



AUSTRALIAN RAIL TRACK CORPORATION

STANDARDS & SYSTEMS

Engineering Standards and Documents

The following recommendation, together with attached supporting documentation, has been considered by the Manager Standards & Systems on 11th April 2008.

Documents:

Ref No:	08-08-10-090 - Equipment Type Approval
Subject:	'SAFETRAN' GCP4000 update
Dated:	9 th April 2008.

Prepared By: Arthur Haberlin, Signalling Engineer

Endorsed by: Trevor Moore, Signalling Standards Engineer

Items Considered for Approval:

Manufacturer:	SAFETRAN Systems (Invensys)
Product:	Grade Crossing Predictor (GCP4000) Software
Item Identification:	See item list Ref No: 01-0803-070a

The items in the form presented at the review date were approved for System & Equipment Approval to be used on all ARTC jurisdictions in accordance with the manufacturers published performance criteria and subject to the following.

Relevant ARTC Specifications:

Ref. No.	Title	Status	Date
SPS 02	Environmental Conditions	Issue 1 Revision 2	May '05
SCP 05	Electrical & Electronic Components (Ratings & Construction Requirements)	Issue 1 Revision 2	May '05
SC 03 01	Level Crossing Equipment	Issue 1 Revision 2	November '05
SDS 18	Level Crossings	Issue 1 Revision 2	March '05
SCP 17	Computer-Based Interlocking Requirements	Issue 1 Revision 3	October '05

Specific Conditions of Approval:

- i.** All design for track circuit operation shall assume a minimum train shunt of 0.2Ω and a ballast resistance of $1.5\Omega/\text{km}$.
- ii.** A special design analysis shall be undertaken and the results shall be submitted for Standards Section approval in each instance before GCP4000 track circuits are applied to dual gauge track (one track circuit equipment detecting trains on either gauge).
- iii.** Use of any GCP4000 approach or IPI track circuit frequency more than once on a single track shall require each usage to be separated by two insulated rail joints, without bypass coupler, in each rail or by a distance $> 1.75\text{km}$.
- iv.** Separation of $> 3\text{km}$ and one insulated rail joint, without bypass coupler, in each rail OR $> 1\text{km}$ and two insulated rail joints, without bypass coupler, in each rail is required from a SAFETRAN PSO III track circuit installation using frequencies (f):- 2140, 2630, 3240 or 4000 Hz.
- v.** SAFETRAN GCP4000 Grade Crossing Predictor track circuits may be used to overlay immune and non-immune DC feed track circuits, electronic coded track circuits and 50Hz AC feed track circuits (not including remote rectifier DC relay track circuits).
- vi.** SAFETRAN GCP4000 Grade Crossing Predictor track circuits may be used only in areas where there is no electric traction current conducted in the rails.
- vii.** For use in accordance with ARTC specification SDS 25 and standard typical circuits which shall be developed and approved specifically for GCP4000 based system only and shall include surge protection provided in accordance with ARTC specification SCP 04 'Lightning and Surge Protection Requirements' for Electronic equipment subject to Category C exposure.
- viii.** Output relay for vital circuits shall be WRSA type QS2. The output relay and GCP4000 equipment shall be housed in the same equipment enclosure. Outputs from any part of the GCP 4000 system equipment may only be used to directly control Level Crossing protection (including adjacent GCP 4000 systems) or provide no-vital information to any other system.
- ix.** Vital track clear information for a signal interlocking shall be derived independently from GCP4000 equipment.
- x.** Design documentation shall record track related dimensions in both metric (meters) and imperial (feet) with the imperial dimensions always shown in parenthesis following the metric.
- xi.** Only components from the list in **Attachment A** may be utilised.
- xii.** Operations, maintenance and Safeworking procedures, including amendments to routine maintenance and testing standards e.g. SMP 25, shall be published before the equipment is commissioned.
- xiii.** Only the latest approved version of module hardware and executive software, together with the associated maintenance & development system (DT) software, may be used in new works installations.
- xiv.** Unless otherwise specified items with approvals for earlier versions still valid may be retained and re-installed in existing installations or upgraded to any later version with the relevant updating of site installation records.
- xv.** All DT modules shall be updated to the latest executive software version before being used as a maintenance spare replacement.
- xvi.** All modules at a site (included in the same circuit book) shall use versions of executive software shown on the same ARTC acceptance certificate.

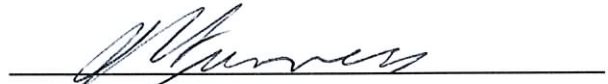
Certificate Issued to:

Westinghouse Rail Systems
Australia
179-185 Normanby Rd.
South Melbourne
Victoria 3205

A general condition of approval is that the supplier remains accredited to ISO 9001 specifically for these products and ARTC is advised on a 12 monthly basis that accreditation is current. ARTC reserves the right to conduct its own audit of the manufacture and supply of these components to AS 19011:2003.

Any subsequent change to the design, materials or manufacturing process is not covered by this approval.

Approved for use in the ARTC.



John Furness

APPROVAL No: 08-08-10-090

Manager Standards

Approval Date: **11th April 2008**

This certificate ~~Supersedes~~ ~~Supplements~~ ~~Suspends~~ prior approvals number **08-08-10-029 and 08-08-10-057** which will be retained on file for record purposes.



AUSTRALIAN RAIL TRACK CORPORATION LTD

Ref No: 01-0803-070a

Date: 20th March 2008

Equipment Type Approval

Subject: ‘SAFETRAN’ Grade Crossing Predictor (GCP4000)

The following lists the individual types (by catalogue number) of Grade Crossing Predictor (Level Crossing) Equipment manufactured by SAFETRAN which are submitted for type approved for use in signalling circuits on ARTC infrastructure under Type Approval Certificate **08-08-10-090** subject only to any conditions shown on that Certificate and the Conditions of Use shown against individual types.

Catalogue No.	Revis'n	Item Type	Conditions of Use	
Equipment Assemblies				
8110-80445	B2 ☺ C	1 Track Crossing Predictor Equipment	Frequencies of approach circuits, for adjacent level crossings, overlaid on the same line or on adjacent independent tracks (with < 0.5km longitudinal separation of terminations) shall be differentiated by not less than one standard frequency increment. Separation of ≥ 1km along track alignment (on same or adjacent track) is required from a PSO III installation using frequencies:- 2140, 2630, 3240 or 4000Hz.	Frequency from the list ¶ of frequencies approved for general use. @
8110-80455	C3 ☺ D	1 Track Crossing Predict & Control Equipment		Frequency from the list ¶ of frequencies approved for general use. @
8110-80440	C4 ☺ D	Complex Crossing Predict & Control Equipment with event recorder.		If more than one crossing controller module is used at a crossing the lamp and gate loads shall be divided approximately equally between the modules.
8110-80465	B5 ☺ C	Dual CPU 1/2 Track Crossing Predict & Control Equipment with event recorder.		
8110-80400	C3 ☺ D	Dual CPU Complex Crossing Predict & Control Equipment with event recorder.		
8000-80049-0001	-	DC Shunt Enhancer Panel with power supply.	May be used to assist shunting of one or more GCP4000 equipments used in a stand alone configuration (NOT overlaid on another track circuit). Δ	
8000-80049-0005	-	DC Shunt Enhancer Panel w/o power supply.	Δ	



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Catalogue No.	Revis'n	Item Type	Conditions of Use
9000-91195-0101	-	SSCC III + Isolated Crossing Controller	Where more than one SSCC III + module used at a crossing divide lamp and gate loads approximately equally between modules.
Auxiliary Equipment			
62780-8621	-	Multi-band termination shunt.	For frequencies: 86, 114, 156 and 211Hz (#).
62780-1543	-	Multi-band termination shunt.	For frequencies: 156, 211, 285, 348 and 430Hz (#).
62780-2152	-	Multi-band termination shunt.	For frequencies: 211, 285, 348, 430 and 525Hz (#).
62780-5297	-	Multi-band termination shunt.	@
8V617-xx00	-	Simulated track inductor	Use with 62780-8621, -1543, -2152 or -5297 multi-band shunt to simulate track length for bidirectional approaches within 10% if needed
62664-Mf	-	Bidirectional Simulation Coupler	Frequency (<i>f</i>) may be from the list ¶ approved for general use. @
62780-f	-	Narrow band termination shunt.	
8A076-0011	-	Wideband Shunt	Use only to terminate approach overlaid on a DC track circuit. Maximum 20V DC track voltage.
8A398-6	-	Adjustable inductor	Must be used with 62780-f narrow band shunt if needed to simulate track length for bidirectional approaches to within 15%.
62785-f	-	IRJ bypass coupler	Frequencies (<i>f</i>): 156, 211, 285, 348, 430 and 525Hz only may be used.
Z803-00052-0001	-	Equalizer	For use as maintenance spares of surge suppression incorporated into IRJ bypass coupler part no 62785-f only.
Z803-00053-0001	-	Gas Tube Arrestor	
8A065A	-	DC track feed isolation choke	Use to isolate any D.C. feed to the track circuit on which GCP4000 is overlaid (within 300m).
6A342-3	-	Relay Pulse Code track feed isolation Choke	Use to isolate any D.C. relay pulse coded track circuit feed on which GCP4000 is overlaid.
8000-26654	A1	Premade cable	Use to connect SEAR Iii event recorder to CPU II + processor module.



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Catalogue No.	Revis'n	Item Type	Conditions of Use
Component Modules			
8000-80403	C12 ☺ C13	CPU II + Processor Module	
8000-80406	B6	Standby Transfer Module	
8000-80468	A1	Standby Transfer Panel	
8000-80405	D8 ☺ D9	SSCC IIIi Crossing Controller Module	If more than one module is used at a crossing the lamp and gate loads shall be divided approximately equally between the modules.
8000-80418	D4 ☺ D5	Track Module	Frequency may be from the list ¶ of frequencies approved for general use. @
8000-80413	C4 ☺ C6	RIO	Vital Relay I/O Module
8000-80407	C1 ☺§ C4 ☺§	Display Module with DT software.	♣ Card assembly D2 and DT software version 4.6.0 approved for existing installations.
	C4	Display II Module with DT software.	♣ Only card assembly D2 and DTCE software 9V794-A01R version 4.7.5 approved for new installations.
8000-80410	B7 ☺ C	SEARIIIi Event Recorder.	Only circuit board revision D4 approved.
8000-80435	A2	ECD Unit	External Configuration Device. Only circuit board revision B2 ☺§ & D approved.
Software			
9V713-	A002U ☺ A002AA	Module Configuration File	Only file version gcp_tx_02_0.mcf approved for new installation, CRC required D297F650.
9V792-	A01M ☺ A01R ☺ A01T	CP Proc. Executive	Only file version ncg03_00.mef approved for new installation, CRC required 9B31.
9V852-	A01D	CP Proc. Boot	Only file version 9V852A01.D approved for new installation.
9V455-	A02C	VLP Proc. Boot	Only file version 9V455A01.C approved for new installation.
9V689-	A01U ☺ A01W ☺ A01AA	VLP Proc. Executive	Only file version VPH03_00.mef approved new for installation, CRC required 188D.
9V681-	A01A	SSCC IIIi Master Boot	Only file version 9V681A01.A approved for new installation, CRC required E092.
9V765-	A01A	SSCC IIIi Master Setup	Only file version 9v765a01.a approved for new installation.



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Catalogue No.	Revis'n	Item Type	Conditions of Use
9V686-	A01K ☺ A01L	SSCC IIIi Master Executive	Only file version Xng03_00.mef approved for new installation, CRC required 0E58.
9V816-	A01B	SSCC IIIi Slave Executive	Only file version 9V816A01.B approved for new installation, CRC required 554E.
9V817-	A01A	SSCC IIIi Slave Boot	Only file version 9V817A01.A approved for new installation, CRC required FC9A.
9V684-	A01C	Transfer Module Boot	Only file version boots.s19 approved for new installation, CRC is 6EDB2544.
9V683-	A01B	Transfer Module Executive	Only file version Xfercrd.bin approved for new installation, CRC is CEFEAD1E.
9V794-	A01N ☺ A01R	Software for Display Module	DTCE version 4.7.5 approved for use in all approved display modules.
9V725-	A01T ☺ A01U ☺ A01V	SEAR IIi Executive	Only file version 9v725-A01v.bin approved for new installation, CRC required CE51D206.
9V726-	A01C	SEAR IIi Boot	Only file version 9V726A01.C approved for new installation, CRC is 847EFB8A.
9V391-	A01A	RIO Module Boot	Only file version 9V391A01.A approved for new installation, CRC required 5889.
9V453-	A01C ☺ A01D ☺ A01E	RIO Module Executive	Only file version rio01_07.mef approved for new installation, CRC required FEF6.
9V788	A01U ☺ A01W ☺ A01Y	Track Module Executive	Only file version gcp03_00.mef approved for new installation, CRC required 22B2.
9V795	A01A	Track Module Boot	Only file version 9V795A01.A approved for new installation, CRC required 2341.

<List ¶> Frequencies:- 86, 114, 156, 211, 285, 348, 430 and 525Hz are approved for general use. Offset and "other" frequencies:- between 44 and 560Hz may be used in complex multiple track / crossing installations subject to acceptance by ARTC of the conclusions from a specific risk analysis of the proposed design. </List ¶>

- # Together with associated "Offset" and "Other" frequencies.
- @ For track circuits which do not require any IRJ to be bypassed frequencies 645, 790 and 970Hz (#) may be used.
- xx Insert even number between 02 and 44 inclusive (except 42) for the length required to be simulated, in hundreds of feet.
- f Insert required GCP4000 frequency.
- ♣ May be used only for stand alone crossing installations not overlaying any track circuit equipment.
- Δ Insulated Rail Joints shall be inserted in each rail not more than 30m beyond the extremities of track area connected to DC shunt enhancer(s).
- § Module no longer supported by manufacturer, may be replaced by Display II module revision C4 with software version 4.7.5.
- ☺ Previous version type approval remains valid for existing installations and like for like maintenance replacement, see earlier type approvals.