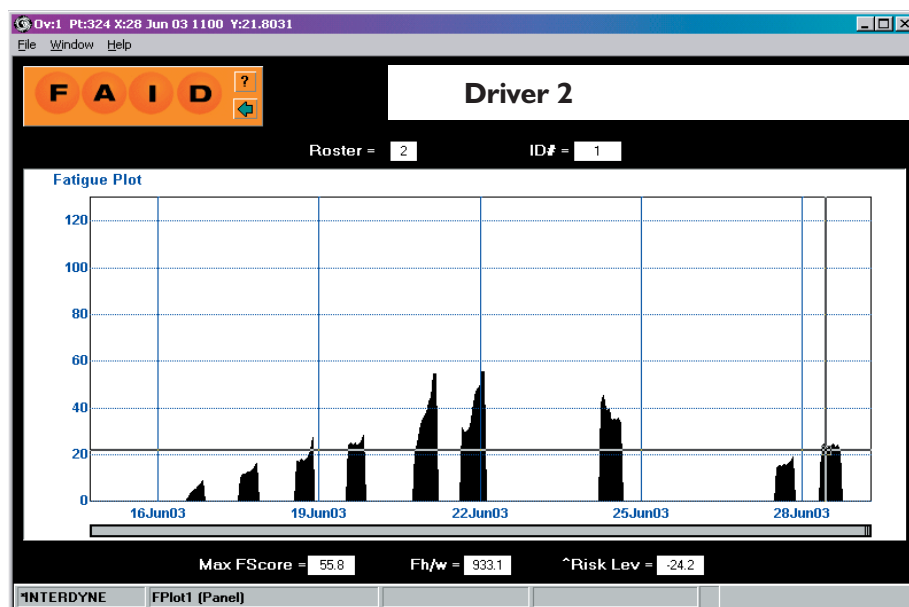
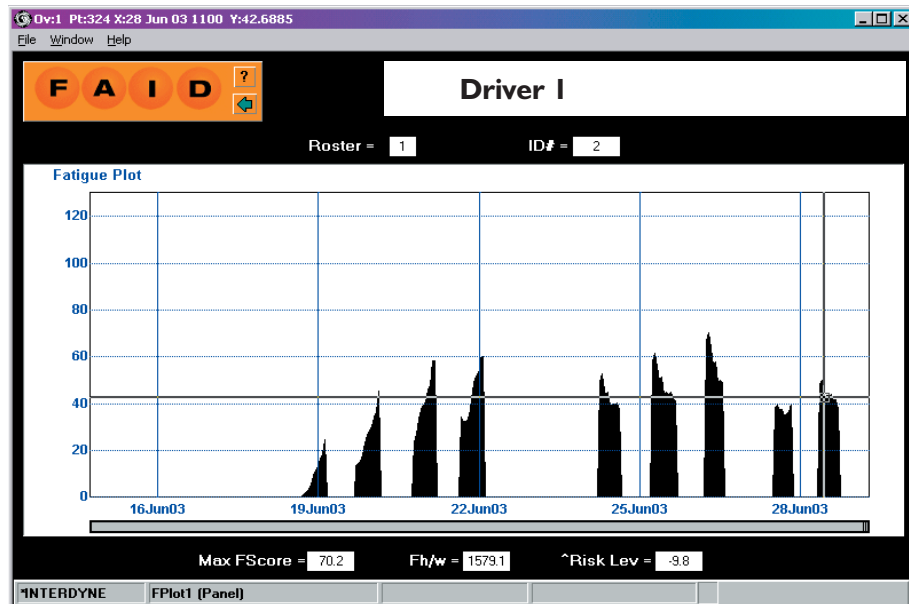
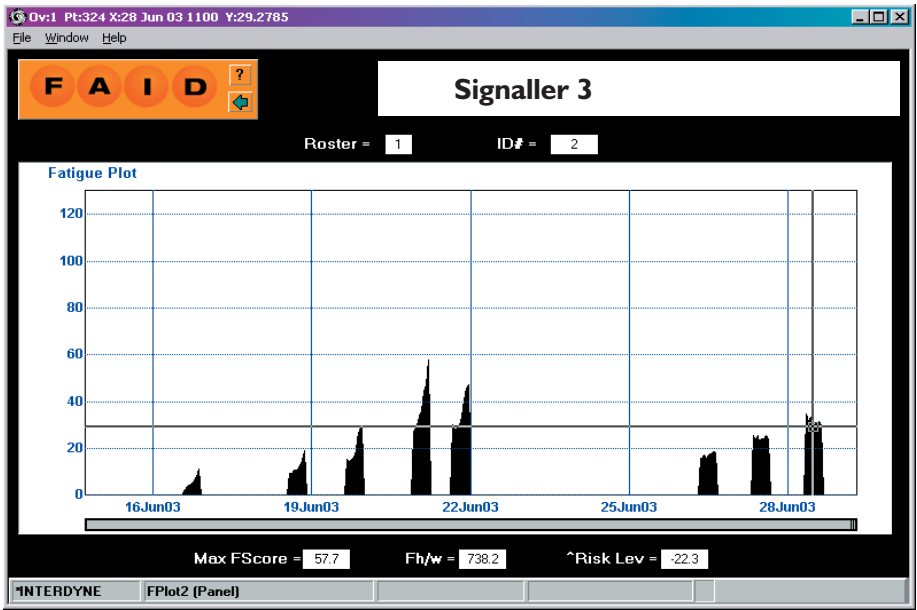
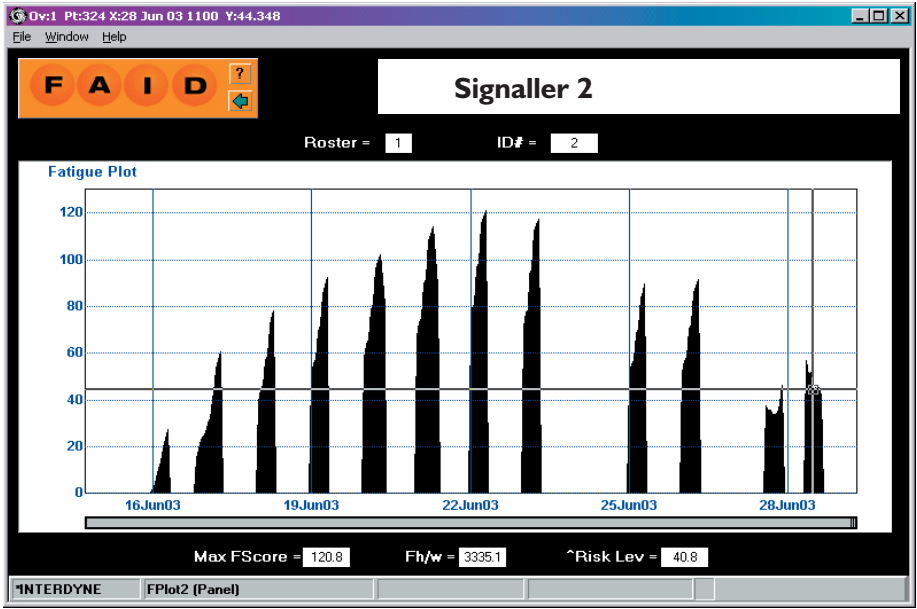
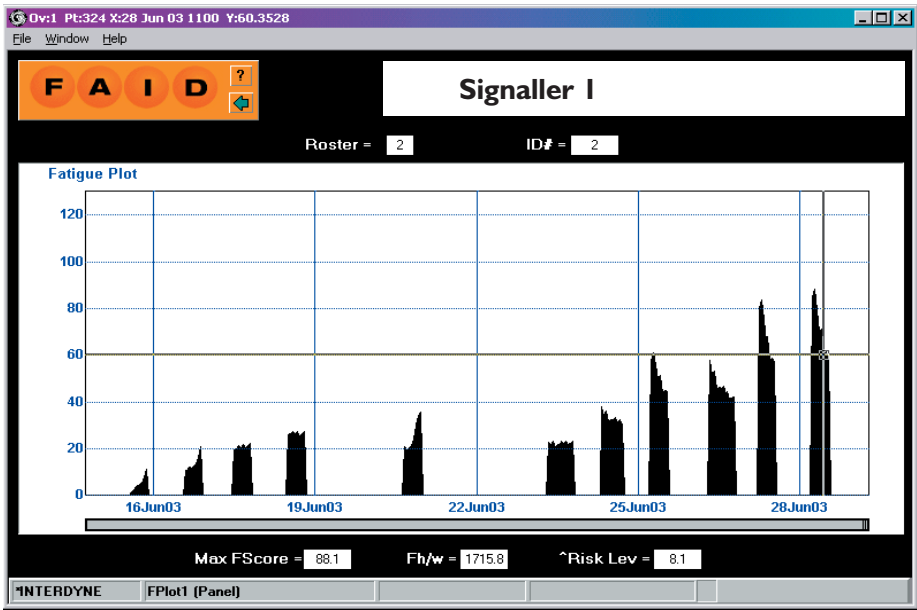


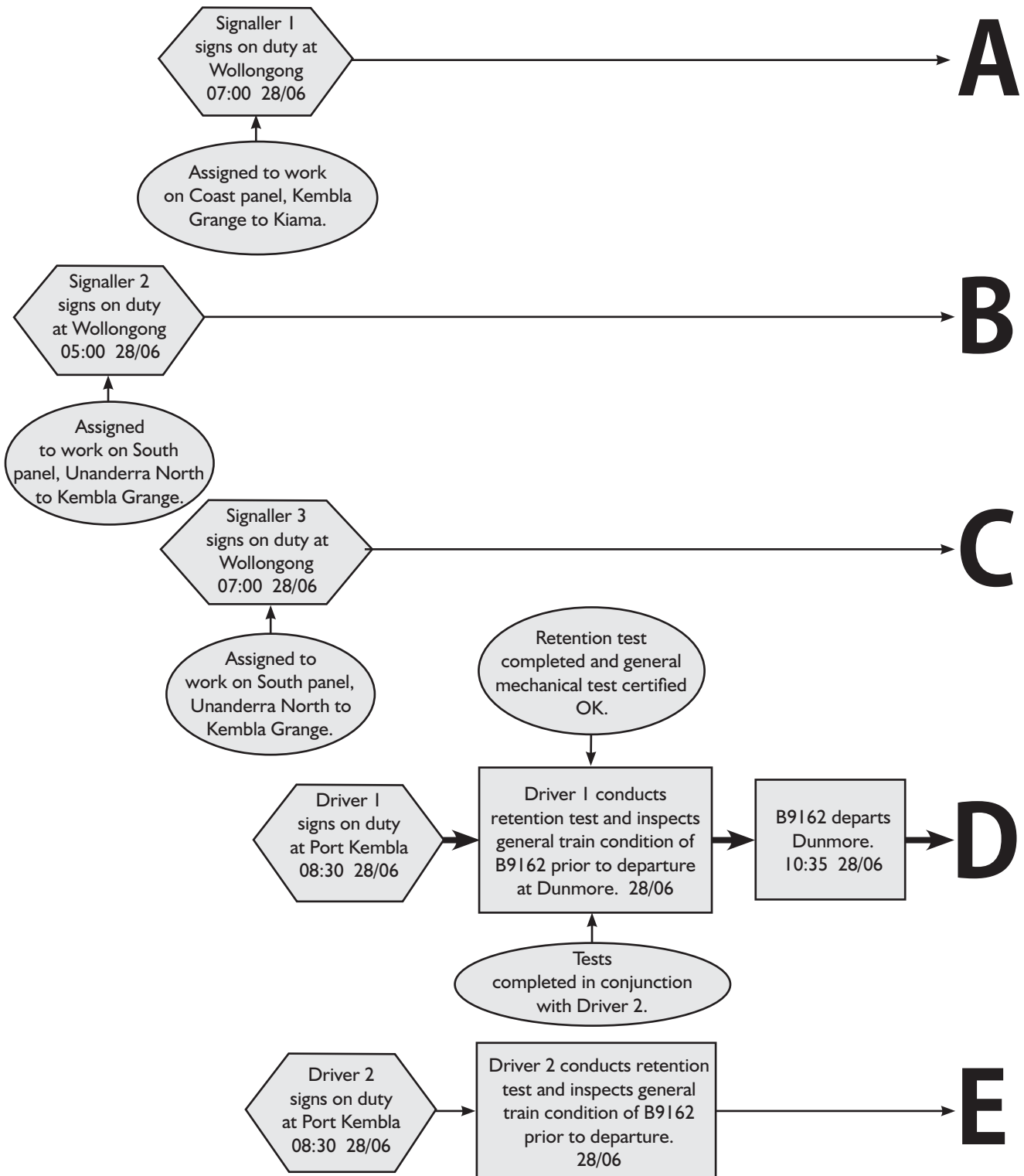
8.0 APPENDICES

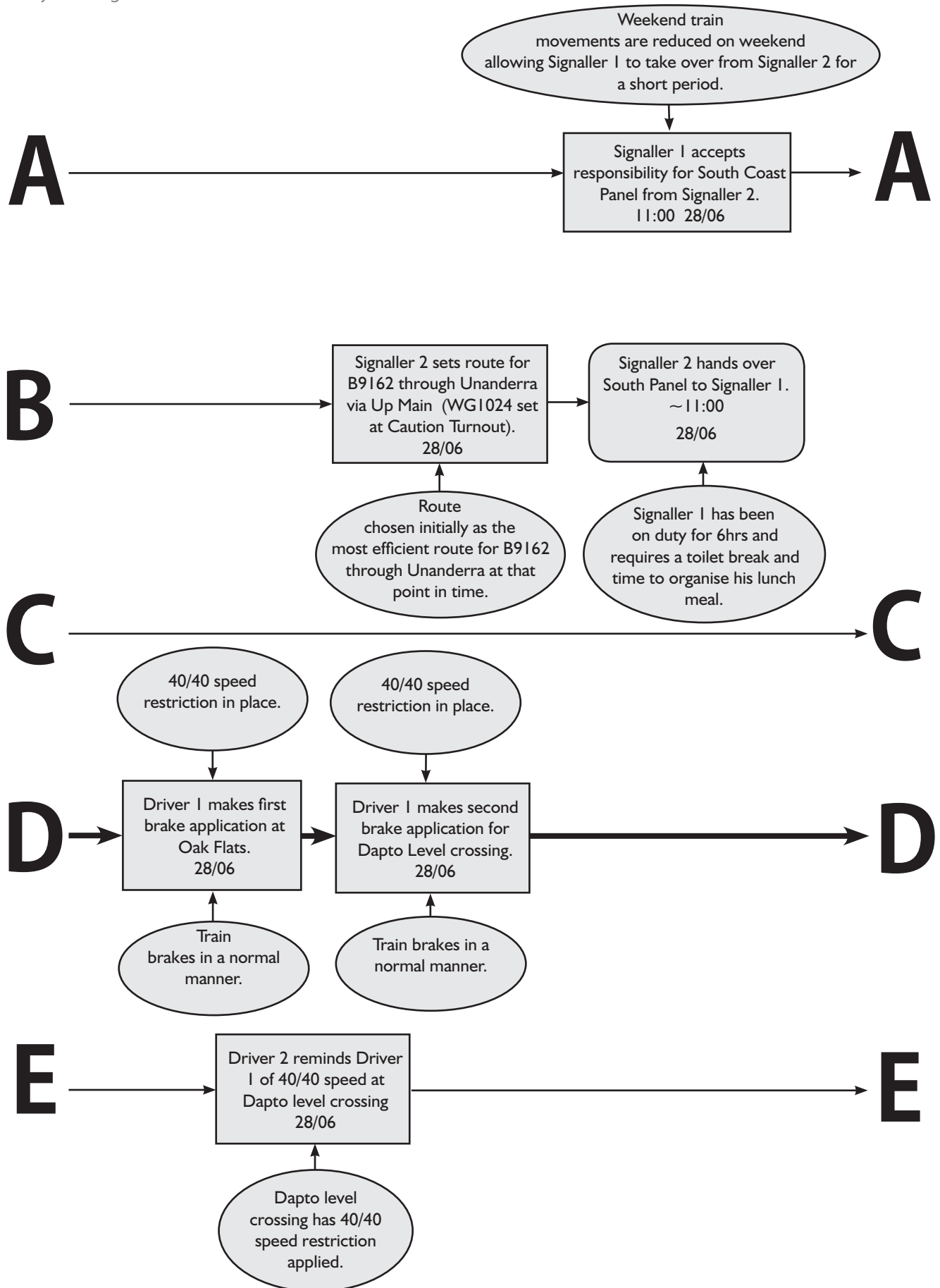
8.1 Rail Safety Worker FAID Fatigue Plots

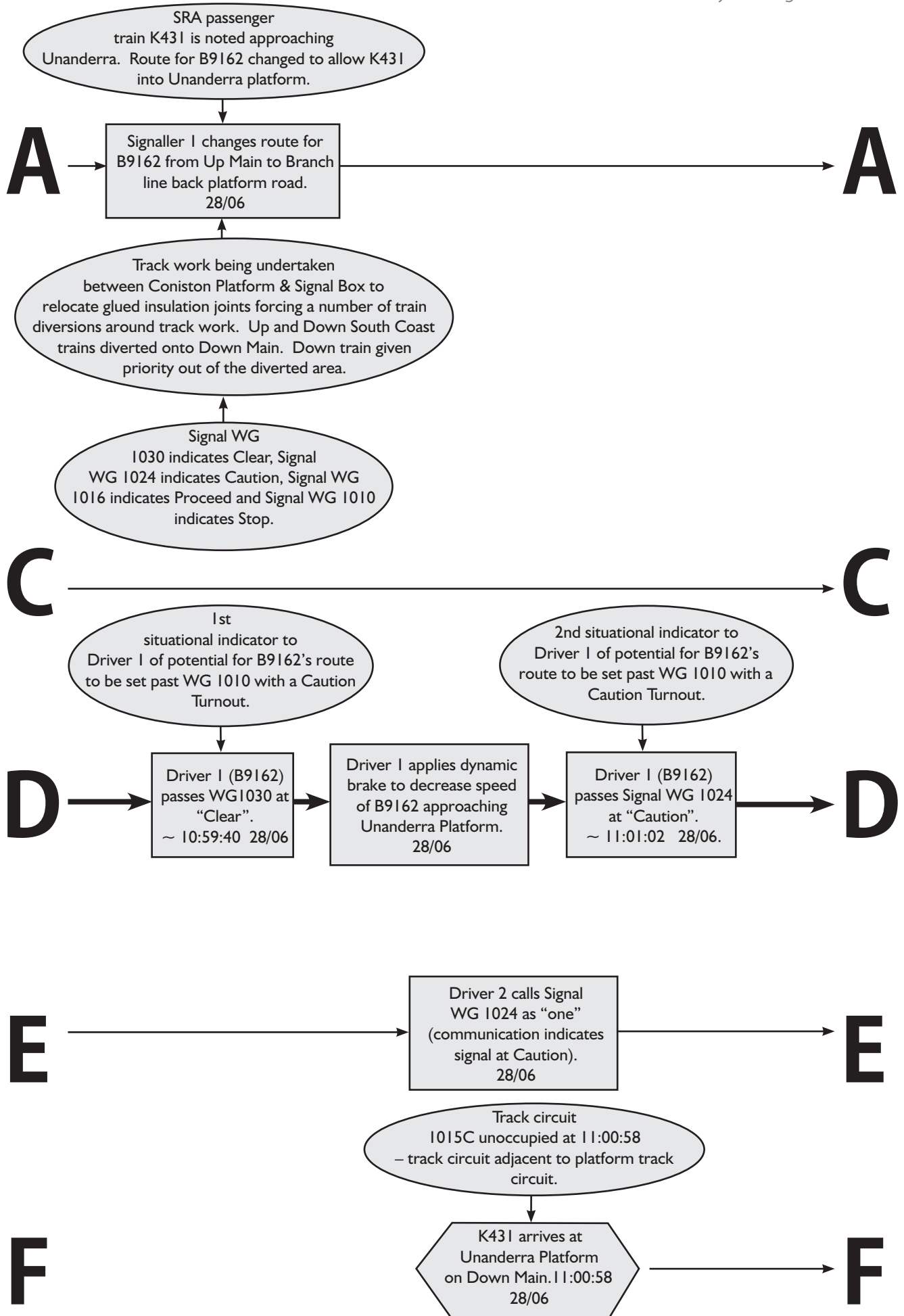


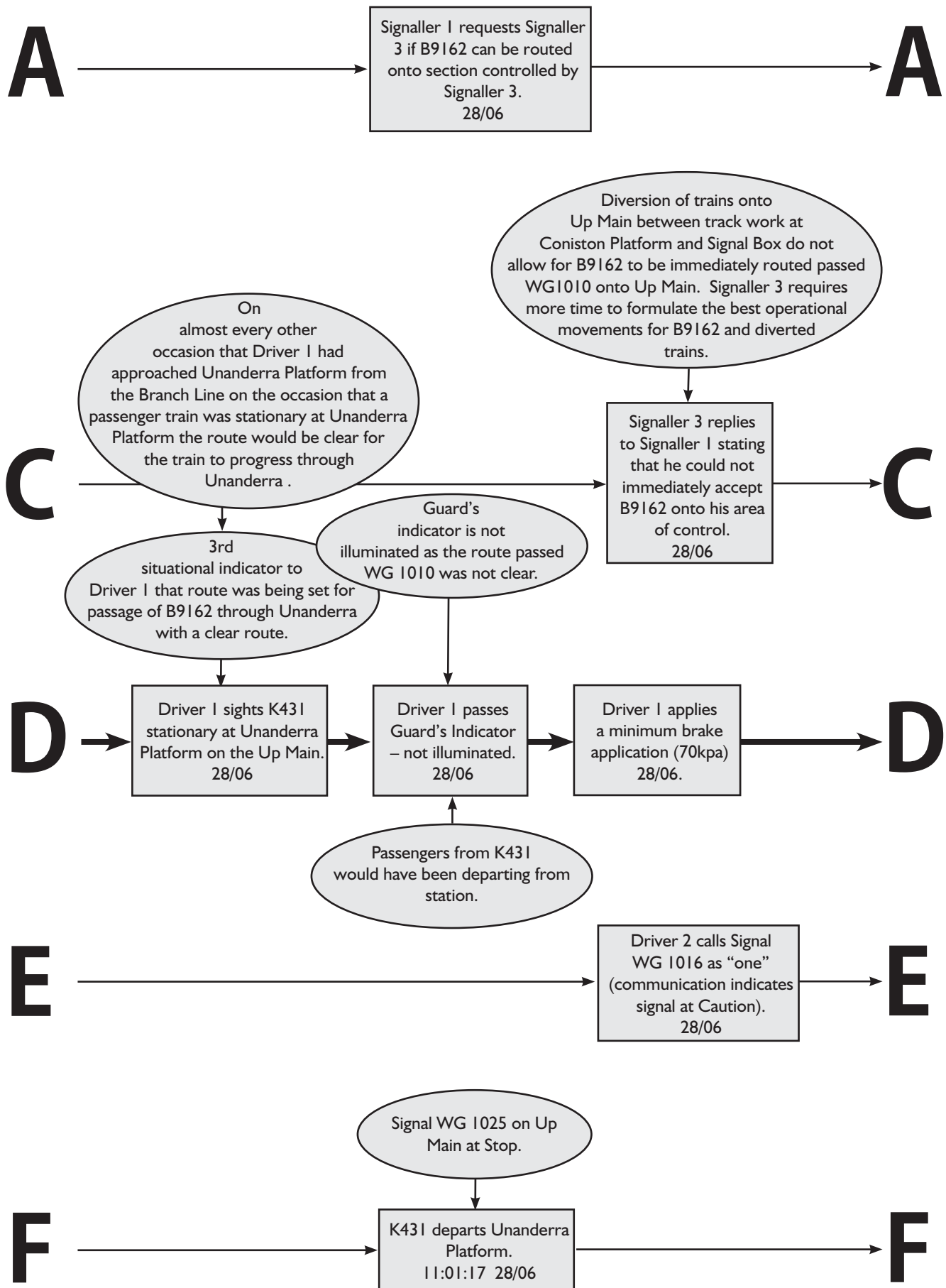


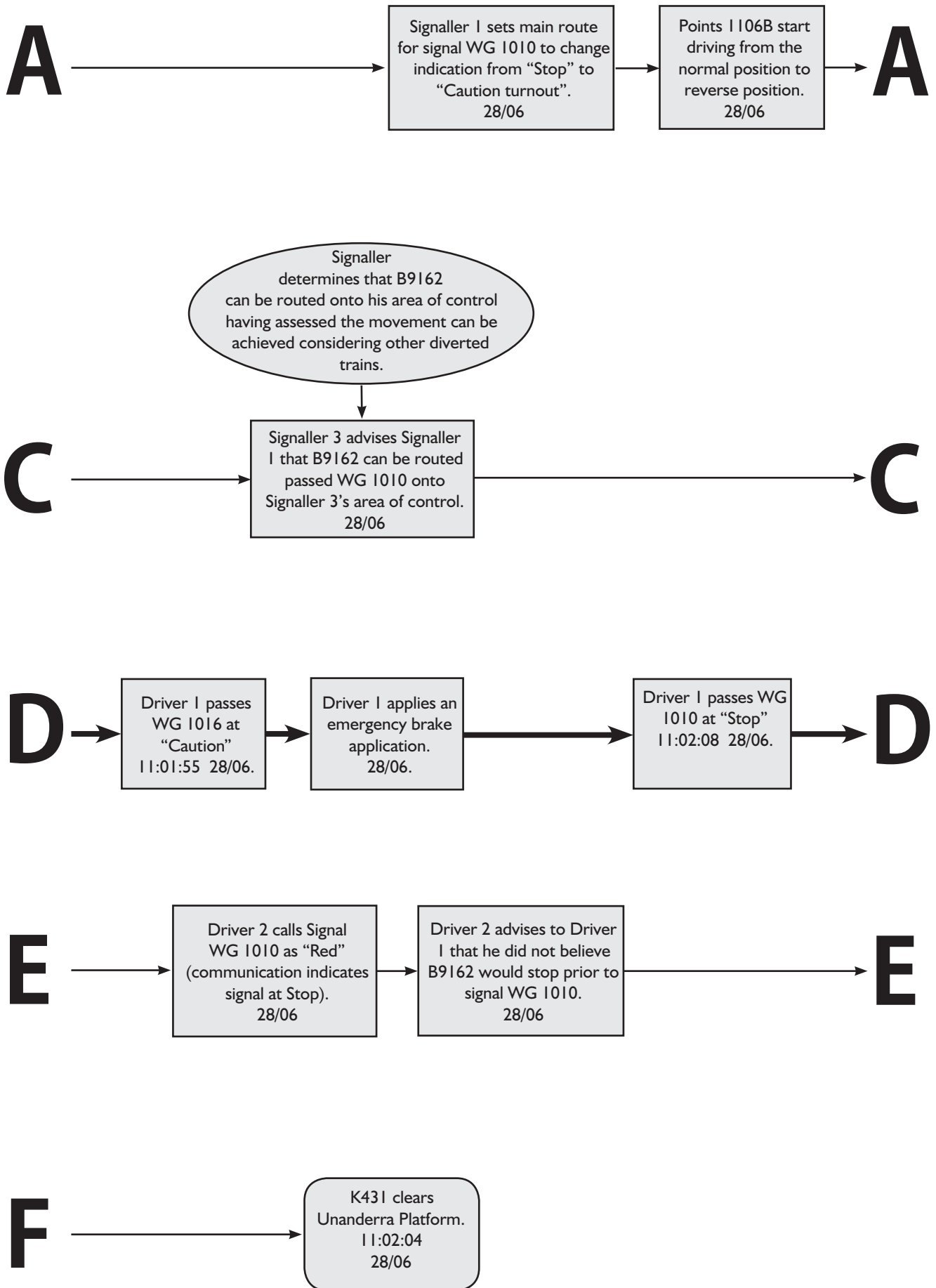
8.2 Events and Conditions Chart – Unanderra 28 June 2003

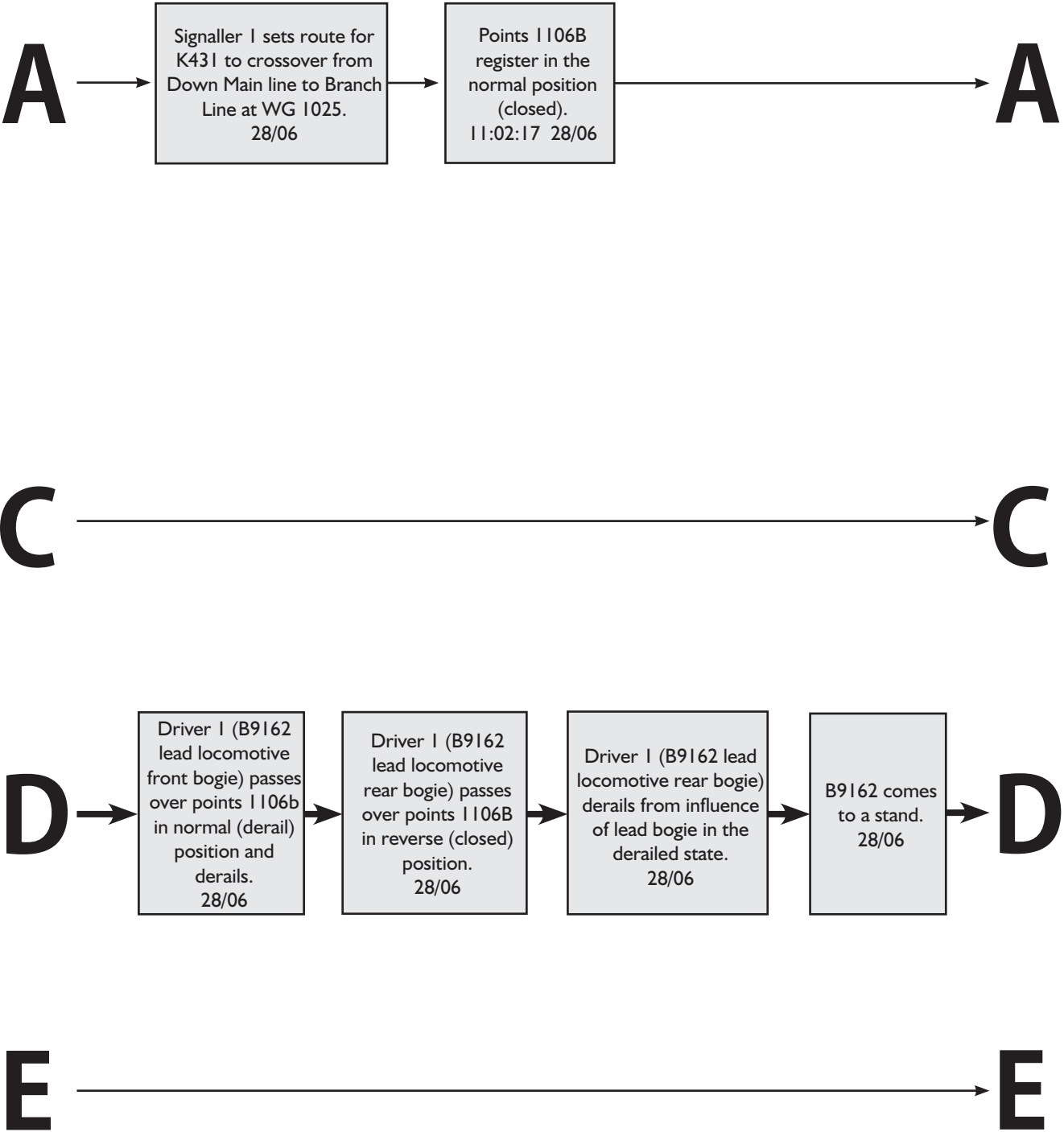












A



Signaller 1 places
block over signals and
initiates emergency
management
procedures.
28/06

C



Signaller 3 advises
Signaller 1 of the
incident.
28/06

D



Driver 1 checks that
Driver 2 has not sustained
injuries from the
derailment.
28/06



Driver 1 contacts
Wollongong signal
complex and advises
Signaller 3 of the
incident.
28/06

E



Driver 2 advises
that he sustained no
major injuries.
28/06

8.3 CCTV Speed check of B9162



Distance = Leading face of 8127 to leading face of 8148
= 21.156 metres

Time between CCTV frames = 1.86s

Approximate Speed = $(21.156/1.86) \times (3600/1000)$
~ 41km/h – confirming those results extrapolated from the Hasler tape at the start of Unanderra Platform from the POR.

8.4 CCTV Time References



CCTV time references noting at 11.00am that both the City Rail passenger train K431 and B9162 were not visible from the Station CCTV cameras.



CCTV footage indicating that K431 had not departed Platform No.1 until both Locomotives on B9161 had passed the end of Platform No.2.

8.5 8148 Hasler Tape Review

18th July 2003



#####,
Pacific National
Port Kembla

Derailment at 88.878 km, Unanderra.

I have examined the Hasler speed recorder tape for Locomotive 8148. The tape from this locomotive is complete and the time recorder was not operating, all other functions are recording correctly.

All measurements for this analysis have been made from the point where the locomotive commences uninterrupted movement.

Throughout the journey the locomotive reaches a maximum speed of 78km/h.

At 5.8 km's there is a minimum reduction in the brake pipe pressure, the pressure is restored after approximately 1.1km's. The speed of the locomotive decreases to 35 km/h.

At approximately 14.9 km's a service reduction is made and then released, the speed of the locomotive reduces from 71km/h to 48km/h.

At approximately 15.9 km's a minimum reduction is made then released, the speed of the locomotive decreases to 45 km/h.

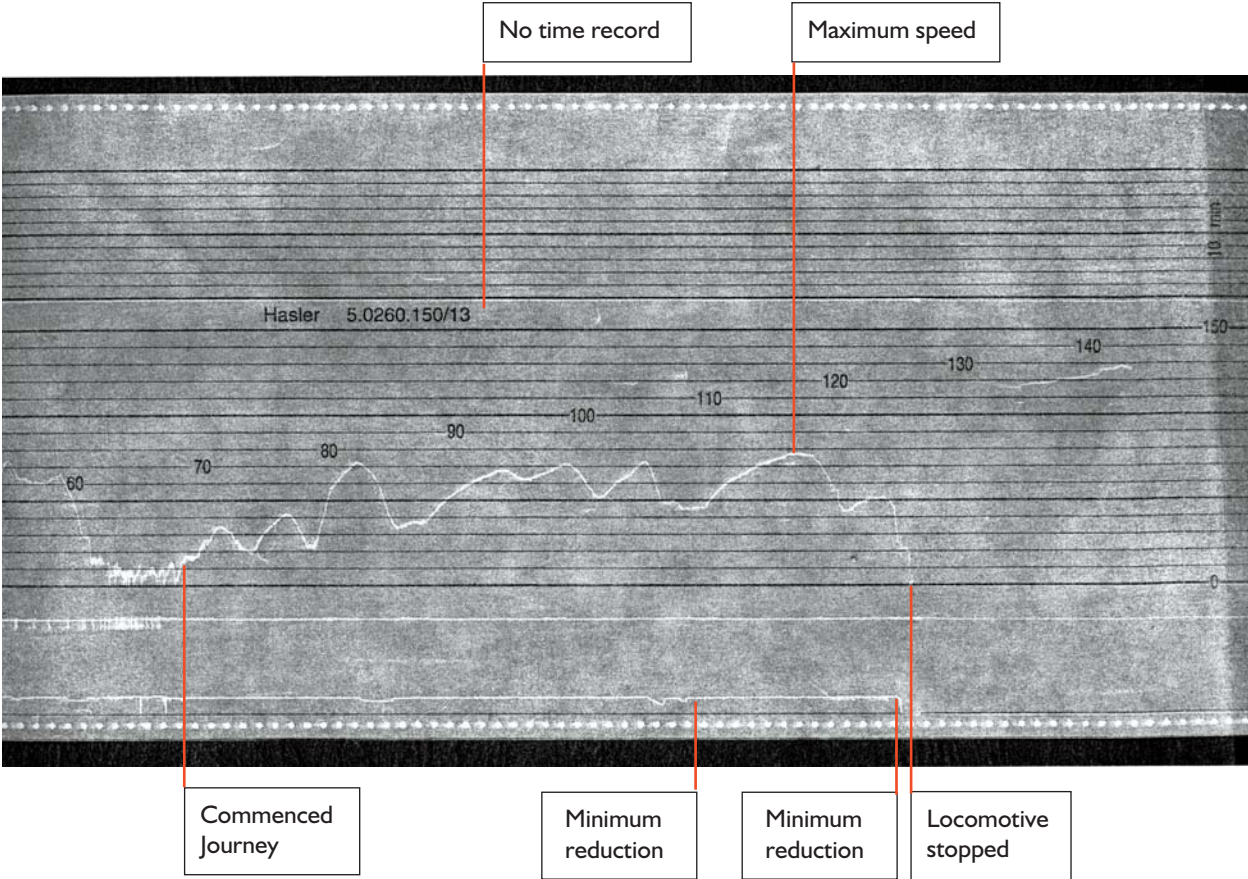
At 22.6 km's the speed of the train starts decreasing from 51km/h to 30km/h, there is no reduction of the brake pipe pressure. This is consistent with controlling a locomotive by the use of dynamic brake.

At 23 km's a minimum reduction is made, the speed of the locomotive decreases to 25km/h.

At approximately 23.1 km's the brake pipe pressure rapidly reduces to zero and the speed of the locomotive decreases. This is consistent with an emergency application.

At approximately 23.3 km's the speed of the locomotive drops suddenly from 20km/h to zero. The rate of deceleration would indicate that there was an outside influence brought to bear on the locomotive.

There are no further movements and the Hasler tape is removed.



8148

8.6 Unanderra Track Circuit Diagram

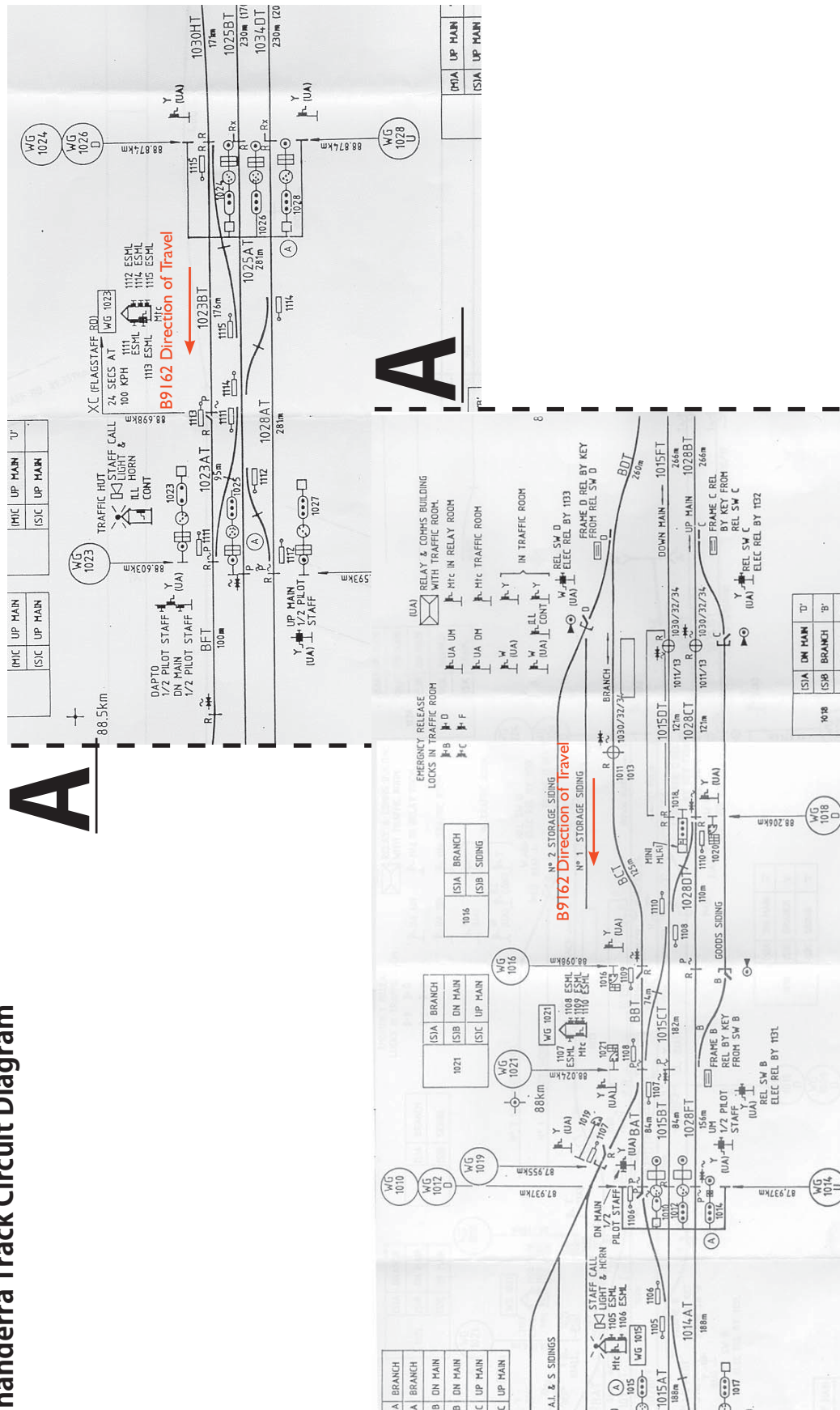
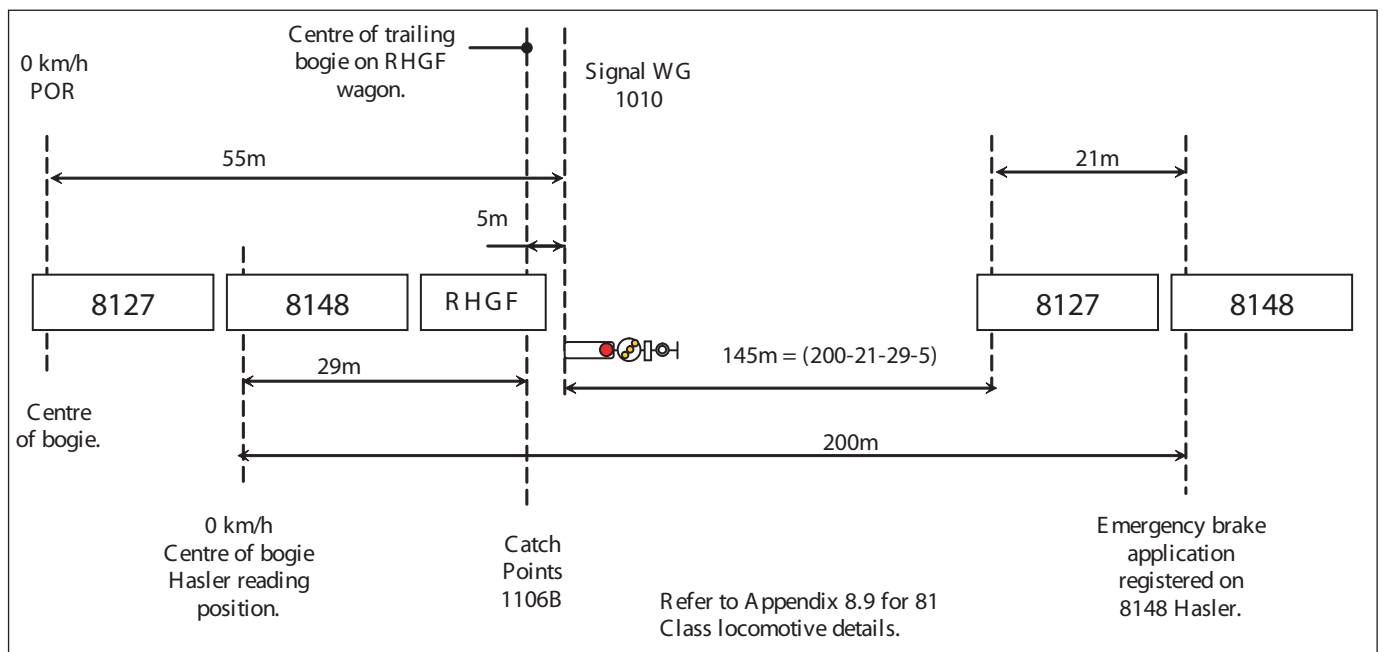


Figure 8.4 Unanderra Signal and Track Circuit Plan

8.7 Relative Rolling Stock and Infrastructure Positions from 8127's Point of Rest (POR)

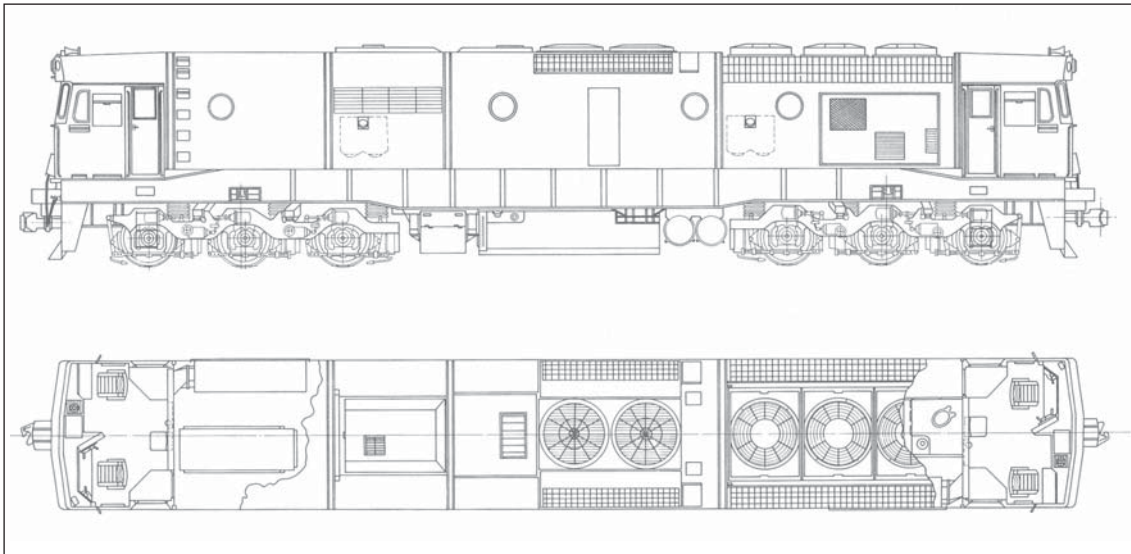
Reference	Reference Distance from centre of leading bogie on 8127	Metres from POR (adjusted from lead bogie centre of lead loco)
81 Class Centre of bogie to Coupler Faces (m)	17.0	0
81 Class length across coupler faces (m)	21.0	38
RHGF Coupler faces to bogie centre (m) ¹⁹	12.0	50
Catch Points 1106B (km)	87.932	50
Signal WG 1010 (km)	87.937	55
Route Indicator 1016 (km)	88.098	216
End of Platform Unanderra (km)	88.211	329
Guards Indicator (km)	88.244	362
Start of Platform (km)	88.349	467
Signal WG 1024 (km)	88.874	992
Level Crossing Nowlan Street (km)	89.359	1477
Summit (km)	89.800	1918
Level Crossing Princess Highway (km)	89.781	1899
Signal WG 1030 (km)	90.011	2129

8.8 Calculation of Emergency Brake Application Relative to Signal WG 1010



¹⁹ Note the trailing bogie centre of the first RHGF wagon came to rest directly over the centre of Catch Points 1106B as shown in Appendix 7.6.

8.9 81 Class Locomotive Details



PERFORMANCE

Tractive Effort at 30% Adhesion	37 900 daN (85,168 lb)
Tractive Effort at 20% Adhesion	25 270 daN (56,780 lb)
Continuous Tractive Effort	33 700 daN at 19.2 km/h (27% Adhesion) (75,730 lb at 12 mph)
Maximum Load and Speed on a Grade of 1 in 40	1 050 tonnes at 22 km/h (1,029 tons at 13.6 mph)
Maximum Speed	115 km/h (Track) (71 mph) Geared for 125 km/h (77 mph)


SPECIFICATIONS & EQUIPMENT

Engine Model	645E3B
Engine Type	Turbo-charged 2 stroke
Number of Cylinders	16 (V formation)
Bore and Stroke	230mm (9") bore 254mm (10") stroke
Engine RPM Idle and Maximum	318 : 904
Engine Power	2 460kW (3,296 HP)
Engine Power for Traction	2 240kW (3,000 HP)
Traction Alternator Type	EMD AR-16
Traction Motor Type	EMD D-77
Number of Traction Motors	6
Traction Motor Gear Ratio	61 : 16
Axle Load	21.5 tonnes (21 tons)
Total Mass	129 tonnes (126 tons)
Wheel Arrangement	Co - Co
Wheel Diameter	1 016mm (40")
Bogie Wheelbase	3 810mm (12' 6")
Distance between Bogie Bearing Centres	12 650mm (41' 6")
Length over Headstocks	19 760mm (64' 9")
Length over Coupling Faces	21 156mm (69' 4")
Height	4 267mm (13' 11")
Width	2 968mm (9' 8")

SUPPLIES

Fuel Oil Capacity	6 600 litres (1,450 gallons)
Lubricating Oil Capacity	920 litres (202 gallons)
Cooling Water Capacity	1 117 litres (245 gallons)
Sand Capacity	0.475 cubic metres (16.7 cu. feet)

8.10PN System Safety Notice No. 07/02 - Responsibility of 2nd Crew Member in a Locomotive

System Safety Notice			
		Level 12, 2-12 Macquarie Street Parramatta NSW 2150 Phone: (02) 9893 2724 Fax: (02) 9893 2691	
SSN No: 07/02			
Title	System Safety Notice	SAFETY CRITICAL CATEGORY B	
Applicable Dates	From Friday 22 November 2002		
Approved By	Executive Manager Safety		
Issued By	Pacific National Safety Health & Environment Group		
Date of Issue	Friday 22 November 2002		
Issue No	07/02 – To all Pacific National Locomotive Drivers		

Responsibility of 2nd Crew Member in Locomotive Cab

This System Safety Notice has been issued as a result of two recent major safety incidents involving two person crewed trains and a misunderstanding by the second crew member on each occasion as to their continuing safety responsibility when not performing the actual driving function.

The following is to reinforce a pre-existing safeworking policy. On trains operated by a two person crew, the safeworking responsibility for the continued safe operation of the train is equally shared by both persons, regardless of which person is actually undertaking the driving duties at that time.

The joint responsibilities of any two person crew include calling all signals (inclusive of full clear) and confirming the appropriateness and accuracy of any safeworking instruction, such as all written instructions involving the taking of train orders etc, and the checking and confirmation of the correct staff token for a section etc.

In relation to a crew member observing that the driver performing the driving duties is undertaking (or is about to undertake) an unsafe act, it is the responsibility and duty of the second crew member to take immediate action as is necessary to prevent the unsafe act from occurring.

This action may, in some extreme circumstances, require the second crew member to take direct action to cause the train to come to an emergency stop. In addition to making an emergency brake application with the brake valve, this direct action may be initiated by opening an emergency isolating cock, continuously depressing a vigilance control button, or tripping the vigilance control circuit breaker etc.


Both crew members are responsible for the safety of the train and for reporting all safety incidents.

Would each applicable Business Division Manager responsible for distribution or their delegated representative please acknowledge receipt of this instruction by return e-mail.

Document control ranking: *Safety Critical Document* **Category B** (signature required)
 Instruction Expiry Date: 22 November 2003

Executive Manager Safety

8.11 PN Driver Certification and Re-certification Checklists



National Rail

Locomotive Driver Re-certification Performance Review Checklist

DRIVER DETAILS

Driver's Name	Home Depot	Date checklist administered
---------------	------------	-----------------------------

CHECKLIST STATUS

Is follow up action required? YES NO (circle one)

Date follow up action completed

When the checklist has been completed satisfactorily, sign off by completing the following:

Performance Reviewer Name	Signature	Date
Line Manager Name	Signature	Date

HRMS Safeworking System Update

In HRMS, please record the code(s) of the safeworking systems (cf TRG Form 29) over which this driver is certified to operate trains

HRMS Safety Critical Competency Update

In HRMS, please record that this driver has been successful in the review of the following safety critical competencies: (circle)

D2.1 D2.5 D2.7 D3.2 D3.4 D3.5

HRMS data entry person's name

Signature

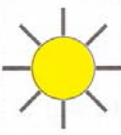





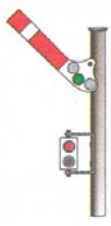
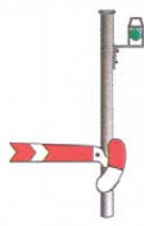
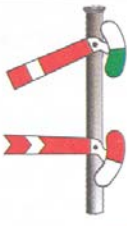
Date data entered

Safety Critical Competency Update
Clauses. Clause D2.3 is not listed
amongst these clauses.

pacific national						
<i>C = performed correctly</i>		<i>R = remedial action required</i>		<i>NC = not checked</i>		<i>N/A = not applicable</i>
Unit of Competence	Procedure or Task	C	R	NC	Comments	
D2.1.3	Attach or detach a locomotive en route					
D2.1.3	Correctly operate the vigilance acknowledge button					
D2.1.4	If applicable, operate a turntable safely and efficiently					
D2.5.1	Correctly interpret all track side boards and detonating signals					
D2.5.1	Ensure that correct procedures are followed when worksite protection is in place					
D2.5.3	Ensure local procedures are followed to enter and exit sidings, yards and terminals en route					
D2.5.3	Manually operate a dual control point machine during system failure					
D2.5.3	Follow local procedures to conduct shunting operations en route (or describe the correct procedure)					
Section 6:	Perform train braking					
D2.3.1	Identify the 26L automatic portion and each of the handle positions					
D2.3.1	Identify the 30 ACDWL automatic portion and each of the handle positions					
D2.3.1	Identify the EPIC 3102 automatic portion and each of the handle positions					
D2.3.1	Identify the B7EL automatic portion and each of the handle positions					
D2.3.1	On the air compressor, correctly locate: <ul style="list-style-type: none"> the inter cooler and its safety valve low and high pressure cylinders inlet and discharge valve unloader lines governor, gauge and cut out cock		
D2.3.1	Locate the main reservoir safety valve and correctly drain the main reservoirs					
D2.3.1	Using the automatic brake valve... <ul style="list-style-type: none"> make a 100 kPa brake pipe reduction and interpret the air pressure indications..... release the 100 kPa air brake application and interpret the air pressure indications..... Perform brake running test		
D2.3.2	Implement emergency train stop procedures quickly and accurately (or simulate on a stationary train in a yard)					
Section 7:	Minor fault find on locomotives					
D2.4.1	Identify the annunciator panel a locomotive and locate the fault lights (if applicable)					
D2.4.1	Identify the computer display panel on a locomotive and interpret messages displayed					
D2.4.1	Identify and reset a tripped circuit breaker					
D2.4.1	Locate the ground relay reset button					

May 2003
Train Driving Level 2.3
Performance Checklist
Page 12 of 19

8.12 Network Rules NSG606 - Responding to Signals and Signs

Meaning and required action	Single colour	Double colour	Upper quadrant	Single lower quadrant	Two lower quadrants, one fishtail
MEDIUM PROCEED. Next signal displays at least a CAUTION or CAUTION TURNOUT indication					
MEDIUM TURNOUT PROCEED on turnout route. Next signal displays at least a CAUTION or CAUTION TURNOUT indication					
CAUTION PROCEED. Next signal may be at STOP					
CAUTION TURNOUT PROCEED on turnout route. Next signal may be at STOP	