



AUSTRALIAN RAIL TRACK CORPORATION LTD

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**Discipline**  
**Engineering Standard – NSW**

**Category**  
**Signalling**

**Title**  
**Guidelines for the Safe Use of Temporary  
Recording, Monitoring and Logging  
Equipment on Signalling Systems**

**Reference Number**  
**SMP 46 – (RIC Standard: SC 00 52 00 46 SI)**

**Document Control**

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		Refer to Reference Number	H Olsen	M Owens	Refer to minutes of meeting 12/08/04

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The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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## About This Standard

This document is to be referenced by Signalling Engineering and Maintenance staff when selecting, installing or operating temporary recording, monitoring and logging equipment that will be left operating unattended for any period on railway signalling systems.

It is intended that this document be used as a guide only and no way does it supersede existing standards, specifications and maintenance practices that may relate to this document.

# Document History

**Primary Source** – RIC Standard SC 00 52 00 46 SI Version 2.0

## List of Amendments –

<b>ISSUE</b>	<b>DATE</b>	<b>CLAUSE</b>	<b>DESCRIPTION</b>
1.1	01/09/2004		▪ Reformatting to ARTC Standard
1.2	14/03/2005	Disclaimer	Minor editorial change

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## 1 General

When installing and using any type of recording, monitoring and logging equipment (herein known recording equipment), it is imperative that the signalling systems' safety, integrity, reliability and availability are maintained at all times.

Reasons for connecting this type of equipment to the signalling system include:

- fault finding and identification of intermittent failures
- tracking of high resistance relay contacts
- short term logging/counting of relay operations
- track sequencing

The types of equipment that this document applies to include:

- Chart Recorders
- Logic Analysers
- Event Recorders
- Oscilloscopes
- PC Based recording/monitoring equipment

## 2 Equipment Selection

### 2.1 General

All equipment that is intended for monitoring, recording or logging of signalling circuits must have been approved for use by the ARTC General Manager ISP or nominated Signalling representative.

When selecting recording equipment for connection to the signalling system, the requirements outlined below must be adhered to.

If recording equipment is required to be used that does not meet these requirements, or if it is unknown if the requirements are met, then approved third party isolation and/or signal conditioning devices may be used to interface the equipment to the signalling system.

### 2.2 Input Isolation

The equipment must not allow cross coupling of signalling circuits through common negative or earth returns. This means that each input to the monitoring equipment must meet or exceed following galvanic isolation requirements:

- 1000  $V_{peak}$  input channel to device power supply isolation
- 1000  $V_{peak}$  input channel to earth isolation

- $1000V_{\text{peak}}$  input channel to output isolation
- $1000 V_{\text{peak}}$  input channel to input channel isolation

The device that provides the electrical isolation shall not fail under any conditions in a manner that provides an electrical connection of less than 2 megaohms at 500 volts between the signalling circuit and the indication circuit.

## 2.3 Input Impedance

For direct connection to signalling circuits for voltage type measurements, a 500 volt rated resistor shall be provided in each leg of the input circuit of the monitoring device. The two resistors shall have the same value. The value of the resistors shall be such that when one of the resistors and any other internal active component of the recording device is shorted out, the leakage current drawn is less than that which is required to maintain energised the relay of the signalling circuit being monitored.

The table below lists typical values for various signalling circuits.

Signalling Circuit	Maximum Allowable Leakage Current
12 Volt DC	8 milliamperes DC
50 Volt DC	5 milliamperes DC
120 Volt AC	4 milliamperes AC

## 3 Equipment Installation

Before any installation work is commenced, a complete circuit diagram of the recording equipment connections (both power and I/O) must be drawn up and approved for use by the Signalling Maintenance Engineer. This approval shall remain valid for a maximum period of four weeks before it expires.

If there is a requirement to still have the recording equipment connected after this time, then a review of the original failure conditions and an assessment of the investigation procedures is to be made before any further approvals are given.

To ensure that the integrity of signalling system is not compromised with the connection of the recording equipment, all wiring to the recording equipment must be independently checked for correct installation. Assurance must also be made that no signalling functions are by-passed by the recording equipment and its wiring.

Two marked up copies of the affected signalling circuits must be made. One copy is to be left on site and the second copy left at the Signalling Maintenance Engineer's office. These circuits are to be removed from site when the recording equipment is disconnected and removed.

## 3.1 Wiring Standards

Wiring to the monitoring equipment is to be done to at least to the same standard as that of vital stage work wiring. The wire used must have a minimum insulation rating of 0.6/1kV and temperature rating of V75.

At all times, there is to be minimal disruption to the existing signalling circuit wiring.

In general, the wiring shall be a highly visible colour and shall contrast sufficiently so that it cannot be mistaken for existing wiring. More importantly, it shall not be black in colour nor shall it be of the same colour as any existing or planned future stage work wiring for that site.

All recording equipment power supply circuits and wiring to voltage free contacts from signalling power supplies are to be protected with a suitably rated fuse to no more than 4 amperes.

## 3.2 Connections and Terminations

If the person is to remain in attendance 100% of the time then temporary connections to the signalling circuits are permitted using recording equipment approved for such temporary connection (eg. Fluke Meter probes on the back of a miniature plug-in relay).

For installations where the recording equipment is to be left unattended, all wiring and connections shall be properly identified, lugged and terminated. If connections cannot be terminated by any standard means or if it is required to tap into a signalling circuit where no spare connection is available, then the proposed method of connection shall be approved before hand by the Signalling Maintenance Engineer.

An approved method for temporarily connecting recording equipment leads to existing wiring in the back of BRB miniature plug-in relays is by the insertion of wire that is crimped with a Q-style crimp which has had the locking loop and locating tag cut off. Once placed in the back of the relay, the temporary wiring is then to be securely fastened with a cable tie or other similar means to the adjacent wiring harness.

Alligator clips, banana plugs or other types of probes intended for temporary unattended connections or that could become dislodged are not permitted.

The temporary wire must be clearly labelled with the number of the relay and the contact to which it is connected

## 4 Special Circumstances

The special circumstances listed below have been identified as a result of specific cases that have arisen in the past. These cases are by no means the only ones that this document can be applied to. If a need or situation arises that is not clearly covered by this document, then further clarification is to be sought from the ARTC GM ISP or nominated Signalling representative.



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## 4.1 Track Circuits

Under no circumstances will the feed/transmitter and the relay/receiver of the same track circuit be fed into two separate channels of the same recording device.

This stipulation is to prevent the possibility of electrically bypassing the presence of a train on a track circuit and applies even if all other isolation requirements mentioned above are adhered to.

## 4.2 CBI Interface Circuitry

Special consideration needs to be made when wiring to CBI interface circuitry. The wiring shall not allow for the induction of electrical noise onto sensitive CBI inputs.

Independent or duplicated data busses and communication channels must not be cross-coupled through the recording device's signal channel returns or via any earthing connections.

## 4.3 Current Measurement

Alterations to existing wiring, for the purpose of inserting current shunts are not permitted for measuring current in signalling circuits. Insertion of a shunt by plugging in across an existing disconnection link (eg. Klippon SAKC10) is permissible.

The disconnection and reconnection of a wire from a terminal for the purposes of passing that wire through a Hall Effect type transducer or similar device is permissible if carried out by suitably qualified staff.

## 4.4 Test Lamps

Under no circumstances shall a Test Lamp be used on signalling circuits. The input impedance of the lamp is too low and can cause wrong-side failures by false feeding or bridging out vital logic circuits if used incorrectly.

## 5 Usage and Maintenance

Regular weekly maintenance visits must be carried out on installed recording equipment. Maintenance tasks shall include, but not be limited to the following:

- confirmation of the integrity of the wiring, connections and terminations of the recording equipment
- inspection of recording equipment to ensure continued correct operation
- downloading or extraction of any stored log information (if required)