



AUSTRALIAN RAIL TRACK CORPORATION LTD

Ref No: 08-08-10-008

New Equipment & Systems Approval **Thermal Timer Replacement**

1. Determination of Need

The TT1B Thermal Timer Relay is in use on the Victorian North East Corridor and Dynon. These are proving unreliable and are no longer supported by the manufacturer. They contain asbestos lagging and are a OH&S hazard for overhaul. It is proposed to replace them with an adapter that will permit currently available and approved BR spec 930 series relays to replace the function on a plug-in basis. This Approval details the proposed plug-in adapter.

The adapter will accept a QTD5 and QBA1 relay and will be pre-configured and labelled for one of seven different time delay options. The unit would also be able to be used in other jurisdictions where a replacement is also required. Initial usage in Victoria will be at 60 sites.

2. Significant Change or Not

This change in equipment is assessed as **MINOR**. The proposed equipment does not change any signalling design principles and utilises components that have previously been used across ARTC infrastructure.

3. Review Panel

The equipment review panel for the Thermal Timer Replacement Adapter was:

- Trevor Moore – Signalling Standards Engineer
- George Vanek – Signal Project Manager Victoria
- Neville Fletcher – Signal Manager Vic & SA

4. Equipment Suitability

- Use in other rail networks

An assessment of the proposed design including evaluation of a sample unit has been undertaken by Asia Pacific Rail. This was done against the Victorian Public Transport Commission – Instruction for Type Approval ENG-SE-INS-0009. This document covers all the requirements in the corresponding ARTC PP-122 New Equipment and Systems Approval. The initial review raised a number of issues which have been addressed and confirmed in the Report Addendum.

- Use in the ARTC network

A sample unit has been produced and was the subject of the review under this Approval Process. There are no working parts in the adapter and an operational trial was not undertaken.

- Issues arising from Usage of the equipment/system

The item has used soldered connections for the internal wiring loom. To ensure the reliability of these and that there are no dry joints it is nominated that the soldered joints be independently inspected and then enclosed within a heat shrink tube.

- Changes required to infrastructure or systems for use of the equipment

The items are plug replaceable for the existing units. As the items are pre-configured for specific time delay values – this is labelled on the unit. The signalling circuits should show the use of this adapter and the 2 relays in lieu of the original TT1B.

5. Approval

Approval is recommended for the use of the Thermal Timer TT1B adapter replacement.

6. Conditions of Approval

The manufacture of the adapter is to include an independent quality review at the hold points nominated in the Construction Method Statements. All manufacture of the unit is to be done in accordance with the approved Construction Method Statements and the Test Certificates are to be produced for each individual unit.

Signalling circuits are to be issued to show the change over from the TT1B to the QTD5 and QBA1 relays.

Signed: Equipment Review Panel

George Vanek	_____	date	<i>see over</i>
Neville Fletcher	_____	date	<i>see over</i>
Trevor Moore	<i>T Moore</i>	date	<i>28-4-05</i>

APPROVAL

John Cowie	<i>[Signature]</i>	Date	<i>3.5.05</i>
Manager Standards & Systems	_____		

APPROVAL Number _____

Attachments:

Debjon Engineering Pty Ltd – Construction Methods Statement.

Asia Pacific Rail Type Approval Report 1 March 05 – Thermal Timer Relay (TT1B) Substitute
Asia Pacific Rail Type Approval Report Addendum 19 April 05 – Thermal Timer Relay (TT1B) Substitute

Victorian Public Transport Commission – Instruction for Type Approval ENG-SE-INS-0009

Drawing DE0405-001 – Internal Wiring for 12TT1B Thermal Timer Replacement Unit 22/2/05

The item has used soldered connections for the internal wiring loom. To ensure the reliability of these and that there are no dry joints it is nominated that the soldered joints be independently inspected and then enclosed within a heat shrink tube.

- Changes required to infrastructure or systems for use of the equipment

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Approval is recommended for the use of the Thermal Timer TT1B adapter replacement.

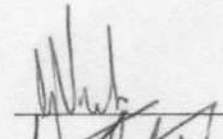
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George Vanek

 date 28/4/05

Neville Fletcher

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Trevor Moore

_____ date _____

APPROVAL

John Cowie

Manager Standards & Systems

Date _____

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DOCUMENT CONTROL
COVERSHEET

Debjon Engineering Pty Ltd
Construction Method Statements
Thermal Timer Relay – Adapter Unit
Technical Procedures

DOCUMENT NO. DEBJON-TP-043
REVISION NO. D
COPY NO.
ISSUE DATE.

D	Revised to Clients Requirements		28/04/05
C	Revised to Clients Requirements	PJC	13/04/05
B	Revised to Clients Requirements	PJC	10/04/05
A	Original Issue	PJC	13/03/05
Rev No.	Description	Authorised By	Date

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PROCEDURE

DEBJON-TP-043

1: INTRODUCTION

An ARTC/Works Infrastructure joint risk assessment identified that unreliable and obsolete thermal timing relays, used for approach locking function, must be replaced. The relays have a safety critical application which prevents a train controller from moving points in front of a train that is on the approach to a junction, until the train has had enough time to stop.

The relays, used on the North East corridor and Dynon, cannot be overhauled due to asbestos lagging inside the units creating an OH&S hazard. The only option available is to replace them with a modern alternative.

An adapter, designed to accept two vital relays, which functionally replaces the existing thermal timer relay, is used. This method makes for very simple changeover and presents a substantial cost saving and risk reduction.

Solder joints are used on the adapter for the connection between the TT1B relay base and wiring to the vital relays. The reliability of these solder joints has been assessed based on in-service experience. Solder joints are used extensively and successfully on the ARTC North East rail corridor for interlocking wiring connections and the adapter is expected to have equivalent or better reliability than the existing solder joints. The solder joints on the adapter are supported with heatshrink insulation to minimise the effects of vibration, this along with the inspection during manufacture for dry joints will ensure a solid and lasting electrical connection.

An in-service trial shall be performed to confirm the adapter is fit for purpose.

This document describes the manufacture of the adapter unit – see figure 1.



Figure 1: Thermal Timer Adapter

2: PURPOSE

To establish and maintain precautions and procedures to ensure that the alterations required to convert the existing TT1B thermal timers into a replacement chassis and miniature Q relays, conform to the requirements of Debjon Engineering Pty Ltd and the client.

2: SCOPE

This procedure applies to the refurbishment of obsolescent TT1B thermal timer relays and their conversion to a unit, which holds two 12 volt miniature relays.

3: REFERENCES

- 3.1 PTC Appendices
- 3.2 Drawing DE0405001: Thermal Timer Adapter Manufacture Details

4: PROCEDURE - Manufacture

- 4.1 The existing units are to be stripped and the internals disposed of in an environmentally secure manner.
- 4.2 The base plates are stripped and all elements cleaned, the contact springs are shortened ready for the new wiring looms.
- 4.3 The new wiring looms are soldered to the shortened contact springs and visually inspected before heatshrinking. The free ends of the wires are attached to the Q relay contacts using the approved crimping tool.
- 4.4 The two Q relay bases are attached to the new chassis and the free ends of the wiring loom are attached to their respective places on the bases.
- 4.5 Attach chassis to base-plate. Seal all screw holes with sealing wax.
- 4.6 Inspect and Test – refer Section 5.
- 4.7 Mount cover with rubber gasket between it and the chassis plate, using 3 off M3 set screws and 1 off M3 threaded rod. The threaded rod is to be drilled to accept a sealing wire.
- 4.8 Fit sealing wire.
- 4.9 Pack units in bubble wrap plastic for dispatch

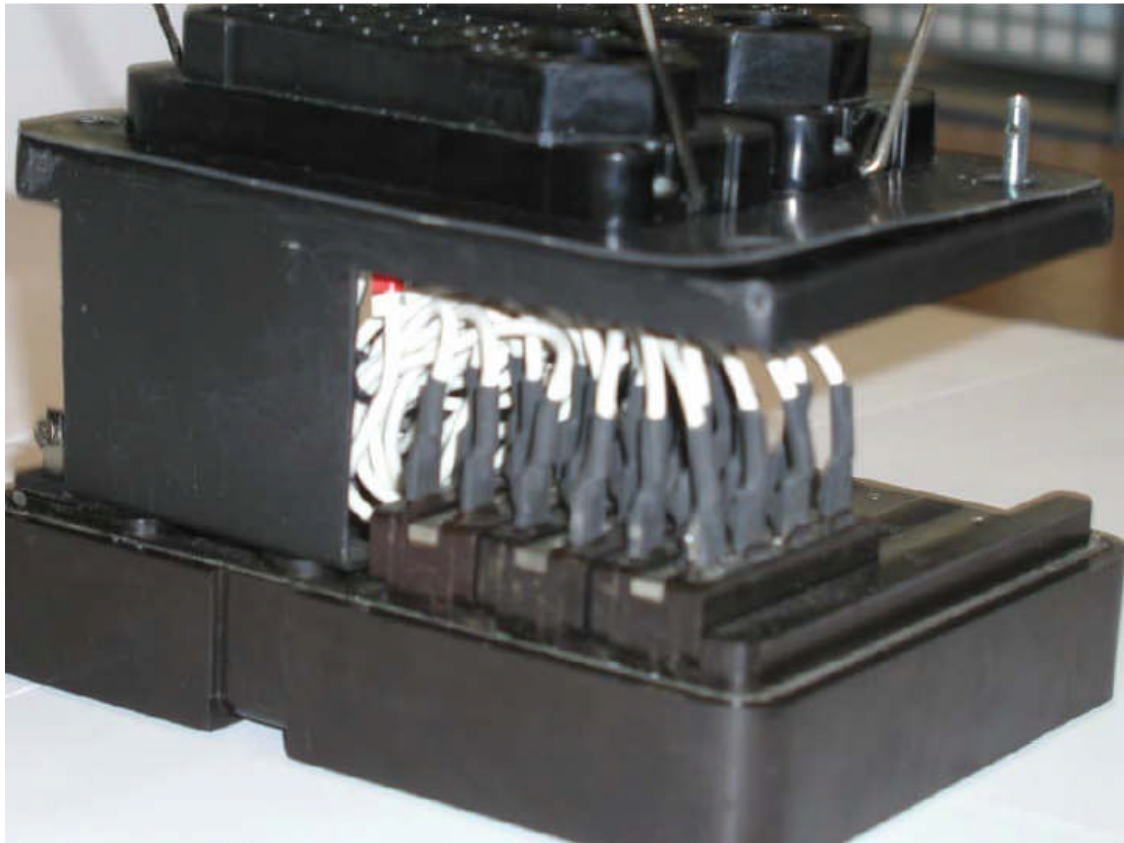


Figure 2: Adapter showing internal wiring arrangement

5 PROCEDURE – Inspection and Testing

- 5.1 All inspection and testing to be performed by people who are independent of those undertaking the assembly of the units. The results of all inspections and tests are to be recorded on the test certificate for each unit.
- 5.2 Ensure soldered connections are visually inspected for dry joints before heatshrink is applied – HOLD POINT.
- 5.3 Visually inspect chassis mounting screws for tightness before sealing – HOLD POINT.
- 5.4 Inspect adapter assembly to ensure it has been constructed to sample/design – HOLD POINT.
- 5.5 Perform Bell/Megger test on internal wiring before fitting cover, document tests on individual internal wiring diagram - HOLD POINT.
- 5.6 Inspect cover and gaskets for fit.
- 5.7 Use relay test bed to perform strap and function test of the internal wiring, document tests on individual internal wiring diagram.
- 5.8 Use relay test bed to set fine time adjustment, document test on individual wiring diagram and chassis identification label.

6 DOCUMENTATION

- 6.1 Each unit will have an identification label attached, which will have the following information – Unit ID, and time setting. Each unit to be individually identified, the id number to be of the form TT1BR (TT1B replacement) 05 (year of manufacture) 001 (sequential numbering during that year). The time setting will be as set on the relay test bed.
- 6.2 A copy of the test certificate will be provided for each unit showing the individual id no. of the unit and a record of the tests performed. Test Certificate to be in accordance with Attachment.
- 6.3 The manufacturer will retain the original test certificates and wiring diagrams within their quality system.

7 SPARES

The unit is not designed for field repair. A set of spare adapters (one of each timing configuration) will be supplied to the maintainers to allow for simple changeover, if required.

8 MATERIALS LIST

The following identifies the list of items required to manufacture the adapter. A comprehensive list will be provided at time of manufacture:

Item #	Description	Quantity
1.	TT1B relay base	1
2.	Chassis – custom made	1
3.	Cover – custom made	1
4.	Wire – 1.5mm square, white insulation	3 metres
5.	Heatshrink – 10 mm dia., Black	200 mm
6.	Rubber Gasket – custom made	1
7.	Relay base (QTD5) and clip	1
8.	Relay base (QBA1) and clip	1
9.	M3 Nuts	5
10.	M3 bolts	4
11.	M3 washers	5
12.	M3 Threaded rod (25mm length)	1

9 Audit

ARTC or Works Infrastructure may audit the adherence to Technical Procedures contained in this Construction Method Statement in accordance with ARTC QA procedures.

TEST CERTIFICATE				
ARTC TT1B THERMAL TIMER REPLACEMENT ADAPTER				
Supplier		Debjon Engineering Pty Ltd, PO Box 5362, Mordialloc, Victoria, 3195		
INSPECTIONS				
Item	Activity	Result	Person	Date
1	Inspect soldered connections for dry joints before heatshrink is applied.			
2	Inspect chassis mounting screws for tightness prior to sealing.			
3	Inspect adapter assembly against sample.			
5	Inspect Cover and gasket for fit.			
TESTING				
4	Perform Bell Test on all internal Wiring Perform Megger Test on all internal wiring. All results > 1M			
6	Use relay test bed to perform strap and function test on internal wiring			
7	Use relay test bed to set fine time adjustment and record on wiring diagram			
Comments:				
All Inspection & Testing Satisfactory		Signed:		Date
		Name:		
Unit ID # :		Timer Setting: seconds/minutes		