AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Signalling) **Category: Procedure**

CAD & Drafting Manual for Signalling Drawings

ESD-25-01

Applicability

ARTC Network Wide	✓	**CRIA (NSW CRN)**	✓

Primary Source

SCP 06, PP-117.4.3

Document Status

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1.2	13 August 2010	Standards	Stakeholders	Chief Operating Officer	Risk & Safety Committee 09/06/2009

Amendment Record

Version	Date Reviewed	Clause	Description of Amendment
1.0	30 Apr 09		First issue. Supersedes NSW Standard SCP 06 v1.3 in part
1.1	07 Oct 09		Disclaimer updated as per Risk & Safety Committee 14/09/2009
1.2	13 August 2010	All	Issued as final.

Contents

1 Introduction

1.1 Purpose

The purpose of this document is to describe the procedures and standards that must be adhered to for the production of signalling documentation & drawings for ARTC Network wide signalling projects.

1.2 Scope

This section of the manual is intended to address the production of CAD drawings associated with signalling works and to assist in:

- Standardise the preparation of drawings
- Simplify the various aspects of the work
- Provide guidance on detailing
- Secure consistency in quality and appearance

Drawings covering signals infrastructure in Victoria are to be in accordance with the agreed requirements of the VicTrack Drawing Management System. Drawings covering infrastructure in South Australia and Western Australia will be in accordance with the symbols detailed in Appendix 6. By agreement with the respective signal maintenance engineer, these symbols may also be in New South Wales.

If, in special cases or for particular clients, it becomes necessary to deviate from these practices, then the Signal Standards Engineer must first give approval. Any proposed permanent change or alternative to these procedures must be circulated to Signal Design Section staff for their comment and subsequent agreement. Changes shall be incorporated in this Procedure.

This section of the Manual also contains information and advice on the detailing of drawings. The use of this information should lead to the best and most economic solution of drafting problems, (resulting in savings in time and effort) even when the drafting officer is not fully familiar with the particular work.

Corporation-wide standards are to be found in Section 1 of this manual, or in the Australian Standard AS1100, parts 101 & 501. This section defines the standards to be applied to drawings specific to the Signal Design discipline. Generally, all drawings shall comply with Australian Standards and any project specific special requirements**.**

All references to Australian Standards refer to the latest edition.

1.3 Signal Design File Structure

All drawings, whether they are AutoCAD (dwg), MicroStation (dgn),XLS, PDF or TIF files must only be stored and worked on in the specified areas of the server. Local drives should not be used for working, storage or retrieval of any design files. This applies to both C: & H: drives or their equivalent.

This reduces the risk of lost work or files due to equipment malfunction and removes the likelihood of the duplicate drawing files existing outside the storage domain. This process also takes advantage of server backup operations.

1.4 Setting up the CAD Environment

To maintain compatibility and transparency with the Railcorp draughting systems currently in use throughout the ARTC alliance framework the AutoCAD environment structure & location should conform to a specific file structure.

A ‘common’ directory is created within the working domain within which all AutoCAD related menus, blocks and templates are to be located. Naming of the sub folders will be as described

to maintain this compatibility without the need to modify menus and search paths within the AutoCAD setup, allowing seamless operation.

Drive	Directory	Sub Directory	Folder	Contents
X:	/Common	/ACADLt Resource	/Analysis Templates	CAD/EXCEL Sheets
			/Blocks	AutoCAD-Blocks
		/Circuit Books	/Region	AutoCAD Files
		/Drivers Diagrams	/Region	AutoCAD Files
		/Locking Tables etc	/Region	AutoCAD Files
		/Signalling Plans	/Region	Micro station Files
		/Track Insulation	/Region	Micro station Files

Within these folders there will be a folder for that specific area e.g. > Signalling Plans\Dubbo or Drivers Diagrams\Dubbo. This system is the same as used for Circuit Books.

Then within each folder there is a sub-folder specific to each type of task:

Designer - This folder is used for storage of any drawings produced or amended during the design process and can contain any number of other folders. It will be electronically secured for the user, so he/she will be the only one who can alter the drawing and has total control of how this area is used. Once the design is done, it can be used to store the drawings until the updates are ready to commence. No work shall be done to this folder without consulting the original owner. The CAD controller will always notify the designer about any changes via e-mail.

Maintenance — This folder contains a current copy of the Original drawings & is used to update the drawings from the returned Master Testing Copies for maintenance updating. Once complete any updated files are copied back to the originals which shall be replaced by the latest version. This folder is then emptied.

Originals — This folder is used to store original files for safekeeping. A backup CD may be also kept as required.

When all files have been updated & issued, new backup may be CDs burnt and drawing masters returned for storage.

1.5 Definitions

DOCUMENTS AND DRAWINGS

Document and drawings shall be defined in the context of this manual as technical documents and technical drawings relating to the infrastructure asset and its life cycle (specification, design, manufacture, construction, test and commission, operation, maintenance, modification, disposal) and shall not include documents or drawings relating to correspondence, administration, finance, marketing, human resource management, project management, contract management and the like.

1.6 Reference Documents

This Manual shall be read in conjunction with the Particular Specification, any general conditions attached thereto and other specifications and documents comprising the Contract.

In particular this Manual shall be read in conjunction with ARTC publications:

- Signalling Design Principles ESD-05-01
- Signalling Control Systems ESD-05-01,
- Signalling Circuit Design Standards SDS 25,
- Signalling Operator Interface, and Procedures.

1.7 Documentation & Drawings

All documentation and drawings including those submitted for review, shall be in accordance with this procedure, and laid out in a clear and logical fashion and shall be such as to facilitate understanding, checking, construction and maintenance.

Current digitised Signalling & Track Insulation Plans are produced using Bentley MicroStation V8 or later software. Circuit Diagrams, Detailed Site Survey Drawings, Drivers Diagrams, Weekly Notice Insertions, Equipment Housing Plans are to be produced using AutoCAD software.

New and amended plans plus other plans and drawings associated with signalling projects shall be prepared using either MicroStation V8 or higher. New and amended circuit diagrams shall be prepared using AutoCAD LT2000 or AutoCAD 2000 or later version. All AutoCAD circuits shall be saved in AutoCADLt 2000 format, to be set as the default setting.

Final digitised drawings shall be provided on write once Compact Discs.

Documentation and drawings shall be prepared for A4 or A3 size paper and roll plans. Roll plans shall be divided into manageable and logical lengths and with height of 450mm wide (max.). A2 and A1 size paper may be allowed for detailed mechanical and structural drawings.

Geographically oriented drawings shall have the Sydney, or other main referenced locality direction at the left hand side.

Each design drawing including amended drawings shall be distinctively and uniquely identified as shall each controlled copy of a drawing.

Each drawing shall include the names of the designer, checker and approver. Details shall be provided for each amendment/issue of the drawing.

1.8 Labelling of Compact Disks

Compact disks shall be labelled to allow easy identification of the contents. Where a number of CDs are provided for a particular circuit book, each compact disc shall be labelled. The CD label shall include the following details:

- Copy Purpose: eg Review Copy, Construction Copy, Test Copy, Commissioning Copy, Maintenance Copy
- Copy Name/No: eg Master Copy, Master Back Up Copy, Copy No. 1
- Copy Holder: Name person issued to — responsible for
- Drawing Type: eg Signalling Plan, Track Insulation Plan, Circuit Book, etc.
- Drawing Name: eg Geographic location/area
- Job Name: as applicable or not
- Drawing Book/No: eg CB.... or xxxxx
- Sheets No To (as applicable)
- Version No:
- Version Date:
- Disc No of
- Drawing Software: eg AutoCAD 2009 Lt
- Saved Drawing Format eg AutoCAD 2000Lt
- File No: (as applicable)
- Job No: (as applicable)

Where several CDs are required for a circuit book the CDs shall be numbered as part of the set. By way of example, where 10 CDs are required for a circuit book the Compact Disc number shall be in the following form:

- COMPACT DISC NO. 1 OF 10 etc

All CDs shall be supported by file lists.

In addition to the original copy a Backup copy of each drawing compact disc shall be provided. These backup copy CDs shall have detailed labels as provided on the original copy drawing compact discs. Additionally, the Backup copy shall carry the name “BACKUP COPY DRAWINGS”.

An example of a typical CD label is shown below:

1.9 Code identification

Drawings shall include the following Code Identification:

Circuit Book Sheet:			
C	Circuit Book Nos:	Coded Sheet Numbering System	
	000 – 999		A000 – Z000
eg	C087A025.dwg		

Signalling Plan / Track Plan:		Four Digits	
D	Circuit Book Nos:	1st Digit	0 = drawing in one part
	000 – 999		1,2 = Drawing in more than one part.
		2nd/3rd Digit	10 = 1:1000 Scale
e.g.	D0450010.dgn		11 = Multi-scale

Track Insulation Plan:		Four Digits	
E	1st Digit	1st Digit	0 = drawing in one part
			1,2 = Drawing in more than one part.
	2nd/3rd Digit	2nd/3rd Digit	10 = 1:1000 Scale
e.g.	E0450010.dgn		11 = Multi-scale

Indicator Diagram:		
F	Circuit Book Nos:	Fixed
	000 – 999	010

Circuit Book Sheet:	
e.g.	F0610010.dgn

Drivers Diagram:	
G	Area Name in Characters:
e.g.	GHornsby.dwg/dgn

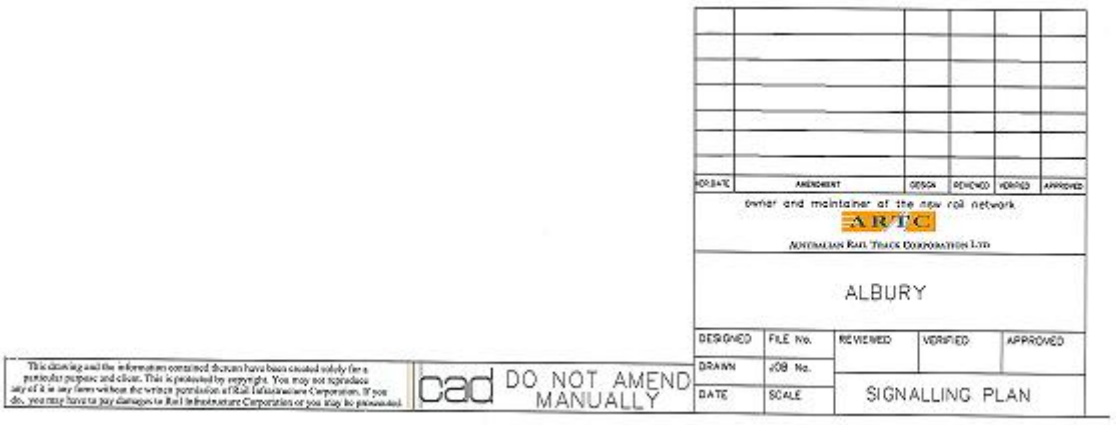
Mechanical Drawing:		
M	Five Digits	Acording to "numbering for Mechanical Drawings" code

1.10 Symbols for Plans and Drawings

Symbols for plans and drawings shall be in accordance with Appendix 4.

1.11 MicroStation Title Block

All large format drawings shall include a title block. The title block shall be horizontal (as shown below) or vertical, where the two halves are placed side-by-side. Internally, the title block information is filled in indirectly via a dialog box, opened from the bar menu. The information in the right margin is automatically filled in at the time of plot/printout.



Drawings shall include a template incorporating the following details:

- ARTC name:
- Drawing Type: (e.g. Signalling Plan, Track Insulation Plan, Circuit Diagram, Signalling Arrangements)
- Title of Drawing: (e.g. Project Name, Location/Area Name, Equipment/Structure Name, Process Name, Purpose Description)
- Purpose of Drawing: (Proposal, Construction, As-built)
- Drawing Number:
- Sheet/Part Number (where applicable):
- Version Date:
- Scale (where applicable):

- Legend (where applicable):
- Name of Organisation responsible for Drawing content
- For each amendment to the drawing the following details shall be included;
- Brief description of amendment:
- Version Number (Amendment):
- Version Date (Amendment):
- Name of Organisation responsible for the Amendment content.

MicroStation Cell Libraries

See Appendix 1 for a full listing of cell libraries and their contents for use in drawings produced by or for the RailCorp Signal Design area. All signal design cell libraries are available on request from the Railcorp Documentation manager or via the ARTC Signal Standards Engineer.

Levels, Level Symbology Overrides and Symbology By Level

All levels, symbology and text shall be in accordance with this manual, (see Appendix 2) and with MicroStation requirements. This level structure can be imported from existing plans.

Different levels shall be used to indicate and separate various features

2 Signalling Circuits – NSW Standards

2.1 General

Signalling circuits shall include details in accordance with this procedure.

2.2 Circuit Book Layout

The circuit book shall be prepared in accordance with the following:

Section	Circuits	Sheet
Frontispieces	Cover Sheet	A000
	Index (Alphabetical)	A001-
	Control Page	CP01-
	Amendment Sheet	AS01-
Automatic	Automatic signals (Standard sheet to include signal control, signal operating, to be in numerical order, track circuits to be in latter section with other track circuits)	B001 –
Section Controls	YR, SCR, DSR, FDM, Half Pilot Staffs	C001-099
Level Crossing	Crossing Lights, Light Circuits, Boom mechanisms	C100 –
Panel Controls	Push Button Relays	(F)R, (FM)R, (N)R, (R)R	D001-099
	Lever Relays	NR, CR, RR	D100-199
	Remote Control (if applic.)	TDM	D200-299
	Ring Circuit	(R)PR	D300-399
	Commence Relays	CeR	D400-499
	Finish Relays	FnR, FnPR, FnJPR	D500-599
	Machine in Use	MuR	D600-699
	Normalising Relays	(N)R	D700-799
	Track Special Relays	TZR	D800-899

Interlocking & Signal Controls	Route Lock Relays	RUR, NLR	E001-099
	Road Closing	RLR, NLR, LCR, RCR	E100-199
	Lever Sticks	SR	F001-099
	Auto Re Clearing	(A)SR	F100-199
	Route Control	UCR	F200-299
	Signal Control	HR, HDR, DR, LSpR	G001-199
	Signal Operating	E, 'A' Lts, Guards Ind.	H001-199
	Trainstop Operating	VR, V	I001-099
	Trainstop Detection	VNR, VRR	I100-199
	Trainstop Checking	VCSR	I200-299
	Trainstop Suppression	VsnR, VsnJR	I300-399
	Signal Normal/Reverse	NGPR, RGKR, DGNR, etc	J001-099
	Approach Sticks	ALSR, ALSJR	J100-J199
	Route Sticks	USR	K001-099
	Track Timers	JR	K100-199

Points	Point Setting Relays	NZR, RZR, (C)PR	L001-099
	Point Lock Relays	NLR, RLR	L100-199
	Point Contactors	NWR, RWR	M001-099
	Isolating Relays	IR	M100-199
	Point Cut Out Timers	WJR	M200-299
	Point Time Limit		M300-399
	Point Motor Operating		N001-099
	Local Detectors	NKR, RKR	N100-199
	Point Detection	NWKR, RWKR	N200-299
	Releasing Sw. Lock Relays	RLR, NLR, NR	P001-099
	Releasing Sw. Detection		P100-199

Vital Misc	Indicating Relays	PR	Q001-199
	Track Circuits	Including Track Sticks	Q200-399

Diagram	Signal Repeater	NGKR, RGKR, ALSKR etc	R001-099
	Signal Repeater Lights	RKE, DKE	R100-199
	Point Indicating Relays	NWKR, RWKR, WZKR	R200-299
	Point Lever Lights	NKR, RKE, WZKE, TKE	R300-399
	Push Button Indications	FEKR, FEK2R	S001-099
	Push Button Lights	PBE	S100-199
	Diagram Indicator Relays	KR	S200-299
	Diagram Route Relays	UR, USKR	T001-099
	Diag. Track Route Relays	TUR	T100-199
	Diag. Track Indications		T200-299
	Diagram Layout		T300-399

Power	Power Supplies		U001-099
	ELD		U100-199

Indicators & Alarms	Power Supply Indicators		V001-099
	Filament/Lamp Indicators	Specify eg Warning Lts, Bells etc	V100-199
	Alarms		V200-299
	Other Non-Vital Misc Circuits		V300-399

	Telephones/Communications		W001-099
	Spare/ other		W100 -

Analysis	Relay Room/Hut Floor Plans		X001-099
	Relay Racks		X100-199
	Cable Lists & Core Plans		X200-299
	Fuse & Terminal Lists		Y001-
	Contact allocation	Vital	Z001-299
		Non Vital	Z300-

Notes:

- *Repeat relays to follow the appropriate section.*
- *All circuits within a section to be in numerical order.*
- *The index is to show the range of page numbers for each section.*
- *Page numbers start with a letter followed by up to 2 numbers. (0 must never be used).*

Where multiple level crossings are within the same circuit book circuits are to be grouped by crossings.

2.3 Signal Circuit Drawing Format

Current digitised circuit drawings may be in AutoCAD 2000 or earlier versions. Unless approved otherwise, new and amended circuit diagrams shall be prepared using later versions of AutoCAD LT provided the default save status is set to AutoCADLt 2000.

Existing drawings which are to be edited and have circuit detail in Model space must be converted to paper space layout.

Drawings shall be stored on write once Compact Discs.

The circuit drawing filename shall be ACAD.DWG.

a) One (1) Circuit drawing sheet per file

b) File name shall be in the following order (8 characters long)

4 characters	**4 characters**	**3 characters**
Circuit Book Number	Sheet Number	File type
(leading zero's required)	(leading zero's required)	(dwg, dgn etc)

e.g. Circuit book - CB15 Page A009

File name would be C015A009.DWG

c) Drawings shall be A3 size
   i) Overall sheet size: 420mm x 297mm
   ii) Drawing area size: 396mm x 273mm

d) Drawing Symbols - In accordance with Appendix 4. Definition and sizes to be approved Circuit drawings shall include layers, linework, text, plus system variables and support operating variables preset to values listed in the tables below.

2.4 Drawing Layers

The signalling circuit and analysis drawings utilise various layers, colours and line styles to indicate NEW, REMOVED and MAINTENANCE information. The following list shows the allowable layers, colours and line styles that may be used in the drawings.

If other layers, colours and/or line styles for temporary use are utilised, then they shall be removed from the drawing before the final discs are submitted.

Layer Name	State	Colour	Linetype	Purpose
0	ON	(1) Red	Continuous	Reserved (do not use)
1	ON	(7) White	Continuous	Borders sheet/analysis etc
2	ON	(2) Yellow	Continuous	Maintenance – text
3	ON	(4) Cyan	Continuous	Maintenance – circuit
4	ON	(3) Green	Continuous	Removals – text
5	ON	(5) Blue	Hidden	Removals – circuit
6	ON	(6) Magenta	Hidden	Dashed linework
7	ON	(10) Brown	Continuous	New work – text
8	ON	(1) Red	Continuous	New work – circuit
9	ON	(6) Magenta	Continuous	New/removed work arrows

2.5 Linework

PLINE shall be used for all line-work.
0mm and 0.5mm are the only allowable widths.

LINE command SHALL NOT BE USED - use PLINE 0mm width.

PLIN F-ARC or CIRCLE shall be used to for curved linework.

TRACE command SHALL NOT BE USED - use PLINE 0.5mm width.

POINT command SHALL NOT BE USED.

2.6 Text

Text can be placed in the drawing using either the TEXT or DTEXT command using the necessary justification.

Text sizes are restricted to the following list.

Text Size	Purpose
1.75mm	Detail (eg relay contact numbers)
2.5mm	Element (eg relay and contact names)
3.0mm	Page Headings
3.0mm underscored	Circuit Headings

NB: Cover sheets will have an additional text size allowed :-

15 mm for Circuit book name and the use of a bold font.

2.7 Master Sheet Blocks

Circuit and analysis drawings shall be created using the standard prototype drawing (ACAD.DWG) as a template. (See Appendix 5)

ACAD.DWG shall contain the standard A3 Border in the form of a block.

The A3 border block is a master sheet block. A library of standard master sheet blocks already exists. e.g. 'Q' type relay analysis sheet, cable analysis sheet, fuse and terminal list sheets, etc...

Master sheet blocks shall be inserted in the drawing at (0,0), X scale factor = 1, Y scale factor = 1 and rotation angle = 0 degrees.

NB: Master sheet blocks listed are the only acceptable blocks that may be placed in any circuit drawing for the purpose of a MASTER SHEET.

The Job number relating to the As Built update shall be place in the next available box located in the lower sheet border upon completion.

Where a master sheet that is not listed needs to be created then full details of the sheet shall be referred for approval.

2.8 Signalling Circuit Symbols

Signalling circuit symbols shall be in accordance with Appendix 3 and shall be placed in the circuit drawing in the form of BLOCKS. Editing of existing blocks should only be carried out using the Attribute Edit command. Inserted blocks SHOULD NOT BE EXPLODED. Movement of attributes within blocks for circuit clarity is permitted by using the Grip feature only.

BLOCKS must be placed on a 5mm GRID in the circuit drawing and connected to other BLOCKS using PLINES.

All updated circuits shall be checked & corrected for block integrity, position, linetype & location on the grid before submitting.

Where a circuit element that is not listed needs to be created then full details of the element shall be referred for approval.

2.9 Plotting of Circuit Drawings

Hard copies of the circuit drawings shall be produced on 80 gsm, (420mm x 297mm) A3 Media Linework for the plotted drawings shall be as follows:

				Maintenance Drawing …..Pen…..	New/Removed Drawing …..Pen…..
Layer	Colour		Function	Size Colour	Size Colour
1	7	White	Border	0.3mm Black	0.3mm Black
2	2	Yellow	Maintenance – text	0.3mm Black	0.3mm Black
3	4	Cyan	Maintenance – circuit	0.7mm Black	0.7mm Black
4	3	Green	Removal – text	----- --------	0.3mm Black
5	5	Blue	Removal – circuit	----- --------	0.3mm Black
6	6	Magenta	Dashed line	0.3mm Black	0.3mm Black
7	10	Brown	New – text	----- --------	0.3mm Black
8	1	Red	New – Circuit	----- --------	0.7mm Black
9	6	Magenta	New/Removed arrows	----- --------	0.3mm Black

Each sheet or part of an extended sheet shall be plotted on 80 gsm (420mm x 297mm) A3 media.

2.10 Extended Sheets

Extended sheets are not permitted in new designs. Where they are encountered during circuit book updating, they should be renumbered to retain the original order of the sheets if possible using the next available sequential sheet number. If this is impractical it is permitted to append the current sheet number with an alphabetical suffix as appropriate to the existing retain sheet order. Ie C015G070 part 2 becomes C015G070A etc.

2.11 Circuit Continuation

Where it is required to continue to draw a circuit from one sheet to another, the wire continuation shall be drawn using the ZZLABEL block then continued on the next sheet using another ZZLABEL block.

This block allows for placement of text to identify the two wires on separate sheets.

The labeling for circuit wire termination shall be by alphabetic character reference & shall be placed inside the block of the terminating wire. The continuation wire shall also have the same block and corresponding alphabetic character reference.

Each wire shall have the circuit name and the continuation circuit sheet number placed adjacent to the block for ease of following the circuit path. These circuit breaks shall occur in logical places and be consistent across a range of similar circuit sheets.

2.12 Filenames

Filenames for drawing files shall be in accordance with the following:

{FILE} this is the document that contains a copy of the CIRCUIT DRAWING.

{SHEET} is the CIRCUIT DRAWING sheet number. one (1) only per FILE. more than one SHEET only permitted for extended sheets.

{CB} Circuit book number.

{FILENAME} identifies the file to allow a particular SHEET to be quickly located for editing.

- the FILENAME is made up of 12 characters consisting of FILENAME plus DRAWING EXTENSION

1st character -----† **‡---- 12th character**

XXXXXXXX_XXX

File name----------♦ ♦------File type (3 characters)

(8 characters) ♦----------File separator (1 character)

{FILE NAME) {WITHOUT} {DRAWING} is made of the 1st 8 characters. These 8 characters are to allow quick visual identification. The filename for circuit drawing files shall be 8 Characters

{EXTENSION}

Character 1 8

+XXX*xxxx

Category---------!

CB Number----------!

Sheet Number----------!

<CATEGORY> - 1 character : Identifies the type of information stored in the file. CIRCUIT DRAWINGS are represented by the letter C.

<CB NUMBER> - 3 character : Identifies the CIRCUIT BOOK by circuit book number. SHALL BE 3 characters. ie:CB:1 = 001

<SIGNALLING STANDARD DRAWING> - Standard book identified by: STD ie:CSTD

<SHEET NUMBER> - 4 characters : Identifies the SHEET whose data is stored in the file. SHALL BE 4 characters, ie:sheet A26 = A026

[FILE SEPARATOR] - is always the 9th character. This character is always a (period). Its purpose is to separate the FILE NAME from the FILENAME EXTENSION

10th character ----------† **‡---- 12th character**

XXXXXXXX_$$$

!

!----Filename Extension

[FILENAME EXTENSION] - is made of the last 3 characters. These 3 characters are set to a standard suffix so as to follow the drawing editor to recognise the file.

The suffix for DRAWING SHEET files is 'DWG' or 'DGN'.

'DWG' is the drawing file format for AutoCAD.

'DGN' is the drawing file format for MicroStation.

'XLS' is the file format for EXCEL

EXAMPLE: Create a drawing sheet A27 for circuit book CB:15
C = circuit drawing files
015 = CB number
A027 = sheet number
DWG = file type
FILENAME FORMAT
C015A027.DWG

Labelling of all CDs shall be as follows:

White Label:	Maintenance Copy	MASTER and BACK-UP
Green Label:	Construction Copy	MASTER and BACK-UP
Pink Label:	Test Copy	MASTER and BACK-UP
Yellow Label:	Commissioning Copy	MASTER and BACK-UP

VERSION NUMBER
Each circuit drawing shall be given a date (date approved).

The Circuit book name shall be in upper case characters.
The Circuit book number shall be in the form - CB No: 27, CB No: 143, etc.

3 Signalling Plans

3.1 General

Signalling Plans shall include details in accordance with this procedure and cover the whole of the Works including interface details at the Contract limits. Plans shall extend sufficiently at Contract limits to detail approach locking points and overlap clearance points for all signals included in the Works.

3.2 Overlapping

Overlapping of Signalling Plans shall be kept to a minimum. However individual plans shall extend sufficiently to detail clearance points for all controlled signals included in the plan. Each end of the plan shall include the name and drawing number of the adjoining plan.

3.3 Drawing Scales

Metric scales shall be used from the range 1:1000, 1:2000, 1:5000 and 1:10,000 and shall be submitted for consideration prior to use. The minimum scale for interlocking areas shall be 1:2000 subject to full details being clearly and legibly shown. Changes of scale shall only take place at kilometre points or at one tenth kilometre points. Asset or Document Discipline

3.4 Centreline

The centreline of all symbols for equipment and structures shall be as longitudinally correct to scale as feasible and laterally correct relative to the track centre lines and laterally spaced for legibility.

3.5 Format for Signalling Plans

Generally existing Signalling plans are in MicroStation software. New and amended drawings shall be prepared using MicroStation v8 or later software.
Signalling Plans shall include the following:-

1) The scale for all plans on screen shall be 1:1000, multi-scaling for plotted drawings may be presented for approval.

2) Text shall be made up as follows :-

   a) Station names and title = 5mm high text

   b) Track names = 2.5mm high text

   c) Any other text shall be 1 .75mm high

3) A Signalling Plan shows the track layout for the area involved on a single line basis ie. each pair of rails shown as a single line. The Signalling Plans are drawn such that Sydney is on the left of the plan, the lines are drawn straight. Curve and gradient details, if required, are drawn above the track layout. The curve diagram illustrates where they occur in the track, the curve radius shown in metres and the gradient details shown relative to the track and illustrate the differing gradients by the ratio of the rise or fall. Eg. 1 in 50 etc.

   Symbols used to represent the various details on the Signalling Plan shall be in accordance with the symbols included in Appendix 1.

4) Graphic grouping shall be used at each location area. To facilitate movement of selected elements as one unit in ratio to movement of track whilst scaling, all items shall be grouped are as follows:

   a) Text and symbols only are grouped.

   b) Do not group red and purple items.

5) The area between 12cm and 14cm (or the Co-ordinate y = 0.012 and y = 0.014) above the coordinate where y = 0 shall be kept clear for use others for scaling purposes.

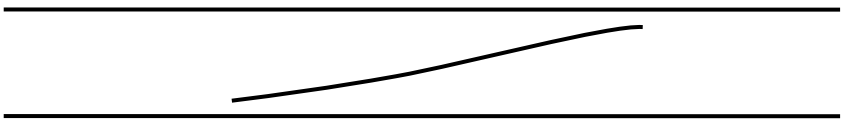
6) Microstation Level Structure is shown in Appendix 2

7) Storage of completed drawings shall be on write once Compact Discs.

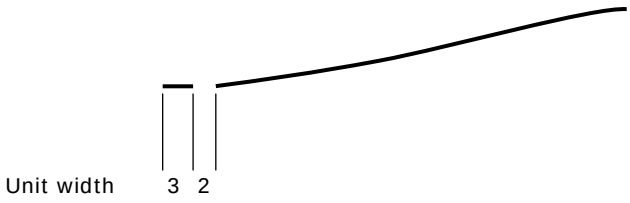
Examples of typical layouts of Signalling Plan details are shown below:

Facing Crossover with FPL Both Ends

Turnout with Catchpoint, FPL one end
(Typically loops, refuges, sidings)

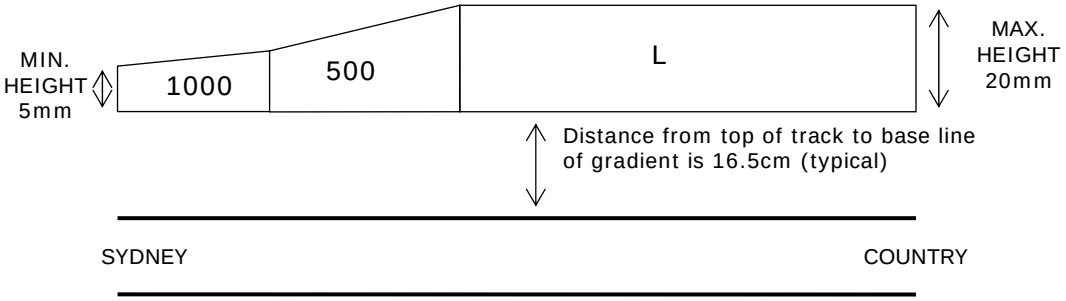


Trailing Crossover, no FPL

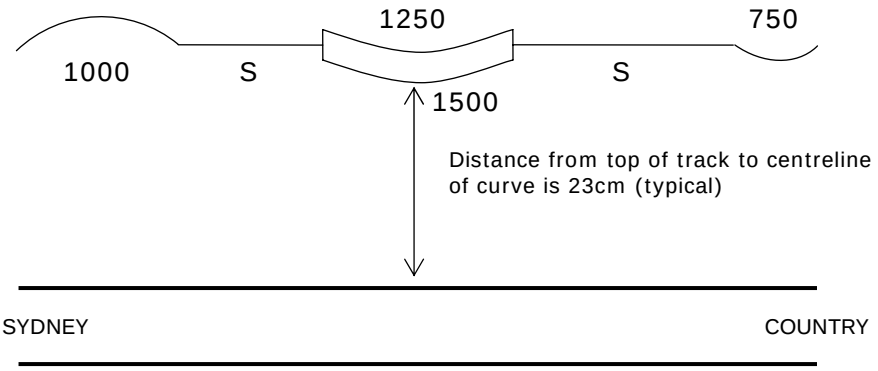


For crossovers or turnout with catchpoints, insert xover from one track to the other then insert straight line to indicate FPL

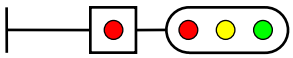
GRADIENTS

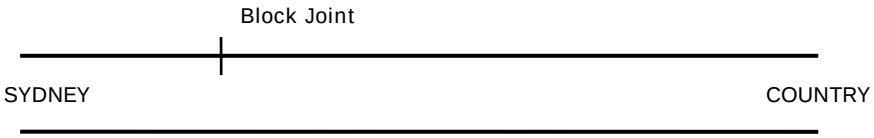


CURVATURE

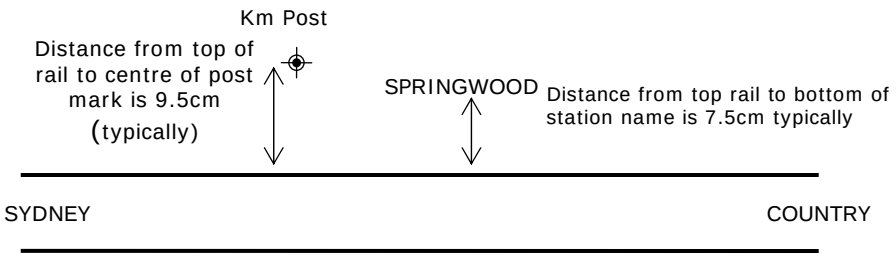


Drawings not to Scale





At s scale of 1:1000 the distance from the base of the signal to the block joint longitudinally is 2m (above is not to scale)



4 Track Insulation Plans

4.1 Scale

Track Insulation Plans shall be straight line plans drawn to longitudinal scales of 1:500 for interlocking areas and 1:1000 for other areas

4.2 Per-way Plans

Prints of the ARTC's permanent way layout plans, which will be to various scales and may not be fully up to date, shall normally be available as an aid. These shall require confirmation of actual site conditions and details for inclusion in the Track Insulation Plans.

4.3 Format for track Insulation Plans

Track Insulation Plans shall be produced in the same format as specified for signalling Plans as detailed under Clause 3.5 above.

TIP's are shown in a double line format. No curve or gradient information is required. Sybology is slightly different from the Signalling plan and a separate cell menu is available.

Graphic grouping applies to signalling equipment in its locality.

5 Detail Site Surveys

5.1 General

Detailed Site Survey Drawings shall include details in accordance with this procedure The content of Detailed Site Survey Drawings (DSS Drawings) shall be kept to manageable areas and shall be numbered to form a logical pattern. An overall index shall be provided.

The software version of the detailed site survey drawings shall be drawn at 1:1 scale and plotted to the required scale on A3 paper. All text and symbols are to be legible when plotted on A4 paper. In very complex areas, the vertical scale may be abandoned but all vertical dimensions must be shown to the relevant trackside equipment. One hundred-metre sections plotted to a scale of 1:250 is preferred in most cases but scales of 1:200 and 1:500 are permissible.

Where mapping files are available these are to be used as a basis for detailed site surveys.

The cable route shall be drawn continuous in manageable proportions with borders abutting to facilitate the insertion in a master drawing held by RailCorp.

DSS drawings shall be fully dimensioned to show the location of every kilometre and half kilometre post, the final cable routes, underline crossings (ULX's), station buildings, signal boxes, relay rooms, housings, location cases and lineside equipment with reference to the running face of the nearest railway line and, where applicable, existing buildings which are to remain and/or overhead wiring structures.

Detailed Site Survey Drawings shall also show those existing items which affect the construction of the new works, and which are subsequently to be removed. After removal they shall be deleted from the as built drawings.

The DSS should also show all pipe and route configurations and cable contents at each change in direction or deviation from the main route.

5.2 Detail Site Survey Drawing Format

Unless otherwise approved, detailed site survey drawings shall be prepared using AutoCAD LT2000 or AutoCAD 2000 or later.

Drawings should be produced on the layers identified by a number, a name, and a different colour for every layer as follows:

Layer Name	Colour		
LO	White	Page Set	Set of the border, Title Lines and the Legend
L1	Yellow	Km Ref	References in kilometres
L2	Cyan	Cable Route	Cable Route with all the trackside equipment
L3	Blue	Environ	Environment: buildings, roads, stairways, pathways
L4	Red	Dimension	Dimensions
L5	Green	Text	Labels and descriptions
L6	Brown	Others	
L7	Magenta	Existing trackside equipment, buildings and cable routes etc. that become redundant	

Drawing sheet sizes shall be A3 with a border layout as per the Signalling Circuit Design Standards SC 00 14 00 00 SP. The sheet (MBORDA3) shall be 396mm (X direction) and 273mm (Y direction).

Hard copies of the drawings shall be produced on 80 gsm A3 paper or where applicable A4 Laser plots will be accepted.

Storage of drawings shall be on write once Compact Discs.

Cover sheets to be supplied as agreed.

5.3 Format

Current drawings are in MicroStation and AutoCAD 2000. Unless otherwise approved new and amended drawings shall be prepared using AutoCAD LT2000 or AutoCAD 2000 or later.

Layers incorporated into the drawings shall be as follows:

Layer Name	Colour	Line Type	Purpose	Weights (Microstation)
1	Red	Continuous	Track	5
3	Yellow	Continuous	Signalling Symbols Power Supply CCTS, Xings	0
5	Purple	Continuous	Structural Symbols Bridges, Platforms (RTC)	2
7	Green	Continuous	Text 1.75mm = Text 2.5mm = Text 5.0mm =	0* 1* 2*

Note: * Weights not applicable if True Type text fonts, such as Arial, are used.

6 Drivers Diagrams & Weekly Notice Insertions

6.1 General

Current digitised signalling plans and drawings may be drafted in Microstation version 4.0 (Signalling Plans, Track Insulation Plans) or AutoCad 10i (Circuit diagrams). New and amended drawings shall preferably be prepared in AutoCAD LT2000, AutoCAD 2000 or later versions.

6.2 Layers

Layers incorporated into the drawings will be as follows:

LAYER NAME	COLOUR	LINE TYPE	PURPOSE	WEIGHTS (micro station)
1	Red	Continuous	Track	1
3	Yellow	Continuous	Signalling Symbols Power Supply CCTS, Xings	0
5	Purple	Continuous	Structural Symbols Bridges, Platforms (RTC)	2
7	Green	Continuous	Text 1.75mm=	0
			2.5mm=	1
			5.0mm=	2

6.3 Size

Shall conform to a suitable reduction for publication in Weekly Notice. Standard sized sheets are available and shall be used. CAD generated diagrams shall be programmed to conform to these sizes. All drawing content shall be drawn as size permitted in proportion to drawing.

6.4 Reduction

Signal symbols, lettering size, line thickness and gaps between lines (particularly in congested areas) shall be large enough to be clearly legible when reduced for publication. (Diagram may be photocopy-reduced to appropriate size for verification).

6.5 Title Block

The Title Block shall refer to the drawing as SIGNALLING ARRANGEMENT and shall include the applicable location/area, extent of work, W.N. (Weekly Notice) number, job number, Drawing Office identity, eg.

ARTC.
BATHURST
SIGNALLING ARRANGEMENT
WN33/95 RAIL SERVICES AUSTRALIA SIGNAL DESIGN OFFICE 92294

7 Other Drawings

7.1 Equipment Housing

Layout plans for equipment housings including huts, relay rooms, signal boxes and control centres etc. shall be to scale and shall detail precise floor, wall and ceiling positions for all items.

These may be contained within the relevant circuit book.

7.2 Level Crossings

Level Crossing Layout Plans shall show, to a scale of 1:50, the physical arrangements at road/rail or controlled pedestrian crossings.

7.3 Mechanical Drawings

Drawings showing mechanical arrangements for equipment and systems shall be fully detailed scale drawings and shall include all fixtures and fittings and manufacturing, fabrication and finishing details.

7.4 Structures & drawings

Working drawings for structures and buildings shall be fully detailed and shall include architectural and structural details, specifications, computations, arrangements for services etc. together with assembly, mounting and erection details where appropriate.

7.5 Clearance Diagrams

Trackside structures such as signals and signal gantries which have been expressly approved in writing to protrude into the area of the ARTC's Standard Structure Gauge, shall be detailed on Clearance Diagrams. Such diagrams shall detail the precise location of structures, including associated ladders, stays and fittings, in relation to the ARTC's Standard Structure Gauge including distances from rail level, running edge and overhead traction wires and equipment. Track curvature and super-elevation shall also be shown on these diagrams.

8 Appendix 1: Signal Design Microstation Cell Libraries

Below is a full listing of cell libraries and their contents for use in drawings produced by or for the ARTC signal design area. For internal use, all files are located on the network at:

X:\xxx\xxx\Sig_des\Common\Graphics.

SD_mstplan.cel

Cell Name	Cell Description	Cell Name	Cell Description
Line		S2000	
2LGHT2		S5000	
SIG6..		S10000	
NTCBRD		S20000	
CUPBRD		XOVER5	
FRAME1		SYMB15	
XSIGN.		LNMARK	
TRNSFM		RELSW2	
POINTS		INDR13	
CLMLCK		INDR15	
CHOKE.		INDR14	
MUTXRX		INDR9.	
MLTCRS		POST1.	
SGLPT.		SIGBOX	
DBLPTS		ISJNT5	
ISJNT4		CTTRK1	
ISJNT1		PLUS	
ISJNT2		BALVER	
CIRCLE		CONTAC	
XOVER2		SCSYM	
SCLBAR		SIG3..	
XOVER4		SIG4..	
BOLTLK		SIG5..	
S250		SOLAR	
S500		REYRL	

Cell Name	Cell Description	Cell Name	Cell Description
S1000		ISJNT6	
PWRFD3		IDCTBD	
PWFD4		MAINBD	
BCROSS		VARSBD	
SMCRSS		VARBD.	
BANNER		IBPBD.	
CUTTRK		CBBD..	
CLRPST		IVAPBD	
XOVER1		THYRS1	
TUMURX		THYRS2	
EARTH1		SPDBRD	
EARTH2		MAKER1	
ISLBND		SHUNT1	
STPBRD		INDR16	
DSTBRD		INDR12	
STDFRM		CLSUP1	
FLAG		RELSW3	
XOVRIS		PHONE2	
ST87		MARKE0	
NOLGHT		1LGHT1	
TRSFM2		2LGHT1	
CB1...		3LGHT1	
TRSFM1		2LGHT3	
EOC1..		3LGHT2	
EOC...		3LIGHT	
MTRMGR		5LIGHT	
VARSB1		POINT2	
GNSIG1		LOCK..	
GNSIG2		DERAIL	

Cell Name	Cell Description	Cell Name	Cell Description
GNSIG3		REYRL1	
GNSIG4		ARESTR	
GNSIG5		INDR11	
GNSIG6		DCFEED	
GNSIG7		1LGHT3	
4LIGHT		JOIN	BLOCK JOINT FOR TIP
5LGHT1		BOND1	BOND FOR TIP
SIG82.		DOT01	DOT01 FOR TIP
SIG444		TEXT04	TEXT 04 FOR TIP
SIG1..		TEXT05	TEXT05 FOT TIP
SIG7		CONN	CONNECT FOR TIP
SIG2..		TU001	TU001 FOR TIP
SIG8..		TU002	TU002 FOR TIP
SIG81.		TU004	TU004 FOR TIP
1LGHT2		ARR01	ARR01 FOR TIP
RABSIG		TU005	TU005 FOR TIP
WRNGRD		ARR02	ARR02 FOR TIP
BELL..		TEXT06	TEXT 06 FOR TIP
XING1.		TEXT07	TEXT07 FOR TIP
XING2.		TEXT08	TEXT08 FOR TIP
XING3.		ACFD01	AC TRACK FEED FOR TIP
PHONE1		FUSE01	FUSE01 FOR TIP
RELSW1		EBOND1	IMP BOND FOR TIP
TSTOP.		BUNG01	BUNGALOW FOR TIP
TEXT01 FOR TIP	TEXT01 FOR TIP	RELAY1	TRACK RELAYS FOR TIP
TEXT02 FOR TIP	TEXT02 FOR TIP	TEXT13	TEXT13 FOR TIP
TEXT03 FOR TIP	TEXT03 FOR TIP	SCALE	SCALE RULER FOR TIP
TEXT10 FOR TIP	TEXT10 FOR TIP	WDPOLE	WOODEN POLE FOR TIP
TEXT11 FOR TIP	TEXT11 FOR TIP	XBOND	CROSS BONDS FOR TIP

Cell Name	Cell Description	Cell Name	Cell Description
LINK01	LINK01 FOR TIP	PBOND	PARALLEL BONDS FOR TIP
RELAY	RELAY FOR TIP	IMPB03	IMPEDANCE BOND3 FOR TIP
DFEED1	DCFEED 1 FOR TIP	TU003	TEXT03 FOR TIP
SIG01	SIGNAL 01 FOR TIP	TLBLC	TITLE BLOCK FOR TIP
TEXT12	TEXT12 FOR TIP	TEXT19	TEXT19 FOR TIP
BBAR01	BUSBAR 01 FOR TIP	TEXT14	TEXT14 FOR TIP
KM01	HALF KM FOR TIP	DTI21	DTI21 FOR TIP
KM02	KM FOR TIP	SDTI21	SDTI21 FOR TIP
TIPTEX	JOB DESC FOR TIP	DRTI21	DRTI21 FOR TIP
LINK02	LINK02 FOR TIP	POINT1	POINT1 FOR TIP
TTIEIN	TIE IN BOND FOR TIP	SGC01	SPARK CONNECTION FOR TIP
TI21	TI21 FOR TIP	SGC02	SGC02 FOR TIP
SRTI21	TSINGLE RAIL TI21 FOR TIP	EBOND2	EBOND02 FOR TIP
CSEE	CSEE TU FOR TIP	TERM1	TERM1 FOR TIP
TU006	TU006 FOR TIP	TERM2	TERM2 FOR TIP
TEXT09	TEXT09 FOR TIP	BUFFER	BUFFER FOR TIP
LEGEND	LEGEND FOR TIP	BSTOP	BUFFER STOP FOR TIP
PID...	PLOT ID FOR TIP	XING01	CROSSING 1 FOR TIP
IMPB01	IMPEDANCE BOND1 FOR TIP	XING02	CROSSING 2 FOR TIP
IMPB02	IMPEDANCE BOND2 FOR TIP	CONN01	CONN01 FOR TIP
DNAM	DNAM FOR TIP	ADDARWF	ADD FILLED ARROW FOR TIP
T001	T001 FOR TIP		Cell Library Name: title.cell
T002	T002 FOR TIP		Date of Output: 20/08/04
T003	T003 FOR TIP	RSADIS	RSA DISCLAIMER
T004	T004 FOR TIP	TBA0A1	STD TITLE BLOCK A0A1
T005	T005 FOR TIP	TBA2A3	STD TITLE BLOCK A2A3
T006	T006 FOR TIP	TBA0	A0 TITLE BLOCK
NOTE..	NOTE FOR TIP LEGEND	TBA1	A1 TITLE BLOCK
SBOND	SERIES BOND FOR TIP	TBA2	A2 TITLE BLOCK

Cell Name	Cell Description	Cell Name	Cell Description
BUNGLW	BUNGALOW FOR TIP	TBA3	A3 TITLE BLOCK
POWER	POWER SUPPLY EQUIP FOR TIP	RSADIS	RSA DISCLAIMER
T007	T007 FOR TIP		
T008	T008 FOR TIP		
ADDARWO	ADD OPEN ARROW FOR TIP		
FRAME2			
FRAME3			
NOTE	SEXTUP NOTE		
NOTE1			
RCLOGO	RAILCAD LOGO		
LOGO	CITYRAIL LOGO		
TD	TRANSITION DETAILS		
LEG	COMMON LEGEND		
CD	CURVE DETAILS		
BNOTES			
SCALE	1:200		
CT	CURVE TEMPLATE		
BOTX			

9 Appendix 2: Signal Design Microstation Level Structure

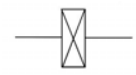
The Microstation V8 levels for placement of various types of elements, Level Symbology Overrides and Symbology ByLevel shall be in accordance with the table in this appendix.

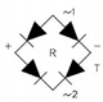
Name	Number	Description	Override Colour	Override Style	Override Weight	ByLevel Colour	ByLevel Style	ByLevel Weight	Global Display	Element Access	Plot
C-TRAK-NORM	4000	Track Normal Linework	0	0	0	6	0	2			
C-TRAK-RDNT	4001	Track New Linework	0	0	0	3	0	1			
C-TRAK-DASH	4002	Track Removed Linework (Dashed	0	0	0	3	0	0			
C-TRAK-CURV	4003	Track curve	0	0	0	3	0	0			
C-TRAK-GRAD	4004	Track Gradient	0	0	0	3	0	0			
C-TRAK-NOTE	4005	Track Name	0	0	0	3	0	0			
C-TRAK-LABL	4006	Track Length	0	0	0	3	0	0			
C-TRAK-CELL-SGNL	4007	Track Signal Symbology	0	0	0	4	0	0			
C-TRAK-CELL-STRU	4008	Track Structural Symbology	0	0	0	5	0	1			
C-TRAK-ROUT	4009	Track Route Information	0	0	0	5	0	2			
C-TRAK-GANT	4010	Structures Gantries	0	0	0	3	0	0			
C-TRAK-PLAT	4011	Structures Platform Linework	0	0	0	3	0	0			
C-TRAK-BRIG	4012	Structures Bridge Linework	0	0	0	3	0	0			
C-TRAK-STRT	4013	Structures Street Linework	0	0	0	3	0	0			
C-SGNL-CELL-SYME	4014	Signal Symbol	0	0	0	3	0	0			
C-SGNL-TEXT	4015	Signal Text	0	0	0	0	0	0			
C-SGNL-AREA	4016	Signal Location Boundary	0	0	0	3	0	0			
C-POWR-CELL	4017	Power Supply Diagram Cells	0	0	0	5	0	1			
C-POWR-LINE-PSTV	4018	Power Supply Diagram Positive	0	0	0	5	0	1			
C-POWR-LINE-NGTV	4019	Power Supply Diagram Negative	0	0	0	5	0	1			
C-POWR-TEXT	4020	Power Supply Diagram General Te	0	0	0	5	0	1			
C-POWR-LABL	4021	Power Supply Diagram Labelling	0	0	0	5	0	1			
C-SIGN-CELL	4022	Sign Speed Posting	0	0	0	3	0	0			
C-PANL-TRAK	4023	Panel Track Linework	0	0	0	3	0	2			
C-PANL-GRID	4024	Panel Grid	0	0	0	2	0	0			
C-PANL-LGHT	4025	Panel Lights	0	0	0	2	0	0			
C-PANL-CTRL-BTTN	4026	Panel Control Buttons	0	0	0	2	0	0			
C-PANL-CTRL-LGHT	4027	Panel Controls lights	0	0	0	2	0	0			
C-PANL-LMRK	4028	Panel Frames and Platforms	0	0	0	2	0	0			
C-PANL-TEXT	4029	Panel Text	0	0	0	2	0	0			
C-INSU-BOND	4030	Insulation Bonding	0	0	0	2	0	0			

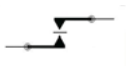
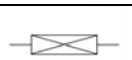
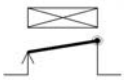
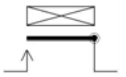
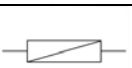
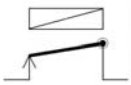
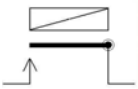
Name	Number	Description	Override Colour	Override Style	Override Weight	ByLevel Colour	ByLevel Style	ByLevel Weight	Global Display	Element Access	Plot
C-INSU-DOTT	4031	Insulation Positive	0	0	0	2	0	0			
C-INSU-FILL	4032	Insulation Negative	0	0	0	2	0	0			
C-INSU-BLKJ	4033	Insulation Block Joints	0	0	0	2	0	0			
C-INSU-STAN	4034	Insulation Stanchions and Spark Gaps	0	0	0	2	0	0			
C-INSU-SIGS	4035	Insulation Cell and Text	0	0	0	2	0	0			
C-INSU-FEED	4036	Insulation Feed and Relay Information	0	0	0	2	0	0			
C-WORK-NEW	4037	New Work	0	0	0	4	0	0			
C-WORK-RMOV	4038	Work to be Removed	0	0	0	2	0	0			
C-LOCK-DPLX	4039	Duplex Locks	0	0	0	2	0	0			
C-LOCK-BARS	4040	Locking Bars and Rods	0	0	0	2	0	0			
C-LOCK-ELEC	4041	Electric Locks	0	0	0	2	0	0			
C-LOCK-CTCH	4042	Catch Rods & Lights	0	0	0	2	0	0			
C-LOCK-KEYS	4043	Locking Keys	0	0	0	2	0	0			
C-KLMG	4044	kilometrage Cells & Text	0	0	0	3	0	0			
C-DIMS-PRIM	4045	Dimensions Primary	0	0	0	2	0	0			
C-DIMS-SECD	4046	Dimensions Secondary	0	0	0	2	0	0			
C-DIMS-GNRL	4047	Dimensions General	0	0	0	2	0	0			
C-DIMS-MISC	4048	Dimensions Miscellaneous	0	0	0	2	3	0			
C-HIDD-LINE-UNDR	4049	Hidden Lines Over	0	3	0	3	2	0			
C-HIDD-LINE-OVER	4050	Hidden Lines Underneath	0	2	0	3	0	0			
C-TEXT-LABL-MINR	4051	Minor Labelling	0	0	0	2	0	2			
C-TEXT-LABL-MAJR	4052	Major Labelling	0	0	0	2	0	3			
C-TEXT-TABL	4053	All Drawing Tables	0	0	0	2	0	1			
C-TEXT-SCHD	4054	All Drawing Schedules	0	0	0	2	0	1			
C-TEXT-175	4055	General Text 1.75	0	0	0	2	0	0			
C-TEXT-25	4056	General Text 2.5	0	0	0	2	0	0			
C-TEXT-35	4057	General Text 3.5	0	0	0	2	0	1			
C-TEXT-50	4058	General Text 5.0	0	0	0	2	0	1			
C-TEXT-70	4059	General Text 7.0	0	0	0	2	0	1			

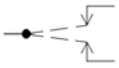
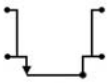
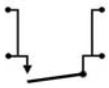
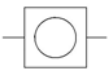
10 Appendix 3: Signal Design AutoCAD Circuit Block List – NSW Standards

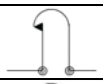
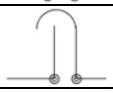
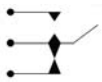
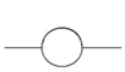
Block Name Insertion & definition Table

Block Graphic	Block Name	Description	Insertion Data
	ARRESTOR		
	ZZARROW	ARROW (Used for tap-off points in circuits)	
	ZZBELLB	BELL Block Type (Single stroke)	
	ZZBELLT	BELL Trembling type	
	ZZBICNC	Block Instrument Stick Relay Normally Closed	
	ZZBIR	Block Instrument Stick Relay Coil	
	ZZBMC	Battery Multi Cell	
	ZZBSC	Battery Single Cell	
	ZZBSIGC	Banner Signal Contact	
	ZZBUSPS	BUS Power Supply	
	ZZBUSTS1	BUS Terminal Supply 1 only	
	ZZBUSTS2	BUS Terminal Supply 2 only	
	ZZCAC	CONTACTOR AC	
	ZZCACMI	CONTACTOR AC Mechanically Interlocked	
	ZZCAP	CAPACITOR Bipolar	
	ZZCAPE	CAPACITOR Electrolytic	
	ZZCAPVSP	CAPACITOR Voltage Surge Suppressor	

Block Graphic	Block Name	Description	Insertion Data
	ZZCBCC	CONTACTOR Back contact closed	
	ZZCBCO	CONTACTOR Back contact open	
	ZZCLUT	CONTACT Clutch	
	ZZCCRK1	CONTACT Crank type 1 (points machine)	
	ZZCDC	Contactor DC	
	ZZCDLNO	CONTACT Duplex lock Normally open	
	ZZCFCC	CONTACTOR Front contact closed	
	ZZCFCO	CONTACTOR Front contact open	
	ZZCOIL	COIL Air cored	
	ZZCOILC1	X COIL Clutch type 1	
	ZZCOILH1	X COIL Pick-up & hold clear type 1	
	ZZCOILIC	COIL (iron cored)	
	ZZCOILT	COIL Transformer	
	ZZCOM	Common terminal	
	ZZDIMCOIL	Dimming Coil	
	ZZDIODE	Diode	
	ZZDIODER	Diode Bridge Rectifier	
	ZZEARTH	Earth connection	
	ZZEDCSCO	Electrical detector Contact Sw. only Change over	
	ZZEDCSN	Electrical detector Contact Sw. only Normal	
	ZZEDCSPN	Electrical detector Contact Sw. & Plunger Normal	

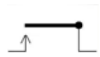
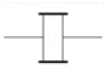
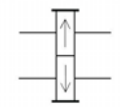
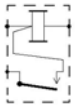
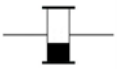
Block Graphic	Block Name	Description	Insertion Data
	ZZEDCSPR	Electrical detector Contact Sw. & Plunger reverse	
	ZZEDCSR	Electrical detector Contact Sw. only Reverse	
	ZZEDESC	Electrical detector Escapement Slide Contact	
	ZZEDPLCN	Electrical detector Plunger lock Contact Normal	
	ZZEDPLCR	Electrical detector Plunger lock Contact Reverse	
	ZZELL	Electric Lever lock	
	ZZELLCC	Electric Lever lock Contact Closed	
	ZZELLCO	Electric Lever lock Contact Open	
	ZZELP	Electric Lock Plunger	
	ZZELRS	Electric lock Releasing Switch	
	ZZELRSCC	Electric lock Releasing Switch Contact closed	
	ZZELRSCO	Electric lock Releasing Switch Contact open	
	ZZEREV	Electric Reverser	
	ZZESMCCL	Electrical Switch Machine Contact Clamp Lock	
	ZZEMSCCON	Electrical Switch Machine Contact Change over Nippon	
	ZZESMCN	Electric Switch Machine Contact Normal	
	ZZESMCNN	Electric Switch Machine Contact Normal Nippon	
	ZZESMCR	Electric Switch Machine Contact Reverse	
	ZZESMCRN	Electric Switch Machine Contact Reverse Nippon	

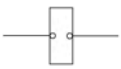
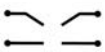
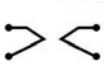
Block Graphic	Block Name	Description	Insertion Data
	ZZESML	Electric Switch Machine Lock	
	ZZFL1	Flasher Unit Type 1 Thermal	
	ZZFL2	Flasher Unit Type 2 Email type	
	ZZFRC	Flashing relay Contact	
	ZZFUSE	Fuse Bussed	
	ZZFUSE1	Fuse Single	
	ZZGPO	General Purpose Outlet 240v	
	ZZHDCB	Heavy Duty Contact Busbar	
	ZZHDCFCC	Heavy Duty Contactor Front Contact Closed	
	ZZHDCFCO	Heavy Duty Contactor Front Contact Open	
	ZZIEC	Indicator Eyeball In separate case	
	ZZIED	Indicator Eyeball In diagram	
	ZZIL	Indicator Lamp	
	ZZILC	Indicator Lamp In separate case	
	ZZILEV	Indicator Lever Light	
	ZZILMI1	Indicator Lamp Module Incandescent Type 1	
	ZZILML1	Indicator Lamp Module LED Type 1 3mm LED	
	ZZILML2	Indicator Lamp Module LED Type 2 3mm LED	
	ZZILML3	Indicator Lamp Module LED Type 3 3mm LED	

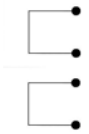
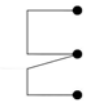
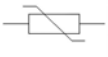
Block Graphic	Block Name	Description	Insertion Data
	ZZILML4	Indicator Lamp Module LED Type 4 3mm LED	
	ZZILML5	Indicator Lamp Module LED Type 5 3mm LED	
	ZZILML6	Indicator Lamp Module LED Type 6 3mm LED	
	ZZILS1	Indicator Lamp with Store no 1 Transformer	
	ZZIRNT	Indicator repeater Needle Type	
	ZZIRST	Indicator repeater Semaphore Type	
	ZZLA	Lightning Arrestor	
	ZZLA1	Lightning Arrestor 3 Terminal Type 1	
	ZZLA2	Lightning Arrestor 3 Terminal Type 2	
	ZZLABEL		
	ZZLCCRNC	Lever Contact Catch Rod Normally Closed	
	ZZLCCRNO	Lever Contact Catch Rod Normally Open	
	ZZLCE	Lever Contact Electric Switch	
	ZZLCMCO	Lever Contact Miniature Type Changeover	
	ZZLCMNC	Lever Contact Miniature Type Normally closed	
	ZZLCMNO	Lever Contact Miniature Type Normally open	
	ZZLCR	Lever Contact Rotary	
	ZZLCS	Lever Contact Route Setting Switch	
	ZZLINK1	Link Type 1	

Block Graphic	Block Name	Description	Insertion Data
	ZZLOC	Terminal Location	
	ZZLOC1	Location Terminal Double Type 1	
	ZZLQSC	Lower Quadrant Signal Contact	
	ZZMETER	Panel Meter eg V, A etc	
	ZZMOTOR	Motor eg Banner signal	DF
	ZZMOTOR2	Motor Type 2 Western Railroad Boom Gate	
	ZZMOTOR3	Motor Type 3 Western Railroad Boom Gate type B	
	ZZMOTOR4	Motor Type 4 Eg Nippon Points Motor	
	ZZMOTOR5	Motor Type 5 Eg Pedestrian Barriers	
	ZZNVRAC	Non Vital Relay AC Ie HH23 type	
	ZZNVCFCC	Non Vital Relay Front contact Closed	
	ZZNVCFCO	Non Vital Relay Front contact Open	
	ZZNVRBCC	Non Vital Relay Back contact Closed	
	ZZNVRBCO	Non Vital Relay Back contact Open	
	ZZNVRDC	Non Vital Relay DC Ie HH23 type	
	ZZNVRDCP	Non Vital Relay DC PCB type	
	ZZNVRDCP2	Non Vital Relay DC PCB type	
	ZZNVRDFCC	Non Vital Relay Dependant Front Contact Closed	
	ZZNVRDFCO	Non Vital Relay Dependant Front Contact Open	

Block Graphic	Block Name	Description	Insertion Data
	ZZNVRFCC	Non Vital Relay Front Contact Closed	
	ZZNVRFCO	Non Vital Relay Front Contact Open	
	ZZPB3F	Push Button 3 position push to make	
	ZZPB3FM	Push Button 3 position pull to break	
	ZZPB3T	Push Button 3 position pull to make	
	ZZPBBBCO	Push Button Block Bell Changeover type	
	ZZPBNC	Push Button Normally Closed	
	ZZPBNO	Push Button Normally Open	
	ZZPBRSNO	Push Button Release Switch Normally Open	
	ZZPBTF	Push Button Push to Break push to make	
	ZZPC	Plug Coupler	
	ZZPSM1	Power Supply Module Type 1	
	ZZR3P	Relay AC 3 position	
	ZZRAC	Relay AC	
	ZZRACDE	Relay AC Double Element	
	ZZRACSR	Relay AC Slow Release	
	ZZRACTS	Relay AC Track Relay - Shelf	
	ZZRBCC	Relay Vital Back Contact Closed	

Block Graphic	Block Name	Description	Insertion Data
	ZZRBCO	Relay Vital Back Contact Open	
	ZZRDC	Relay DC	
	ZZRDCB	Relay DC Biased	
	ZZRDCL	Relay DC Latched	
	ZZRDQ1	Relay DC QTR1 Type	
	ZZRDCSP	Relay DC Slow Pick	
	ZZRDCSPR	Relay DC Slow Pick & Release	
	ZZRDCSR	Relay DC Slow Release	
	ZZRDCT	Relay Dependant Front Contact Timer	
	ZZRDCTQ3	Relay DC Timer QTD3 Type	
	ZZRDFCC	Relay Dependant Front Contact Closed	
	ZZRDFCO	Relay Dependant Front Contact Open	
	ZZRES	Resistor Fixed	
	ZZRESV	Resistor Variable	
	ZZRESV2	Resistor Variable Type 2	
	ZZRESV3	Resistor Variable Type 3	
	ZZRFCC	Relay Vital Front Contact Closed	
	ZZRFCO	Relay Vital Front Contact Open	

Block Graphic	Block Name	Description	Insertion Data
	ZZRTJS	Relay Rack Jeumont Schneider	
	ZZSAC	Solenoid AC	
	ZZSCNC	Switch contact Normally Closed	
	ZZSCNO	Switch contact Normally Open	
	ZZSDC	Solenoid DC	
	ZZSDP	Switch Double Pole	
	ZZSDPS	Switch Double Pole Snap action	
	ZZSLC	Search Light signal Contact Reverse	
	ZZSLCN	Search Light signal Contact Normal	
	ZZSLINDN	Search Light signal Indication (signal operating)	
	ZZSSHELF	Switch SHELF type (used with mechanical levers)	
	ZZSSHELF1	Switch SHELF type 2 (used with mechanical levers)	
	ZZSSPNC	Switch Single Pole Normally Closed	
	ZZSSPNO	Switch Single Pole Normally Open	
	ZSSPNOD	Switch Single Pole Normally Open for Dimming	
	ZZSSPS	Switch Single Pole Snap action	
	ZZSTP1	Strap type 1 (for timer relays - ZRDCT)	

Block Graphic	Block Name	Description	Insertion Data
	ZZSTP2	Strap type 2 (for timer relays - ZRDCT)	
	ZZSTP3	Strap type 3 (for timer relays - ZRDCT)	
	ZZSTP4	Strap type 4 (or timer relays - ZRDCT)	
	ZZTSCN	Train Stop Contact Normal	
	ZZTSCNR	Train Stop Contact made Normal to almost Reverse	
	ZZTSCR	Train Stop Contact Reverse	
	ZZTSM	Train Stop Motor	
	ZZUQC	Upper Quadrant Contact (0 degrees)	
	ZZUQCOO1O	Upper Quadrant Contact (0 to 10 degrees)	
	ZZUQCOO45	Upper Quadrant Contact (0 to 45 degrees)	
	ZZUQCOO88	Upper Quadrant Contact (0 to 88 degrees)	
	ZZUQC45	Upper Quadrant Contact (45 degrees)	
	ZZUQCO69O	Upper Quadrant Contact (6 to 90 degrees)	
	ZZUQC459O	Upper Quadrant Contact (45 to 90 degrees)	
	ZZUQC889O	Upper Quadrant Contact (88 to 90 degrees)	
	ZZVARES	Varistor	

10.1 Special Blocks for New & Removed Circuit Work

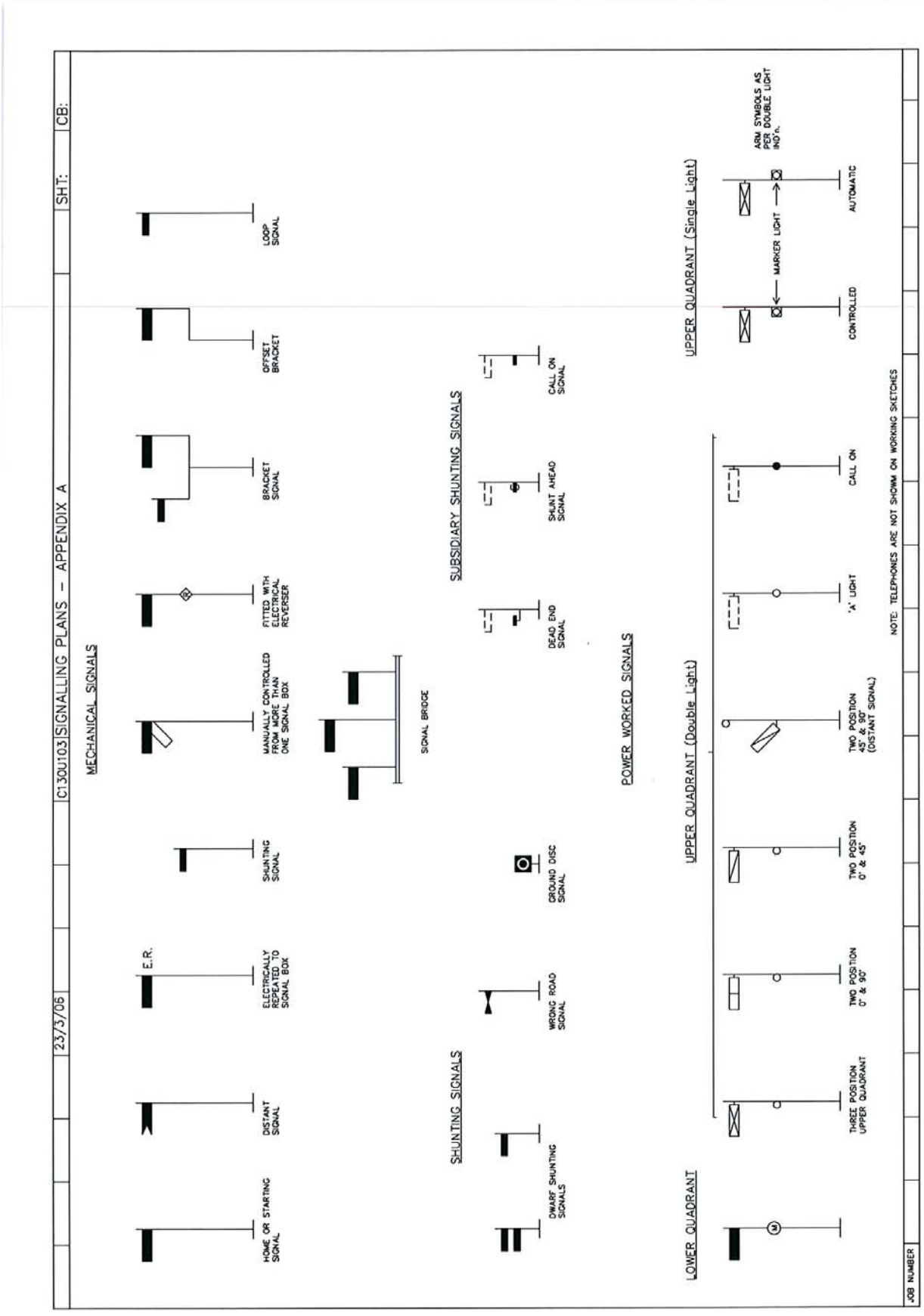
Block Graphic	Block Name	Description	Insertion Data
	ZZNWAR	New Work Arrow	
	ZZRWAR	Removal Work Arrow	

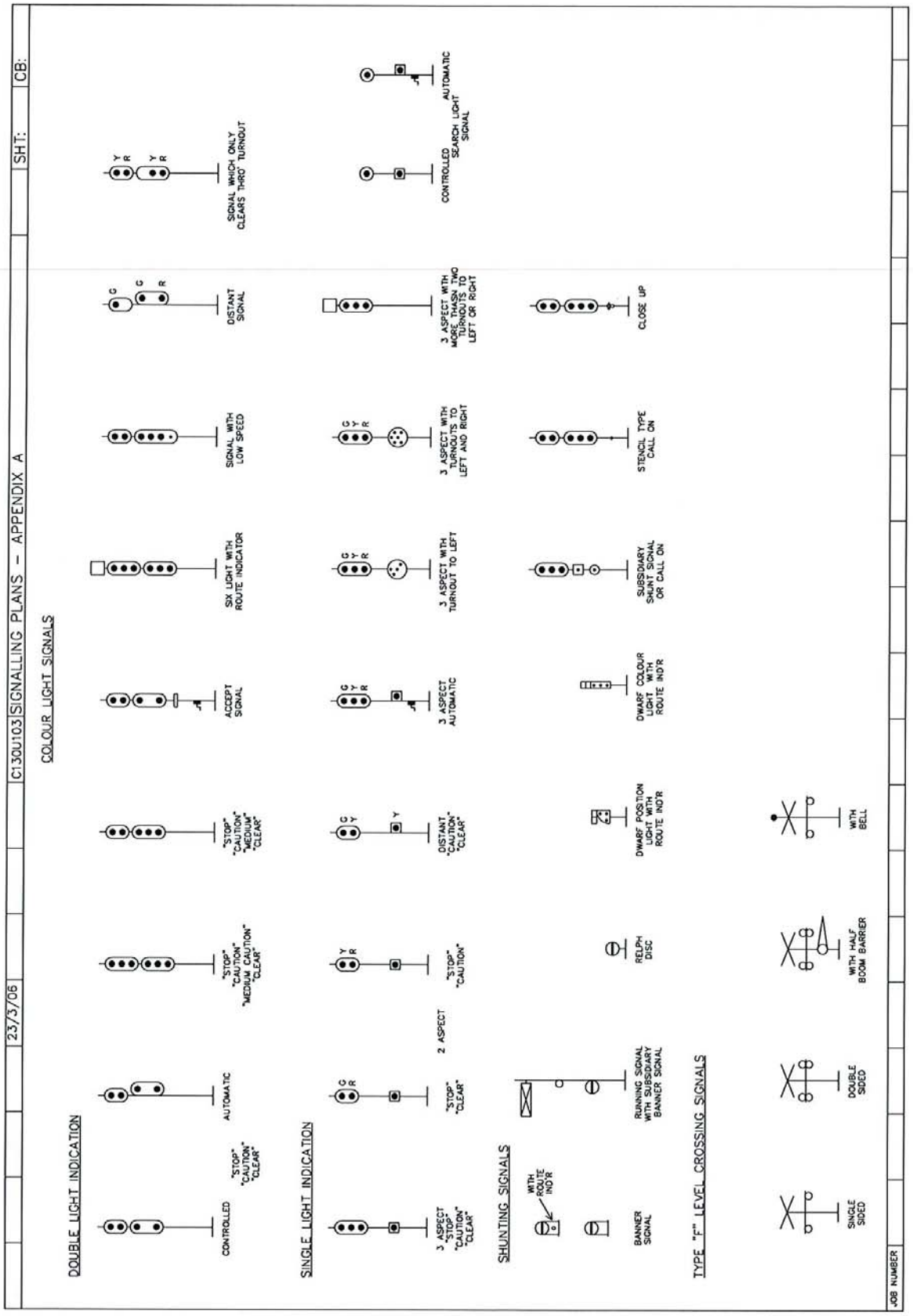
10.2 Special Blocks for Extended Sheets

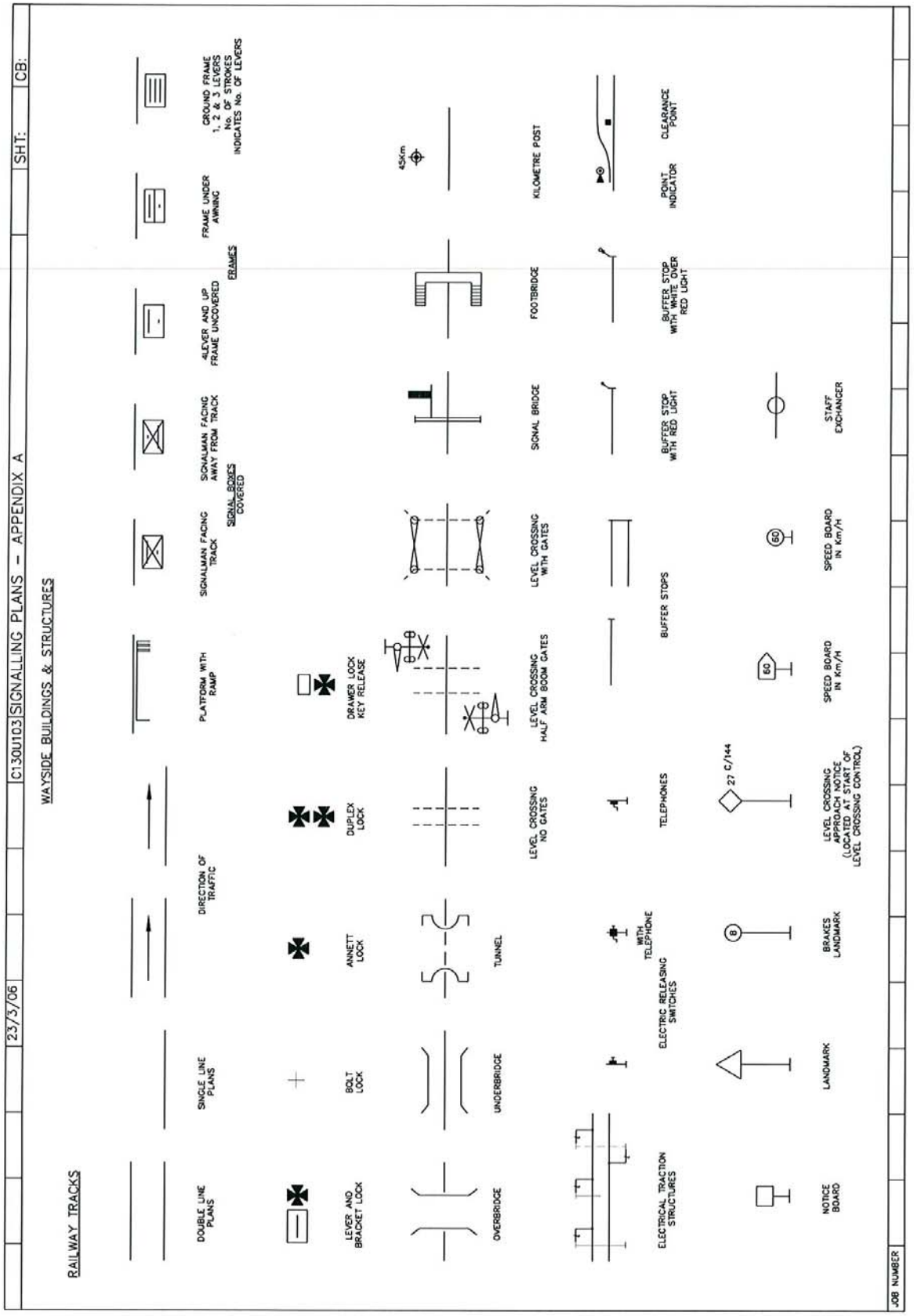
		Scale				Rotation Angle			
Block Name	Fig No.	Y +	Y -	Y +	Y -	-90	0	+90	Description
ZLABEL	19I	1	X	1	X	X	X	X	Label for Extended Sheets

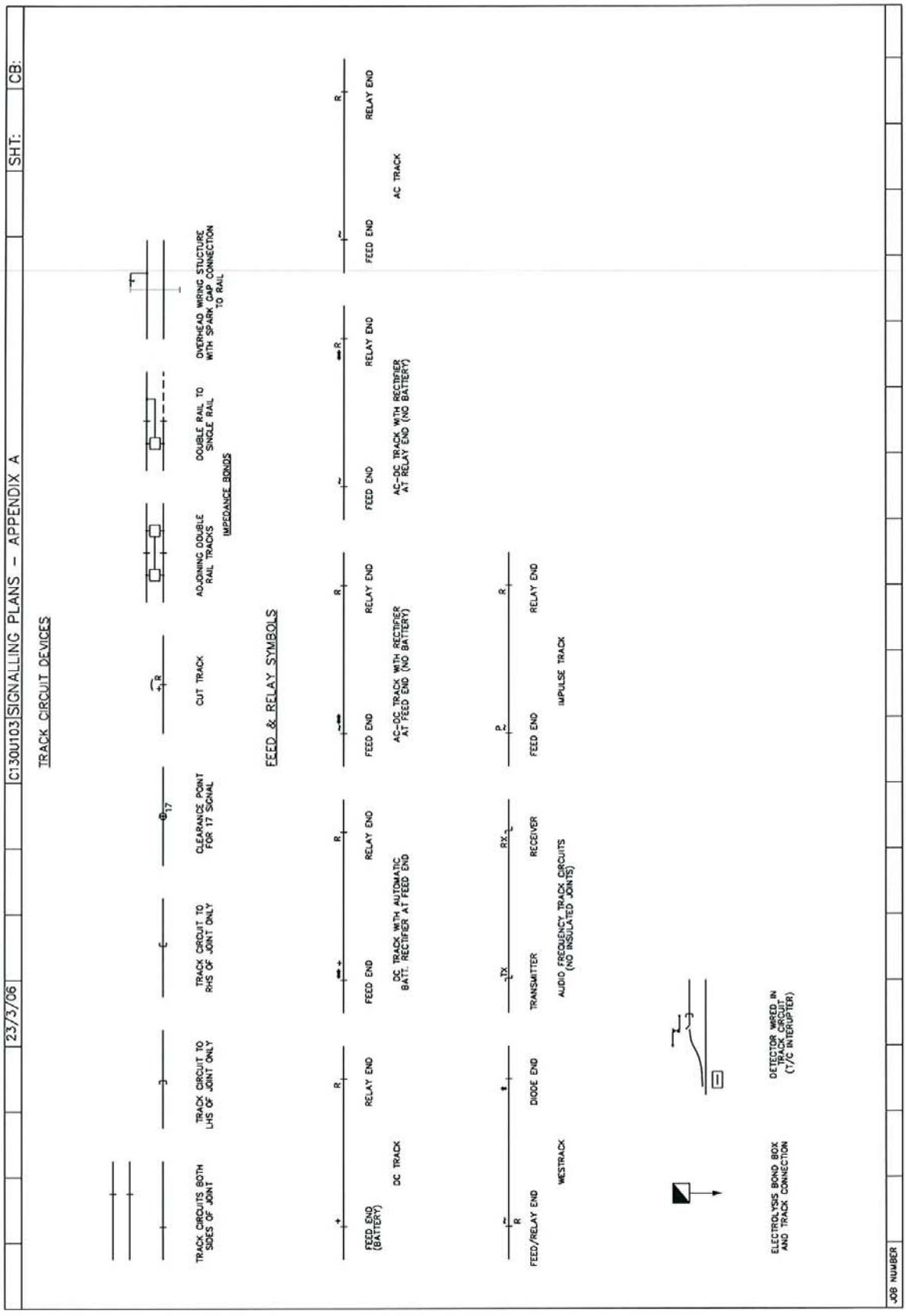
11 Appendix 4: Symbols for Plans & Drawings – NSW Standards

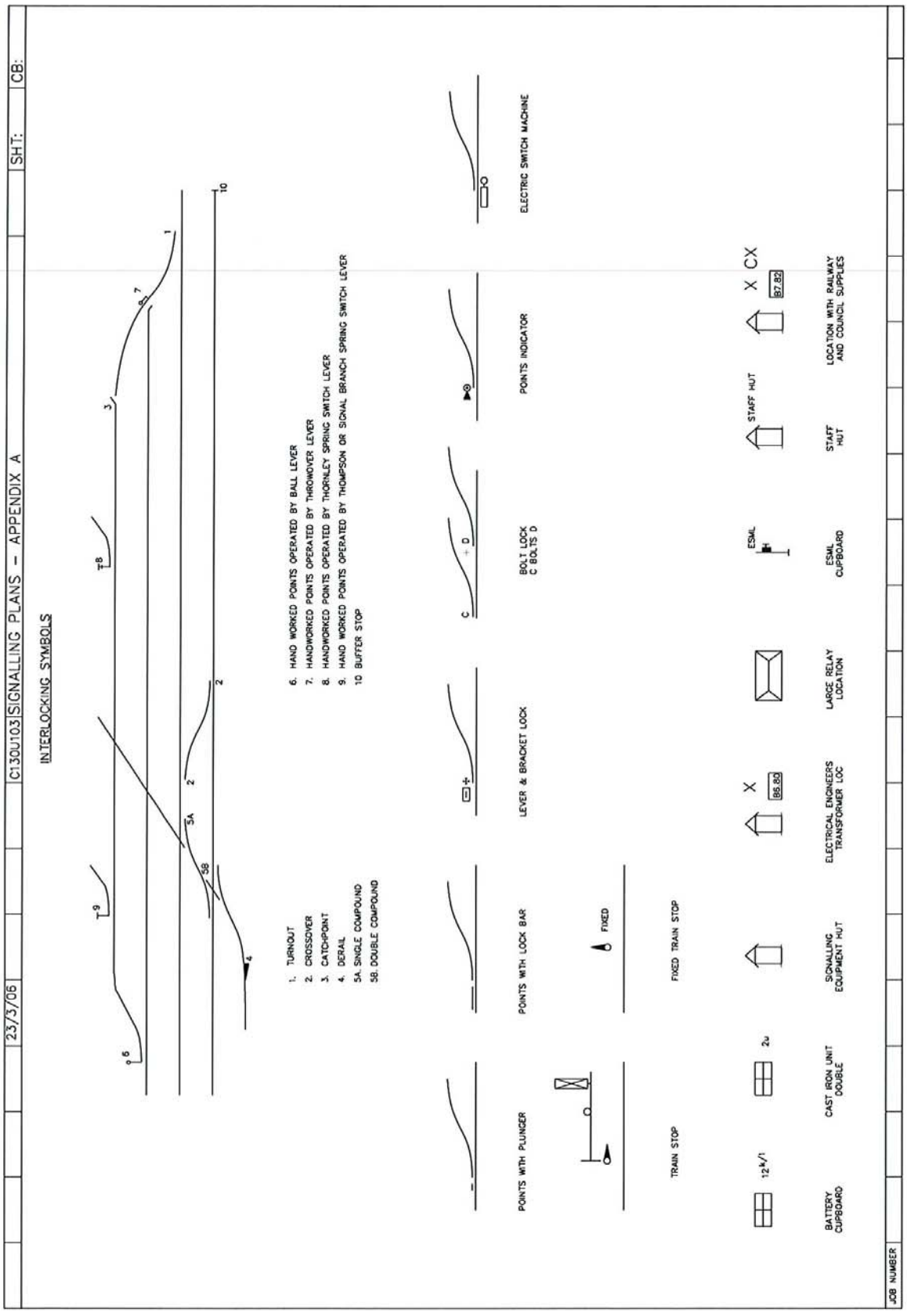
Signalling Plan & Working Sketch Symbols

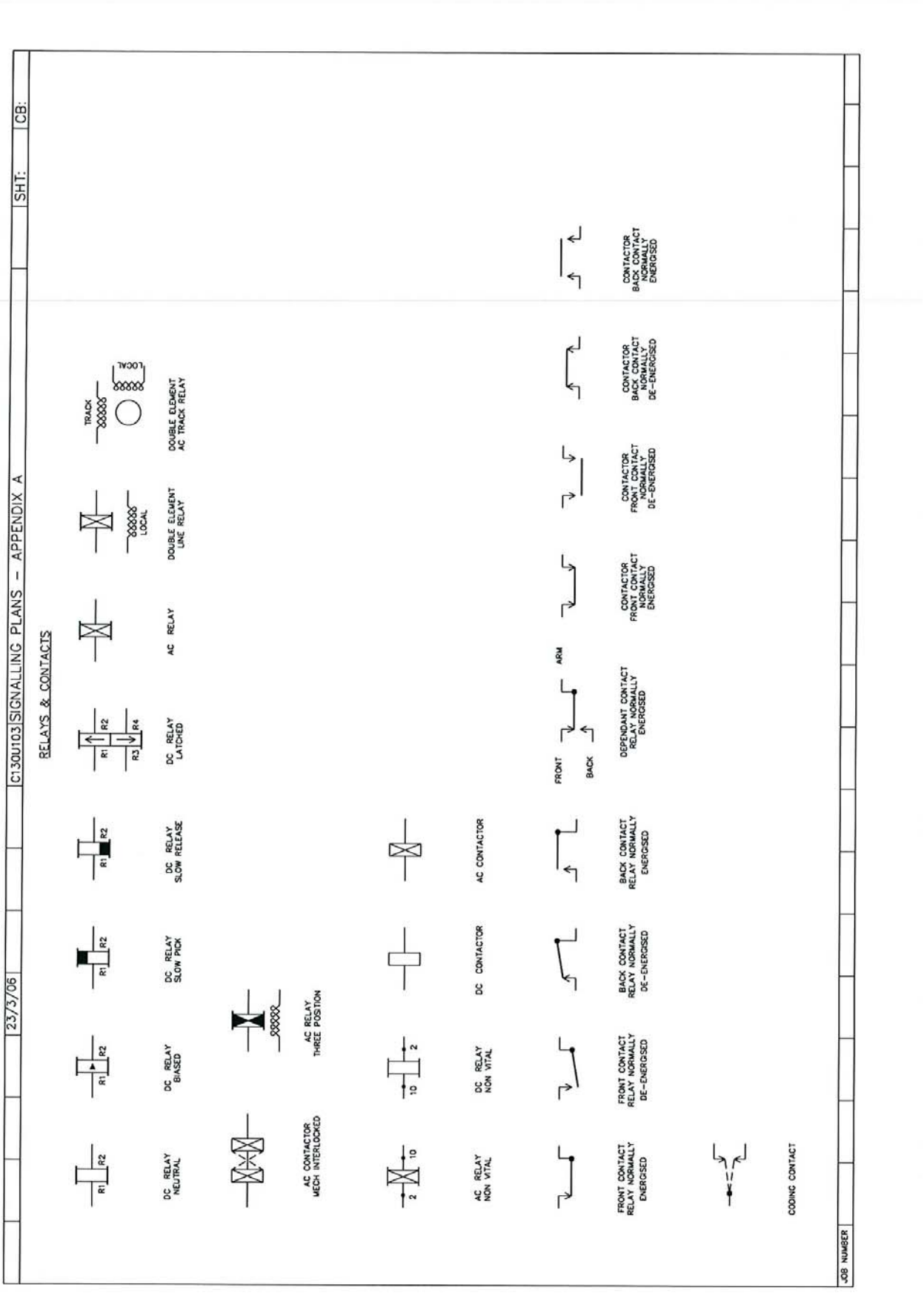

C130U103 SIGNALLING PLANS – APPENDIX A
23/3/06
SHT:
CB:
JOB NUMBER
MECHANICAL SIGNALS
HOME OR STARTING SIGNAL
DISTANT SIGNAL
E.R.
ELECTRICALLY REPEATED TO SIGNAL BOX
SHUNTING SIGNAL
MANUALLY CONTROLLED FROM MORE THAN ONE SIGNAL BOX
FITTED WITH ELECTRICAL REVERSER
BRACKET SIGNAL
OFFSET BRACKET
LOOP SIGNAL
SIGNAL BRIDGE
SHUNTING SIGNALS
DWARF SHUNTING SIGNALS
WRONG ROAD SIGNAL
GROUND DISC SIGNAL
SUBSIDIARY SHUNTING SIGNALS
DEAD END SIGNAL
SHUNT AHEAD SIGNAL
CALL ON SIGNAL
POWER WORKED SIGNALS
LOWER QUADRANT
THREE POSITION UPPER QUADRANT
UPPER QUADRANT (Double Light)
TWO POSITION 0° & 90°
TWO POSITION 0° & 45°
TWO POSITION 45° & 90° (DISTANT SIGNAL)
'A' LIGHT
CALL ON
UPPER QUADRANT (Single Light)
CONTROLLED
MARKER LIGHT
AUTOMATIC
ARM SYMBOLS AS PER DOUBLE LIGHT IND'n.
NOTE: TELEPHONES ARE NOT SHOWN ON WORKING SKETCHES

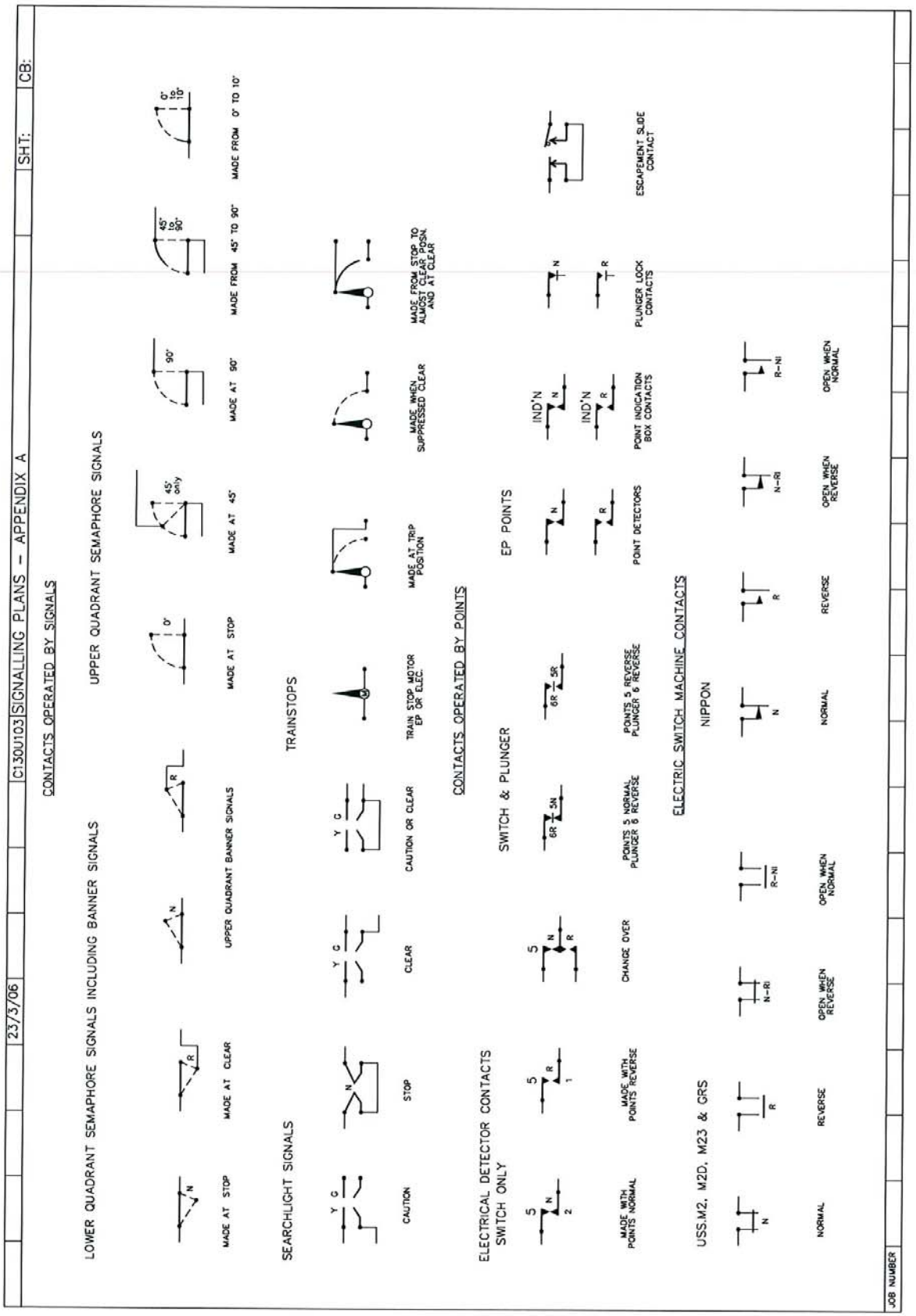

JOB NUMBER
SHT:
CB:
23/3/06
C130U103 SIGNALLING PLANS – APPENDIX A
COLOUR LIGHT SIGNALS
DOUBLE LIGHT INDICATION
CONTROLLED
"STOP" "CAUTION" "CLEAR"
AUTOMATIC
"STOP" "CAUTION" "MEDIUM CAUTION" "CLEAR"
"STOP" "CAUTION" "MEDIUM" "CLEAR"
ACCEPT SIGNAL
SIX LIGHT WITH ROUTE INDICATOR
SIGNAL WITH LOW SPEED
DISTANT SIGNAL
SIGNAL WHICH ONLY CLEARS THRO' TURNOUT
SINGLE LIGHT INDICATION
3 ASPECT "STOP" "CAUTION" "CLEAR"
2 ASPECT
"STOP" "CLEAR"
"STOP" "CAUTION"
DISTANT "CAUTION" "CLEAR"
3 ASPECT AUTOMATIC
3 ASPECT WITH TURNOUT TO LEFT
3 ASPECT WITH TURNOUTS TO LEFT AND RIGHT
3 ASPECT WITH MORE THAN TWO TURNOUTS TO LEFT OR RIGHT
CONTROLLED AUTOMATIC SEARCH LIGHT SIGNAL
SHUNTING SIGNALS
WITH ROUTE IND'R
BANNER SIGNAL
RUNNING SIGNAL WITH SECONDARY BANNER SIGNAL
RELPH DISC
DWARF POSITION LIGHT WITH ROUTE IND'R
DWARF COLOUR LIGHT WITH ROUTE IND'R
SUBSIDIARY SHUNT SIGNAL OR CALL ON
STENCIL TYPE CALL ON
CLOSE UP
TYPE "F" LEVEL CROSSING SIGNALS
SINGLE SIDED
DOUBLE SIDED
WITH HALF BOOM BARRIER
WITH BELL

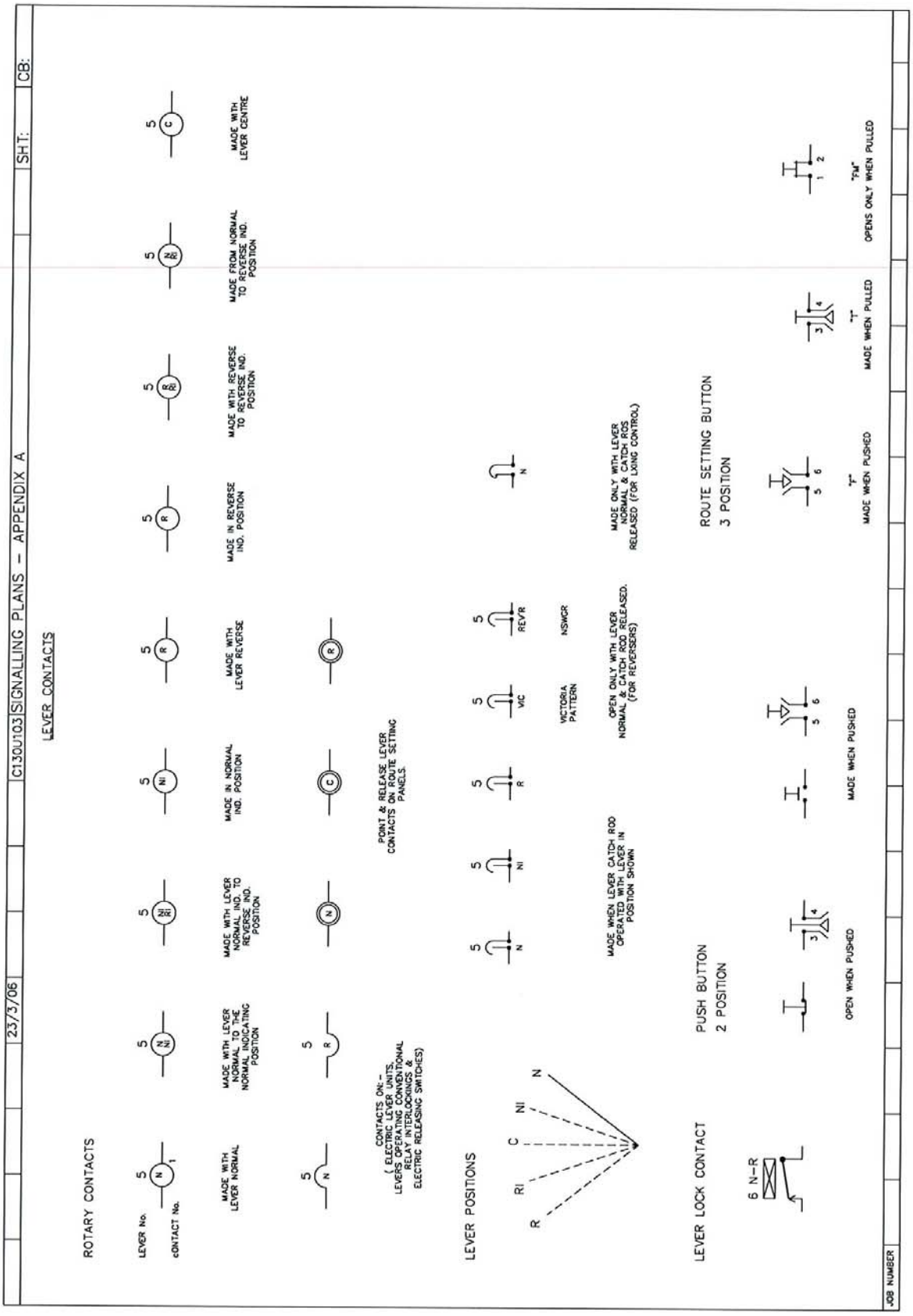

RAILWAY TRACKS
23/3/06
C130U103 SIGNALLING PLANS – APPENDIX A
SHT:
CB:
WAYSIDE BUILDINGS & STRUCTURES
JOB NUMBER
DOUBLE LINE PLANS
SINGLE LINE PLANS
DIRECTION OF TRAFFIC
LEVER AND BRACKET LOCK
BOLT LOCK
ANNETT LOCK
DUPLEX LOCK
DRAWER LOCK KEY RELEASE
OVERBRIDGE
UNDERBRIDGE
TUNNEL
PLATFORM WITH RAMP
SIGNALMAN FACING TRACK
SIGNALMAN FACING AWAY FROM TRACK
SIGNAL BOXES COVERED
4LEVER AND UP FRAME UNCOVERED
FRAME UNDER AWNING
GROUND FRAME 1, 2 & 3 LEVERS No. OF STROKES INDICATES No. OF LEVERS
FRAMES
LEVEL CROSSING NO GATES
LEVEL CROSSING HALF ARM BOOM GATES
LEVEL CROSSING WITH GATES
SIGNAL BRIDGE
FOOTBRIDGE
KILOMETRE POST
45Km
BUFFER STOPS
BUFFER STOP WITH RED LIGHT
BUFFER STOP WITH WHITE OVER RED LIGHT
POINT INDICATOR
CLEARANCE POINT
TELEPHONES
WITH TELEPHONE
ELECTRIC RELEASING SWITCHES
27 C/144
BRAKES LANDMARK
SPEED BOARD IN Km/H
SPEED BOARD IN Km/H
STAFF EXCHANGER
LANDMARK
LEVEL CROSSING APPROACH NOTICE (LOCATED AT START OF LEVEL CROSSING CONTROL)
ELECTRICAL TRACTION STRUCTURES
NOTICE BOARD

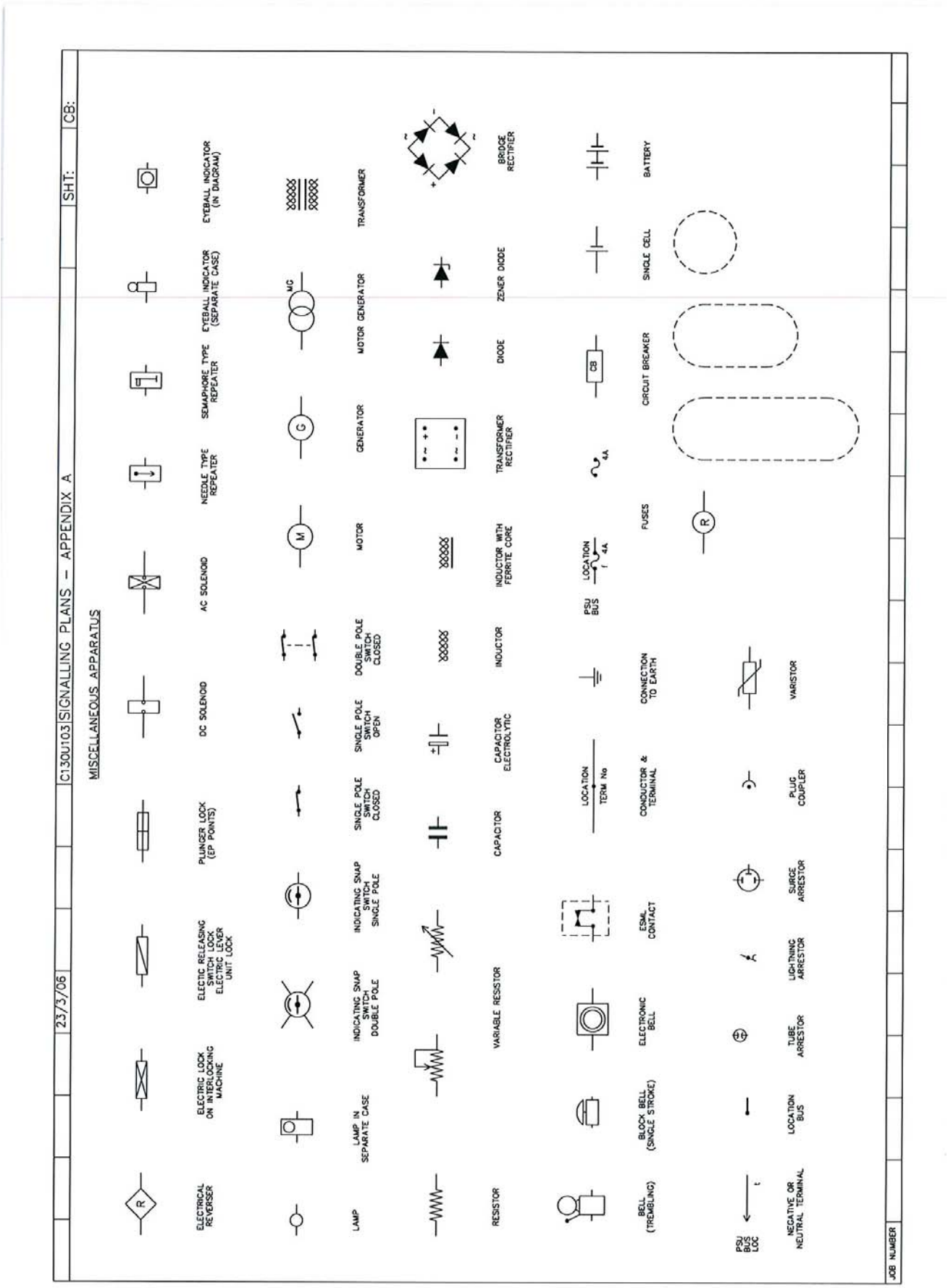

C130U103 SIGNALLING PLANS – APPENDIX A
23/3/06
SHT:
CB:
JOB NUMBER
TRACK CIRCUIT DEVICES
FEED & RELAY SYMBOLS
TRACK CIRCUITS BOTH SIDES OF JOINT
TRACK CIRCUIT TO LHS OF JOINT ONLY
TRACK CIRCUIT TO RHS OF JOINT ONLY
CLEARANCE POINT FOR 17 SIGNAL
CUT TRACK
ADJOINING DOUBLE RAIL TRACKS
IMPEDANCE BONDS
DOUBLE RAIL TO SINGLE RAIL
OVERHEAD WIRING STUCTURE WITH SPARK GAP CONNECTION TO RAIL
FEED END (BATTERY)
RELAY END
DC TRACK
DC TRACK WITH AUTOMATIC BATT. RECTIFIER AT FEED END
FEED END
RELAY END
AC-DC TRACK WITH RECTIFIER AT FEED END (NO BATTERY)
FEED END
RELAY END
AC-DC TRACK WITH RECTIFIER AT RELAY END (NO BATTERY)
FEED END
RELAY END
AC TRACK
FEED/RELAY END
DIODE END
WESTRACK
TRANSMITTER
RECEIVER
AUDIO FREQUENCY TRACK CIRCUITS (NO INSULATED JOINTS)
FEED END
RELAY END
IMPULSE TRACK
ELECTROLYSIS BOND BOX AND TRACK CONNECTION
DETECTOR WIRED IN TRACK CIRCUIT (T/C INTERRUPTER)


23/3/06
C130U103 SIGNALLING PLANS – APPENDIX A
SHT:
CB:
INTERLOCKING SYMBOLS
1. TURNOUT
2. CROSSOVER
3. CATCHPOINT
4. DERAIL
5A. SINGLE COMPOUND
5B. DOUBLE COMPOUND
6. HAND WORKED POINTS OPERATED BY BALL LEVER
7. HANDWORKED POINTS OPERATED BY THROWOVER LEVER
8. HANDWORKED POINTS OPERATED BY THORNLEY SPRING SWITCH LEVER
9. HAND WORKED POINTS OPERATED BY THOMPSON OR SIGNAL BRANCH SPRING SWITCH LEVER
10 BUFFER STOP
ELECTRIC SWITCH MACHINE
POINTS INDICATOR
BOLT LOCK C BOLTS D
STAFF HUT
LOCATION WITH RAILWAY AND COUNCIL SUPPLIES
ESML CUPBOARD
LARGE RELAY LOCATION
ELECTRICAL ENGINEERS TRANSFORMER LOC
SIGNALLING EQUIPMENT HUT
CAST IRON UNIT DOUBLE
BATTERY CUPBOARD
POINTS WITH PLUNGER
POINTS WITH LOCK BAR
LEVER & BRACKET LOCK
FIXED
FIXED TRAIN STOP
TRAIN STOP
ESML
STAFF HUT
X
X CX
JOB NUMBER

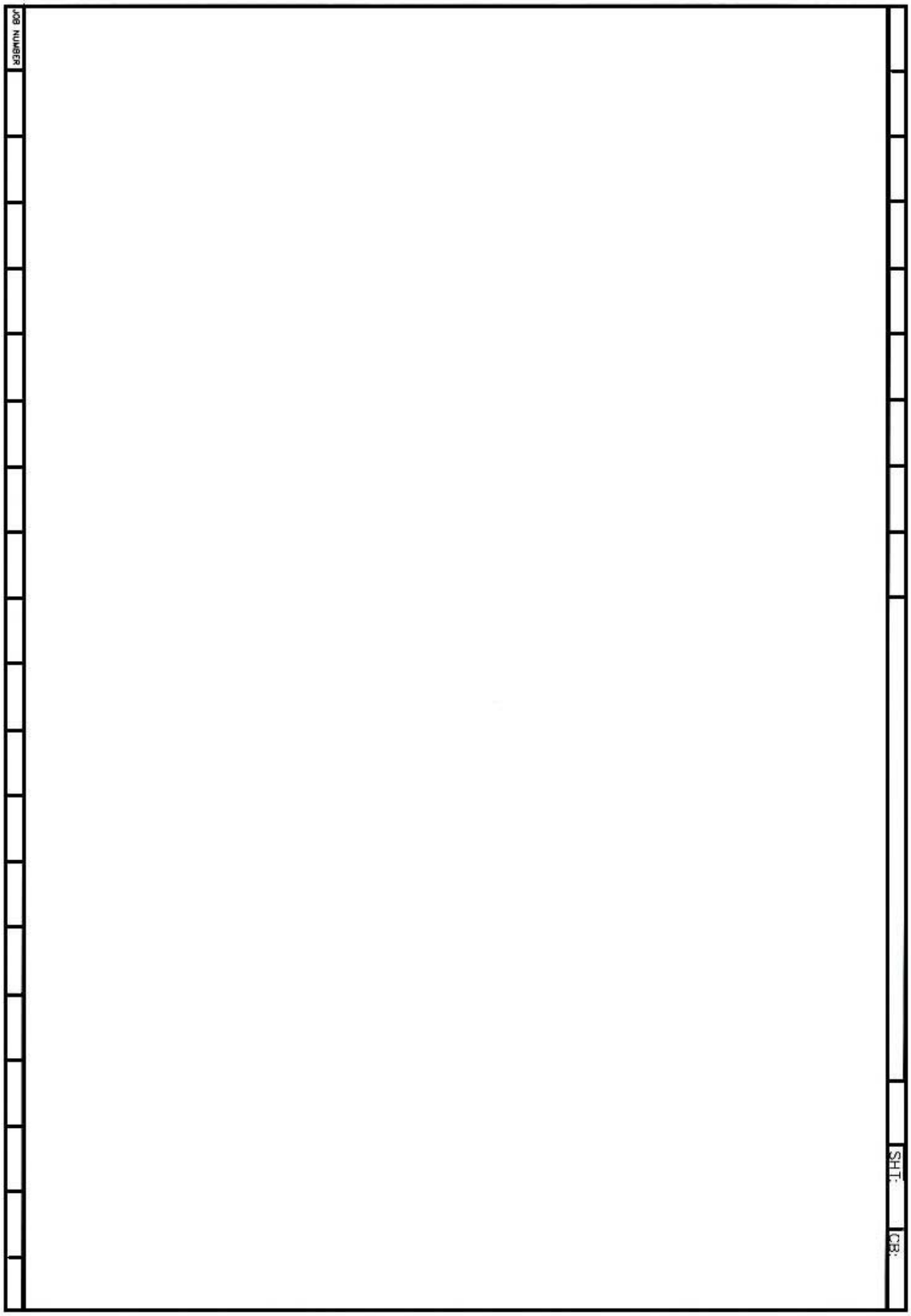

23/3/06
C130U103 SIGNALLING PLANS – APPENDIX A
SHT:
CB:
RELAYS & CONTACTS
DC RELAY NEUTRAL
DC RELAY BIASED
DC RELAY SLOW PICK
DC RELAY SLOW RELEASE
DC RELAY LATCHED
AC RELAY
DOUBLE ELEMENT LINE RELAY
DOUBLE ELEMENT AC TRACK RELAY
TRACK
LOCAL
AC CONTACTOR MECH INTERLOCKED
AC RELAY THREE POSITION
AC CONTACTOR
DC CONTACTOR
AC RELAY NON VITAL
DC RELAY NON VITAL
FRONT CONTACT RELAY NORMALLY ENERGISED
FRONT CONTACT RELAY NORMALLY DE-ENERGISED
BACK CONTACT RELAY NORMALLY DE-ENERGISED
BACK CONTACT RELAY NORMALLY ENERGISED
DEPENDANT CONTACT RELAY NORMALLY ENERGISED
FRONT
BACK
ARM
CONTACTOR FRONT CONTACT NORMALLY ENERGISED
CONTACTOR FRONT CONTACT NORMALLY DE-ENERGISED
CONTACTOR BACK CONTACT NORMALLY DE-ENERGISED
CONTACTOR BACK CONTACT NORMALLY ENERGISED
CODING CONTACT
JOB NUMBER


JOB NUMBER
C130U103 SIGNALLING PLANS – APPENDIX A
23/3/06
SHT:
CB:
CONTACTS OPERATED BY SIGNALS
LOWER QUADRANT SEMAPHORE SIGNALS INCLUDING BANNER SIGNALS
UPPER QUADRANT SEMAPHORE SIGNALS
MADE AT STOP
MADE AT CLEAR
UPPER QUADRANT BANNER SIGNALS
MADE AT STOP
MADE AT 45°
MADE AT 90°
MADE FROM 45° TO 90°
MADE FROM 0° TO 10°
SEARCHLIGHT SIGNALS
TRAINSTOPS
CAUTION
STOP
CLEAR
CAUTION OR CLEAR
TRAIN STOP MOTOR EP OR ELEC.
MADE AT TRIP POSITION
MADE WHEN SUPPRESSED CLEAR
MADE FROM STOP TO ALMOST CLEAR POSN. AND AT CLEAR
CONTACTS OPERATED BY POINTS
ELECTRICAL DETECTOR CONTACTS
SWITCH ONLY
MADE WITH POINTS NORMAL
MADE WITH POINTS REVERSE
CHANGE OVER
POINTS 5 NORMAL PLUNGER 6 REVERSE
POINTS 5 REVERSE PLUNGER 6 REVERSE
POINT DETECTORS
POINT INDICATION BOX CONTACTS
PLUNGER LOCK CONTACTS
ESCAPEMENT SLIDE CONTACT
SWITCH & PLUNGER
EP POINTS
IND'N
USS.M2, M2D, M23 & GRS
NORMAL
REVERSE
OPEN WHEN REVERSE
OPEN WHEN NORMAL
NIPPON
ELECTRIC SWITCH MACHINE CONTACTS

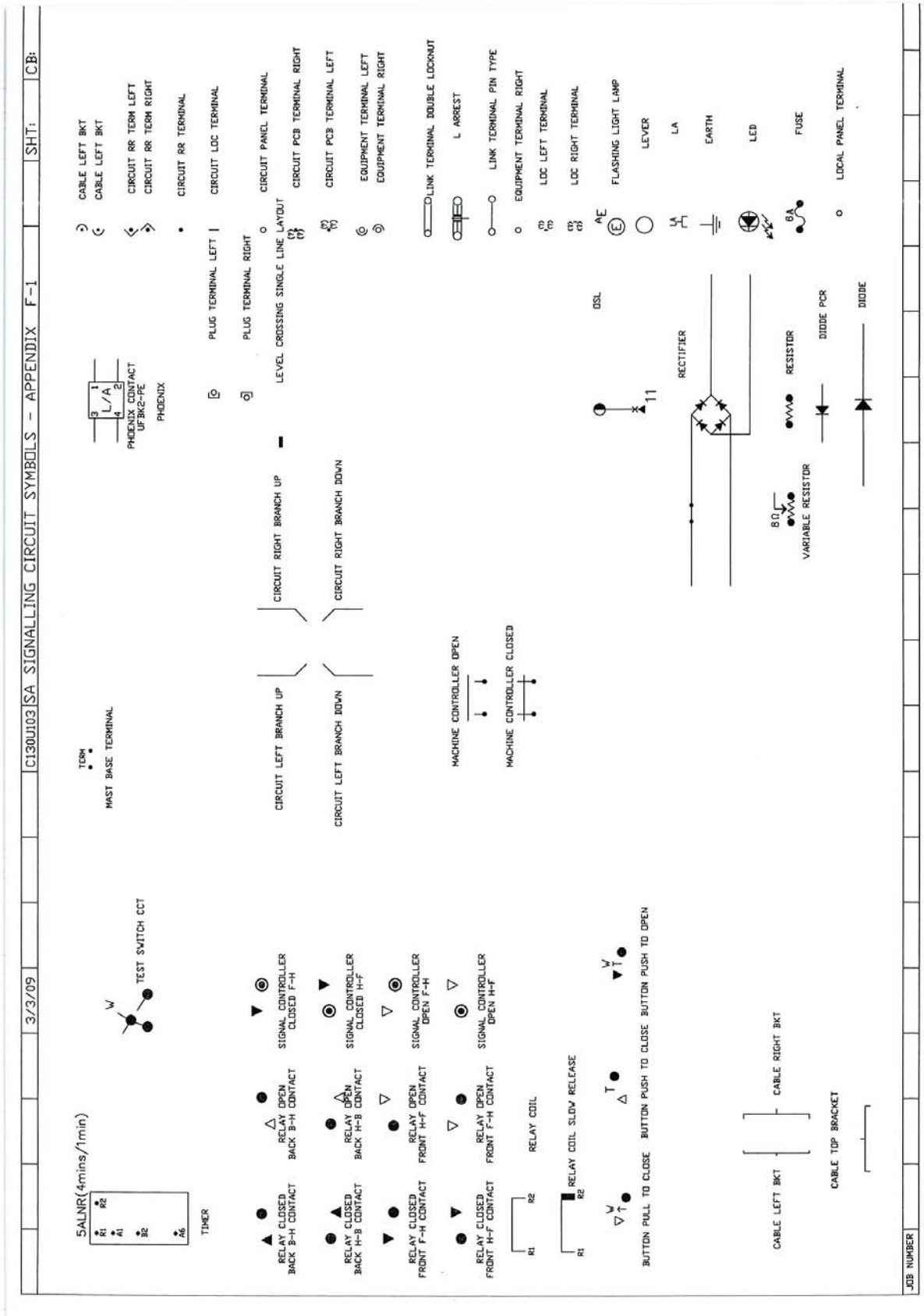

JOB NUMBER
C130U103 SIGNALLING PLANS – APPENDIX A
23/3/06
SHT:
CB:
LEVER CONTACTS
ROTARY CONTACTS
LEVER No.
CONTACT No.
MADE WITH LEVER NORMAL
MADE WITH LEVER NORMAL TO THE NORMAL INDICATING POSITION
MADE WITH LEVER NORMAL IND. TO REVERSE IND. POSITION
MADE IN NORMAL IND. POSITION
MADE WITH LEVER REVERSE
MADE IN REVERSE IND. POSITION
MADE WITH REVERSE TO REVERSE IND. POSITION
MADE FROM NORMAL TO REVERSE IND. POSITION
MADE WITH LEVER CENTRE
CONTACTS ON:-
(ELECTRIC LEVER UNITS,
LEVERS OPERATING CONVENTIONAL
RELAY INTERLOCKINGS &
ELECTRIC RELEASING SWITCHES)
POINT & RELEASE LEVER CONTACTS ON ROUTE SETTING PANELS
LEVER POSITIONS
N
NI
C
RI
R
MADE WHEN LEVER CATCH ROD OPERATED WITH LEVER IN POSITION SHOWN
VICTORIA PATTERN
NSWGR
OPEN ONLY WITH LEVER NORMAL & CATCH ROD RELEASED. (FOR REVERSERS)
MADE ONLY WITH LEVER NORMAL & CATCH ROD RELEASED (FOR LXING CONTROL)
LEVER LOCK CONTACT
6 N-R
PUSH BUTTON
2 POSITION
OPEN WHEN PUSHED
MADE WHEN PUSHED
ROUTE SETTING BUTTON
3 POSITION
"N" MADE WHEN PUSHED
"R" MADE WHEN PULLED
"N" OPENS ONLY WHEN PULLED

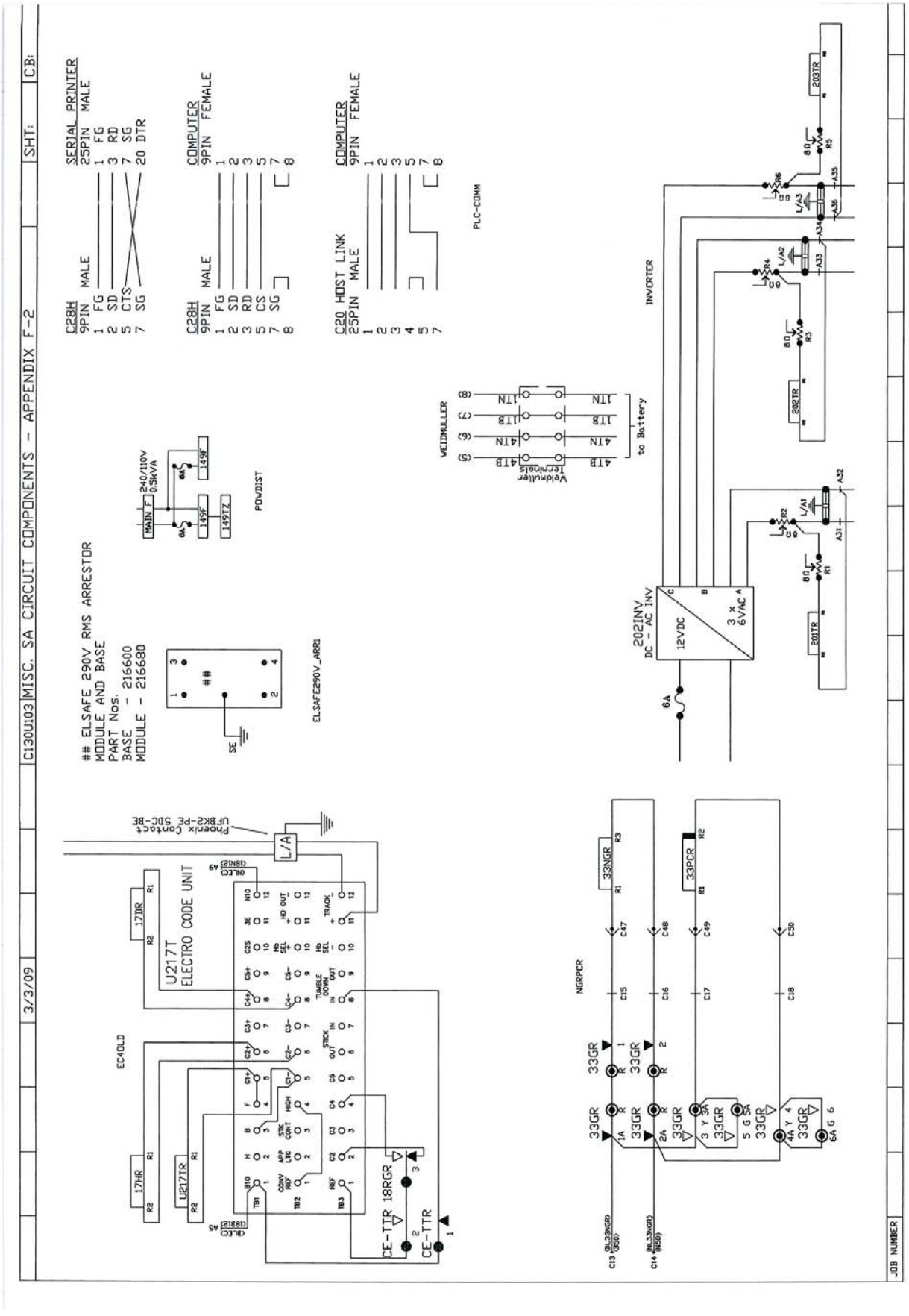

C130U103 SIGNALLING PLANS – APPENDIX A
23/3/06
SHT:
CB:
MISCELLANEOUS APPARATUS
ELECTRICAL REVERSER
ELECTRIC LOCK ON INTERLOCKING MACHINE
ELECTRIC RELEASING SWITCH LOCK ELECTRIC LEVER UNIT LOCK
PLUNGER LOCK (EP POINTS)
DC SOLENOID
AC SOLENOID
NEEDLE TYPE REPEATER
SEMAPHORE TYPE REPEATER
EYEBALL INDICATOR (SEPARATE CASE)
EYEBALL INDICATOR (IN DIAGRAM)
LAMP
LAMP IN SEPARATE CASE
INDICATING SNAP SWITCH DOUBLE POLE
INDICATING SNAP SWITCH SINGLE POLE
SINGLE POLE SWITCH CLOSED
SINGLE POLE SWITCH OPEN
DOUBLE POLE SWITCH CLOSED
MOTOR
GENERATOR
MOTOR GENERATOR
TRANSFORMER
RESISTOR
VARIABLE RESISTOR
CAPACITOR
CAPACITOR ELECTROLYTIC
INDUCTOR
INDUCTOR WITH FERRITE CORE
TRANSFORMER RECTIFIER
DIODE
ZENER DIODE
BRIDGE RECTIFIER
BELL (TREMBLING)
BLOCK BELL (SINGLE STROKE)
ELECTRONIC BELL
ESAL CONTACT
LOCATION TERM No
CONDUCTOR & TERMINAL
CONNECTION TO EARTH
PSU BUS
LOCATION
FUSES
CIRCUIT BREAKER
SINGLE CELL
BATTERY
NEGATIVE OR NEUTRAL TERMINAL
LOCATION BUS
TUBE ARRESTOR
LIGHTNING ARRESTOR
SURGE ARRESTOR
PLUG COUPLER
VARISTOR
PSU BUS LOC
JOB NUMBER

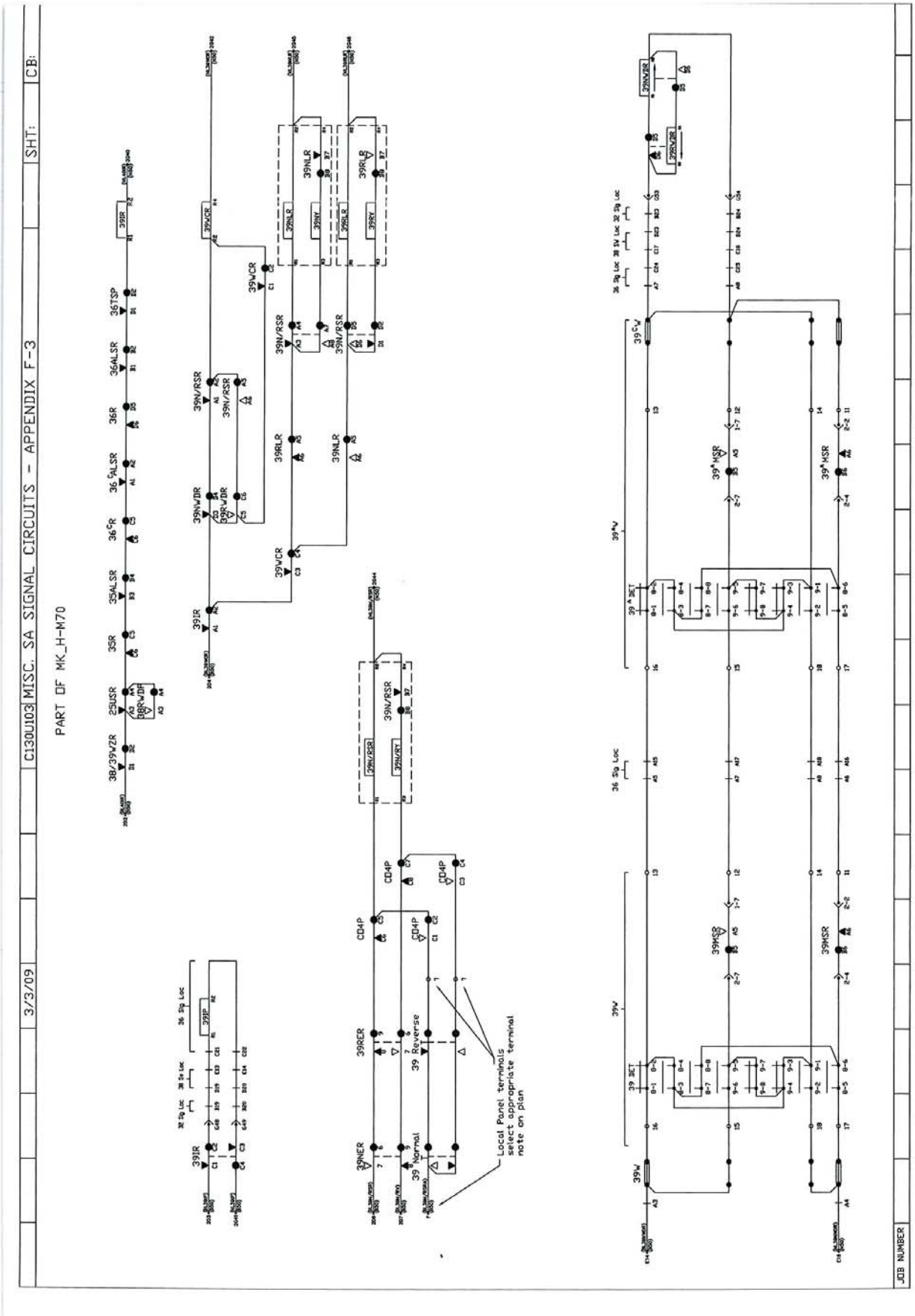
12 Appendix 5: Drawing Template – ACAD.DWG

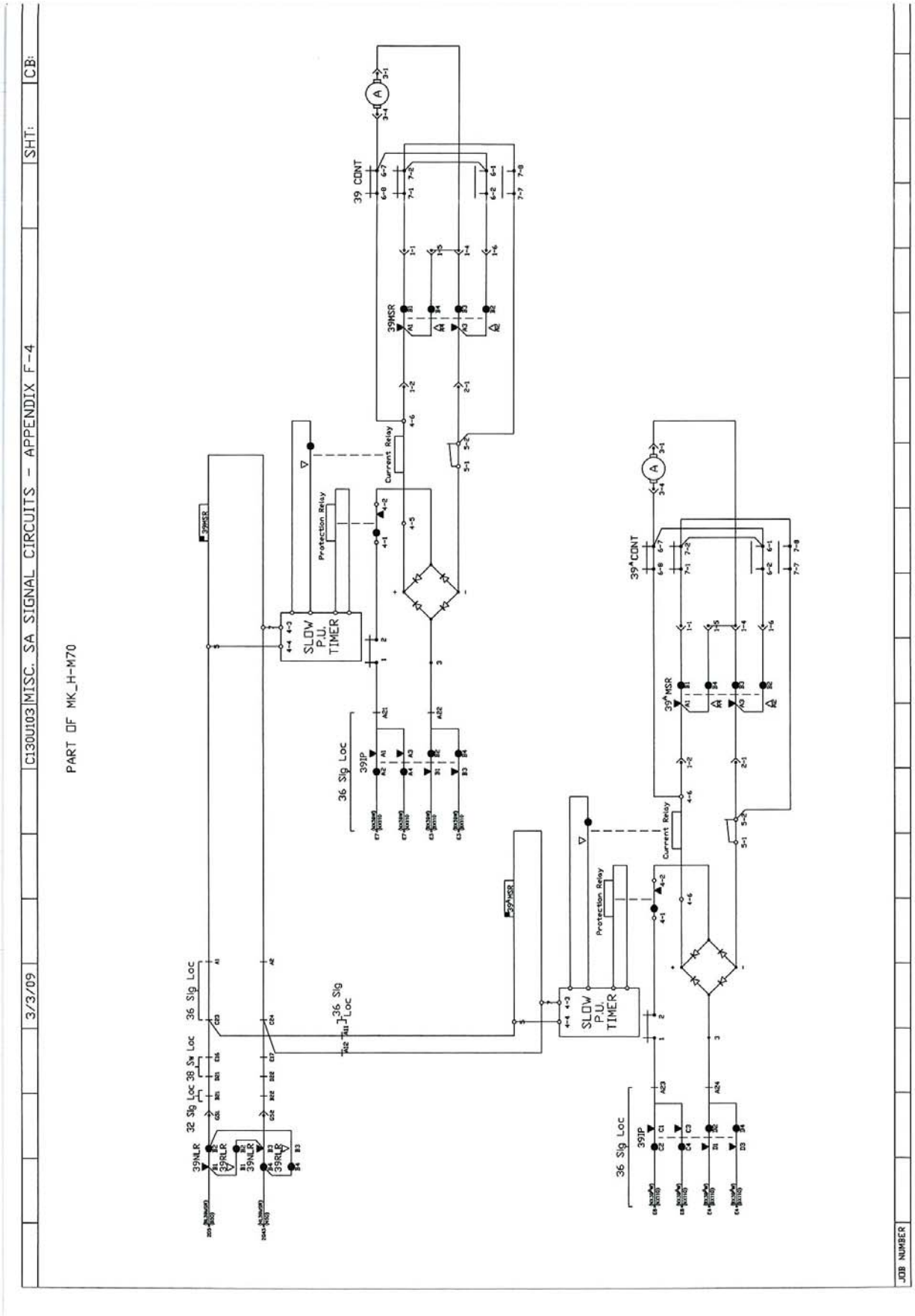


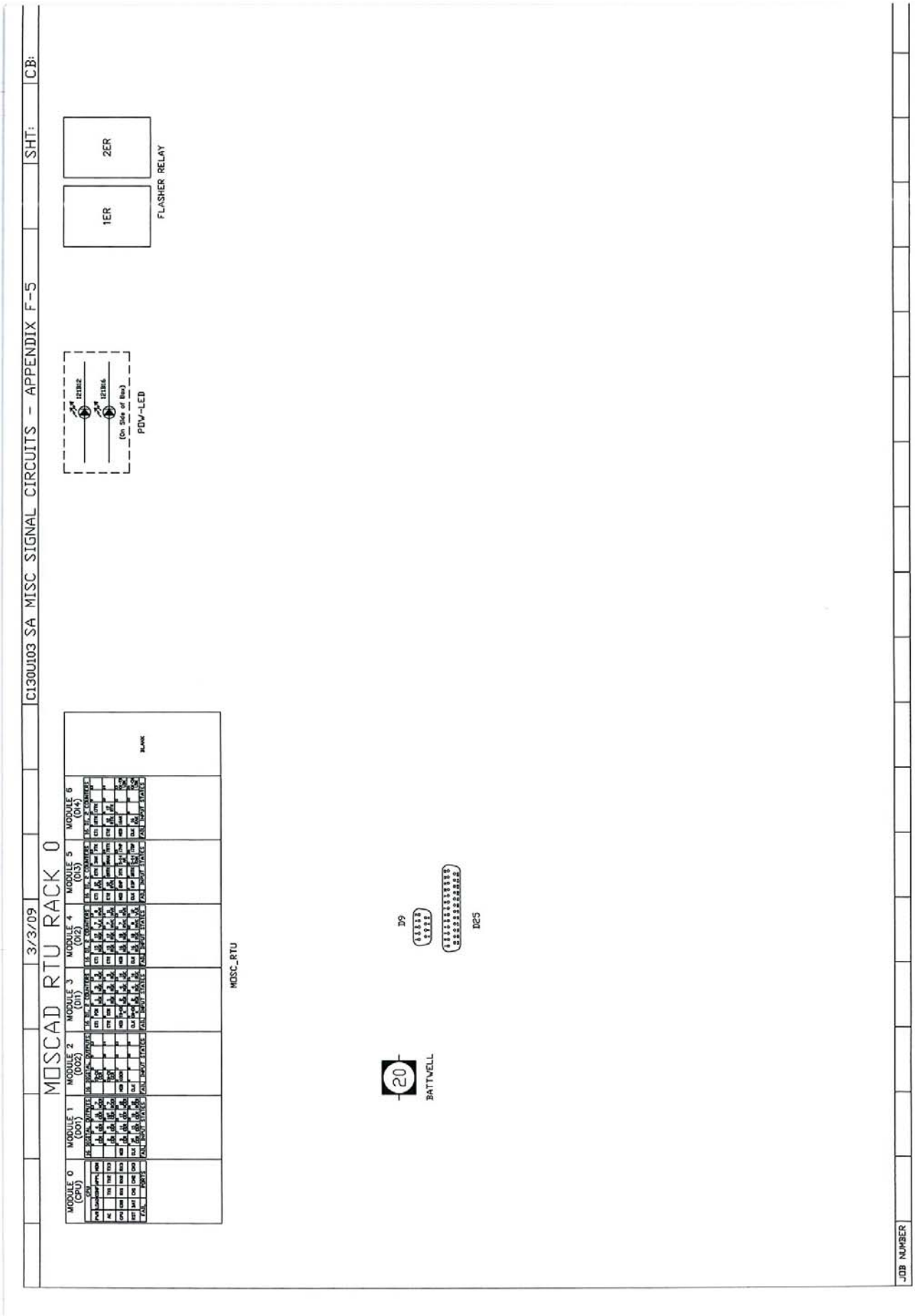
13 Appendix 6: Symbols for Plans & Drawings – SA Standards

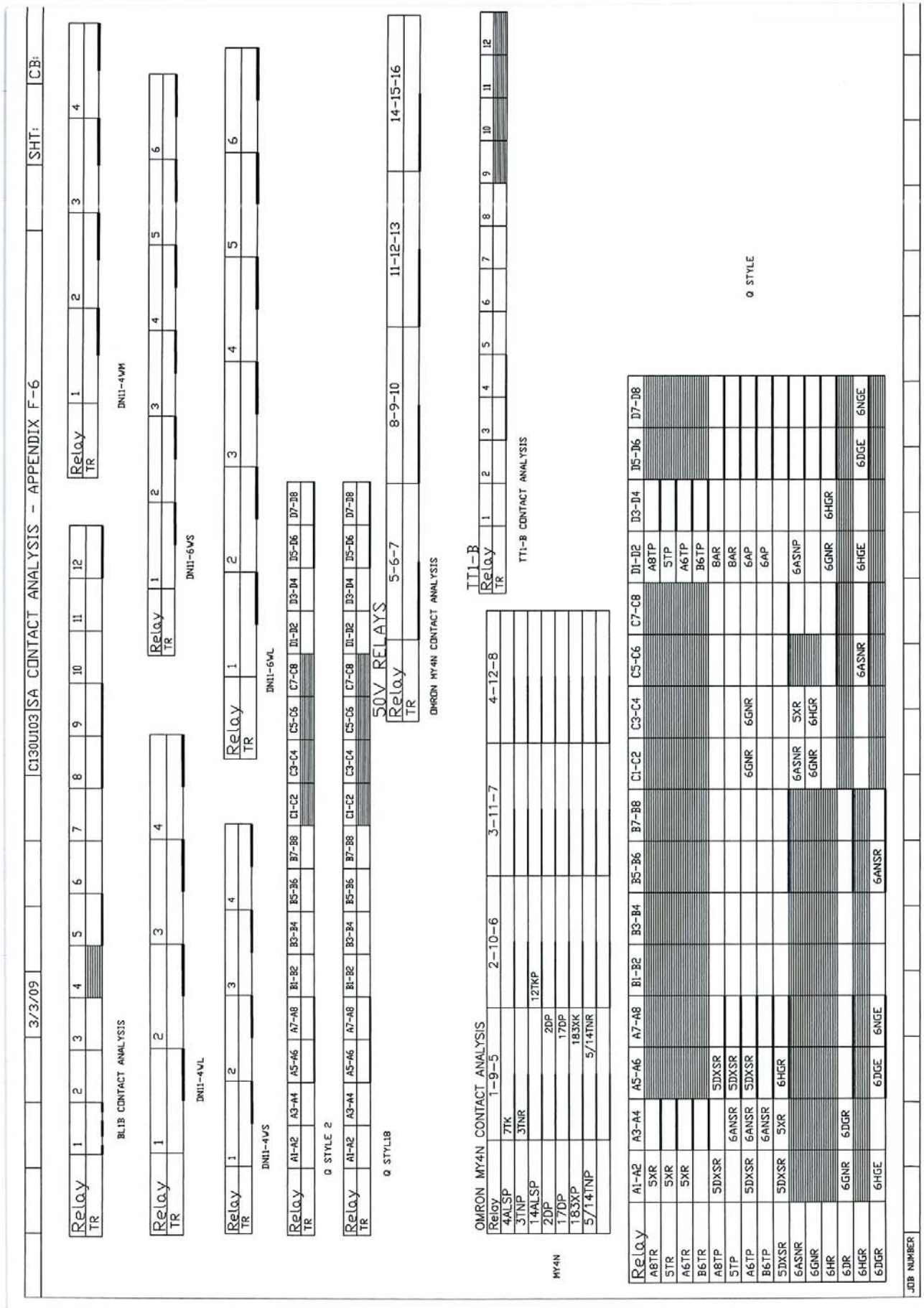


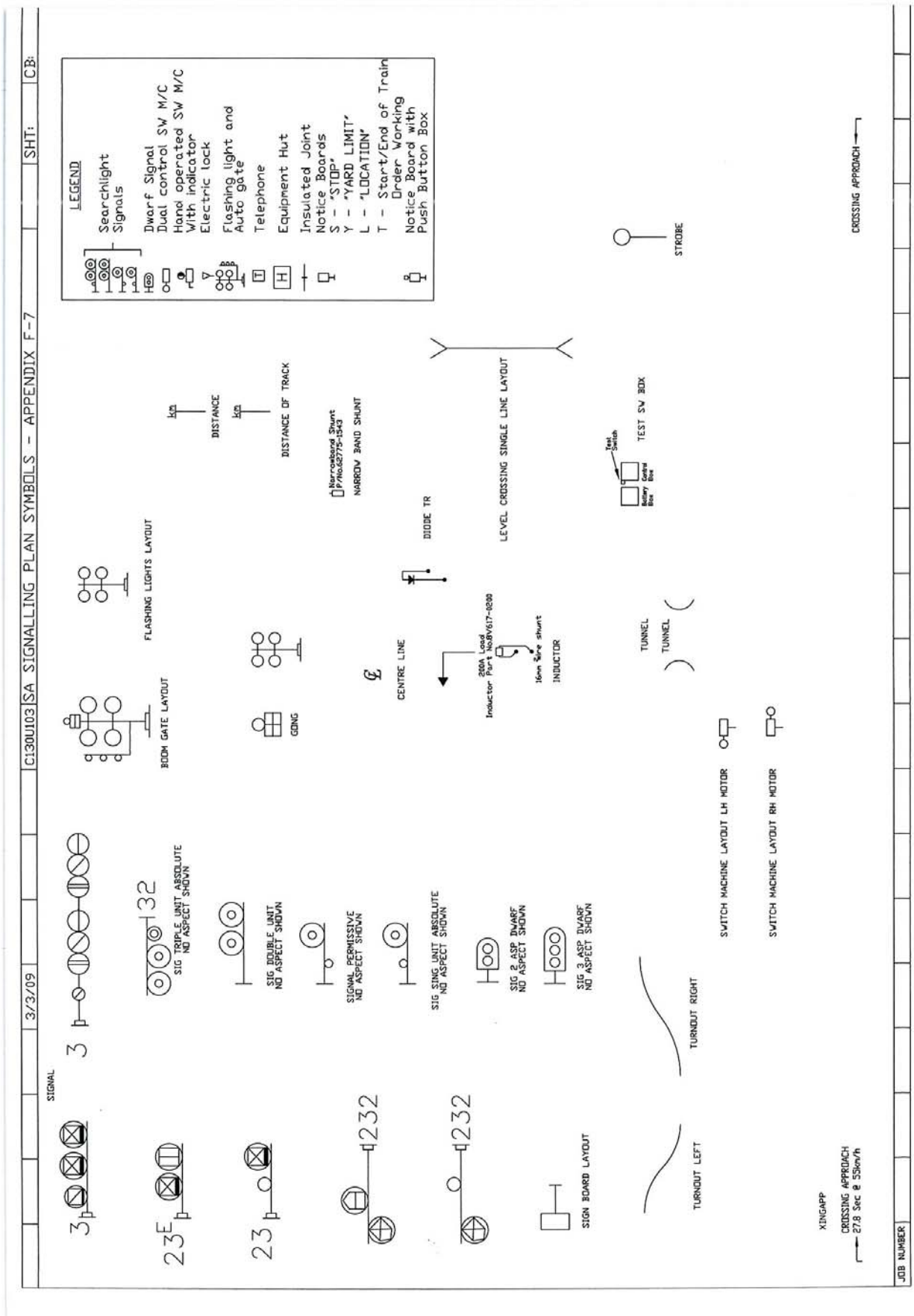

C130U103 MISC. SA CIRCUIT COMPONENTS - APPENDIX F-2
3/3/09
SHT:
CB:
SERIAL PRINTER
25PIN MALE
1 FG
2 SD
3 RD
7 SG
20 DTR
COMPUTER
9PIN FEMALE
C28H
9PIN MALE
1 FG
2 SD
3 RD
5 CS
7 SG
8
C20 HOST LINK
25PIN MALE
PLC-COMM
INVERTER
VEIDMULLER
to Battery
ELSAFE 290V RMS ARRESTOR
MODULE AND BASE
PART Nos.
BASE - 216600
MODULE - 216680
ELSAFE290V_ARR1
PDV/DIST
240/110V
0.5KVA
MAIN F
149F
149FZ
2021NV
DC - AC INV
12VDC
3 x
6VAC
U217T
ELECTRO CODE UNIT
EC4QLD
Phoenix Contact
UFBK2-PE SDC-BE
CE-TTR 18RGR
CE-TTR
33NGR
33PCR
33GR
NGRPCR
203TR
202TR
201TR
17DR
17HR
U217TR
JOB NUMBER

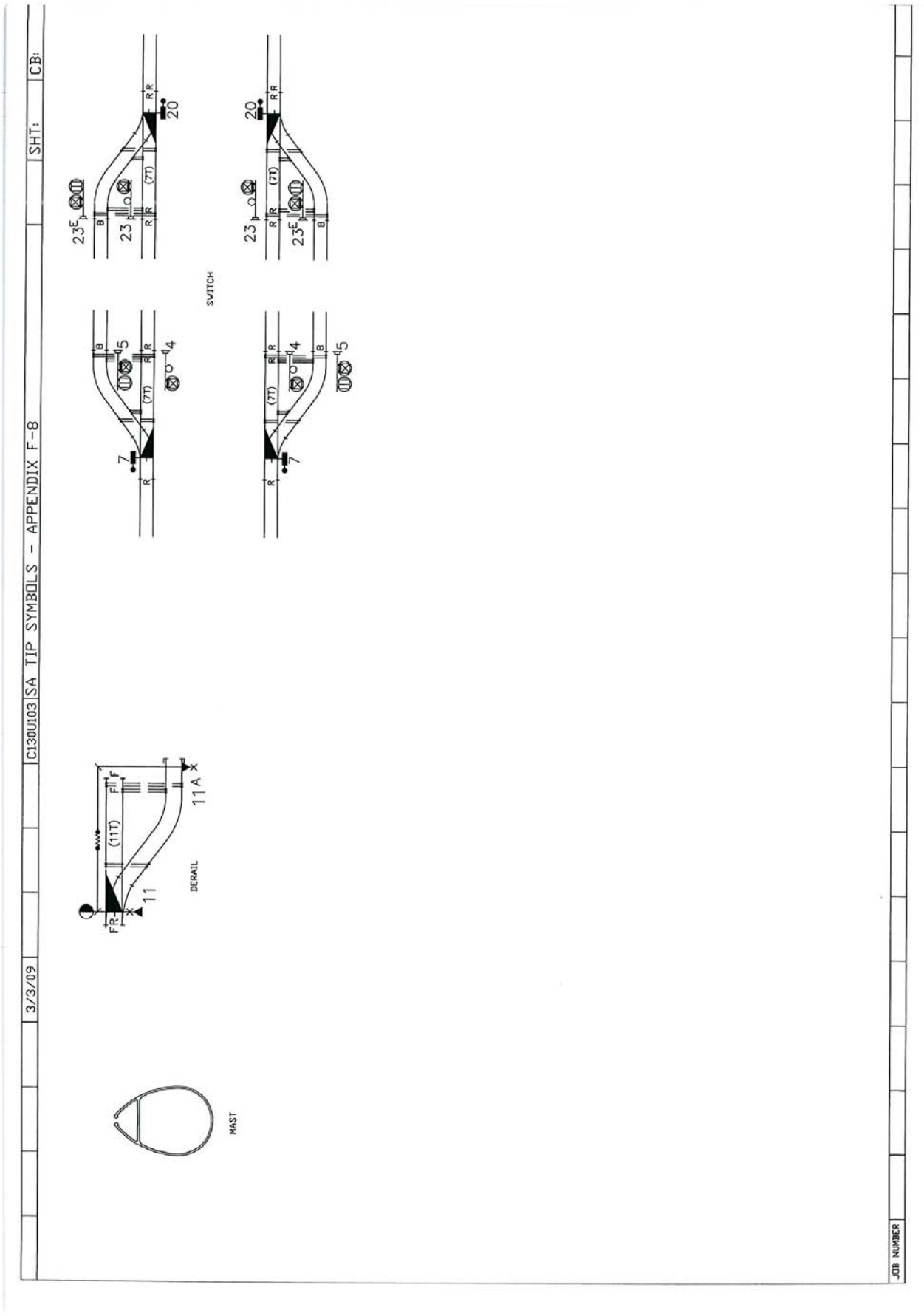

C130U103 MISC. SA SIGNAL CIRCUITS - APPENDIX F-3
3/3/09
SHT:
CB:
PART OF MK_H-M70
JOB NUMBER
Local Panel terminals select appropriate terminal note on plan
39 Reverse
39 Normal


C130U103 MISC. SA SIGNAL CIRCUITS - APPENDIX F-4
3/3/09
SHT:
CB:
PART OF MK_H-M70
39 CONT
39MSR
Current Relay
Protection Relay
SLOW P.U. TIMER
36 Sig Loc
39IP
39 CONT
39MSR
Current Relay
Protection Relay
SLOW P.U. TIMER
36 Sig Loc
36 Sig Loc
32 Sig Loc
38 Sw Loc
36 Sig Loc
39NLR
39RLR
39NLR
39RLR
36 Sig Loc
39IP
JOB NUMBER


MOSCAD RTU RACK 0
3/3/09
C130U103 SA MISC SIGNAL CIRCUITS - APPENDIX F-5
SHT:
CB:
MODULE 0 (CPU)
MODULE 1 (001)
MODULE 2 (002)
MODULE 3 (011)
MODULE 4 (012)
MODULE 5 (013)
MODULE 6 (014)
BLANK
MOSC_RTU
PDV-LED
1ER
2ER
FLASHER RELAY
20
BATTWELL
D9
D25
JOB NUMBER


3/3/09
C130U103 SA CONTACT ANALYSIS - APPENDIX F-6
SHT:
CB:
BL1B CONTACT ANALYSIS
DN11-4VL
DN11-4VS
DN11-6VL
DN11-6VS
DN11-4VM
Q STYLE 2
Q STYL1B
50V RELAYS
OMRON MY4N CONTACT ANALYSIS
TTi-B
TTi-B CONTACT ANALYSIS
Q STYLE
MY4N
JOB NUMBER


C130U103 SA SIGNALLING PLAN SYMBOLS - APPENDIX F-7
3/3/09
SHT:
CB:
LEGEND
Searchlight Signals
Dwarf Signal
Dual control SW M/C
Hand operated SW M/C
With indicator
Electric lock
Flashing light and Auto gate
Telephone
Equipment Hut
Insulated Joint
Notice Boards
S - "STOP"
Y - "YARD LIMIT"
L - "LOCATION"
T - Start/End of Train Order Working
Notice Board with Push Button Box
SIGNAL
SIG TRIPLE UNIT ABSOLUTE NO ASPECT SHOWN
SIG DOUBLE UNIT NO ASPECT SHOWN
SIGNAL PERMISSIVE NO ASPECT SHOWN
SIG SING UNIT ABSOLUTE NO ASPECT SHOWN
SIG 2 ASP DWARF NO ASPECT SHOWN
SIG 3 ASP DWARF NO ASPECT SHOWN
SIGN BOARD LAYOUT
BOOM GATE LAYOUT
FLASHING LIGHTS LAYOUT
GONG
CENTRE LINE
200A Load Inductor Part No.BV617-0200
16mm Wire shunt
INDUCTOR
DIODE TR
TUNNEL
TUNNEL
LEVEL CROSSING SINGLE LINE LAYOUT
TEST SW BOX
Test Switch
Battery Control Box
STROBE
DISTANCE
DISTANCE OF TRACK
Narrowband Shunt P/No.62775-1543
NARROW BAND SHUNT
TURNOUT LEFT
TURNOUT RIGHT
SWITCH MACHINE LAYOUT LH MOTOR
SWITCH MACHINE LAYOUT RH MOTOR
XINGAPP
CROSSING APPROACH
27.8 Sec @ 55km/h
CROSSING APPROACH
JOB NUMBER

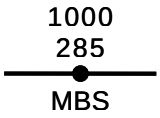

C130U103 SA TIP SYMBOLS - APPENDIX F-8
3/3/09
SHT:
CB:
JOB NUMBER
SWITCH
DERAIL
MAST

14 Appendix 7: Signalling Symbols for Grade Predictors

14.1 Signalling Plan Symbols for Grade Predictors

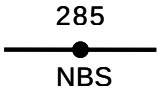
BI-DIRECTIONAL TRACK & FREQUENCY
ISLAND FREQUENCY

UNI-DIRECTIONAL TRACK & FREQUENCY
NO ISLAND

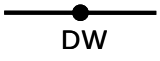


MULTIBAND SHUNT WITH FREQUENCY & LENGTH COMPENSATION

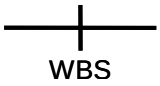
WIDE BAND SHUNT



NARROW BAND SHUNT & FREQUENCY

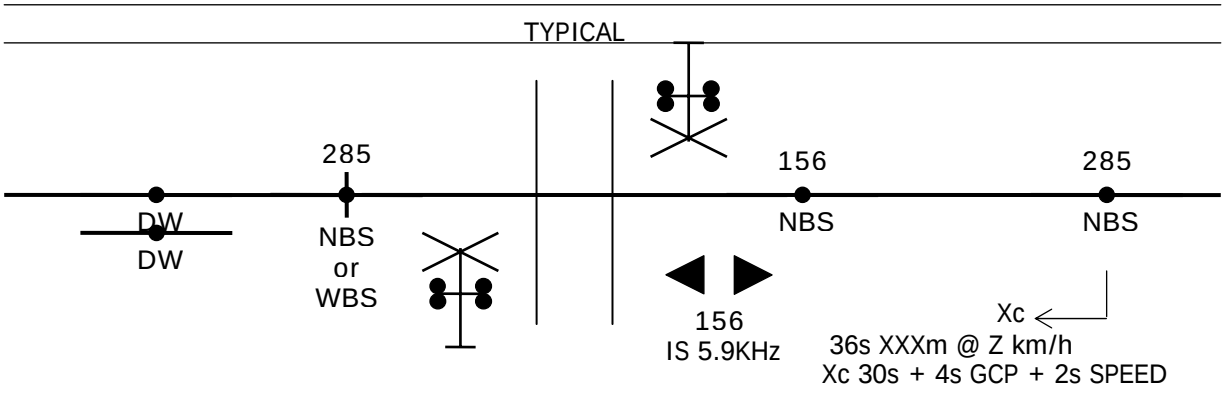


DIRECT WIRE SHUNT

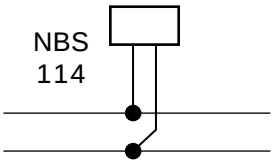


BLOCK JOINTS AND SERIES WIDE BAND SHUNT

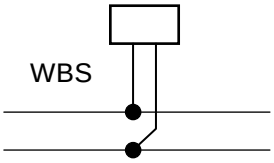
BLOCK JOINTS AND SERIES NARROW BAND SHUNT & FREQUENCY



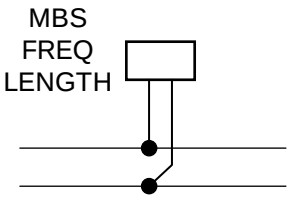
14.2 Track Insulation Plan Symbols for Grade Predictors



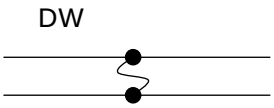
NARROW BAND SHUNT



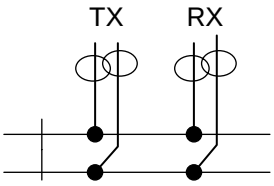
WIDE BAND SHUNT



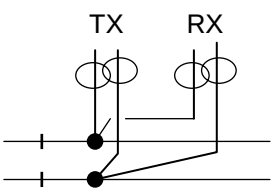
MULTI-BAND SHUNT



DIRECT WIRE SHUNT



GCP CONNECTIONS (ISLANDS) (NB TX LEADS TO BE SHORT)
TX & RX TO BE RUN SEPARATELY



UNI-DIRECTIONAL

ISLAND & FREQUENCY TRACKS TO BE SHOWN