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SIGNALLING RECORD SOCIETY OF VICTORIA INC



The signal bridge at Benalla B was brought into service in August 1914 as the last stage in the enlargement of the yard and the consequent provision of the new Benalla B Box with its new 118 lever frame. The bridge was situated between the connections to the goods yard and island platform and the junctions to the Yarrawonga and Tatong lines (the island platform has since been replaced by more yard tracks). There were originally six lattice masts on the bridge, but one mast, Post 27, was relocated to become a ground mast (it can be seen in the foreground) in 1972. Two masts were provided for each track under the bridge; one for moves into the station (behind the camera) and one for moves out of the station to the main Albury line, two branch lines, or further sidings. Posts 25 and 27, which had two homes each when this photo was taken, originally had three homes mounted vertically. The top arm for the Yarrawonga line, the second arm for Albury, and the bottom arm for Tatong. The Tatong line arms were replaced by discs in 1960. The three track bridge spanned 43'5" and the bottom booms of the truss were 15'6" above the rails. It was typical of the signal bridges built at that time. The basic structure was a rivetted Warren truss girder. The booms were formed from 3.5"x3.5"x0.625" steel angles. The truss was formed from steel angles and flats. The supports were manufactured from new 80 lb rails. The signalbridge was taken out of use when Benalla B was abolished.

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MINUTES OF MEETING HELD FRIDAY NOVEMBER 16, 2001,

AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS

Present: - J.Black, W.Brook, B.Cleak, G.Cleak, B.Crosby, G.Cumming, C.Gordon, W.Johnston, K.Lambert, D.Langley, J.McLean, I.Michaelson, T.Murray, B.Sherry, R.Smith & A.Wheatland.

Apologies: - I.Chan, A.Hinde, G.O'Flynn, P.Silva & R.Whitehead.

Visitor: - Judy Gordon.

The President, Mr. David Langley, took the chair & opened the meeting @ 20:17 hours.

Minutes of the September 2001 Meeting: - Accepted as read. R.Smith / W.Johnston. Carried.

Business Arising: - The date for the closing of Princes Bridge is being sourced from a past issue of Rail News Victoria.

Correspondence: - Various items of correspondence regarding the operation of the signal box tour were sent & received. J.McLean / B.Sherry. Carried.

Reports: - Tours. Glenn Cumming reported that a good day was had by all participants on the signal box tour. All locations were visited as planned.

Archives. More clean up work is underway to allow final touch ups of paintwork.

General Business: - Glenn Cumming sought the views of the meeting regarding mail outs to give notice of meetings when Somersault has been delayed, bearing in mind the cost of the mail outs. Members present at the meeting agreed that mail outs of this nature should continue.

Keith Lambert reported that the completion of the Jolimont - Victoria Park had been deferred indefinitely. It is believed that issues with signal sighting & the colours displayed by the new style of LED signal are the cause of the delay.

Keith Lambert described the new signalling arrangements between St.Albans - Keilor Park - Watergardens - Sydenham. Discussion took place on the provision of a facility to shunt from the platforms in the Up direction on to the Down Line & the signalling arrangements to allow this to occur.

Glenn Cumming asked why a signal fixed at stop had been provided at Sydenham when a Limit of Shunt board had been provided at Sunbury to allow exactly the same movement.

Keith Lambert noted that work on the Burnley - East Camberwell re - signalling project had commenced. New bases for new equipment cases had been provided at Auburn & earthworks for cabling had commenced.

Keith Lambert advised the colour light signals between Richmond - South Yarra had recently been converted to LED style signals.

Keith Lambert noted that the proposed work at Eaglehawk had been deferred.

David Langley reported on the conversion of the crossing loop at Wharunui (Picton - Christchurch NZ) had been converted from a TWC indicator loop to fixed signals last weekend.

Jack McLean reported on the theft of the train staff from Bundamba in Queensland. The question "who would steal the staff?" reminded Jack that he had written story entitled "Who Would Steal The Staff?" and that it was published in the 1950's.

Jim Black described photographs seen recently of high speed points in Germany that feature very long blades driven by a number of point machines.

Rod Smith described his visit to the Diamond Valley Railway Signal Boxes on the weekend of the railway's 40th Anniversary. Both signal boxes were very busy.

Rod Smith noted that a review of world' best practice for level crossings on high speed lines revealed that there were no level crossings on lines where speed was greater than 160 km/h.

Bob Crosby described a newspaper report that speculated about duplication & a new station between Altona - Westona.

Bob Crosby asked is Westona was the only right hand running crossing loop in Victoria. It was pointed out that some crossing loops on the Mildura Line are set up for right hand running. This led to a discussion about & comparisons with other unattended crossing loops. Locations noted in the discussion included locations on the Portland Line, the Mildura Line, Laverton Loop, & Lyndbrook Loop.

David Langley described proposed arrangements for the standardisation works in the North - East District. Refer to the separate item for details of the proposal.

David Langley noted that Colza Oil formerly used in signal lamps was manufactured from Rape Seed or Canola.

Brett Cleak noted that Booz - Allen - Hamilton had released a draft tender on behalf of the ARTC for a communications based safeworking system.

Chris Gordon advised that the North Geelong grain loop had operated in the reverse direction today as part of the planning for the SG works.

Syllabus Item: - The President introduced member Roderick B. Smith to present the Syllabus Item.

Rod presented the annual screening of slides from the collection of the late Stephen McLean.

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

Meeting closed @ 22:14 hours.

The next meeting will be on Friday 15 February 2002 at the Surrey Hills Neighbourhood Centre, 1 Bedford Street, Surrey Hills, commencing at 20:00 hours (8.00pm).

SIGNALLING ALTERATIONS

The following alterations were published in WN 40/01 to WN 49/01 (last issue of 2001). 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.

- 05.10.2001 **North Geelong B** (SW 1089/01, WN 40/01)
On Friday, 5.10., a LED co-acting signal was provided for the right hand semaphore on Post 32. The co-acting signal is positioned at cab height on the post. The signal light for the right hand semaphore was also replaced by a LED unit; note that only the light has been replaced, the signal remains a semaphore. Amend Diagram 4/98.
- 11.10.2001 **Flinders Street** (SW 525/01, WN 41/01)
On Thursday, 11.10., Home 311 was converted to LED.
- 11.10.2001 **Spencer Street** (TS 138/01, WN 41/01)
On Thursday, 11.10., Home 541 was converted as a trial to a 90 dot LED.
- 14.10.2001 **Newport South** (TS 126/01, WN 40/01)
On Sunday, 14.10., Homes 194 and 196 were converted from searchlight signals to multilens LED heads.
- 14.10.2001 **Donald** (SW 1093/01, WN 41/01)
On Sunday, 14.10., the Annett locked points to the Loco Tracks (Points L) were abolished. The point machine on Points K (to the Freezer Works Siding) was replaced. Circuit alterations were made to the circuit controller on the platform, however the method of operating the station has not been changed. Amend Diagram 16/91.
- 14.10.2001 **Richmond - South Yarra** (TS 128/01, WN 40/01)
On Sunday, 14.10., Automatics D99, D100, F99, F100, B99, and B100 were converted to multilens LED heads.
- (22.10.2001) **Portland North** (SW 1094/01, WN 41)
A Hayes Derail Block has been installed in the lead to No 3 Track and a hand locking bar provided on the points to No 3 Track. The key of the hand locking bar is held by the Freight Centre Supervisor. Whenever loading operations are carried out in No 3 Track, the Low Road, or the Shed Road, the Derail must be locked on and the points secured for No 2 Track. Amend Diagram 14/97.
- 28.10.2001 **West Tower** (SW 1092/01, WN 42/01)
On Sunday, 28.10., Dwarf 136 (South Hump Avoiding Track) was abolished. Circular SW 1050/01 was cancelled. Diagram 30/01 replaced 26/99.
- 28.10.2001 **Richmond - South Yarra** (TS 146/01, WN 41/01)
On Sunday, 28.10., Automatics D117, F117, and B117 were converted to LEDs.
- 01.11.2001 **Donald** (SW 1101/01, WN 44/01)
On Wednesday, 31.10., and Thursday, 1.11., Donald station yard was abolished as an attended crossing station. Down Homes 2 and 4 were abolished. Down Home 1 and Up Home 5 were converted to Repeating signals and renumbered DON1 and DON2 respectively. Down Repeating Signal DON1 will display 'Warning' indication when Points C, K, or B are not correctly set and locked. Up Repeating Signal DON2 will display a 'Warning' indication when Points F, or B are not correctly set and locked.

The Annett Locks on Points B, F, and K were replaced by ST21 locks which can be operated by Corridor Master Keys. All hand levers were secured normal by V5PSW padlocks. All key switches, signal repeaters, and the circuit controller were removed from the station platform.

The Harmon Crossing Predictor was retained at Sunraysia Highway and a key switch was provided to activate the flashing lights during shunting. A Harmon Crossing Predictor was provided at Hammill Street (including detection for moves from the station exit) and the existing key switch to operate the flashing lights during shunting was retained. Notice boards were provided on the Up and Down sides of Sunraysia Highway, the Up side of Campbell Street, and the Up and Down sides of Hammill Street. The boards are white and are lettered "Stopping trains must not enter crossing until Flashing Lights have operated 20 seconds". If a Down stopping train is detained beyond the clearance point board for more than 50 seconds the flashing lights will cease operation and must be restarted by the key switch.

Donald Loop was classified as an Unattended Crossing Loop with the station yard becoming an Intermediate Siding in the Donald Loop - Watchem Loop Train Order Section.

Diagram 32/01 replaced 16/91.

The instruction in Operating Procedure 88, Section 34, Book of Rules is to be replaced:

88. Donald - Rail Tractor shunting by Pea Growers Co-Op Ltd Employees

a) Rail Tractor Shunting

Pea Growers Co-operative Ltd have been granted joint use of the rail shunting tractor. The tractor must only be operated by qualified personnel. Tractor operations must be confined within the 'Limit of Rail Tractor Operation Boards' in Nos 3, 4, 5, and 6 Tracks. Under no circumstances can the tractor operate outside the designated area or foul any part of the running line. The tractor must not operate when a locomotive is under power in any part of the sidings. Folding boards are provided at each end of the yard. These are lettered 'No entry into siding - tractor shunting in place'. The boards are secured by a padlock and the key is held by the Pea Growers Co-Op. Trains must not enter the yard if the boards are displayed. If the boards are displayed arrangements must be made for tractor operations to cease and the co-op employee must apply the special lock to the tractor to disable it.

b) Commencing Shunting Operations.

When shunting operations are to commence, the Co-Op employee must unlock and display the notice boards. The employee must confer with any GEB employees in attendance as to their requirements for the loading of grain wagons and come to an understanding of the movements which are required. During shunting the provisions of Rule 3, Section 8, Book of Rules must be strictly adhered to, particularly with GEB operations.

c) Completion of Shunting Operations.

The tractor must be disabled by means of the special lock and the notice boards closed and relocked.

- 04.11.2001 **Richmond - South Yarra** (TS 147/2001, WN 44/01)
On Sunday, 4.11., Automatics D88, F88, B88, D91, and B91 were converted to LED.
- 04.11.2001 **Murray River Bridge - Albury South** (SW1099/01, WN 44/01)
On Sunday, 4.11., Rail Infrastructure Corporation introduced new 'Working on Track Rules' which apply over all lines (including the broad gauge tracks) from the Murray River Bridge to Albury.
- (05.11.2001) **Dandenong** (SW 31/01, WN 43/01)
The stabling of electric suburban trains in No 4 Track is prohibited.
- 09.11.2001 **North Geelong B** (SW 1109/01, WN 45/01)
On Friday, 9.11., the left hand arm on Post 32 was replaced by a disc signal. The discs on Post 32 now apply as follows: Top Left, to Fyansford Sidings (Sidings C), Folly (Through Siding), or Old Sorter (Sidings A) via Ballarat line; Bottom Left, Ballarat main line; Right, Folly (Through Siding) via X, Old Sorter (Sidings A) via X, or New Sorter (Sidings E).
- 09.11.2001 **Burnley** (TS 81/01, WN 45/01)
On Friday, 9.11., the light units on Home BLY377 were lowered to improve sighting.
- 11.11.2001 **Spencer Street** (TS 149/01, WN 44/01)
On Sunday, 11.11., the signal gantry for Homes 283, 306, and 526 was removed due to works for the Collins Street Extension. These three posts were replaced by ground mounted posts with LED heads.
- 11.11.2001 **St Albans** (SW 29/01, WN 42/01)
From 0700 hours on Sunday, 11.11., the main lines at St Albans were resignalled. The Up platform (on the Down side of Main Road) was replaced by a new platform on the Up side of the level crossing.
- * Up Automatic M606 was relocated 160 metres in the Up direction and renumbered M602. The B arm was replaced by a new unit capable of displaying medium speed aspects.
 - * New Up Automatic M622 was provided 264 metres in advance of Home 20.
 - * Down Home 35 was relocated 120 meters in the Up direction and the head replaced by a LED head.
 - * Down Home 34 was relocated from the level crossing to the Down end of the No 2 platform and was temporarily converted to a two position Home signal. This signal will now be the starting signal for the St Albans - Sydenham block section. The signal head was converted to a LED.
 - * Up Home 9 was relocated 430 metres in the Down direction and a co-acting signal provided on the opposite side of the line.
 - * Down Home 33 (the former starting signal) was abolished.

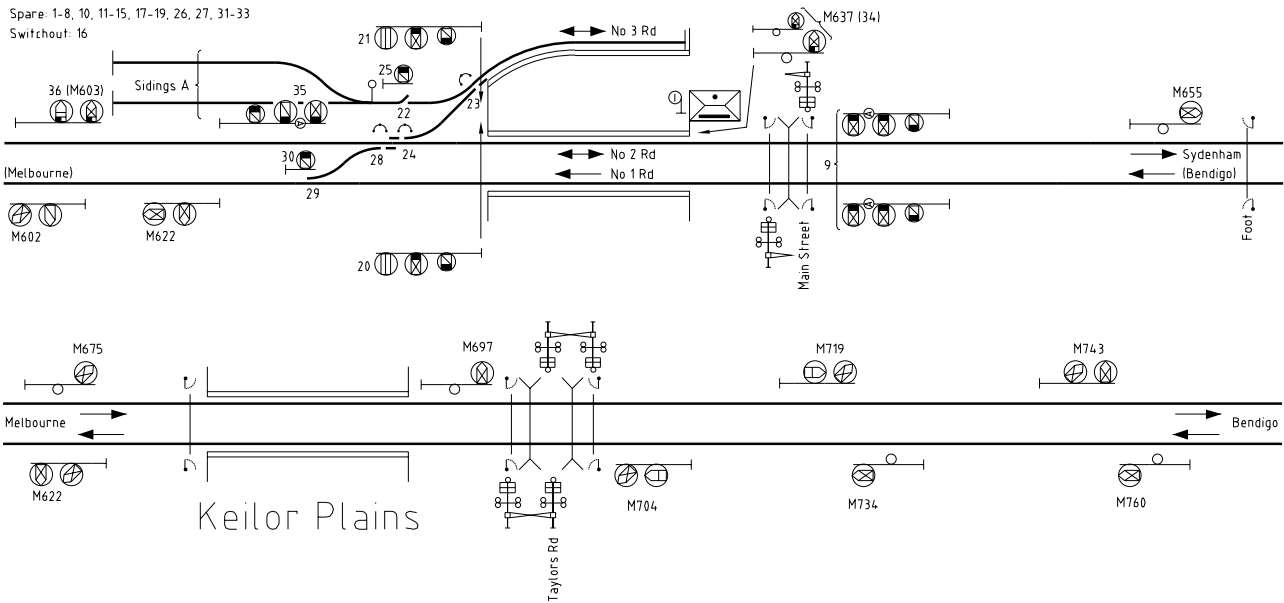
- * Up Automatics M668 and M690 were abolished.
- * New Up Automatic M678 was provided 806 metres on the Down side of Home 9. The signal is temporarily dressed as a fixed Repeating signal.
- * The boom barriers and wicket gates were converted to automatic operation.
- * A switchover lever (16) was provided but not brought into service.
- * Levers 2, 3, 4, 5, 6, 7 and 33 were abolished.

18.11.2001 **St Albans** (SW34/01, WN 43/01)
 Down Home 34 was redressed as a Controlled Automatic and renumbered M637. A 5P keyswitch to control this signal was provided on the wall of the station building.

18.11.2001 **St Albans - Sydenham** (SW34/01, WN 43/01)
 From 0800 hours Sunday, 18.11., the mechanical interlocking frame and signals at the existing Sydenham station were abolished. The signalling at the new station (Watergardens) was brought into use. The Double Line Block system between St Albans and Sydenham was replaced by Three Position Signalling. Diagrams 34/01, 27/01, and 16/01 replaced 21/01 and 08/01.
 Existing Posts 1, 3, 5, 8, 9, and 13 were abolished. New three position signals were brought into use. All new signals have LED heads. All point machines are dual control. Crossover 602 and Points 607 are high speed points.
 The new interlocking is controlled from the new station building and is operated from a computer terminal.
 A closed circuit TV camera is provided at the Down end of the station to allow the Signaller to confirm that an Up train has arrived complete within Home 9.
 The maintenance vehicle access at the Down end of the stabling sidings was not commissioned and vehicles may not cross the tracks.

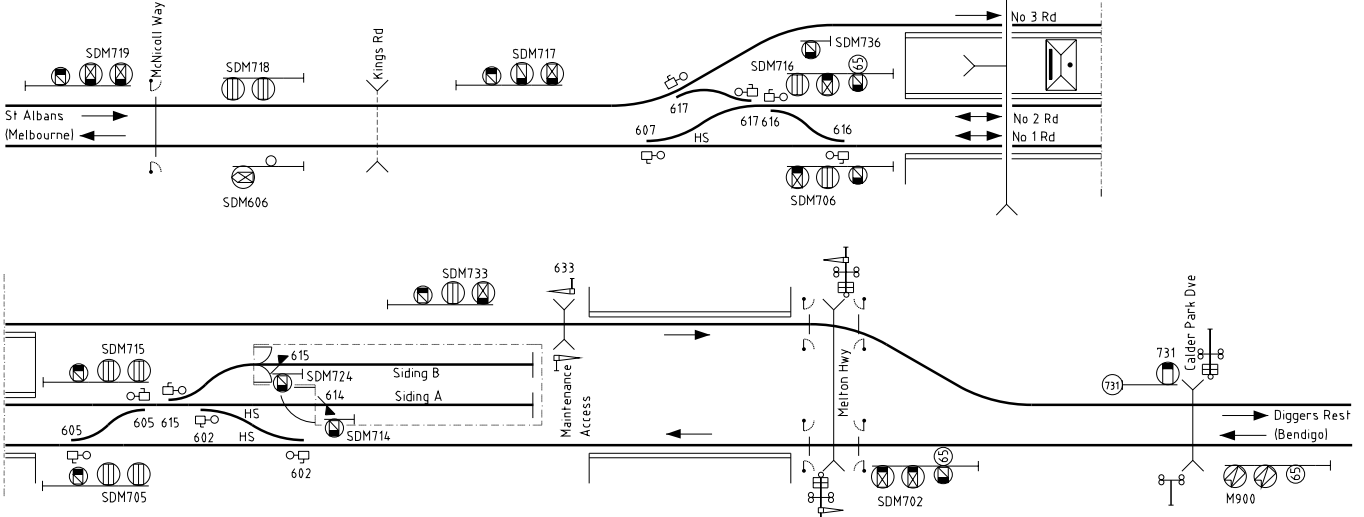
St. Albans 2001

(Based on Chris Gordon's diagram)
 36 Lever A Pattern Frame
 Spare: 1-8, 10, 11-15, 17-19, 26, 27, 31-33
 Switchover: 16



Sydenham 2001

(Based on Chris Gordon's Diagram)



Insert the following as new rules in Section 34 of the Book of Rules:

115A Failure of Signals at Sydenham

All messages sent over the post telephones are automatically recorded. In the event of a failure of a Home signal the Driver must contact the Signaller by post telephone stating his or her name, grade, Home signal, train number, and originating and terminating station. The Signaller must confirm that the signal has failed by checking the VDU *and observing the heartbeat indication to ensure the display is up to date*. If the signal has failed and a complete track route line is displayed the Signaller will complete and read out a Signallers Caution Order (2377) and exchange names. If a complete track route line is not displayed the Signaller must check that the points are detected in the correct position for the movement. If they are, the Signaller will apply a point sleeve command to *all* the affected points in the route. A Signallers Caution Order (2377) will then be completed and read out to the Driver. If point detection is not available the points must be manually operated by the Signaller, after which a Caution Order may be transmitted to the Driver.

115B Failure of Stabling Compound Gates

If the gates fail to operate the Signaller must ensure that the gate control has been operated to the position the gates are required to be in. A competent employee must then obtain the gate release key from the Signaller and manually operate the gates. The release key releases the braking system and the key switch is found on the console on the right hand gate post (single gate over Siding A) or the top of the hydraulic ram (double gate over Siding B). When the gates have been opened they must be secured by the chains provided. Detection should be obtained when the gates are opened which will allow the signals to be operated.

(The diagrams are based on a set drawn by Chris Gordon.)

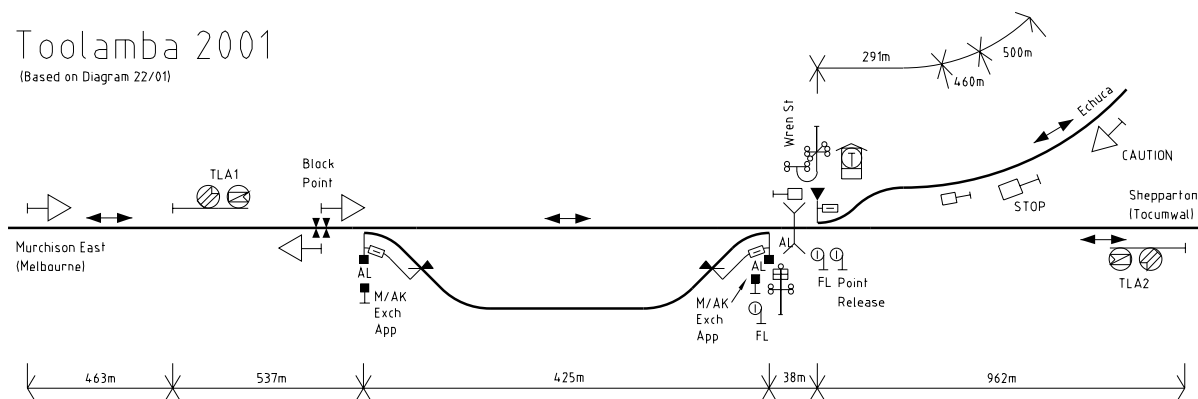
- 18.11.2001 **Dandenong - Greens Road** (TS 150/01, WN 45/01)
On Sunday, 18.11., the level crossing predictor was tested and recommissioned. The turnout to the through siding was reinstated and is available for use.
- 25.11.2001 **Track Warrant Working** (SW 1078/01, WN 46/01)
From 0001 hours, Sunday, 25.11., revised Track Warrant Rules came into force. Track Warrants are the authority for unplanned infrastructure work activities. Rule 21, Section 15, Book of Rules is to be replaced.
- 25.11.2001 **Electric Staff System (Section 22 Book of Rules)** (SW 1112/01, WN 46/01)
From 0001 hours, Sunday, 25.11., Rule 16 (Obstruction of the Line) is amended as follows:
a) Train to Return to Staff Station in the Rear
A train in a single line section is not permitted to return to the crossing station in the rear unless:
1. the train is returning from an intermediate siding; or
2. permission has been granted by the network Rail Safety Manager. Prior to granting permission, the Rail Safety Manager must ensure that permission has not been granted for a road vehicle to follow the train or for a train to shunt beyond the Home signal at the signalbox in the rear of the train.
The train is permitted to return as far as the Home signal at the signalbox in the rear. From this point the Driver must act in accordance with the indications as displayed on the Home signal.
b) Controlling the Set Back Movement. The speed of the set back movement has been amended to be not exceed 15 km/h unless the Driver can drive from the front end of the train, in which case the train may return at line speed (subject to any lesser speed restriction).
c) Fresh Train Authority Required. The Train Controller must ensure that a Track Warrant has not been issued for the section prior to issuing the Train Authority.
- 25.11.2001 **Train Staff and Ticket System (Section 21 Book of Rules)** (SW 1112/01, WN 46/01)
From 0001 hours, Sunday, 25.11., Rule 16 (Train Returning to Station in the rear) is amended. The amendment is the same as Clause a, Rule 16, Section 22, given in the amendment to Rule 16, Section 22 (above).
- 25.11.2001 **Spencer Street** (SW 40/01, WN 46/01)
On Sunday, 25.11., the approach operation of Home 706 was removed. Homes 705 and 706 were converted to LED.
- 26.11.2001 **Spencer Street** (SW 41/01, WN 46/01)
On Monday, 26.11., Automatic 491 and Home 566 were relocated 19 metres in the Down direction account Collins Street extension works. Both posts were converted to LED. The track and overhead was also slewed.
- 28.11.2001 **Elmore** (SW 1119/01, WN 48/01)
On Wednesday, 28.11., the plunger locks and home signals were abolished. Elmore was abolished as an Intermediate Train Order station and became an Intermediate Siding in the Echuca - Hunter Block Point section.
Down Home E (semaphore), Down Home M (light), and Up Home A (semaphore) were abolished. The Up and Down Location Boards were abolished. The quadrants and push buttons on the platform for Homes A, E, and M were abolished. The plunger lock on the Down end points was replaced by a Master Key lock. The WSA lever on these points was removed and the points were rodded to a Hayes Derail and Crowder located on the Down side of Raywood Road. The points leading to No 2 Road are spiked out of use (including the main line points at the Up end of the yard). The points to the dead end at the Up end of No 3 Road are spiked to lie for the main line.

A level crossing predictor was provided for the Flashing Lights at Raywood Road and operate automatically for all trains. A notice board is provided at the Down end of the platform restricting the speed of trains to 15 km/h between the platform and the crossing. The existing push buttons at the Down end points and near the points to No 2 Track were retained to operate the Flashing Lights for shunting moves. Diagram 20/01 replaced 4/89.

- 28.11.2001 **Hunter Block Point** (SW 1119/01, WN 48/01)
 On Wednesday, 28.11., Hunter Block Point was established at 214.500 km between Elmore and Rochester. The section North Bendigo Junction - Echuca was replaced by North Bendigo Junction - Hunter Block Point - Echuca. Bi-directional electronic end of train detection is not provided, but the block point may be used for follow on movements by using ETAS.
 Diagram 20/01 replaced 4/89.
- (03.12.2001) **Bacchus Marsh - Ballan** (SW 1117/01, WN 47/01)
 Diagram 34/01 replaced 40/96. The main alteration is the addition of flashing lights at Ingliston Road.
- (03.12.2001) **Aspendale - Frankston** (SW 047/01, WN 47/01)
 Diagram 11/01 replaced 29/99. The main alterations are: the abolition of the crossover between No 5 and No 6 Track; and the provision of security gates for Sidings A and B.
- 05.12.2001 **Rochester** (SW 1119/01, WN 48/01)
 On Tuesday, 4.12., and Wednesday, 5.12., Down Home 'G' was abolished together with the Up and Down Location Boards.
 Down Home 'K' at Elizabeth Street was retained to protect the crossing during shunting moves. The signal was converted to a two position automatic signal. This signal will normally be at proceed and when it is necessary to shunt at the Down end of the yard the signal is to be placed at stop by means of the pushbutton on the platform. The signal must be reversed before the train departs.
 A level crossing predictor was provided for the Flashing Lights at Northern Highway and Elizabeth Street and operate automatically for all trains. A notice board is provided at the Down end of the platform restricting the speed of trains to 15 km/h between the platform and the crossing.
 Diagram 20/01 replaced 4/89.
- 16.12.2001 **Dandenong** (SW 51/01, WN 49/01)
 On Sunday, 16.12., Down Automatic DNG 700 was replaced by a new mast with LED heads.
- (17.12.2001) **Franklin Street** (SW 35/01 & 50/01, WN 45/01 & 49/01)
 A 'Theatre Type' route indicator was provided on Home 710. The indicator is located on the main arm of the gantry above the walkway. The indicator will display 'M' when the route is set for the Up Main Suburban, 'C' for the Down Main Suburban (thence the Through Country), or 'T' for the Up Through Suburban. If the route is set for the Down Main Suburban the train stop at Home 710 will not be lowered and drivers of electric trains must not take the route.
- (17.12.2001) **Geelong Racecourse** (TS 1101/01, WN 49/01)
 The siding is booked out of service and the points spiked and clipped. The Master Key for the Geelong Racecourse has been withdrawn.
- 18.12.2001 **Wodonga** (SW 1123/01, WN 49/01)
 On Tuesday, 18.12., the signalling on the former Broad Gauge connection to Bandianna was removed. Points 91 and Catch 91 were abolished and the point machines removed. Up Home 98 and Down Home 104 were abolished. Down Home 106 was altered to only apply to Standard Gauge movements and the 'V' and 'S' indicators were abolished. The Flashing Lights at Hovell Street were abolished. Levers 91, 98, 104, and 106 were removed. Amend Diagram 6/97.
- 19.12.2001 **Toolamba** (SW 1125/01, WN 49/01)
 On Wednesday, 19.12., the junction points were secured by a Westinghouse electric point lock. The existing Master Key lock and Up Home signal from the branch were abolished. Up and Down Repeating signals were provided. A 'Stop' Board is provided on the Echuca line on the Up side of the line 500 metres from the junction points and a 'Caution' Board 500 metres in the rear of the Stop Board. The Stop Board is square with the word 'STOP' in white lettering on red background. The Caution Board is square with the word 'CAUTION' in black lettering within a yellow triangle.
 The current operating procedure for Toolamba in the Book of Rules is to be replaced:
 109 Toolamba
 Toolamba is the junction for the Echuca line and is situated in the Toolamba Block Point - Shepparton Train Order section. The junction points are secured in the normal position by an electric point lock. The release for the point lock is via operation of a V5PSW key switch while a train is standing on one of two release track circuits. One release track circuit extends for 40 metres on the main line from the toe of the junction points and extending in the Up direction. The second release track circuit extends for 40 metres on the branch line from the fouling point in the Down direction. The commencement of both track circuits is indicated by an Approach Section Indicator.
 The V5PSW key switch has three positions: Cancel (10 o'clock); Centre (12 o'clock); and Reverse (2 o'clock). Red and yellow LED indicators are provided above the key switch.
 Up and Down Repeating signals are provided on the primary corridor. These signals will display a

Toolamba 2001

(Based on Diagram 22/01)



'Warning' indication if either of the releasing track circuits is occupied, the V5PSW key switch has been operated, or the junction points are not set and locked for the main line.

Train to the Secondary Corridor (Echuca Branch)

A competent employee must attend at Toolamba 30 minutes prior to the arrival of the train and obtain a Train Order for the train to proceed to the branch. The V5PSW key switch must then be operated to the Reverse position. A 5 minute time release will then start and will be indicated by the yellow indicator flashing. When the yellow indicator displays a steady yellow light the point lock is free. The points will then be unlocked and reversed. The V5PSW key switch will then be restored to the Centre position and the key removed.

Upon arrival of the train at the junction the Driver must bring the train to a stand and receive the Train Order. The train may proceed to the secondary corridor once the order has been verified. The Driver must fulfil the Train Order for the primary corridor once it has been ascertained that the train has arrived complete.

When the train has cleared the junction the employee must restore the points to the normal position (which will automatically engage the point lock). The point lever must be secured in the notch with the V5PSW padlock and pin provided.

Train from the Secondary Corridor

These instructions are the same as for a train to the secondary corridor. The Driver must bring the train to a stand at the Stop board to receive the Train Order.

Insulated Track Machines

Movement of a track machine that does not operate track circuits to or from the secondary corridor is achieved as described above for a train, however the point lock will not automatically re-engage after the passage of the machine. To cancel the release after the passage of the machine the V5PSW key switch must be operated to the Cancel position. The red indicator will commence to flash and will become steady after 5 minutes. The key will then be restored to the Centre position and removed.

Failure of the Electric Point Lock

Should a release fail to be given, the Driver must immediately advise the Train Controller who will arrange for a Signal Maintenance Technician to attend.

Repeating Signal at the 'Warning' Position

Should a Driver find a Repeating Signal showing Warning the train must be brought to a stand at the junction points. The Driver must then inspect the points to ensure they are set and secured for the main line. If the points are reversed the Driver must restore the points to normal and confirm that the points are locked from the indications on the key switch. If the points cannot be locked the Train Controller must be advised, who will arrange for a Signal Maintenance Technician to attend.

Issue of Train Orders

A Train Order may be issued to the Stop Board on the Secondary Corridor while a Train Order is effective over the Primary Corridor. While a Train Order is effective from the Secondary Corridor to Shepparton, a Train Order may be issued for a Down train to proceed to Murchison East station (if attended) or Murchison East Block Point (otherwise). While a Down Train Order is effective from the Primary to the Secondary Corridor, no Up Train Order is allowed to be issued beyond Shepparton.

MODIFYING ROCKER FRAMES

Ian Barkla recently gave to me a fascinating book that answered one of my questions about rocker frames: how did the blacksmiths know the dimensions of lockrods required for alterations? It turns out that the lockrods were designed in the drawing office and ordered from the workshops. My gift was the order book for this blacksmith work and contains the carbon copies of the orders.

To explain what a lock rod is, and why it was difficult to manufacture, requires an explanation of how a rocker frame worked. Full explanations can be found in the series of articles by Colin Rutledge in Somersault commencing in Volume 10 No 5, and a shorter explanation can be found in Somersault Volume 20 No 6. For those members who do

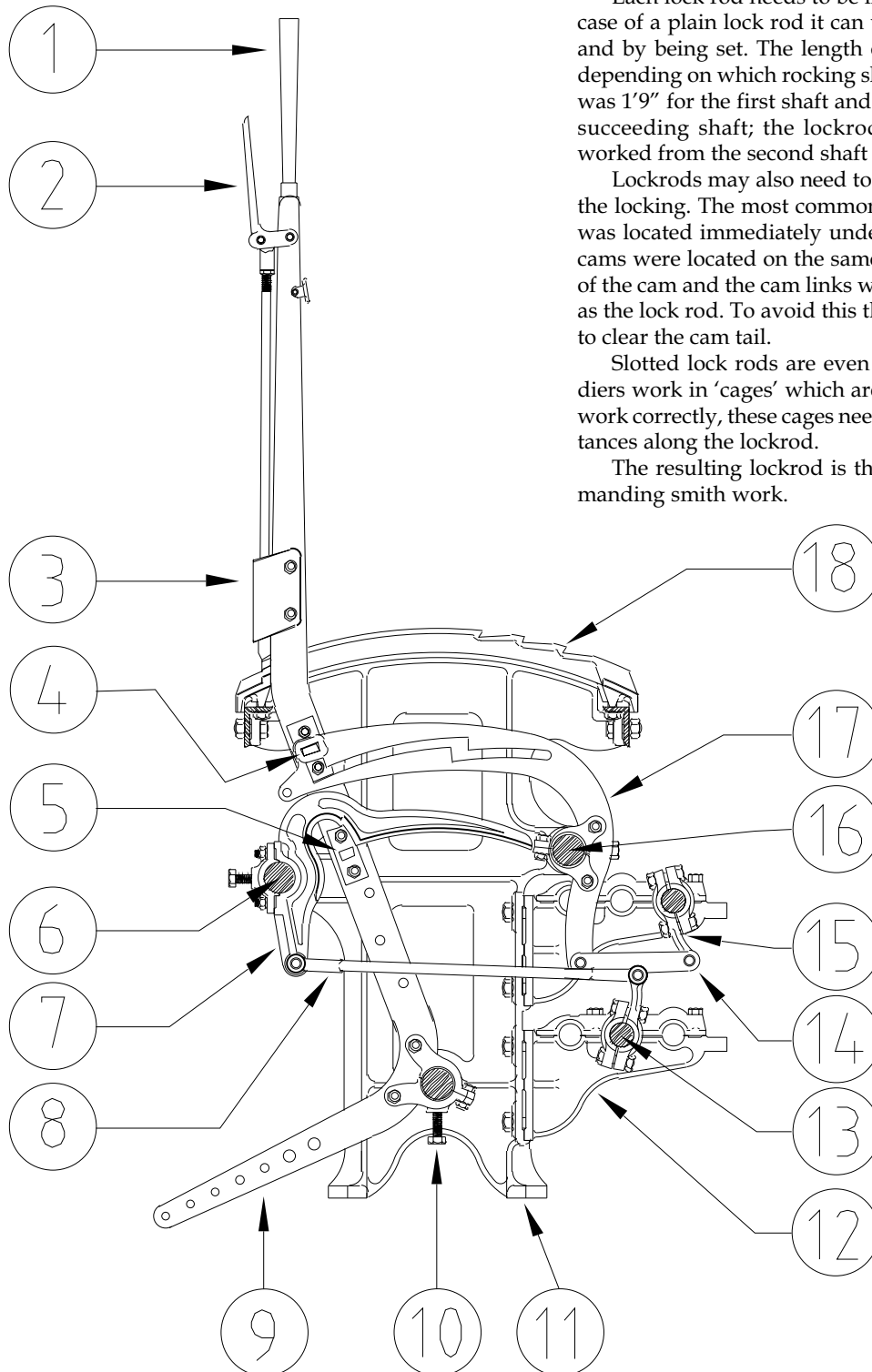
not have these issues, the following diagram and short explanation is provided. The diagram is a transverse view of a rocker frame. When the lever (1) is reversed, the cam (17) is lifted by means of the cam stud (4) which operates in the cam race. The cam rotates around the cam shaft (16). This movement is transferred to rocking shafts (13) which run up and down the frame by means of cam links (14) and soldiers (15). Wherever it is necessary to lock or release a lever, the motion is transferred from the rocking shaft to the cast iron locks (7) by means of lock rods (8). The lock rod in the drawing is a plain lock rod; the lock is driven by one rocking shaft. However locks are commonly driven by several rocking shaft; this occurs where a lever is locked (or released) by several levers. These require slotted lock rods.

Each lock rod needs to be individually designed. In the case of a plain lock rod it can vary in two ways: by length and by being set. The length of a plain lockrod will vary depending on which rocking shaft drives the lock. The rule was 1'9" for the first shaft and an additional 3.75" for each succeeding shaft; the lockrod shown in the diagram is worked from the second shaft and would be 24.75" long.

Lockrods may also need to be set to clear other parts of the locking. The most common example was where a lock was located immediately underneath a cam. As locks and cams were located on the same vertical centre line, the tail of the cam and the cam links would occupy the same space as the lock rod. To avoid this the lockrod would be set 1.5" to clear the cam tail.

Slotted lock rods are even more complicated. The soldiers work in 'cages' which are 'loops' off the lock rod. To work correctly, these cages need to be located at precise distances along the lockrod.

The resulting lockrod is the result of complex and demanding smith work.



The diagram on this page is the order for the seventeen lockrods required at Kiata when departure home signals were provided in 1940. On the facing page is the locking sketch after the alteration.

The lockrods are identified by the lever on which the lock works and the type of the lock. For example, the first lockrod works the weighted branch lock on lever 1. The locks referenced here are: M, main; B, branch; WM, weighted main; WB, weighted branch; and FP, main facing point.

Plain lockrods (e.g. 3M) are simply described by a length with an optional set.

Slotted lockrods are described by a sketch of the rods showing the required cages. The number shown within each cage is the rocking shaft, so, for example, 1WB is worked by rocking shaft 3 top and 6 bottom (incidentally, it appears that the order is wrong as the locking sketch shows that this should be 2 top). Note that lockrod 18WM is worked by rocking shafts 3 and 4 top and bottom requiring a double height cage. The distances shown for a slotted lock rod are from the start of the rod. For example, the cage for shaft 6 bottom on lockrod 1WB is 3'0.75" from the left hand end of

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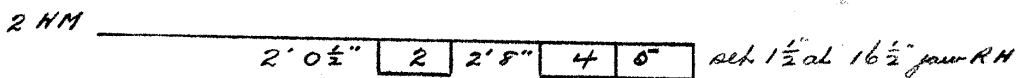
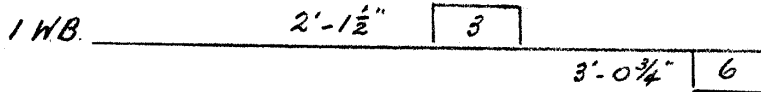
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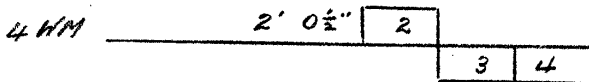
Kiata

Provision of Departure Home signals Cap No. 152/pending

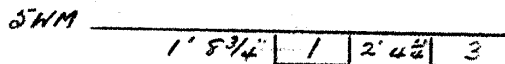


3M Plain rod $2'-0\frac{3}{4}"$

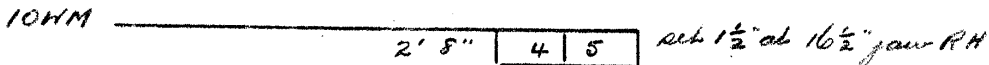
3FP " " $2'-0\frac{3}{4}"$



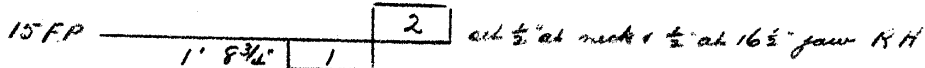
5B Plain rod $2'-0\frac{3}{4}"$



6FP Plain rod $3'-7\frac{1}{2}"$ set $1\frac{1}{2}"$ at $16\frac{1}{2}"$

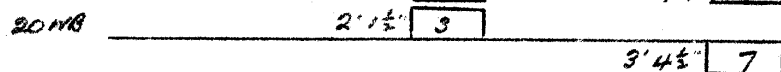
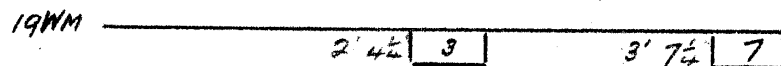
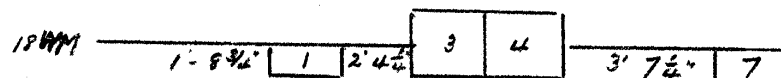
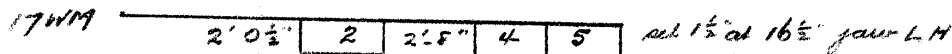


12FP Plain rod $2'-8\frac{1}{2}"$



16B Plain rod $3'-0"$ set $1\frac{1}{2}"$ at $16\frac{1}{2}"$

16M " " $3'-3\frac{3}{4}"$



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the rod, not three feet from the cage for shaft 3 top.

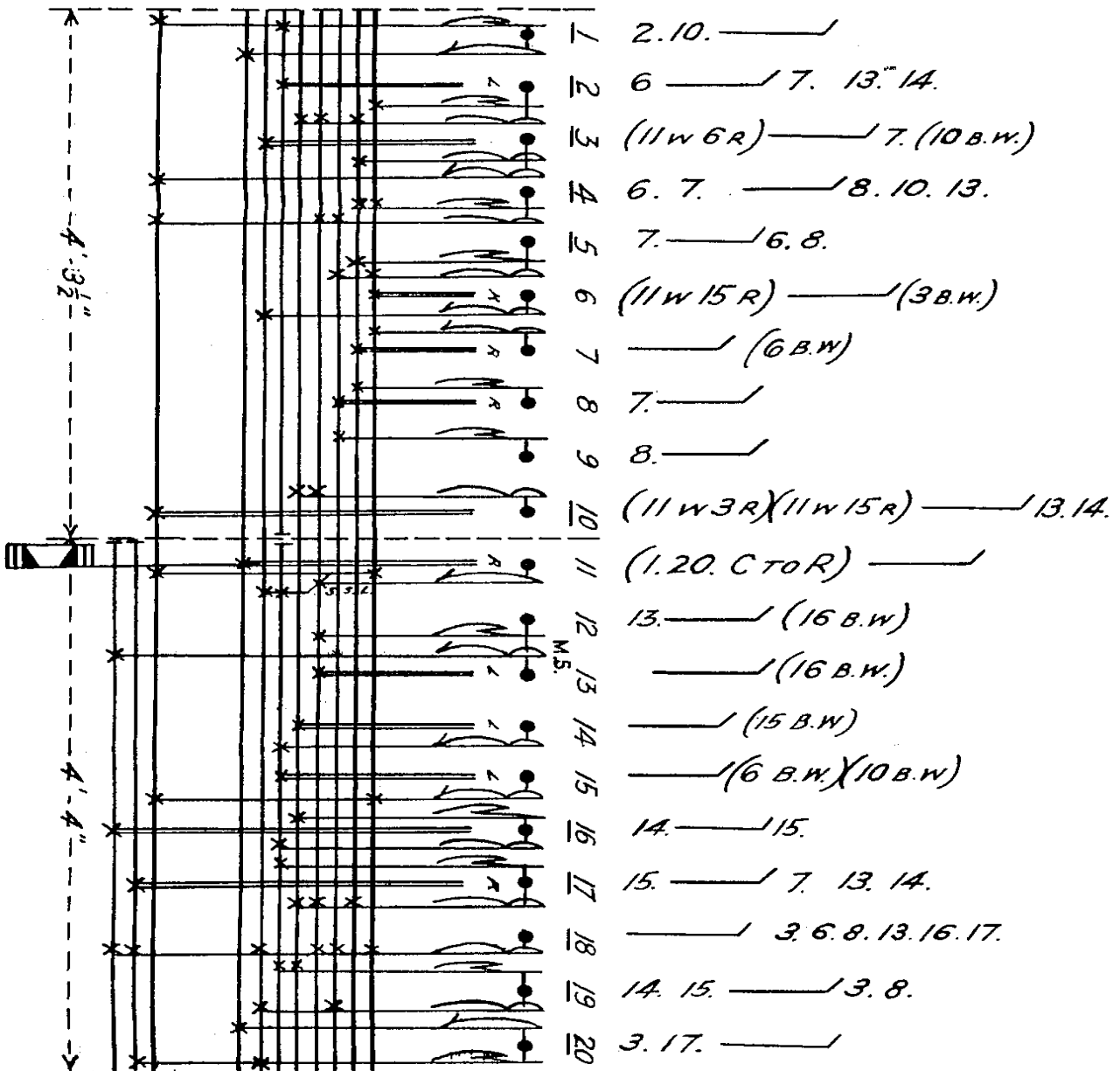
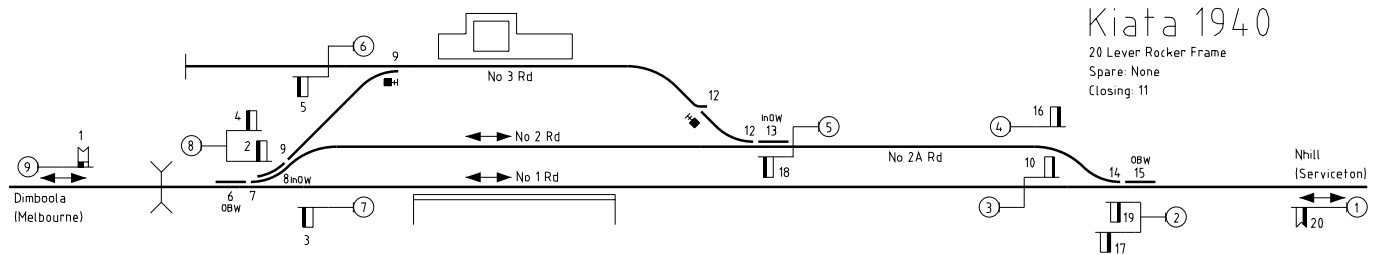
The locking sketch is rotated 90 degrees to make it fit on the page. The rocking shafts are the vertical lines. These are shown in two groups. The first 8 shafts are the bottom shafts, the second 3 shafts are the top shafts. The lockrods are the horizontal single lines leading to the symbols for the locks at the right. The crosses are soldiers (i.e. drives to the lockrods). For example, if you look at 20WB, this has crosses on the 7th vertical line in the first group (7th bottom rocking shaft) and 2nd vertical line in the second group (3rd top rocking shaft -- the first top rocking shaft was never used).

The horizontal double lines (e.g. next to lever 3) are the cam links and indicate the presence of a cam on that lever. Cams can be mounted on either side of the lever; the actual side is normally indicated by the letters 'L' and 'R'. These

match the sets specified for the lockrods. For example, 6FP is set 1.5" at 16.5" to clear the cam on lever 6 which is mounted on the right hand side of the lever. Note, however, that the order does not indicate whether the set is right hand or left hand; this is probably a mistake on the order and presumably the blacksmith had a copy of the locking sketch and could work it out.

I cannot explain all of the sets: for example lockrod 15FP was set twice, half an inch each time. Presumably this had something to do with the cam on the adjacent lever 16, but I cannot guess from the locking sketch. This suggests that an alteration may have required an initial site inspection.

To give some idea of the complexity (and cost) involved in altering a rocker frame, consider that to add four signals to Kiata required the manufacture of 17 lockrods. The frame



only contained 29 lockrods in total, so over half of the rods were replaced in this single alteration. Each lockrod had to be individually crafted.

The design work did not finish with the lockrods. An additional three rocking shafts were required to transfer the opposing locking up and down the frame. (The order actually calls for four shafts: an additional shaft for the unused first top rocking shaft bracket.)

Each rocking shaft had to be cut to length and turned down to run accurately in the bearings of the brackets. Only the portion that actually ran in the bearings was actually turned; the remainder was left black. Unfortunately, the

frames that supported the interlocking were not at fixed distances, and hence neither were the brackets. Consequently it was necessary to show the actual distances between the brackets on the locking sketch and these were transferred to the order.

The bearings of the intermediate brackets are 1.625" in diameter. To prevent the rocking shafts from moving longitudinally the bearings in the end brackets are 1.25" in diameter. Where a rocking shaft ends at an intermediate bracket (as 3rd and 4th shafts here) a collar is used to prevent the shaft from moving.

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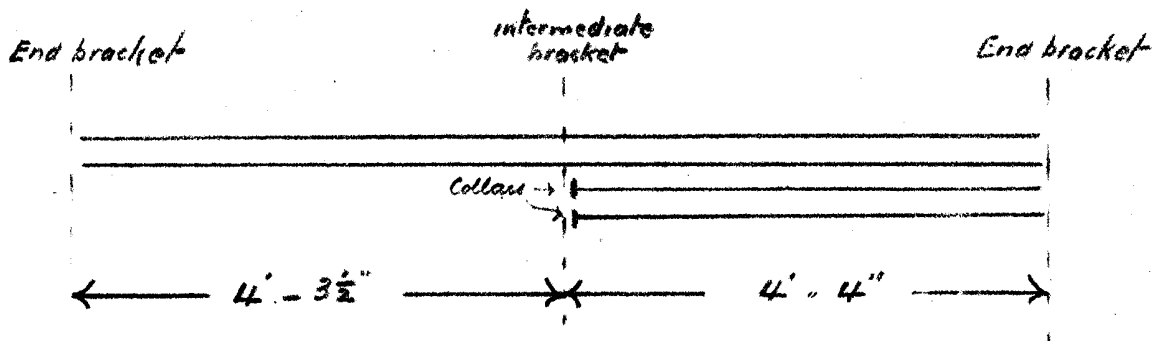
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Kiata

Provision of Deposition Home signals
Cap. No. 1520 for fund.

4 N^o Soldier shafts -



M. Jack

Reg. 890

THE FOOTSCRAY COLLISION

At 0828 on the 5 June 2001 a Comeng set running empty cars from Flinders Street to Williamstown ran into the back of Train 6369 which was stationary at Footscray station. Fortunately only minor injuries were sustained by the passengers and crew.

The report of this collision has been completed by the Australian Transport Safety Bureau (ATSB) and is available from their web site (<http://www.atsb.gov.au/>).

The ATSB concluded that the driver of the empty cars probably fell asleep shortly after crossing Maribryong River. The report states that "the driver was taking a course of prescribed medication, which combined with the early start to his working day on the morning of the accident and a history of chronically disturbed sleep, may have resulted in a sleep period (apnoeic episode) while he was driving the train."

In addition to investigating whether the driver's health problems should have been detected before the accident, the report also considers the failure of the two safety systems which are designed to bring the train safely to a stand in the event of the driver becoming incapacitated. These are the hand or foot 'pilot valve' (dead man's handle) and the trainstop system.

The course of the accident

Train 6369 is the 0816 stopping all stations service from Flinders Street to Williamstown. At Williamstown the train forms Train 6368, the 0850 departure for Melbourne. Trains 6369/6368 are the last of the morning through services between Melbourne and Williamstown. Until the through services commence again in the afternoon peak, the service to Williamstown is maintained by shuttles from Newport which connect with the Werribee services.

Train 6371 is an empty car movement to Williamstown to form one of these shuttles. It departs Flinders Street at 0818 and follows Train 6369 to Williamstown. After waiting at the Down Home at Williamstown for Train 6368 to depart, Train 6371 arrives into the platform where it forms Train 6202, the 0900 service to Newport. The 6 car set then runs a further return journey to Williamstown before going 'off' at Newport Workshops. Although the report states that Train 6371 runs 'express' between Flinders Street and Williamstown this term is misleading, if for no other reason that it is clear that it would normally quickly catch up to Train 6369 (which stops all stations). Train 6371 would then normally run from signal to signal behind Train 6369.

On the morning of the accident Train 6369 was formed by a 6 car Comeng set. It departed from Flinders Street Platform 9 at 0816:32 and made its scheduled stops at Spencer Street (0818:19), North Melbourne (0820:24), South Kensington (0823:32) before arriving at Footscray at 0826:04.

Train 6371 was also formed by a 6 car Comeng set. It departed from Flinders Street Platform 10 at 0817:55. As it was closely following Train 6369 it is not surprising that the driver recalled being required to travel at restricted speed and, on one or two occasions, having to stop at a signal to wait for it to clear. Upon departure of the train at Flinders Street, Train 6371 was 83 seconds behind Train 6369. At Spencer Street 109 seconds, at North Melbourne 90 seconds, and at South Kensington 63 seconds. The train slowed at some point between South Kensington and Post SKN 661 as at this post it was 105 seconds behind Train 6369. However, from the track circuit occupancy times, Train 6371 was steadily increasing its speed; reaching a calculated speed of between 77 and 81 km/h between Posts SKN661 and W223. Train 6371 was tripped at Post W235 as this signal was being held at Stop by the presence of Train 6369 in the plat-

form at Footscray. The speed of the train was reduced from around 77 km/h to a calculated speed of about 33 km/h at impact.

Train 6369 was just about to depart from Footscray station when the collision occurred. The doors were shut and the brakes released. The train was propelled forward approximately 15 metres by the collision.

The leading unit of Train 6371 sustained severe damage in the accident. The unit was formed from 333M (lead motor), 1017T, and 334M. In the collision motor 334M underran trailer 1017T causing the anti collision posts on 334M to fail and the two cars to telescope. The trailer entered the body of 334M about half a metre.

Tests after the collision showed that both trains and the signalling system were operating as designed.

The driver's medical condition

The driver of Train 6371 was regarded by his peers as a good, safe and conscientious driver. He was also highly regarded by his employer; 'always satisfactory, very punctual and reliable'. In all aspects of his work he was assessed as 'satisfactory' and was reported as a driver that assured passenger comfort.

However, the driver had a complex medical history which the report discusses in detail, although in a somewhat confused fashion. The driver had suffered for many years from stress, insomnia, and recurring pain in his right shoulder and back. These ailments were the legacy of a motorcycle accident in 1991 and two fatal accidents in the mid '90s in which pedestrians walked in front of the driver's train. To deal with these problems the driver had attended a variety of doctors between 1991 and mid 2001. At the time of the accident the driver was on three prescription medications; two of which, in the opinion of the ATSB, were not compatible with the safe operation of a train.

The ATSB stated:

The evidence suggest that the driver's medical management and on-going health surveillance following a serious head injury in a motor-cycle accident in 1991, in the context of his employment as a train driver, has been inadequate. Furthermore, little or no consideration has ever been given to the possible deleterious neuro-psychiatric/neuro-psychological consequences of this injury. The injury appears to have been trivialised by railway management in the course of time. In addition, the lack of communication and co-ordination between the employer, employee, company medical officer, authorised medical examiner, general practitioner and treating specialists/practitioners has been responsible for the driver's continued employment despite the fact that he has been medically unfit for train driving for years. Further to this, his medical certification lapsed and he still continued to drive.

In regard to the specialists treating the driver the report stated:

There is no evidence to indicate that the driver's treating specialists considered the nature of the drivers [...] disorders in the context of the potential risk to public safety by permitting his continued occupation as a train driver. Similarly, there is no evidence that these specialists considered the possible hazards to public safety by permitting the driver to continue driving a train whilst on a complex regime of [...] medications.

While the report acknowledges that there is an argument for medical disclosure by drivers, it goes on to say that the onus must be on the employer and/or the regulatory authority to provide a medical examination and monitoring system that reduces the risk of allowing an unfit driver to operate. The report notes that suspension or reclassification would have significantly affected the driver's salary and, in any case, the driver was proud of his driving ability and did not consider that his condition posed a danger. (It is worth noting that the report presents no evidence that the driver realised the effects of his condition and the medication on his ability to drive a train.)

In managing the driver's condition NXB was handicapped by the 'significant and dangerous' lack of co-ordination of medical records as a result of the privatisation of the rail industry. All the driver's medical records prior to August 1999 were kept by the PTC and were not available to NXB. Even though medical claims continued to be made during 2000 and 2001 against the accident in 1991 these were made direct to the PTC's insurer as NXB was not a party to the original claim. There was no system under the prevailing medical standards to consolidate the medical records so as to make an informed assessment of a driver's capacity to drive. The report notes that this is an issue of individual privacy, but also notes that there is also an issue of public safety.

However, there were also flaws in NXB's handling of medical examinations. As part of NXB's accreditation to operate trains in Victoria the company is required to produce and adhere to a safety management system, embodied in a safety manual and supporting guidelines. These require employees to attend at a company nominated medical practitioner within four weeks of the due date of examination. An employee who fails to attend is to be withdrawn from normal duties as if unfit. The driver was due for his examination in December 2000, and the company's monitoring system identified that the driver was overdue in January 2001 and in each subsequent month. However, this resulted in neither the driver's attendance for a medical or the driver's suspension from duty. The report suggests that NXB was influenced in this by the shortage of qualified drivers.

Pilot Valve - hand and foot (Deadman's handle)

Victorian EMU trains have been equipped with a deadman's handle (pilot valve) since electrification. The purpose of the pilot valve is to automatically cut power and make an emergency brake application if the driver loses consciousness. Clearly this did not occur in this incident.

When 'single person operated trains' (SPOT) were introduced in Victoria in the early '90s it was recognised that the driver would have additional functions to perform and controls to operate. To allow the driver to perform these functions the deadman's handle was supplemented by a foot control for the pilot valve; this allowed 'hands free' operation. In operation the driver had to maintain a steady pressure on either the hand valve or foot valve. Many drivers, including the driver of Train 6371, preferred to use the foot control.

A 1992 report to the PTC noted that the pedal forces produced by the weight of the driver's thigh, lower leg, and foot alone would vary between 5.4 kg and 9.5 kg. Based on

NSW Tangara train pilot valve pedals, where the minimum force required was about 6.5 kg and the maximum about 11 kg, the report noted that a significant proportion of drivers would be capable of activating the foot pedal merely by the dead weight of their lower leg.

The report concluded that there is a strong possibility the driver was capable of maintaining adequate foot pressure although not consciously doing so.

Trainstops

The quadruple track between South Kensington and Footscray is equipped with automatic signals. On the Down Through Suburban lines there are three automatic signals approaching Footscray: SKN661, W217, and W223 (referred to, incorrectly, as 'permissive' signals in the report). Both signals SKN661 and W217 can show medium speed aspects.

With a train standing at Footscray platform, W223 will show Stop (Red); W217 Medium Speed Warning (Red over Yellow) and SKN661 Reduce to Medium Speed (Yellow over Green). The key here is that only a medium speed overlap needs to be provided between signal W223 and the platform at Footscray; this allows train to approach much closer to Footscray while a stopping train is standing in the platform than if normal speed overlaps were provided. According to Sinnatt (Clear Normal Speed) this use of four aspect signalling was first introduced in 1960 at the new station at Richmond.

The weakness of this system is that it assumes that it only protects against a Driver obeying all the signals except the last one at stop; that is the driver correctly reduces speed to medium speed but then drives through the stop signal. At medium speed (40 km/h) on level track a Comeng train would require around 75 m to stop under emergency braking, given good track and weather conditions. At 80 km/h (the line speed at Footscray) the same train under the same conditions would require 275 m to 300 m to stop. (This is basic physics: brakes work by converting kinetic energy to heat. The kinetic energy of an object is proportional to the *square* of its velocity. So doubling a train's velocity will quadruple the distance to stop, all other things being equal.)

In this case the distance from W223 to the rear of a stationary six car train at Footscray is about 225 m. The overlap is consequently not sufficient to allow a train to trip safely past W223 at line speed (and, of course, would be even more inadequate if the train was travelling at greater than line speed).

Telescoping of carriages

Both this accident and the Holmesglen accident involved telescoping with significant incursion of one carriage into an adjacent carriage. This despite the collisions being at relatively low speeds. Such telescoping has long been recognised as a major cause of deaths and injury in railway accidents. Although not highlighted in the report, this telescoping should be a concern; it suggests that either the anti-collision posts at the end of these cars lack sufficient strength, or the fixed drawgear between the cars of a set is not capable of keeping the carriages level and in-line in a collision. It was fortunate that in both accidents the trains involved were either lightly loaded or empty.

TWO GROUND DISCS, ONE ABOVE THE OTHER

Ground discs were uncommon in Victoria. The Victorian Railways always preferred to mount disc signals on posts. Post mounted discs were definitely easier to see, particularly when the engine was at the far end of a train. This preference probably also reflected the Victorian practice of providing a separate disc signal for each possible route; often requiring two or three (and occasionally four and rarely five) discs per track.

Ground discs were used, however, whenever it was required to place a disc in the 'six foot' between two tracks. Even rarer than the ground disc was the double ground disc

(Below) Ground Discs 'Post' 18 at Benalla B Box in 1989. These were officially described as "Two Ground Discs, on above the other, Up Signals - (Controlled by "A" Box). Top Disc, from Siding "K" to No 5 Road - towards Ground Disc, No 8B; or to No 6 Road - towards Ground Disc No 9B. Bottom Disc, from Siding "K" to Goods Yard.' In the background on the right can be seen the double ground disc "Post 17". These two double ground discs were the first installed in 1914. This photo gives a good idea of the restricted clearance between the two tracks, indeed the upper disc has a restricted width Disc (14" wide instead of the usual 18" diameter disc).





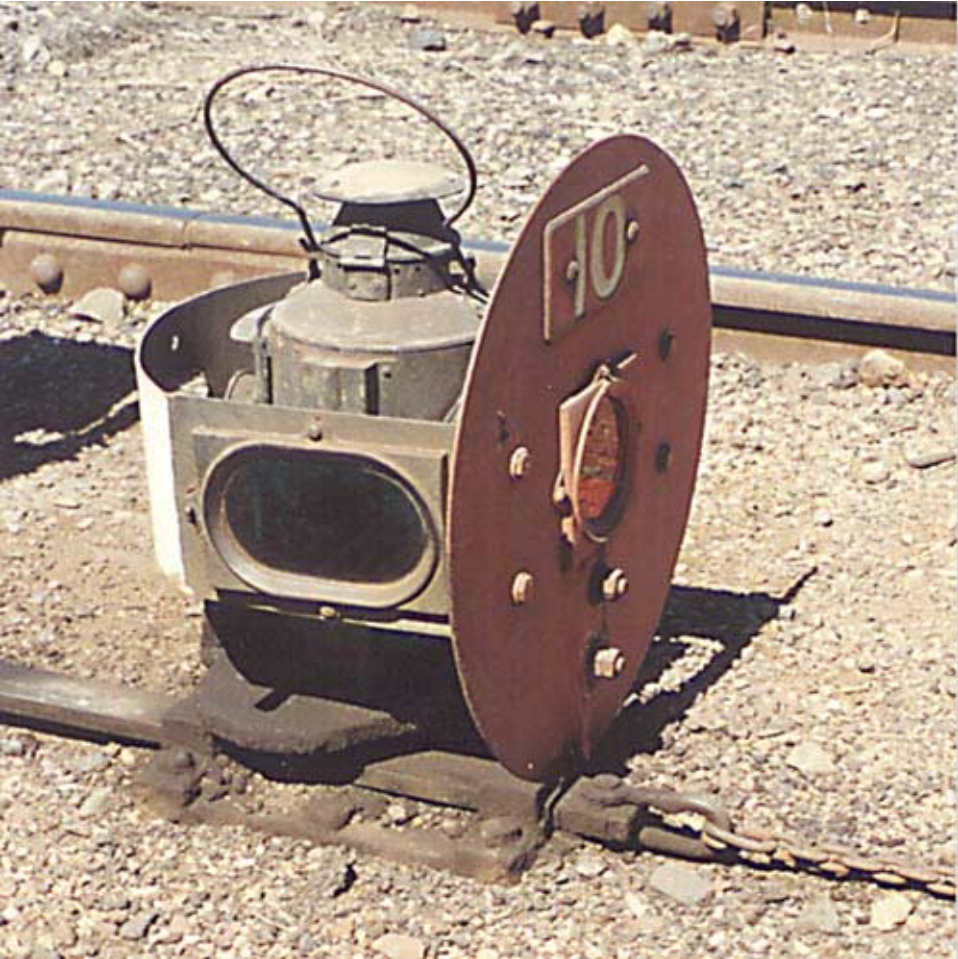
where it was required to signal two separate routes past a location. Such signals were described in the quaintly formal language of the 'Book of Signals' as 'Two Ground Disc Signals, one above the other'.

Double ground discs appear to have been introduced in 1914 at Benalla. Two sets were provided at 'B' Box. They were described in WN 32/14 as 'Two Ground Disc Signals, one of which is higher than the other'.

Benalla B ended up with three sets of double ground discs, the most, as far as I know at any one location. Other examples existed at No 1 Box (2 sets) Geelong B (1 set), Stawell A (1 set), Woodend (1 set) and Seymour A (2 sets). This is not an exhaustive list; other examples probably existed, but they were not common.

Appropriately the last sets in existence were at Benalla and were removed when B Box was abolished.

(Above) A side on view of Ground Disc "Post 10" at Benalla B with the lower disc 'off' courtesy of a friendly signalman during the SRS visit. The 'upper' disc was a standard ground disc. The 'lower' disc was completely separate and consisted of a separate disc mechanism and counterweight. The operating chain comes in on the right around the flat pulley in the foreground. The chain is connected to the flat operating slide which runs through the base of the lower disc. A second chain is connected to the rear of the slide and, running past the upper ground disc, is connected to the counterweight in the left background. The counterweight has the important function of returning the disc to danger when the lever is restored to normal in the frame. A serious disadvantage of this design was that the lower disc was not failsafe; if the counterweight became disconnected the disc would not return to danger. The counterweight, incidentally, appears to be the standard counterweight used to hold wicket gates shut. (Top Right) A close up view of the lower disc of "Post" 10 at danger. The mechanism consisted of a flat base in which the operating slide worked. A stud was fixed to the slide which worked in a 'Y' shaped slot in the target carrier (one arm of this slot can be seen in the photo). When the operating lever was reversed the slide was drawn to the right. The stud was drawn along one arm of the slot until it bore against the target carrier. This pressure rotated the carrier around a vertical stud to clear the signal. Towards the end of the movement of the slide the stud entered the other arm of the slot. These slot arms provided some lost motion to enable the disc to properly go to 'danger' and 'clear' despite varying wire travel. This slot mechanism was identical to that used in the standard ground disc. (Bottom Right) A close up view of the disc at 'clear'. The slide has been drawn to the right and the target has been rotated 90 degrees.



PROPOSED STANDARDISATION WORKS FOR THE NORTH - EASTERN DISTRICT & OTHER PARTS OF VICTORIA.

David Langley

(In reading these notes it must be remembered that the BG line to Seymour will ONLY have commuter trains (and the Apex trains), all former BG trains from north of Seymour will be operating on the SG line. This removes a fair amount of the traffic from the BG thus allowing for the reduction of the double line south of Seymour. Thoughts of mine raised by the following notes are italicised in square brackets. - DEL)

Parts of the double line south of Seymour will be singled, believed to be Donnybrook - Wallan and Kilmore East - Broadford. The former BG line will be used to provide extended crossing facilities for SG trains.

At Broadmeadows, a temporary SG platform will be built for interchange purposes. [Present up platform converted to island platform?]

High speed turnouts will be provided at some BG double to single line junctions. [Presumably the SG turnouts will be high speed.]

Two or three SG holding sidings and a direct connection from Sunshine to Brooklyn will be constructed at Tottenham Loop.

Existing BG line Albion to Jacana will become dual gauge - McIntyre and Tullamarine Loops to be abolished. [Jacana and Albion BG Loops to remain - yes/no? The Apex and BG ballast trains will still run.]

At Seymour, the East platform to be converted to SG with existing SG main line remaining as is. [The existing SG platform to be removed?]

At Benalla and Wangaratta [and Euroa?] the SG line will additionally be altered to run via the existing BG platform and then form part of an extended crossing loop on the north side. Benalla and Alumatta Loops will be abolished. The existing SG platforms at Benalla and Wangaratta will be retained allowing for passenger crosses. At Wangaratta the new loop will extend almost to Bowser.

A new long crossing loop to be provided near Springhurst and possibly one other location. [Further note not in the original text - I have since read that Avenel might be the location]

The Wodonga deviation is to go ahead and the Victorian Government encouraged to invest substantially more in the area than first indicated. A new station and freight centre to be constructed near the present Wodonga Loop.

Chiltern Loop to be retained.

All lines north of Seymour i.e., Albury, Oaklands, Tocumwal, Cobram, Dookie and Toolamba - Moulamein and Deniliquin - to be converted to SG.

Echuca becomes a dual gauge station for passenger and heritage train operations. Some consideration is being given to adding a SG line to Melbourne via Upfield owing to the expected provision of a SG yard near Upfield for the new business park being constructed in the area.

As part of the Craigieburn electrification scheme, Craigieburn will replace Broadmeadows as the BG/SG interchange station. Craigieburn is expected to have four platforms and stabling sidings. Three new stations to be provided between Broadmeadows and Craigieburn.

Mildura line SG project. Conversion of Gheringhap - Ballarat (all trains via Bacchus Marsh), Ballarat - Maryborough (all trains via Castlemaine) and Maryborough - Mildura (trains expected to operate to the temporary SG railhead). Some loops will be extended and others closed as part of the loop rationalization.

The Grain Loop at North Geelong will be converted to SG and a SG connection laid on the east side of the existing BG line to enable SG trains to serve the Shell refinery. The Grain Loop will be signalled and the direction of traffic reversed.

The present BG connection out of the North Dynon area to be converted to Dual/SG? and a SG line laid over the former BG goods lines to Kensington to serve a new unloading facility for the flour mill. It is expected that rail traffic from NSW into the mill will increase significantly.

CRT (Colin Rees Transport) have bought land at/near Mangalore Airport and are looking at developing an Air/Rail interchange for premium rate quality traffic such as frozen meat, cut flowers, etc. The Aust. Govt. have invested some money towards this project.