less then

At 80 km/h (Line Speed at Footscray) a suburban train would take between 275 and 300m to stop.

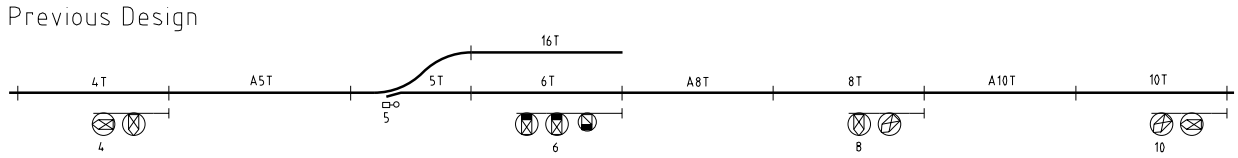
The previous design of medium speed overlaps is show in the following diagram. 100m overlaps provided beyond each signal will clear the preceding signal to Medium Speed Warning. As shown in the diagram a train sitting in the platform on A6T track will hold the signal behind, 6 at stop. With 6T being the medium speed overlap for signal 8 and up, then signal 8 will show Medium Speed Warning (R/Y).

Approach Clearing:

If a train is stationary in the platform for a long period of time and a second train approaches signal 8 it will pass over a timing track (A10T) which is 200m long, after 13 second signal 8 will clear to R/Y. This proves the train is travelling at 55km/h or less over that timing track (any faster and you would SPAD on signal 8).

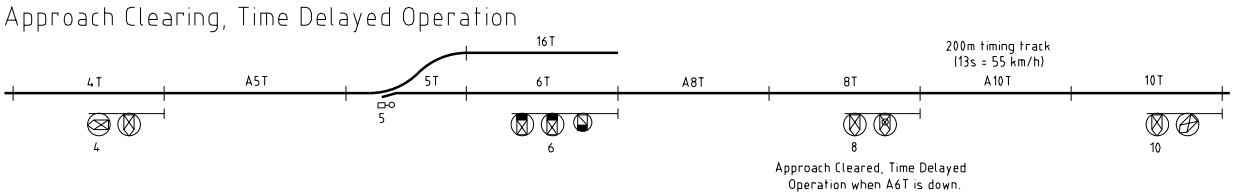
The second accident was at Epping on the 18th June 2002, where an up suburban train passed signal EPP121 at Stop at line speed (restricted to medium speed from EPP127) and line speed overlap (again 80 km/h line speed).

A standard layout with points is shown in the figure below. With points 5 normal (as shown) signal 8 would show Medium Speed Warning, with a 100m overlap beyond home signal 6.



The design change will now keep signal 8 at Stop if points 5 are set normal. Again signal 8 will approach clear with a 200m timing track.

If points 5 can be run reverse, they will be locked and signal 8 will show Medium Speed Warning with signal 6 at Stop.



Approach Clearing, Time Delayed Operation has been provided in the last 12 months at: Gardiner, Ringwood, Cranbourne, Sydenham, Heatherdale, Glenferrie, Surrey Hills, Mont Albert, Werribee, Caulfield, Box Hill, Aircraft, Footscray, Moorabbin, Gowrie, Upper Ferntree Gully, Upwey, Camberwell, and Lynbrook Loop

Notes:

(1) This change will not treat any situation where the proceeding train is stationary at a point other then a platform. Trains generally stop at platforms and that is the high risk area (Syndal, Holmesglen, Footscray accidents)

(2) Assume the driver is in control of his train and won't exceed the turnout speed or line speed. Treatment of these problems would require a full ATP system.

Time Interval Working in Victoria

The key safety challenge in operating a railway is to prevent the collision of two trains. Over the years a large number of 'safeworking systems' have been used in Victoria. This article will examine the time interval system which was in use, at least from the opening of the Victorian Railways in 1859, until effectively abolished around 1898.

Unlike the block system which separates trains by space, Time Interval working attempts to separate trains by time. Essentially it prevents two trains from passing one point too close together in time. In operation it was simplicity itself. When a train passed a station, the signalman there placed the signal back to danger for a prescribed period of time (normally five minutes) and prevented following trains from departing from the station during that period. After this period of time had elapsed the signal was changed to show caution for a second period of time. Trains could leave the station while the caution signal was being displayed, but the signal warned the driver that he was closely following another train. Finally, after both periods of time had elapsed the signal was altered to show clear.

The time interval system had many weaknesses. Chief amongst these was that just because the preceding train had passed a station 10 minutes ago, it does not mean that it was still 10 minutes in front. It could have come to a stand just around a bend or over a crest. The second weakness, seen in a number of accidents in the UK, was that there was a tendency to shave the time intervals and let trains depart at less than the stipulated intervals.

The origins of the time interval system

Like almost all early railway practice in Victoria, the time interval system was developed in the United Kingdom. When it was introduced in Victoria, Time Interval working was the standard safeworking system in use in the United Kingdom.

Vanns [1] states that the Liverpool and Manchester Railway was the first railway to regulate traffic by means of the time interval system. This predated the use of fixed signals and the railway policemen at the stations used hand signals to communicate to passing trains. The colours chosen, incidentally, were red for stop, green for caution, and white for clear. These colours are still used for hand signalling in Victoria roughly 170 years later. Kichenside and Williams [2], while agreeing that the L&M used policemen to signal trains, state that the basic form of signalling was not necessarily linked to safety procedures. Although they discuss a number of hand signals, none are linked to time interval working. Both books agree that this system was introduced in the 1830s and states that most railways had adopted this system by 1840.

Unfortunately, we do not know the rules under which the Melbourne and Hobson's Bay railway operated when it opened in 1854, though S.T. Gill's well known contemporary drawing of Flinders Street shows a typical UK style three position semaphore. Given the almost dead straight line, it would not be surprising that trains were actually operated under the 'Guess and by God' system of safeworking. Similarly it is not clear how the Geelong and Melbourne Railway Company operated when it opened in 1857.

When the Victorian Railways opened for business on 13 January 1859 it was worked under the provisions of the rulebook dated January 1858. It is very likely that this rulebook was a verbatim copy of a contemporary UK rulebook, but which one is not known. This rulebook included time intervale working.

Basic time interval working in Victoria

In the 1858 rulebook, the basic time interval working was given in three instructions . These were primarily concerned with the working of signals:

> 2. The Danger Signal is always to be made immediately after at Train or Engine, or Carriage of any description, has passed along the Line, and it is to be continued for Five Minutes, in order to stop any Train, Engine, or Carriage of any description, that may be coming after it; it is also to be made whenever there is any obstruction on the Line, or any danger of obstruction.
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> 3. The Caution signal is always to follow the Danger, and to be continued Five Minutes as a Signal to the Engineman that another Train is ahead of him; it is also to be made whenever the state of the road or other circumstances (though not such as to require the Danger Signal) make it desirable that the speed should be reduced.
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> 4. The All Right Signal is only to be made when the Signal-man has satisfied himself that the Line is clear and unobstructed, and that there is no danger to the free passage of the Engine or Train.

The basic principle of operation was the same in the 1864 rulebook, but the language had been made more precise, perhaps as the result of experience:

> 82. Immediately upon any Engine or Train reaching the platform of an Intermediate Station or stopping short of the platform when approaching the Station, the Semaphore Signal must be placed at "Danger" and kept so for Five Minutes after such Engine or Train shall have proceeded on its journey (whether there is another Train expected to follow or not;) if there be no obstruction on the Line it is then to be lowered to "Caution" and kept so for Five Minutes, after which time, if the Line be clear, it is to be dropped to "All Right" and kept so until there is necessity to use it again.

The Deniliquin and Moama Railway used identical text in their 1876 Rulebook.

The time interval working in the Melbourne and Hobson's Bay United Railway Company rulebook (undated, but no earlier than 1865 and no later than 1878) had some interesting variations on the theme as shown in the following extract. The time interval was only three minutes, probably reflecting the denser traffic but of questionable safety. The M&HBUR signals apparently only worked in two positions - danger and caution - and the normal position of the signal was at danger.

> 67. Immediately upon any train or engine passing a junction or arriving at an intermediate station, where there is a semaphore signal, such signal must be placed at 'danger,' and the line must not be considered clear until three minutes after such train or engine shall have proceeded on its journey (whether or not there is another train expected to follow or not). When the signal is challanged by the following train or engine, if the line is clear, the signal may be lowered to 'caution,' to allow such train or engine to proceed on its journey. In case there is no semaphore, hand signals must be used in a similar manner.

When the VR rulebook was re-issued in May 1885, time interval working was largely unchanged although, again, the opportunity was taken to revise the language:

> 127. At places where the Block System is not in operation, when any train or engine has stopped at

or passed without stopping at a Station, or any place other than a Junction where there are fixed signals, the Danger Signal must be immediately exhibited at the Home and Distant Signal, and remain so until the train or engine shall have passed or left at least five minutes, after which a Caution Hand Signal must be exhibited for a further period of five minutes. The All Right Signal must then, if the Line be clear, be exhibited.

128. Where the Block System is not in operation, no train or engine must be allowed to followany other train or engine on thesame line within five minutes. A Caution Hand Signal must be given to any train which passes between five and ten minutes after the last preceding train. This regulation does not apply to Racecourse traffic, which may be specially provided for by the General Traffic Manager.

The use of a Caution hand signal was necessary as the new rulebook no longer allowed the old three position signal. The 45 degree position had been redefined as 'All right' and "arms obscured from view or hanging straight with the Signalpost should also be treated as a Danger Signal."

The emphasis on the block system in the 1885 rules was interesting. Block working had been introduced in 1876, albeit on a very limited number of sections and using the morse telegraph. Conventional double line block working was introduced in 1885 using Winter's Block instruments, and its pending introduction may have been one reason why the rulebook was revised.

The March 1891 VR rulebook contained roughly the same text, but the time interval had been extended to 10 minutes with the abolition of the 'caution' period:

128. At places where the Block System is not in operation, when any train or engine stops at, or passes a Station or any place other than a Junction, where there are FixedSignals, the Home and Distant Signals must beput to Danger, and kept at Danger for at least ten (10) minutes after the train or engine has left. The All Right Signal must then, if the Line be clear, be exhibited. [...]

128. Where the Block System is not in operation, no train or engine must be allowed to follow any other train or engine on the same Line within ten (10) minutes.

The July 1898 VR rulebook still contained Time Interval working:

121. Where the Electric Train Staff, Train Tablet, or Block System is not in operation, no train must be allowed to follow any other train on the same Line within ten (10) minutes. [...]

However, as will be explained later, they were effectively a dead letter by this date. Provision for time interval working had been removed from the 1907 Rulebook.

Protecting trains at stations

The station semaphore offered little protection to trains between stations, but did offer protection to trains stopped at or departing from stations. Under normal working conditions, stations were the most dangerous locations for trains. At stations trains were often either stationary, or travelling very slowly, and hence were at most risk of being overtaken by a following train travelling at speed.

The 'Danger' and 'Caution' positions of the station semaphore, in particular, protected trains that were departing from the station and gradually building up speed. After 10 minutes the departing train could be assumed to be at running at line speed and hence, even if the following train was running faster, the closing speed would be relatively low.

Trains arriving at a station were equally at risk as they would be slowing down to stop. Note that the 1864 rules specifically instruct Signalmen to place the station semaphore at Danger as soon as the approaching train stops, whether this was at the platform or before it. The train departed against the station semaphore at Danger. This was made quite explicit in Rule 84:

84. When a Train stops at the Station, the use of the Semaphore is to protect it from any Train which may be following, and after at Train has stopped, the Signal to "Go on" from the Station-Master to the Guard and from the Guard by whistle to the Engineman will be sufficient to start the Train again without the Arm of the Semaphore being lowered from Danger.

Where there was an 'advanced' signal (what we would now call an outer home), this was to be placed at Danger immediately the engine passed the signal when arriving at the station. The advanced signal protected the train when it was standing at the station and could be cleared as soon as line was clear to the Station semaphore and the preceeding train had departed from the station.

By the issue of the 1885 rulebook, signalling had become more standard. The three position station semaphore had become the two position home signal, and the distant signal had been introduced.

63. Distant Signals are fixed at a considerable distance back from the Home to act asan auxiliary towarn trains of danger, and also to protect engines of trains standing at the Home Signal. Drivers seeing Distant Signals at "Danger," should come to a standstill thereat, and then draw cautiously as near to the Home Signal as they can [...]

Home signals were fixed clear of fouling points and could be passed at Danger:

118. [...] When a train has been stopped or brought nearly to a stand at the Home Signal, and it is necessary to draw it within such signal before the line ahead is clear, the Engine-driver must, on receiving verbal instructions from the Signalman, draw past the Home Signal, so as to bring his train under its protection.

The rules in the 1891 and 1898 rulebook were very similar.

Protecting trains between stations

In Victoria stations were often spaced at significant intervals. For example, in 1875, there was a gap of 15 miles between Harcourt and the next station at Kangaroo Flat. A clear signal given at Harcourt would have meant little even a mile or two down the line and it is clear that a train becoming disabled, or losing time was dependent on the Guard for protection. All the rules contained strong requirements for the Guard to immediately protect his train.

The 1858 rulebook contained the fundamental protection rule:

22. When an Engine or Train is stopped from any cause on the Main Line (except at Stations), the Guard, or, in his abscence the Fireman, or some other compentent person, shall immediately go half a mile back with a Red Signal to STOP any coming train.

When from any cause a Train is unable to proceed at a greater speed than four miles an hour, the Guard or Fireman shall be sent back half a mile, and

continue walking at that distance behind his Train with his Danger Signal shewn, so as to Stop anyfollowing Train until assistance arrives or the Train is shunted.

It appears that the Victorian Railways considered 4 miles per hour as a good walking pace. Walking at that pace, the Guard would take between eight and nine minutes to cover the half mile. Remarkably close to the ten minute time interval, but the Guard would have to be prompt in setting out from his stationary train. Perhaps to encourage promptness, Rule 12 prohibited any stoppage between stations except in an emergency:

12. No Engine or Train of any sort shall stop on the road,nor at any by the appointed Stations, except only when a Signal is given, or in case of accident to any part of the Engine or Train, or when in the judgement of the Engineman it is necessary to prevent accident or collision.

While nice in theory, this rule reflected a significant lack of the appreciation of the realities of railway operation. Even today trains occasionally come to a stand due to an inability to haul the load .

If one train did catch up with the preceeding train the following rule came into play:

17. All Engines travelling on the same Line shall keep at least Half a Mile apart from each other, that is to say, the Engine which follows shall not approach within Half a Mile of the Engine which goes before; and in coming down any Incline, the Engine following shall not come within THREE-QUARTERS of a mile of the Train which precedes it.

These odd little rules disappeared in the 1864 rulebook. The fundamental rule requiring the protection of the train remained, but had been reworded:

87. In the event of any obstruction or accident occurring, or of a Train stopping on the Main Line (from whatever cause), except at a Station, the Signalman, or, in his absence, the Guard is **instantly** to display the **Danger** signal, and send or himself hasten in the proper direction to stop any Train that may be approaching; and, in the event of its happening on a Single Line, or both Lines being obstructed, to send competent men in both directions with the **Danger** signal for a distance of **800 yards** from the place of accident, where he or theymust remain with the **Danger** Signal **exhibited** until it is ascertained that the Line is again perfectly clear and unobstructed.

This rule curiously contradicts Rule 123:

123. The follow is the mode of applying the Detonating Signals:- In cases of obstruction, where it is necessary to Stop any Engine or Train following on thesame Line, one of the [Detonating] Signals is to be placed by the person engaged in the duty at the end of very 250 yards, for a distance of not less than 1000 yards from the place of obstruction (on levels, but farther on descending gradients, or, if a curve, to continue it until the Red Signal can be seen round the curve; and should the distance end in a tunnel then the Signal is to be exhibited at the end of the tunnel farthest from the obstruction) in the proper direction, and two must be fixed ten yards apart at the point where the Signalman stands at the moment a following Train comes in sight, or on arriving at the end of the distance named, between him and the approaching Train; five Signals will be thus required to protect the Train. The Red Flag Signal or Red Lamp at night must at the same time be exhibited as conspicuously as possible, and every exertion made to stop any approaching Engine or Train.

This convoluted rule must have been rather difficult to understand, and, not surprisingly, had been reworded in the 1885 rulebook:

278. When from any cause a train is unable to proceed at a greater speed than four miles an hour, the Guard, if there be only one, or the Rear Guard, if there be more than one, must go back or send some other competent person 1,000 yards. The person who goes back must follow the train at that distance, and use the proper Danger Signals, so as to stop any following train, until assistance arrives or the train is shunted.

279. When a train is topped by an accident or from any cause (except where it is efficiently protected by fixed signals), the Guard, if there be only one, or the Rear Guard, if there be more than one, must immediately go back 1,200 yards, or if on a longer incline to the top of the incline, to stop any following train, and, in addition to his Hand Signals, he must take not less than six detonators (to be used by day as well as by night), which must be placed upon the Line of rails on which the stoppage has happened as follows, viz:- 1 Detonator at a distance of 400 yards from his train, 1 Detonators at a distance of 800 yards from his train and 2 Detonators, ten yards apart, at a distance of 1,200 yards from his train. He must also conspicuously exhibit his Hand Danger Signal to stop any coming train. The Guard must not return to his train until recalled by the Engine-driver sounding the whistle of his engine, and when recalled, he must leave the two most distant Detonators and return to his train, taking up the other Detonators on his way.

Extended time intervals

As already described, the basic 'Danger' period was five minutes and this had been extended to 10 minutes by 1891. There were very few examples of longer 'Danger' time intervals.

In the 1864 rulebook the 'Danger' period was extended to fifteen minutes at several stations: Lancefield Road [now Clarkefield] (Up), Gisborne (Up), Woodend (Up or Down), Carlsruhe (Down), Malmsbury (Down), Elphinstone (Down), and Buninyong (Down). Most of these had steep falling grades in the forward section. However, it does not appear that the Caution period was similiarly extended. Many of these sections were amongst the first to be converted to block working in 1876.

By December 1877 the telegraph block was in force on the NE main line in both directions on the sections Essendon - Craigieburn - Wallan - Kilmore, and in the Down direction only on the sections Kilmore - Broadford - Tallarook - Seymour. Telegraph block was extended on the sections Seymour - Mangalore - Avenel (both directions) between January and February 1880. Between March and April 1880, however, block working was removed from a number of these sections. The sections were now: Essendon - Broadmeadows (both directions), Broadmeadows - Craigieburn (Up direction only), Wallan - Kilmore (both directions), Kilmore - Broadford - Tallarook - Seymour (Down direction only) and Seymour - Mangalore - Avenel (both directions). The Working Timetable of 1 April 1880 stated that "Between stations where there is no Block one Train is not to follow another till Fifteen minutes has elapsed." This instruction apparently lasted until the block system was extended to cover all section.

The only other example of an extended time interval I am aware of was similarly imposed after the removal of block working. This was between Franston and Mornington

Junction where the WTT of 21 May 1894 noted that "an interval of 30 minutes must be maintained between trains running between Frankston and Langwarrin on Down and Up journeys". This followed the removal of Winters Block between Frankston and Langwarrin.

Junction working

By the issue of the 1864 rulebook the working of junctions was slightly different to stations on plain line:

> 100. The mode of working Junction Signals is as follows:-
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> 101. The Junction Danger Signal is always to be made immediately after a Train, or Engine, or Carriage of any description has passed along the Line, and is to be continued at Danger in order to stop any Train, Engine, or Carriage that may be following, and is not to be again altered til challenged by the following Train, and a period of Five Minutes has elapsed since the former Train lefter the Junction. The Signal is to be kept at Danger when there is any obstruction on the Line.
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> 102. The Caution Signal is never to be used unless to allow an approaching Train to pass, and the Engineman of such Train shall have sounded his whistle, and the man in charge of such Signal shall be satisfied that no other Train than the one is due to cross over the Junction of the two Lines.

In other words, the signals at the junction were normally kept at Danger until an approaching train had slowed and challenged the signal. Provided the preceding train had passed over five minutes previously, the Signalman could then lower the signal to Caution. After the train had passed, the signal had to be restored to Danger and kept there for five minutes.

In 1885 the rule was (where the block system was not in operation):

> 129. Should a Passenger Train approach a Junction within ten minutes after a Goods, Cattle, Mineral, or Ballast Train, which it has to follow on the same Line, the Signalman must stop it, and inform the Engine-driver of the time that has elapsed since the previous train passed, and the Passenger Train must proceed cautiously until the Engine-driver receives an "All Right" Signal indicating that the Goods, Cattle, Mineral, or Ballast Train is shunted,or that there is an interval of at least ten minutes between such trainand the Passenger Train.
>
> Should two trains, which have to run forward on the same line, approach a Junction within five minutes of each other, the second train must be stopped and the Engine-driver informed of the train in advance. If the first train has passed more than five minutes, but less than ten minutes, the Signalman must exhibit the Caution Signal by hand, hand lamp, or flag, as occasion may require, to the Engine-driver of the second train.

This rule is slightly confusing, but appears to require an additional safeguard: if a second train arrives within 10 minutes at a junction, the second train is stopped and the driver informed when the previous train passed.

In 1891 only the first part of this rule was included:

> Should a Passenger Train approach a Junction within ten minutes after a Goods, Cattle, Mineral, or Ballast Train, which it has to follow on the same line, the Signalman must stop it, and inform the Engine-driver of the time that has elapsed since the previous train passed, and the Passenger Train must proceed cautiously until the Engine-driver receives an "All Right" Signal indicating that the Goods train is shunted,or that there is an interval of at least ten minutes between such trainand the Passenger Train.

By the issue of the July 1898 Rulebook the rule was further simplified:

> 122. Should a Passenger train approach a Junction within ten minutes after a Goods train which it has to follow on the same Line, the Signalman must stop it, and after ten minutes have elapsed since the previous train left inform the Engine-driver of the time the previous train passed, and the Passenger train must proceed cautiously until the Engine-driver receives an All Right Signal indicating that the Goods train is shunted. [Exception.- This Regulation does not apply where the Electric Train Staff, Train Tablet, or Block System is in operation...]

Time interval working at gates

The time interval was not just applied at stations. Gatemen at level crossings also had a responsibility for enforcing the time interval. In 1858 they were instructed:

> 3. If an Engine follow another within five minutes, the Danger Signal is to be shewn [by the Gateman], after which time the Caution Signal must be exhibited for five minutes [Regulations for Gatemen at Level Crossings, p38]

In 1864 and 1885 gatekeepers were still required to display the Danger and Caution signals if required, but with a curious twist: "The Danger Signal to be exhibited for a longer time when the first Train passes slowly and makes the Gatekeeper fear that it might be overtaken by a faster Train following' (Rule 461). This was not required of Signalman, though it would seem to be a sensible rule. By 1891 the instructions were:

> 245 [...] When the line is not worked on the block system, if an engine follow another within ten minutes, the Danger Signal must be shown. The Danger Signal to be exhibited for a longer time whenthe first train passes slowly, and might be overtaken by a faster train following [...]
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> 250. At places where the Block System is not in operation, and where there are Fixed Signals, the Danger Signal must be exhibited at these Signals for ten minutes after the passing of any train or engine, at the expiration of which time the All Right Signal must be exhibited. Where there are no Fixed Signals, the same process must be gone through, the Signals being given in each case by Hand Lamp or Flag.

In 1891 this was extended to track workers:

> 416. Where the Line is not worked under the Block Telegraph Regulations, if a Passenger train approach within ten minutes of a Goods, Cattle, Mineral, or Ballast train or light engine, the men repairing the Line must give the Engine-driver of such Passenger train a Signal to go slowly.

Identical rules were in force in 1898 (232/237/389), however the scope had been broadened from passenger trains to any trains.

Precedence of trains

In 1858 a simple precedence rule reduced the chance of a passenger train catching up with a goods train:

> 21. A Goods, Mineral, or Ballast Train, when likely to be overtaken by a Passenger Train, shall shunt at least fifteen minutes before the Passenger

Train is due, and wait there till five minutes after the Passenger Train has passed; and before shunting care must be taken that Signals are made in one or both directions, as the case may require.

A similar rule applied in the 1864 rulebook. In the 1884 rulebook the instructions as to precedence were more complex:

131. Passenger Trains must,as a rule, take precedence of allother trains;and,[...] no Goods, Mineral or Ballast Trainsmust be started from any Station, Siding, or Junction within ten minutes of a Passenger Train being due to leave. If, however, the Station-master or Signalman has ascertained, bytelegraph or otherwise, that the Passenger Train which is due to leave is late, he may dispatch the Goods, Mineral, or Ballast Train, with a sufficient margin to admit of its reaching the next Shunting Station or Siding in time to avoid delay to the Passenger Train, taking care specially to warn the Engine-driver and Guard of the Passenger Train when it arrives, and to inform them of the precise time when the Goodsor Mineral Train was dispatched.

132 [Goods, Mineral, Cattle, and Ballast Trains] which have to be passed by any other train must be shunted as Stationsor Sidings where there are fixed signals by at least ten minutes before such Passenger Train or Fast Goods is due, and kept there till five minutes after it has passed.

These were repeated in the March 1891 rules and the first paragraph (with slight rewording) in the July 1898 rulebook.

Fog working

The 1885 rulebook was the first to have specific rules for fog working:

95. Where the line is not worked under the Block system, a Passenger Train must not during foggy weather follow a Goods Train, nor must a fast Goods Train follow a stopping Passenger Train from a Station nor pass a Signal-box where trains are ordinarily signalled within fifteen minutes, nor even then, until the Engine-driver has been properly warned of the time of the departure of the preceding train, and where it will next stop.

An almost identical rule appeared in the March 1891 rulebook (147) except that it had been augmented with "nor must a Passenger Train or a Fast Goods Train follow a Stopping Passenger Train..." and the time interval had been reduced to 10 minutes. In July 1898 the following rule was in force:

92. Where the line is not worked under the Electric Train Staff, Train Tablet, or Block System, a Train must not during foggy weather or snow storms follow another train, nor pass a Signal-box where trains are ordinarily signalled until ten minutes have elapsed, nor after that time until the train has been brought to a stand and the Engine-driver warned of the time of the departure of the preceding train, and where it will stop. After thirty minutes have elapsed the foregoing precautions need not be observed.

The end of time interval working

The end of time interval working was intimately tied up with the provision of block working, and only a summary will be given here.

Until October or November 1876 time interval working reigned supreme on the Victorian Railways. Although Staff and Ticket Working had been introduced to Victoria, Staff working just controlled the direction of trains on the single line. Keeping following trains apart remained the task of time interval working. However, sometime between the 1 October and 1 November 1876 block working was introduced into Victoria. The block was maintained using the morse telegraph instruments. The initial block sections were on significant down hill grades: Woodend to Sunbury and Elphinstone to Castlemaine. Yendon to Ballarat was quickly added. The first use of telegraph block working on single lines was on the North Eastern line between Essendon and Seymour which was introduced between 1 September 1877 and 1 October 1877. There was little expansion of the block system over the following six years; the major extension was on the Eastern line between Longwarry and Darnum, and between Moe and Traralgon.

On 15 October 1883 Winter's block instruments were introduced between Flinders Street and Balaclava. It was only slowly introduced at first. By December 1885 it had only spread to Flinders Street - Brighton Beach and Caulfield, Spencer Street - Essendon, Leigh Road (Bannockburn) - Meredith (Up trains only), and Yendon - Ballarat (replacing telegraph block). The first use of Winters Block on a single line appeared to be No 68 Gate - Stawell which was in use by 1 April 1886. By 8 June 1887 the suburban area was worked by Winters Block with it extending to Williamstown Pier, the North Eastern line, Coburg, Lilydale, Caulfield, Brighton Beach, St Kilda and Graham.

Attention was then turned to country lines. In 1888 telegraph block was provided over most of the Ballarat - Maryborough line and the North Creswick - Daylesford line. In 1890 and early 1891 the main line between Footscray and Bendigo was gradually equipped (the last section was Woodend - Carlsruhe). By 21 May 1894 it appears that all double lines, country and suburban, were worked by the block (except Newport - Newport South which was worked by Staff).

Subsequently time interval was confined to single lines. It appears that the effective end of time interval working was in September 1895 when the working of these single lines. Unfortunately, I do not have a copy of WN 13, but it appears that this marks the final triumph of telegraph block working. On the busier single lines 'Train Departure' and 'Train Arrival' telegrams were introduced (later 'Apix' and 'Acre'). On less busy lines, trains were required to carry the Staff unless specially authorised differently.

However, there was at least one possible time interval section. In the 1898 General Appendix it specifically excludes the section Newport - Newport South as being worked by the block. Block working had been provided by 1901.

References

[1] M.A. Vanns, An Illustrated History of Signalling, Ian Allen, 1997, ISBN 0 7110 2551 7, p9

[2] G. Kichenside & A. Williams, Two Centuries of Railway Signalling, OPC, 1998, ISBN 0 86093 541 8, p16

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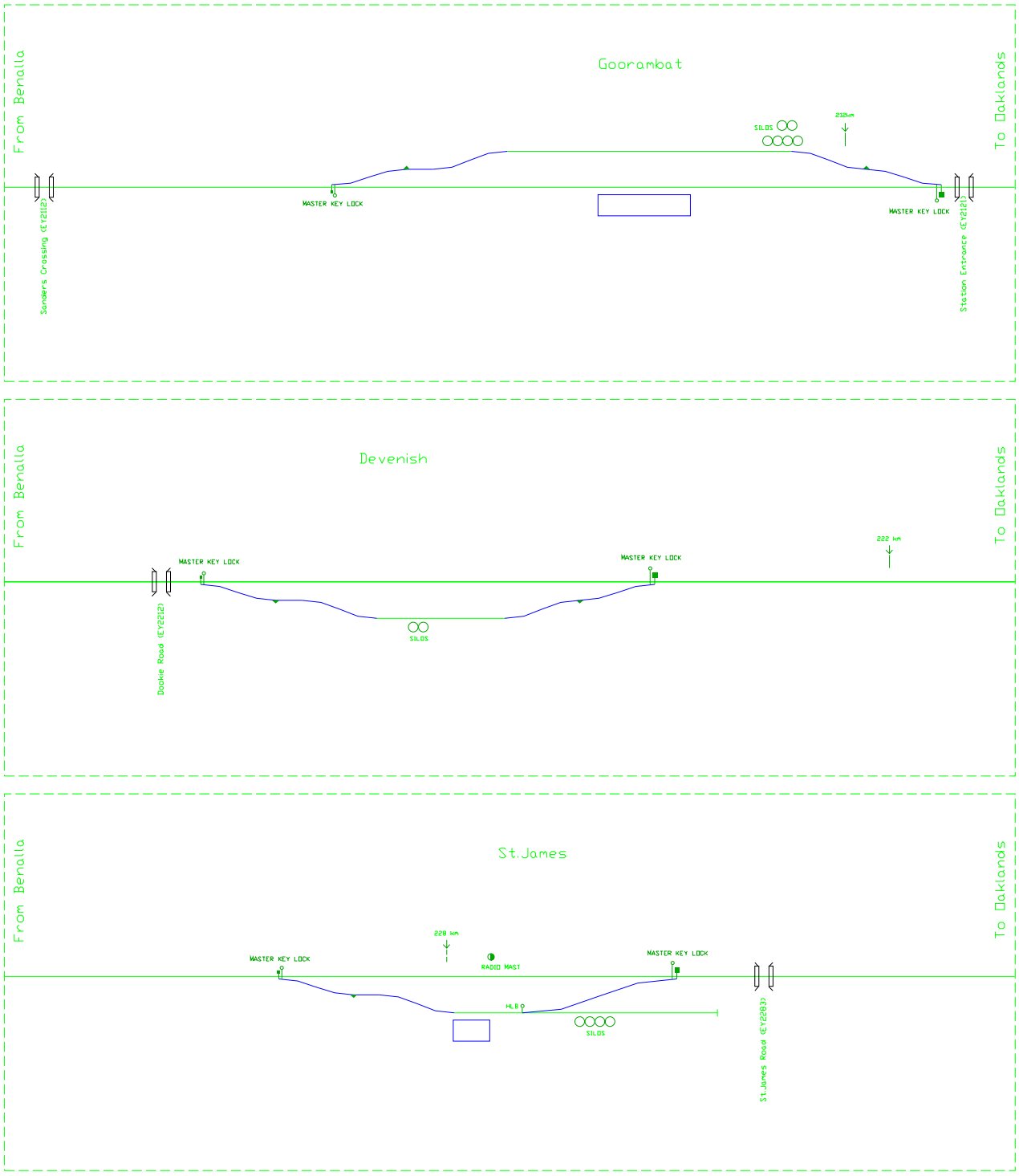
Benalla - Oaklands

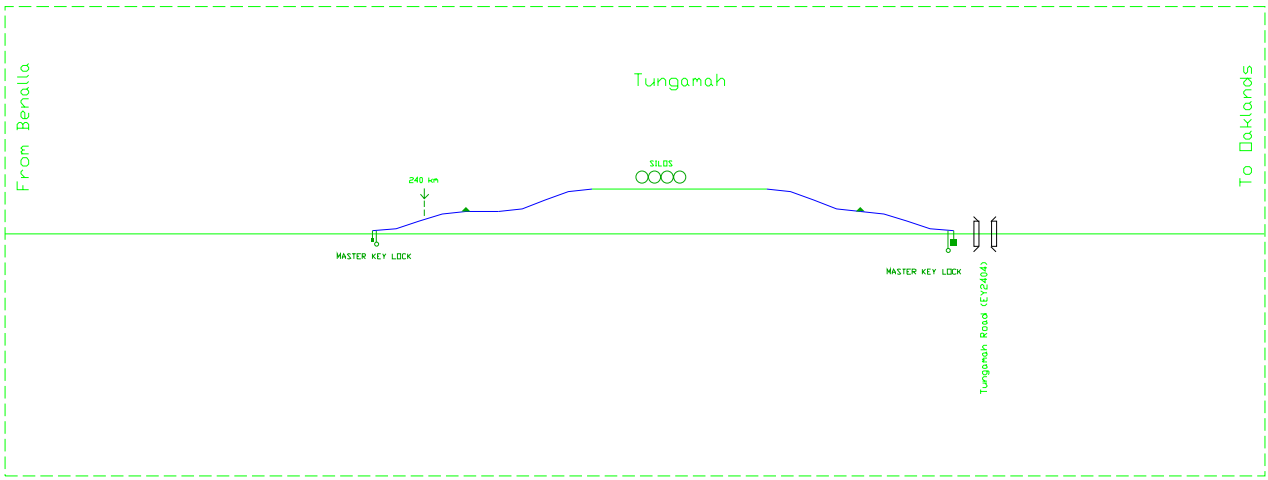
Chris Gordon

The line between Benalla and Oaklands is only open to carry grain traffic. It was opened in three stages: Benalla to St James on 3 September 1883, St James to Yarrawonga on 6 May 1886, and then a long delay until the line was extended across the border to Oaklands on 15 August 1938. At Oaklands it met the standard gauge NSWGR branch from The Rock and there was a dual gauge yard.

South of Yarrawonga, the signalling and safeworking was interesting. Until 1989 the line had always been worked by Train Staff and Ticket with all stations, bar Chesney, Nooramunga, and Telford being Staff stations and equipped with plunger locks. North of Yarrawonga the line was worked for the first 10 years by Train Section Orders and then by one section of Train Staff and Ticket.

Today, the line is worked by Train Orders with the sections Benalla - Yarrawonga - Oaklands. All of the points are secured by large Master Key locks with the exception of the points at Yarrawonga and Oaklands. At Yarrawonga the Up end points are secured by plunger locks, while the Down end points are secured by hand locking bars and padlocks. All the points at Oaklands are similarly equipped.

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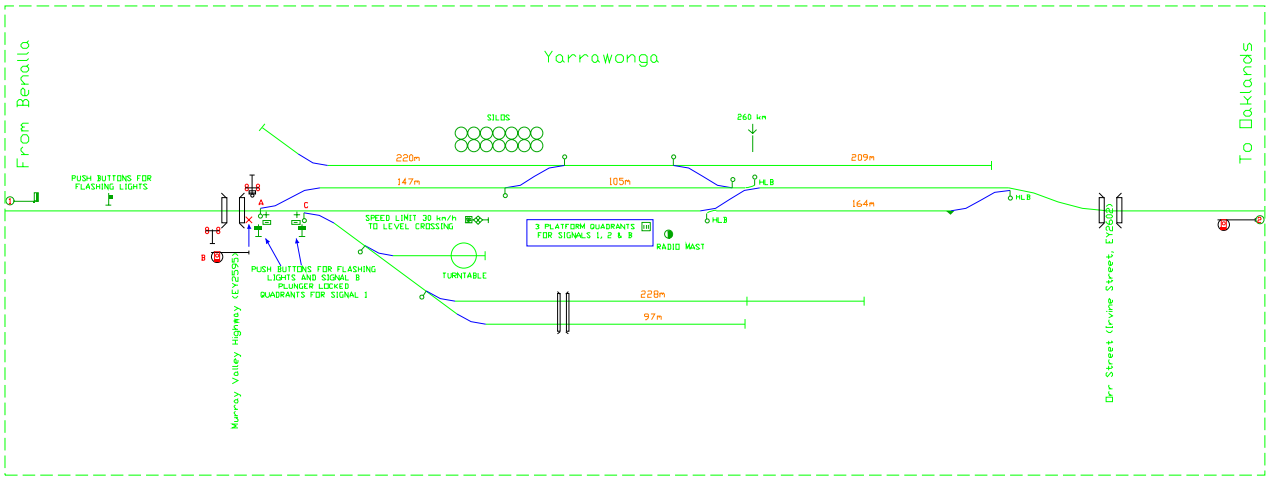
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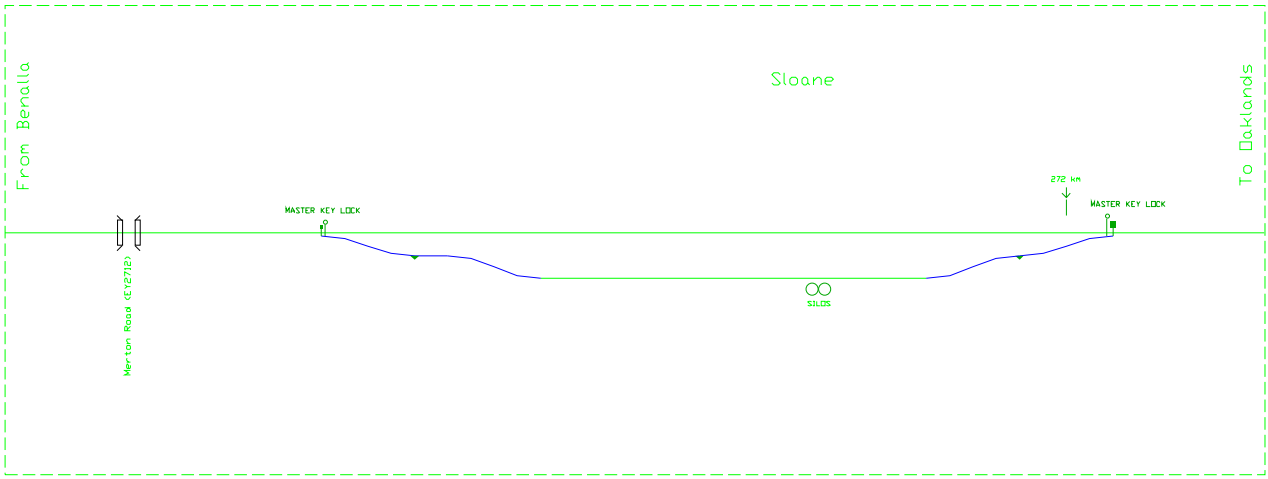
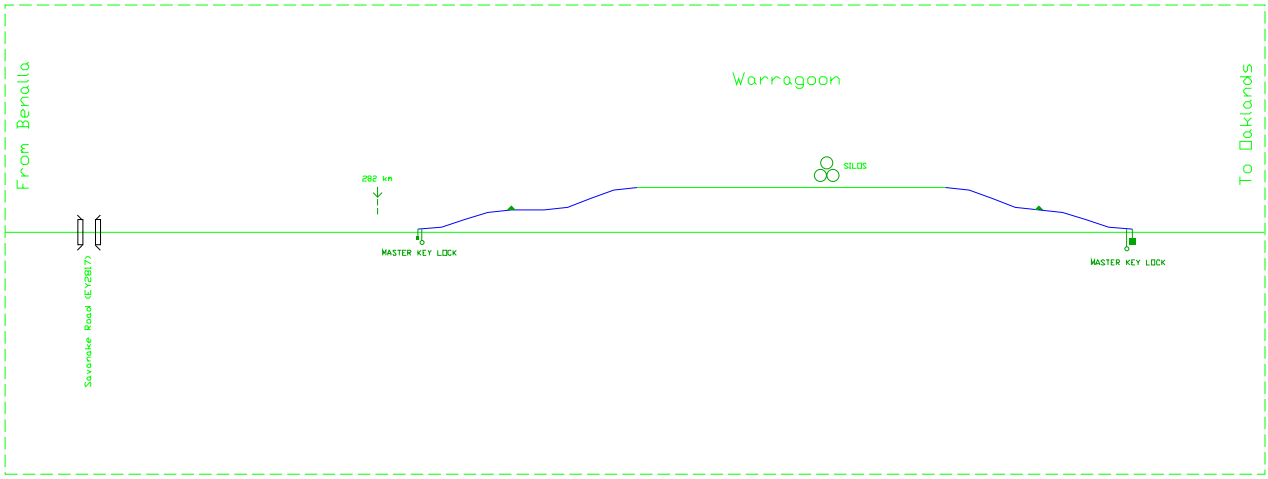
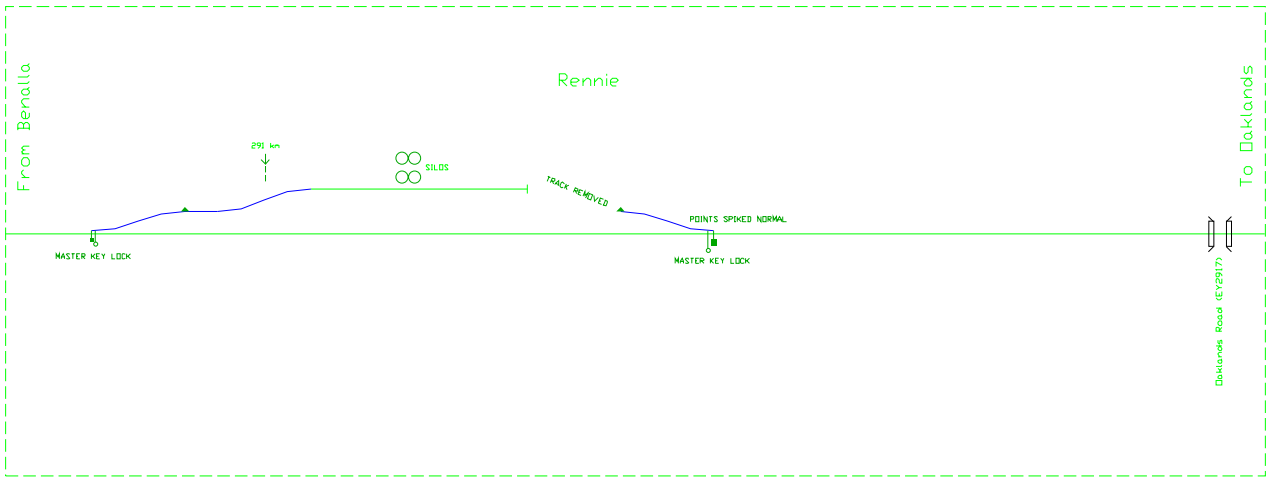
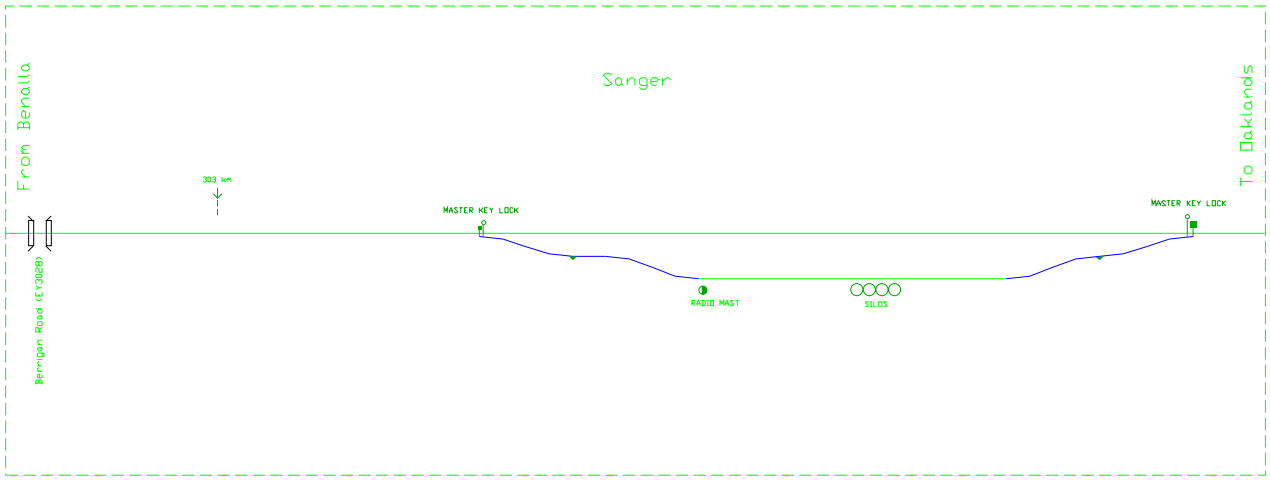
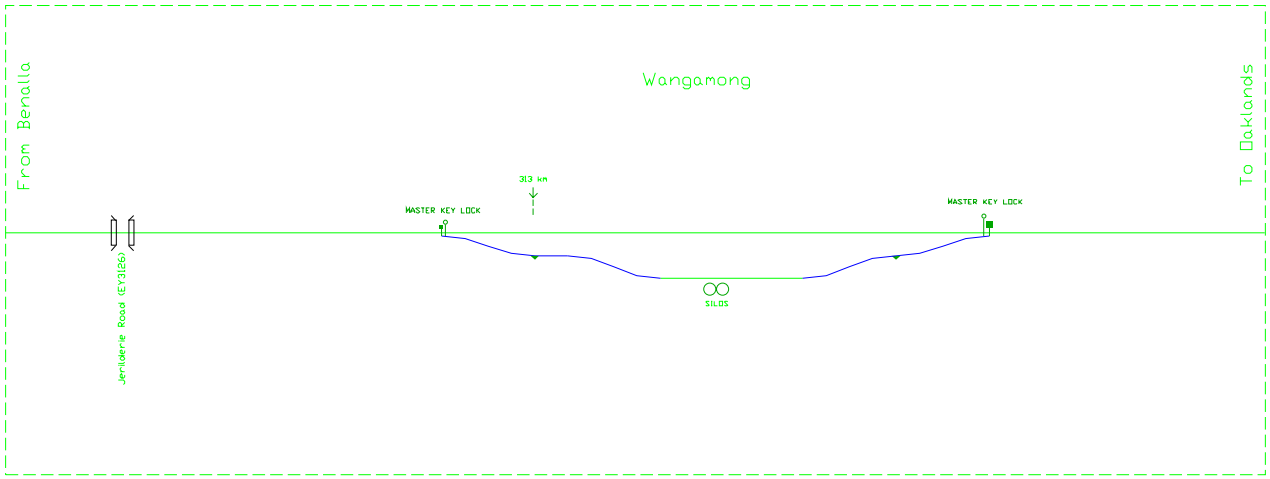
RADIO MAST
TURNTABLE
PUSH BUTTONS FOR FLASHING LIGHTS AND SIGNAL 8 PLUNGER LOCKED QUADRANTS FOR SIGNAL 1
228m
97m
Murray Valley Highway (EY2595)
Drr Streets (Irvine Street, EY2620)

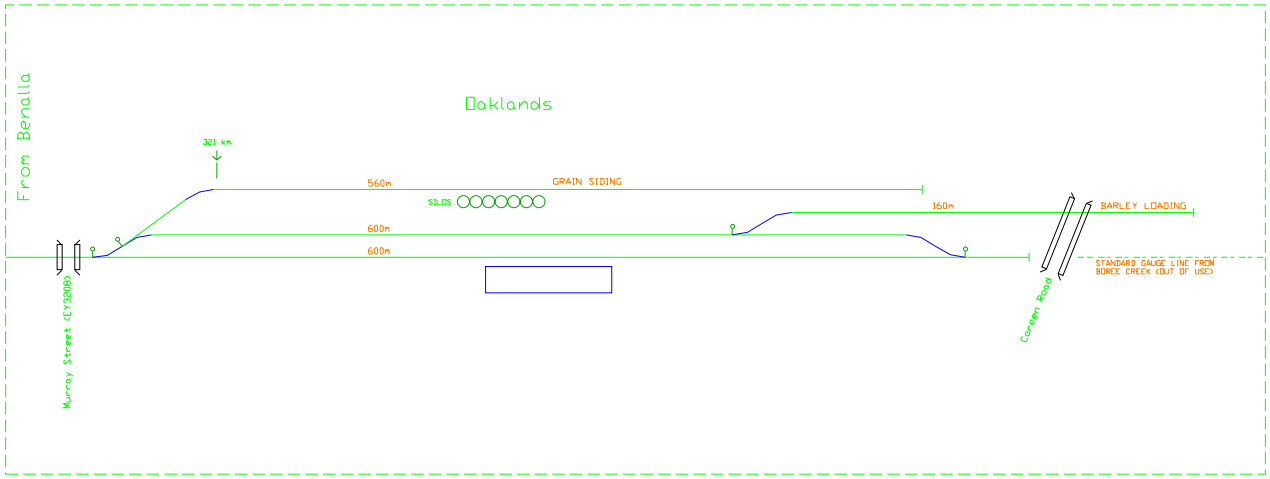

Sloane
From Benalla
To Oaklands
272 km
MASTER KEY LOCK
MASTER KEY LOCK
SILOS
Merton Road (EY2712)


Warragoon
From Benalla
To Oaklands
SILOS
282 km
MASTER KEY LOCK
MASTER KEY LOCK
Savanake Road (EY2817)


Rennie
From Benalla
To Oaklands
291 km
SILOS
TRACK REMOVED
POINTS SPIKED NORMAL
MASTER KEY LOCK
MASTER KEY LOCK
Oaklands Road (EY2917)


Sanger
From Benalla
To Oaklands
303 km
MASTER KEY LOCK
MASTER KEY LOCK
RADIO MAST
SILOS
Berrigan Road (EY3028)


Wangamong
From Benalla
To Oaklands
313 km
MASTER KEY LOCK
MASTER KEY LOCK
SILOS
Jerilderie Road (EY3126)


Oaklands
From Benalla
321 km
560m
GRAIN SIDING
SILOS
160m
BARLEY LOADING
600m
600m
STANDARD GAUGE LINE FROM BOREE CREEK (OUT OF USE)
Murray Street (EY3208)
Corowa Road

The Moonee Ponds Creek Junction Accident

The ATSB has released an interim report on the collision that occurred between Freight train 4MP5 and the XPT train 8622 that occurred at Moonee Ponds Creek Junction, South Dynon, on 19 January 2005. The full text of the interim report can be found on the ATSB's website.

The collision occurred when the rear portion of Pacific National (PN) train 4MP5, which was being made up in Pacific National's yard at South Dynon, passed Dwarf 214U at Stop and was derailed at Catch points 215D at the Up end of the yard. Despite derailing, the movement collided with the Melbourne bound XPT at around 2000 hours. There was minor damage to the fifth, sixth, and seventh cars of the XPT but there were no reported injuries. This fortunate lack of casualities was due to the fact that both trains were travelling at less than 20 km/h at the time of the accident.

The immediate cause of the collision was a misunderstanding by a trainee PN terminal operator.

Immediately prior to the accident Train 4MP5 was being marshalled for departure. On this day Train 4MP5 was to be 1415 long; however a train of this length could not loaded wholly on one siding in the Pacific National yard. Accordingly, the train was made up as two separate strings of waggons on Tracks 4 and 5. The accident occured as these two strings of waggons were being combined to form Train 4MP5.

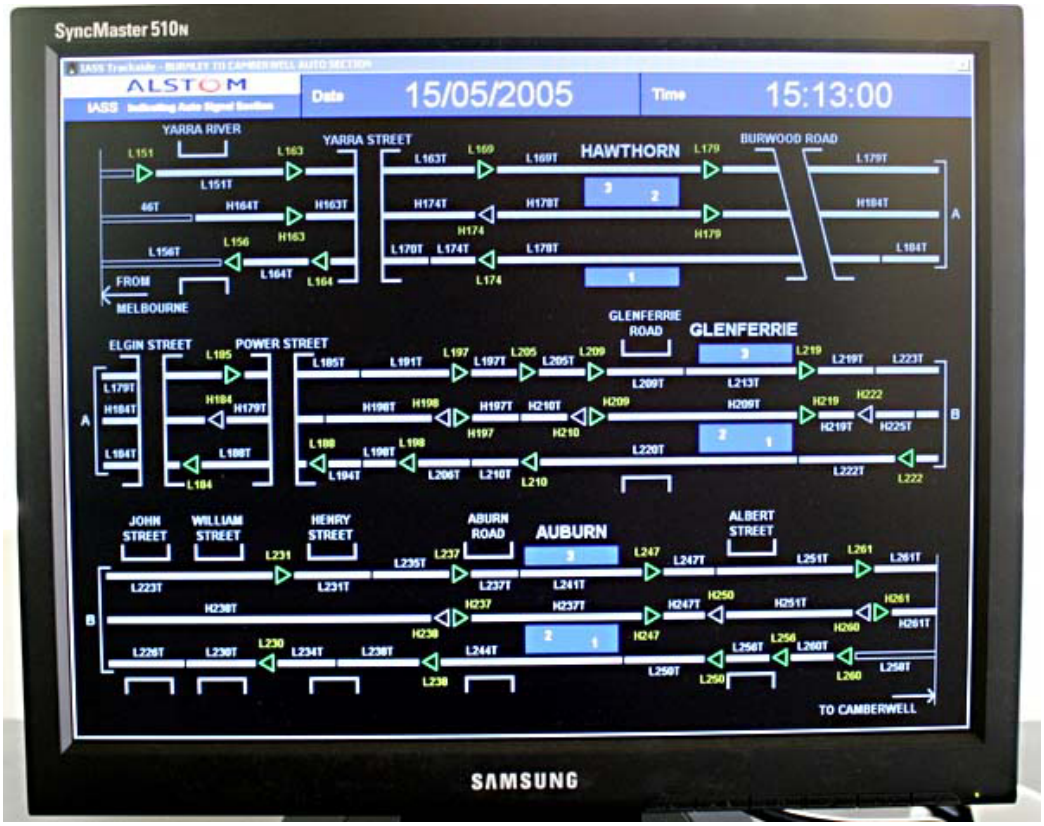
The 656 metre long rear portion of Train 4MP5 was standing on No 5 Road. The plan was for it was to be propelled by PN yard pilot C508 onto No 1A Extension Road. The yard pilot would then cut off and the front portion of the train would then be propelled onto the rear portion by the train locomotives NR103 and NR109 from No 4 Road. At the Up end of the yard No 1A Extension Road joined the main standard gauge line. The connection was protected by Dwarf 214U and Catch Points 215.

There were three PN employees involved: the driver of C508, a terminal operator, and a trainee terminal operator. A second terminal operator had left to meet the two train locomotives and attach them to the front portion of the train in No 4 Road. After C508 had been coupled to the rake in No 5 Road, the terminal operator instructed the trainee to go to the "Melbourne end" and added that he would "stay on the locomotive". The intention was that the trainee would guide the propelling movement along No 1A Road towards Dwarf 214U and inform the Driver when to stop. The trainee was also asked to remove a derail from the track beyond No 5 Road points. The terminal operator rode on the leading steps of the locomotive ready to uncouple C508.

The trainee drove to the eastern end of the rear portion in No 5 Road. His understanding of his task was to remain at this location and to uncouple C508. He had carried out similar duties previouslyand it was not uncommon for him to be positioned at this location. However he was situated only half way down the yard and could not judge how close the train was to Dwarf 214U.

For the first part of the movement neither the driver nor the Terminal Operator on the locomotive could see the trainee. The trainee, however, was communicating regularly with the Driver by radio concerning the movement. It was not until the locomotive neared the end of No 5 Road that the driver, terminal operator and trainee realised the situation. The driver first observed the trainee's utility and then saw the trainee standing opposite the points to No 5 Road. An immediate stop was made by the Driver, but the rear of the train had already passed Dwarf 214U and collided with the XPT.

With the introduction of the new panel at Camberwell, a display showing the status of the three tracks between Burnley and Camberwell has been provided. The display shows all signals, track circuits, and track occupancy on this section of line. Photo by Chris Gordon

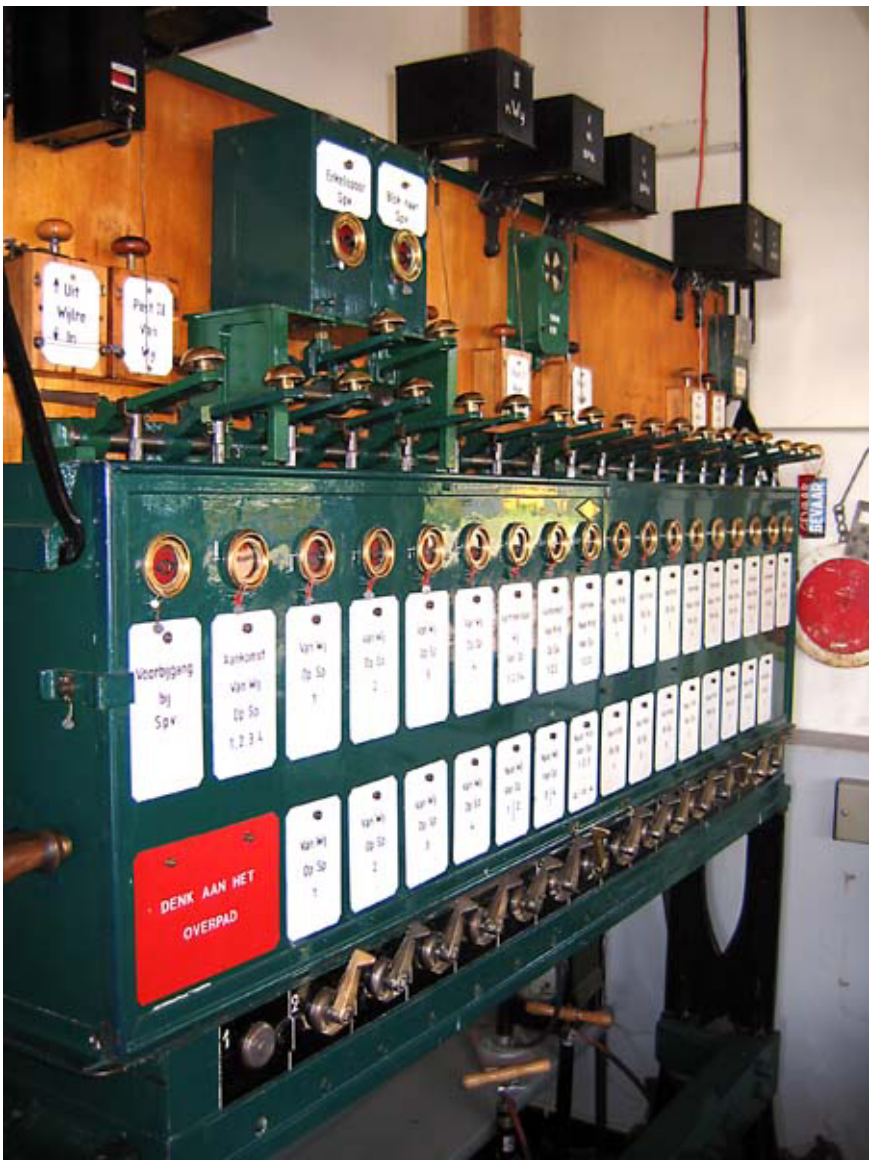


Simpelfeld, The Netherlands

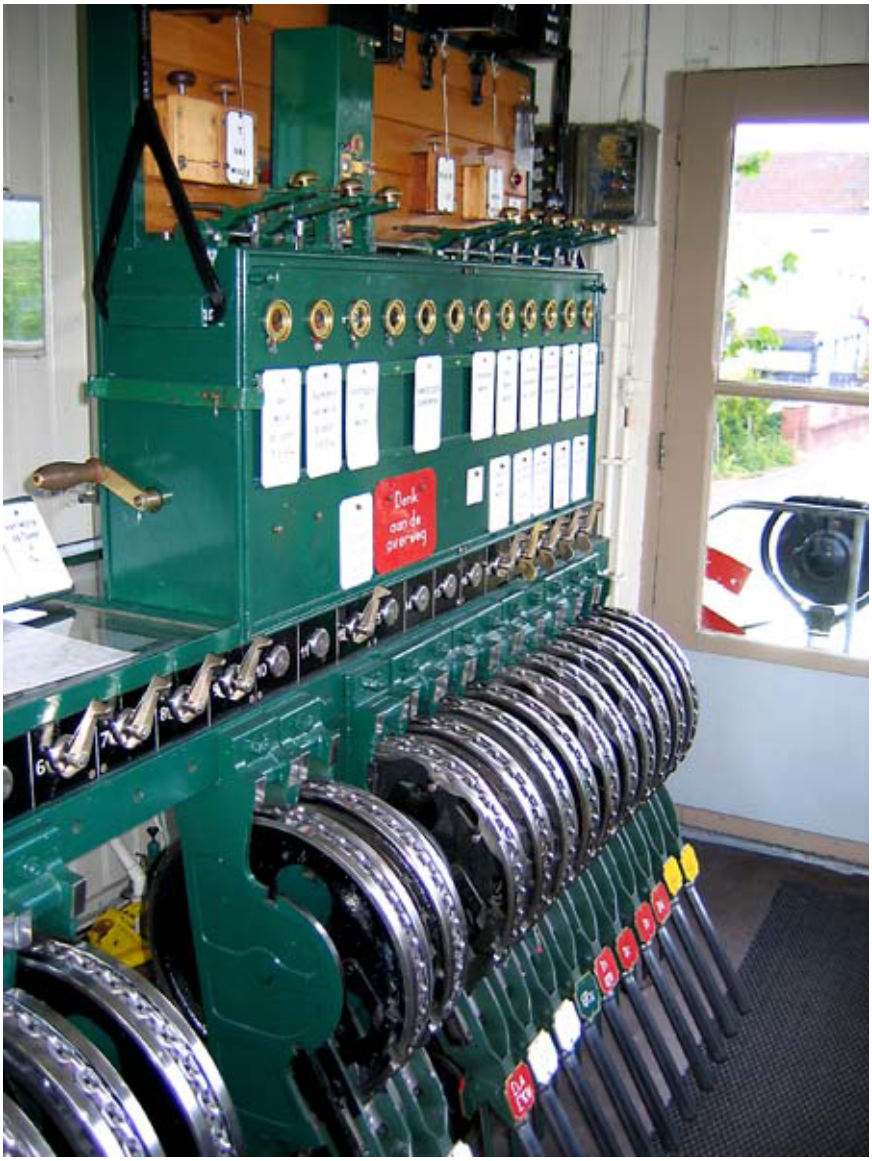
The Zuid-Limburge Stoomtrein Maatschappij (ZLSM) is a museum line in the far south of the Netherlands, just across the border from the German city of Aachen. It runs a steam/railcar service between Heerlen and Schin op Geul (where connections with the Dutch railways are made), and a branch railcar service between Simpelveld and Vetschau. The operational heart of the line is Simpelveld.

Simpelveld is fully mechanically signalled from three signalboxes; a 'Post' at each end of the yard and a central controlling frame in the station building. The brochure and the web site (http://www.zlsm.nl/) specifically invite visitors to visit the signalboxes. These boxes are, apparently, the only remaining mechanical signalboxes in the Netherlands. In addition to the operational boxes, the waiting room on the island platform at Simpelveld contains a collection of small interlocking frames and panels.

The society is also reinstalling the signalbox and signalling at Wijlre, to the west of Simpelveld. This box will work the end of the short double line between Schin op Geul and Wijlre. When the box is recommissioned the single line between Wijlre and Simpelveld will again be worked by Block System "A" (lock and block).



(Left) The central controlling frame installed in Post T at Simpelfeld, situated in the signalbay of the station building. This frame is used by the Stationmaster to electrically release the routes signalled by Posts I and II at each end of Simpelveld yard. The stationmaster first selects the routes by means of the handles at the bottom of the frame. Movement of this handle is interlocked with the other handles and prevents permission being granted for conflicting movement. Reversal of the interlocking handle releases one of the mushroom buttons at the top. This is then pressed down and the handle of the magneto generator on the side wound to send AC current to the Post and release the route there. When the release has been granted the indicator in the brass ring under the button changes from red to white and the interlocking handle is locked reverse. Each Post has a similar machine and returns the release back in a similar fashion. The mechanism appears to be a varient to the Siemens-Halske's lock and block system which was developed in Germany and widely used in Northern Europe.



(Above) Post II is located at the eastern end of Simpelfeld and works the connections to the four through roads and the goods yard (Losweg). It also works boom barriers across the adjacent lane. Post I, at the other end of the yard, is of similar design. (Left). A portion of the frame in Post I. The frame is a 21 lever double wire frame. The levers stand normally down in the frame, as shown here, and are lifted to the vertical position to operate the points, signal, or boom barrier. The interlocking is not operated directly by the double wire levers. Instead, a separate set of small interlocking handles, located immediately above the double wire levers, actuate the locking and mechnically release the appropriate double wire levers. At the far end of the frame can be seen the electric releases from Post T. These release the interlocking handles when an appropriate release is granted by the stationmaster. Once the release is granted it cannot, of course, be returned until the route is normalised.