



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Signalling)

Category: Procedure

Bridging or False Feeding Signalling Circuits

ESM-24-01

Applicability

ARTC Network Wide	✓	CRIA (NSW CRN)	✓
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Primary Source

NSW Standard SMP 02 Version 1.2

Document Status

Version	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.2	13 August 2010	V Samson; M Stoneham; K Driver	Signal Managers	Chief Operating Office	Safety Committee 11/03/2008

Amendment Record

Version	Date Reviewed	Clause	Description of Amendment
1.0	02 Apr 08	8; 14	Updated, as approved by COO on 22/4/2008, to address conditional approval by Safety Committee. Supersedes NSW Standard SMP 02 v1.2
1.1	07 Oct 09		Disclaimer updated as per Risk & Safety Committee 14/09/2009
1.2	13 August 2010	All	Issued as final.

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1 General

BRIDGING OR FALSE FEEDING IS NORMALLY NOT PERMISSIBLE.

The bridging of contacts on relays or any device, which will in any way impair the protection normally provided by the relay or circuit controlling device, must not be done except when absolutely necessary and only in strict accordance with procedures prescribed in these Signalling Maintenance Procedures.

False feeding is a form of bridging and the restrictions similarly apply.

THE USE OF BRIDGING ALWAYS REQUIRES THAT THE PROTECTION DEFEATED BE PROVIDED BY SOME ALTERNATE MEANS.

2 Temporary Bridging Arrangements

Temporary bridging is bridging permitted in only a few circumstances, as prescribed, where it is necessary to minimise the disruption to rail traffic when signalling equipment is damaged or disconnected/ disarranged for renewal or other work and where safe and reliable arrangements are able to be made to prevent conflicting train movements and/or to secure the apparatus concerned so that it cannot be moved out of correspondence with the interlocking.

Authorisation of temporary bridging will generally be confined to bridging of closed contacts of trackside signalling apparatus that indicate the locked, fail-safe position of the apparatus (e.g. the normal indicating contacts of signals or the detection contacts of points) and will generally require that the specific signalling apparatus be booked out of use and be disconnected from its power source in order to prevent its operation and to secure it in correspondence with the interlocking.

3 Regulation Jumper Wires for Temporary Bridging

Where temporary bridging is permitted as prescribed in these Procedures, regulation jumper wires are to be used.

The jumper wires must be not less than 1.5 metres long, be flexible, minimum conductor cross section 1.5mm squared, with insulation 0.6/1kv standard and be a bright colour which is to be:

- a) **Orange** when installed for temporary maintenance requirements, unless otherwise approved by the appropriate Signal Representative who authorises the temporary bridging.
- b) **Pink** used for testing purposes, shall be issued to individuals with their name, employee number, consecutively numbered and be registered with the appropriate Signal Representative. No bridging authority is required for testing purposes.

Additional testing jumper wires are to be available from the depot/office and each identified by the depot/office name and consecutively number. Details of which are to be kept in a register, with individuals signing for each bridging jumper wire, when it is issued and when returned.

The connection lugs, plugs or clips at each end of the jumper wire must be insulated as far as practical and applied and held secured so that there is no possibility of them connecting across adjacent circuit terminals or of an end coming loose and touching other exposed terminals.

Should it be necessary to place the bridging jumper wires within closed equipment housings and if the standard jumper wires will not fit, then the particular jumper wires involved may be reduced in length on the authority of the appropriate authorising Signal Representative with the objective of keeping jumper wires at their maximum practical length.

In an emergency the appropriate authorising Signal Representative can approve the making up of an improvised jumper wire for temporary bridging. The emergency jumper wire is to be fitted with an identification label. The appropriate authorising Signal Representative will write down a description of this jumper wire in the margin of the authorising form. Immediately after use, the jumper wire is to be destroyed.

4 Authorisation for Bridging

Bridging of contacts of vital signalling relays or control devices must only be applied by suitably accredited Signalling Maintainers.

Note: Temporary bridging around contacts in vital signalling circuits constitutes a disconnection of signalling equipment and the respective network rules and procedures are to be observed.

Temporary bridging may be authorised by approved circuit diagrams. All other cases where temporary bridging is permitted as prescribed in these procedures requires authorisation by an appropriate Signal Representative on a numbered form [ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits](#).

The signalling employee who is to apply the bridging must ensure that they have fully explained the details to the appropriate authorising Signal Representative including details of the terminal numbers that will be bridged.

The appropriate authorising Signal Representative must ensure that he/she understands the circumstances requiring the bridging, and satisfies themselves that the bridging will be applied correctly by the signalling maintainer involved, that the protection defeated will be covered by alternate means of protection while bridging is applied, and that the bridging will be removed and the normal functioning of the equipment will be tested before the alternate protection is removed.

The signalling employee applying the temporary bridging is to compile a field circuit alteration report to ensure the local signalling maintainer responsible for the maintenance of the equipment concerned is made aware of the details.

5 ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits

The form [ESM2401F-01 Authority for Temporary Bridging of Signalling Circuits](#) is to be completed and signed by the appropriate authorising Signal Representative when issuing authority and again when advised that the bridging is removed.

In emergency and only when necessary, if the appropriate Signal Representative who is the Authorising Signal Representative cannot reasonably obtain an 'Authority for Temporary Bridging of Circuits' Form, then the appropriate Signal Representative, provided he/she establishes that all other temporary bridging requirements are met and it is safe to do so, may verbally issue an interim Authority for Temporary Bridging of Circuits with the details written on an improvised form. In this case the interim Bridging Authority Number shall be the initials of the authorising Signal Representative followed by the date. Also, in this case, a proper 'Authority for Temporary Bridging of Circuits' Form must be completed at the earliest opportunity by the authorising Signal Representative to supersede the interim copy.

Each ESM2401F-01 form issued from a particular office is to be numbered with the next consecutive Bridging Authority number. The Bridging Authority number shall be alphanumerical and identify the office from which it is issued.

6 Removal of Temporary Bridging

The signalling maintainer responsible for removing the bridging is to inform the authorising Signal Representative that the bridging has been removed.

These arrangements for removal are to be discussed with the authorising Signal Representative.

Wherever practical the signalling employee who applies the bridging is to be the signalling employee who removes the bridging. Where not the same signalling employee, arrangements must be made for the prompt return of jumper wires to the signalling employee who applied the bridging, who is to follow up this return with the signalling employee responsible for their removal as soon as practical after the planned removal time.

In all cases the authorising Officer is to be promptly advised of the removal of the temporary bridging, either directly by telephone or by forwarding (or faxing) the field copy, signed off accordingly.

The authorising Signal Representative is to pursue advice of the removal of bridging if he/she has not been informed promptly after the planned removal time.

7 Temporary Bridging for an Extended Period

Where bridging is required to extend beyond one shift this would normally be for planned work and the bridging jumper wires shall be issued from the depot/office concerned. These are to be left on between shifts where required, as prescribed.

In exceptional cases if a signalling employee applies their own personal bridging jumper wire(s) then they may remove them at the end of their shift and see them replaced by jumpers provided by the relieving signalling employee, provided the authorising Signal Representative has been consulted and agrees with this arrangement. Frequent changing of bridging wires (between shifts) is to be avoided.

8 Bridging for Planned Works

For planned work by workforces who are not the local maintenance staff, or for planned work requiring the temporary bridging to be on for more than one shift, a field copy of the Bridging Authority in its written form is to be obtained by the signalling employee in charge of the field work before the work commences.

Where applicable, a copy of the completed ESM2401F-01 form is to be forwarded by the authorising Signal Representative to the local Signal Representative for his/her information and retention on file. The original is to be retained by the authorising Signal Representative and kept with the book of forms.

The local Signal Representative is to examine the details on the copy of the completed ESM2401F-01 form, investigate any matters of concern and, when satisfied, initial the copy for filing.

A circuit diagram is to be prepared showing the temporary bridging to be applied.

A copy of the diagram is to be signed by the authorising Signal Representative and forwarded to the signalling employee who is to apply the bridging.

The diagram is to be signed by the signalling employee who applies the bridging at the time of bridging and also signed by the signalling employee who removes the bridging at the time of removal, and then promptly returned to the authorising Signal Representative who is to attach it with his/her copy to the book of ESM2401F-01 forms.

9 Temporary Bridging in Exceptional Circumstances

For situations not prescribed in these ARTC procedures, special approval is required from the ARTC Executive Manager Standards and Systems or delegated Senior Signalling Representative.

An Engineering Waiver may also be used to detail temporary bridging in exceptional circumstances.

10 Work Instructions for Planned Work

Further to the above requirements, where there is work which is not of a minor nature, such as planned upgrading or project work, and which extends over more than one shift or involves different signalling employees applying and removing the bridging, then work instructions are to be prepared by the appropriate Signal Representative in charge of the work, specifying the bridging application and removal details as well as the testing requirements.

For planned works, the Signal Representative in charge of the work shall provide regulation jumper wires, individually registered and formally issued by and returned to him/her (or delegate) together with associated work instructions, in this case the use of jumper wires from other sources for the work is forbidden.

For planned works, circuit diagrams showing the temporary bridging shall also be used.

Note: New Non Commissioned Equipment

With new signalling equipment, prior to it being commissioned into use, temporary bridging may be utilised to facilitate testing on the authority of the appointed Test Engineer or Commissioning Engineer, as the circuit controlling device at this stage has not yet been commissioned to provide protection, temporary bridging of its contacts does not come under the requirements of this procedure but under relevant procedures in the manuals/ specifications for testing and commissioning new and altered works.

11 Network Procedures

Where signalling equipment is booked out of use and bridging is applied, the requirements of local Network Procedures are to be followed.

12 Testing Procedures when Bridging Removed

After the bridging is removed the signalling contacts / circuits that were bridged out must be function tested to be effective in their normal operation. Such testing is to be completed before the alternate protection is removed and before the signalling equipment is booked back into use.

13 Computer Based Systems – Function Bridging

The preceding sections detail the processes to be followed when applying wire bridges to relay logic and related equipment. There are many computer based systems that now provide the same vital signalling functions as the relay based equipment. There are capabilities within these computer based signalling systems to effectively block a function either by disabling the function or setting a particular parameter value. These capabilities shall be used with the same rigour and process as the application of wire bridges and false feeds. The following processes shall be applied prior to an authorised signals representative blocking any function in a computer based signalling system.

13.1 Applicability for Computer Based Systems

The following systems may have capabilities to block a signal function or to set a parameter or value such that the signalling protection for that function is no longer applied. The systems are:

- a) Grade Crossing Predictors
- b) Computer Based Interlockings
- c) Coded Track Circuits
- d) Axle Counter Systems
- e) Vital Radio Systems
- f) Telemetry Systems
- g) Signalling Control Systems including VDU systems, Panel multiplexers and train describers.

The processes detailed below shall be followed in any change to approved configurations for these systems.

THE USE OF FUNCTION BLOCKING ALWAYS REQUIRES THAT THE PROTECTION DEFEATED BE PROVIDED BY SOME ALTERNATE MEANS.

13.2 Authorised persons for Function Setting

Signals representatives must have competency in the respective system to perform Function Setting. This competency must have been previously assessed and recorded. Other signals representatives without the competency for the item of equipment must not apply Function Setting to bridge out a signalling function or system protection.

The signals representatives that design and detail the list of functions to be set must have been trained in the design of the system and have achieved a competency rating for the system. Functions that are set must be in accordance with the design principles of the system.

Signals representatives that have been trained in the maintenance of a system and achieved a competency rating may design a list of functions to be set. The functions so designed must be strictly in accordance with Guidelines laid down in the System Maintenance Manual, or system Design Manual or ARTC Guidelines for Function Setting for the respective system.

13.3 Authority for Temporary Setting of Signalling Functions

The form *ESM2401F-02 Authority for Temporary Setting of Signalling Functions* is to be completed and signed by the appropriate authorising Signal Representative when issuing authority and again when advised that the Function Setting is removed.

In emergency and only when necessary, if the appropriate Signal Representative who is the Authorising Signal Representative cannot reasonably obtain an 'Authority for Temporary Setting of Signalling Functions' Form, then the appropriate Signal Representative, provided he/she establishes that all other temporary function setting requirements are met and it is safe to do so, may verbally issue an interim Authority for Temporary Setting of Signalling Functions with the details written on an improvised form. In this case the interim Function Setting Authority Number shall be the initials of the authorising Signal Representative followed by the date. Also, in this case, a proper 'Authority for Temporary Setting of Signalling Functions' Form must be completed at the earliest opportunity by the authorising Signal Representative to supersede the interim copy.

Each ESM2401F-02 form issued from a particular office is to be numbered with the next consecutive Function Setting Authority number. The Function Setting Authority number shall be alphanumerical and identify the office from which it is issued.

13.4 Testing Procedures when Function Settings are Removed

After the Function Setting is reset to the original configuration the items that were bridged out must be function tested to be effective in their normal operation. Such testing is to be completed before the alternate protection is removed and before the signalling equipment is booked back into use.

13.5 Function Settings for New Signalling Assets

If Function Setting is used during the commissioning into service or the removal from service of signalling assets then the details shall be referenced on the Infrastructure Booking Authority form (IBA). Whenever Function Setting is applied during a Commissioning, there shall be an appropriate Work Instruction and the Authority for Temporary Setting of Signalling Functions' Form must be used and recorded as part of the Commissioning work Package. A Register of Signal Functions Settings applied shall also be included in the Commissioning Work Package.

14 Authorised Signal Representatives for Bridging and Function Setting

Signal Representatives with authority to approve Bridging or Function Setting shall have a Level 1 assessed and certified competency for this task.

Signal Representatives to perform approved Bridging or Function Setting shall have a Level 2 (or Level 1) assessed and certified competency for this task.

The person who performs the Bridging or Function Setting shall be separate from the person who approves the authority.

15 Appendix 1 – ESM2401F-01 Form (example only)

Engineering (Signalling) Specification - Form
 ESM-24-01 Bridging or False Feeding Signalling Circuits



Form number: ESM2401F-01

AUTHORITY FOR TEMPORARY BRIDGING OF SIGNALLING CIRCUITS

THIS FORM MUST BE COMPLETED FOR AUTHORITY TO APPLY TEMPORARY BRIDGING OF SIGNALLING CIRCUITS (WHICH IS NOT AUTHORISED BY APPROVED CIRCUIT DESIGN)

BRIDGING AUTHORITY NUMBER:	
Authorising Officer Name & Position: _____	
Employee Authorised to Apply Bridging: _____	
Employee Required to Remove Bridging: _____	
Planned Application Date: _____	Location: _____
Planned Removal Date: _____	Equipment: _____
Reason for Bridging: _____	
Alternate Protection: _____	
Procedures to be Observed: _____	
<p><i>Copies of this form are to be issued to the signalling officer performing the work and signals maintenance representatives affected by the work.</i></p>	

CIRCUIT DIAGRAM ISSUED	YES / NO
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BRIDGING DETAILS			
Jumper Wire	From	To	
1			
2			
3			
4			
5			
6			

Authorising Officer's Signature: _____ **Date:** _____

Performing Officer's Signature: _____ **Date:** _____

Signature of Signalling Employee Receiving Handover: _____

REMOVAL ADVICE	
The jumper wires used for the bridging listed above were removed by: _____	
Number of jumper wires removed: _____ and entered into jumper wire register of: _____	
Name: _____	Date: _____
Signature of Officer receiving advice: _____	
<p><i>Immediately upon completion of the form a copy is to be forwarded to those previously issued with a copy. The completed original is to be retained by the Authorising Officer with the book of forms. All forms are to be numbered consecutively.</i></p>	

16 Appendix 2 – ESM2401F-02 Form (example only)

AUTHORITY FOR TEMPORARY SETTING OF SIGNALLING FUNCTIONS

THIS FORM MUST BE COMPLETED FOR AUTHORITY TO APPLY FUNCTION SETTING OF SIGNALLING CONTROL SYSTEM DATA (WHICH IS NOT AUTHORISED BY APPROVED SIGNAL SYSTEM DATA & DESIGN)

FUNCTION SETTING AUTHORITY NUMBER: _____

Authorising Officer Name & Position _____

Employee Authorised to Apply Function Setting: _____

Employee Required to Remove Function Setting: _____

Planned Application Date: _____ **Location:** _____

Planned Removal Date: _____ **System:** _____

Reason for Bridging: _____

Alternate Protection: _____

Procedures to be Observed: _____

Copies of this form are to be issued to the signalling officer performing the work and signals maintenance representatives affected by the work.

SYSTEM DATA ISSUED YES / NO

FUNCTION SETTING DETAILS

Action	Function	Original Parameter & Value	Reset Parameter & Value	Reset
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Authorising Officer's Signature: _____ **Date:** _____

Performing Officer's Signature: _____ **Date:** _____

Signature of Signalling Employee Receiving Handover: _____

REMOVAL ADVICE

The actions used for the function setting listed above were reset to original values by:

Name: _____ **Date:** _____

Signature of Officer receiving advice: _____

Immediately upon completion of the form a copy is to be forwarded to those previously issued with a copy. The completed original is to be retained by the Authorising Officer with the book of forms. All forms are to be numbered consecutively.