AS4000
Wireless Local Loop System

Subscriber Terminal
Installation and Commissioning

605-0000-436
Issue 1.5 Date: 18th October 1999

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Notice

1. This manual is subject to revision.

2.

3. Right of modification reserved.

4. This manual is supplied without liability for errors or omissions.

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6. This equipment is conditioned by the requirement that no modifications will be made to the equipment unless the changes or modifications are expressly approved by ACC Communications.

7. Prerequisite skills: Personnel installing, commissioning, and maintaining the AS4000 products must have a basic knowledge of telephony and radio communications, and have experience in installing, commissioning and maintaining telecommunications products. ACC provides a range of comprehensive training courses specifically aimed at providing operators/users of Airspan products with the prerequisite skills to install, commission and or maintain the product. The courses can be tailored to provide the level of training required by the operator/user.

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UB8 1UN

Call (44) 1784 886700

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Safety Instructions - Warnings and Cautions

SAFETY

1. Read and follow all warning notices and instructions marked on the product or included in this manual.

2. Do not allow anything to rest on the power cord and do not locate the product where persons could step or walk on the power cord.

3. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

4. No hazardous RF radiation is emitted from the equipment. Measured at the surface of the CRU radome, when transmitting, the maximum total power radiated from the CRU is 0.01% of the UK National Radiological Protection Board basic restriction per kg. of body part.

WARNING - HAZARDOUS VOLTAGES

On AC installations, hazardous voltages exist. Use caution when verifying or working with AC power. Remove metal jewellery that could come into contact with AC power.

On DC sections, short circuiting the low voltage, low impedance circuits can cause severe arcing that may result in burns or eye damage. Remove rings, watches etc. to avoid shorting DC circuits.

Electro-Static Discharge ESD

Electro-Static Discharge. Many circuits contain devices which are susceptible to damage from high impedance voltage sources. To avoid such risks always follow anti-static procedures where marked.

NOTE

Airspan products do not contain hazardous substances (as defined in UK 'Control of Substances Hazardous to Health Regulations 1989', and the 'Dangerous Substances Regulations 1990'). At the end of any Airspan product's life cycle, the customer should consult with ACC to ensure that the product is disposed of in conformance with the relevant regulatory requirements

CE

The CE Symbol on an Airspan product signifies that it has been certified according to the EMC directive 89/336/EEC. The product fulfils the requirements according to the following standards:

EN50082-1 for Immunity.
EN55022 Group 1 Class A for the Central Terminal Emissions.
EN55022 Group 1 Class B for the Subscriber Terminal Emissions.

NOTE

The Subscriber Terminal equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

User Response Form

Mail: Airspan Communications Limited
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Document Rating	Excellent	Good	Average	Below Average	Poor
Accuracy / Completeness	❑	❑	❑	❑	❑
Clarity / Organisation	❑	❑	❑	❑	❑
Figures	❑	❑	❑	❑	❑
Table of Contents/Index	❑	❑	❑	❑	❑

The nature of this response is Addition ❑ Deletion ❑ Correction ❑

Please enter details of response below (include precise reference to Section, Page, Paragraph)

Please Complete the following for acknowledgement/response:

Name: .....…Address .....
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Thank you for your co-operation and assistance.

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ISSUE CONTROL LIST

CHANGE TYPE/DATE	PURPOSE	PAGES AFFECTED
Issue #, Month Year		
1.0	New document created from 156-036-200 DSC references changed to ACC.	All
1.1	Logo change, product name change. Polemount details added	All
1.2	Update to Junction Box wiring details	
1.3 December 1998	STMON J added PSU 4A added	DLPs Renumbered to retain sequence all affected
1.4 April 1999	Changes to CRU programming Procedures	DLP-013, DLP-014,DLP-015
1.5 August 1999	STMON J programming codes added	Appendix 1

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Abbreviations

AC	Alternating Current
AGC	Automatic Gain Control
CPE	Customer Premises Equipment
CRU	Customer Radio Unit
CT	Central Terminal
DC	Direct Current
DMM	Digital Multi Meter
DRS	Digital Radio System
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union -Telecommunications
LD	Loop Disconnect
LED	Light Emitting Diode
MF	Multi-Frequency
NTU	Network Termination Unit
PC	Power Control
PSU	Power Supply Unit
RF	Radio Frequency
ST	Subscriber Terminal
Rx	Receive
Tx	Transmit
VDU	Video Display Unit
VF	Voice Frequency

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INTRODUCTION

1. General

1.01 This document describes the installation and commissioning of the ACC Communications AS4000 Subscriber Terminals (ST) Equipment to release 3.0 specifications.

1.02 Prerequisite skills. Personnel installing and commissioning the AS4000 STs require a basic knowledge of telephony and radio communications, and experience in installing telecommunications products. ACC provides a range of comprehensive training courses specifically aimed at providing operators/users of AS4000 STs with the prerequisite skills to install, commission and or maintain the product. The courses can be tailored to provide the level of training required by the operator/user.

1.03 Intended Audience. This manual is intended for use by persons familiar with the AS4000 ST having attended the ACC ST Installation and Commissioning training course.

2. Safety

2.01 Personnel installing the ACC AS4000 product should follow local safety procedures, particularly those requirements relating to working above ground. ACC safety procedures are contained in document W300 0002 001 Rev A.

2.02 No hazardous RF radiation is emitted from the equipment. Measured at the surface of the CRU radome, when transmitting, the maximum total power radiated from the CRU is 0.01% of the UK National Radiological Protection Board basic restriction per kg. of body part. Also at the surface of the CRU radome, the power flux density is approximately one tenth of the investigation level of the UK National Radiological Protection Board.

WARNING - HAZARDOUS VOLTAGES

On AC installations, hazardous voltages exist. Use caution when verifying or working with AC power. Remove metal jewellery that could come into contact with AC power.

On DC sections, short circuiting the low voltage, low impedance circuits can cause severe arcing that may result in burns or eye damage. Remove rings, watches etc. to avoid shorting DC circuits.

3. Related Documentation

605-0000-430	System Overview
605-0000-434	Hardware Overview
605-0000-431	System Operations and Maintenance Manual
605-0000-435	Material Return and Repair
605-0000-432	Central Terminal - Equipment Rack Installation & Commissioning
605-0000-427	Sitespan
605-0000-437	D128 Terminal Converter
605-0000-433	Antenna/Feeder Installation & Commissioning Procedure

Table 1. Related Documentation

AS4000 SUBSCRIBER TERMINAL OVERVIEW

1. AS4000 Subscriber Terminal

1.01 The AS4000 Subscriber Terminal (ST) Equipment is installed at the end-user's premises, normally by the Network Operator. The ST is made up of four distinct physical components known as:

- Customer Radio Unit (CRU), mounted outdoors wall or pole mounted
- Power Supply Unit (PSU), mounted indoors
- A Junction Box (Type 1 PSU Only)
- Network Terminating unit (NTU), normally supplied by the Network Operator
- Connectorised Drop Cable, to connect CRU and PSU

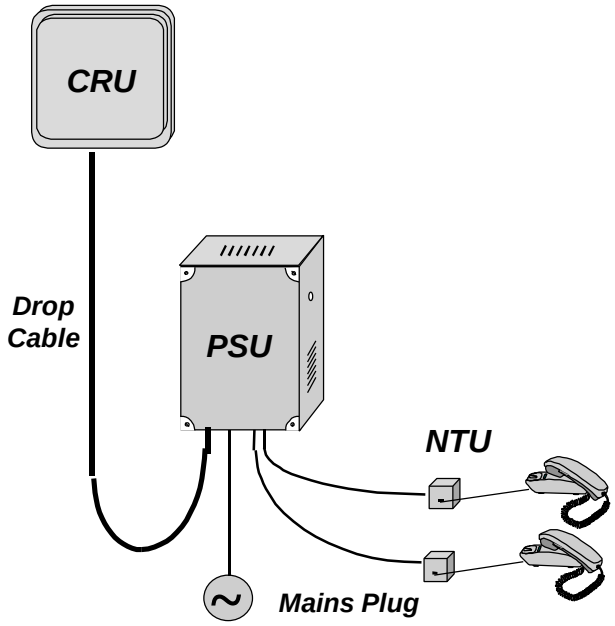

Figure 1. AS4000 ST-V2 Connection (Type 2 Power Unit)

1.02 The CRU is a sealed weatherproof unit and contains the majority of the electronics, including the antennas, radio transceiver and the line interface functions. This unit is normally mounted externally on a wall facing in the general direction of the CT. The CRU is connected to a junction box (PSU Type 1) or a terminal block within the PSU (PSU Type 2 and 4) using a drop cable. The junction box/terminal block is cabled to an NTU, into which the Customer Premise Equipment (CPE) is connected. The CRU may also be mounted on a pole using a pole mounting bracket and special strain bearing drop cable.

1.03 The CRU Mounting Bracket provides adjustment (in the azimuth plane) of the CRU in an arc over 150°, the optimum positioning being determined by measuring the strength of the incoming signal, usually in the direction of the CT antenna.

2. ST-V2

2.01 The ST-V2 provides two analogue VF telephone lines. These can be used for telephony, fax and modems. The system supports CAS/ DASS2 connections to the switched network and supports the full range of advanced services supported by these interfaces, including CLASS services and Subscriber Pulse Metering (SPM).

3. ST -D128 Subscriber Terminal

3.01 The ST-D128 provides fixed link access in support of customer Premise Equipment (CPE) and special applications that can utilize fractional E1, N x 64 kbit/s services. The ST-D128 supports two 64 kbit/s time-slots on a 2 Mbit/s G.703 interface with TS0 alarm and synchronisation support. TS16 signalling support is not required.

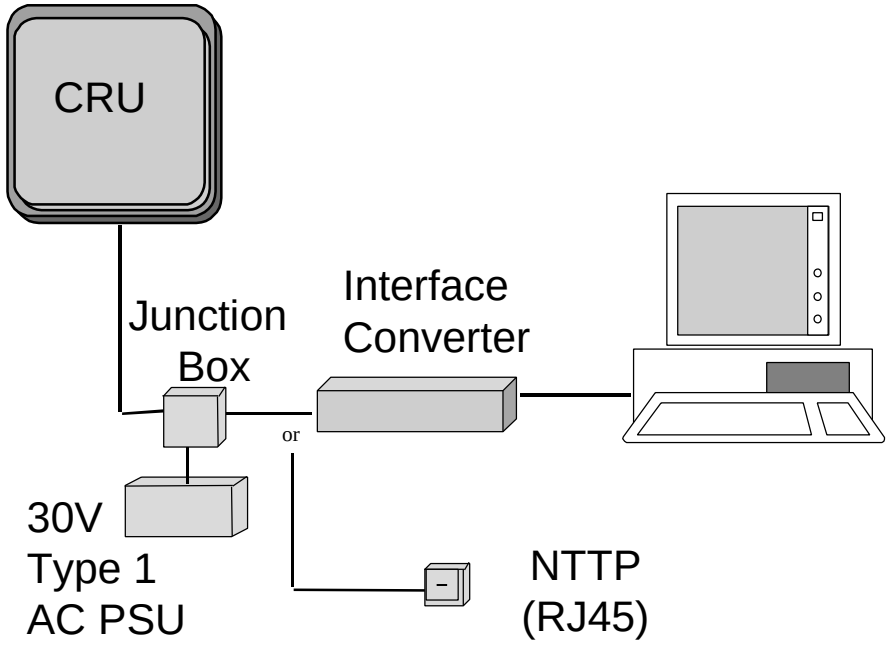

Figure 2. Subscriber Terminal D128

3.02 The equipment to be connected to the ST-D128 is CPE equipment designed to support the private or virtual private networks of business customers. The CPE equipment supports a variety of data, voice and image applications where traditional analogue or low speed (<9,600 kbit/s) digital services are inadequate. Additionally, there are a number of specialised applications, such as the support of microcell base stations, that can be served by the ST-D128.

3.1 Using Interface Converters

Products that are not designed for using the E1 interface can be connected to the system using an interface converter that provides either 2 x 64 kbit/s (X.21 or V.35)

interfaces or 1 x 128kbit/s. The host can also be interfaced using an interface connector if needed. The Converter plugs into the Network Terminating and Test Point (NTTP) equipped with a RJ45 Socket.

4. ST -I1 Subscriber Terminal

4.01 The CRU is connected to a junction box (PSU Type 1) or a terminal block within the PSU (PSU Types 2). The junction box/terminal block is cabled to an NTU, into which the Customer Premise Equipment (CPE) such as ISDN compatible telephones, faxes, terminal adapters etc. can be plugged.

4.02 The NTU provides an ITU-T I420 S termination point. The NTU is provided by the Network Operator to meet country specific requirements. Details are given in this document for termination of standard RJ45 to the Junction Box. The S termination can support up to eight ISDN S-bus compatable devices.

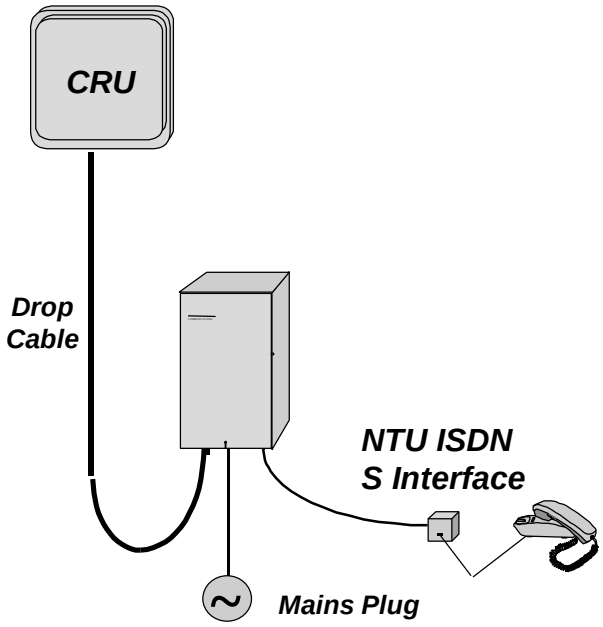

Figure 3. AS4000 ST-I1 Connection (Type 4 Power Unit)

5. Power Supply Units

5.01 The ST Equipment is powered from the mains supply of the subscriber premises via an AC PSU. DC Power from the PSU is passed to the CRU by means of a drop cable.

5.02 Four types of PSU are available **:**

1) AC Power Supply Unit (Type 1)

The ST equipment is powered from the AC mains supply available at the customer's premises. This Power supply consists of an AC/DC converter that converts the customers 230/110V AC mains supply to a 30 Volt DC supply for the CRU, and a Junction Box that facilitates the connection of the DC supply to the Drop Cable. The Junction Box also contains test access and connection points to connect NTU's to the Drop Cable.

2) AC Power Supply Units (Type 2 and 4)

The Type 2 and 4 PSUs are available for the ST-V2 The PSU receives the mains supply and generates a 24V DC level to power the external CRU. In addition, the PSU contains an internal 24V lead-acid battery which is trickle-charged and which provides a back-up supply for approximately three hours. The battery has an operational life of five years.

The PSU generates alarms as follows:

a) PSU tamper alarm, in the event the lid is removed
b) Mains supply failure
c) Low battery voltage alarm
d) Failure of the AC PSU

and terminates the following test signals sent from Sitespan /Element manager to simulate:

a) A hazardous voltage on VF line
b) An earth leakage condition
c) Detect the presence of NTU(s) and Customer Equipment
d) Mains supply failure to the AC PSU

Visual indication of mains failure is by an LED on the side of the unit. Also within the AC PSU are an "install switch" (S2) and two LED's (D8 and D9) which are used during the initial installation of the ST equipment as part of the frequency and code setting procedure.

3) AC Power Supply Unit (Type 4A)

This Power supply consists of an AC/DC converter that converts the customers 230/110V AC mains supply to a 40 Volt DC supply for the CRU, The PSU also contains test access and connection points to connect NTU's and the Drop Cable. It is primarily designed for the ST- D128 but may be used for ST-V2 and ST-I1 if battery backup is not required.

6. Drop Cables

6.01 The drop cable connects the PSU/Junction Box to the CRU via an environmentally protected 12 pin connector which plugs into the rear of the CRU. It consists of:

- 2 wires for DC power for the CRU
- 4 wires for transmit and receive
- 2 wires for alarm communications between the units

- 2 wires for monitoring AGC and Power Control
- 1 wire for logic 0Volts (6 Pair D128 only)

6.02 There are four types of drop cable available.

Use	Description	Colour	Length	Part Number
V2 /ISDN	5 pair PVC Connectorised Drop Cable Foil Sheild	Black	25 metres	454-0000-162
D128	6 Pair Belden Connectorised Drop Cable Braided Sheild. Stranded Signal Wires	Grey	25 metres	454-0000-184
V2 /ISDN	5 pair PE Connectorised Drop Cable Steel Re-enforced Multistrand Power Wires	Black	80 metres	454-0000-192
D128 *see Note 1	6 Pair PE Connectorised Drop Cable Steel Re-enforced Multistrand Power Wires	Black	80 metres	454-0010-044

Table 2. Drop Cable Types

* Note 1. The 6 Pair 80 metre cable can also be used for V2/ISDN working . For this use the thin Red/Black pair is not used.

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SPECIFICATIONS

1. Specifications

Physical

CRU without brackets:		305mm W x 250mm H x 95mm D
PSU:	Type 1	85mm W x 150mm H x 50mm D
	Type 2	225mm W x 300mm H. x 100mm D
	Type 4	180mm W x 300mm H. x 80mm D

Weight

CRU without brackets:	4Kg
PSU: Type 1	1.5Kg
Type 2	7Kg
Type 4	7Kg

Environmental (CRU)

Operating Temperature:	-30° to +50°C
Relative Humidity:	0 to 100% non - condensing
Storage Temperature:	-30° to 70°C
Wind Gusts:	200 km/hr
Ice Accumulation of Density:	900 kg/m: 10mm (complete equip. coverage)

Environmental (PSU all types)

Operating Temperature:	-5° to +45°C
Relative Humidity:	0 to 95% non-condensing
Storage Temperature:	-25° to +45°C

Electrical Type 1 PSU

AC Input Voltage:	Range, 100VAC to 250VAC 50-60Hz	
Operating Range:	230V +/-10%. = 207V to 253V. 110V +6% -10%. / 99V to 116.6V.	
Frequency:	48 to 63 Hz.	
Nominal Output Voltage:	30V DC	
Min Voltage required to power PSU at outdoor connector block:	ST-V2	18V
	ST-D128	24V
	ST-I1	18V

Electrical Type 2 PSU (ACPSU)

AC Input Voltage:	Range, 110VAC or 240VAC - Two Models.	
Operating Range:	230V +/-10%. = 207V to 253V.	
	110V +6% -10%. / 99V to 116.6V.	
Frequency:	48 to 63 Hz.	
AC Input Fuse:	1 Amp - HBC[T] 5 x 20mm.	
Nominal Output Voltage:	36V DC With mains present or +24V DC on battery	
Min Voltage required at CRU:		
connector block:	ST-V2	18V
	ST-D128	24V Can only be used without batteries.
	ST-I1	18V
Power Consumption:	15 Watts	
Overload Protection Fuse:	3.15 Amp, [T] 5 x 20mm.	
Low Volts Alarm:	Approx. 21V DC.	
Standby Battery:	2 x Panasonic LCR 12V3.4P 12V3.4 Ah Sealed lead acid. Standby duration approximately 3 hours	

Electrical Type 4 PSU

AC Input Voltage:	Range, 100VAC to 250VAC .	
Operating Range:	+6% -10%. / 90VAC to 265VAC.	
Frequency:	45 to 65 Hz.	
AC Input Fuse:	1 Amp - HBC[T] 5 x 20mm.	
Nominal Output Voltage:	36V DC With mains present or +24V DC on battery	
Min Voltage required at CRU:		
connector block:	ST-V2	18V
	ST-D128	24V Can only be used without batteries.
	ST-I1	18V
Power Consumption:	16 Watts normal	
	23 Watts Ringing	
Overload Protection Fuse:	3.15 Amp, [T] 5 x 20mm.	
Battery Fusing	Resetable Fuse (PTC)	
Low Volts Alarm:	Approx. 21V DC.	
Standby Battery:	2 x Panasonic LCR 12V3.4P 12V3.4 Ah Sealed lead acid. Standby duration approximately 3 hours	

Electrical Type 4A PSU

AC Input Voltage:	90 - 265 VAC
Operating Range:	+6% -10%. / 100VAC to 250VAC.
Frequency:	45 to 65 Hz.
AC Input Max Current:	1 Amp .
Nominal Output Voltage:	40V ±1V
Power Consumption:	16 Watts normal (400mA@40V)
	23 Watts Ringing (580mA@40V)
	Ring Enable (1.8A peak)

REQUIRED TOOLS AND EQUIPMENT.

1. Required Tools

1.01 The following lists of tools and equipment are required to successfully install and test the ST equipment.

Table 3. Required Tools

ITEM	DESCRIPTION	MODEL	SIZE
01	Combination Spanner		13mm
02	Ratchet and Socket		17mm
03	Spirit Level		18 inch.
04	Screwdriver	Pozidrive	No 1 x 75mm
05	Screwdriver	Pozidrive	No 2 x 199mm
06	Screwdriver	Pozidrive	No 3 x 150mm
07	Screwdriver	Flat Blade	3mm x 100mm
08	Hammer	Ball Pein	1lb
09	Ratchet Crimp Tool	for Red, Blue, Yellow Insulated Crimps	
10	Drill/driver	Cordless - with depth gauge	Hilti
11	Drill Bit	Masonry	6mm
12	Drill Bit	Masonry	10mm
13	Ladder - Triple	Fully Extended 7 metre minimum	
14	Cable Stripping Tool	RS Standard Cable Stripper 547-442	
15	Auto Trim Termination Tool	RS Auto Trim Termination Tool 197-952	

2. Required Equipment

2.01 The table below shows the required equipment.

Table 4. Required Equipment.

ITEM	DESCRIPTION	MODEL
01	Digital Multimeter	Fluke 77 or similar
02	Test Telephone	*Note 1
03	Compass	
04	CRU Generic Test Cable (connectorised CRU only) 2 adapters are provided per CT rack installation.	ACC 454-0000-182
05	PC with STMON	*Note 1

2.02 **Note 1:** STMON software is needed to programme the CRU. A test telephone can be used to programme the ST-V2 if STMON is not available. The system needs to be connected to a network switch to fully commission the ST-V2 with a test telephone.
The ST I1 needs to be commissioned with a ISDN phone.

2.03 Installers may not be familiar with the local environment and topographical conditions, it is necessary to provide each installer with a map of the local area. A compass for use when determining the exact bearing of the CT location is also necessary.

INSTALLATION PARTS.

1. AS4000 Subscriber Terminal Parts List

1.01 Table 5 and Table 7 show the parts required for installing the ST

Item	Description	ACC Part Number	Quantity
1.	Customer Radio Unit (CRU)	503-0000-###	1
2.	AC Power Supply Unit (ACPSU)	See PSU List below	1
3.	Wall Mounting Assembly	403-0000-286	1
or	Pole Mount Assembly	TBA	
4	Connectorised Drop Cable (V2/I1)	454-0000-162	1
or	Connectorised Drop Cable (D128)	454-0000-184	1
5.	ST Installation Kit comprising	605-0000-019	1
5.1	Wood Screw M8 x 70mm	175-0008-006	4
5.2	Washer, Flat M8	192-9000-033	4
5.3	Plug, Nylon 10mm	128-0000-122	4
5.4	Hex Head screw M10 x 15.2mm	175-0010-002	2
5.5	Washer, SPLK M10	192-9000-032	2
5.6	Washer, Flat M10	192-9000-037	2
6.	Box and Site Kit	402-0010-002	1
### Note CRU part number depends on frequency, type and MIF.			

Table 5. CRU and Installation Kit Parts List.

1.02 The type of drop cable used is dependent on the type is CRU used and the length of feed required.

Use	Description	Colour	Length	Part Number
V2 /ISDN	5 pair PVC Connectorised Drop Cable Foil Sheild	Black	25 metres	454-0000-162
D128	6 Pair Belden Connectorised Drop Cable Braided Sheild. Stranded Signal Wires	Grey	25 metres	454-0000-184
V2 /ISDN	5 pair PE Connectorised Drop Cable Steel Re-enforced Multistrand Power Wires	Black	80 metres	454-0000-192
D128 *see Note 1	6 Pair PE Connectorised Drop Cable Steel Re-enforced Multistrand Power Wires	Black	80 metres	454-0010-044

Table 6. Drop Cables

* Note 1. The 6 Pair 80 metre cable can also be used for V2/ISDN working . For this use the thin Red/Black pair is not used.

1.03 The PSU supplied is one of the two versions of PSU available.

Item	Description		ACC Part Number	Quantity
1.	Type 1 AC Power Supply Unit (AC PSU): Consists of a 30V PSU Brick and a separate Junction Box	110/ 230V	503-0700-027	1
2.	Type 2 AC Power Supply Unit (AC PSU): Consists of a 24V PSU with battery backup alarm reporting and integral termination strip	110V or 230V	503-0700-014 503-0700-006	1
3	Type 4 AC Power Supply Unit Consists of a 24V PSU with battery backup alarm reporting and integral termination strip	100-250V	261-1000-296	1
4	Type 4A AC Power Supply Unit Consists of a 24V PSU with integral termination strip	100-250V	005-9472-050	1

Table 7. PSU List

2. Delivery Inspection

2.01 Upon taking delivery of the equipment consignment, check that the consignment agrees in all particulars with the consignment delivery documentation (number of boxes, descriptions, contents of boxes, etc.). Any discrepancy or damage must be reported immediately to ACC (see 3.01) for further instructions. In case of severe damage, do not accept the consignment from the carrier.

3. Unpacking Inspection

3.01 The contents of each box must be checked against the relevant part lists provided with the box, for the correct part numbers and quantities, and for damage. Any shortage or damaged items must be reported immediately to ACC for further instructions at the address given in Material Return and Repair Procedure (605-0000-435) or:

TELEPHONE: +44 (0) 1527 402800

FAX: +44 (0) 1527 550956

E-Mail: support@airspan.com

3.02 Dispose of all unnecessary packaging in a safe manner according to the customer's requirements.

3.03 **Note:** It is recommended that one package carton of each type be retained should it be required to return any faulty or damaged items for repair.

INSTALLATION PROCESS.

Use the flow charts on the following pages to guide the installation processes

1. ST-V2 Telephony Installation and Commissioning

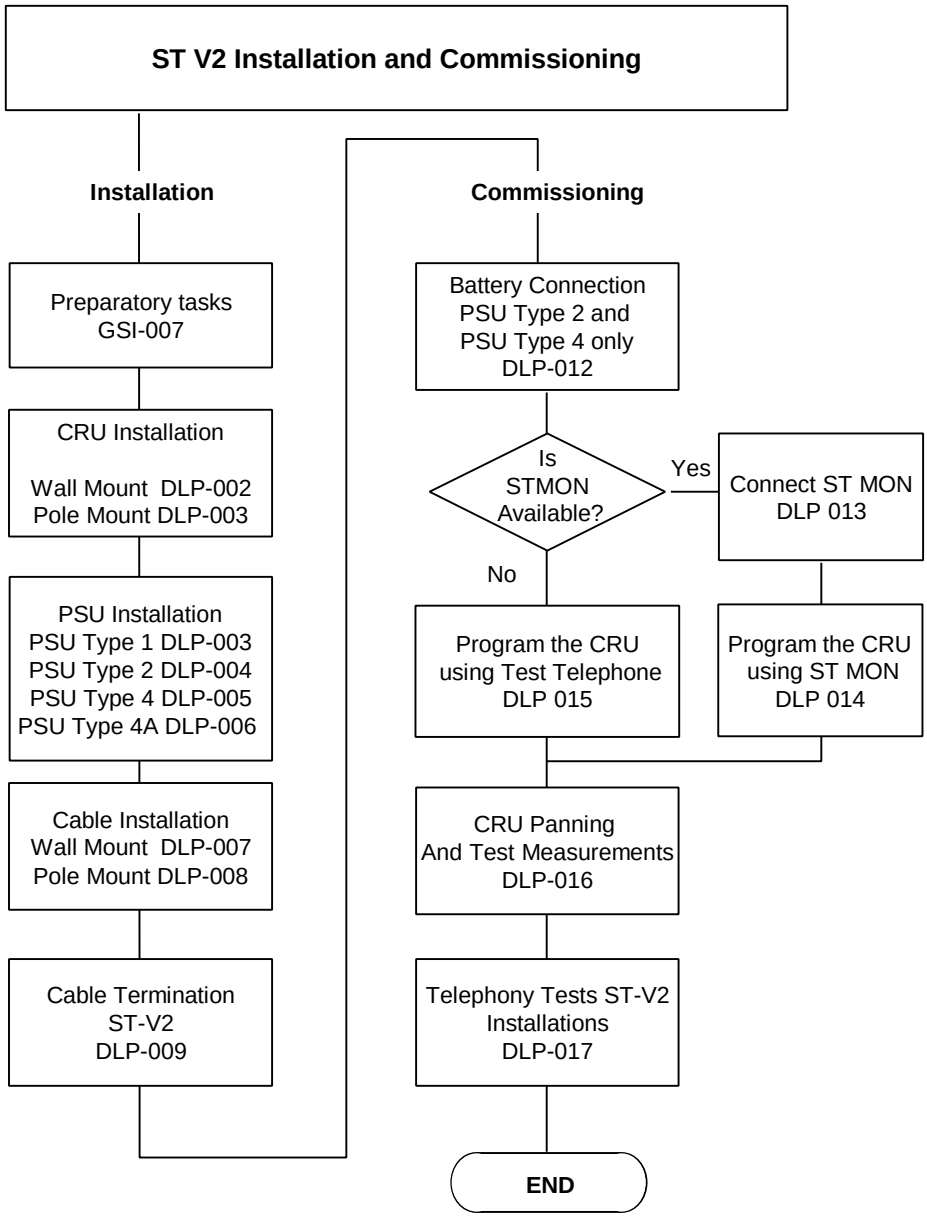

Chart 1. ST-V2 installation

2. ST D128 Data Installation

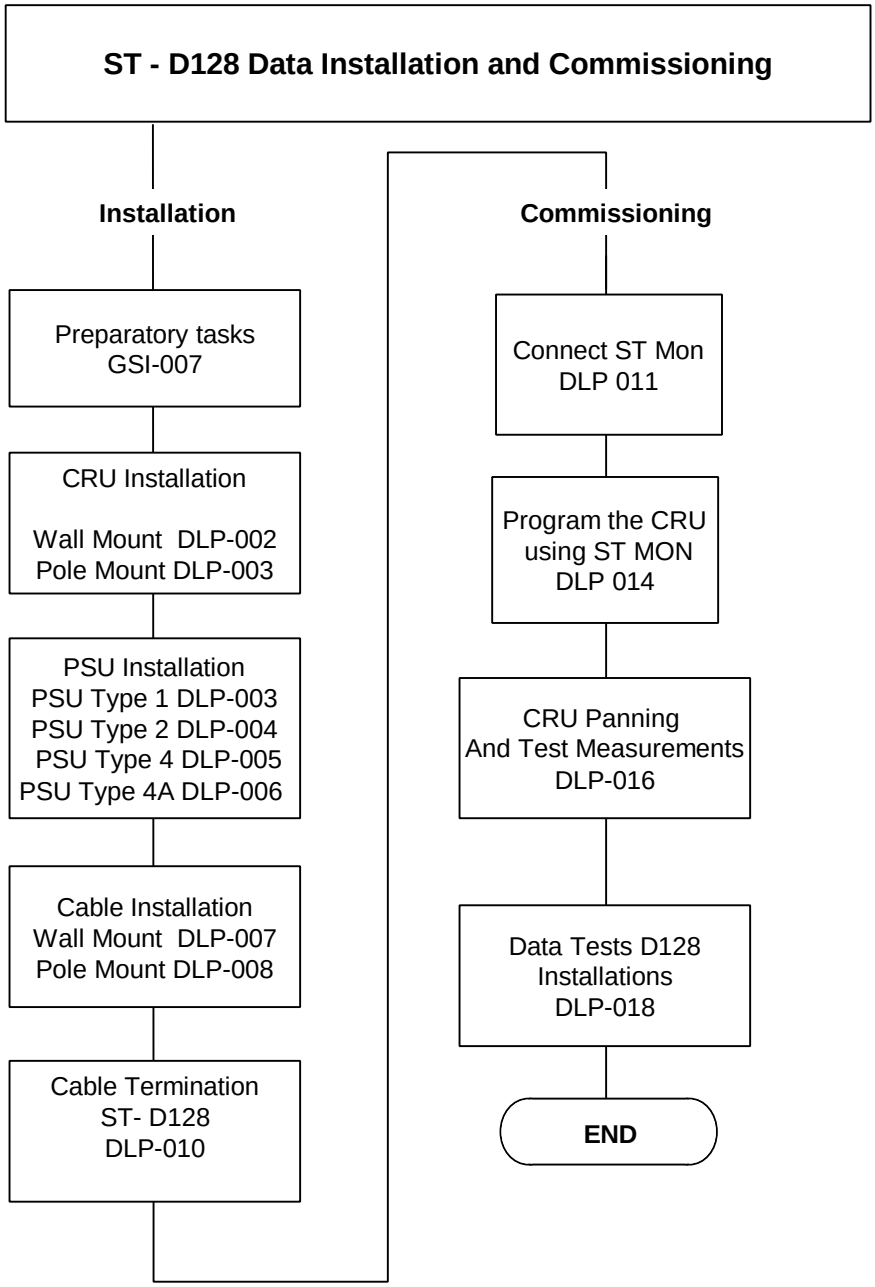

Chart 2. ST-D128 Installation

3. ST I1 ISDN Installation

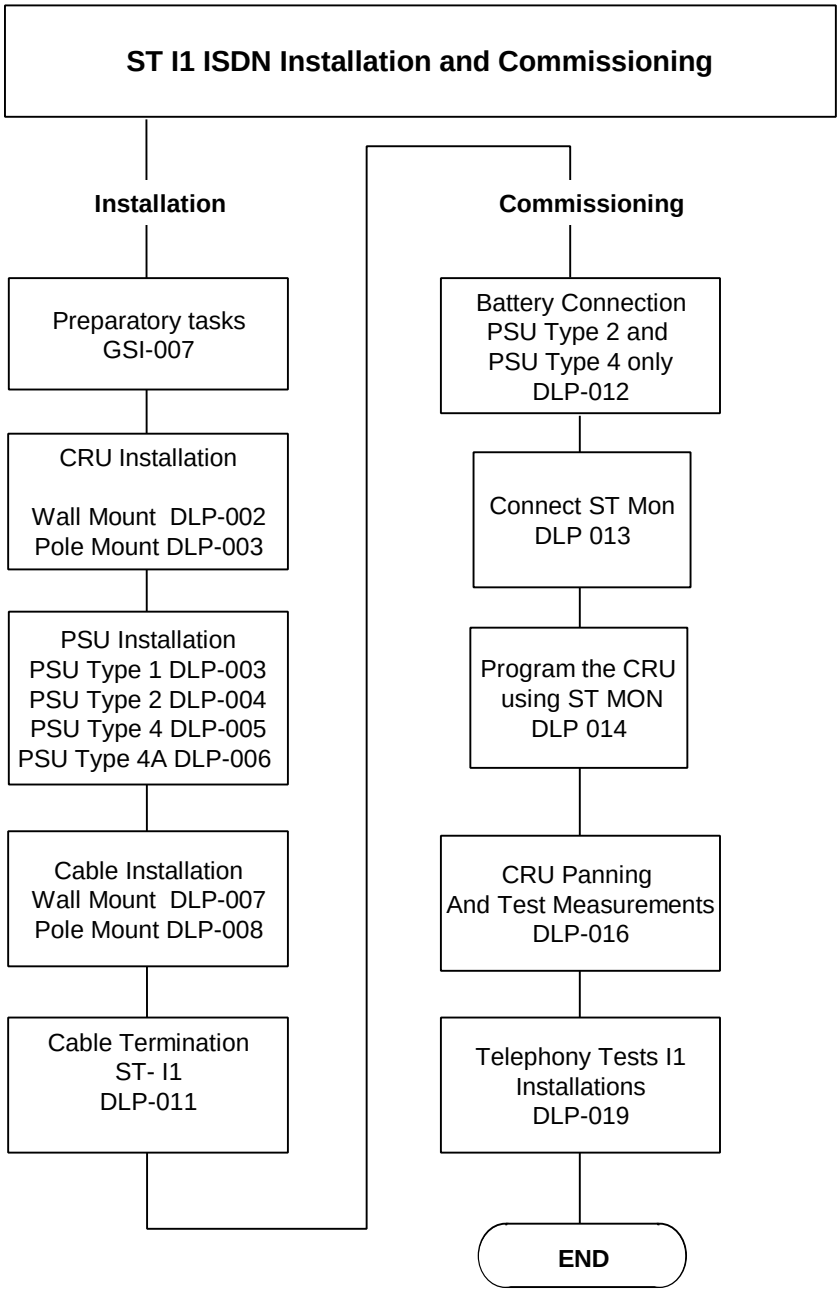

Chart 3. ST-I1 installation

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

4. Installation Check List.

Check site meets site selection criteria	❑
Position and fix CRU mounting bracket	❑
Install CRU	❑
Fix PSU to wall (type 2 & 4 only)	❑
Install power chord	❑
Earth PSU (if applicable)	❑
Fix junction box to wall (type 1 PSU only)	❑
Terminate the drop cable on PSU / Junction Box	❑
Stick on PSU logo label (type 4 PSU only)	❑
Fix cable strain relief (pole mount CRUs only)	❑
Fix house cable support bracket (pole mount CRUs only)	❑
Run drop cable	❑
Plug connector into CRU (ST-V2 and ST-I1)	❑
Terminate drop cable on CRU (D-128)	❑
Terminate the drop cable on PSU / Junction Box	❑
Run and terminate cable for NTUs	❑
Install interface adapter if required (D128 only)	❑
Connect batteries (Type 2 & 4 PSU only)	❑
Programme CRU	❑
Pan CRU	❑
Measure and record PC and AGC voltage on test form	❑
Functional tests record result on test form	❑
Clear and tidy site	❑

PREPARATORY TASKS.

1. Site Readiness

1.01 Task 1 involves verifying that your site is ready for the installation of the ST Equipment.

- Check access to the building before unloading or unpacking the equipment.

2. Site Selection

2.01 The following factors should be taken into account to determine the installation position for the CRU:

a) The CRU should be installed as high as possible on the wall facing in the direction of the CT. Mounting height should normally be 5-7 metres above ground level.

b) Inspect the suitability of the wall structure for the installation position of the CRU mounting.

Typical acceptable structures are:-

- Secure brick walls
- Concrete cladding covered Building Blocks
- Metal / Wooden pole, with suitable bracket.

c) For efficient and reliable service it is suggested that the external mounting location of the CRU be chosen such that once ‘panned’ for optimum signal level it observes the following criteria:-

- Avoid aligning the CRU directly toward an obstruction within a distance of 15 metres from the CRU installation point.
- Avoid obstructions such as adjacent walls or overhanging roof eaves, within 15° in the horizontal plane and 30° in the vertical plane (see Figure 4).
- Ensure adequate clearance is allowed for ‘panning’ the CRU.
- The CRU is capable of being ‘panned’ with at least 15° of adjustment either side of the direction of the CT Antenna.
- Note: Trees exceeding a distance of 50 metres from the CRU are considered ineffective to the units performance.

These guidelines should not be violated during the CRU panning process described in DLP - 015.

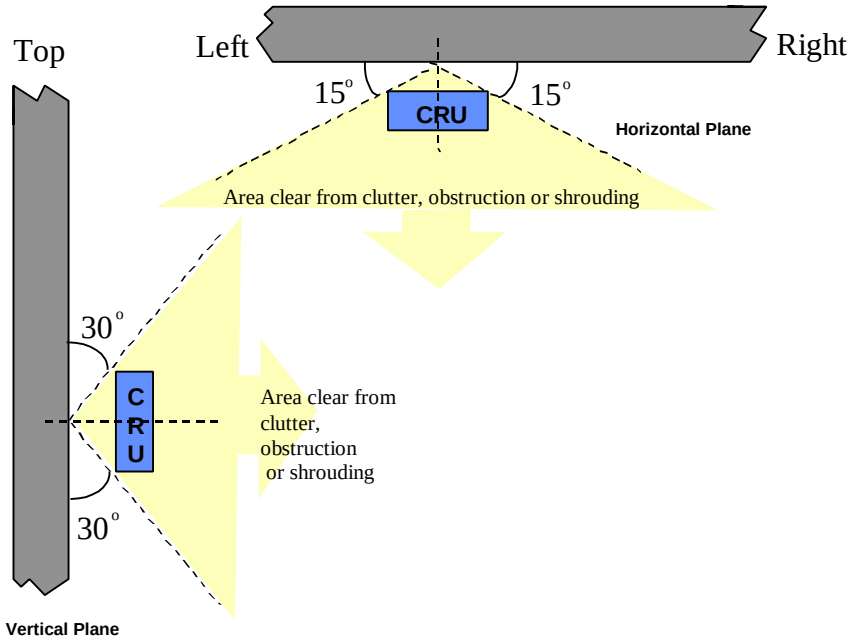

Figure 4. CRU Positioning

2.02 Check how the drop cable is to enter the site and the internal drop cable run from the CRU to the PSU.

2.03 Before commencing with the installation, confirm with the customer the following:-

- Suitability of the CRU position.
- Entry point of the Drop Cable to the site.
- Internal cable run from entry point to the PSU.

3. Power Availability

3.01 Check with the customer the suitability of the PSU position - Within 2 metres of the AC Power Point and within 25/80 metres of the CRU. (Maximum length of drop cable is 80 metres).

INSTALLING THE CRU (WALL MOUNT).

Use this procedure to install the CRU. Before installing the CRU check that the proposed position meets the site selection guidelines. See GSI 007

STEP **PROCEDURE**

CRU Positioning and Securing.

1. Confirm the position of the CRU ensuring that there is no obstruction in front and to either side of the CRU.

2. When multiple STs are deployed at the same site the recommended minimum spacing between each CRU is 1 metre.

3. The CRU mounting bracket should be fixed so that the hinges allow panning in the horizontal plane and check that line of sight with antenna does not breach the deployment rules. (see GSI-007).

4. **Note:** Leave adequate clearance around the CRU wall mounting assembly to allow for the full adjustment range when aligning the CRU. (See Figure 5).

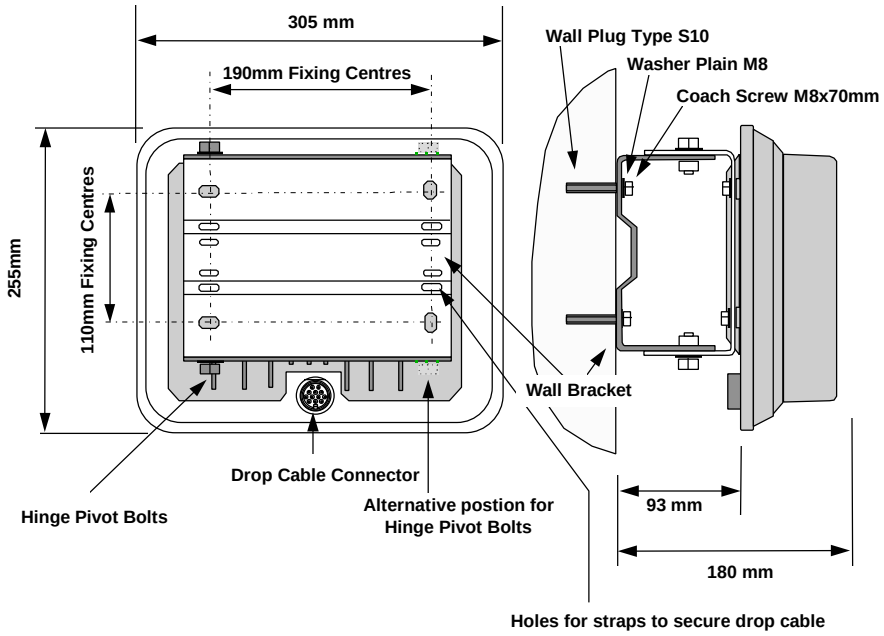

Figure 5. CRU Positioning and Securing

5. Using the wall bracket as a template, mark the first hole position. Where the CRU is to be mounted to a brick built building, try to ensure that each hole coincides with the middle of a brick and not the mortar course.

6. Drill the first hole, 10mm diameter to a **maximum** depth of 70mm (use a drilling depth gauge) and then fit the Type S10 Wall Plug (Part No 128-0000-122) provided.

7. Using one of the wood screws M8 x 70mm (Part No 175-0008-006) and Plain Washers (Part No 192-9000-033) provided, secure the CRU wall bracket section of the mounting assembly to the wall.

8. Using a spirit level, adjust the position of the wall bracket and mark the remaining 3 holes.

9. Drill the remaining holes, 10mm diameter to a maximum depth of 70mm, then fit the Type S10 Wall plugs (Part No 128-0000-122) provided.

10. Using the wood screws (Part No 175-0008-006) provided, secure firmly the CRU wall bracket section of the mounting assembly to the wall.

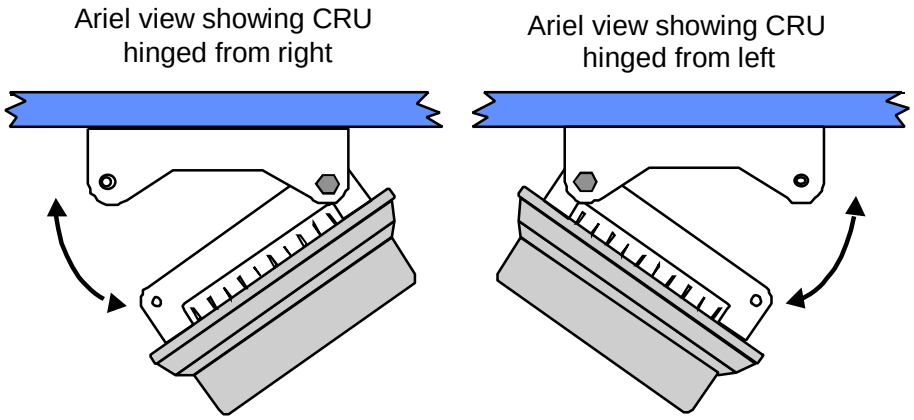

Figure 6. CRU Hinge Position

11. Screw the CRU and bracket assembly to the wall bracket choosing to hinge from left or right to allow panning in the directions of the CT antenna.

12. Rotate the CRU to face in the general direction of the CT. At this stage, finger tighten the bracket locking hex headed screws (Part No 175-0010-002) only.

13. Check that the CRU is stable and secure in both planes.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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INSTALLING THE CRU (POLE MOUNT).

To enhance the deployment possibilities of the AS4000 Subscriber Terminal, a pole mounting may be used for the CRU. A special drop cable is used to enable the CRU to be powered over an 80 metre cable length. The maximum span of the cable should be no greater than 40 metres. Before installing the CRU check that the proposed position meets the site selection guidelines. See GSI 007

STEP **PROCEDURE**

Installation of Pole Mounting Bracket

1. The CRU is mounted on a pole as close to the top as possible, whilst avoiding any existing drop wires.

2. Before fitting the mounting bracket establish the direction of the RLT site so that the mounting bracket can be positioned in the correct orientation to allow a suitable panning swing of the CRU (see Figure 7). Use a compass if necessary.

3. *Note: The CRU is not used for the initial installation of the bracket. The CRU body is only shown in* Figure 7 *and* Figure 8 *to illustrate the final position and panning angles.*

4. There are two choices for bracket orientation that can be selected by turning the bracket upside-down. The actual choice depends upon the presence of wire or cable ducting that may interfere with the mounting of the bracket against the pole. Line up the mounting flange edge furthest away from the CRU mounting point to the known direction of the RLT. This may be done at a convenient height for eye level alignment and the bracket then moved vertically up or down to the intended position. If the desired orientation of the bracket is not possible some additional rotation is acceptable provided that a minimum panning adjustment angle of 10° is maintained (see Figure 8).

5. There are 2 sets of mounting flange holes to cater for varying pole size, use the holes that are nearest to the pole surface. Once in position mark the mounting holes through the bracket flanges on to the pole surface. Secure the bracket into position using coach bolts with washers positioned between the bolt heads and the flanges. Pilot holes may be drilled at the positioned marked to facilitate the insertion of the coach bolts.

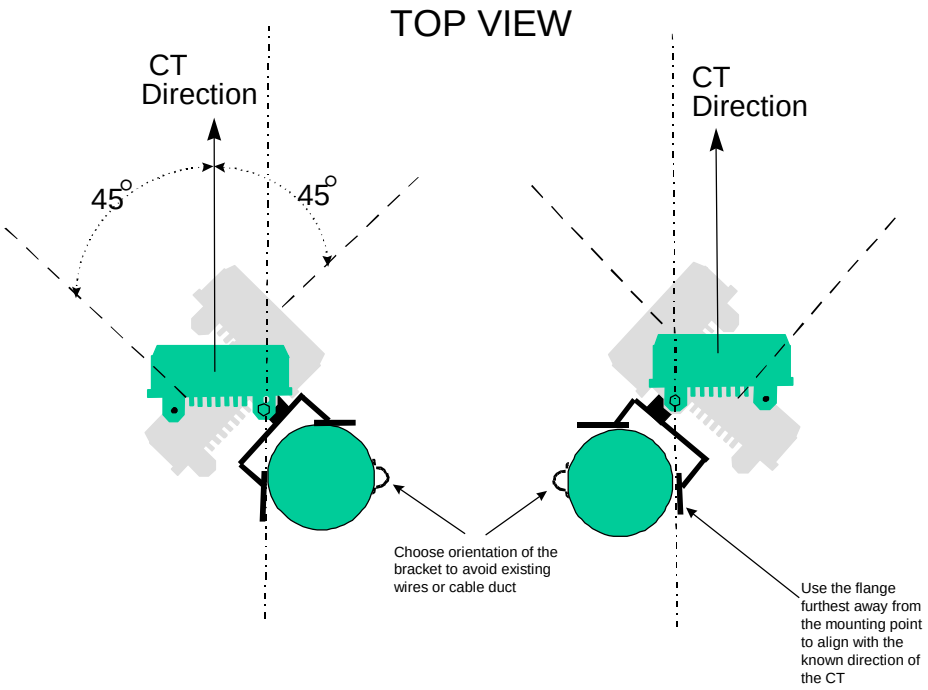

Figure 7. Choice Of Bracket Orientation

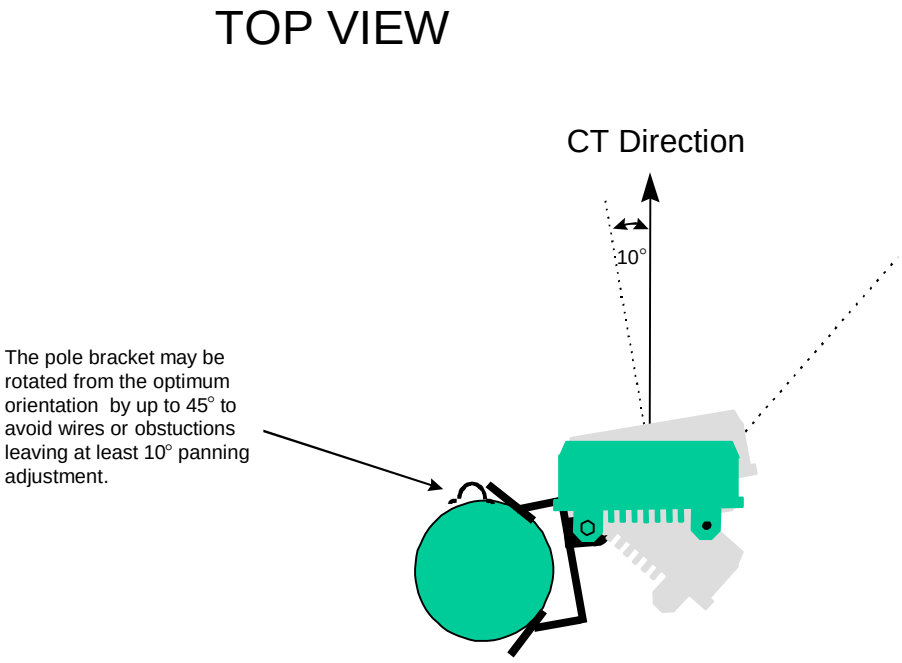

Figure 8. Non-Ideal Bracket Orientation

Fitting the CRU

Once the bracket is in place, fit the CRU using 2 bolts with plain and spring washers. Rotate the CRU to face in the general direction of the CT. At this stage, finger tighten the bracket locking bolts The main body of the CRU should always be orientated towards the larger part of the bracket relative to the mounting points (see Figure 9). The CRU is always mounted with the cable connector at the bottom.

Note: The final torque setting is only applied when the panning operation is complete.

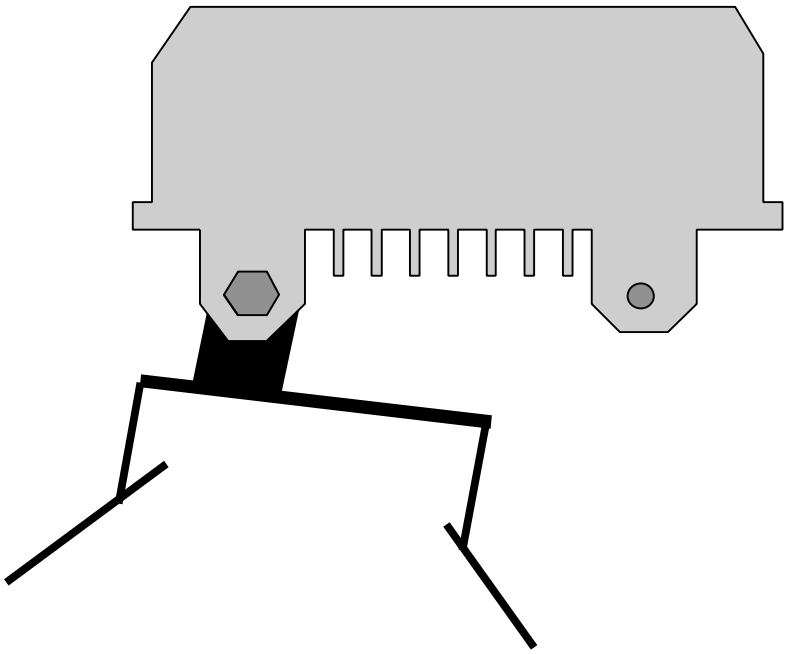

Figure 9. Correct CRU orientation relative to the Mounting Bracket

Cable Support Bracket Installation

The cable support bracket is mounted on the pole. If the cable leaves the pole in the direction of the CRU radiation pattern (i.e. within +/- 15°of the direction perpendicular to the front face of the CRU), then the cable support bracket must be mounted a minimum of 0.5 m above (or below) the CRU such the cable does not run in the near field of the CRU antenna radiation pattern. Align the cable support bracket such that the flat front surface is aligned in the direction of the cable run. Screw the cable support bracket to the pole below the CRU using 4 coach bolts with plain washers in a similar way to the CRU bracket. The cable support bracket may be mounted either way up so that it can be mounted on either side of the pole to avoid existing cables or cable ducts running down the pole.

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INSTALLING THE TYPE 1 PSU.

The Type 1 PSU consists of an AC Brick Power Unit and a Junction Box.

STEP **PROCEDURE**

PSU (Type 1) and Junction Box Positioning and Securing

1. Confirm the position of the PSU, allow for adequate ventilation and service access.
2. Install the PSU and Junction Box within 2 metres of an AC power point and 25 metres of the CRU.
3. The PSU is free standing and should be placed near to the Junction Box in a non-hazardous location.
4. Secure the Junction Box in position using the No 8 x 50mm screws (Part No 174-0815-002).

PSU (Type 1) Connection to the Junction Box

1. Cut the 3 pin socket off the DC output cable and trim and prepare ends for connection to the Junction Box as shown in Table 8 below.

Terminal	Colour	Description
4	Red	V+ (24V)
5	Green	Earth/Screen
6	Black	0V

Table 8. PSU (Type 1) to Junction Box Connections

STEP **PROCEDURE**

AC Power Cord Installation

1. Use a supply cord fitted with a mains plug in accordance with local requirements.

2. Plug the AC supply cord into the IEC connector on the PSU (Type 1).

3. Do not connect the plug to the supply socket until instructed to by the Commissioning Test Procedure.

Safety:
Do not allow anything to rest on the power cord and do not locate the product where persons could step or walk on the power cord.

Notes:

1. The AC PSU (TYPE 1) is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

INSTALLING THE TYPE 2 ACPSU.

The Type 2 PSU (ACPSU) consists of an AC PSU Unit with standby batteries and generates power fail alarms that are passed to the CT.

STEP **PROCEDURE**

PSU (Type 2) Positioning and Securing

1. Confirm the position of the ACPSU, allow for adequate ventilation and service access.

2. **Note:** The life of the batteries within the ACPSU will be increased in a low temperature, but standby time will be improved by a warm environment. Ideally the location should be cool, as the electronics within the unit will keep it warm enough to ensure a good standby period.

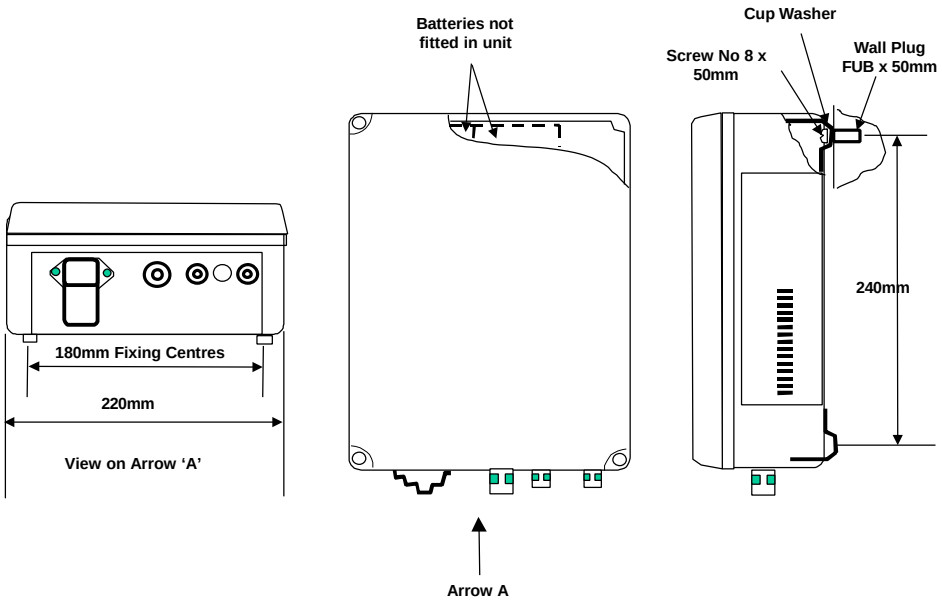

Figure 10. PSU Positioning and Securing

3. Install the ACPSU within 2 metres of an AC power point and 25 metres of the CRU.

4. Mark the wall fixing positions using the drilling template supplied. The ACPSU should be fitted with the batteries towards the top and the mains input connector at the bottom. (See Figure 10).

5. Drill the 4 holes, 8mm. diameter to a depth of 50mm. (use a depth gauge) and then fit the FUB x 50mm Wall Plugs (Part No 128-0000-123) provided.

6. Remove the ACPSU front cover and install the batteries.

Note: Do not connect the batteries until instructed to do so at the commissioning stage.

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7. Secure the ACPSU squarely in position using the No 8 x 50mm screws (Part No 174-0815-002) and cup washers (Part No 192-0080-230) provided.

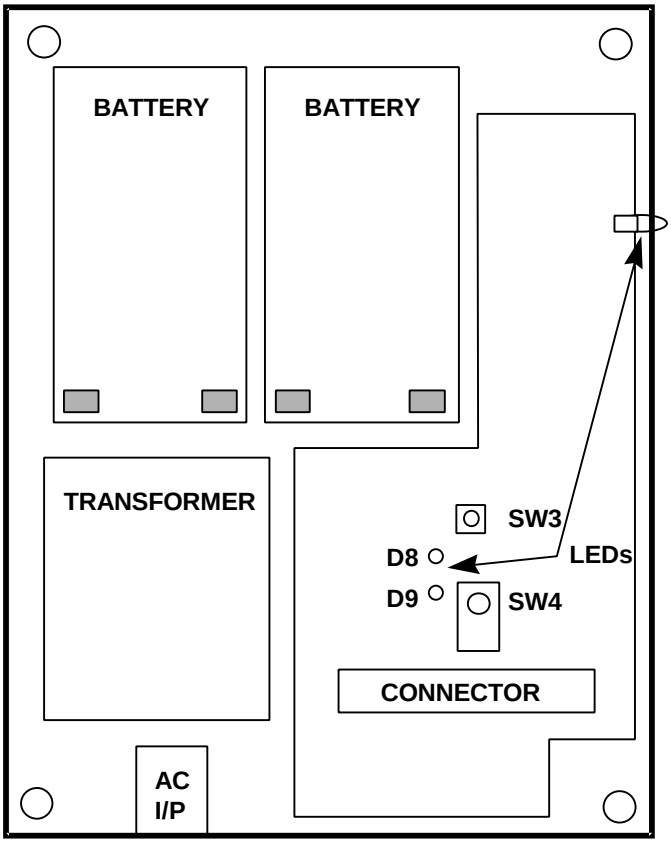

Figure 11. AC Power Supply Unit.

STEP **PROCEDURE**

AC Power Cord Installation

1. Use a supply cord fitted with a mains plug in accordance with local requirements. Plug the AC supply cord into the IEC connector on the ACPSU and secure with retaining clip.

Note. Do not connect the plug to the supply socket until instructed to by the Commissioning Test Procedure.

2. Fit the cover to the PSU without securing the screws until instructed to by the Commissioning Test Procedure.

PSU earthing

1. **Note:** The ACPSU is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit.

Safety: Battery Handling

Care should be taken when handling lead acid batteries to avoid dropping or short circuiting them. Disposal should be in line with local codes. Batteries may explode if put into a fire. Install the batteries in the AC PSU first, then connect them taking care to observe correct polarity.
Connect the blue lead first to connect them together, then connect the red lead to the +ve terminal and the black lead to the -ve terminal.

Hazardous Voltage Test Earth

If the hazardous voltage test is to be made functional then an additional earth has to be run from a know good domestic earth and terminated to the 0V (Type 2 TB1 terminal 4)

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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INSTALLING THE TYPE-4 PSU.

The Type 4 PSU consists of an PSU Unit with standby batteries and generates power fail alarms that are passed to the CT.

STEP **PROCEDURE**

PSU (Type 4) Positioning and Securing

1. Confirm the position of the Type-4 PSU, allow for adequate ventilation and service access.

2. **Note:** The life of the batteries within the Type-4 PSU will be increased in a low temperature, but standby time will be improved by a warm environment. Ideally the location should be cool, as the electronics within the unit will keep it warm enough to ensure a good standby period.

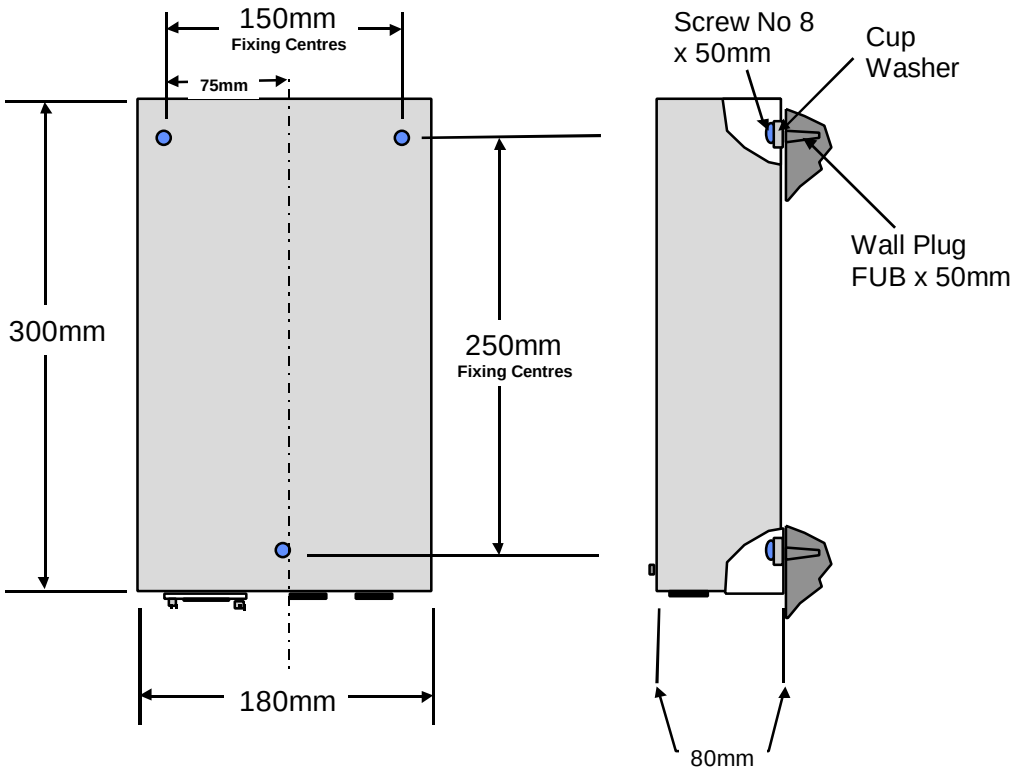

Figure 12. PSU Positioning and Securing

3. Install the Type 4 PSU within 2 metres of an AC power point and 25 metres of the CRU. (80 metres if using cabling to pole mount for CRU).

4. Remove the PSU front cover. Offer the PSU up into position and mark the three fixing positions onto the wall. The PSU should be fitted with the batteries towards the top and the mains input connector at the bottom. (See Figure 12).

5. Drill the 3 holes, 8mm. diameter to a depth of 50mm. (use a depth gauge) and then fit the FUB x 50mm Wall Plugs (Part No 128-0000-123) provided.

6. Secure the PSU squarely in position using the No 8 x 50mm screws (Part No 174-0815-002) and cup washers (Part No 192-0080-230) provided.

7. Install the batteries.

Note: Do not connect the batteries until instructed to do so at the commissioning stage.

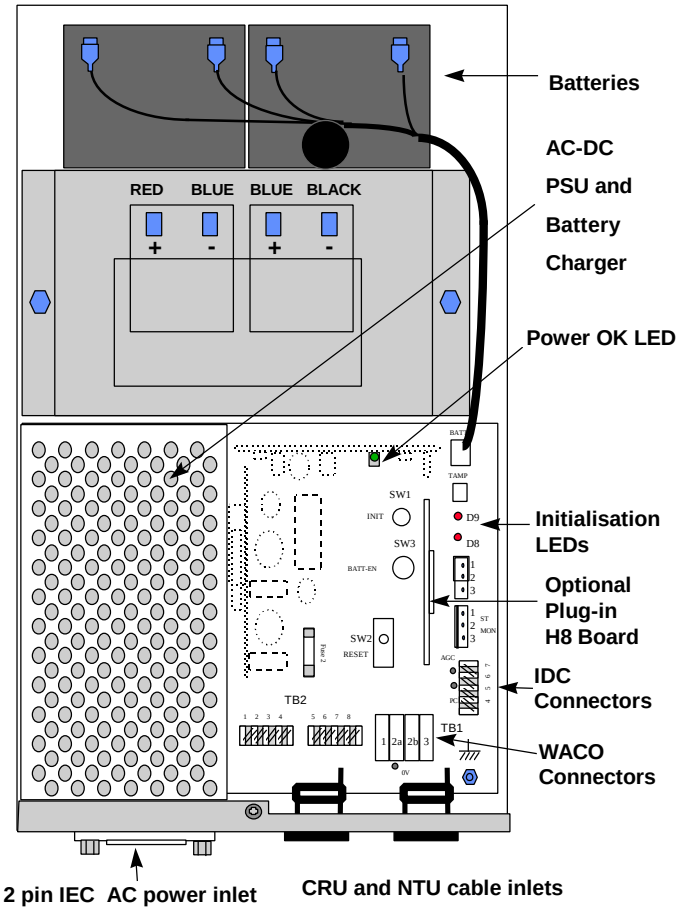

Figure 13. AC Power Supply Unit.

STEP **PROCEDURE**

AC Power Cord Installation

1. Use a supply cord fitted with a mains plug in accordance with local requirements. Plug the AC supply cord into the IEC connector on the Type-4 PSU and secure with retaining clip.

Note. Do not connect the plug to the supply socket until instructed to by the Commissioning Test Procedure.

1. Fit the cover to the PSU without securing the screw or earthing the lid until instructed to by the Commissioning Test Procedure.

PSU earthing

1. **Note:** The Type-4 PSU is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit.

Safety: Battery Handling

Care should be taken when handling lead acid batteries to avoid dropping or short circuiting them. Disposal should be in line with local codes. Batteries may explode if put into a fire. Install the batteries in the PSU first, then connect them taking care to observe correct polarity. Connect the blue lead first to connect them together, then connect the red lead to the +ve terminal and the black lead to the -ve terminal.

Hazardous Voltage Test Earth

If the hazardous voltage test is to be made functional then an additional earth has to be run from a know good domestic earth and terminated to the 0V (Type 4 TB1 terminal 2b)

PSU Labelling

If the CRU has been provided with a customer specific logo label, stick the label in the top left hand corner of the front of the case as shown.

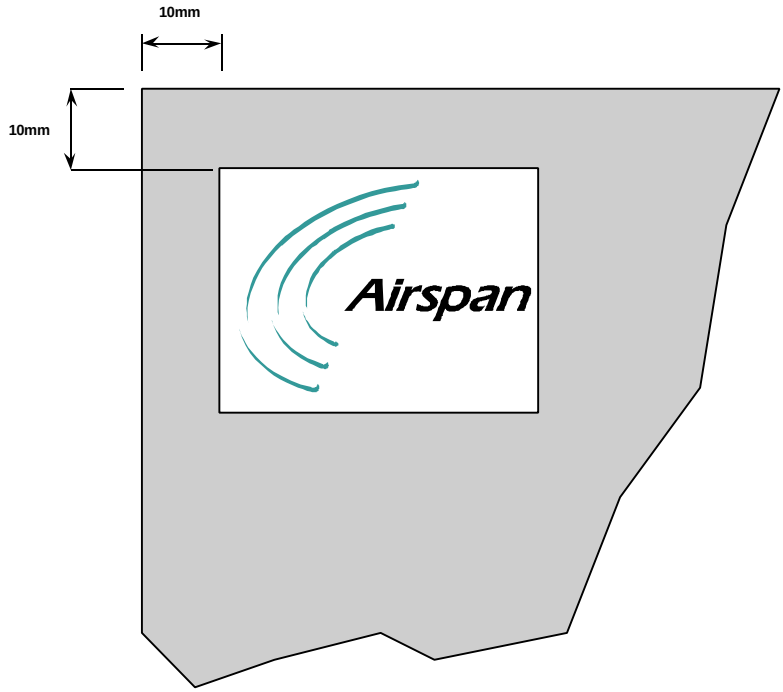

Figure 14. Customer Logo Placement

STOP. THIS PROCEDURE HAS BEEN COMPLETED

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INSTALLING THE TYPE-4A PSU.

The Type 4A PSU consists of an PSU Unit with cable termination facilities and is designed to be used in applications where battery backup is not needed.

STEP **PROCEDURE**

PSU (Type 4A) Positioning and Securing

1. Confirm the position of the Type-4 PSU, allow for adequate ventilation and service access.

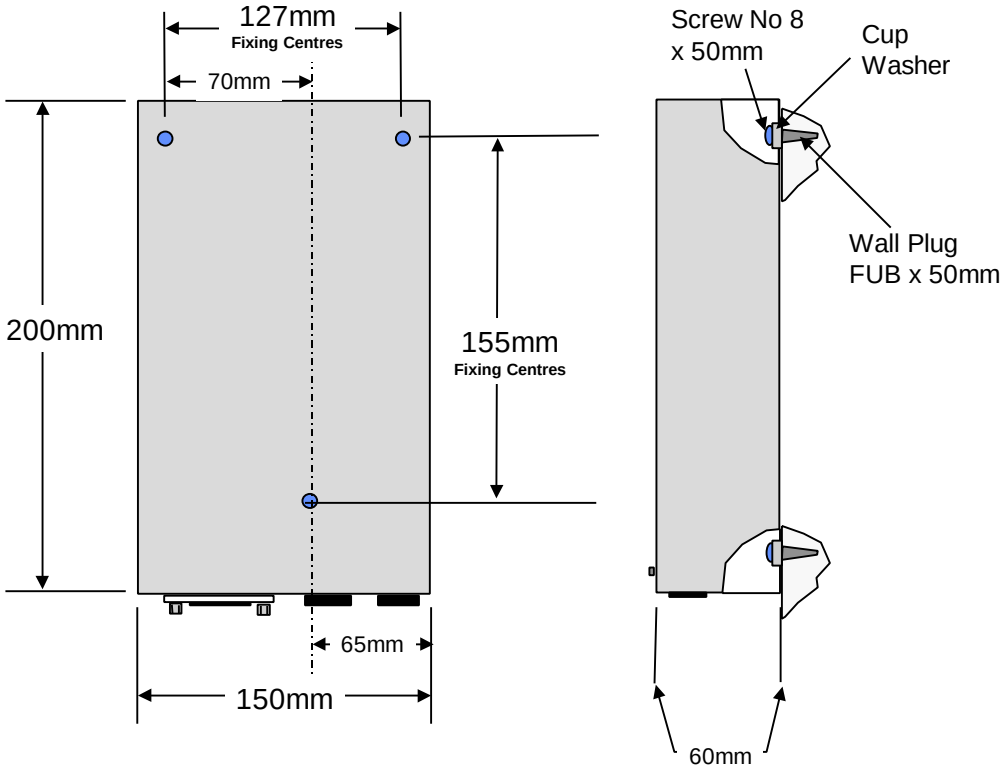

Figure 15. PSU Positioning and Securing

2. Install the Type 4A PSU within 2 metres of an AC power point and 25 metres of the CRU. (80 metres if using cabling to pole mount for CRU).

3. Remove the PSU front cover. Offer the PSU up into position and mark the three fixing positions onto the wall. (See Figure 12).

4. Drill the 3 holes, 8mm. diameter to a depth of 50mm. (use a depth gauge) and then fit the FUB x 50mm Wall Plugs (Part No 128-0000-123) provided.

5. Secure the PSU squarely in position using the No 8 x 50mm screws (Part No 174-0815-002) and cup washers (Part No 192-0080-230) provided.

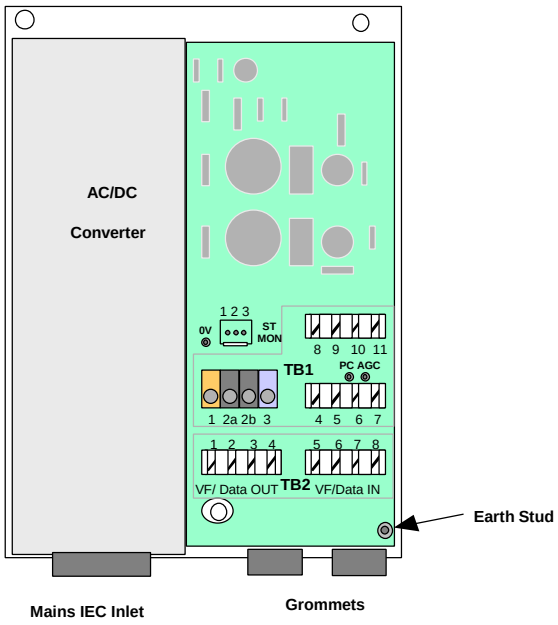

Figure 16. Type 4A Power Supply Unit.

STEP	PROCEDURE

AC Power Cord Installation

1. Use a supply cord fitted with a mains plug in accordance with local requirements. Plug the AC supply cord into the IEC connector on the Type-4 PSU and secure with retaining clip.

Note. Do not connect the plug to the supply socket until instructed to by the Commissioning Test Procedure.

2. Fit the cover to the PSU without securing the screw until instructed to by the Commissioning Test Procedure.

PSU earthing

1. **Note:** The Type-4 PSU is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit.

PSU Labelling

If the CRU has been provided with a customer specific logo label, stick the label in the bottom right hand corner of the front of the case as shown.

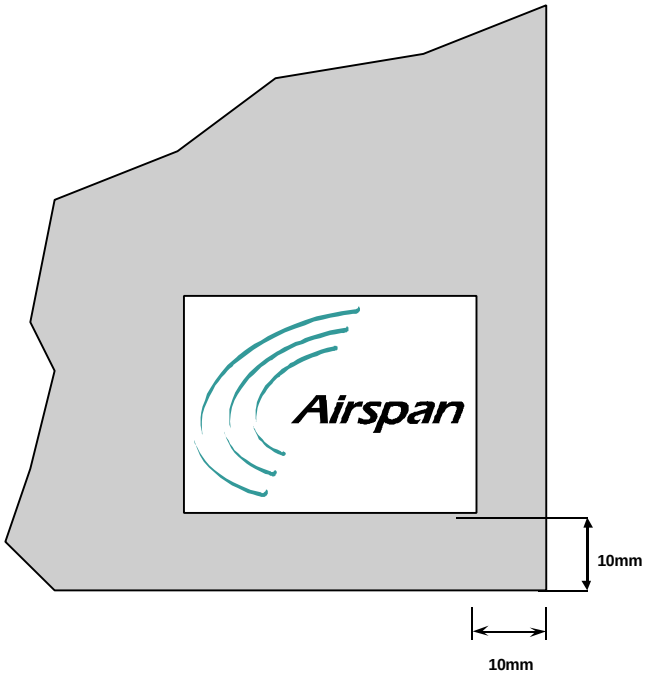

Figure 17. Customer Logo Placement

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CABLE INSTALLATION FOR WALL MOUNT CRU.

The drop cable consists of a single 5 pair cable (25 metres) or a single 6 pair cable (80 metres) complete with environmentally protected connector. The connector plugs into the CRU Socket mounted on the rear plate of the CRU.

STEP **PROCEDURE**

Drop cable installation

1. Because the CRU is connectorised, the cable is installed starting from the CRU end leaving the free end of the cable to be finally dressed into place and cut to length for neat connection with the power supply unit.

2. Run the drop cable from the CRU connector block to the Junction Box/ACPSU. Secure with 7mm cleats as required. Ensure that a drip loop is formed at the point where the cable enters the building to avoid the ingress of water into the building.

3. The maximum drop cable distance between the CRU and the PSU must not exceed 25 metres for 5 pair cable or (80 metres) for 6 pair cable

4. The cable has a minimum bend radius of 40mm.

5. Secure the drop cable to the CRU mounting bracket using straps. Leave sufficient slack to allow for CRU panning at the commissioning stage.

6. Plug the drop cable into the connector on the rear plate of the CRU.

7. **Important Notice:** Care should be taken when plugging the drop cable into the connector on the rear plate of the CRU. The cable approaches the socket from above. The cable socket has a polarisation key and the plug has a polarisation slot to ensure that the connectors mate correctly. Support the cable so that the plug does not connect to the socket at an angle. The plug must be eased into the socket ensuring the polarisation key locates. Damage to the pins may result if the pins are not inserted straight into the sockets or the polarisation key is not located correctly. Ensure that the pins are fully mated before attempting to tighten the locking ring. Tighten the locking ring using the fingers. Do not use a wrench as over-tightening will strip the thread on the locking ring.

STOP THIS PROCEDURE IS NOW COMPLETE

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CABLE INSTALLATION FOR POLE MOUNT CRU.

The drop cable consists of a single 5 pair cable (80 metres) for ST-V2 and ISDN and 6 Pair cable (80 metres) for complete with environmentally protected connector. The connector plugs into the CRU Socket mounted on the rear plate of the CRU.

STEP	PROCEDURE

THIS SECTION IS UNDER REVIEW

STOP THIS PROCEDURE IS NOW COMPLETE

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CABLE TERMINATION FOR ST-V2.

The drop cable consists of a single 5 pair cable (25 metres or 80 metres) complete with environmentally protected connector. The connector plugs into the CRU Socket mounted on the rear plate of the CRU. The 6 pair 80 metre data cable can also be used with the ST-V2 (Thin Red & Black remain unterminated)

STEP **PROCEDURE**

Important Notice: Care should be taken when plugging the drop cable into the connector on the rear plate of the CRU. The cable approaches the socket from above. The cable socket has a polarisation key and the plug has a polarisation slot to ensure that the connectors mate correctly. Support the cable so that the plug does not connect to the socket at an angle. The plug must be eased into the socket ensuring the polarisation key locates. Damage to the pins may result if the pins are not inserted straight into the sockets or the polarisation key is not located correctly. Ensure that the pins are fully mated before attempting to tighten the locking ring. Tighten the locking ring using the fingers. Do not use a wrench as over-tightening will strip the thread on the locking ring.

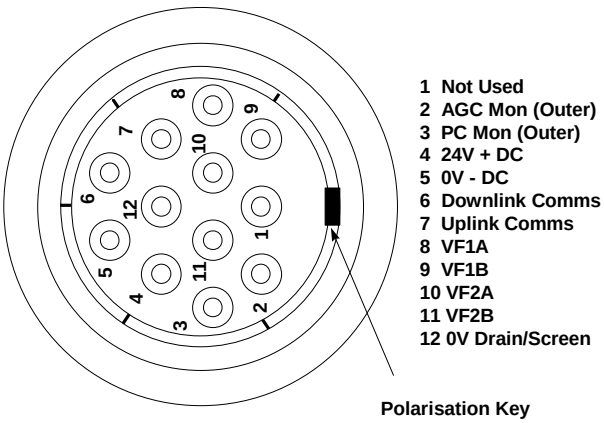


Figure 18. Drop Cable Connector Plug

Pin	Function	Limits	Description	Colour	
				5 Pair (25 metre and 80 metre drop cable)	**6 Pair** (80 metre drop cable)
1	0V	0V	Monitor Breakout	Unused	Black (Thin)
2	AGC Mon	+1V to +5V	Monitor Breakout	Green	Green
3	PC Mon	+1V to +5V	Monitor Breakout	Brown	Brown
4	+24V DC	20-42VDC	DC +ve Supply	Red	Red (thick multistrand)
5	0V DC	0V	DC -ve Supply	Black	Black (thick multistrand)
6	Down Link Comms	Data: +/- 10V	System Data - RS232 Transmit	Yellow	Yellow
7	Up Link Comms	Data: +/- 10V	System Data - RS232 Receive	Grey	Grey
8	VF1A	On Hook: 0v	Voice Channel 1	Violet	Violet
9	VF1B	On Hook: -50v	Voice Channel 1	Orange	Orange
10	VF2A	On Hook: 0v	Voice Channel 2	Blue	Blue
11	VF2B	On Hook: -50v	Voice Channel 2	White	White
	0V Chassis Earth)	0V	Drain /Screen (Monitor)	Tinned	Tinned Drain Wire

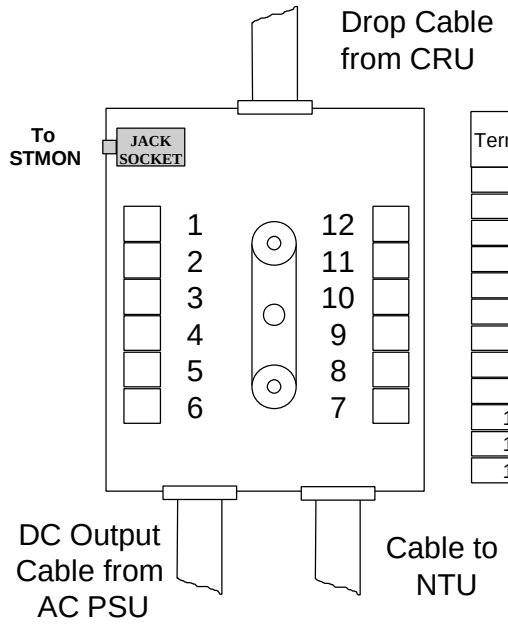
Table 9. CRU Connector Pin Termination

Five Pair Drop Cable Termination at the PSU (Type 1 only)

1. Run cable end into the Junction Box. Estimate the length of end required for termination of wires (allow 150mm of conductor for a maintenance re-termination of wires) and cut cable to length.

2. Strip outer cable sheath using a knife or cable stripping tool to expose wires.

3. Strip and terminate the wires of the drop cable as shown in Figure 19.



Terminal	Function	Colour		
		5 pair	PSU	NTU
1	System Data - Up	Grey		
2	System Data - Down	Yellow		
3	Ground			
4	V+; 24 Volts	Red	Sleeved outer braid	
5	Ground			
6	0 volts	Black		
7	VF2B	White		VF1A
8	VF2A	Blue		VF1B
9	Not Connected			
10	VF1B	Orange		VF2A
11	VF1A	Violet		VF2B
12	Ground	Screen	White	

Figure 19. Junction Box 5 pair Termination ST-V2 (Type 1 PSU)

Six Pair Drop Cable Termination at the PSU (Type 1 only)

1. Run cable end into the Junction Box. Estimate the length of end required for termination of wires (allow 150mm of conductor for a maintenance re-termination of wires) and cut cable to length.

2. Strip outer cable sheath using a knife or cable stripping tool to expose wires.

3. Strip and terminate the wires of the drop cable as shown in Figure 20.

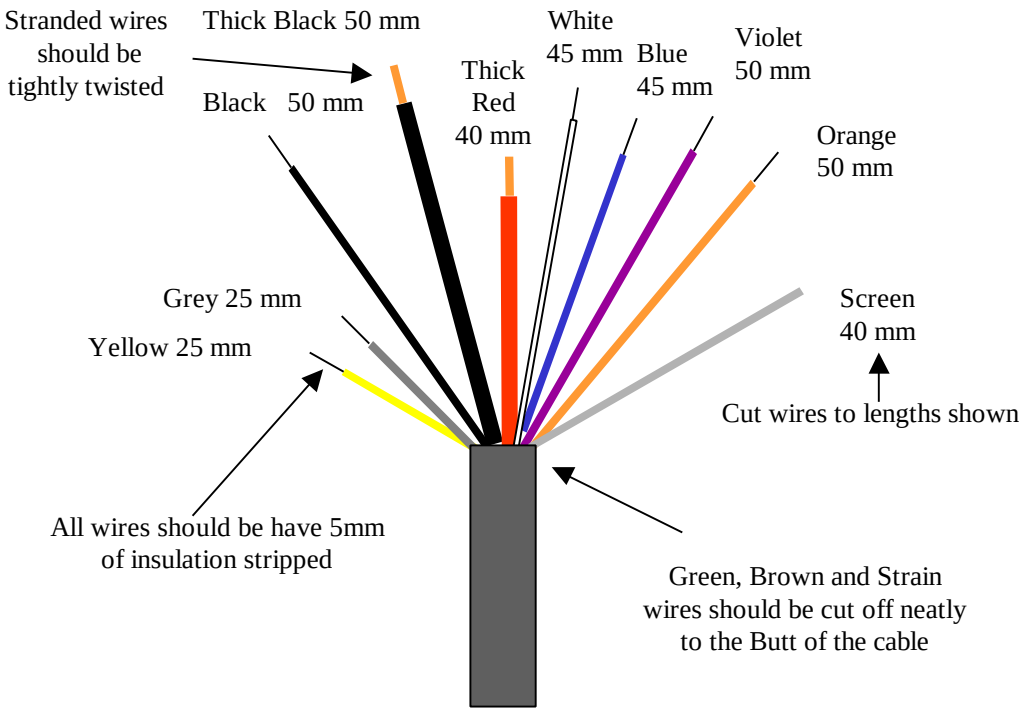
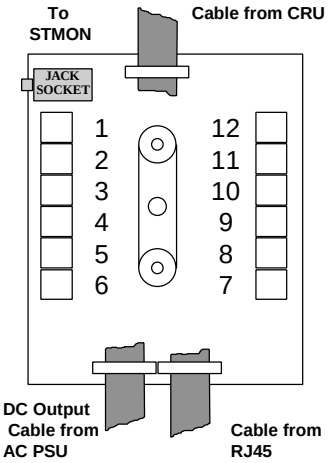


Figure 20. Wire Striping Dimensions for 80 Metre Drop Cable Lead-Out

4. Figure 21 below, illustrates the connections of the drop cable to the connector blocks inside the Junction Box. Figure 22 shows the order of wire insertion to ensure that the cables fit in the junction box. When connecting the thick stranded wire ensure that the screws are fully undone and the hole fully opened to allow the wire to be inserted without displacing strands. A wire loop should be inserted between tags 3 & 4.

5. Run and connect the cable from the NTU to the Junction Box. The VF wires are connected to the same Tags as the wires from the CRU. Run and connect the cable from the PSU to the Junction Box.

6. When wiring is complete re-insert the circuit board into the box and secure the cables with tie wraps.



Tag	Function	Colour		NTU
		80 Metre (Black Sheath)	PSU 30V brick	
1	UpLink Comms	Grey		
2	Down Link Comms	Yellow		
3	♦ Logic 0V	Thin Black & Screen		
4	♦ Logic 0V		Outer Braid	
5	Batt Pos DC Volts	Thick Red		
6	Batt Neg DC Volts	Thick Black		
7	VF1A	Violet		VF1A
8	VF1B	Orange		VF1B
9	Not Connected			
10	VF2A	Blue		VF2A
11	VF2B	White		VF2B
12	Batt Pos DC Volts		White	

♦ Note:Tags 3& 4 should be looped with a single strand wire.

Figure 21. Drop Cable Connections to Junction Box.

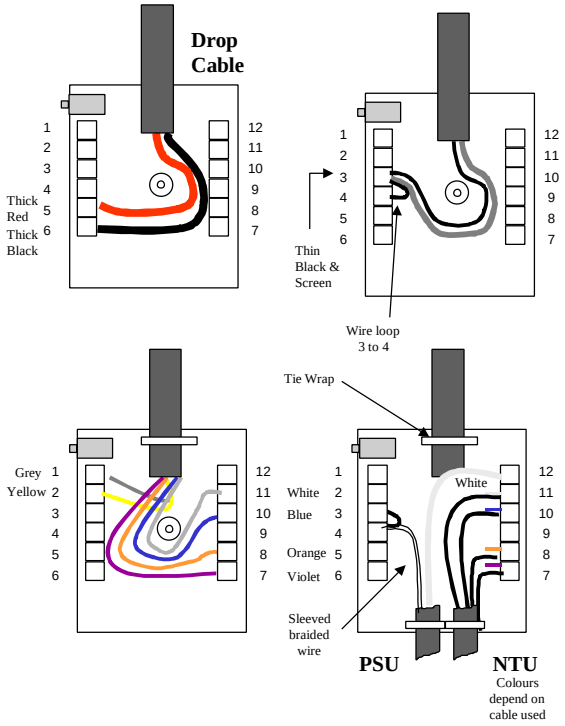


Figure 22. CRU Drop Cable Forming And Terminating In The Junction Box

Drop Cable Termination at the PSU (Type 2 only)

1. Run cable end into the PSU. Estimate the length of end required for termination of wires (allow 150mm of conductor for a maintenance re-termination of wires) and cut cable to length.

2. Strip outer cable sheath using a knife or cable stripping tool to expose 150mm of conductor, leaving sufficient length to allow the cable retaining clip to grip the sheath.

3. At the PSU terminate the wires of the drop cable with the red insulated terminal pins and screw to the terminal blocks(TB1 & TB2). Figure 23 below, illustrates the connections of the drop cable to the connector blocks inside the AC PSU.

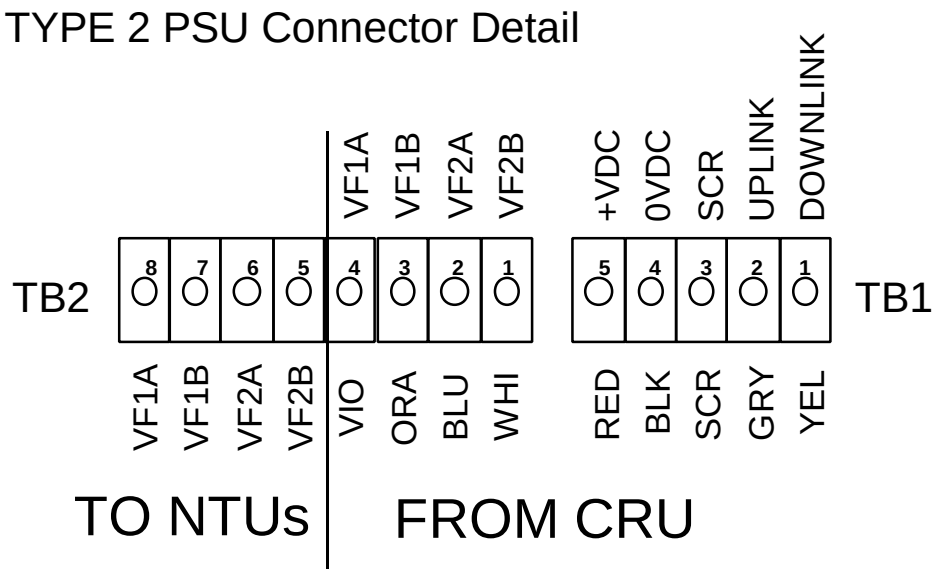


Figure 23. ST-V2 Drop Cable Connections to AC PSU (Type 2)

Terminal	Function	Description	Colour	
			5 pair	6 pair
TB1 1	Down Link Comms	System Data - RS232 Transmit	Yellow	Yellow
TB1 2	Up Link Comms	System Data - RS232 Receive	Grey	Grey
TB1 3	0V (Chassis Earth)	Drain /Screen (Monitor)	Tinned	Tinned
TB1 4	0V DC	DC -ve Supply	Black	Thick Black
TB1 5	+24V DC	DC +ve Supply	Red	Thick Red
TB2 1	VF2B	Voice Channel 2	White	White
TB2 2	VF2A	Voice Channel 2	Blue	Blue
TB2 3	VF1B	Voice Channel 1	Orange	Orange
TB2 4	VF1A	Voice Channel 1	Violet	Violet

Drop Cable Termination at the PSU (Type 4 only)

1. At the PSU punch down the wires of the drop cable, to the IDC terminal blocks (TB1 & TB2) using an Auto Trim Termination Tool and connect the DC and screen to the Wago block. The Figure 24 below, illustrates the connections of the drop cable to the connector blocks inside the PSU. If using 6 pair cut surplus wire and strain relief wires at the butt

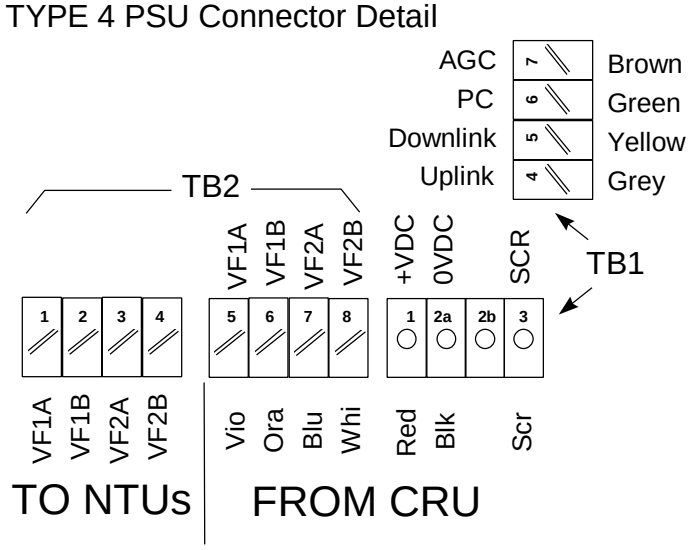


Figure 24. ST-V2 Drop Cable Connections to Type-4 PSU

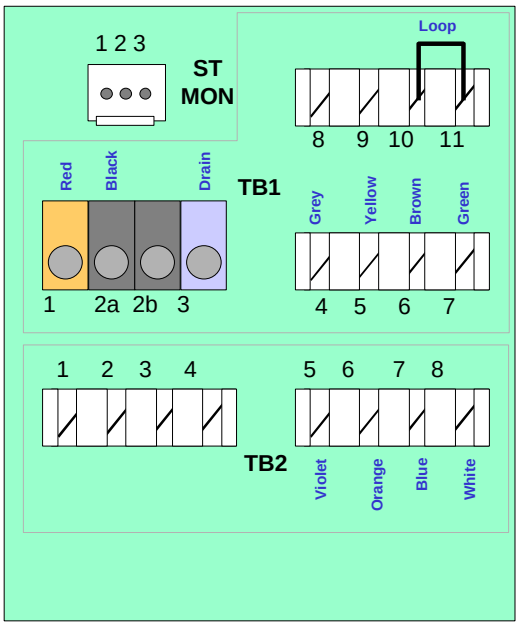
Terminal	**Function**	**Colour**	
Type 4		**5 pair**	**6 pair**
TB1 1	+24V DC Supply	Red	Thick Red
TB1 2a	0V DC-ve Supply	Black	Thick Black
TB1 2b	0V DC See Note 1		
TB1 3	0V (Chassis Earth) (Monitor)	Tinned	Tinned
TB1 4	Up Link Comms System Data - RS232 Transmit	Grey	Grey
TB1 5	Down Link Comms System Data - RS232 Receive	Yellow	Yellow
TB1 6	PC Mon Monitor Breakout	Green	Green
TB1 7	AGC Mon Monitor Breakout	Brown	Brown
TB2 5	VF1A Voice Channel 1	Violet	Violet
TB2 6	VF1B Voice Channel 1	Orange	Orange
TB2 7	VF2A Voice Channel 2	Blue	Blue
TB2 8	VF2B Voice Channel 2	White	White

Note 1 The hazardous voltage test earth is connected to TB1 terminal 2b if required

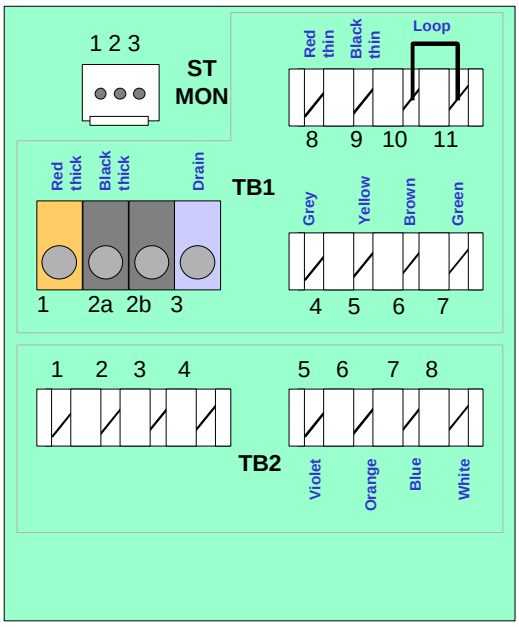
Drop Cable Termination at the PSU (Type 4A only)

2. At the PSU punch down the wires of the drop cable, to the IDC terminal blocks (TB1 & TB2) using an Auto Trim Termination Tool and connect the DC and screen to the Wago block. The table and figures below, illustrate the connections of the drop cable to the connector blocks inside the PSU. If using 6 pair cut surplus wire and strain relief wires at the butt

Terminal	Function	Colour	
Type 4A		5 pair	6 pair
TB1 1	+24V DC Supply	Red	Thick Red
TB1 2a	0V DC-ve Supply	Black	Thick Black
TB1 2b	0V DC See Note 1		
TB1 3	0V (Chassis Earth) (Monitor)	Tinned	Tinned
TB1 4	Up Link Comms System Data - RS232 Transmit	Grey	Grey
TB1 5	Down Link Comms System Data - RS232 Receive	Yellow	Yellow
TB1 6	PC Mon Monitor Breakout	Green	Green
TB1 7	AGC Mon Monitor Breakout	Brown	Brown
TB1 8	Not Used		Thin Red
TB1 9	Not Used		Thin Black
TB1 10	0V logic Ref	Loop to TB1..11	
TB1 11	0V to CRU	Loop to TB1..10	
TB2 5	VF1A Voice Channel 1	Violet	Violet
TB2 6	VF1B Voice Channel 1	Orange	Orange
TB2 7	VF2A Voice Channel 2	Blue	Blue
TB2 8	VF2B Voice Channel 2	White	White



5 Pair Drop Cable



6 Pair Drop Cable

Termination of NTUs

1. Run the NTU cable (2 wire) from NTU to the Junction Box, securing with 4mm cleats as required and terminate as detailed in Table 10.

Function	NTU	PSU Type 1 Junction Box Termination	PSU Type 2 Terminal Block Terminations	PSU Type 4 Terminal Block Terminations
VF1A	NTU1	11	TB2 terminal 5	TB2 terminal 1
VF1B	NTU1	10	TB2 terminal 6	TB2 terminal 2
VF2A	NTU2	8	TB2 terminal 7	TB2 terminal 3
VF2B	NTU2	7	TB2 terminal 8	TB2 terminal 4

Table 10. NTU Terminations for ST-V2

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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CABLE TERMINATION FOR ST-D128 WHEN USING TYPE 1 & TYPE 4A PSU.

STEP **PROCEDURE**

Drop Cable Termination at CRU.

Important Notice: Care should be taken when plugging the drop cable into the connector on the rear plate of the CRU. The cable approaches the socket from above. The cable socket has a polarisation key and the plug has a polarisation slot to ensure that the connectors mate correctly. Support the cable so that the plug does not connect to the socket at an angle. The plug must be eased into the socket ensuring the polarisation key locates. Damage to the pins may result if the pins are not inserted straight into the sockets or the polarisation key is not located correctly. Ensure that the pins are fully mated before attempting to tighten the locking ring. Tighten the locking ring using the fingers. Do not use a wrench as over-tightening will strip the thread on the locking ring.

1. Table 11 below, details the 12 way CRU connector block showing pin number, function, limits, description and colour drop cable conductors.

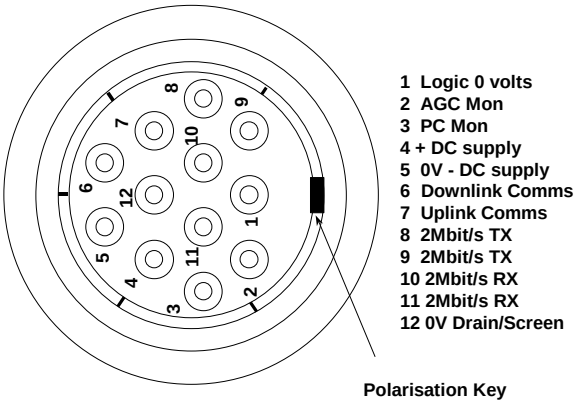


Figure 25. CRU Drop cable connector

Pin	Function	Limits	Description	Colour Code	
				25 Metre Belden Cable Grey sheath	**80 Metre Drop Black Sheath**
1	0V	0V	Logic Ground	Red with blue stripe	Black (thin)
2	AGC Mon		AGC Test Point	White with green stripe	Green
3	PC Mon		PC Test Point	Green with white stripe	Brown
4	Pos Batt	20-42VDC	DC +ve Supply	White with grey stripe	Red (thick multistrand)
5	Neg Batt	0V	DC -ve Supply	Grey with white stripe	Black (thick multistrand)
6	Down Link Comms	Data: ± 10V	System Data - RS232 Transmit	White with brown stripe	Yellow
7	Up Link Comms	Data:± 10V	System Data - RS232 Receive	Brown with white stripe	Grey
8	2Mbit/s Tx		2Mbit/s Tx G703	White with blue stripe	Violet
9	2Mbit/s Tx (RTN)		2Mbit/s Tx G703	Blue with white stripe	Orange
10	2Mbit/s Rx		2Mbit/s Rx G703	White with orange stripe	Blue
11	2Mbit/s Rx (RTN)		2Mbit/s Rx G703	Orange with white stripe	White
	0V (Chassis Earth)	0V	Screen (Monitor)	Tinned	Tinned Drain Wire

Table 11. CRU Connector Block Terminations

Drop Cable Termination At Junction Box. (type 1 PSU)

1. Note Wiring of the junction Box may differ if wired prior to December 1998

2. Run the drop cable from the CRU connector block to the Junction Box. Secure the junction box housing to the wall in the required position with two screws.

3. Remove the junction box circuit board from the housing held in position by one plastic retaining clip on each side.

4. Make sure that the free end of the drop cable reaches the junction box housing. Mark and cut to length and tailor the wire ends as shown in Figure 26.

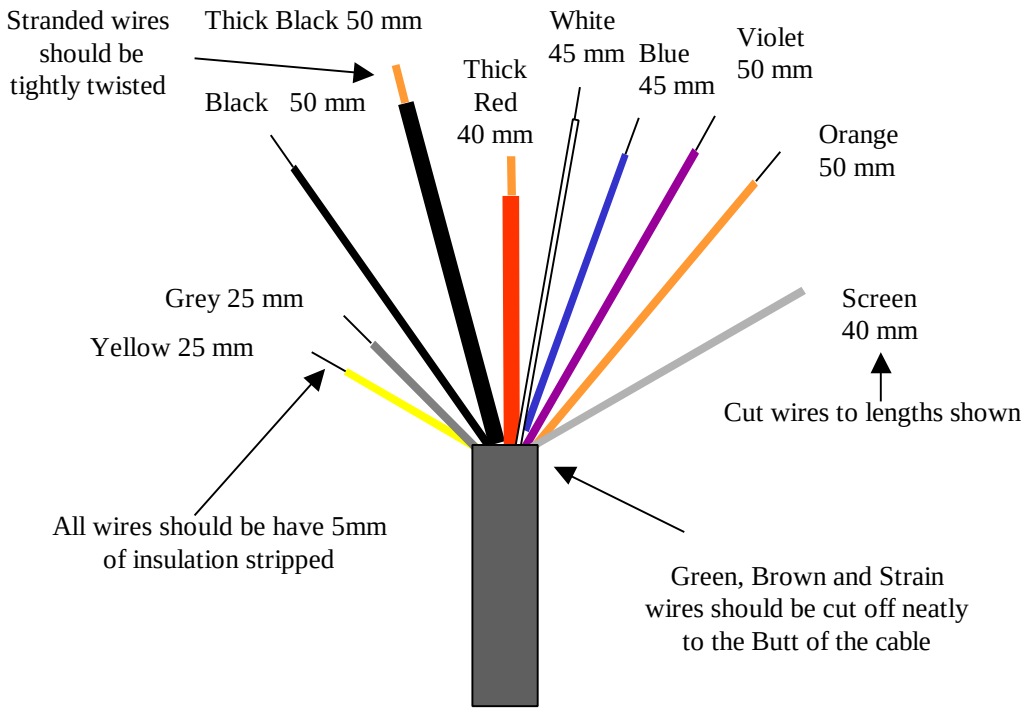
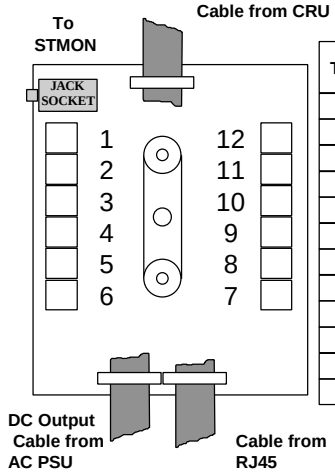


Figure 26. Wire Striping Dimensions for 80 Metre Drop Cable Lead-Out

5. Figure 27 below, illustrates the connections of the drop cable to the connector blocks inside the Junction Box. Figure 28 shows the order of wire insertion to ensure that the cables fit in the junction box. When connecting the thick stranded wire ensure that the screws are fully undone and the hole fully opened to allow the wire to be inserted without displacing strands. A wire loop should be inserted between tags 3 & 4.

6. Run and connect the cable from the RJ45 to the Junction Box. The TX and RX wires are connected to the same Tags as the wires from the CRU. Run and connect the cable from the PSU to the Junction Box.

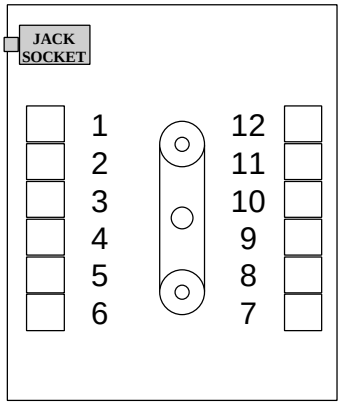
7. When wiring is complete re-insert the circuit board into the box and secure the cables with tie wraps.



Tag	Function	Colour			RJ45
		25mBelden (Grey Sheath)	80 metre (Black Sheath)	PSU 30V brick	
1	UpLink Comms	Brown with white stripe	Grey		
2	Down Link Comms	White with brown stripe	Yellow		
3	♦ Logic 0V	Red with blue stripe & Screen	Thin Black & Screen		
4	♦ Logic 0V			Outer Braid	Outer Braid
5	Batt Pos DC Volts	White with grey stripe	Thick Red		
6	Batt Neg DC Volts	Grey with white stripe	Thick Black		
7	TX 2Mbit/s	White with blue stripe	Violet		TX 2Mbit/s
8	TX 2Mbit/s	Blue with white stripe	Orange		TX 2Mbit/s
9	Not Connected				
10	RX 2Mbit/s	White with orange stripe	Blue		RX 2Mbit/s
11	RX 2Mbit/s	Orange with white stripe	White		RX 2Mbit/s
12	Batt Pos DC Volts			White	

♦ Note:Tags 3& 4 should be looped with a single strand wire.

Figure 27. Drop Cable Connections to Junction Box.



Pin	Function	Colour
1	UpLink Comms	Brown with white stripe
2	Down Link Comms	White with brown stripe
3	Logic 0V	Red with blue stripe
4	Batt Pos DC Volts	White with grey stripe
5	Ground	
6	Batt Neg DC Volts	Grey with white stripe
7	TX 2Mbit/s	White with blue stripe
8	TX 2Mbit/s	Blue with white stripe
9	Not Connected	
10	RX 2Mbit/s	White with orange stripe
11	RX 2Mbit/s	Orange with white stripe
12	Ground	Screen

Figure 28 Drop Cable Connections to Junction Box. Before Dec 1998

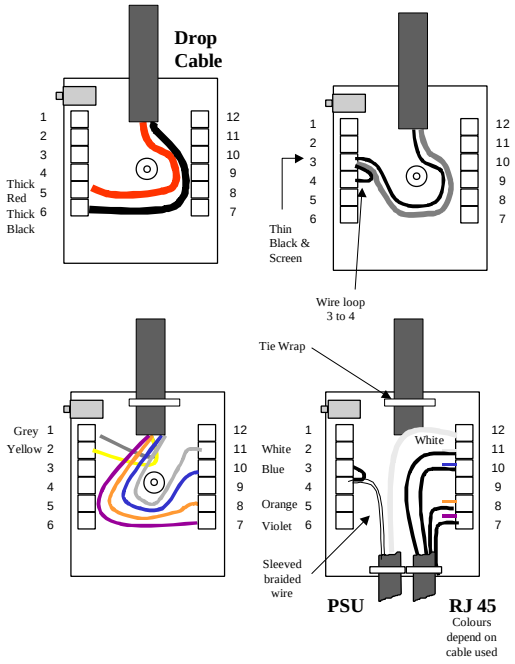


Figure 29. CRU Drop Cable Forming And Terminating In The Junction Box

Drop Cable Termination at the PSU (Type 4A only)

1. Run cable end into the PSU. Estimate the length of end required for termination of wires (allow 150mm of conductor for a maintenance re-termination of wires) and cut cable to length.

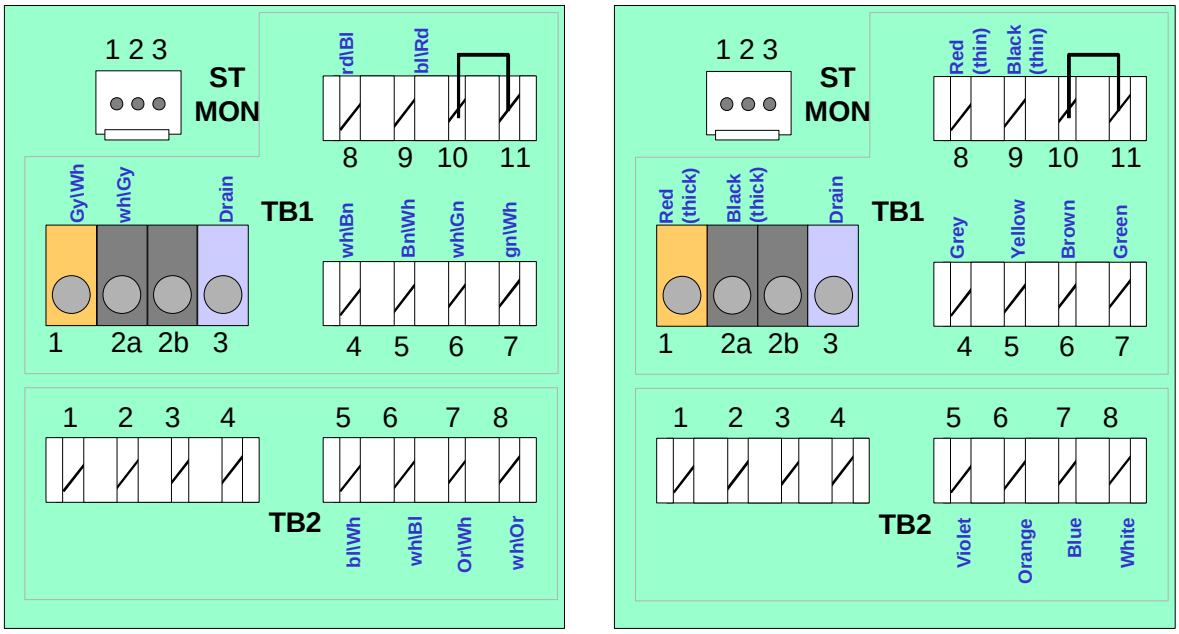
2. Strip outer cable sheath using a knife or cable stripping tool to expose 150mm of conductor, leaving sufficient length to allow the cable retaining clip to grip the sheath.

3. At the PSU terminate the wires of the drop cable with the red insulated terminal pins and screw to the terminal blocks(TB1 & TB2). Table 12 illustrates the connections of the drop cable to the connector blocks inside the AC PSU.

PCB		Function	25 Metre	80 Metre	RJ45
TB1	**Connector**		**Belden (Grey)**	**(Black)**	
1	Wago	V+ to CRU	White with grey stripe	Red (thick multistrand)	
2a	Connectors	0V to CRU	Grey with white stripe	Black (thick multistrand)	
2b		0V to CRU			
3		Screen from Drop-cable	Tinned	Tinned Drain Wire	
4	IDC	Up-Link (RS232-TX)	Brown with white stripe	Grey	
5		Down-Link (RS232-RX)	White with brown stripe	Yellow	
6		Power Control	Green with white stripe	Brown	
7		AGC	White with green stripe	Green	
8		Drop-cable 12th wire	Blue with red stripe	Red (thin)	
9		0V Logic	Red with blue stripe	Black (thin)	
10	] note 3	ϕ 0V Logic Ref	Link to TB1 11	Link to TB1 11	
11		0V to CRU	Link to TB1 10	Link to TB1 10	
TB2					
1	VF Data OUT IDC	2Mbit/sTX			Twisted pair 1
2		2Mbit/sTX			
3		2Mbit/sRX			Twisted pair 2
4		2Mbit/sRX			
5	VF Data IN IDC	2Mbit/sTX	White with blue stripe	Violet	
6		2Mbit/sTX	Blue with white stripe	Orange	
7		2Mbit/sRX	White with orange stripe	Blue	
8		2Mbit/sRX	Orange with white stripe	White	

Table 12 Type 4A PSU terminations

ϕ Note 2: TB1/10 is used as a 0 Volt reference when measuring PC and AGC.
] Note 3: Link to TB1 10 to TB1 11 using wire offcut.



25 Metre Belden (Grey) Drop Cable **80 Metre (Black) Drop Cable**

Figure 30. Wiring For D128 Type 4A Power Supply Unit

Customer Interface Wiring

Type 1 PSU

Run and Terminate the 2 Mbit/s Tx and 2 Mbit/s RX interfaces from the RJ45 G703 NTU's to the Junction Box using twisted pair cable with single strand wire. Secure with 4mm cleats as required and terminate TX2M on connections 10 & 11 (RJ45 Pin1&2) and RX2M on connections 7&8 (RJ45 pins4&5) as detailed in Figure 31 and Table 13.

Type 4A PSU

Run and Terminate the 2 Mbit/s Tx and 2 Mbit/s RX interfaces from the RJ45 G703 NTU's to the PSU using twisted pair cable with single strand wire. Secure with 4mm cleats as required and terminate TX2M on connections TB1/1 &TB1/2 (RJ45 Pin1&2) and RX2M on connections TB1/3& TB1/4 (RJ45 pins4&5) as detailed in Figure 31 and Table 13.

Pin Number	Function
1	receive (receiving from the network).
2	receive
3	shield reference point. Fit LK3 to ground
4	transmit (transmit to the network).
5	transmit
6	shield reference point.
7	not used
8	not used

Table 13. RJ45 Connections

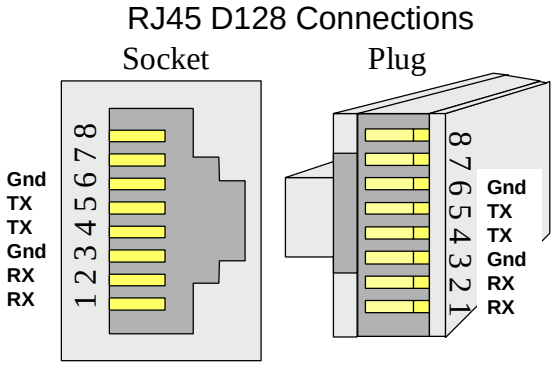


Figure 31. RJ45 connections for D128

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

CABLE TERMINATION FOR ST-I1.

STEP **PROCEDURE**

Drop Cable Connector

1. **Important Notice:** Care should be taken when plugging the drop cable into the connector on the rear plate of the CRU. The cable approaches the socket from above. The cable socket has a polarisation key and the plug has a polarisation slot to ensure that the connectors mate correctly. Support the cable so that the plug does not connect to the socket at an angle. The plug must be eased into the socket ensuring the polarisation key locates. Damage to the pins may result if the pins are not inserted straight into the sockets or the polarisation key is not located correctly. Ensure that the pins are fully mated before attempting to tighten the locking ring. Tighten the locking ring using the fingers. Do not use a wrench as over-tightening will strip the thread on the locking ring.

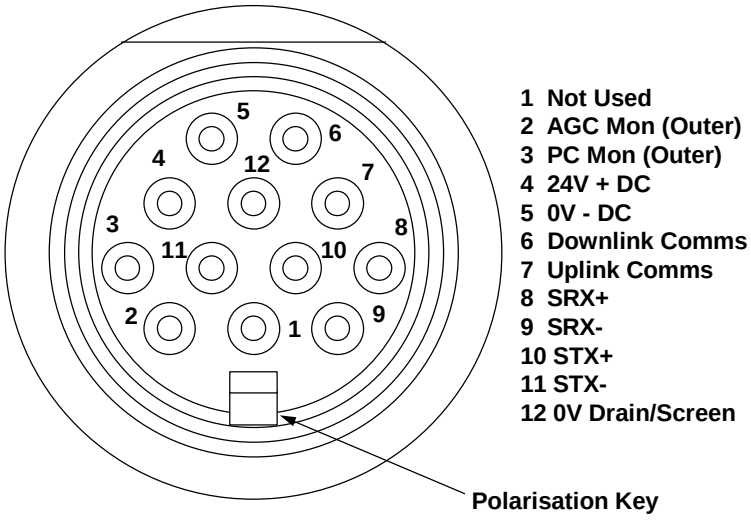


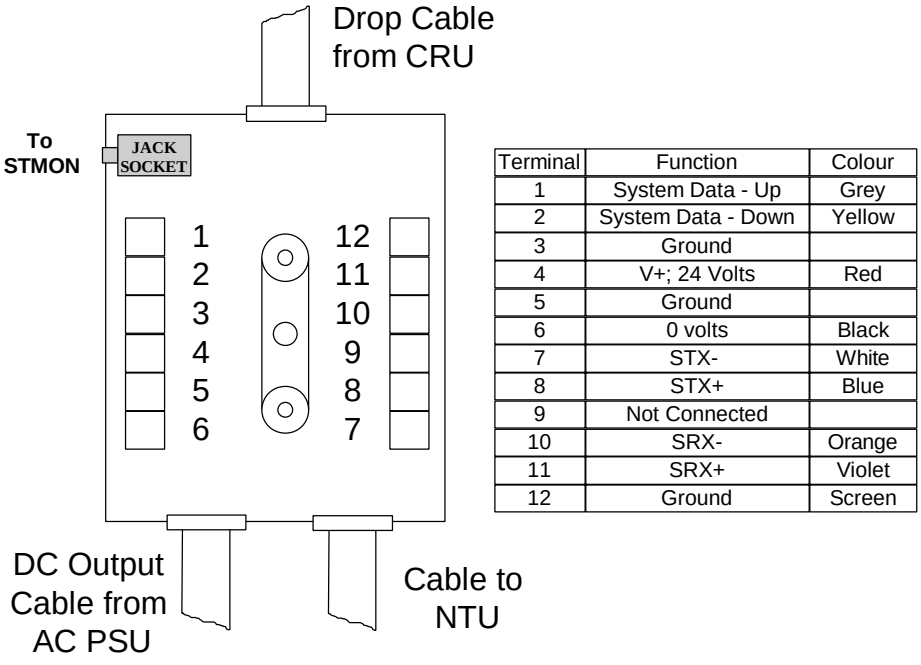
Figure 32. Drop Cable Connector Plug

Table 14. CRU Connector Pin Termination

Pin	Function	Limits	Description	Colour	
				5 Pair 25/80 metre drop	6 Pair 80 metre drop
1	0V	0V	Monitor Breakout	Unused	Black (thin)
2	AGC Mon	+1V to +5V	Monitor Breakout	Green	Green
3	PC Mon	+1V to +5V	Monitor Breakout	Brown	Brown
4	+24V DC	20-42VDC	DC +ve Supply	Red	Red (thick multistrand)
5	0V DC	0V	DC -ve Supply	Black	Black (thick multistrand)
6	Down Link Comms	Data: +/- 10V	System Data - RS232 Transmit	Yellow	Yellow
7	Up Link Comms	Data: +/- 10V	System Data - RS232 Receive	Grey	Grey
8	SRX+		ISDN Receive	Violet	Violet
9	SRX-		ISDN Receive	Orange	Orange
10	STX+		ISDN Transmit	Blue	Blue
11	STX-		ISDN Transmit	White	White
	0V (Chassis Earth)	0V	Drain /Screen (Monitor)	Tinned	Tinned Drain Wire

Five Pair Drop Cable Termination at the PSU (Type 1 only)

1. At the Junction Box terminate the wires of the drop cable as shown in Figure 33.



Terminal	Function	Colour
1	System Data - Up	Grey
2	System Data - Down	Yellow
3	Ground	
4	V+; 24 Volts	Red
5	Ground	
6	0 volts	Black
7	STX-	White
8	STX+	Blue
9	Not Connected	
10	SRX-	Orange
11	SRX+	Violet
12	Ground	Screen

Figure 33. Junction Box Termination (Type 1 PSU)

Six Pair Drop Cable Termination at the PSU (Type 1 only)

1. Run cable end into the Junction Box. Estimate the length of end required for termination of wires (allow 150mm of conductor for a maintenance re-termination of wires) and cut cable to length.

2. Strip outer cable sheath using a knife or cable stripping tool to expose wires.

3. Strip and terminate the wires of the drop cable as shown in Figure 34.

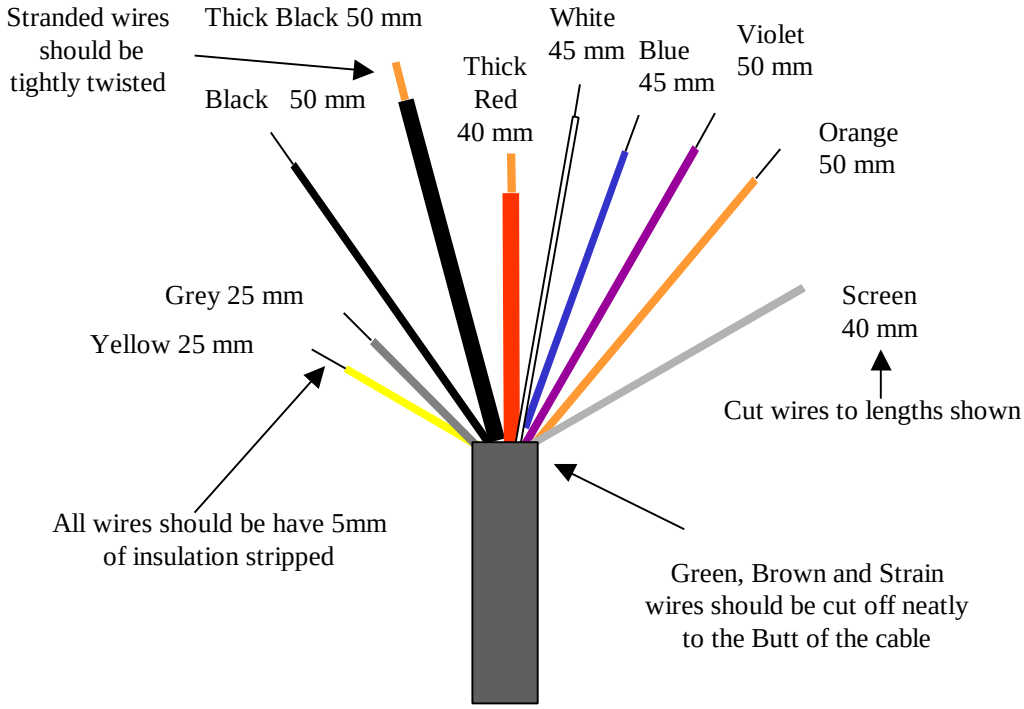
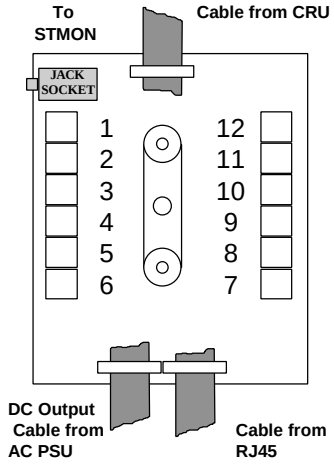


Figure 34. Wire Striping Dimensions for 80 Metre Drop Cable Lead-Out

8. Figure 35 below, illustrates the connections of the drop cable to the connector blocks inside the Junction Box. The diagram shows the order of wire insertion to ensure that the cables fit in the junction box. When connecting the thick stranded wire ensure that the screws are fully undone and the hole fully opened to allow the wire to be inserted without displacing strands. A wire loop should be inserted between tags 3 & 4.

9. Run and connect the cable from the NTU to the Junction Box. The VF wires are connected to the same Tags as the wires from the CRU. Run and connect the cable from the PSU to the Junction Box.

10. When wiring is complete re-insert the circuit board into the box and secure the cables with tie wraps.



Tag	Function	Colour		NTU
		CRU Cable	PSU 30V brick	
1	UpLink Comms	Grey		
2	Down Link Comms	Yellow		
3	♦ Logic 0V	Thin Black & Screen		
4	♦ Logic 0V		Outer Braid	
5	Batt Pos DC Volts	Thick Red		
6	Batt Neg DC Volts	Thick Black		
7	ST RX+	Violet		VF1A
8	ST RX-	Orange		VF1B
9	Not Connected			
10	ST TX+	Blue		VF2A
11	ST TX -	White		VF2B
12	Batt Pos DC Volts		White	

♦ Note:Tags 3& 4 should be looped with a single strand wire.

Figure 35. Drop Cable Connections to Junction Box.

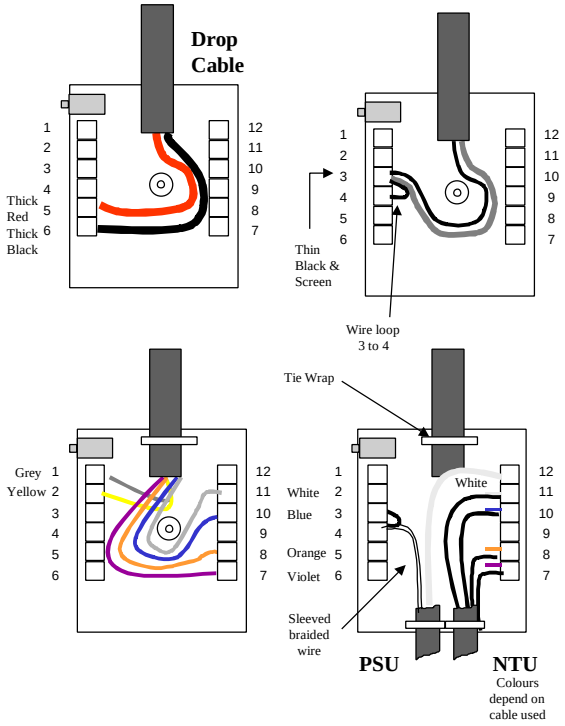


Figure 36. CRU Drop Cable Forming And Terminating In The Junction Box

Drop Cable Termination at the PSU (Type 2)

1. At the PSU terminate the wires of the drop cable with the red insulated terminal pins and screw to the terminal blocks(TB1 & TB2). Figure 37 below, illustrates the connections of the drop cable to the connector blocks inside the AC PSU.

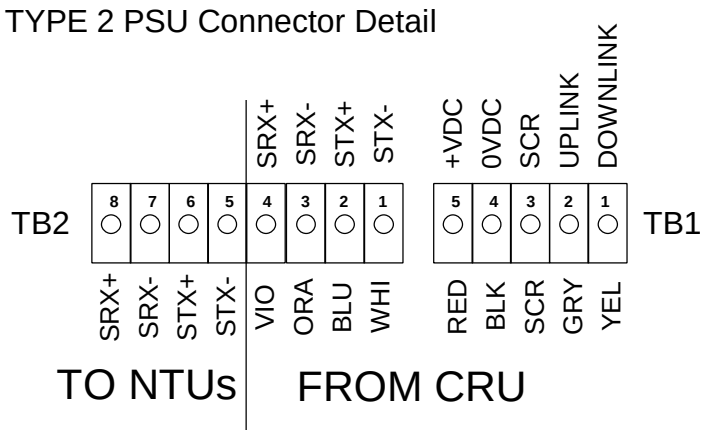


Figure 37. ISDN Drop Cable Connections to AC PSU (Type 2)

Drop Cable Termination at the PSU (Type 4 only)

1. At the PSU punch down the wires of the drop cable, to the IDC terminal blocks (TB1 & TB2) using an Auto Trim Termination Tool and connect the DC and screen to the Wago block . The Figure 38 below, illustrates the connections of the drop cable to the connector blocks inside the PSU.

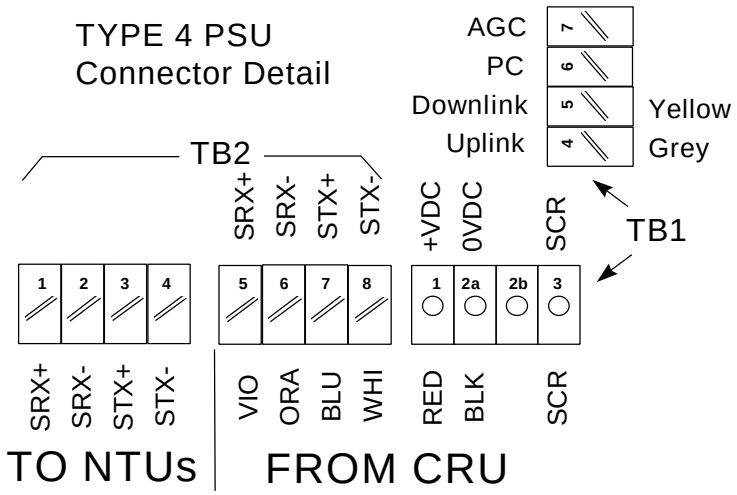


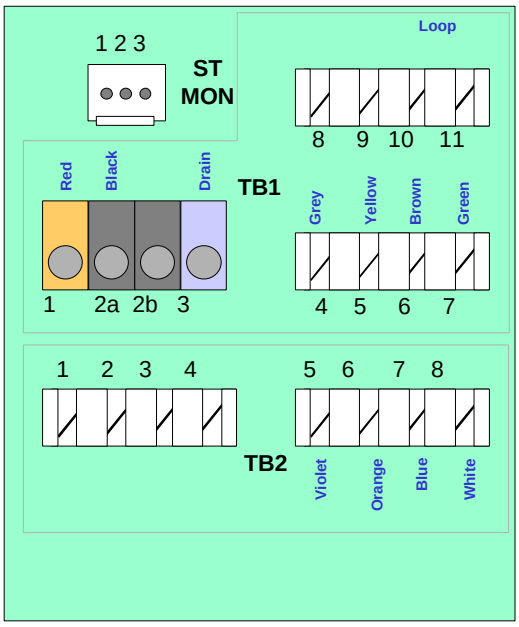
Figure 38. ST-I1 Drop Cable Connections to Type-4 PSU

Terminal	Function	Description	Colour
TB1 1	+24V DC	DC +ve Supply	Red
TB1 2a	0V DC	DC -ve Supply	Black
TB1 2a	0V DC	See Note 1	
TB1 3	0V (Chassis Earth)	Drain /Screen (Monitor)	Tinned
TB1 4	Up Link Comms	System Data - RS232 Transmit	Grey
TB1 5	Down Link Comms	System Data - RS232 Receive	Yellow
TB1 6	PC Mon (outer)	Monitor Breakout	Green
TB1 7	AGC Mon (outer)	Monitor Breakout	Brown
TB2 5	SRX+	RX	Violet
TB2 6	SRX-	RX	Orange
TB2 7	STX+	TX	Blue
TB2 8	STX-	TX	White

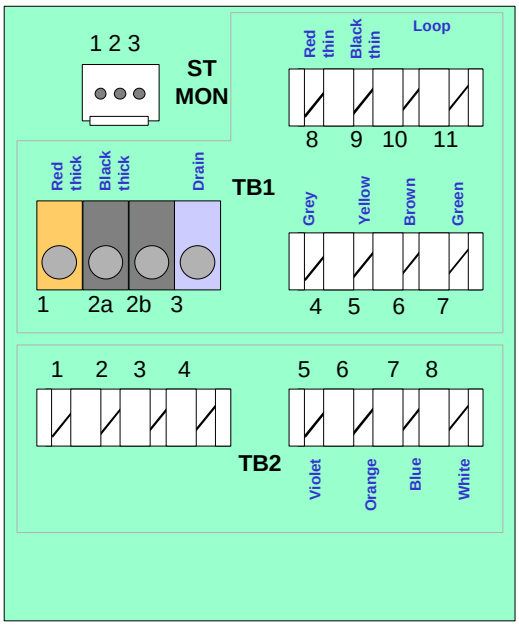
Drop Cable Termination at the PSU (Type 4A only)

3. At the PSU punch down the wires of the drop cable, to the IDC terminal blocks (TB1 & TB2) using an Auto Trim Termination Tool and connect the DC and screen to the Wago block. The table and figures below, illustrate the connections of the drop cable to the connector blocks inside the PSU. If using 6 pair cut surplus wire and strain relief wires at the butt

Terminal	Function	Colour	
Type 4A		5 pair	6 pair
TB1 1	+24V DC Supply	Red	Thick Red
TB1 2a	0V DC-ve Supply	Black	Thick Black
TB1 2b	0V DC See Note 1		
TB1 3	0V (Chassis Earth) (Monitor)	Tinned	Tinned
TB1 4	Up Link Comms System Data - RS232 Transmit	Grey	Grey
TB1 5	Down Link Comms System Data - RS232 Receive	Yellow	Yellow
TB1 6	PC Mon Monitor Breakout	Green	Green
TB1 7	AGC Mon Monitor Breakout	Brown	Brown
TB1 8	Not Used		Thin Red
TB1 9	Not Used		Thin Black
TB1 10	0V logic Ref	Loop to TB1..11	
TB1 11	0V to CRU	Loop to TB1..10	
TB2 5	STX- ISDN S-Bus	Violet	Violet
TB2 6	STX+ ISDN S-Bus	Orange	Orange
TB2 7	SRX- ISDN S-Bus	Blue	Blue
TB2 8	SRX+ ISDN S-Bus	White	White



5 Pair Drop Cable



6 Pair Drop Cable

Termination of NTUs

- Run the NTU cable (4 wire)for S interface TX and RX from NTU to the Junction Box, securing with 4mm cleats as required and terminate as detailed below.

Function	Terminations			
	RJ45 NTU	**PSU Type 1 Junction Box**	**PSU Type 2 Terminal Block**	**PSU Type 4 / 4A Terminal Block**
STX-	5	7	TB2 terminal 5	TB2 terminal 4
STX+	4	8	TB2 terminal 6	TB2 terminal 3
SRX-	6	10	TB2 terminal 7	TB2 terminal 2
SRX+	3	11	TB2 terminal 8	TB2 terminal 1

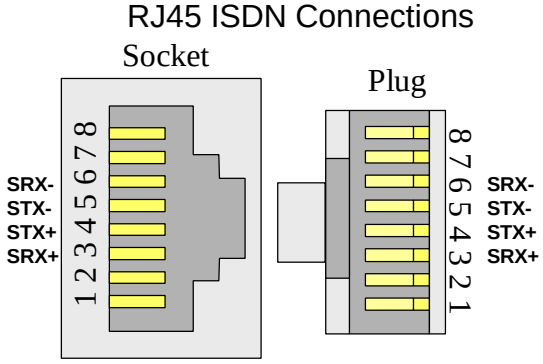


Figure 39. RJ45 Connections for ISDN

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

BATTERY CONNECTION FOR TYPE 2 AND TYPE 4 PSUs.

Do not connect the battery until the commencement of commissioning

Note if the Type 2/4 PSU is used for D128 do not use batteries to ensure sufficient voltage is present at CRU

STEP **PROCEDURE**

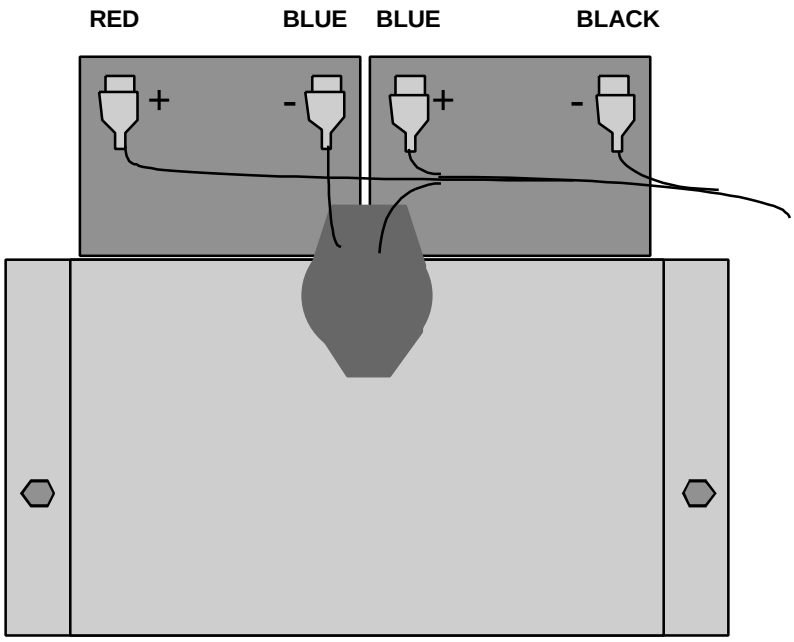
1. Remove PSU cover and disconnect cover earthing lead if connected.

2. Place the spade connectors onto the battery terminals in the following order:

a) Blue leads to centre positive and -ve terminals

b) Black lead to -ve terminal (Right hand battery)

c) Red lead to +ve Terminal



3. Press SW3 and ensure green Power OK LED is illuminated

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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CONNECTING TO THE CRU USING STMON.

STMON is an MS-DOS PC communications utility that allows the status of an AS4000 Subscriber Terminal to be displayed on a PC screen. It is intended to be used as a commissioning tool and may also be used as an aid to troubleshooting.

New versions of the CRU require STMON Version J or later as the have an extended information field to cater for the increased range of RF Frequencies used by the AS4000 System. Version J is also compatible with older versions of the CRU

STEP **PROCEDURE**

Preliminary

1. STMON works by intercepting messages that are sent over the ST downlink RS232 link to the Junction Box. From these messages STMON is able to display the following data;

    - ST channel code
    - Downlink status
    - Uplink status
    - Downlink AGC level
    - Downlink ‘soft error’ count
    - Uplink Power Control level
    - ST software status

In addition to displaying this data STMON is also able to log this information to a file.

Cable requirements

Note
This convention is used for all wires. Blue on Red means that there is a small Blue band on a Red background.

1. STMON communicates via the PC RS232 com port which connects to the ST drop cable. The PC may be attached to the Junction Box, PSU or survey tool with a cable terminated at the PC end as in Figure 40.

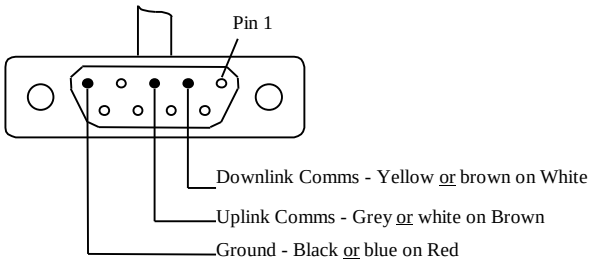

Figure 40. STMON PC Connection

2a) **Connecting to Junction Box (Type 1 PSU)**
The ST connection is made via a 3.5mm stereo jack socket located on the drop cable junction box. See Figure 41 below.

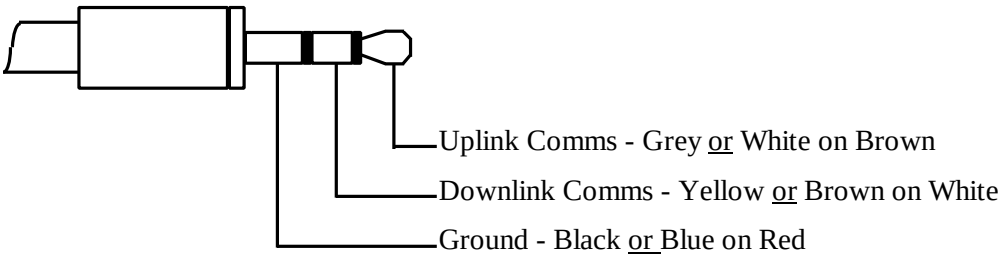

Figure 41. STMON Junction Box Connection

2b) **Connecting to Survey Tool**
The ST connection is made via a ¼ inch stereo jack socket located the survey tool box. See Figure 42 below.

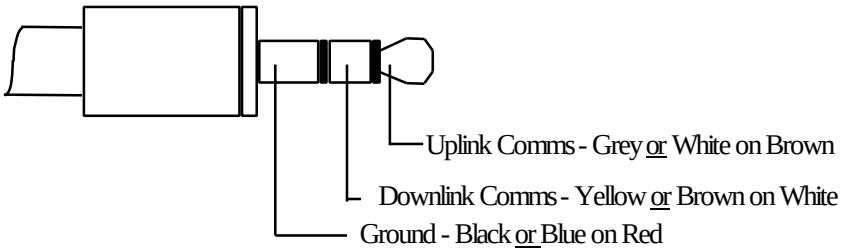

Figure 42. STMON Survey Tool Connections

2c) **Connecting to Terminal Block (Type 2 PSU)**
The ST connection is made by connecting the STMON cable to TB1 as shown below.

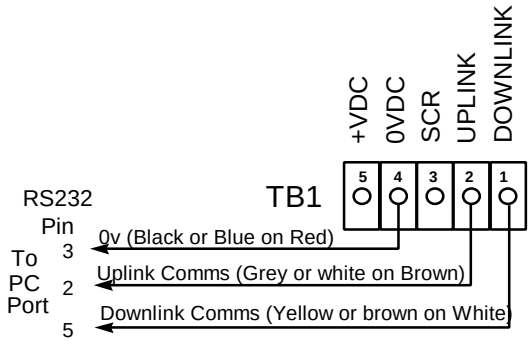

Figure 43. STMON Connections To Type 2 PSU

Note: Remove the grey wire from TB1 (2) and twist together with the grey wire from STMON to isolate the uplink comms from the PSU.

2d) **Connecting to Terminal Block (Type 4 & 4a PSU)**
The following tables shows connections for STMON to PSU

PC STMON CABLE 9 Way D type	Type 4 / 4A PSU 3 Way Molex	Type 4 /4A PSU PSU TB1	Drop Cable	Drop Cable Connector
PC RS232 pin 2	3	5	Yellow	6
PC RS232 pin 3	2	4	Grey	7
Ground pin 5	1	2B	Not Used	No connection

Table 15. VF AND ISDN configuration for STMON

PC STMON CABLE 9 Way D type	Type 4 / 4A PSU 3 Way Molex	Type 4 / 4A PSU PSU TB1	Drop Cable	Drop Cable Connector
PC RS232 pin 2	3	5	brown on White	6
PC RS232 pin 3	2	4	white on Brown	7
Ground pin 5	1	2B	blue on Red	1

Table 16. D128 Belden Cable configuration for STMON

Note: On Type 4 PSU the ST connection is made by connecting the STMON cable to ST MON and setting the jumper link between pins 2 & 3 and as shown below.

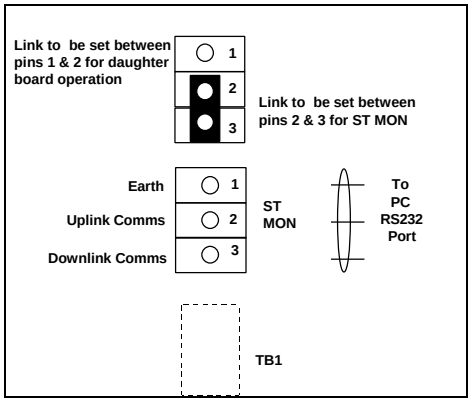

Figure 44. STMON Connections To Type 4 PSU only

Starting STMON

1. STMON should be executed within the DOS environment. STMON is not suitable for execution from within the MS-Windows environment.

2. Type the following at the MS-DOS command line;

stmon /c com_port /f filename

All parameters are optional.

/c com_port specifies which serial communications port to use (COM1 is used as default). Valid com_port settings: ***COM1 COM2***

/f filename specifies where to store the log file. Any valid MS-DOS filename is allowed.

/m specifies monochrome display - useful for maximum contrast.

If the STMON panel shows a communications timeout alarm then;
1) Check cable connection.
2) Check PC Com port selection and if necessary quit STMON by pressing ESC and invoke using:
stmon /c com1 (for com_port 1) or stmon /c com2 (for com_port 2)

Once the Comms status indicates “COMx: OK” the ST software build , channel codes and ST options fields should begin to update. A ‘clean’ update of the full information set may be forced by power cycling the ST.

Principle of operation

1. STMON intercepts messages that are sent from the ST approximately every two seconds - this governs the screen update rate.

2. Immediately after power-up the ST outputs data for STMON specifying the ST software version code and the ST RF channel code. STMON is updated with link status information. Further STMON support can be disabled by pressing F2 to 'Close' STMON communications. STMON support can be reactivated by pressing F1 to 'Open' STMON communications.

3. If a message is not received after five seconds, STMON reports a communications time-out alarm. STMON support is reactivated by pressing F2 followed by F1 or by stopping and re-starting the STMON program. If these actions do not clear the comms time-out alarm, the cable connections should be checked, the com port selection could be wrong or the ST or its power supply could be faulty.

STMON display panel description

1. A brief description of the STMON display panels follows.

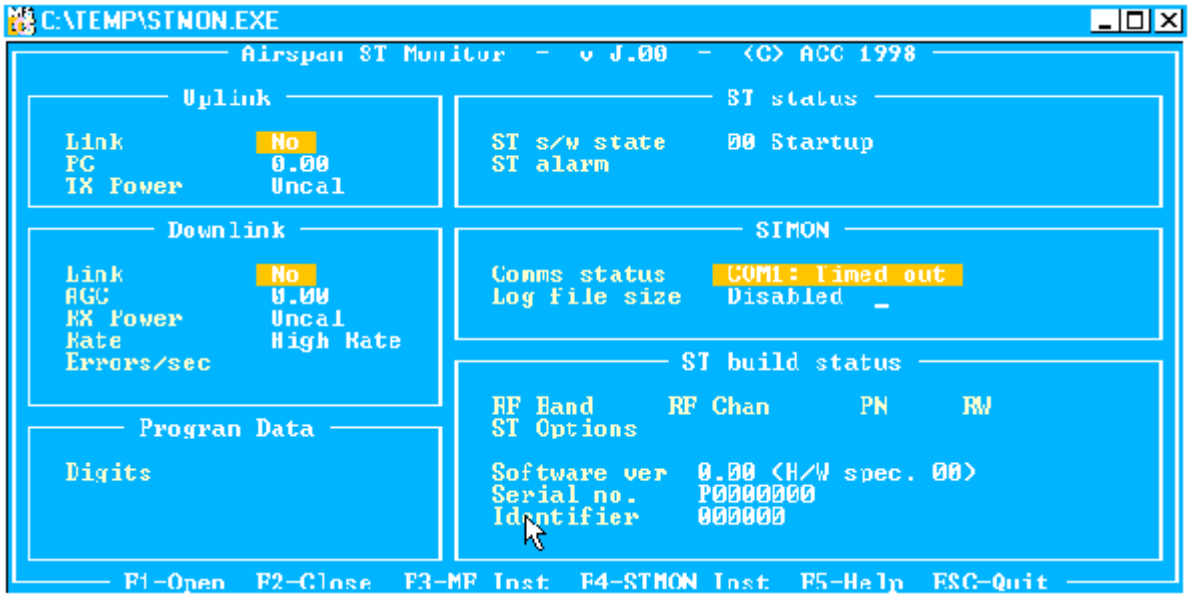

Figure 45. STMON Display

Uplink Panel	
Link	Status of Uplink, either **No** link or link **OK**.
PC & TX Power	If the CRU has been factory calibrated, the actual TX power will be given in dBm (range 0dBm to 25dBm), and the PC control Voltage is in the range 0.00 to 5.00 V (where 0.00V = maximum power). For un-calibrated CRUs the TX Power displays 'Uncal' and the control voltage is in the range 0.00 to 3.00V(where 3.00V = maximum power).

Table 17. Uplink Panel

Downlink panel	
Link	Status of Downlink, either **No** link or link **OK**.
AGC and RX Power	If the CRU has been factory calibrated, the actual RX power will be given in dBm (range - 85dBm to -105dBm). and the AGC control Voltage is in the range 0.00 to 5.00 V (where 0.00V = maximum power). For un-calibrated CRUs the TX Power displays 'Uncal' and the control voltage is in the range 0.00 to 3.00V(where 3.00V = maximum power).
Rate	The acquisition rate
Errors /sec	Number of soft errors counted on the downlink averaged over one second. The soft error count does not directly correspond to a link Bit Error Rate as most soft errors are corrected by forward error correction, but this is a reasonable indication of data link quality. Table 19 below gives atypical error count for a 15 user system - low error counts should be expected in systems populated with less than 15 users.

Table 18. Downlink Panel

Soft error count / second	Downlink quality
<4000	Excellent
4000-5000	Good
5000-7000	Fair
>7000	Poor

Table 19. Error Count

3.1 Program Data Panel

Digits	Accepts digits entered by the user during the STMON install

Table 20. Program Data Panel

ST Status panel	
ST s/w state	Internal operational state of the ST software. See Table 24 below.
ST alarm	Indicates ST alarm condition. May be blank (no alarm), Initialising or Faulty.

Table 21. ST Status Panel

STMON panel	
Comms status	Indicates com port to which STMON is attached and status, **OK** or **Timed out**.
Log file size	Indicates size of log file size in Bytes, or **Disabled** if log file option was not invoked.

Table 22. STMON Panel

ST build status panel	
CRU channel code	Indicates channel code entered during installation - this information is updated on ST initialisation.
ST Options	Indicates the special options chosen. i.e. the SPM frequency at 12 kHz or 16kHz
ST s/w ver	Indicates the version number of the ST software build - this information is updated on ST initialisation.
Serial Number	Indicates size the serial number of the CRU - this information is updated on ST initialisation.
Identifier	Normally set to 000000

Table 23. ST Build Status Panel

ST s/w state number	State name	Description
0	Start-up	ST is initialising - this should last no longer than 5 seconds
4	Waiting for link	ST is functional but has yet to acquire Downlink and Uplink
5	Operative	ST is operating correctly
6	Disabled	ST has failed authentication and has been disabled by the CT
7	Waiting for off-hook	ST install mode entered. Not Valid for ISDN / D128
8	Collecting digits	Telephone is off-hook and install digits are being collected Invalid for ISDN / D128
9	Install done	ST installation is complete, ST needs to re-boot
10	ST not installed	ST has no installation data, no link will be acquired
11	Collecting STMON Digits	ST is accepting digits from STMON
12	STMON install Failed	ST did not accept the programming code
13	STMON install OK	ST has accepted programming code, ST needs to re-boot

Table 24. ST States

STMON log file

1. A text log file may be created by using the /f switch. Log file entries are created every time the status of the ST changes. Invoke STMON by typing;

   stmon /f log.txt

2. After STMON is stopped the log file may be viewed using any standard ASCII file editor such as MS-DOS EDIT, Windows NOTEPAD or MS Word. A sample log file is shown below.

Date	Time	Secs(E)	Downlink	Uplink	AGC	PC	Errors	Rate	S/W	Comms
Thu Aug 17	15:44:48	0			1.61	0.01	0	High	5	
Thu Aug 17	15:44:50	2			1.61	0.01	0	High	5	
Thu Aug 17	15:44:53	5			1.61	0.01	0	High	5	
Thu Aug 17	15:44:53	5			1.61	0.01	0	High	5	
Thu Aug 17	15:44:59	11		Failed	1.61	0.01	0	High	4	
Thu Aug 17	15:45:01	13		Failed	1.61	0.01	6013	High	4	
Thu Aug 17	15:45:02	14		Failed	1.61	0.01	6013	High	4	
Thu Aug 17	15:45:03	15		Failed	2.28	0.00	6013	High	4	
Thu Aug 17	15:45:05	17		Failed	2.28	0.00	2642	High	4	

Individual fields are shown in Table 25.

Field	Description
Date	Date when log entry was made
Time	Time when log entry was made
Secs (E)	Number of seconds that have elapsed since log was started
Downlink	Status of ST downlink, blank if uplink is OK
Uplink	Status of ST uplink, blank if uplink is OK
AGC	Downlink AGC voltage as presented to the RF subsystem
PC	Uplink power control voltage as presented to the RF subsystem
Errors	Number of soft errors counted since last reported count
Rate	Indication of radio bit rate
S/W	Current state of ST software, numeric from 0 to 10.
Comms	Status of communications from ST, blank if OK

Table 25. Log Fields

Key	Name	Function
F1	Open	Opens STMON communication between the PC and ST. Press F1 if connecting to an ST that is already powered up and operating.
F2	Close	Closes STMON communication between the PC and ST. Press F2 before disconnecting from an ST.
F3	Install	Invokes the **ST-V2** install mode. **Not valid for ST-I1 / ST-D128** With a telephone attached to either VF pairs, press F3 and lift the telephone handset. The install 'ready to proceed' tone is heard. The ST channel code may the be entered by pressing the appropriate digits on the telephone handset. When complete, hang up and wait for the ST to re-boot. Check that the correct channel code is displayed in the Build Status panel.
F4	Install	Invokes the STMON install mode. There are 2 install options, the RF channel/PN/RW installation and ST options installation. A cursor appears in the Program Data panel. **1. RF Channel/PN/RW install** Enter the ST programming code, e.g. 101207*9, then press <ENTER>. **2. ST options install** Enter the 3 digit ST install option code, eg #0009, then press <ENTER> In both cases the digits will be sent to the ST. If the ST accepts the digits a message will appear 'ST Install OK' otherwise either 'ST Install Failed' or 'No response' will appear. When complete, wait for the ST to re-boot. Check that the correct channel code or st options are displayed in the Build Status panel.
3.25	STMON Help	Displays the help menu. This shows how to program STs that support the new 3 digit RF channel code and old 2 digit RF channel code. It also shows how to program the ST options.
ESC	Quit	Exits the STMON application.

Table 26. Function Key Description

Programming Codes for CRUs when using STMON Rev J

The following table shows the codes used in the RF digit positions when programming external Fixed Assignment CRUs.

RF # 2/3 digits			PN 1 digit	RW 2 digits		Identity 6 digits	Check N°. 1 digit	Remote site location
1	0	5	1	0	1	* or 000000	7	CRU1

The codes differ depending on the generation of CRU used. Previous release CRUs use a 2 digit code shown in column 3 of the table below. Current release CRUs use a 3 digit code as shown in column 2 in the table below.

RF BAND	ST MON REV J RF BAND (1 digit) CHAN NO. (2 digits)	STMON < REV J CHAN NO (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
2.0 – 2.3GHz	**1 00**	01	2029.75	2204.75
2.0 – 2.3GHz	**1 01**	02	2033.25	2208.25
2.0 – 2.3GHz	**1 02**	03	2036.75	2211.75
2.0 – 2.3GHz	**1 03**	04	2040.25	2215.25
2.0 – 2.3GHz	**1 04**	05	2043.75	2218.75
2.0 – 2.3GHz	**1 05**	06	2047.25	2222.25
2.0 – 2.3GHz	**1 06**	07	2050.75	2225.75
2.0 – 2.3GHz	**1 07**	08	2054.25	2229.25
2.0 – 2.3GHz	**1 08**	09	2057.75	2232.75
2.0 – 2.3GHz	**1 09**	10	2061.25	2236.25
2.0 – 2.3GHz	**1 10**	11	2064.75	2239.75
2.0 – 2.3GHz	**1 11**	12	2068.25	2243.25
2.0 – 2.3GHz	**1 12**	13	2071.75	2246.75
2.0 – 2.3GHz	**1 13**	14	2075.25	2250.25
2.0 – 2.3GHz	**1 14**	15	2078.75	2253.75
2.0 – 2.3GHz	**1 15**	16	2082.25	2257.25
2.0 – 2.3GHz	**1 16**	17	2085.75	2260.75
2.0 – 2.3GHz	**1 17**	18	2089.25	2264.25
2.0 – 2.3GHz	**1 18**	19	2092.75	2267.75
2.0 – 2.3GHz	**1 19**	20	2096.25	2271.25
2.0 – 2.3GHz	**1 20**	21	2099.75	2274.75
2.0 – 2.3GHz	**1 21**	22	2103.25	2278.25
2.0 – 2.3GHz	**1 22**	23	2106.75	2281.75
Unused		24		
Unused		25		
Unused		26		
Unused		27		
Unused		28		
Unused		29		
2.3 – 2.5GHz	**2 00**	30	2308.00	2402.00
2.3 – 2.5GHz	**2 01**	31	2312.00	2406.00
2.3 – 2.5GHz	**2 02**	32	2316.00	2410.00

RF BAND	ST MON REV J RF BAND (1 digit) CHAN NO. (2 digits)	STMON < REV J CHAN NO (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
2.3 – 2.5GHz	**2 03**	33	2320.00	2414.00
2.3 – 2.5GHz	**2 04**	34	2324.00	2418.00
2.3 – 2.5GHz	**2 05**	35	2328.00	2422.00
2.3 – 2.5GHz	**2 06**	36	2332.00	2426.00
2.3 – 2.5GHz	**2 07**	37	2336.00	2430.00
2.3 – 2.5GHz	**2 08**	38	2340.00	2434.00
2.3 – 2.5GHz	**2 09**	39	2344.00	2438.00
2.3 – 2.5GHz	**2 10**	40	2348.00	2442.00
2.3 – 2.5GHz	**2 11**	41	2352.00	2446.00
2.3 – 2.5GHz	**2 12**	42	2356.00	2450.00
2.3 – 2.5GHz	**2 13**	43	2360.00	2454.00
2.3 – 2.5GHz	**2 14**	44	2364.00	2458.00
2.3 – 2.5GHz	**2 15**	45	2368.00	2462.00
2.3 – 2.5GHz	**2 16**	46	2372.00	2466.00
2.3 – 2.5GHz	**2 17**	47	2376.00	2470.00
2.3 – 2.5GHz	**2 18**	48	2380.00	2474.00
2.3 – 2.5GHz	**2 19**	49	2384.00	2478.00
Unused		50		
Unused		51		
Unused		52		
Unused		53		
3.4 – 3.6GHz	**4 00**	54	3411.75	3511.75
3.4 – 3.6GHz	**4 01**	55	3415.25	3515.25
3.4 – 3.6GHz	**4 02**	56	3418.75	3518.75
3.4 – 3.6GHz	**4 03**	57	3422.25	3522.25
3.4 – 3.6GHz	**4 04**	58	3425.75	3525.75
3.4 – 3.6GHz	**4 05**	59	3429.25	3529.25
3.4 – 3.6GHz	**4 06**	60	3432.75	3532.75
3.4 – 3.6GHz	**4 07**	61	3436.25	3536.25
3.4 – 3.6GHz	**4 08**	62	3439.75	3539.75
3.4 – 3.6GHz	**4 09**	63	3443.25	3543.25
3.4 – 3.6GHz	**4 10**	64	3446.75	3546.75
3.4 – 3.6GHz	**4 11**	65	3450.25	3550.25
3.4 – 3.6GHz	**4 12**	66	3453.75	3553.75
3.4 – 3.6GHz	**4 13**	67	3457.25	3557.25
3.4 – 3.6GHz	**4 14**	68	3460.75	3560.75
3.4 – 3.6GHz	**4 15**	69	3464.25	3564.25
3.4 – 3.6GHz	**4 16**	70	3467.75	3567.75
3.4 – 3.6GHz	**4 17**	71	3471.25	3571.25
3.4 – 3.6GHz	**4 18**	72	3474.75	3574.75
3.4 – 3.6GHz	**4 19**	73	3478.25	3578.25
3.4 – 3.6GHz	**4 20**	74	3481.75	3581.75

RF BAND	ST MON REV J RF BAND (1 digit) CHAN NO. (2 digits)	STMON < REV J CHAN NO (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
3.4 – 3.6GHz	**4 21**	75	3485.25	3585.25
3.4 – 3.6GHz	**4 22**	76	3488.75	3588.75
3.4 – 3.6GHz	**4 23**	77	3492.25	3592.25
3.4 – 3.6GHz	**4 24**	78	3495.75	3595.75
Unused		79		
Unused		80		
Unused		81		
Unused		82		
1.8-1.9GHz	**0 00**	-	1851.25	1931.25
1.8-1.9GHz	**0 01**		1853.75	1933.75
1.8-1.9GHz	**0 02**		1856.25	1936.25
1.8-1.9GHz	**0 03**		1858.75	1938.75
1.8-1.9GHz	**0 04**		1861.25	1941.25
1.8-1.9GHz	**0 05**		1863.75	1943.75
1.8-1.9GHz	**0 06**		1866.25	1946.25
1.8-1.9GHz	**0 07**		1868.75	1948.75
1.8-1.9GHz	**0 08**		1871.25	1951.25
1.8-1.9GHz	**0 09**		1873.75	1953.75
1.8-1.9GHz	**0 10**		1876.25	1956.25
1.8-1.9GHz	**0 11**		1878.75	1958.75
1.8-1.9GHz	**0 12**		1881.25	1961.25
1.8-1.9GHz	**0 13**		1883.75	1963.75
1.8-1.9GHz	**0 14**		1886.25	1966.25
1.8-1.9GHz	**0 15**		1888.75	1968.75
1.8-1.9GHz	**0 16**		1891.25	1971.25
1.8-1.9GHz	**0 17**		1893.75	1973.75
1.8-1.9GHz	**0 18**		1896.25	1976.25
1.8-1.9GHz	**0 19**		1898.75	1978.75
1.8-1.9GHz	**0 20**		1901.25	1981.25
1.8-1.9GHz	**0 21**		1903.75	1983.75
1.8-1.9GHz	**0 22**		1906.25	1986.25
1.8-1.9GHz	**0 23**		1908.75	1988.75

PROGRAMMING THE CRU USING STMON

The following procedure will have to be completed before placing the ST into service. **(This procedure is based on using STMON Rev J or later.)**
For details on setting up and operating STMON see section B1 and B2. All results must be entered on the Commissioning Test Result Sheet (see Appendix 2).
The table below shows the Part numbers and the Rev Level at which revised programming (3 Digit RF Code) was introduced.

Product	**Part Number**	**Revised programming introduced at the following Rev Level (3 Digit RF Code)**
ST-V2	605-0000-411	Rev B
ST-V2	503-0700-144	Rev A
ST-V2	503-0700-149	Rev A
ST-V2	503-0700-134	Rev B
ST-V2	503-0700-129	Rev C
ST-V2	503-0700-136	Rev C
ST-D128	605-0000-536	Rev A
ST-D128	605-0000-538	Rev A
ST-D128	605-0000-334	Rev B
ST-D128	503-0700-127	Rev H
ST-D128	503-0700-140	Rev A
ST-I1	503-0700-141	Rev B
ST-I1	503-0700-128	Rev F
ST-I1	503-0700-139	Rev B
+ All CRUs in the 1.8-1.9Ghz Band		

Note: Any other CRU part number or CRUs in the above list with a lower Rev level should be programmed using the two digit RF Code.

STEP **PROCEDURE**

STMON ST Programming

STMON J will program previous release level STs using a 2 digit RF channel numbering scheme. If STMON is connected to an "old" ST it will display the 2 digit RF band in RED. The ST can be programmed as per the old scheme.

1. Ensure that the mounted CRU is facing in the general direction of the CT office before commencing set-up and commissioning procedure.

2. Connect cable between Subscriber Terminal and PC as described in section B1.

3. From the DOS prompt start STMON by typing;

   stmon

4. If the STMON panel shows a Com Time-out then;

   a) Check cable connection.
   b) Check PC Com port. The default is com 1. To change the com port see section B2.

5. ST software build and channel codes may not be fully displayed unless the ST is power cycled after STMON is connected and invoked. Immediately after power-up the ST outputs data for STMON specifying the ST software version and the ST RF channel code. STMON is updated with RF link status information. STMON support can be ceased and reactivated by pressing F2 to ‘Close’ and F1 to ‘Open’ STMON communications.

6. If a message is not received after five seconds, STMON reports a communications time-out alarm. If after pressing F1 the comms time-out alarm does not clear then this indicates that there is a cable / com port selection fault or that the ST is faulty.

7. Once the Comms status of “COM(x): OK” has been achieved, the CRU RF parameters /ST options are programmed by pressing the F4 function key followed by the specific code number for the RF band/channel, pn code, RW code or ST option code (and finally carriage return).

8. Each CRU is a network should be configured by entering a unique code. These codes should be provided by the RF planning office on a form similar to that shown in Table 27. A full list of codes is provided at the end of SECTION B of this PCN document. STMON will automatically detect if it is connected to an old type CRU and will display the RF field in red. The RF code can then be entered as a two digit code.
   The algorithm check number is the sum of the RF, PN, RW, and identity digits. The number entered is the number in the units column of the result -1.
   i.e. if the result of summing the digits was 14 the number entered would be 3 and if the result of summing the digits was 8 the number entered would be 7

RF * 2/3 digits			PN 1 digit	RW 2 digits		Identity * or 000000	Check N°. 1 digit	Remote site location
1	0	5	1	0	1	000000	7	CRU1
9. *Note: Older CRUs will have a 2 digit RF code. Newer CRUs will have a 3 digit RF code. (e.g. 105101*7 or 1051010000007). See Appendix 1 for list of RF codes.								

Table 27 CRU Programming Information

8. When complete wait for the ST to reboot. Check that the correct channel code is displayed in the ST Build Status panel.

Programming 12 and 16kHz SPM tones

With the RF channel information accepted there is a further process to select the SPM frequency option. This should be done on all new voice. The command supports options for 12kHz or 16kHz Subscriber Private Metering (SPM) on voice STs.

1. To program voice CRUs with the required SPM option repeat steps 7 to 8 above and enter the required SPM option code digits. The format has 5 numbers starting with # as shown below.
   1 2 3 4 5
   # <n> <n> <n><check digit>
   Characters 2,3,4 are the options code (range 000 to 255). Character 5 is the checksum – calculated the same as the RF channel checksum.

   The Only options are:
   16kHz SPM has been assigned to option code 000
   12kHz SPM has been assigned to option code 001
   Hence: 16kHz SPM is programmed with **#0009** and 12kHz SPM is programmed with **#0010**

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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PROGRAMMING THE ST-V2 CRU (TYPE 2 PSU AND TYPE 4 PSU) USING A TEST TELEPHONE

The following procedure will have to be completed before placing the AS4000 Subscriber Terminal into service. This procedure should be used if programming the system using a test telephone and **can only be applied to Voice STs**.. Alternatively the system can be programmed using STMON (see DLP-0011/12 . All results must be entered on the Commissioning Test Result Sheet, see DLP-019.

The table below shows the Part numbers and the Rev Level at which revised programming (3 Digit RF Code) was introduced.

Product	**Part Number**	**Revised programming introduced at the following Rev Level (3 Digit RF Code)**
ST-V2	605-0000-411	Rev B
ST-V2	503-0700-144	Rev A
ST-V2	503-0700-149	Rev A
ST-V2	503-0700-134	Rev B
ST-V2	503-0700-129	Rev C
ST-V2	503-0700-136	Rev C
ST-D128	605-0000-536	Rev A
ST-D128	605-0000-538	Rev A
ST-D128	605-0000-334	Rev B
ST-D128	503-0700-127	Rev H
ST-D128	503-0700-140	Rev A
ST-I1	503-0700-141	Rev B
ST-I1	503-0700-128	Rev F
ST-I1	503-0700-139	Rev B
+ All CRUs in the 1.8-1.9Ghz Band		

Note: Any other CRU part number or CRUs in the above list with a lower Rev level should be programmed using the two digit RF Code.

STEP **PROCEDURE**

ST Programming

1. Ensure that the mounted CRU is facing in the general direction of the CT office before commencing set-up and commissioning procedure.

2. Remove the cover from the PSU

3. Connect an MF type telephone to the NTU

Programming

1. Each CRU is initialised by entering a unique code. These codes are entered using the telephone and should be provided by the RF planning office on a form similar to that shown in Table 28.
   The algorithm check number is the sum of the RF, PN, RW, and identity digits. The number entered is the number in the units column of the result -1.
   i.e. if the result of summing the digits was 14 the number entered would be 3
   and if the result of summing the digits was 8 the number entered would be 7

2. If the Telephone is connected to an "old generation" ST it should be programmed using a two digit RF Code. If STMON is connected to a "new generation" ST it should be programmed using a three digit RF Code. If the generation of the CRU is not known the programming should be attempted in either mode. If the mode chosen is the correct mode an acceptance tone is returned. If no tone is received then programming should be attempted in the other mode and the acceptance tone is returned if the programming is successful.

RF # 2/3 digits			PN 1 digit	RW 2 digits		Identity 6 digits	Check N°. 1 digit	Remote site location
1	0	5	1	0	1	* or 000000	7	CRU1
#Note: Older CRUs will have a 2 digit RF code. Newer CRUs will have a 3 digit RF code. . (e.g. 105101*7 or 1051010000007) See Appendix 1 for list of RF codes.								

Table 28 CRU Programming Information

ST Initialisation/Reset

1. To program the ST, depress the reset switch, (Type2 PSU = SW4, Type 4 PSU = SW2), in the PSU for approximately 3 seconds. LED D8 will begin flashing to indicate the CRU initialising and self test sequence.

2. After approximately 10 sec, the CRU initialising and self test sequence will be complete and the LED will be extinguished. LED D9 will still be illuminated.

3. Should the above sequence not be successfully executed, replace the faulty ST.

Programming Sequence

1. With the telephone handset on-hook, depress the Programming switch (Type2 PSU = SW3, Type 4 PSU = SW1). Lift the telephone handset Off-Hook and wait for the 3 sec continuous “programming start” tone of 1400 Hz, to be heard in the handset receiver.

2. Lift the handset, a steady tone for 2 seconds should be heard to confirm that the ST is ready to accept programming information. Enter the respective ST programming code (or option code) on the telephone keypad, within 40 seconds of depressing the install switch.

Code Acceptance

1. Should an incorrect programming code be entered, an “incorrect code” tone shall be heard in the handset receiver, which consists of 1400 Hz pulses for less than 1/2 sec on, and less than 1/2 sec off, for a duration of 5 sec.

Note: If the code is not accepted it may be because the CRU has been programmed with the two digit RF code where a 3 digit code is needed or Vice Versa.

2. Ensure that at the end of the programming sequence, the “code accepted” tone is heard in the handset receiver, which consists of 1400 Hz pulses for 1 sec on; 1 sec off, for a duration of 5 sec.

3. Replace the telephone handset.

4. If the ST fails to accept the programming code after a second attempt, confirm with the network planning staff that the correct code is being used.

5. Should the ST still fail to accept the code, the ST will need to be replaced.

Programming 12 and 16kHz SPM tones

1. With the RF channel information accepted there is a further process to select the SPM frequency option. The command supports options for 12kHz or 16kHz Subscriber Private Metering (SPM) on voice STs.

2. The format has 5 numbers starting with # as shown below. Characters 2,3,4 are the options code (range 000 to 255). Character 5 is the checksum –

16kHz SPM has been assigned to option code 000
12kHz SPM has been assigned to option code 001

1 2 3 4 5
<n> <n> <n><n> <checksum>
The algorithm check number is the sum of the digits -1.
i.e. if the result of summing the digits was 0 the number entered would be 9
and if the result of summing the digits was 1 the number entered would be 0
Hence: 16kHz SPM is programmed with **#0009** and 12kHz SPM is programmed with **#0010**

To program the required SPM option repeat steps 7 to 13 above and enter the required SPM option code digits into the CRU using a phone keypad at step 7.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

PANNING AND MEASUREMENTS AT THE CRU

The following procedure will have to be completed before placing the AS4000 system into service. All results must be entered on the Commissioning Test Result Sheet, see DLP-010.

STEP **PROCEDURE**

Link Acquisition

Important Notice: Care should be taken when plugging the drop cable or test cable into the connector on the rear plate of the CRU. The cable approaches the socket from above. The cable socket has a polarisation key and the plug has a polarisation slot to ensure that the connectors mate correctly. Support the cable so that the plug does not connect to the socket at an angle. The plug must be eased into the socket ensuring the polarisation key locates. Damage to the pins may result if the pins are not inserted straight into the sockets or the polarisation key is not located correctly. Ensure that the pins are fully mated before attempting to tighten the locking ring. Tighten the locking ring using the fingers. Do not use a wrench as over-tightening will strip the thread on the locking ring.

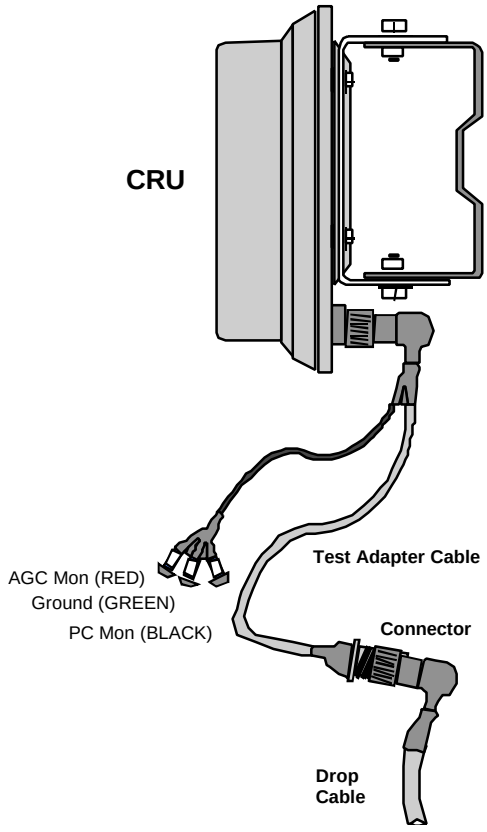

Figure 46. Connecting CRU Generic Test Cable

1. Disconnect the drop cable from the CRU and connect the CRU Generic Test Cable to the CRU. Connect the other end to the drop cable.

2. If the CRU has not been programmed Program the CRU (See DLP-014)

3. Once programmed, the ST will automatically attempt to establish an RF link with the respective CT. The link shall acquire within 5 minutes.

4. If unable to acquire link it will continue attempting to do so until power is removed. If the link fails to acquire check that the CRU is facing the general direction of the CT and that the CT is operational.

5. Once the R.F. link between the ST and CT has been successfully established the RF link fail LED on the CT modem will be extinguished In the AC PSU (type 2/4) D9 will be extinguished.

CRU Panning

1. Using the DMM, Using the DMM, measure the DC voltage between Ground (green) and the AGC Monitoring point, (red) on the Generic Test Cable. The voltage measured is a relative indication of the received signal strength; The lower the voltage the weaker the RX signal, and vice versa.

2. Whilst observing the voltage on the DMM, pan the CRU through the peak point, then pan back to it. If there is not sufficient panning range use the other mounting point on the CRU mounting bracket in order to pan through the peak.

3. Using a 17mm spanner or socket torque the pivot bolts to 25nm.

CRU Characterisation

Each CRU has a characterisation label fixed to the CRU back plate. This label records factory measured readings of TX PC and RX AGC Volts for different set levels.

AGC Voltage Recording

1. Lock and secure the CRU in position by tightening the locking bolts on the CRU mounting bracket.

2. Using the DMM, measure the DC voltage between Ground (green) and the AGC Monitoring point, (red) on the Generic Test Cable.

3. Check the label on the CRU to get an indication of the receive signal strength from the characterised readings to ensure that the required fade margins are attained; The higher the voltage the stronger the signal. The receive signal strength should be better than –98dBm for a viable link.

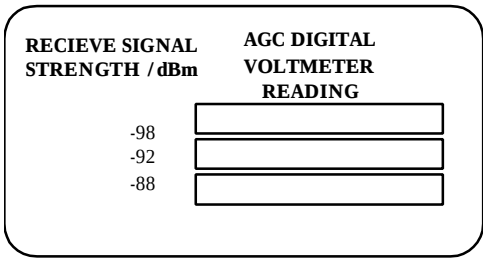

Figure 47. Label Detail: Receive AGC

4. Record the value of the DC voltage on the test result sheet.

Power Control Recording

1. Using the DMM, measure the DC voltage between Ground (Green) and the PC Monitoring point (Black) on the Generic Test Cable. The voltage measured is a relative indication of the transmit power level: The lower the voltage the higher the output power level.

2. Check the label on the CRU to get an indication of the transmit signal strength from the characterised readings to ensure that the margins are consistent with the receive fade margins.

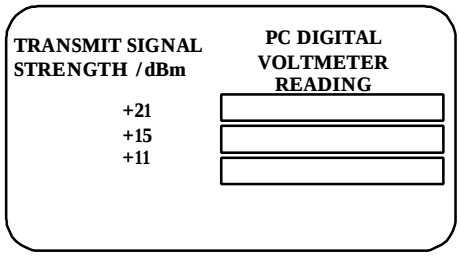

Table 29. Label Detail: Transmit Power Control

The maximum transmit levels for the ST are:
2.0 - 2.3GHz Band +21dBm
2.3 - 2.5GHz Band +20dBm
3.4 - 3.6GHz Band +18dBm

3. Record the value of the DC voltage on the test result sheet.

4. Record the Part number, Serial Number, and Electronic Serial No. recorded on the label attached to the CRU backplate.

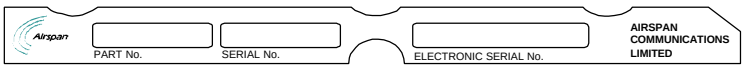

Figure 48. CRU Label

5. Remove the Generic Test Cable and re-connect the drop cable

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

TELEPHONY TESTS ST-V2 INSTALLATIONS

The following procedure will have to be completed before placing the AS4000 system into service. All results must be entered on the Commissioning Test Result Sheet, see DLP-020.

STEP **PROCEDURE**

Telephony Tests ST-V2 installations

1. Telephony tests can only be done after the CT has been connected to a network switch.

2. Using Sitespan set up subscribers at the CT as outlined in the Sitespan user guide 600-001-300, using the detailed level procedures (DLP's) DLP-035 or DLP 037.

3. Connect the test telephone to the NTU.

4. **Dial Tone Present.** Lift the telephone handset of VF 1 Off-Hook, and confirm that dial tone is heard in the handset receiver. Record on the Test Result Sheet.

5. **Outgoing call.** Initiate a call from the subscribers telephone to a test number provided by the CT Office. Ensure that the call can be successfully set up and that line quality is good.

6. **Incoming call.** Initiate a return call from the CT Office to the subscribers telephone. Ensure that the call can be successfully set up and that line quality is good.

7. **VF 2 Test Calls.** Repeat steps 4 to 6 for VF pair 2.

8. If using Type 1 PSU. Fit the Junction Box cover. Tighten all screws.

9. If using Type 2 PSU. Fit the PSU cover; ensure correct orientation by placing embossed logo on cover on the same side of the cable entry holes of the main case. Tighten all screws.

10. If using Type 4 PSU. Fit the PSU cover after connecting the yellow on green earth from the chassis earth to the lug located at the bottom right side of the cover ; ensure the location pins at the top the cover locate in the slots on the PSU case. Tighten all screws.

11. End of Subscriber Terminal Commissioning. Ensure all results are recorded in the test form.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

DATA TESTS ST-D128 INSTALLATIONS

The following procedure will have to be completed before placing the AS4000 system into service. All results must be entered on the Commissioning Test Result Sheet, see DLP-019.

STEP **PROCEDURE**

BER Test

If AS4000 modem shelf is not in service the following test can be carried out. This Test is carried out at the Central Terminal Rack.

1. **At the ST**. Place Tx/Rx Loopback cord either at the CRU or in the NTU RJ45 socket.)

2. **At the CT Rack** Ensure that the CT shelf is programmed from the Site Controller with :

   - Modem Frequency
   - PN Code
   - Signalling: GCAS
   - ST Mode: E1
   - ST o/g Idle code: 3
   - ST i/c Idle code: 0
   - ST deafault frame: 0

   Create Subscribers on Database
   Set Subscribers in service.

3. At the CT Modem Shelf 2Mbit/s network interface connect a BER tester (Tx SK16 and Rx SK15)

   Set the tester to:
   Transmit:
   Signalling: Disable
   Line Coding: HDB3
   Timing: Internal
   Test Pattern: PRBS23
   Receive:
   Signalling: Disable
   Line Coding: HDB3
   Timing: Recover from data stream
   Test Pattern: PRBS23

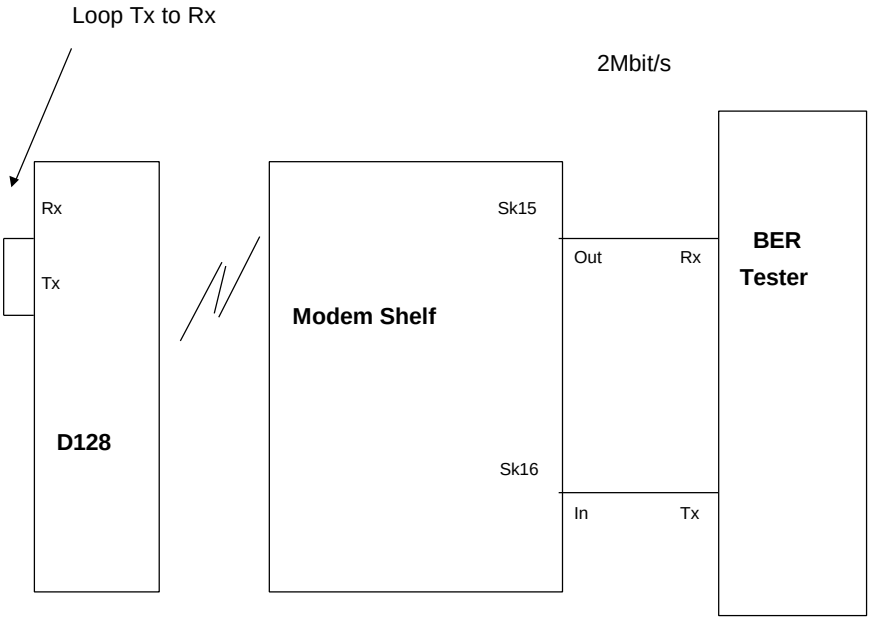

Figure 49. Bit Error Rate Test

The BER Test should be for a 1min period for each 64Kbit/s circuit.

All test results should be held in the Site Data File so that they can be referred to in the future.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

FUNCTIONAL TESTS ST-I1 INSTALLATIONS

The following procedure will have to be completed before placing the AS4000 system into service. All results must be entered on the Commissioning Test Result Sheet, see DLP-019.

STEP **PROCEDURE**

Telephony Tests

1. Telephony tests can only be done after the CT has been connected to the ISDN network switch.

2. Using Sitespan set up ISDN subscribers at the CT as outlined in the Sitespan user guide 600-001-300, using the detailed level procedures (DLP's) DLP-038 to DLP 040.

3. Connect the ISDN test telephone to the RJ45 NTU.

4. Enable B Channel 1 by selecting the subscriber from the subscribers list and checking the circuit activation in the Edit Subscriber Window in Sitespan .

5. Make an outgoing ISDN call, (ensure that no barring has been applied).

6. Arrange to receive an incoming call, (ensure that no barring has been applied).

7. Record the results on the test form.

8. Using Sitespan at the CT disable B Channel 1 by clicking on the circuit activation box and enable B Channel 2 by selecting that channel from the Subscribers list in Sitespan and checking the circuit activation in the Edit Subscriber Window.

9. Repeat steps 5,6, and 7.

10. Disconnect phone and restore the circuit activation to the desired state for both channels.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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TEST RESULTS

All results of testing must be entered on this Test Result Sheet. Please photocopy one for each ST to be commissioned.

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The ST Installation and Commissioning Result Sheet

Customer ID/Name: ..... CT Rack ID: .....

Modem Shelf ID: ..... Modem Circuit ID: .....

ST Programming Code: .....

CRU Serial No.: ..... Part No.: .....

PSU Serial No.: ..... Part No.: .....

Customer Address : ....

....

Details and description of RF Path Profile and local environment;

.....

.....

Details and Position of CRU to be used with a photograph and schematic

.....

.....

Details and Position of PSU to be used with a photograph and schematic

.....

.....

CRU TX Power Control Voltage:

Measured at PC Monitor Point using test breakout cable: …….
Measured using STMON PC (if applicable): ……..
Measured at PC test point on Type 4/4A PSU (if applicable): ……...

CRU RX AGC Voltage:

Measured at AGC Monitor Point using test breakout cable:……...
Measured using STMON AGC (if applicable): ……..
Measured at AGC test point on Type 4/4A PSU (if applicable): ……...

CRU Characterisation Information (From CRU Label)

PC Volts		
+11dBm	**+15dBm**	**+21dBm**

AGC Volts		
-88dBm	**-92dBm**	**-98dBm**

Telephone functionality for ST-V2 installations

Function / Test		Result
VF Pair 1	Dial Tone Present	
	Outgoing Call	
	Incoming Call	
VF Pair 2	Dial Tone Present	
	Outgoing Call	
	Incoming Call	

Telephony functionality for ST-I1(ISDN) installations

ISDN Channel	Test	Result
B Channel 1	Outgoing call Incoming call	
B Channel 2	Outgoing call Incoming call	

Data test for ST-D128 installations

Channel	**Test**	**Result**
Channel 1	Looped BER	
Channel 2	Looped BER	

Comments

.....
...

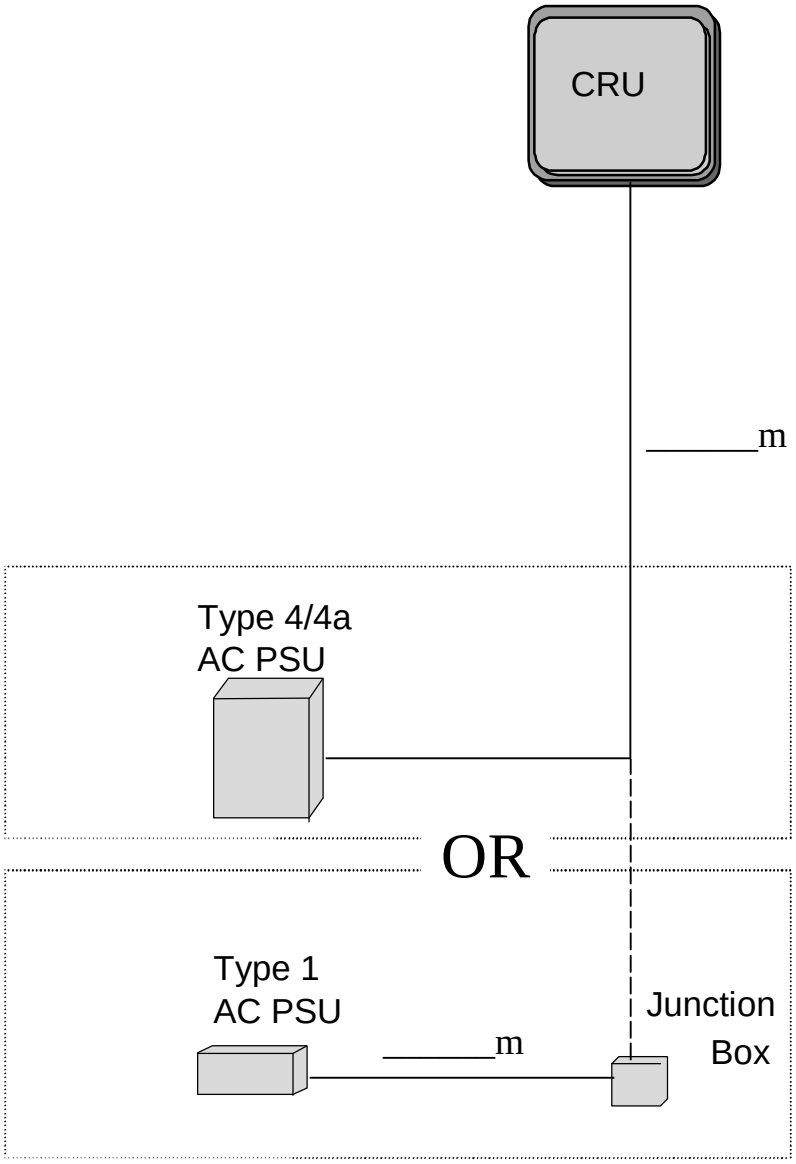
.....
...

.....
...

Installation Engineer: .....

Date of Installation: .....

ST Installation Schematic, please annotate with cable lengths



If possible attach photographs of ST and Junction box as installed.

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AS4000 SUBSCRIBER TERMINAL ACCEPTANCE FORM.

1. This section includes the ACC and customer copies of the AS4000 Subscriber Terminal Acceptance Form. Photocopy sufficient forms for commissioning, (1 set per ST).

2. After completion give the customer a copy and retain one for ACC.

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AS4000 SUBSCRIBER TERMINAL ACCEPTANCE FORM

CONTRACT OR CUSTOMER'S REF. NO:

.....

ACC COMMUNICATIONS LTD REF .NO:

.....

SITE IDENTITY: .....

The Customer accepts that the following equipment has been supplied, installed and tested.

CRU Serial No:..... Part No: .....
PSU Serial No:..... Part No: .....

Customer Representative
Name: ..... Position: ..... Signature: ..... Date: .....
ACC Representative
Name: ..... Position: ..... Signature: ..... Date: .....

CUSTOMER COPY

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AS4000 SUBSCRIBER TERMINAL ACCEPTANCE FORM

CONTRACT OR CUSTOMER'S REF. NO:

.....

ACC COMMUNICATIONS LTD REF. NO:

.....

SITE IDENTITY: .....

The Customer accepts that the following equipment has been supplied, installed and tested.

CRU Serial No:..... Part No:
.....
PSU Serial No:..... Part No:
.....

Customer Representative
Name: ..... Position: ..... Signature: ..... Date: .....
ACC Representative
Name: ..... Position: ..... Signature: ..... Date: .....

ACC COPY

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STMON CODES.

The following codes are used for STMON J when programming Subscriber Terminal

SITESPAN Frequency code	ST internal frequency code (ST nvram)	RF BAND	ST MON / VF PROG. RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
1	0	2.0-2.3GHz	**1 00**	2029.75	2204.75
2	1		**1 01**	2033.25	2208.25
3	2		**1 02**	2036.75	2211.75
4	3		**1 03**	2040.25	2215.25
5	4		**1 04**	2043.75	2218.75
6	5		**1 05**	2047.25	2222.25
7	6		**1 06**	2050.75	2225.75
8	7		**1 07**	2054.25	2229.25
9	8		**1 08**	2057.75	2232.75
10	9		**1 09**	2061.25	2236.25
11	10		**1 10**	2064.75	2239.75
12	11		**1 11**	2068.25	2243.25
13	12		**1 12**	2071.75	2246.75
14	13		**1 13**	2075.25	2250.25
15	14		**1 14**	2078.75	2253.75
16	15		**1 15**	2082.25	2257.25
17	16		**1 16**	2085.75	2260.75
18	17		**1 17**	2089.25	2264.25
19	18		**1 18**	2092.75	2267.75
20	19		**1 19**	2096.25	2271.25
21	20		**1 20**	2099.75	2274.75
22	21		**1 21**	2103.25	2278.25
23	22		**1 22**	2106.75	2281.75
24	23	Unused			
25	24	Unused			
26	25	Unused			
27	26	Unused			
28	27	Unused			
29	28	Unused			
30	29	2.3-2.5GHz	**2 00**	2308.00	2402.00
31	30		**2 01**	2312.00	2406.00
32	31		**2 02**	2316.00	2410.00
33	32		**2 03**	2320.00	2414.00
34	33		**2 04**	2324.00	2418.00
35	34		**2 05**	2328.00	2422.00
36	35		**2 06**	2332.00	2426.00

SITESPAN Frequency code	ST internal frequency code (ST nvram)	RF BAND	ST MON / VF PROG. RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
37	36		**2 07**	2336.00	2430.00
38	37		**2 08**	2340.00	2434.00
39	38		**2 09**	2344.00	2438.00
40	39		**2 10**	2348.00	2442.00
41	40		**2 11**	2352.00	2446.00
42	41		**2 12**	2356.00	2450.00
43	42		**2 13**	2360.00	2454.00
44	43		**2 14**	2364.00	2458.00
45	44		**2 15**	2368.00	2462.00
46	45		**2 16**	2372.00	2466.00
47	46		**2 17**	2376.00	2470.00
48	47		**2 18**	2380.00	2474.00
49	48		**2 19**	2384.00	2478.00
50	49	Unused			
51	50	PCS BAND	**9 00**	1852.50	1932.50
52	51		**9 01**	1857.50	1937.50
53	52		**9 02**	1862.50	1942.50
54	53	3.4-3.6GHz	**4 00**	3411.75	3511.75
55	54		**4 01**	3415.25	3515.25
56	55		**4 02**	3418.75	3518.75
57	56		**4 03**	3422.25	3522.25
58	57		**4 04**	3425.75	3525.75
59	58		**4 05**	3429.25	3529.25
60	59		**4 06**	3432.75	3532.75
61	60		**4 07**	3436.25	3536.25
62	61		**4 08**	3439.75	3539.75
63	62		**4 09**	3443.25	3543.25
64	63		**4 10**	3446.75	3546.75
65	64		**4 11**	3450.25	3550.25
66	65		**4 12**	3453.75	3553.75
67	66		**4 13**	3457.25	3557.25
68	67		**4 14**	3460.75	3560.75
69	68		**4 15**	3464.25	3564.25
70	69		**4 16**	3467.75	3567.75
71	70		**4 17**	3471.25	3571.25
72	71		**4 18**	3474.75	3574.75
73	72		**4 19**	3478.25	3578.25
74	73		**4 20**	3481.75	3581.75
75	74		**4 21**	3485.25	3585.25
76	75		**4 22**	3488.75	3588.75
77	76		**4 23**	3492.25	3592.25
78	77		**4 24**	3495.75	3595.75

SITESPAN Frequency code	ST internal frequency code (ST nvram)	RF BAND	ST MON / VF PROG. RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
79	78	Unused			
80	79	Unused			
81	80	Unused			
82	81	Unused			
83	82	1.8-1.9GHz	**0 00**	1851.25	1931.25
84	83		**0 01**	1853.75	1933.75
85	84		**0 02**	1856.25	1936.25
86	85		**0 03**	1858.75	1938.75
87	86		**0 04**	1861.25	1941.25
88	87		**0 05**	1863.75	1943.75
89	88		**0 06**	1866.25	1946.25
90	89		**0 07**	1868.75	1948.75
91	90		**0 08**	1871.25	1951.25
92	91		**0 09**	1873.75	1953.75
93	92		**0 10**	1876.25	1956.25
94	93		**0 11**	1878.75	1958.75
95	94		**0 12**	1881.25	1961.25
96	95		**0 13**	1883.75	1963.75
97	96		**0 14**	1886.25	1966.25
98	97		**0 15**	1888.75	1968.75
99	98		**0 16**	1891.25	1971.25
100	99		**0 17**	1893.75	1973.75
101	100		**0 18**	1896.25	1976.25
102	101		**0 19**	1898.75	1978.75
103	102		**0 20**	1901.25	1981.25
104	103		**0 21**	1903.75	1983.75
105	104		**0 22**	1906.25	1986.25
106	105		**0 23**	1908.75	1988.75
107	106	Unused			
108	107	Unused			
109	108	Unused			
110	109	Unused			
111	110	Unused			
112	111	Unused			
113	112	2.0-2.3GHz SUNTEL	**5 00**	2045.5	2220.5
114	113		**5 01**	2049.0	2224.0
115	114		**5 02**	2052.5	2227.5
116	115		**5 03**	2056.0	2231.0
117	116		**5 04**	2059.5	2234.5
118	117		**5 05**	2063.0	2238.0
119	118		**5 06**	2066.5	2241.5
120	119		**5 07**	2070.0	2245.0

SITESPAN Frequency code	ST internal frequency code (ST nvram)	RF BAND	ST MON / VF PROG. RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
121	120		**5 08**	2073.5	2248.5
122	121		**5 09**	2077.0	2252.0
123	122		**5 10**	2080.5	2255.5
124	123		**5 11**	2084.0	2259.0
125	124	Unused			
126	125	Unused			
127	126	Unused			
128	127	1.8-1.9GHz PA BAND	**6 00**	1852.75	1932.75
129	128		**6 01**	1856.25	1936.25
130	129		**6 02**	1859.75	1939.75
131	130		**6 03**	1863.25	1943.25
132	131		**6 04**	1866.75	1946.75
133	132		**6 05**	1870.25	1950.25
134	133		**6 06**	1873.75	1953.75
135	134		**6 07**	1877.25	1957.25
136	135		**6 08**	1880.75	1960.75
137	136		**6 09**	1884.25	1964.25
138	137		**6 10**	1887.75	1967.75
139	138		**6 11**	1891.25	1971.25
140	139		**6 12**	1894.75	1974.75
141	140		**6 13**	1898.25	1978.25
142	141		**6 14**	1901.75	1981.75
143	142		**6 15**	1905.25	1985.25
144	143		**6 16**	1908.75	1988.75

NOTE: C2A BAND is a ‘special’ for SUNTEL.