# SOMERSAULT

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## SIGNALLING RECORD SOCIETY OF VICTORIA INC

*Albury Station Box on the morning of 8 November 1995. This brick to floor box was opened on 25 March 1887 and was placed out of use at 0600 hours on Friday, 1 August 2003, at the grand old age of 116 years. During this time the box controlled the track and signals at the northern (Sydney) end of Albury platform. Originally Albury Station Box appears to have been equipped with a 36 lever frame. This was replaced by a new 44 lever frame on 14 March 1940 to work additional crossovers in the vicinity of the box to assist in shunting the expanded transhipping sidings opposite the platform. On 31 July 1945 the yard was extended northwards and 4 new car sidings and 3 new reception sidings provided. The main line connections to these sidings were worked from ground frames electrically released by Albury Station Box. An 11 lever kellogg key panel was provided to release ground frames and to operate a new upper quadrant home signal. This panel was replaced by a rotary switch panel on 10 March 1984 when the signalling was rearranged in preparation for the provision of CTC between Junee and Albury.*

## Society Contact Information

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*EDITOR:* Andrew Waugh, 25 Grieve St, Macleod, VIC, 3085

Phone (03) 9457 3795 (AH), (03) 9285 7927 (BH)

*PRESIDENT:* David Langley, P.O. Box 8, Avenel, VIC, 3664,

Phone (03) 5796 2337 (AH), (03) 5792 2823 (BH)

*SECRETARY and MEMBERSHIP OFFICER:* Glenn Cumming,

19 Peace St, Glen Iris, VIC, 3146. Phone (03) 9885 8546 (AH), (03) 9623 2289 (BH),

NSW PRESIDENT: Don Allitt,

8 Whites Ridge Road, Annangrove, NSW, 2156. Phone (02) 9679 1741

NSW GROUP SECRETARY: Bob Taaffe,

12 Western Crescent, Westleigh, NSW, 2120, Phone: (02) 9481 9994.

QUEENSLAND CONTACT: Phil Barker

PO Box 326, Samford, QLD, 4520



## Minutes of Meeting Held Friday July 18, 2003,

### At the Surrey Hills Neighbourhood Centre, 1 Bedford Avenue, Surrey Hills

Present: - N.Bamford, W.Brook, B.Cleak, G.Cleak, G.Cumming, C.Gordon, A.Gostling, W.Johnston, K.Lambert, D.Langley, S.Malpass, B.McCurry, T.Murray, B.Sherry, P.Silva, R.Smith, S.Turnbull, A.Wheatland & R.Whitehead.

Apologies: - J.Black, A.Hinde, J.McLean, G.O'Flynn & A.Waugh.

Visitors: - Judy Gordon & Ray Williams.

The President, Mr. David Langley, took the chair & opened the meeting @ 20:08 hours.

Minutes of the May 2003 Meeting: - Accepted as published. A.Wheatland / G.Cleak. Carried.

Business Arising: - The Term Deposit held at the CBA has now matured & has been transferred to the account at J.B.Were.

Correspondence: - Various documents required to complete the new SRSV bank account were sent J.B.Were.

A letter was sent to Adrian Ponton at Freight Australia requesting permission for the signal box tour.

A letter was received from John Yonge at Quail Books providing further information re the involvement of the SRSV in the distribution of the Quail Victorian rail atlas. Peter Silva addressed the meeting re this matter & some discussion followed.

Further correspondence was exchanged with Colliers (the agent for the Archives Room in Seymour) re the valuation of the property at Seymour & proposing an extension of the lease.

Various emails were received concerning the proposal for a national organisation.

W.Johnston / R.Whitehead. Carried.

Reports: - The President opened the discussion on the proposal to investigate the formation of a national body. The initial email to the Committee was read out, along with the responses from members received so far. A wide-ranging discussion followed.

Issues discussed included the operation of similar organisations (eg. ARHS, LRRSA, etc.), differences between Incorporated Associations in Victoria & New South Wales, Public Liability Insurance requirements in New South Wales and the NRHS in North America.

Tours. Glenn Cumming outlined arrangements so far for the proposed Signal Box Tour to be held on Monday 22 September 2003 in Geelong. Any comments or questions are to be directed to Glenn Cumming.

General Business: - Peter Silva has created a basic shell for a web site for the SRSV. We now require a webmaster / developer to manage this activity. The site is based at Vicnet, who provide 10 megabytes of space for community groups.

Market Street Signal Bridge. The latest report on this project was read out with the results of two site inspections. The question was put to the meeting as to whether the SRSV proceeds with this project or not. Members are needed to get involved to allow the project to proceed.

Discussion on this project took place. It was noted that this project would be a joint project with the ARHS. Moved Bill Johnston, seconded Bruce McCurry, that this meeting moves to actively proceed with the restoration of the Market Street Signal Bridge. Carried.

Advice was received from John Briggs in New Zealand that Auckland "A" Box was abolished on Saturday 5 July 2003. Auckland "A" Box was home to a 128 lever McKenzie & Holland style "A" power frame. Members of the SRSV visited this box during the tour in April 1998. Discussion took place on the new

arrangements at the passenger station in Auckland.

Keith Lambert reported on the provision of blue LED dwarf signals at Macaulay & Belgrave.

Keith Lambert advised that the introduction of the new Xtrapolis trains requires some signals around the network to be relocated eg Burnley Stabling Sidings. This is because the driver sits in the middle of the cab of the Xtrapolis, as opposed to the left hand of a Hitachi or Comeng train.

Keith Lambert noted that when Platforms 12 7 13 at Spencer Street are closed for rebuilding during August 2003, Caulfield & Northern Loop trains will run non stop through Spencer Street.

The meeting was advised that a rail discharge train would operate in the Burnley Underground Loop after the passage of the last train on Saturday night. Freight Australia will operate this train.

Advice was received of the progress on the diversion of the Western Highway at Armstrong.

The report on the level crossing accident involving the "Ghan" is now available on the ATSB website.

Chris Gordon & Brett Cleak provided a detailed description of proposed track & signalling alterations as part of the Regional Fast Rail project.

It was suggested that TPWS might be installed on all four Regional Fast Rail Corridors.

Proposals have been sighted for the remote control of Echuca & for the remote control of West Tower, presumably from Centrol.

Rod Smith advised that the Toolamba - Echuca, Castlemaine - Maryborough & Barnes - Moulamein Lines had recently been booked out of service.

Track & signal alterations at Albury to allow remote control from Junee are to commence on Saturday 2 August 2003. Bill Johnston gave a description of the proposed works including an extension to the crossing loop to 1660 metres.

Chris Gordon described proposed changes at Spencer Street. Platform 1 at Spencer Street will be shortened to about half its current length and will not have run around facilities for SG trains. Platform 2 will be modified to provide run around facilities for SG trains.

Bob Whitehead noted from his research activities that Tablet working was to have been introduced between Avenel - Benalla on 15 January 1897 but this was postponed until 22 January 1897 apparently because of a shortage of tablets.

Syllabus Item: - The President introduced member Wilfrid Brook to present the Syllabus Item.

Continuing with the theme for this year's Syllabus Items, Wilfrid presented a fascinating collection of slides illustrating various scenes of the Western Line over the past 40 years.

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

Meeting closed @ 22:27 hours.

The next meeting will be on Friday 19 September 2003 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 28/03 to WN 31/03 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.*

14.07.2003 **Belgrave** (SW 519/03, WN 28/03)

On Monday, 14.7., Dwarf 54 was replaced by a new taller mast located on the right hand side of the track. The Stop indication was converted to a purple light.

(15.07.2003) **Bungaree Loop - Ballarat** (SW 1069/03, WN 28/03)

Commencing forthwith, absolute block conditions will apply to all trains on this section. No train is permitted to depart until the preceding train has been confirmed as having arrived completeand in clear at the other end of the section.

16.07.2003 **Mitcham** (SW 520/03, WN 28/03)

On Wednesday, 16.7., Dwarf 14 was replaced by a new taller mast fitted with a tri-colour LED head.

(22.07.2003) **North Melbourne - Macaulay** (SW 156/03, WN 29/03)

Diagram 21/03 replaced 13/03. The main alteration is a revision of the siding lengths in the Macaulay Stabling Sidings.

26.07.2003 **Newport** (SW 161/03, WN 30/03)

On Saturday, 26.7., an uninteruptable power supply (UPS) will be provided to 730 zone box. This box contains the modules to operate Points 613 and the UPS will prevent the drop out of these points when the normal power fails at Newport. Previously a power failure required a signal technician to attend and operate the points from normal to reverse and back again before the points could be operated from the panel again.

03.08.2003 **Hampton** (SW 164/03, WN 30/03)

On Sunday, 3.8., upper quadrant semaphore Down Automatic B353 was replaced by a new mast fitted with a Style L RX8 LED head. Amend Diagram 27/88.

28.07.2003 **Heidelberg** (SW 525/03, WN 30/03)

From Monday, 28.7., the signal box will be switched in:

Monday - Friday ..... 0700 hours to 1030 hours; 1530 hours to 1900 hours.
Saturday, Sunday ..... Closed.

(29.07.2003) **Hurstbridge** (SW 526/03, WN 30/03)

Hurstbridge will be worked under Driver-in-Charge conditions after 2000 hours, Monday to Saturday, and all day Sunday.

Prior to ceasing duty, the station staff must relocate the Train Staff Ticket Box to the Drivers Locker Room. This room will contain a strong box to secure the Train Staff when not in use, a telephone and the Train Register Book.

*Duties of the Driver of Trains 1863 & 1867 (3rd and 2nd last trains to arrive), Monday - Thursday.*

When a train travelling on a Staff Ticket arrives at Hurstbridge the Driver must immediately restore the Down Home to Stop. The Driver will open the gates to the train stabling compound at the Down end (Nos 4, 5, and 6 Roads), remove the derail from the rail, and set the road. The Driver will then shunt the train to the sidings, secure it, restore the derail to the rail, and lock the gates. The Driver will then go to the locker room and give the ACRE message to the Signaller at Eltham and enter the details of the train in the TRB (the Driver is to sign in, enter the train number, actual time of arrival, time ACRE message sent, Staff Ticket number, any details relating to train running, and sign out). The Driver is then to write 'cancelled' across the face the Staff Ticket and attach it to the TRB. The Driver will then clear the Down Home signal.

*Duties of the Driver of Train 1905 (the last train to arrive), Monday - Thursday.*

This train also runs on a Staff Ticket (the first train Tuesday - Friday is a Down empty cars from Eltham). The duties of the Driver are the same as for the previous two trains except that it is not necessary to restore the Down Home to Stop and then reclear it after the train has been shunted to the sidings.

*Duties of the Driver of Trains 1863 & 1867 (3rd and 2nd last trains to arrive), Friday.*

These are identical to those of the Driver of the 3rd and 2nd last trains to arrive at Hurstbridge Monday to Thursday.

*Duties of the Driver of Train 1905 (the last train to arrive), Friday.*

This train runs on Staff. The duties of the Driver are the same as for the preceding two trains, except that the Driver will lock the Train Staff in the strongbox and write 'SLA' (Staff Locked Away) in the TRB.

*Duties of the Driver of Trains 1881 and 1899, Saturday.*

These are identical to those of the Driver of the 3rd and 2nd last trains to arrive at Hurstbridge Monday to Thursday. Train 1881 arrives at 2030 on Ticket, and Train 1899 is the second last train of the evening.

*Duties of the Driver of the last train to arrive at Hurstbridge, Saturday.*

This train runs on Staff and the duties of the Driver are the same as for the last train on Friday.

*Duties of the Driver of Train 1210 (the first train to depart), Sunday.*

The Driver must sign on, read the special notices and circulars, and advise the Signaller Eltham of his or her attendance. The Driver must then inspect the Up end main line points and ensure that the points are set and secured for the main line and that the Down Home is at Stop. The Driver will then proceed to the train stabling compound, open the gates, remove the derail from the rail, prepare the train, dock to platform, secure train, re-apply the derail and close and lock the gates. The Driver must then obtain the Train Staff from the strong box and examine the TRB to ensure that the arrival of the previous train is shown. The ticket book must then be removed from the Staff Ticket Box and a Staff Ticket filled in (including the details on the butt portion). The Staff Ticket Book is then to be returned to the Staff Ticket Box and the Staff to the strongbox. An entry is to be made in the TRB that the Staff has been locked away (i.e. 'SLA'). Before the departure of the train, the Driver is to send the APIX message to the Signaller at Eltham and the necessary details entered in the TRB (sign in, train number, time of departure in APIX column, number of ticket issued, and then sign out). The train may then depart.

*Duties of the Driver of Train 1214 (the second train to depart), Sunday.*

These are the same as those for the previous train, except that the Driver is not required to inspect the Up end points or Down Home, and the Driver must obtain the ACRE message for Train 1210 and enter the details in the TRB before obtaining the Staff from the strongbox

*Duties of the Driver of Train 1218 (the third train to depart), Sunday.*

This train will depart on Staff. The Driver will dock the train as described for the previous trains, and then obtain the ACRE message for Train 1214 and enter the details in the TRB. After obtaining the Staff from the strongbox the necessary details are to be entered in the TRB (sign-on, train number, time of departure, sign-off). Before departing (with the Staff), the Down Home is to be cleared and the quadrant locked.

*Duties of the Driver of Trains 1889 & 1891 (3rd and 2nd last trains to arrive), Sunday.*

These are identical to those of the Driver of the 3rd and 2nd last trains to arrive at Hurstbridge Monday to Thursday.

*Duties of the Driver of Train 1893 (the last train to arrive), Sunday.*

These are identical to those of the Driver of the last train to arrive at Hurstbridge Monday to Thursday.

All other trains

The Drivers of any other train that arrives or departs from Hurstbridge whilst a signaller is not on duty must sign in to the TRB, enter the details for the Down (arriving) train on the left hand page (train

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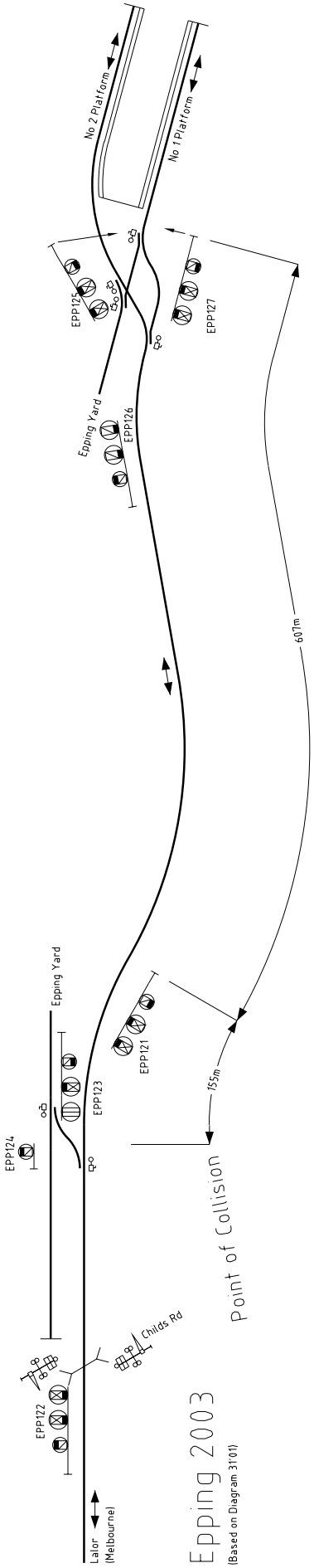
# Collision at Epping

18 June 2002

About 0914 on Tuesday, 18 June 2002, the 0913 Up electric service from Epping (Train 1648) collided at Epping with the 0836 Down empty cars from Melbourne (Train 1025). The driver of the Up train suffered minor bruising and a number of passengers suffered minor injuries. Fortunately there were no serious injuries or deaths.

The immediate cause of the collision was that the Up electric service (Train 1648) passed Up Home EPP121 at stop. This was due to the driver becoming incapacitated by a migraine. However, the 'deadman' handle and train stop failed to bring the train to a stand before the collision.

This report is based on the ATSB's accident report which is available on the ATSB's Web site at http://www.atsb.gov.au/




## Location

Epping is the terminus of the electrified suburban line from Melbourne. It is also the location of the Epping Maintenance Yard. This consists of extensive storage sidings and the main maintenance workshops for Connex trains. The yard is situated on the Down side of the line and extends from Child's Road to the Epping platforms.

Epping station, the yard, and the line as far south as Keon Park is worked from Epping signalbox located in the maintenance building. The signalling is controlled by an SSI operated by a Metrol style NX panel.

Between Melbourne and Keon Park the Epping line is double track. The 4.7 km between Keon Park and Epping is single track with an intermediate crossing loop at Lalor. The section between Keon Park and Lalor is operated under ATC rules from Epping panel. The single line section between Lalor and Epping is part of Epping yard and is operated under station limit rules.

Three position signalling is provided throughout.

There are two entrances to the maintenance yard. One entrance, facing Up trains, is located at the Up end of the Epping platforms. This is used for trains that start or terminate their runs at Epping station. The second entrance is located in the single line section about half way between the platforms and Child's Road. This entrance, Points 22, faces Down trains and provides direct access to the yard for empty car movements to or from Melbourne.

The entrance to the main line at Epping station is controlled by Home signals EPP127 (Platform 1) and EPP125 (Platform 2). Past these signals the track curves left (323 metre radius) through a crossover and then enters a long right hand curve (497 metre radius) around the boundary of Epping yard. There is then a straight section passing Home EPP121. Beyond Home EPP121 the line curves left again (550 metre radius) before straightening for the run to Childs Road. Points 22 are situated in this last straight section. The fouling point of Points 22 is 155.3 metres in advance of Home EPP121. Home EPP121 is situated 607 metres in advance of Home EPP127 at the exit of Platform 1 at Epping station.

The line speed is 80 km/h. At this speed the distance required to bring a Comeng train to a halt is between 280 and 320 metres depending on rail, wheel, and weather conditions (assuming an emergency braking performance of 0.83 plus or minus 0.5 m/s$^2$). As this is greater than the distance between Home EPP121 and Points 22, a train travelling at line speed and tripping at Home EPP121would not come to a stand before reaching Points 22. However, a medium speed overlap is available (the stopping distance from 40 km/h is around 73 metres). Consequently the signalling is arranged so that when Points 22 are reverse, Homes EPP125 and EPP127 will display Medium Speed Warning.

## Course of the Accident

Train 1648 was a three car Comeng set consisting of 634M (leading), 1167T, and 633M. It was due to depart from Epping at 0913 and departed on time at 0913:15 from Platform 1 on a Medium Speed Warning indication on Home EPP127.

Home EPP127 was displaying a Medium Speed Warning indication as the single line section between Lalor and Epping was occupied by a Down train. This train, Train 1025, was a six car Comeng set (698M -1109T-517M-647M-1174T-590M) running empty cars from Flinders Street to Epping Yard. It was signalled into the yard via Points 22. It departed Lalor at 0912:35, two and a half minutes behind schedule, and was slowing for the diverging move into

the yard (this move was governed by a Low Speed Warning indication on Home EPP122).

The Signaller advanced Train 1648 from Epping platform to Home EPP121 to ensure that the train departed on time; on-time departures are used to measure the performance of Connex against its contract.

The Driver of Train 1648 indicated that he noticed the restricted signal indication shown on Home EPP127, but could not recall anything beyond this point until hearing the brake apply as the train passed Home EPP121. During this period the Driver was incapacitated by a severe migraine. Despite this the "dead man's handle" (actually the traditional spring loaded controller handle and a foot pedal) did not activate and the train continued to accelerate normally. Tests carried out after the accident suggest that the train would have been travelling at close to line speed (80 km/h) when it passed EPP122 and the trip was activated.

Train 1648 passed EPP121 at 0914:19. Four seconds later, the empty cars, Train 1025, passed over Points 25 at slow speed. The Driver of the Down empty cars, Train 1025, saw the oncoming train and decided to apply power, hoping to move the crew compartment out of the impact zone. In this he was successful. The leading car (634M) of Train 1648 collided with leading car (698M) of Train 1025 about 12 metres from the front of the train. 634M then skidded along the side of 698M before colliding with 1109T.

Damage to 634M was confined to the offside area of the driver's compartment; essentially the left hand external wall was destroyed back to the bulkhead separating the passenger compartment. There was also extensive under carriage damage, and the body was forced off the leading bogie. Of the second train, the skin of the leading motor, 698M, was extensively scored. The trailer, 1109T, however, fared much worse. The righthand external wall was destroyed for about three quarters of the carriage length. The passenger seats on the right hand side of the carriage were torn from the floor and thrown across the carriage.

**Analysis**

There are three key issues in this accident: the incapcitation of the Driver by a migraine, the failure of the deadman's handle to bring the train to a stand when the driver was incapcitated, and that the length of the overlap beyond EPP121 was insufficient to bring the train to a stand after the train was tripped at the signal.

**Incapcitation of the Driver**

The Driver of Train 1648 had a history of severe migraines resulting in nausea and vomiting. On the night prior to the collision his sleep was disturbed due to the onset of a migraine. On the morning of the collision he was suffering from a severe migraine prior to commencing work, but did not report in sick because there was insufficient time to meet the minimum two hours notice required by Connex.

The Driver was 53 years old and was required to undergo a medical examination annually. At the previous four examinations the Driver had declared his medical condition (migraines) on the self assessment form, and at two of these examinations had indicated the frequency, severity, and nature of these episodes. The self assessment form had not been further investigated by any medical practioner performing the PTC medical assessment.

This was criticised by the ATSB's medical expert and was contrasted with the situation in aviation medice where migraine sufferers are referred to CASA's Aviation Medicine Section for individual consideration to determine the type and severity of the migraines. CASA considers that a 'classical migraine', experienced by 20% of sufferers, can completely incapacitate the sufferer and consequently considers it a serious medical issue. The ATSB recommended that the Department of Infrastructure revise its Medical Guidelines to provide clear instructions as to the handling of migraines. It also recommended that the Department generally review the medical conditions which must be examined in detail when they are detected or declared during these examinations. Such conditions should be referred to an independent reviewing medical authority for the ultimate decision regarding the medical fitness to drive a train.

**Failure of the Deadman Handle**

When the Melbourne suburban system was electrified around the First World War it was recognised that an incapacitated Driver had the potential to cause a serious accident as the proposed electric trains were to be operated with a crew of two (Driver and Guard) not three (Driver, Fireman, and Guard). In consequence, the motor cars were fitted with a "deadman's handle". In practice this formed the knob of the controller handle. While in operation, the Driver had to keep the knob depressed. Failure to do so would result in the traction power being cut and the brakes being applied. This basic deadman mechanism was applied to all subsequent classes of electric multiple unit rolling stock.

With the removal of Guards from the suburban trains it was recognised that the Driver would have additional tasks and it would not always be possible to hold the down the controller handle. The Hitachi and Comeng trains were consequently modified to include a foot pilot valve in addition to the hand pilot valve (deadman's handle). Depression of either pilot valve would prevent the brakes from operating. Many drivers have adapted to using the foot control in preference to the hand control, and the Driver of Train 1648 was one such driver.

Subsequently, however, a number of reports have identified weaknesses with foot pilot valves that could prevent them from being activated if the Driver becomes incapacitated. These include the possibility that the dead weight of the Driver's lower limbs could be sufficient to maintain the foot pedal position and that the Driver could, unconciously, keep pressing the foot pedal. This concern was raised in the accident report on the Footscray collision which was found to have been caused by the Driver of a suburban train falling asleep at the controls and the failure of the deadman's handle to act.

The ATSB found that, due to the design of the pilot valve system, there was a strong possibility that the driver was able to instinctively maintain adequate foot and/or handle pressure and prevent the automatic application of the brakes. It recommends that the design be reviewed, but also notes that alternative systems, such as vigilance controls, may be more problematic in a metropolitan system given the density of traffic, the time gap between trains, and the workload of the Drivers.

**Failure of the train stop**

The final defence against Driver error is the train stop/trip mechanism. If an EMU passes a signal equipped with a train stop while the signal is at danger, the power is cut and the brakes applied. The distance it takes for a train to come to a stand once the trip has activated depends on the initial speed of the train, the gradient, and the condition of the rails, wheels, and brakes. This braking distance governs the minimum distance between a signal and the obstruction that it protects. To be effective, a trip mechanism is critically dependent on the maximum speed at which the train can pass the signal.

When trip stop mechanisms were introducted, the length

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# The Market Street Signal Bridge

Colin Rutledge

I must open by saying that the article on the greatest of all signal bridges stirred my recollections.

As second year apprentices in 1976 we were taken to Flinders Street to view the arrangements and presumably to be impressed by the signalling. Not all my fellow apprentices appreciated such outing as anything other than an escape from the monotony of signal theory classes but I, with camera always to hand, relished these trips and photographed the said signal bridge. I recall that we were not permitted to climb the structure because the previous year an apprentice after ascending the lofty structure found himself struck with terror and quite unable to move. As I remember the story the fire brigade were called upon for assistance although I have lost track of what it was they actually did.

The following two years saw me spend a lot of time in the inner area of North Melbourne to Richmond and I participated in the wanton destruction of classic VR mechanical and early power signalling in the name of the Melbourne Underground Rail Loop. Much time was expended wandering around Flinders Street A often exposing a plate or ten on track and signalling alterations. A whole afternoon was occupied on one occasion photographing all the signal bridges at Flinders Street from the ground, on the structures and from the roof of the Flinders Street Station building. Great experiences and opportunities and I am truly thankful to have had the chance to indulge and be paid for it.

Upon reading the text of the article in Somersault, I learnt that there had been three bridges. I confess I thought there were only two as I only have detailed drawings in my collection for two structures. Before I could locate the prints it became obvious that the second structure was required to allow for overhead clearances, the clue being the dates of 1914 and 1915. Obviously the vertical clearances were one of the first things to be attended to in the program of electrification. Also on the list was the alteration of many detailed track layouts to make it practical to provide track circuits over complex layouts with the need to have one leg of each track dedicated to traction return current.

The first drawing I have is titled "Flinders Street New Station Signal Bridge at Market St". It is dated 17 October 1901 and references contract number 10190. The structure is shown as being 35 feet above the road level with a clearance over the track of 15 feet 2 inches. It is designed to take 5 wood dolls at 6-foot centres over a clear span of 31 feet 6 inches. Like most other signal bridges the basic structure is built from 3 inch by 3 inch "Tee" section cross braced with 2-inch angles. The legs are parallel and are 80-pound rail embedded in a concrete block measuring 1 foot 3 inches wide, 4 feet 6 inches long and 3 feet 6 inches deep. A connection was made to the girders of the railway viaduct a little below rail level. The horizontal member is in the usual box type configuration 3 feet wide and 3 feet 6 inches high. The old type landing is 5 feet wide making it a tight squeeze around the dolls for the signal adjuster. Notes on the drawing indicate a 1-inch camber was designed and to ensure correct erection certain rivets between the horizontal member and the legs were only to be drilled for and fitted when the structure was fully loaded.

The second drawing is for the four track structure, dated 22 June 1916 and titled 'Flinders Street Signal Bridge Market St". The detail is very brief compared to the earlier version and I suspect it is because the Signal Shops have made a lot of these structures and understand the usual style. They would only need to know unique dimensions that apply to a particular application. Compared to the first bridge the dimensions are now massive. Road to top of the horizontal member is 48 feet, rail to underside is 27 feet (there was no overhead connection to the bridge but an overhead structure was not far away hence the need to clear the catenary wire near its highest point) and the clear span is 62 feet. The legs are slightly splayed and made from 100-pound rail. The concrete foundation is again small but the legs are again anchored to the viaduct. A note says the bridge is to have guys at each end. The camber is 2 ½ inches with similar instructions about drilling and riveting. A larger cross section material is used for the horizontal member being 3 ½ inch "Tee" and 2 ½ inch angle. The girder is also deeper at 4 feet. In terms of the dolls the spacing is shown to be from the north end, 1 foot, six dolls at 6 feet spacing, 5 feet 3 inches to a disc doll then 7 feet 6 inches followed by four dolls at 6 feet centres and finally a disc doll at 5 feet 3 inches, and 1 foot the end.

The arrangement of arms shown on the drawing is three arms on the first doll, two with a lower position vacant on the second, third with three arms and fourth and fifth with top two arms only. The sixth doll shows five discs, three left and two right. Although the remaining dolls are shown they are noted as not to be supplied. Dolls seven and nine have the top two arms only while dolls eight and ten have three arms. Doll eleven is shown as having six discs, three on each side. The other item of interest is a reference to the bottom arm on the first doll needing to be "reversed".

The bridge that I have fond memories of had all arms fitted with reversers, some of which were a cow to maintain because each reverser got in the way of something else. You also had to know which signal would be required when as trains came thick and fast and there was not too much time to work on some bits. I think I recall someone had at some time extended the post phone circuit to the top of the signal bridge to help with maintenance and faults.

The ladder to the structure came down the south side and an extended portion of the walkway outside the main girders of the viaduct was provided to give access and still permit passage past. The last time I was in Flinders Street (the road that is) you could still see the foundations of the bridge. The foundation had been extended upwards from the ground to above head height presumably to reduce the risk of damage by road vehicles impacting. The 100-pound rail could be seen protruding from above the extended foundation.

As an aside I also found in my files drawings for a number of other signal bridges at Flinders Street along with a couple of unconventional signal masts.

# Finding the Grampians Line in 2003

Keith Lambert

Note: Map references are from the Vicroads (edition 2) directory, map 56.

(56 D2) From the point of divergence (1.8 km west of Stawell) with the Western line the track formation can be followed by car to the Western Highway. The level crossing was at an approx. 30/60-degree angle, approximately 30 metres on western side of the Major Mitchell monument.

Approximately 1 km on the Down side of the Western Highway level crossing, a minor road crosses the formation. The track formation can be seen looking in the Up direction. At this point the line can be driven along as it is now a roadway in the Down direction.

NOTE: The road leading to this point is not shown on the Vicroads directory and it runs to the right off Grampians Road approximately 2 kilometres from the Western Highway and runs through to the Western Highway about 1kilometre west from where the Grampians line crossed the Western Highway.

Return to the Grampians Road.

(56 C2) Approximately 4 kilometres further along the Grampians Rd, there is a road to the right towards Deep Lead (called Deep Lead Road). Turn right and travel 200 metres to where the line crossed. The track formation can be seen in both the Up and Down directions. Return to Grampians Road and turn right.

(C 3) Approximately 2 kilometres from Deep Lead Road there is a road to the right (Mount Dryden Road.). Take this road for approximately 3 kilometres to where the road veers right on the approach to a crossroads (Mokepilly - Lake Lonsdale Road). The formation can be seen if you look hard enough on right hand side in the area just prior to the crossroads. It appears that the level crossing may have been in the road junction crossroads

Set tripmeter to 0.0 at crossroads and continue to travel along Mount Dryden Road.

0.0 Crossroads. Line was on left hand (southern) side of roadway heading west paralleling the road.

0.4 Where the line crossed the causeway most evidence of the bridge have been removed, but some piers are visible if you look close enough.

0.8? Could not see any evidence of the line at Mount William creek. It is likely that construction of the bridge and levy bank has eliminated evidence of line at this point.

1.7 (56 B3) The road veers right and the remains of the rail bridge can be seen opposite the entrance to Wimmera Mallee Water/Lake Lonsdale.

As you continue, the formation can be seen in the paddock on the left-hand side of the roadway.

2.8 Stewart Park. Continue straight ahead.

4.1 (56 B3) Road to Western Highway (Greenhole Rd). Continue straight ahead.

5.4 (56 B3) The road to Heatherlie (Pines Rd) branches of to the right. Fyans Creek was located near here, but I was unable to find evidence of the rail formation or Fyans Creek station. It was possibly on the left hand side of road. It is likely that the line then crossed the Halls Gap – Fyans Creek Road and then ran along alignment of, or to the side of, Pines (Heatherlie) Rd.

Reset tripmeter to 0.0.

0.0 (56 B3) Junction of Halls Gap – Fyans Creek Road and Pines Road (road to Heatherlie). Take Pines Rd.

The roadside is heavily vegetated on both sides and it is not possible to see any evidence of the rail formation. It is possible that the rail formation along here is now the roadway, maybe this road did not exist in the days of the Grampians line.

2.2 (56 A2) Junction of Pines Road and Heatherlie Track. At this point, Pines Road veers to the left and Heatherlie Track to the right. The rail formation can be clearly seen, it runs straight ahead between Pines Road and Heatherlie Track, supporting the theory that the previous 2.2 kilometres of roadway has taken over the rail alignment.

The rail formation is to the left of Heatherlie Track. Reset tripmeter to 0.0.

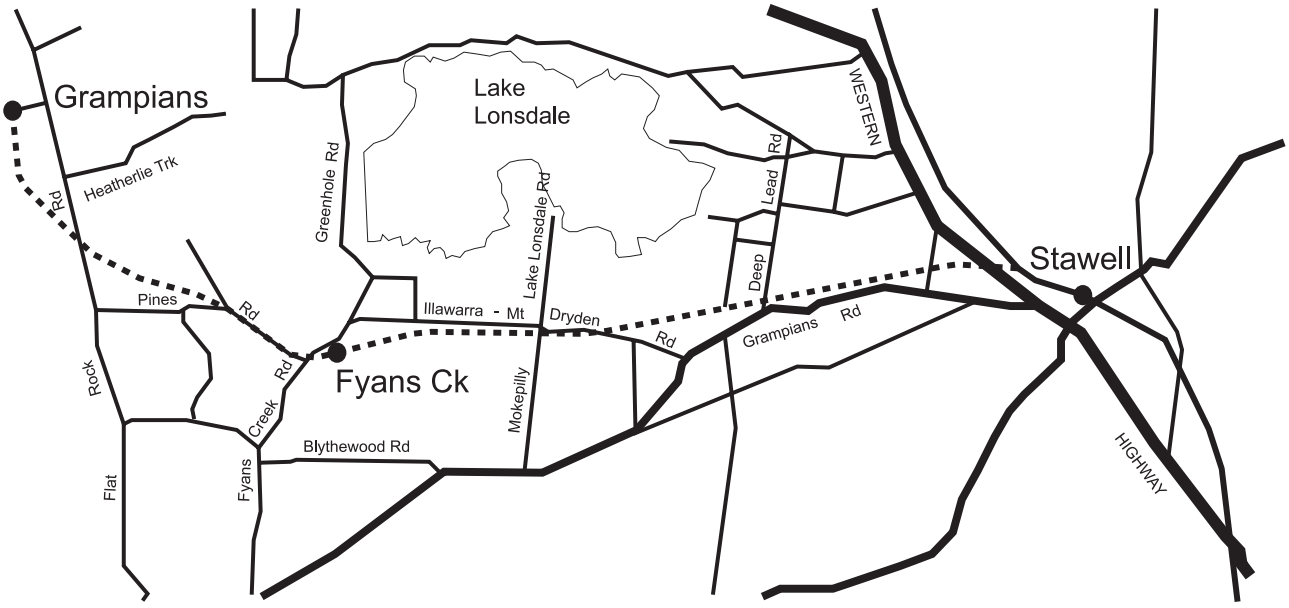
0.0 Junction of Pines Road and Heatherlie Track. Continue along Pines Rd. From this point, Pines Rd runs in a westerly direction, the line ran generally in a north westerly direction to where it crossed Halls Gap Rd. I did not see and evidence of the line between this point and the terminus.

3.3 'T' intersection at Pines Road & Halls Gap Road. Turn right. Reset tripmeter to 0.0

0.0 Intersection of Pines Road and Halls Gap Rd.

(56 A2) At approximately two to two and a half kilometres from the Pines Road junction, in the vicinity of Ledcourt

(Continued on Page 90)



## ALBURY

As mentioned in the signalling alterations section, the two signalboxes at Albury were abolished on Wednesday 6 August (all points and signals worked by the boxes were booked out of use at 0700 hours Friday, 1 August, but the boxes continued to be staffed and the signallers were responsible for working the trains through Albury until the remote control from Junee was commissioned which was scheduled to occur at 1700 hours Wednesday, 6 August).

These two boxes were of considerable interest to Victorians as they controlled Victorian trains. Albury is the terminus of the broad gauge line from Melbourne, and, until recently, it was the point at which Victorian and New South Wales crews changed on the standard gauge.

The first railway to Albury/Wodonga was the Victorian broad gauge line which was opened in 1873. This spurred the New South Wales government to extend its southern line beyond Goulburn lest southern New South Wales become a defacto part of Victoria. Due to the long distances involved, however, the line was not completed to Albury until 3 February 1881. The two governments then agreed to connect the two systems. Such was the rivalry between the two governments that the connection took the form of two parallel single lines, one broad gauge and one standard gauge, between the two stations. Effectively, the broad gauge was extended to Albury and the standard gauge to Wodonga. The connection was officially opened on 14 June 1883, although the permanent iron bridge over the Murray did not come into use until the following year.

Initially it appears that the New South Wales trains continued through to Wodonga, while the Victorian trains terminated at Albury. When this practiced ceased I do not know, but the standard gauge passenger platform at Wodonga was removed in 1906. After this, the standard gauge line between Albury and Wodonga was effectively reduced to a lengthy siding and was only used to shunt the livestock yards at Wodonga (and later the transhipping sidings at Wodonga Coal Sidings and the army sidings on the Tallangatta line). In effect, the broad gauge line was the 'main' line and Albury was where passengers changed trains and goods were transhipped. It is likely that the broad gauge also carried a considerable number of passengers and quantity of goods for Albury as Albury was considerably closer to Melbourne than Sydney.

In 1962, of course, the standard gauge line was extended from Wodonga to Melbourne. This reversed the relative importance of the two lines. The standard gauge became the more important of the two lines and carried most of the through traffic. Albury remained an important operating location as it was where the Victorian and New South Wales locomotives were exchanged. The broad gauge continued to be important; the broad gauge passenger trains continued to run, of course, and local Albury goods was handled and goods even continued to be transhipped.

By 1995, however, Albury had largely lost importance as a rail location. Through working of locomotives between Victorian and New South Wales had commenced in June 1982 with the Southern Aurora and the Spirit of Progress. Through working on freight trains appears to have commenced in the mid 1980s, however, the Victorian and New South Wales crews continued to change at Albury. This largely ended in mid 1994 when the NRC took over the running of the interstate freight service and moved the crew change point to Junee. By this date Albury had ceased to handle LCL freight and the broad gauge goods sidings north of the passenger platform had been completely lifted by November 1995. It appears that the last regular use of the transhipping sidings was on 1 June 1995 when transhipping of slab steel ceased. The loco depot had closed in 1993 and was quickly demolished.

By the time of the SRS visit in February 2000 the yard was becoming seriously overgrown.

Until the mid 1990s Albury consisted of four major sections: the passenger station, transhipping yard, locomotive depot, and goods yard. The passenger station was situated at the south western end of the yard with the transhipping yard opposite it. The goods yard was north of the passenger station with the locomotive depot opposite it.

The yard was worked from two boxes: Albury Station Box and Albury South Box. Albury Station Box was situated in the centre of the yard, opposite the northern end of the passenger platform, and controlled the connections between the four sections of the yard. It also controlled (via electric releases) the ground frames that provided access to the goods yard and loco sidings at the northern (Sydney) end of the yard. Albury South Box was sitatued at the southern end of the passenger platform and controlled the connections at that end of the station. This included the broad gauge connections to the transhipping sidings.

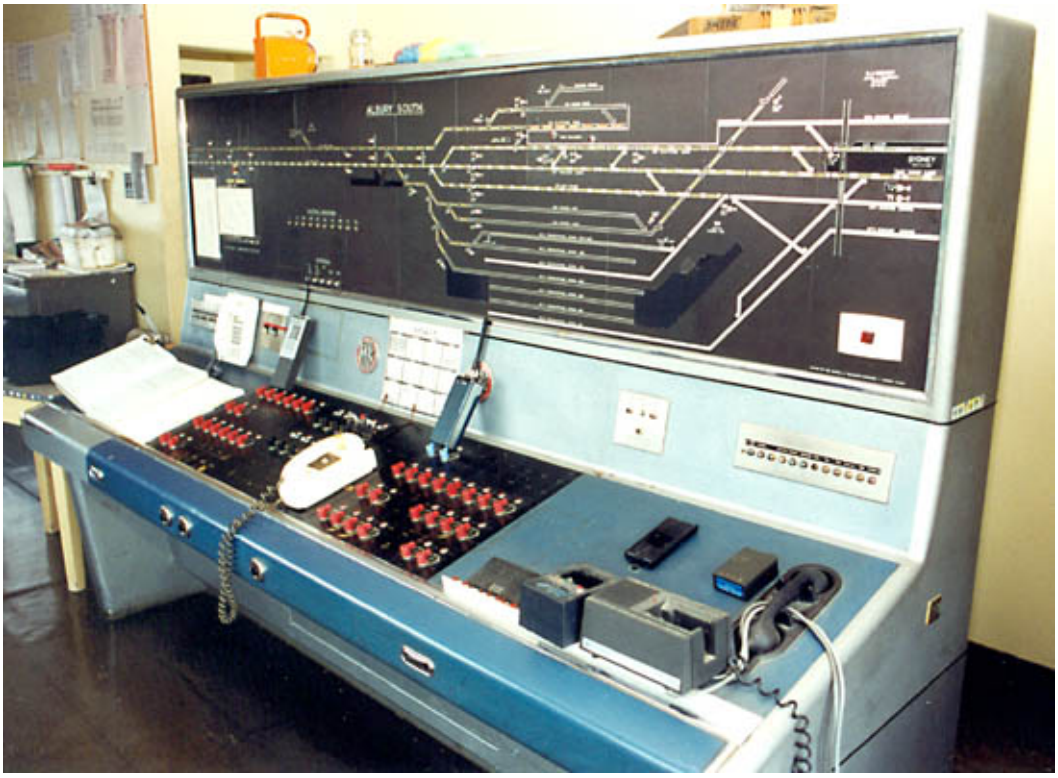
The arrangement of the broad gauge lines in the yard were interesting. From Victoria the two lines - broad and standard - ran parallel with the broad gauge line on the western side. The 'main' broad gauge line terminated on the western side of the passenger platform and was provided with a run around. These are the only broad gauge lines today. The broad gauge goods lines junctioned from the main line south of the station. The goods line crossed the standard gauge main line and then ran through the station between the standard gauge passenger station and the transhipping sidings. A broad gauge run-around (the Goods Loop). was situated at this point. At the northern end of the passenger platform the broad gauge goods line crossed back to the western side of the yard to serve the goods yard. In doing so, it crossed four standard gauge tracks on the level: No 1 Loco Road, the Through Road, the Platform Road, and the Car Dock. There were a number of sidings in the goods area, including sidings serving the goods shed, Dalgety's and Younghusband's and Burrows. In addition to these sidings there were a number of broad gauge transhipping sidings that were accessed from the southern end of the yard. In 1961 there were also four broad gauge transhipping sidings, one dual gauge transhipping siding, and a long shunting neck on the eastern side of the line at the southern end. In 1985 a number of these broad gauge transhipping sidings were lifted or converted to standard gauge to aid the transhipment of slab steel.

Information from these notes has been drawn from a wide range of sources. These include:


* New South Wales Track and Signal Diagrams (ARHS NSW).
* NSW Weekly Notice extracts, courtesy of Bob Taaffe
* Notes courtesy of Chris Banger.
* Rail News Victoria
* The Steam Locomotive Depots in NSW, Locomotive Depot No. 31: Albury, Ray Love, Byways of Steam 11, Everleigh Press, July 1996.
* Diesel and Electric Locomotives of the NSWGR, Volume 2, M. Morahan, New South Wales Rail Transport Museum, 1998.
* Six and a half inches from destiny, Keith Turton, ARHS (Vic), 1973

*(Above) Looking north from the southern throat of the yard in February 2000 during the SRS tour. The broad gauge line is on the left and the standard gauge line on the right. Albury South box can be seen at the end of the platform on the left of the picture between the broad and standard gauge lines. All movements, including broad gauge movements, in Albury yard were controlled by NSW signals; Victorian drivers had to know enough about NSW signalling to navigate around the yard. (Below) Looking south from Albury South box in November 1995. The broad gauge line is on the extreme right. The standard gauge Platform Road, Through Road, and Run Around are in the centre and end at the three way points with the standard gauge line leading onward to Melbourne. Note that the Through Road has a set of catch points; a feature retained today even though the line is now the main line. The two tracks to the extreme left are the broad gauge goods lines with the transhipping yard out of the picture to the left. The connection from the goods lines to the broad gauge main line can be seen crossing the standard gauge line just beyond the three way points.*

*(Above) Albury South Box was situated at the southern end of the passenger platform between the broad and standard gauge tracks and was opened on 14 May 1962. The original Albury South Box was opened in 1888, and unlike the fancy brick Albury Station Box, was of ulitarian wooden construction. The box originally contained a 24 lever frame, but this was replaced by a 32 lever frame on 8 July 1913. The larger frame was required to work additional signals; the basic layout did not change. The frame was replaced (or extended?) again on 31 January 1940 when a 36 frame was provided to work additional transhipping sidings. The new brick box was provided as part of the work associated with the provision of the standard gauge line to Melbourne. It was not, however, ready for the opening of the standard gauge line to goods (2 January 1962) or to passengers (12 April 1962) and the old box had the honour of signalling these initial trains. The coming of the new box saw all the signals at the south end of Albury yard replaced by light signals, however, the basic track layout remained almost unchanged. Indeed, like Albury Station Box, the original 1888 layout could be traced in 1995. (Below) The new box was provided with a rotary switch panel manufactured by McKenzie and Holland. The switches were mounted on the desk below the diagram and were grouped into Up signals, points, and Down signals. The telephone concentrator was at the right hand end of the desk and the left hand end was used for the Train Register. Built into the front of the desk were three bell pushes (standard and broad gauge to Wodonga, and Albury Station) and two ashtrays. It seems passing strange that the opportunity was not taken in 1962 to combine the functions of Albury South Box and Albury Station Box onto one panel. But this did not occur and both boxes continued to work for over forty years.*

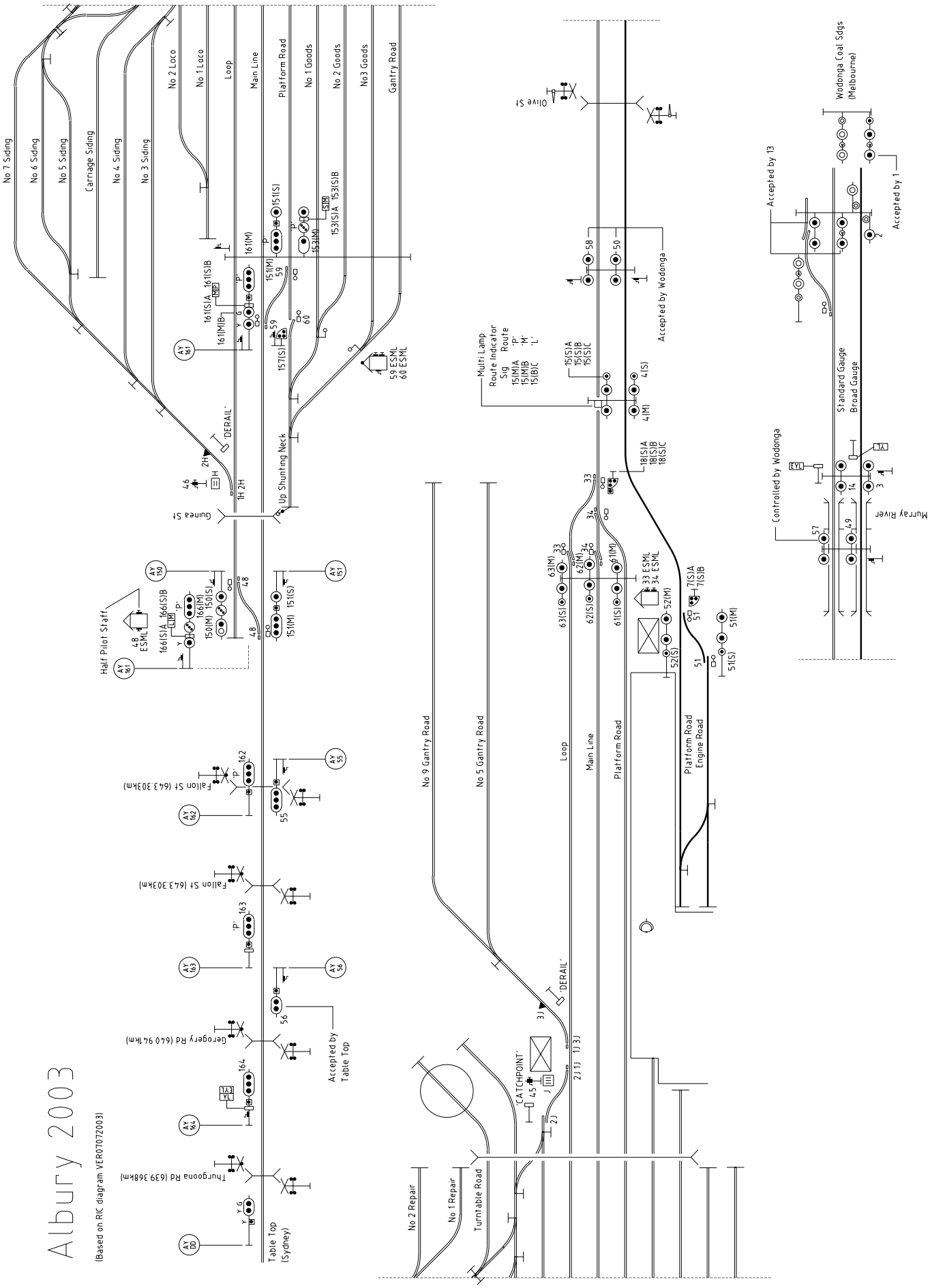



*(Above) The centre portion of Albury yard looking north with Albury Station box on the left. The track crossing diagonally across the picture between the platform and the box is the broad gauge Goods Line providing access to the goods yard. The track immediately adjacent to the platform is, of course, the standard gauge Platform Road. To the right is the Through Road, and then the Run Round which continues to become the No 1 Engine Siding. The sidings seen beyond Albury Station Box were the site of the loco depot and carriage sidings. Locomotive 42220 can be seen stabled in loco just beyond the Dean St overbridge. Prior to 1984, the Platform loop ended at Crossover 22 (just beyond the broad gauge line), and the track beyond was the No 1 Goods Siding. In that year part of the No 1 Goods Siding was converted into the 'Extended Loop'. Almost none of the trackwork in this view survives; only the three standard gauge roads, as plain track, and the two sets of points immediately in front of the box. (Left). The Up 2nd Home (Signal AY 9) from the Platform Road. The main signal was above the platform verandah, and a co-acting signal was provided below the verandah. This signal had a fixed red upper light. The second target was the marker light (white) which was illuminated at all times. Underneath these 'fixed' lights the working lights which actually signalled trains can be seen. A two position route indicator is below the marker light and this shows 'M' for moves across Crossover 22 to the main line, or 'L' for moves along the extended loop. The small signal below the route indicator is a low speed signal. This shows a green light for running moves to the main line or extended loop and indicates that the driver should be prepared to stop at the next signal. The lowest signal is a shunt signal and shows a yellow light for shunting moves to the main line or extended loop. Note that no route indicator is provided on the co-acting signal. The route indicator was added in 1984 when the Extended Loop was provided, and perhaps it was too difficult (expensive) to add to the co-acting signal.*


*(Above) Looking towards Melbourne from Albury Station Box in November 1995. From the platform the first three tracks are the standard gauge Platform Road, Through Road, and Run Round. The next two roads are the broad gauge Goods Line and Goods Loop. The start of the diagonal broad gauge crossing to the goods yard can be seen. The broad gauge crossing had ceased to be used when the former goods yard was cleared, and by November 1995 the broad gauge tracks ended just beyond the catch point on the western side. The transhipping sidings can be seen to the left of the broad gauge Goods Loop. By this date these sidings were effectively out of use as transhipping at Albury had ceased. All the point work and signals in this view have been removed. (Below) Looking towards Sydney from the footbridge adjacent to Station Signal Box in November 1995 showing most of the remaining mechanical signals. During 1995 the loco depot had been closed, the track in the shed area lifted and the shed demolished. However, locomotive 42220 was stabled in No 1 Loco Siding when this photo was taken.*

*(Left) The interior of Albury Station Box in November 1995 showing a very well kept and highly polished box. The 44 lever Standard NSW Cam and Tappet frame was provided on 14 March 1940 as part of the expansion of Albury to handle the war time transhipping traffic. In 1995 most of the levers were still in use, but a few white levers can be identified; these were made redundant in 1984 when a portion of No 1 Goods Siding was converted into the Extended Loop. The illuminated diagram above the frame was provided at the same time. A small rotary switch (what Victoria calls a 'unilever') panel is located at the far end of the illuminated diagram to work the points, signals, and ground frame releases at the Sydney end of the yard. The standard NSW Cam and Tappet frame is similar in design to the Victorian A Pattern cam and tappet frame, but, of course, almost all the details differ. (Below) Looking south from the Guinea Street at the northern end of Albury yard. From the right the tracks are the Up Shunting Neck, Main Line, No 1 Engine Siding. To the left of the Engine Siding are a collection of sidings added during 1945 to ease congestion in the yard. Access to these sidings was by two ground frames (F and G) released by Albury Station Box. Ground Frame G was almost underneath the Guinea Street bridge (the points that can be seen in the Up Shunting Neck were worked from the frame). The Down 4th Home, controlling movements into the main line or Extended Loop can be seen in the middle of the picture, just before the Wilson Street footbridge. On the extreme right can be seen the massive wall of Dalgety's woolstore.*

*A short freight arriving at Albury from the north on the afternoon of the 7 November 1995 behind 8169. The photo is taken from the Dean Street bridge. The train is on the main line with the Extended Loop to the left. The tail of the train is passing over Points 59 at the end of this extended loop and the signals for the end of the loop can be seen on the signal bridge above the train. Beyond the end of the Extended Loop, the line continues as the Up Shunting Neck. To the right of the main line is 'No 1 Engine Siding' and beyond them the Car Sidings and Reception Sidings provided in 1945 to assist in handling the massive transhipping task undertaken during the Second World War. (Below) The points at the Sydney end of the yard were worked from three ground frames which were electrically released from Albury Station Box. This is Frame G which worked connections between the Main Line and the Up and Down Shunting Necks. The electric release can be seen to the left of the frame on the short post. The electric release releases an Annett key which can be used to unlock the facing point lock lever (2) and allow the point levers to be reversed. This frame was provided in 1940 with the extension of the goods yard. Close examination of the left hand running rail shows that a lock bar is provided to prevent the points from being unlocked while a train is passing over them; even though the operating frame is adjacent to the points. The points worked by Frame H at Albury were similarly equipped.*



Albury 2003
(Based on RIC diagram VER07072003)
No 7 Siding
No 6 Siding
No 5 Siding
Carriage Siding
No 4 Siding
No 3 Siding
No 2 Loco
No 1 Loco
Loop
Main Line
Platform Road
No 1 Goods
No 2 Goods
No 3 Goods
Gantry Road
Up Shunting Neck
Guinea St
Olive St
Half Pilot Staff
Fallon St (643.303km)
Gerogery Rd (640.94.1km)
Thurgoona Rd (639.368km)
Table Top (Sydney)
Accepted by Table Top
No 9 Gantry Road
No 5 Gantry Road
No 2 Repair
No 1 Repair
Turntable Road
Platform Road Engine Road
Multi Lamp Route Indicator
Accepted by Wodonga
Wodonga Coal Sdgs (Melbourne)
Accepted by 13
Accepted by 1
Standard Gauge
Broad Gauge
Controlled by Wodonga
Murray River

## Signalling Alterations

(Continued from Page 76)

number, time of arrival, and any details in train running) and the details for the Up (departing) on the right hand page (train number and time of departure), and sign out of the TRB.

01.08.2003 **Spencer Street** (SW 170/03, WN 31/03)

On Friday, 1.8., Automatic 491 (No 11 Track) was relocated 4 metres in the Down direction to its original position.

04.08.2003 **Spencer Street** (SW 159/03 & 172/03, WN 31/03)

From Monday, 4.8., Home 536 (No 8 Track) was relocated 800 mm to the left to its original position. Due to the completion of the absolute occupation of No 7 South Track, Home 302 was replaced by a new cantilever mast located 1 metre in the Up direction and Home 310 will be returned to service. When piling works are completed, it is expected that Home 310 will be replaced by a cantilever mast. The permanent low speed aspect provided on Home 312 was cancelled.

05.08.2003 **Spencer Street** (SW 534/03, WN 31/03)

On Tuesday, 5.8., the Parcels Sidings and Van Dock were abolished. Dwarfs 113 (from Van Dock), 115 (from No 1 Parcels Sdg), & 117 (from No 2 Parcels Sdg) were abolished. Points 013 (to Van Dock) & 017 (to No 2 Parcels Siding) were taken out of use. Derails 015 (in No 1 Parcels Siding) & 017 (in No 2 Parcels Siding) were abolished. Circuit alterations were performed to prevent operation of Double Compound 012/019 (Up end Parcels Siding) and Points 014 (to Parcels Sidings from viaduct). Amend Diagram 35/02.

06.08.2003 **Albury** (WN 31/03)

Between 0700 hours Friday, 1.8., and 1700 hours Wednesday, 6.8., Albury Station box and Albury South box were abolished. Albury will henceforward be controlled from a Phoenix VDU workstation at the Southern Rail Management Centre at Junee. The system of working between Table Top and Albury will be Rail Vehicle Detection (RVD).

The former Run Around/No 1 Loco Siding/Down Shunting Neck became a 1660m crossing loop known as the Loop Road. The points worked by Frame F at the Sydney end were motorised and three new signals (AY150, AY151, and AY160) were provided. Frame F was removed. A new 2 lever Frame H (electrically released from Junee) was provided to work the connection to Nos 3 to 7 Sidings. The former Frames G (Up shunting neck to Down shunting neck), H (Main line to No 1 Loco Siding), and J (Extended Loop to Goods Siding) were removed. The Half Pilot Staff currently located on a post near 154 signal will be relocated to the external wall of 166 location (relay room). Yard Limit and End Yard Limit boards were provided on signal AY164

Additional aspects were provided on signals AY153 (Medium aspect [pulsating yellow]), AY154 (Medium aspect), AY161 (Medium, Caution [yellow] and Clear [green] aspects), AY162 (Medium and Clear aspects) and AY163 (Medium aspect). A train movement from AY161 along the Main Line will lock Points 33 normal.

All connections and signals in the vicinity of the former Albury Station Box were removed except for the connections to the Loco Sidings and Gantry Roads. These connections were worked by a new Frame J which was electrically released from Junee. Crossovers 18, 22 and 27, Points 21, and Catches 15, 24, and 60 were removed together will all associated signals. A new guards indicator will be provided on the platform for AY153 signal.

At Albury South Box, Crossover 35 (and associated signals), the broad gauge goods lines (Points 25) and the Caltex Siding (Frame G) were removed.

The white marker light on signals AY14, AY15, AY18, AY57, AY58, AY61, AY62, AY63 (standard gauge) and signals 3, 4, 7, 49, 50, 51, and 52 (broad gauge) were changed to red. All signals on the broad gauge and on the standard gauge south of AY58 (inclusive) now show Victorian indications instead of NSW indications.

An additional aspect was provided on signal AY18 (clear [green]) for main line moves.

The approach locking on signals AY14, AY15, AY18, AY61, AY62, and AY63 were extended to meet current standards. It will now be possible to select the Main or Shunt aspects for signals AY4 and AY15.

Yard Limit and End Yard Limit boards were provided on posts underneath the gantry supporting signal AY14.

10.08.2003 **Middle Brighton** (SW 173/03, WN 31/03)

On Sunday, 10.8., upper quadrant semaphore Down Automatic B419 was replaced by a new signal fitted with a 3 aspect Style L RX8 LED head. Amend diagram 27/88.

## Collision at Epping

(Continued from Page 78)

of the overlap was always based on the the line speed. However, it did not take signal engineers long to realise that the overlap could be shortened by restricting the maximum speed at which the train could pass a signal.

In Victoria, this restriction takes two forms. The first is to have a blanket speed restriction on a specific section of track; an example of this is the Jolimont to Clifton Hill section where the speed is restricted to 55 km/h. The second is the use of medium speed aspect (40 or 65 km/h) which restricts the maximum speed a train can travel given the location of the preceeding train. Since there is no system of automatic train control in use in Victoria, the protection provided by the trip system is solely depedent on Drivers observing the speed limits, whether these are either line speed limits or the limits set by signal aspects. (In practice, there are a few locations in Victoria where speed proving is provided. With this one or more additional train stops are provided to ensure that a train is observing a speed limit. The first examples were on the underground loops, and more recent examples were at Ringwood and Heidelberg.)

Note that the problem is not just caused by the use of the medium speed aspect; it is inherent where there is no control over the maximum speed of trains. Train 1648 was travelling at or near line speed (80 km/h) when it tripped past EPP121. If this signal had been further from the platform, or located on a falling gradient, the train could have been travelling much faster when passed the signal. In this case, even had a full line speed overlap been provided it may not have prevented the collision.

The only technique that can prevent these types of accidents is some form of ATP (which controls the speed of the train) or by providing speed proving. Systems that provide neither of these techniques (e.g. the UK AWS system, used in Queensland, South Australia, and Western Australia) have exactly the same weakness as the Victorian system. This does not appear to have been understood by the ATSB team, and they suggest AWS, for example, as 'another' control system that (it is implied) might have prevented the collision.

However, the ATSB note that the problem with the length of the overlap was made worse in this instance because the signal led onto a single line section. The failure of a train to come to a stand within the overlap could lead to a head on collision in the single line section. For this reason, the ATSB recommends that the Department of Infrastructure review the 'safety margin and route interlocking, particularly on single line sections of track with only one signal protection from oncoming movements'.

## Finding the Grampians Line in 2003

(Continued from Page 80)

Track, the line crossed the road, but I was unable to find evidence of this as the area was heavily vegetated.

4.4 (map 55 J2) Heatherlie Quarry car park. Walk approximately 500 metres to quarry site.

The line terminated at the loading area. This point is marked by a plaque. A trolley used for transferring stone from the quarry to rail wagons is on display here.

**TOPOGRAPHIC MAPS USED IN RESEARCH.**

(25,000 scale) 7423-4-1 Illawarra (edition 1, prepared 1978): this map shows approximately 12 kilometres of the line from a point just beyond the point of divergence (near Stawell) to just beyond the Mount Dryden/Lake Lonsdale crossroads (C 3). 7423-4-4 Fyan's Creek (edition 1, prepared 1985): this map does not show the line. 7323-1-1 Mount Difficult: (edition 1, prepared 1985): the line is not shown. The quarry site and path from car park leading to quarry site is shown.

(100,000 scale) 7423 Ararat: (edition 2, printed 1986): this map covers the area from Stawell to where the line crossed Halls Gap Rd. The line (approx 23km) is not shown. 7323 Grampians: (edition 1, printed 1983) this map shows the line from the point where this map joins the next map (Ararat 7423), to the terminus. A distance of approx. 1.5 km.

(250,000 scale) SJ 54-8 Ballarat: (edition 1, printed 1966) this map shows the line from Stawell to a point just beyond Halls Gap Rd.

*(Right) Possibly the most interesting signal at Albury was this 'mechanical revloving disc signal'. Albury Station Box signal 32 applied from No 2 Goods Siding to the Car Dock. Mechanically, it is almost identical to a Victorian ground disc. It shows a red square disc with horizontal white stripe when at Stop (red light at night) and a green diamond with vertical white stripe when at Caution (green light at night). Both the red and green faces can be seen in this view. This was probably the oldest remaining signal in Albury yard. It was in existance in 1929, and probably from 1909 when the 'discs were altered to new standard'.*