AS4000
Wireless Local Loop System

Central Terminal
Installation and Commissioning

605-0000-432 **Airspan Communications Corporation**
Issue 1.3a Date 18th October 1999

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Notice

1. This manual is subject to revision.

2.

3. Right of modification reserved.

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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 Airspan 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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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 DSC 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

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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 ❑

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ISSUE CONTROL LIST

Title	Issue	Date	Issue Details
Title Page	1.3	April 1999	
ICL-001	1.3	April 1999	
IXL-001	1.3	April 1999	
GSI-001	1.3	April 1999	
GSI-002	1.3	April 1999	
GSI-003	1.3	April 1999	
DLP-001	1.3	April 1999	
DLP-002	1.3	April 1999	
DLP-003	1.3	April 1999	
DLP-004	1.3	April 1999	
DLP-005	1.3	April 1999	
DLP-006	1.3	April 1999	
DLP-007	1.3	April 1999	Content Removed
DLP-008	1.3	April 1999	
DLP-009	1.3	April 1999	
DLP-010	1.3	April 1999	
DLP-011	1.3	April 1999	
DLP-012	1.3	April 1999	
DLP-013	1.3	April 1999	
DLP-014	1.3	April 1999	Changes to LCU operation
DLP-015	1.3	April 1999	
DLP-016	1.3	April 1999	
DLP-017	1.3	April 1999	
DLP-018	1.3	April 1999	
DLP-019	1.3	April 1999	
DLP-020	1.3	April 1999	Content Removed
DLP-021	1.3	April 1999	
DLP-022	1.3	April 1999	

CHANGE TYPE/DATE	PURPOSE	PAGES AFFECTED
Issue #, Month Year		
1.0 1st July 98	Re structured and Renumbered from 157-032-200	All
1.1 27th August 98	New logo and product numbering. Changes to commissioning process	All
1.2 19th November 98	Changes to Rxsetup uising LCU	DLP14
1.3 7th April 99	Changes to Band names. References to Element Manager removed	

INDEX TASK LIST

List of Figures

List of Tables

List of Charts

Abbreviations

AC	Alternating Current
AGC	Automatic Gain Control
AU	Analogue Unit
BER	Bit Error Rate
CAS	Channel Associated Signalling
CDMA	Code Division Multiple Access
CPE	Customer Premises Equipment
CRU	Customer Radio Unit
CT	Central Terminal
DC	Direct Current
DMM	Digital Multi Meter
DRS	Digital Radio System
ERP	Effective Radiated Power
HCI	Human Computer Interface
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union -Telecommunications
LCU	Level Control Unit
LD	Loop Disconnect
LED	Light Emitting Diode
MF	Multi-Frequency
NTU	Network Termination Unit
PC	Power Control
POTS	Plain Old Telephony Service (analogue)
PSU	Power Supply Unit
RF	Radio Frequency
Rx	Receive
SC	Shelf Controller
ST	Subscriber Terminal
TU	Tributary Unit
Tx	Transmit
VDU	Video Display Unit
VF	Voice Frequency

Definitions

dBm	Decibels relative to 1 milli-watt
dBr	Decibels relative to the network PCM level
Downlink	The communication channel from the CT to the ST
Uplink	The communications channel from the ST to the CT

Symbols

IEC Earth 

Related Documentation

605-0000-430	AS4000 System Overview
605-0000-431	AS4000 Operations And Maintenance
605-0000-433	AS4000 Central Terminal - Antenna/Feeder Installation & Commissioning
605-0000-434	AS4000 Subscriber Terminal - Installation & Commissioning
605-0000-437	AS4000 D128 Terminal Converter
605-0000-435	Material Return and Repair
605-0000-427	AS8100 Sitespan 2.5

INTRODUCTION

1. Purpose of Document

This document describes the installation and commissioning of the ACC AS4000™ Central Terminal (CT) Rack and associated shelves to AS4000 specifications. This document covers new rack installations and the incremental addition of modem shelves.

2. Prerequisite skills

Personnel installing and commissioning the Airspan products must have a basic knowledge of telephony and radio communications, and have experience in installing 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.

This manual is intended for use by persons familiar with the AS4000 product having attended the ACC CT Installation and Commissioning training course prior to performing the procedures in this practice.

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OVERVIEW

1. Installation Tasks

The installation procedures are arranged as a series of tasks and are generalised to cover the majority of applications and configurations. If your particular system application is not covered, call the ACC Help Desk, for assistance at the following number: TELEPHONE: +44 (0) 1527 402800

FAX: +44 (0) 1527 550956

E-Mail: support@airspan.com

It is recommended that the tasks be completed in the sequence listed below:

- Task 1 — Verify Site facilities
- Task 2 — Unpack and Inspect Equipment
- Task 3 — CT Rack Installation
- Task 4 — System Interface Cabling

2. Safety

 Personnel installing the ACC AS4000 System should follow ACC safety procedures W090 0001 001 Issue 01 April 96

2.1. Electromagnetic Radiation

 When working on the CT and Antenna, do not remove coax feeder connectors when the unit is operating.

No hazardous RF radiation is emitted from the equipment. When transmitting, the maximum total power radiated from each CT aerial is equal to the level of the UK National Radiological Protection Board basic restriction per kg of body part. At the surface of each aerial radome, the power flux density is approximately one fifth of the investigation level of the UK National Radiological Protection Board.

2.2. Hazardous Voltages

 There are hazardous voltages present in the modem shelves of this equipment. Do not touch components or track on the cards while they are in operation.

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. Do not install power modules in the shelf until the shelf and rack are properly mounted and secured.

2.3. 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.

TECHNICAL SPECIFICATIONS

1. Central Terminal

The following tables provide technical specifications for the AS4000 Central Terminal.

Physical Characteristics	
CT Rack Dimensions, (without brackets):	
Width	600mm
Height	2175mm
Depth	300mm
Shipping Weight**:**	
Rack Frame	60 kg
Air Inlets/Outlets	16.5 kg
Combiner Shelf	30 kg
Power Amp	4.5 kg (each)
LNA	1 kg Frequency Dependant
Branch Unit	1 kg Frequency Dependant
PSU	1.5 kg (each)
Modem Shelf	15kg (each)

Table 1. Physical Characteristics.

Environmental		
	Minimum	Maximum
Operating Temperature	-5° C	+45° C
Relative Humidity, non-condensing	0%	95%
Storage Temperature	-40° C	85° C
Storage Humidity, non-condensing	Less than 100%	
Air Pressure	70 kPa	106 kPa

Table 2. Environmental Specifications.

POWER REQUIREMENTS	
DC Input Voltage Operating Range. (N.B. This supply to be a guaranteed SELV from an EN60950 approved source.)	Maximum Range, -21.8V DC to -60.0V DC @ 500W
DC Input Current (Fully populated CT Rack)	20.5 Amps max. @ -21V DC 11.7 Amps max. @ -48V DC 8.1 Amps max. @ -60V DC
Recommended Power Distribution Fusing (With a readily accessible disconnect device which will isolate all poles.)	-21. 8V DC to -60V DC 30Amps High Inrush
Power Distribution CT Fusing	-21.8V DC to -60V DC 30Amps each feed

Table 3. Power Requirements.

 **Warning.** The maximum DC input should not exceed 60 Volts. Voltages in excess of this are considered hazardous.

PREPARATORY TASKS

1. Installation Tools and Equipment

The following lists of tools and equipment are required to successfully install and test the AS4000 Central Terminal Racks.

1.1. Required Tools

- Combination Spanners: 8 mm, 13 mm, 17 mm, & 19 mm.
- Spirit Level: 18 inch.
- Pozidriv: No 1 x 75 mm.
- No 2 x 100 mm
- No 3 x 150 mm.
- Screwdriver, flat blade: 3 mm x 100 mm.
- Screwdriver, flat blade: 5.5 mm x 100 mm.
- Screwdriver, flat blade: 8 mm x 150 mm.
- Hammer, Ball Pein: 1lb.
- Drill Bits, Masonry: 11 mm, 12 mm, 13 mm.
- Ratchet Crimp Tool for red, blue and yellow insulated crimps.
- Crimp Tool type 6A with VQ dies for co-ax connectors.
- Cordless Drill/Driver.

1.2. Required Equipment

Item	Description	Recommended Model	Quantity
1	Digital Multimeter	Fluke 77 or similar	1
2	Coupler Test Lead	Lead with SMA connector	1
3	RF Power Meter	Marconi 6970	1
4	Power Sensor	Marconi 6932	1
See note 1			

Table 4. Required Test Equipment.

Note 1: If commissioning with a test CRU additional test equipment will be need as listed in DLP-015, DLP-016, and DLP-017.

2. Site Readiness

Verify that the site is ready for the installation of the CT Rack.

This preparation will have been covered by a ACC Site Survey or a survey form completed by the customer. The survey will include a site plan of the facility Identifying the floor layout, power outlets, distribution boxes, and cabling runways. A sketch showing the rack support arrangements showing the exact positions of the mounting points on the rack with dimensions, and typical overhead ironwork provision should be included.

Inspect the site, and particularly the equipment room, before unloading or unpacking the equipment to ensure the following:

- Adequate grounding is provided.
- Access to the equipment room will be adequate for normal handling and movement.
- Adequate lighting is available for carrying out the installation.

Any non compliance with acceptable standards should be bought to the customers attention and resolved before proceeding with the installation

2.1. Power Availability

From the site survey, confirm the location of the two fuse positions for the negative battery supply and the return point. The fuse position for the alarm unit 55B power supply should also be located.

2.2. Site Earth

Confirm the position of the grounding point using the site survey.

2.3. Flooring

Ensure that flooring is substantial enough to support the rack and can provide a secure fixing.

2.4. Cable Trays

Verify that cable trays are installed to provide routing to the proper destinations and are of adequate strength

2.5. Delivery Inspection

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 for further instructions. In case of severe damage, do not accept the consignment from the carrier. See Material Return and Repair document 605-0000-427. for further details. The equipment is normally shipped as shown in Figure 1

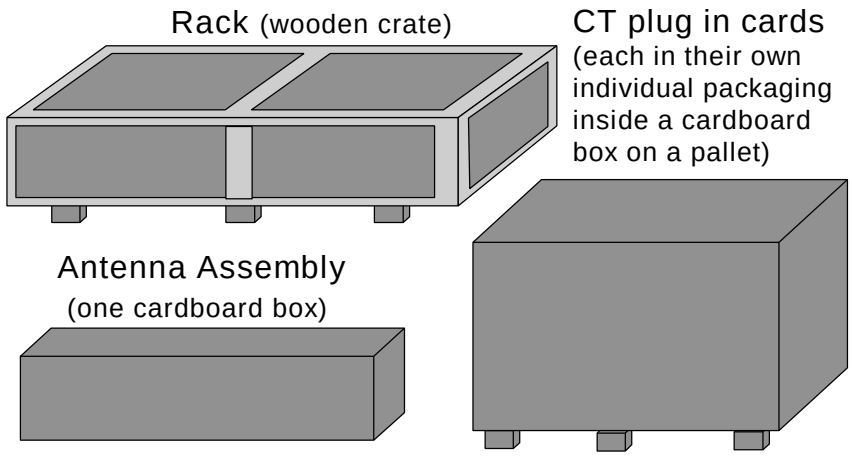

Figure 1. Packaging for CT Site

If subsequent to the initial shipment incremental upgrades are made to the system the equipment will be delivered in packaging of size and type suitable for that shipment.

2.6. Unpacking Inspection

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 Preface of this manual or:

TELEPHONE: +44 (0) 1527 402800

FAX: +44 (0) 1527 550956

E-Mail: support@airspan.com

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

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.

AS4000 RELEASE 3 RACK INSTALLATION

1. Positioning and Securing

1.1. In a Suite

From the site survey, confirm the position of the CT Rack. If the rack is to be positioned in a suite, metalwork will be required to secure it to the overhead structure. Either a proprietary system or fabricated steelwork will be required - see site survey.

Manoeuvre the rack into position.

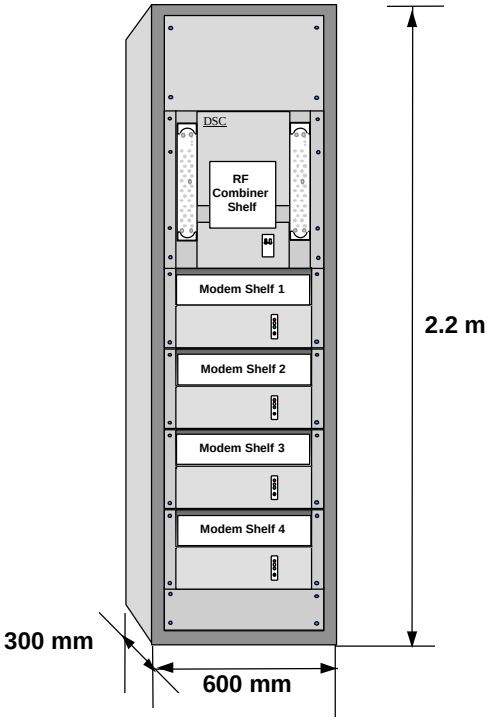

Figure 2. Central Terminal Rack.

Using the base of the rack as a template, mark the floor locating positions through the welded nuts in the Rack Frame. Using a 13mm. diameter drill bit, drill four holes to a depth of approximately 25mm. Position the CT rack over the four holes and screw the four (supplied) M12 screws through the rack base. **Warning: These screws are provided as locating pins only and must be used in conjunction with the overhead steelwork and not as an alternative method for securing the rack.**

Temporarily secure the rack to adjacent racks or steelwork until the overhead support is in place.

Assemble the overhead steelwork as required and secure the rack to the overhead structure using suitable fixings in compliance with local requirements. Remove all burrs and sharp edges.
Ensure that the rack is secure, stable and level in both planes.

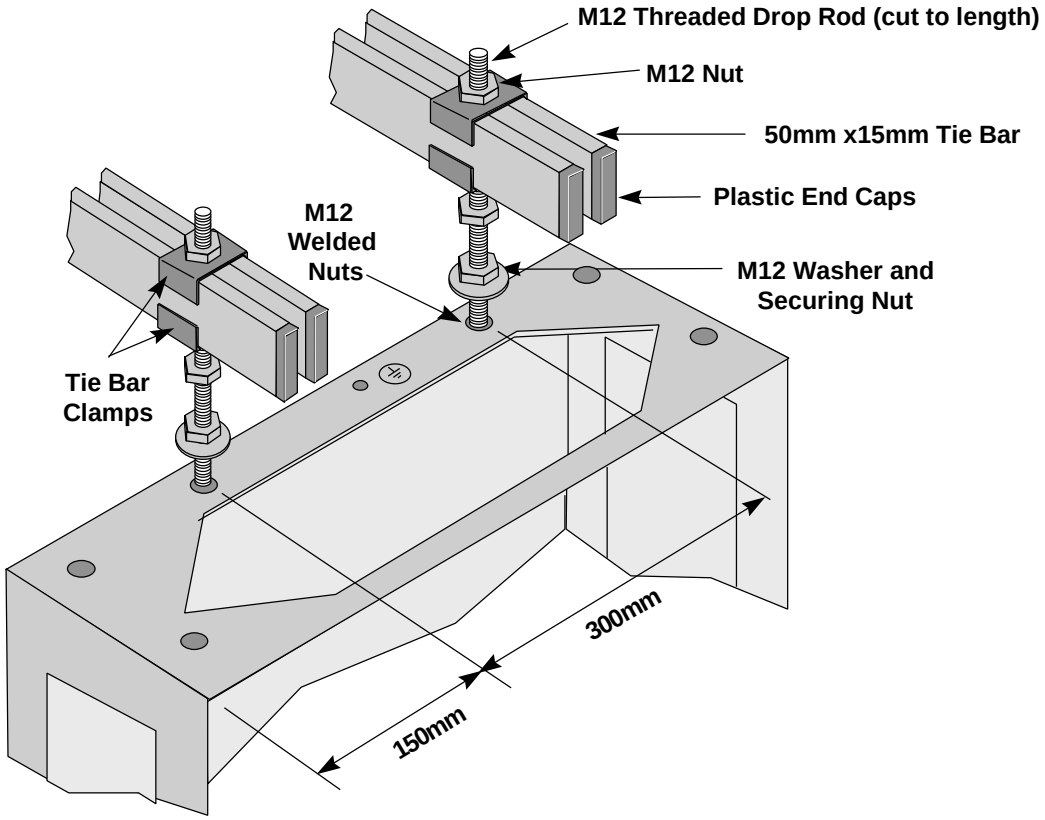

Figure 3. Typical Overhead Ironwork Support

Note: In installations where threaded droprods in excess of 500mm are employed it may be necessary to provide additional support bars to ensure rigidity of the support structure.

1.2. To a Wall

If the rack is to be positioned against a wall, attach one of the two right-angled wall brackets (these brackets are part on the packaging) to the top of the rack and finger tighten with the provided M12 screws. Position the rack against the wall, and mark through the holes in the brackets.

Follow the procedure for the rack base as described in the rack mounting in a suite.

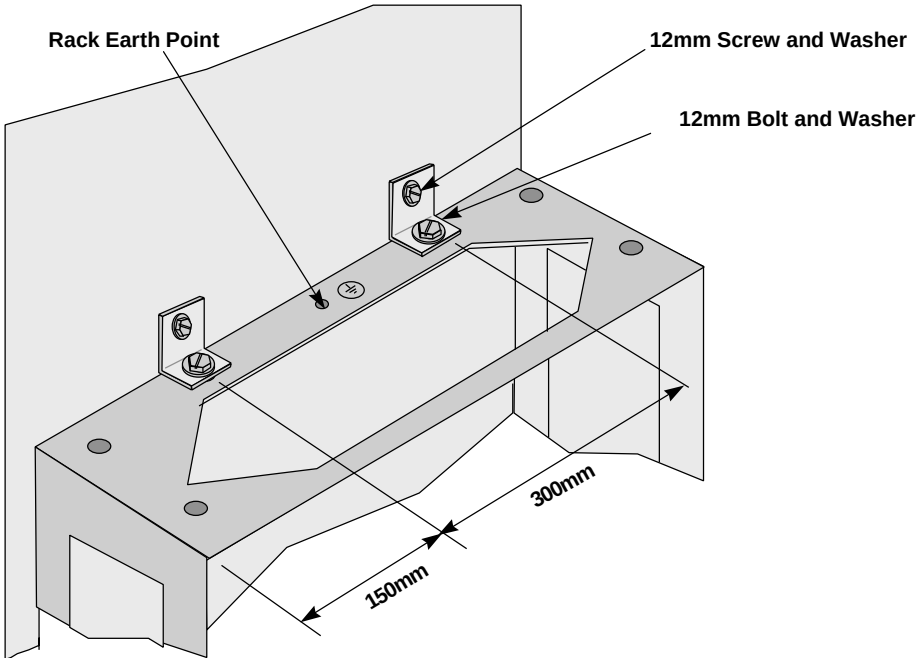

Figure 4 Securing a AS4000 Release 3 rack to a wall

Using an 11mm. drill bit, drill holes in the wall to a depth of 75mm. and fit masonry plugs. Fix the hex head screws through the brackets and finger tighten. Check that the rack is in the correct position and tighten all fixings. Attention should be paid to the fabric of the wall. Where possible, drill directly into the brick and not into mortar. With panelled or partitioned walls, instruction should be taken locally as to how the rack is to be secured. See site survey.

2. Rack Earthing

Using the site survey, locate the building central [safety] grounding point. Run an earth cable rated at 30A. and connect it to the centre earth stud located at the top or bottom of the ETSI rack only. See Figure 4. These points are labelled with the IEC Earth symbol. ⏚.

Warning: No other external safety earth connection shall be made to the rack. The two studs located towards the sides at the top of the rack are used for earth bonding the side and rear panels to the rack and must be left untouched to maintain the systems safety earthing integrity

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AS4000 RELEASE 4 RACK INSTALLATION

1. Positioning and Securing Racks

1.1. Installing Rack in a Suite

From the site survey, confirm the position of the CT Racks. If the racks are to be positioned in a suite, metalwork will be required to secure it to the overhead structure. Either a proprietary system or fabricated steelwork will be required - see site survey.

Manoeuvre the racks into position. Join the racks together with 12mm nuts and bolts placed through the holes at the top and bottom of the side panels

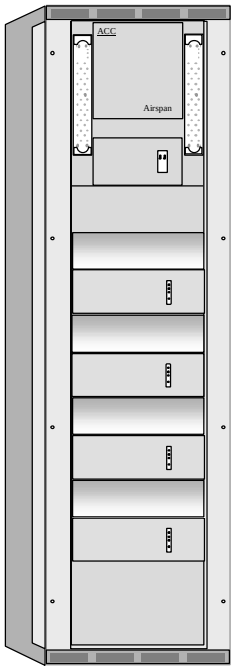

Figure 5. AS4000 Release 4 Central Terminal Rack.

1.2. Securing Rack Base

Using the base of the rack as a template, mark the floor locating positions through the Cut-outs in the Rack Frame. Using a 13mm. diameter drill bit, drill four holes to a depth of approximately 25mm. Position the CT rack over the four holes and screw the four (supplied) M12 screws through washers to secure the rack base.

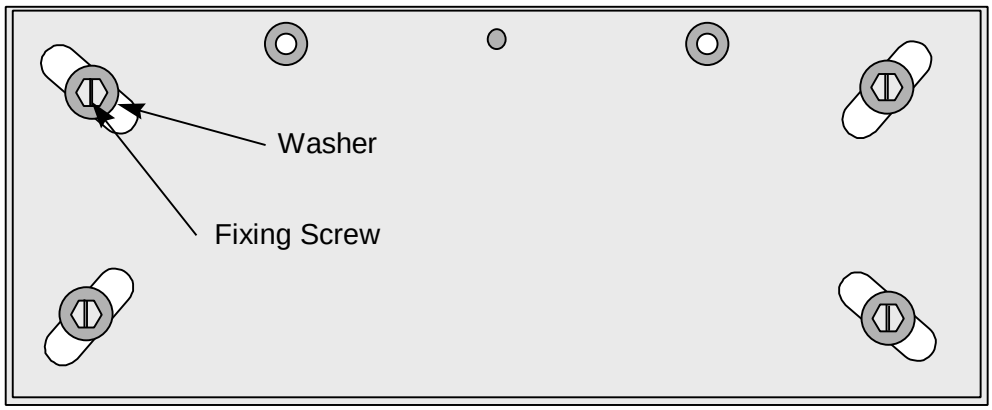

Figure 6. Securing Rack Base

Warning: These screws are provided as locating pins only and must be used in conjunction with the overhead steelwork and not as an alternative method for securing the rack.

Temporarily secure the rack to adjacent racks or steelwork until the overhead support is in place.

1.3. Securing the rack using overhead Ironwork

Assemble the overhead steelwork as required and secure the rack to the overhead structure using suitable fixings in compliance with local requirements. Remove all burrs and sharp edges.

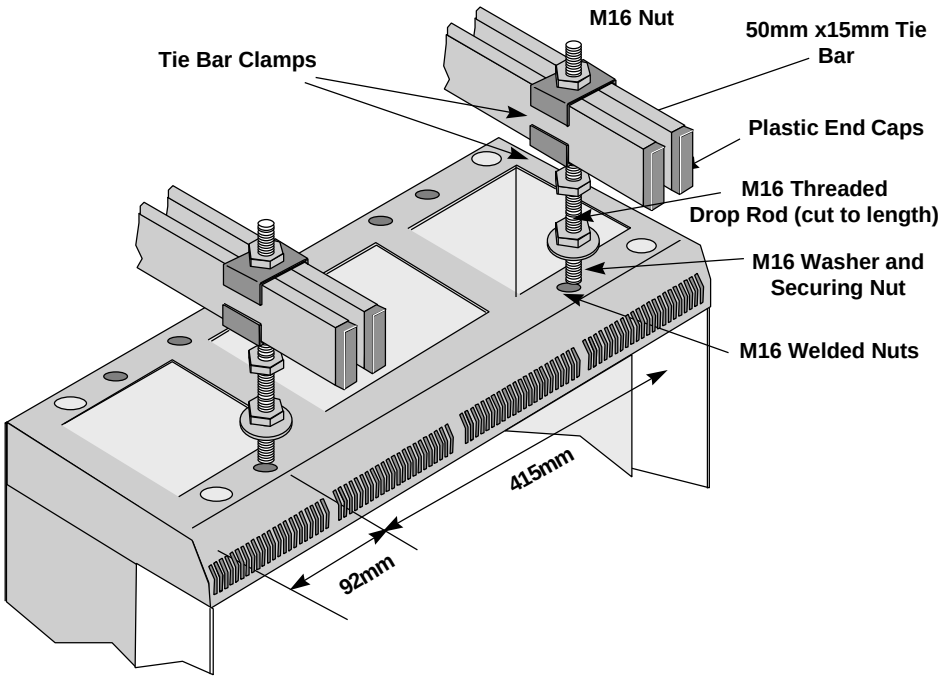

Figure 7. Typical Overhead Ironwork Support

Note: In installations where threaded droprods in excess of 500mm are employed it may be necessary to provide additional support bars to ensure rigidity of the support structure.

1.4. Securing a Rack to a Wall

If the rack is to be positioned against a wall, attach one of the two right-angled wall brackets (these brackets are part on the packaging) to the top of the rack and finger tighten with the provided M12 screws.

Manoeuvre the racks into position against the wall. Join the racks together with 12mm nuts and bolts placed through the holes at the top and bottom of the side panels and mark the wall through the holes in the top brackets.

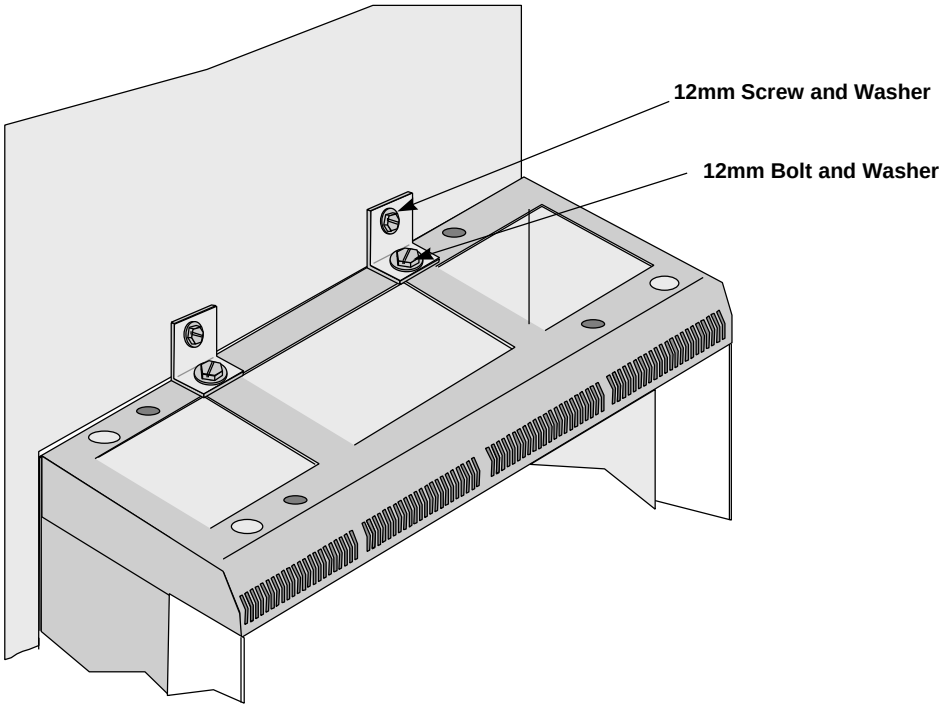

Figure 8. Securing Rack To Wall

Using an 11mm. drill bit, drill holes in the wall to a depth of 75mm. and fit masonry plugs. Fix the hex head screws through the brackets and finger tighten. Check that the rack is in the correct position and tighten all fixings.

Attention should be paid to the fabric of the wall. Where possible, drill directly into the brick and not into mortar. With panelled or partitioned walls, instruction should be taken locally as to how the rack is to be secured. See site survey.

Follow the procedure for the rack base as described in paragraph1.2.

2. Rack Earthing

Using the site survey, locate the building central [safety] grounding point. Run an earth cable rated at 30A. to <u>each</u> rack and connect it to the centre earth stud located at the top <u>or</u> bottom (not both) of the rack. See Figure 9. These points are labelled with the IEC Earth symbol.

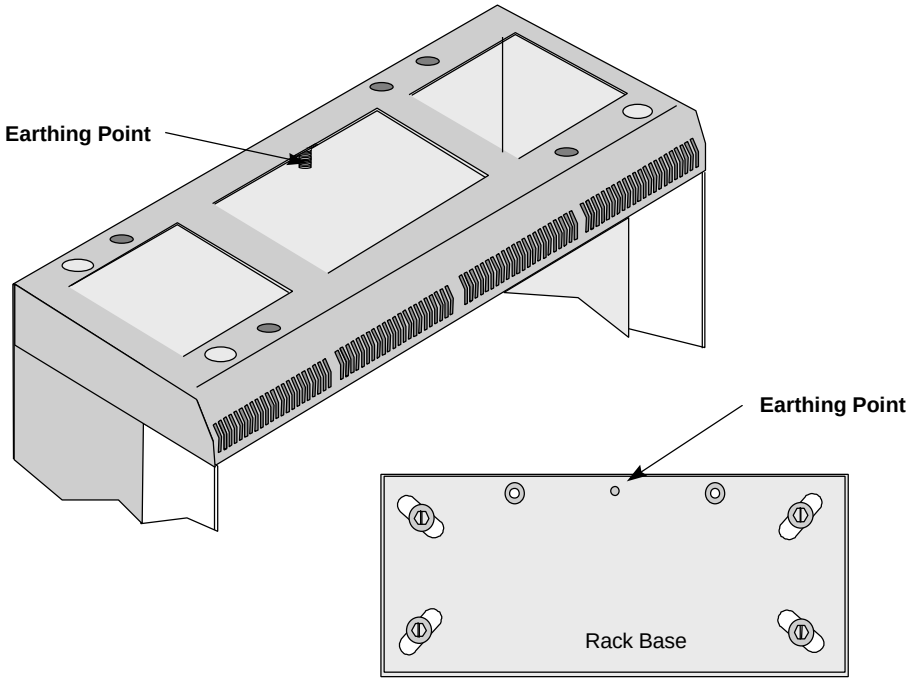

Figure 9. Rack Earthing

Warning: No other external safety earth connection shall be made to the rack. The two studs located towards the sides at the top of the rack are used for earth bonding the side and rear panels to the rack and must be left untouched to maintain the systems safety earthing integrity

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CT POWER AND ALARM CABLING

1. DC Power

The cables for the negative DC battery feeds, the 0V returns and the Rack Ground are detailed in Table 2. Should local requirements specify otherwise, it is acceptable for cables of other colours to be used, however, under no circumstances should the cable sizes be less than that specified in Table 5. The length of the cable supplied will be detailed in the site survey. Separate DC sources are desirable for maximum protection.

Function	Colour	Min. Cable Size
Negative Battery Feed	Blue	10 AWG; 6.0mm^2
Zero Volt Battery Return	Black	10 AWG; 6.0mm^2
Rack Ground	Green/Yellow	8AWG; 10.0mm^2

Table 5. DC Power Cables.

Warning.

The maximum DC input should not exceed 60 Volts. Voltages in excess of this are considered hazardous.

From the site survey confirm the location of the Isolator for the negative battery feed points; then ensure that the supply is isolated. If the location is remote from the CT, take appropriate action to ensure that the supply is not inadvertently reconnected. This may include locking OFF an isolator, by taking its unique handle with you or ensuring that replacement fuses are not easily installed. Provide a label at the CT to indicate the location of the isolator or fuse positions mentioned above.

Run and tie in the two negative battery feeds and the two zero volt returns to each CT rack installed. These should be rated at 30A. Power cables must be run and tied separate from signal cables.

Note: Do not insert fuses until instructed to do so in the commissioning stage of installation.

Run the DC cables through the top right hand side of the rack, loosen the screws on the combiner shelf and slide the screen to the right. Place the DC cables behind the screening and though to the connection block at the lower right of the combiner shelf. return the screen to its original position. Re-tighten the combiner shelf screws.

Trim cables and strip 7mm to insert into the termination block. Terminate the cables on the Combiner Shelf at the appropriate connection points. The negative supplies go to Termination Block 2 & 4. The positive battery returns go to 1 & 3. See Figure 10

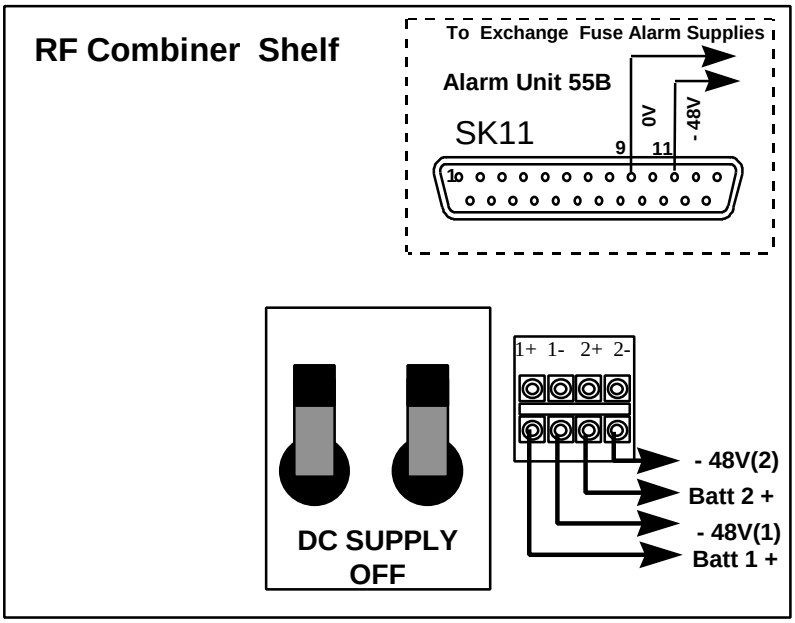

Figure 10. DC Termination On Combiner Shelf.

Terminate the battery feed and return cables at the isolator/fuse positions, and ensure that the CT rack is isolated prior to commencing commissioning tests.

2. Shelf Identity Settings

Ensure that each shelf identity is set by the provision of links as shown in Table 6.

Shelf	JP1	JP2
1	In	In
2	Out	In
3	In	Out
4	Out	Out

Table 6. Shelf Identity Settings

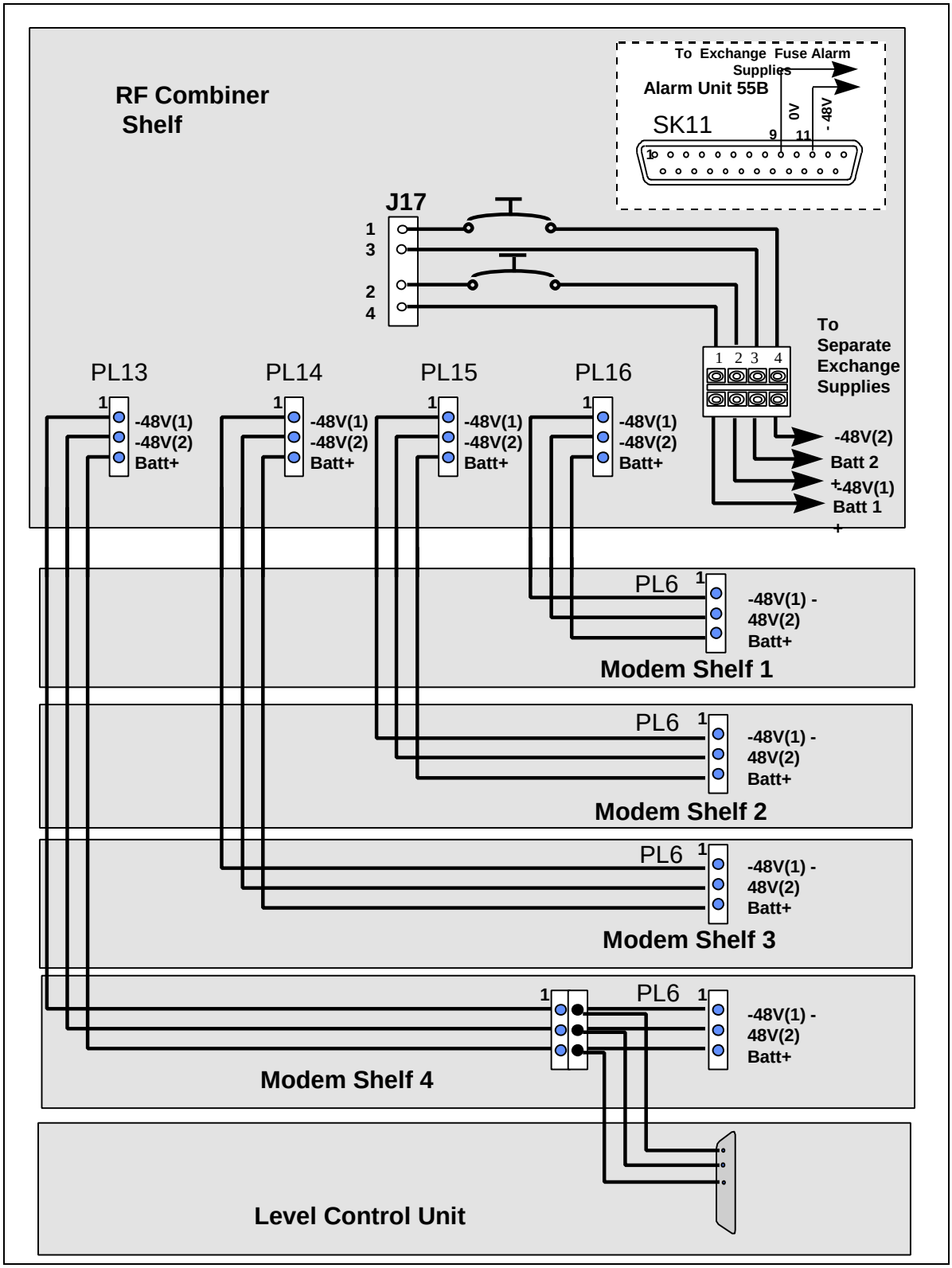

Figure 11. Rack Power Wiring

3. Alarm Unit (Type 55B) External Connections

Run and terminate alarm cables from the central office alarm scheme on the 25 Way D-Type connector as shown in Figure 12. Connect the -48V/24V alarm supply to the alarm supply fuse box using 1.0mm cable and terminate on the D-type connector.

If a visual indication at the rack is all that is required, only the power connection to pins 9 and 11 need to be connected.

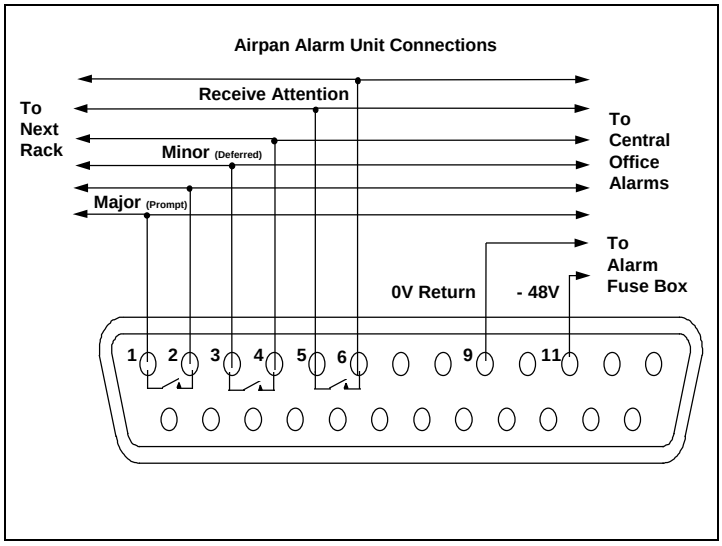

Figure 12. AS4000 Alarm Unit Connections

Connect the station alarm cable to the backplane of the combiner shelf. See Figure 13.

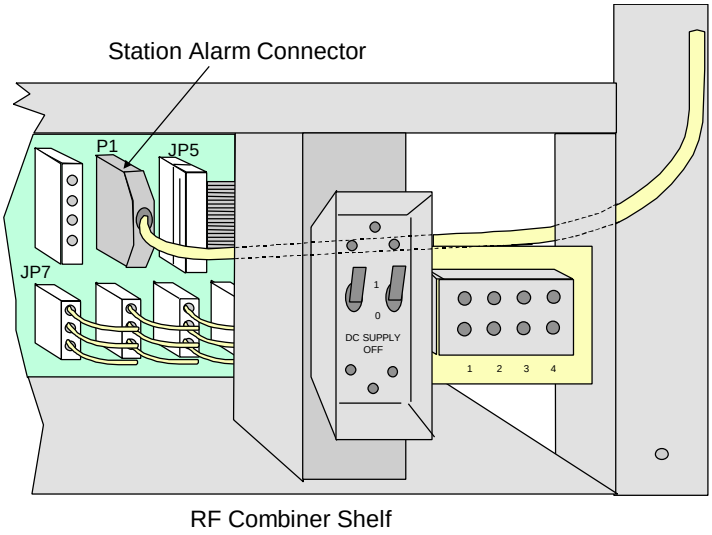

Figure 13. Station Alarm Connection

AS4000 RELEASE 3: 2Mbit/s / CABLING

1. 2Mbit/s Cabling 75W Coax

From the site survey, confirm the location of the Digital Distribution Frame (DDF). The length of 2Mbit/s feeds from the rack to the DDF should not exceed 250 metres

Note: This must be a SELV port of an EN 60950 approved product.

Run the 2Mbit/s co-axial cables from the modem shelf to the allocated positions on the DDF. (Two cables per shelf). In partial equipped installations it may be appropriate to run enough cables to cater for a complete rack of equipment. This reduces the need to disturb original installation when adding additional equipment.

Feed the cables through the top of the rack , out through the hole in the right hand side of the top shelf and down the front of the rack.

Fit Ferrites to each cable at the point of entry to the shelf. Secure a tie wrap each side of the ferrite to keep it in place. See Figure 15.

Identify and label each cable at both ends as well as the DDF positions.

Terminate all cables with the appropriate Co-ax connector. (BNC for 2002 or Type 43 for 3002 cable).

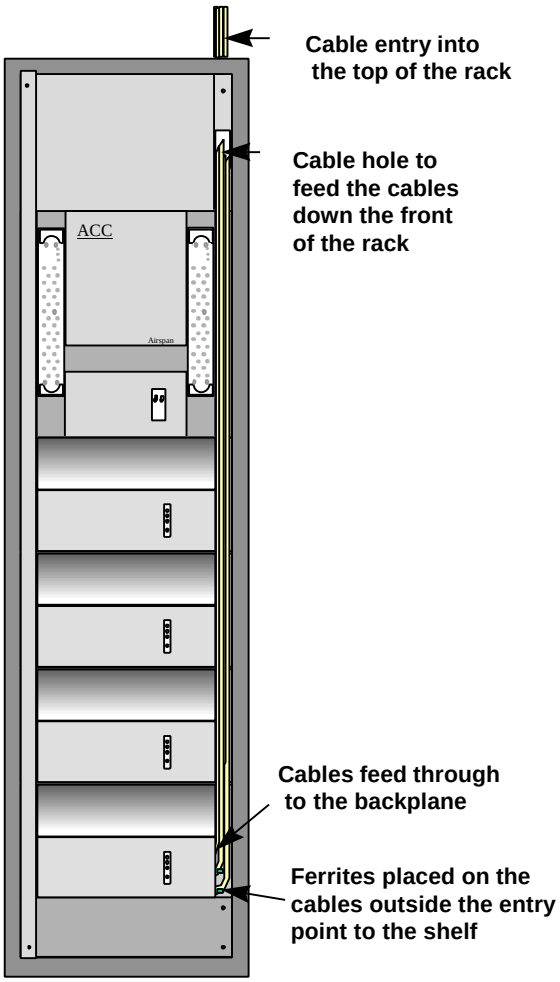

Figure 14. AS4000 Release 3 Rack Cable Runs

Connect the 2Mbit/s ports on the DDF to the 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on Shelf Interface Connections located at the right hand side of each Modem Shelf. See Figure 15 and Figure 16.

Ensure that the 2Mbit/s grounding options are set. The default is for JP5, JP6 and JP7 to be fitted with links for 75Ω.unbalanced. The links are not fitted for 120Ω balanced operation.

Ensure that the respective 2Mbit/s ports have been configured on the DDF in the exchange.

Tie in cables as necessary using suitable cable ties, trim, leaving no sharp edges.

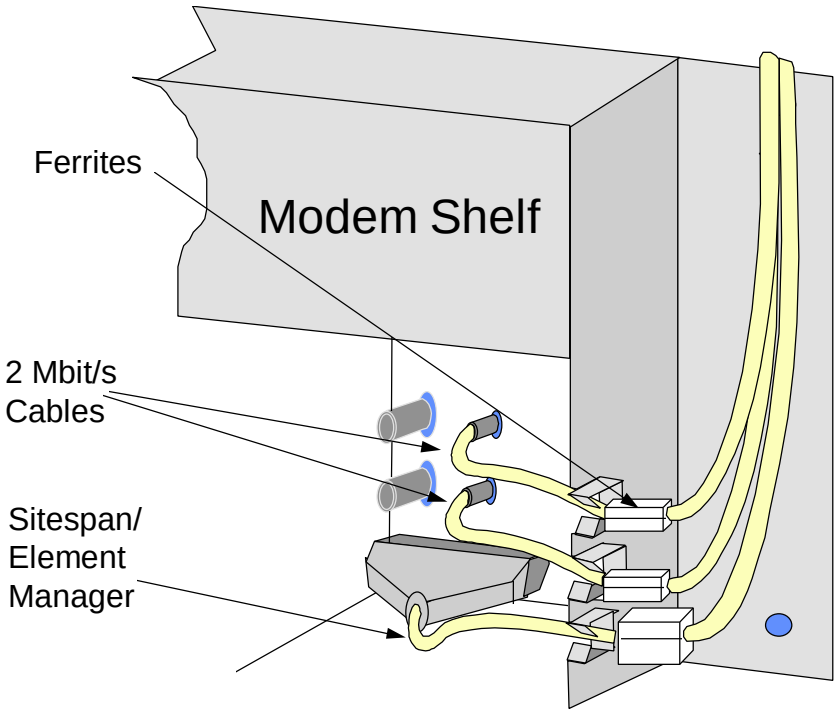

Figure 15. Rack Cabling

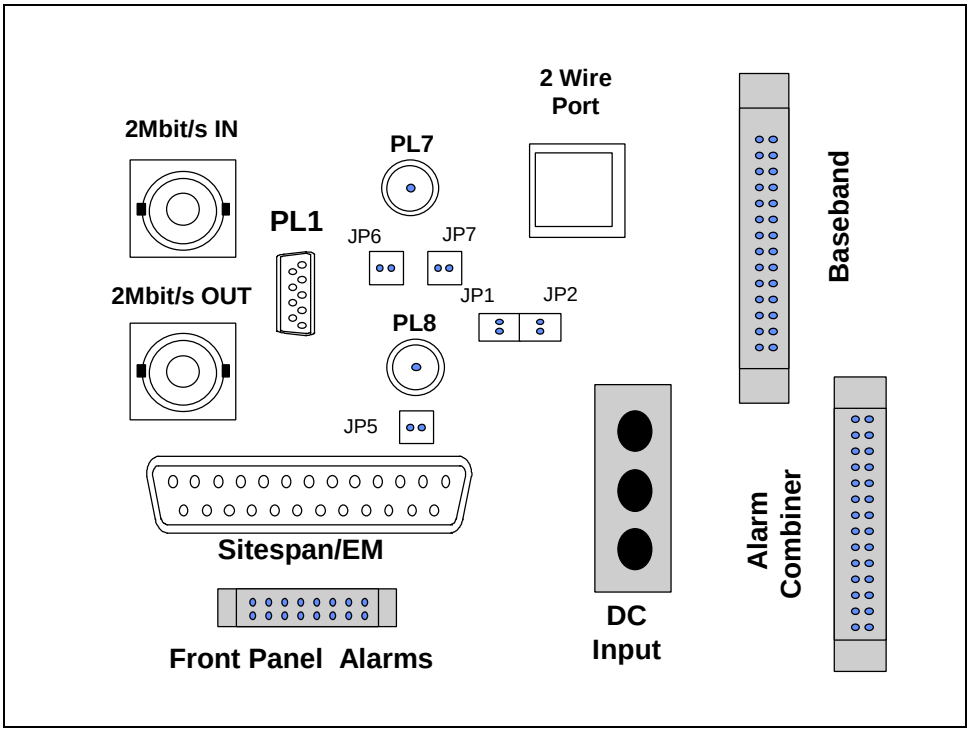

Figure 16. Shelf Interface Connections.

2. 2Mbit/s Cabling 120W Twisted Pair

From the site survey, confirm the location of the Digital Distribution Frame (DDF). The length of 2Mbit/s feeds from the rack to the DDF should not exceed 250 metres

Note: This must be a SELV port of an EN 60950 approved product.

Run the 2Mbit/s twisted pair cables from the modem shelf to the allocated positions on the DDF. (Two cables per shelf if using screen twisted pair or one cable if using screened four wire). In partial equipped installations it may be appropriate to run enough cables to cater for a complete rack of equipment. Identify and label each cable at both ends as well as the DDF positions.

Feed the cables through the top of the rack, out through the hole in the right hand side of the top shelf and down the front of the rack. Tie in cables as necessary using suitable cable ties, trim, leaving no sharp edges. Fit Ferrites to each cable at the point of entry to the shelf. Secure a tie wrap each side of the ferrite to keep it in place.

Terminate cables on 9 Way D-Type 2Mbit/s Out 6 & 7, 2Mbit/s In 2 & 3, Screen on 5 & 9. See Figure 17.

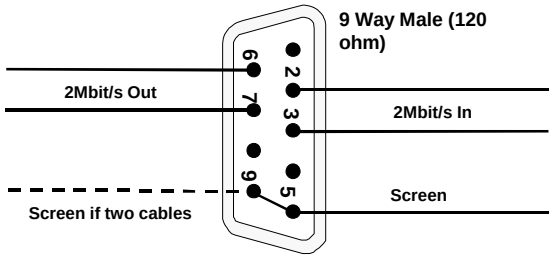

Figure 17. 120 balanced connections

For 120Ω balanced operation JP5, JP6 and JP7 should be removed. See Figure 16

3. Channel Bank

Should there be no 2Mbit/s interface available, the Channel Bank will be installed to interface between the analogue lines of the exchange equipment and the Modem Shelf in order to provide the required 2Mbit/s traffic link for the AS4000 System.

The 2Mbit/s IN and 2Mbit/s OUT ports on the Modem Shelf are then connected to the respective 2Mbit/s IN and 2Mbit/s OUT connections on the Channel Bank. Configure and set the required parameters in the Channel Bank according to the instruction in the manufacturers manual.

AS4000 RELEASE 4: 2Mbit/s CABLING

1. 2Mbit/s Cabling 75W Coax

From the site survey, confirm the location of the Digital Distribution Frame (DDF). The length of 2Mbit/s feeds from the rack to the DDF should not exceed 250 metres

Note: This must be a SELV port of an EN 60950 approved product.

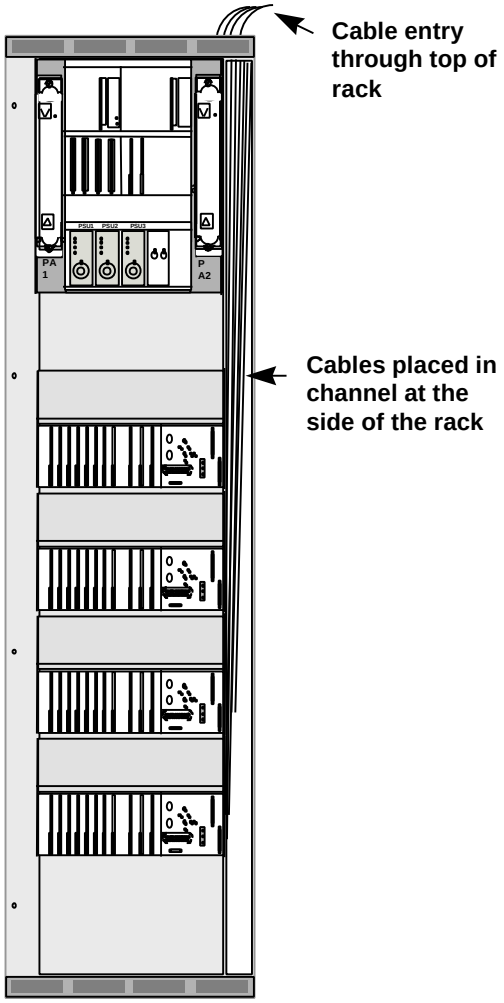

Figure 18. AS4000 Release 4 Rack Cable Runs

Run the 2Mbit/s co-axial cables from the modem shelf to the allocated positions on the DDF. (Two cables per shelf). In partial equipped installations it may be appropriate to run enough cables to cater for a complete rack of equipment. This reduces the need to disturb original installation when adding additional equipment.

Feed the cables through the top of the rack and down the front of the rack.

Identify and label each cable at both ends as well as the DDF positions.

Terminate all cables with a BNC connector.

Connect the 2Mbit/s ports on the DDF to the 2Mbit/s I/P (Top) BNC and 2Mbit/s O/P (Bottom) BNC connectors on Shelf Interface Connections located at the right hand side of each Modem Shelf. See Figure 15.

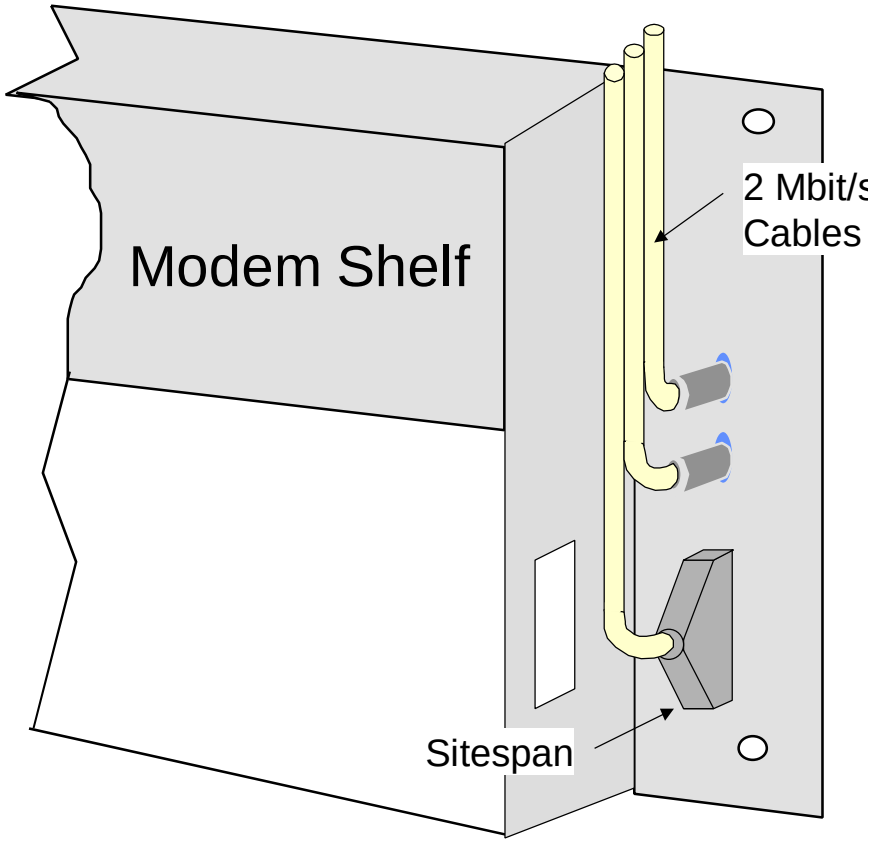

Figure 19. Rack Cabling

Ensure that the respective 2Mbit/s ports have been configured on the DDF in the exchange.

Ensure that the 2Mbit/s grounding options are set. JP5, JP6 and JP7 to be fitted with links for 75Ω.unbalanced. The links are not fitted for 120Ω balanced operation.

Tie in cables as necessary using suitable cable ties, trim, leaving no sharp edges.

2. 2Mbit/s Cabling 120W Twisted Pair

From the site survey, confirm the location of the Digital Distribution Frame (DDF). The length of 2Mbit/s feeds from the rack to the DDF should not exceed 250 metres

Note: This must be a SELV port of an EN 60950 approved product.

Run the 2Mbit/s twisted pair cables from the modem shelf to the allocated positions on the DDF. (Two cables per shelf if using screen twisted pair or one cable if using screened four wire). In partial equipped installations it may be appropriate to run enough cables to cater for a complete rack of equipment. Identify and label each cable at both ends as well as the DDF positions.

Feed the cables through the top and down the front of the rack. Tie in cables as necessary using suitable cable ties, trim, leaving no sharp edges.

Feed the cable through the hole on the side of the modem shelf to access the backplane.

Fit Ferrites to each cable at the point of entry to the shelf. Secure a tie wrap each side of the ferrite to keep it in place.

Terminate cables on 9 Way D-Type 2Mbit/s Out 6 & 7, 2Mbit/s In 2 & 3, Screen on 5 & 9. See Figure 20

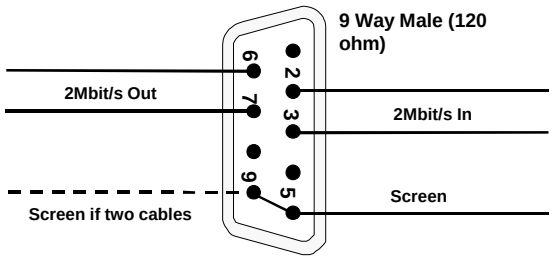

Figure 20. 120 balanced connections

For 120Ω balanced operation JP5, JP6 and JP7 should be removed. See Figure 21.

Fit the D-type connector to P1 on the Modem Shelf Backplane See Figure 21.

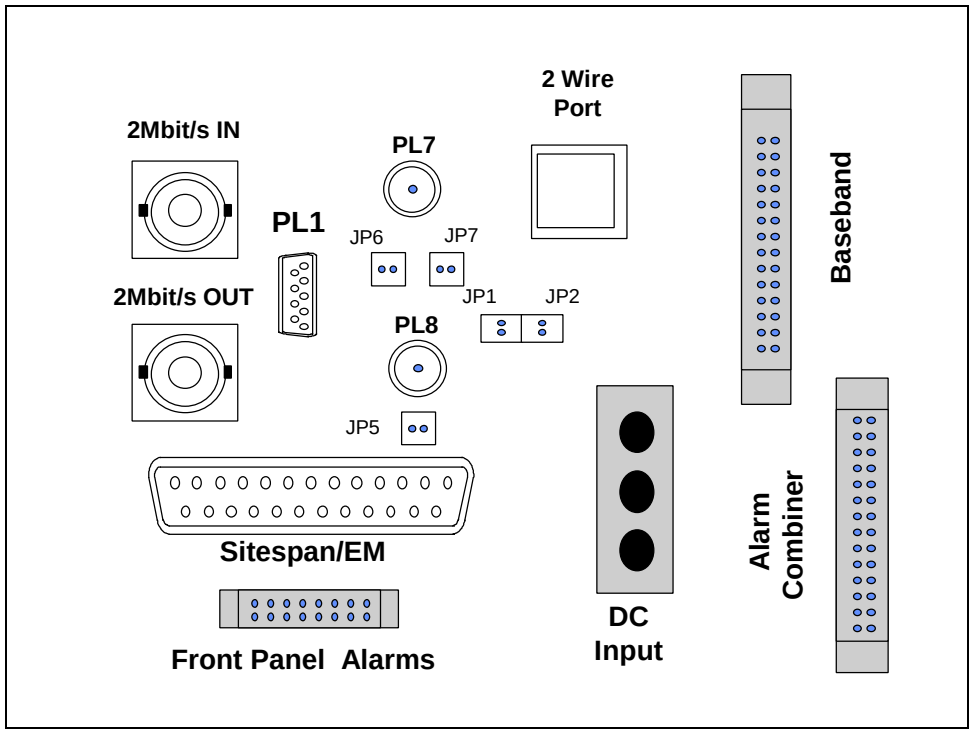

Figure 21. Shelf Interface Connections.

3. Channel Bank

Should there be no 2Mbit/s interface available, the Channel Bank will be installed to interface between the analogue lines of the exchange equipment and the Modem Shelf in order to provide the required 2Mbit/s traffic link for the AS4000 System.

The 2Mbit/s IN and 2Mbit/s OUT ports on the Modem Shelf are then connected to the respective 2Mbit/s IN and 2Mbit/s OUT connections on the Channel Bank. Configure and set the required parameters in the Channel Bank according to the instruction in the manufacturers manual.

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CONNECTION TO SITESPAN

1. Modem Connection to Sitespan

The figure below shows a typical set-up for connecting the CT site to a remote management site. The CT rack connects to the Server PC via a Digiboard port expansion card in the PC. Each modem shelf connects to a port using an RS232 cable. A modem connected to a serial port access the POTS network. At the remote site the modem connects to the Sitespan Client PC. Cable connections are shown

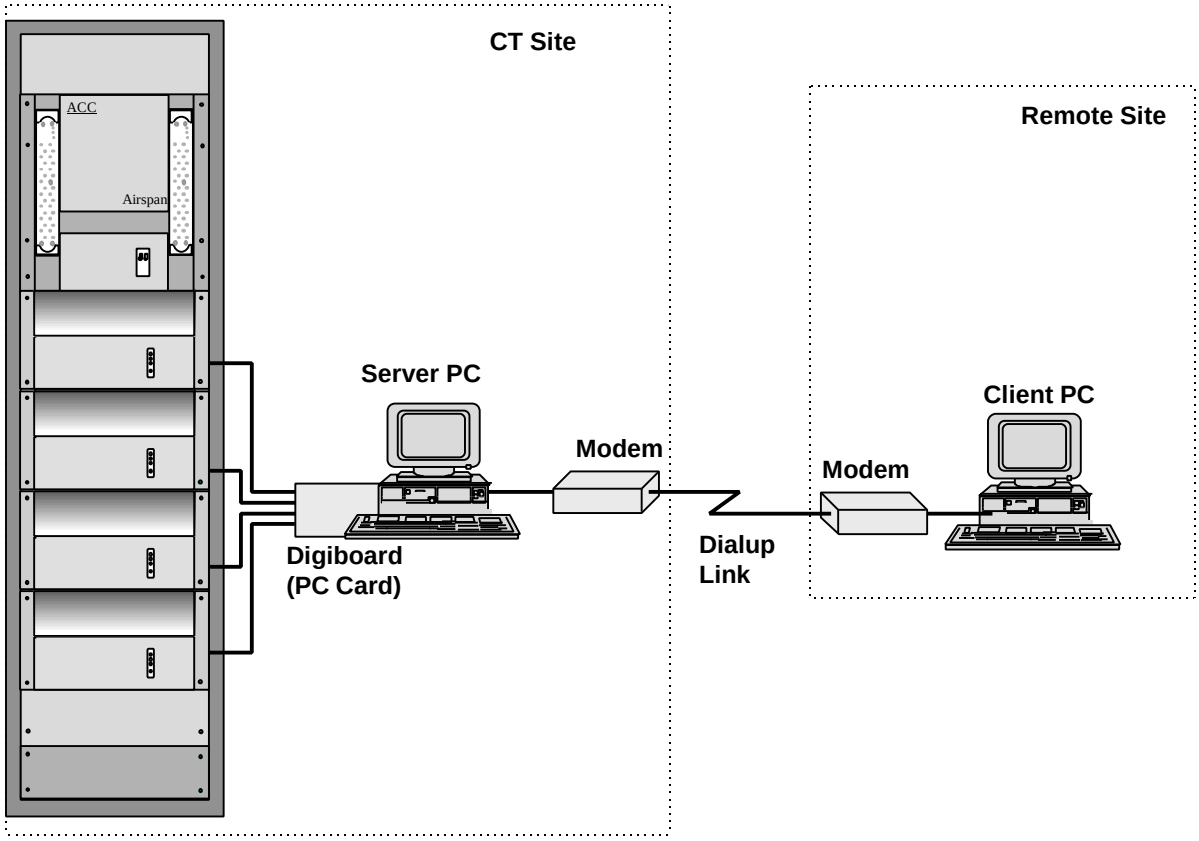


Figure 22. Sitespan Modem Connections

2. Fixed Link Connection to Sitespan

The figure below shows a typical set-up for connecting the CT site to a remote management site using a 2Mbit/s E1 . The CT rack connects to a 4 port Mux (Sprint 2) that concentrates the outputs of the modem shelves into a 64kbit/s output. This output can connect over a 64K link to another Mux or go through a further Micromux to put the information on an E1 Link. The E1 link can be further aggregated onto a high speed link using an Optical Mux (LS120). The reverse process takes place at the remote site. The outputs of the 4port Mux connect to a Digiboard Port expansion card located in the server PC. The server and Client (equipment View software are both run on the same PC.

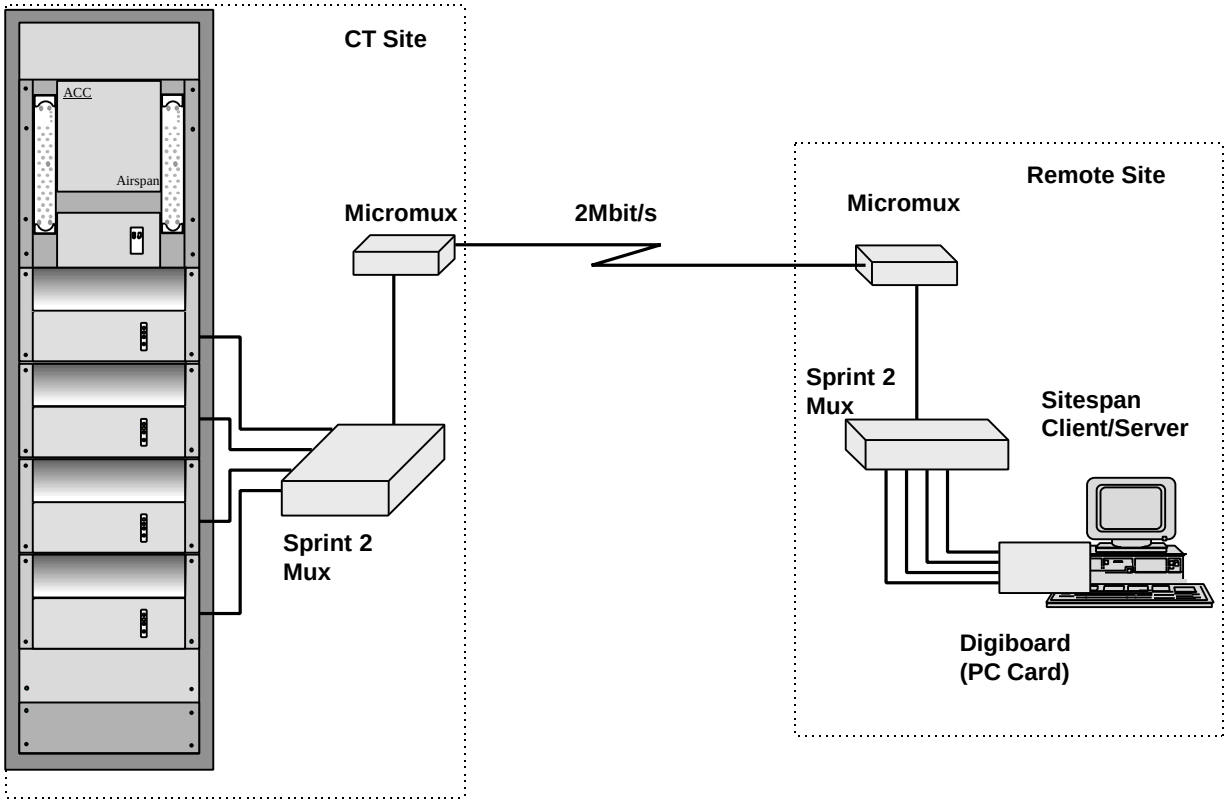


Figure 23. Sitespan E1 Fixed Link Connection

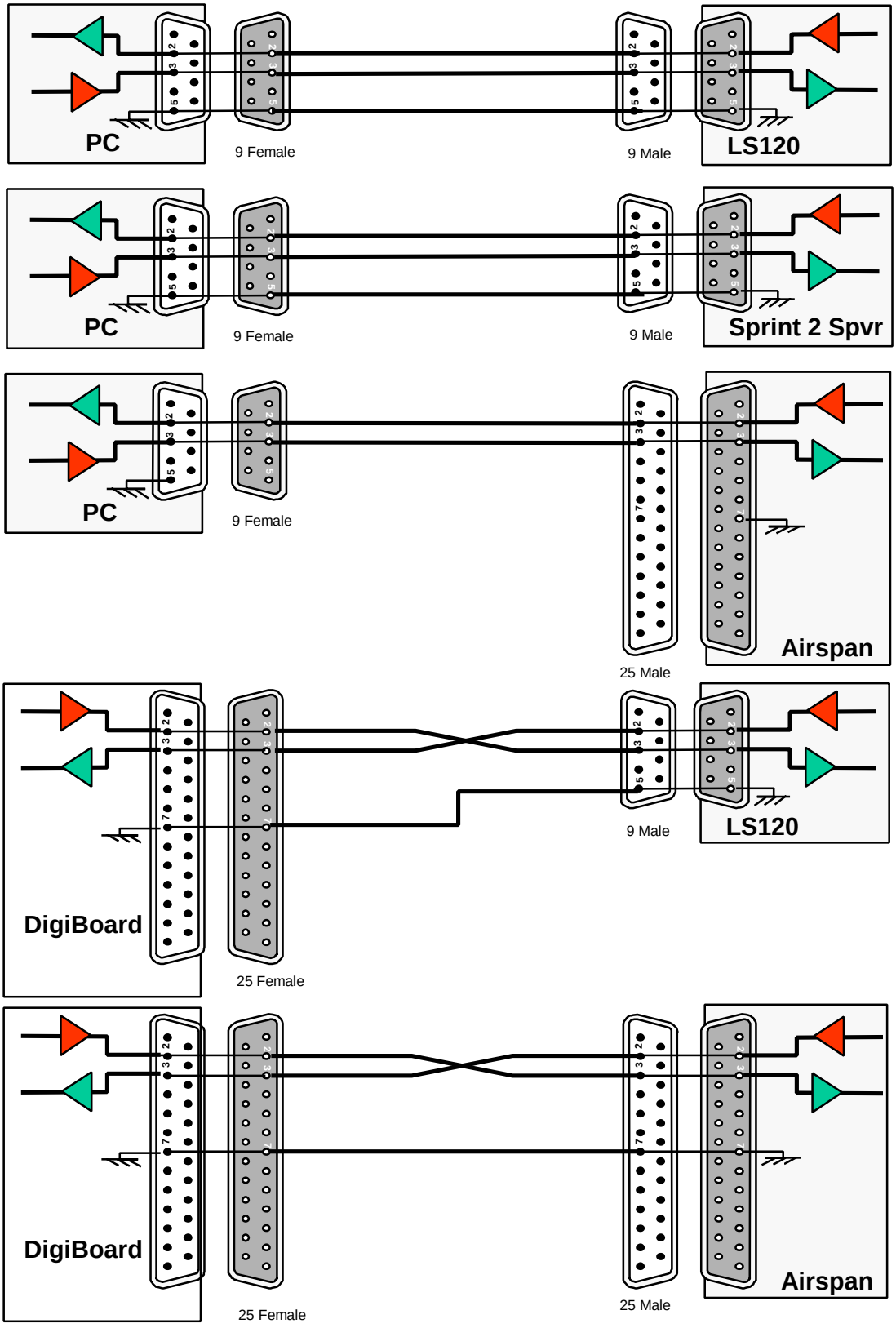


Figure 24. D-Type Wiring Details (1)

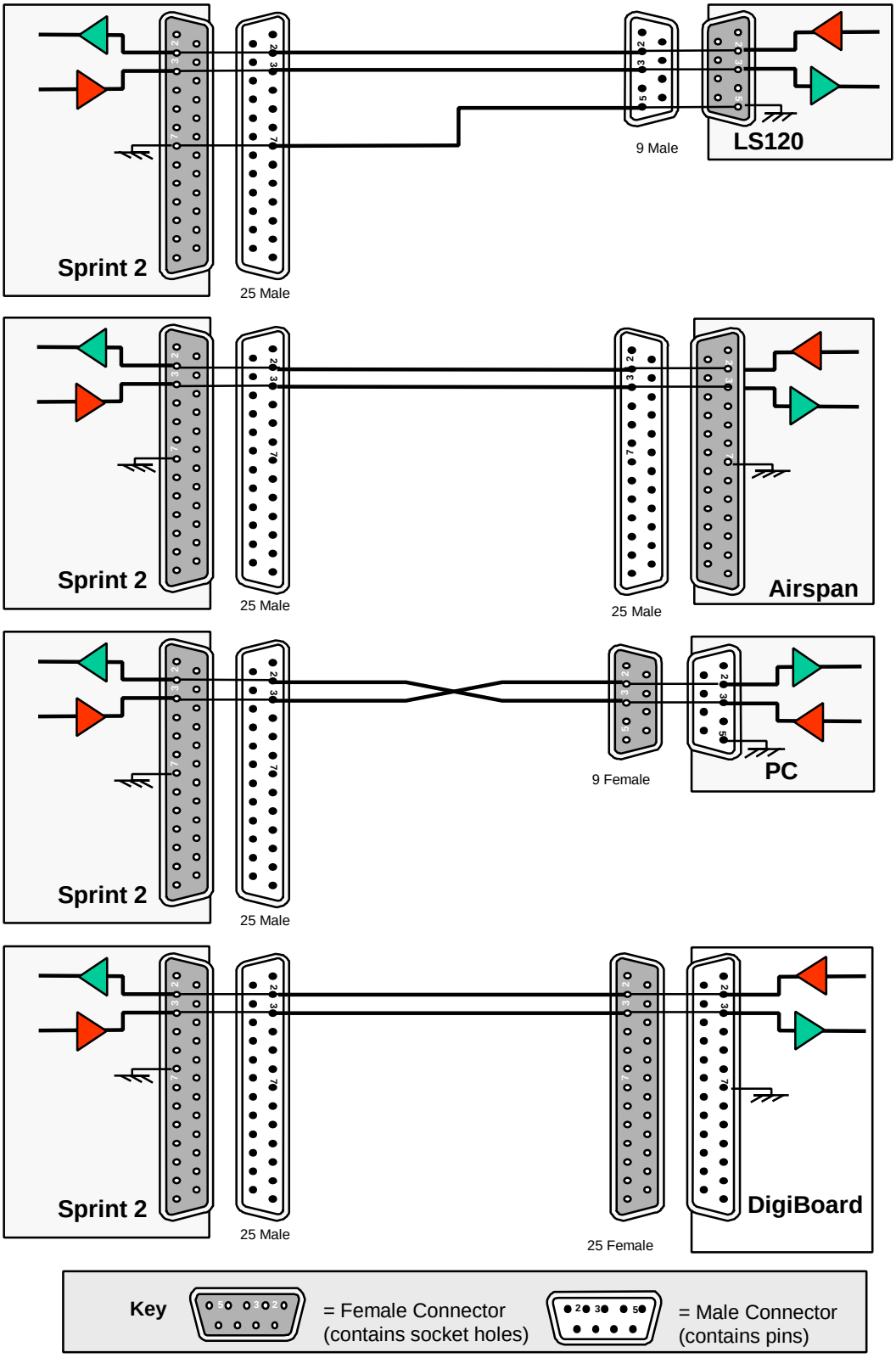


Figure 25. D-Type Wiring Details (2)

CARD INSTALLATION

3. Preliminary

Warning: Before handling any cards or modules, observe full anti-static precautions.

1. Ensure that the CT Circuit Breakers located on the lower assembly of the Combiner Shelf are set to the OFF position.(Down) See Figure 26.

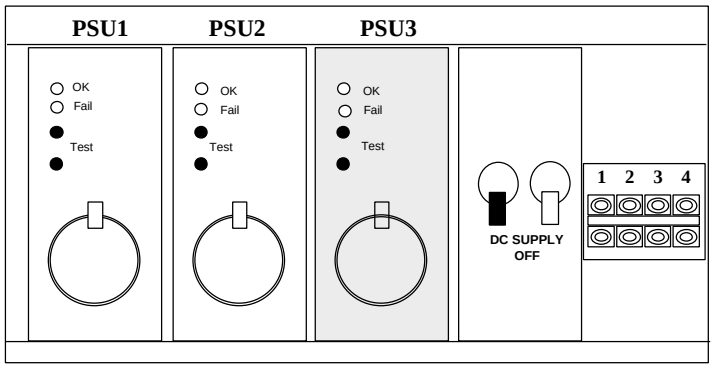


Figure 26. Part of RF Combiner Shelf showing Circuit Breakers.

Warning: Isolation of power from the rack is only achieved by ensuring that both circuit breakers are in the off position.

2. Ensure that the end of suite fuses are adequately rated and insert these into the respective fuse holder positions.

3. Ensure that each shelf identity is set by the provision of links as shown in Table 7.

Shelf	JP1	JP2
1	In	In
2	Out	In
3	In	Out
4	Out	Out

Table 7. Shelf Identity Settings

4. Card Insertion

Insert the cards into the shelves as directed in Chart 1, recording the serial numbers and revision status in the test form (DLP-021.)

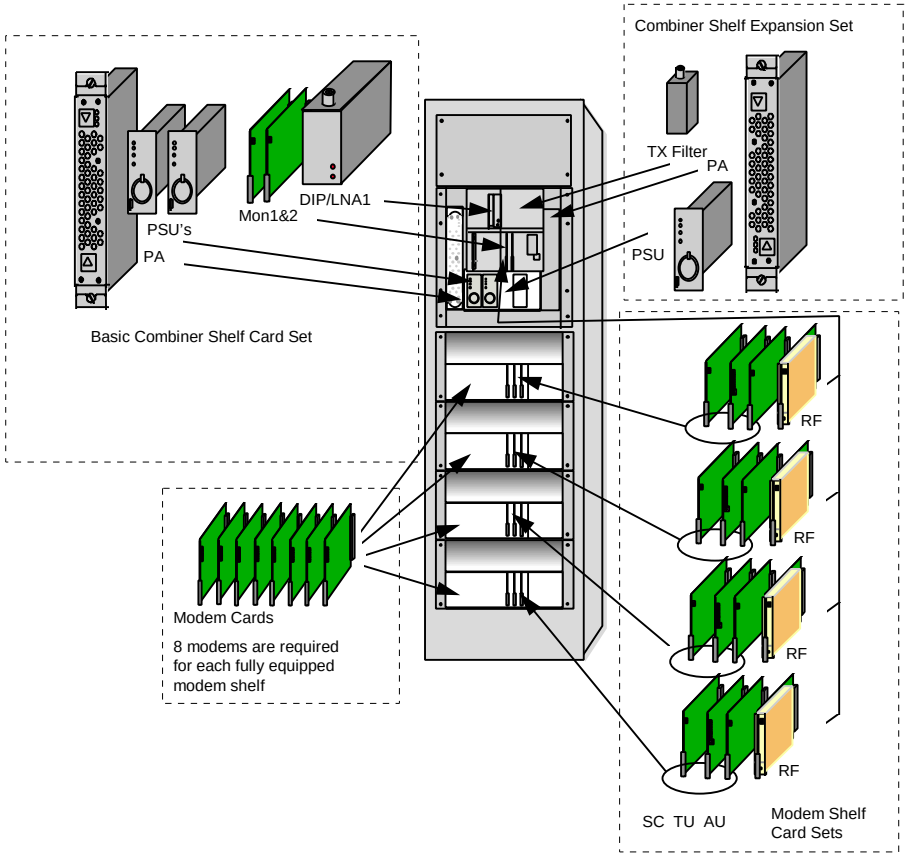


Figure 27. Card Insertion

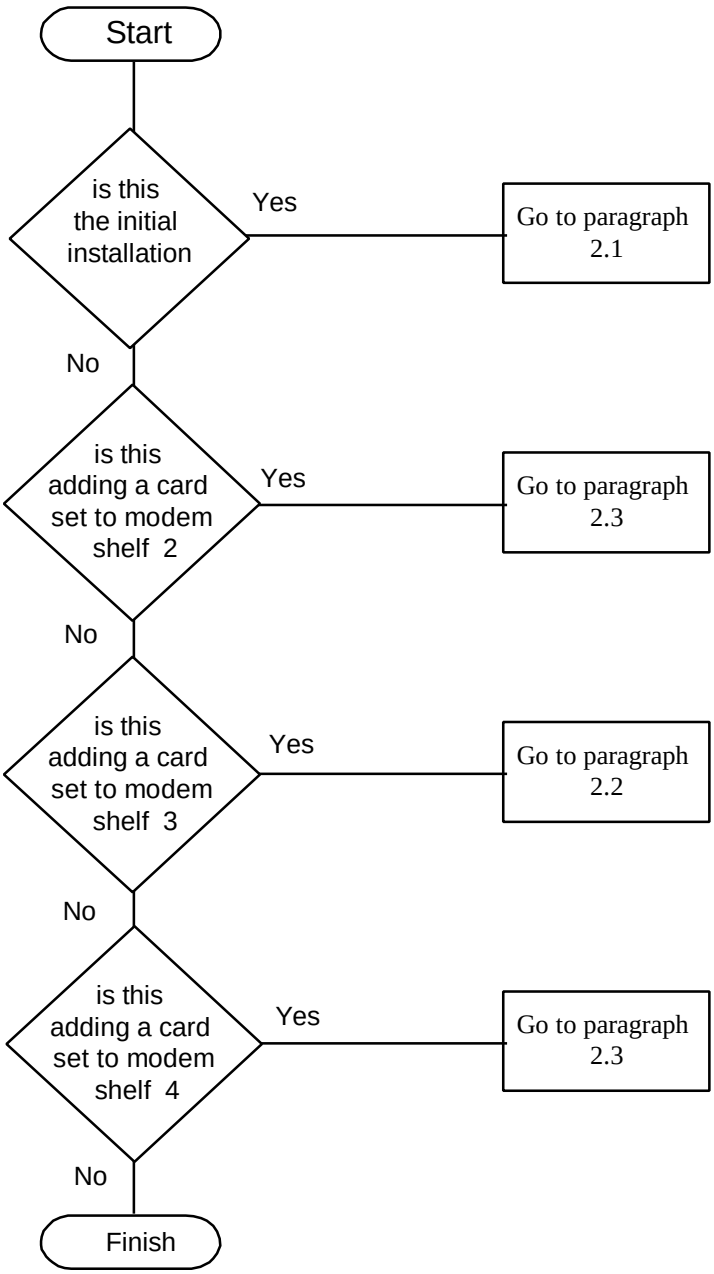


Chart 1. Card Insertion

4.1. Initial installation of cards in a newly provided rack

With the initial installation it is preferred to install the cards in both the combiner shelf and the modem shelves with the power switched off.

A) RF Combiner Shelf

Insert the following modules and secure:-

i) For an installation of up to 2 Modem Shelves

- 1 RF Power Amplifier Module (2 PA's) in the left hand position in the combiner shelf
- 1 x Low Noise Amplifier + Diplexer (DIP/LNA 1) (Terminate output with 50ohm termination.)
- 2 x PSU's
- 2 x Combiner Monitor Card (Monitor 1 303-043-900 & Monitor 2 303-043-901)

Note: Alarm unit 55B (already inserted at factory)

ii) For an installation of 3 or 4 Modem Shelves install the cards as a) with the addition of:-

- 1 RF Power Amplifiers Modules (2 PA's per module) in the right hand position in the combiner shelf
- 1 TX Filter (Terminate output with 50ohm termination.)
- 1 x PSU

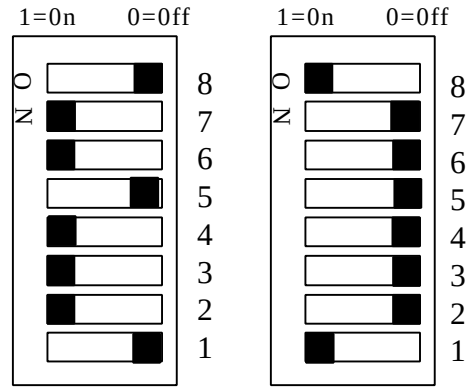
B) For each shelf provided install the RF and Modem Shelf card sets

Insert the following cards into the Combining Shelf:-

- 1 x RF Card (RF) for each equipped Modem Shelf

Insert the following cards into each Modem Shelf:-

- 1 x Shelf Controller Card (SC)
- 1 x Analogue Card (AU)
- 1 x Tributary Card (TU). The Tributary unit DIL Switches should be set as in Figure 28.



	Release 3 TUs		
	PCB Ref	**Switch Position**	**Notes**
75 Ohm input	S1.2 S1.3	s/c on 1 s/c on 1	
120 Ohm input	S1.2 S1.3	o/c off 0 s/c off 0	
Input a/c earth	S1.4 S1.5	o/c off 0 s/c on 1	Input earth options are for 75 ohm only
Input earthed	S1.4 S1.5	s/c on 1 o/c off 0	
Input floating	S1.4 S1.5	o/c off 0 o/c off 0	
75 Ohm output	S1.1 S1.7 S1.8	o/c off 0 s/c on 1 o/c off 0	
120 Ohm output	S1.1 S1.7 S1.8	o/c on 1 o/c off 0 s/c on 1	
Output earthed	S1.6	s/c on 1	Output earth options are for 75 ohm only
Output Floating	S1.6	o/c off 0	

Figure 28. DIL Switch (Typical Settings)

Note: Test Modem

A ‘test modem’ is also required. Any modem card supplied with the equipment will suffice for this purpose. 3.4-3.6GHz Band installations will require two modem cards.

Fitting RF Coupler

30dB couplers should be fitted to the male N-Type connector that is situated at the top of the DIP/LNA1 and the TX filter. Port J1 fits onto the DIP/LNA or TX Filter module and the antenna feed fits on to port J2. The coupler should be orientated as shown in so that the SMA port faces to the right side of the rack (when viewed from the front) to allow easy access for test leads. The Antenna should not be connected to the coupler at this stage.

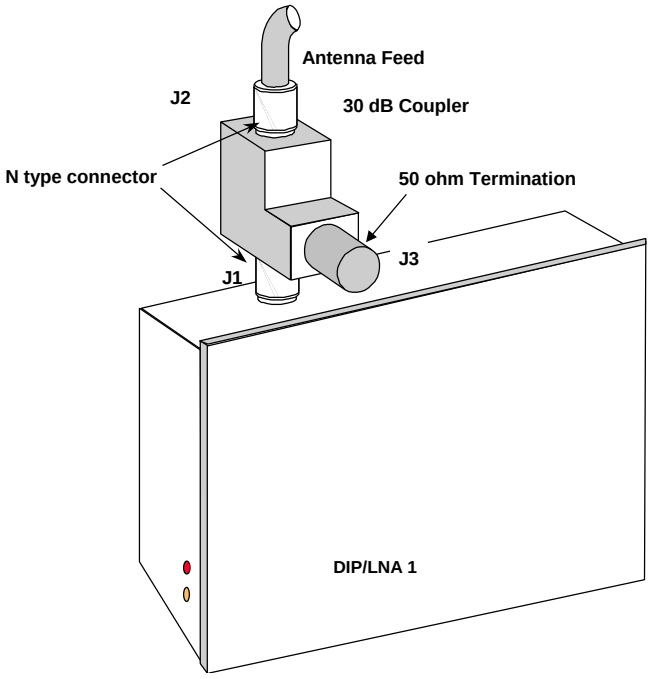


Figure 29. Coupler Connection

4.2. Installation of card sets when providing Modem Shelf 3

When installing cards into an existing installation the power is already connected and the cards should be inserted in the order listed below.

A) For a installation of modem shelf 3 install the following

- RF Power Amplifiers Modules (2 PA's per module) in the right hand position in the combiner shelf
- TX Filter (Terminate output with 50ohm termination.)
- x PSU's

B) Install the RF and Modem Shelf card set

Insert the following cards into the Combining Shelf:-

- 1 x RF Card (RF) (Third Slot)

Insert the following cards into the Modem Shelf:-

- 1 x Shelf Controller Card (SC)
- 1 x Analogue Card (AU)
- 1 x Tributary Card (TU) The Tributary unit DIL Switches should be set as in Figure 28.

<u>Note:</u> Test Modem

A 'test modem' is also required. Any modem card supplied with the equipment will suffice for this purpose. 3.4-3.6GHz Band installations will require two modem cards.

4.3. Installation of card sets when providing Modem Shelf 2 or 4

When installing cards into an existing installation the power is already connected and the cards should be inserted in the order listed below.

A) Install the RF and Modem Shelf card set

Insert the following cards into the Combining Shelf:-

- 1 x RF Card (RF)(in slot 2 for modem shelf 2 or slot 4 for modem shelf 4)

Insert the following cards into the Modem Shelf:-

- 1 x Shelf Controller Card (SC)
- 1 x Analogue Card (AU)
- 1 x Tributary Card (TU) The Tributary unit DIL Switches should be set as in Figure 28.

Note: Test Modem

A ‘test modem’ is also required. Any modem card supplied with the equipment will suffice for this purpose. 3.4-3.6GHz Band installations will require two modem cards.

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COMMISSIONING PROCESS FLOWCHARTS

The Charts below shows the commissioning and testing process. The reference in brackets is the corresponding paragraph in the DLP. Tests are shown with a rounded corner box and procedures are shown in a square box. In addition each test has a number indicating the order of testing and reference for the test record sheets.

Commissioning racks for use with Sitespan

1. Commissioning Using Level Control Unit

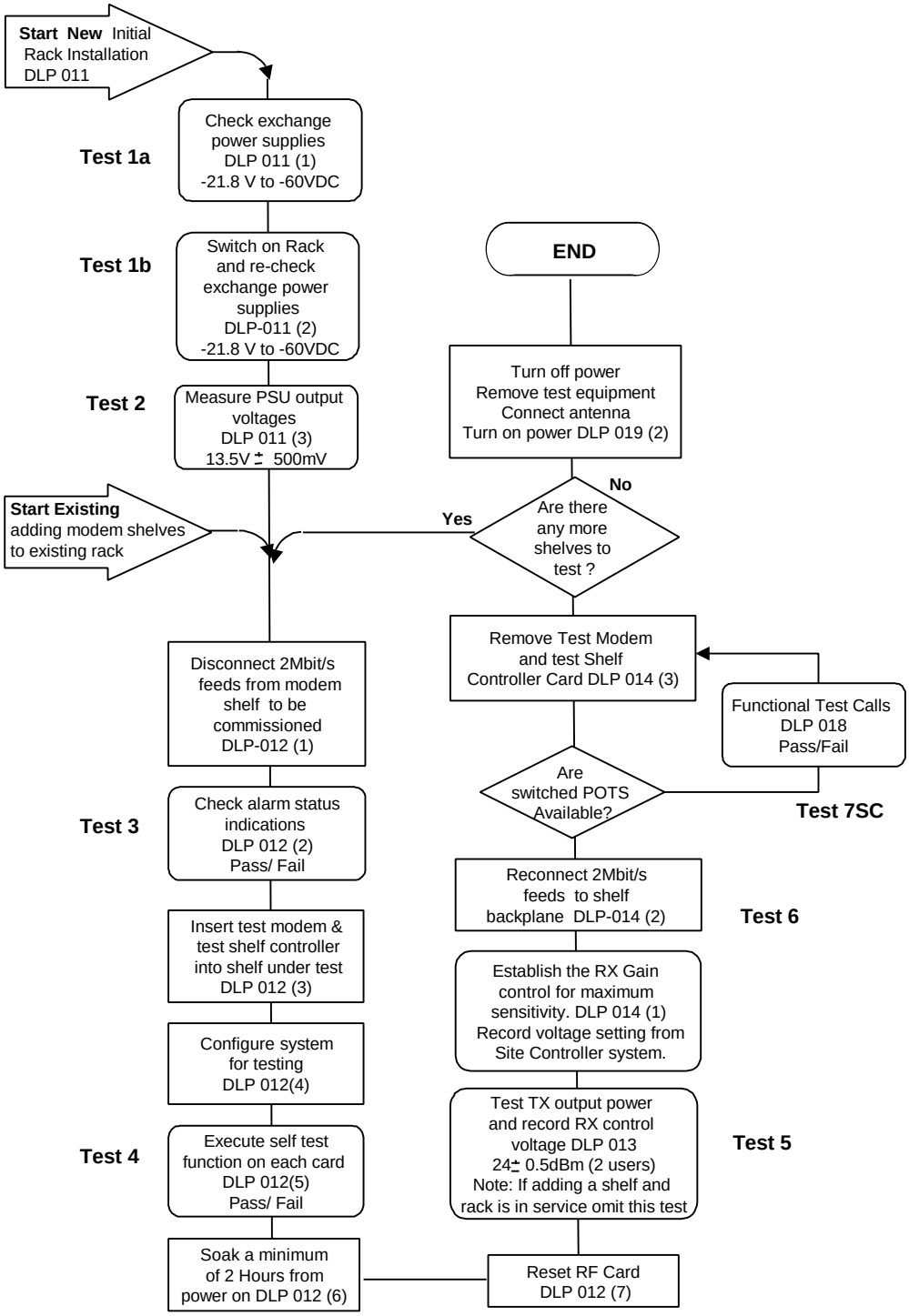

Chart 2. Commissioning ALL-Bands connecting to Sitespan using Level Control Unit.

2. Commissioning 2.0-2.3GHz Band Using Test CRU

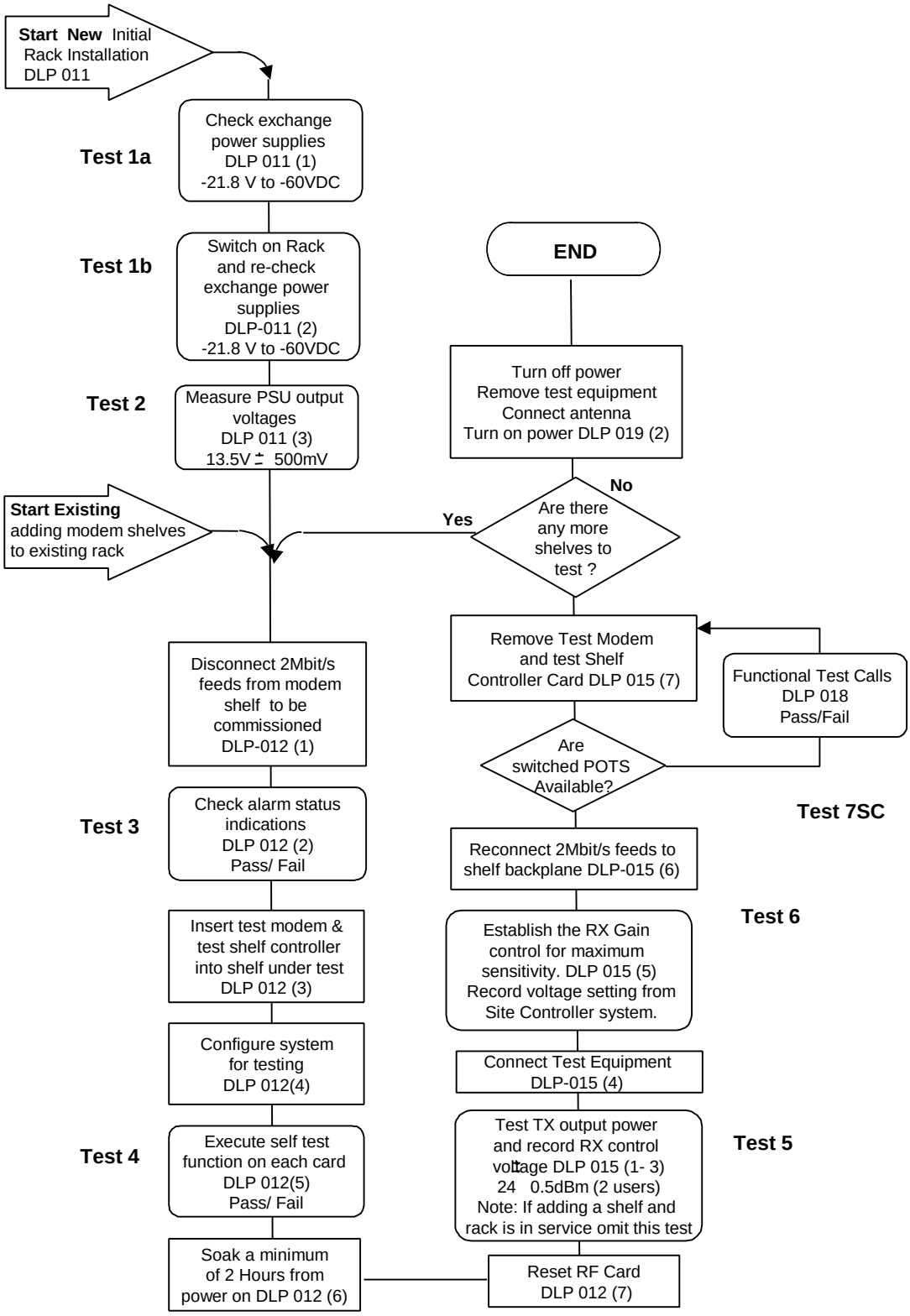

Chart 3. Commissioning 2.0-2.3GHz Band connecting to Sitespan using Test CRU.

3. Commissioning 2.3-2.5GHz Band Using Test CRU

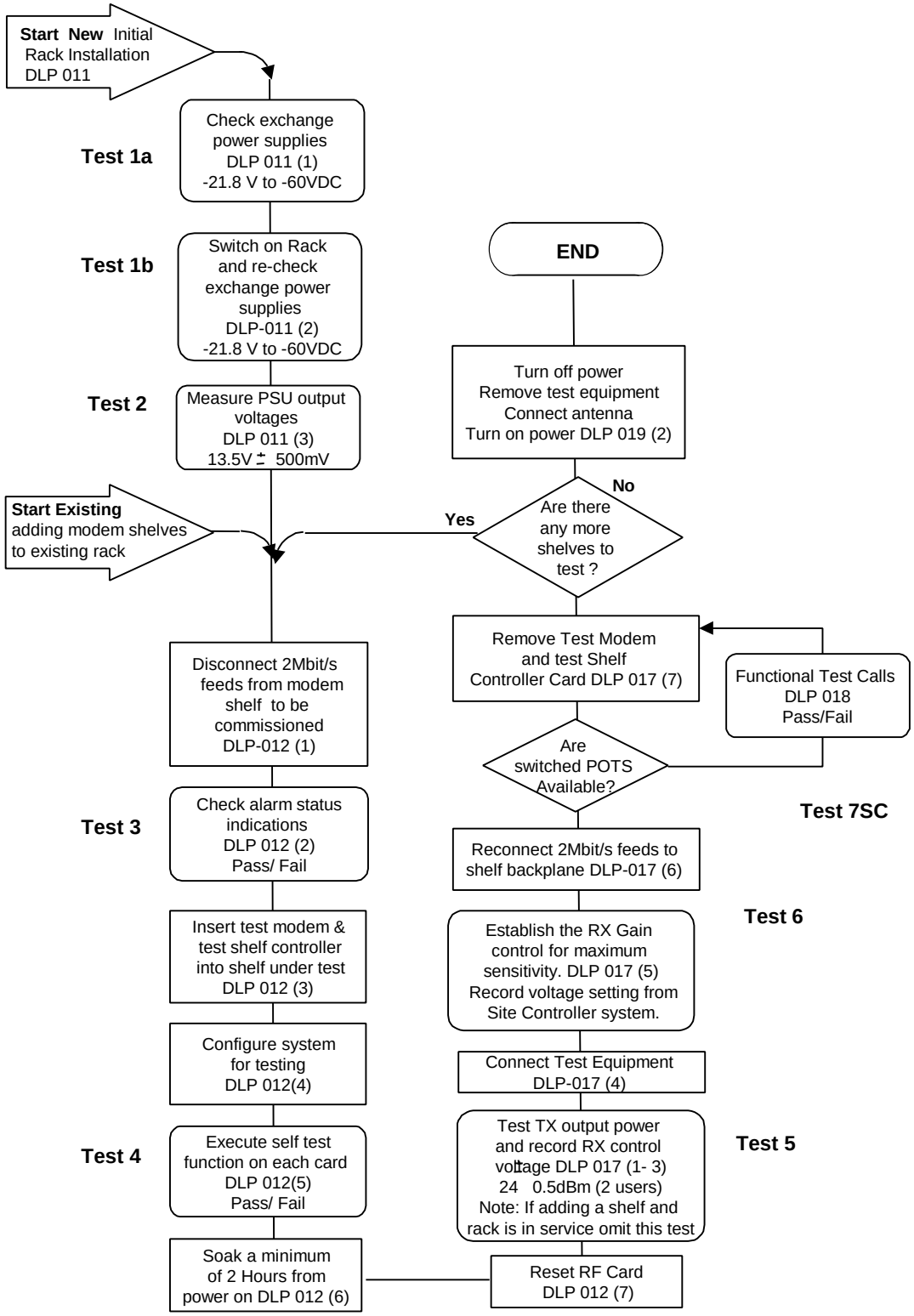

Chart 4. Commissioning 2.3-2.5GHz Band connecting to Sitespan using Test CRU.

4. Commissioning 3.4-3.6GHz Band Using Test CRU

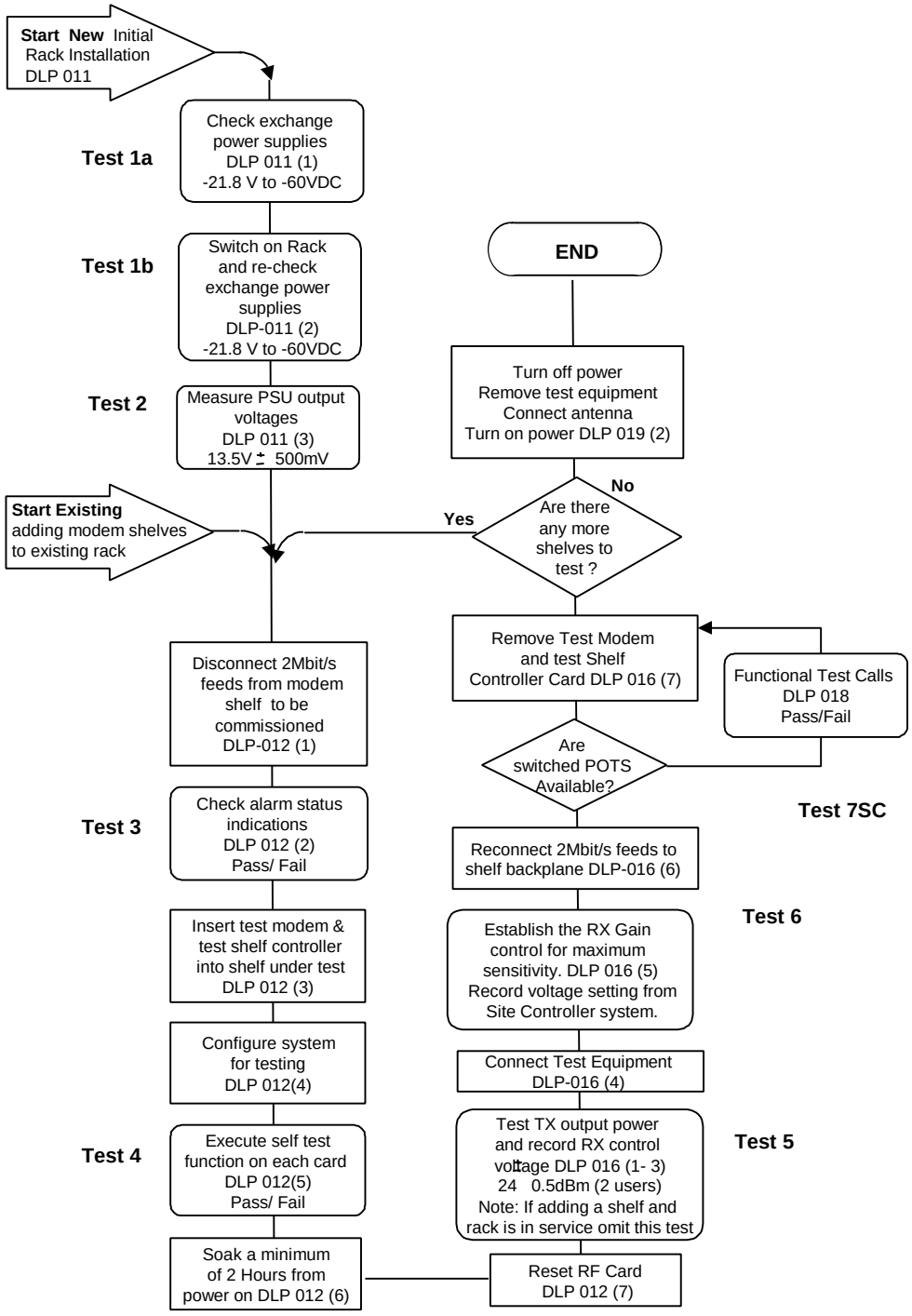

Chart 5. Commissioning 3.4-3.6GHz Band connecting to Sitespan using Test CRU.

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RACK TURN-UP

1. Rack Turn-Up and Measuring Input Voltage(Test 1a)

This section describes the procedure for measuring and connecting DC to the rack, checking that the cards have the correct alarm indications on power-up and measuring the PSU output voltages.

Using the DMM measure and record the Exchange DC voltage supply across the input terminals (1& 2 for Supply 1 and 3 & 4 for supply 2). Ensure that the voltage measured complies with the site nominal voltage and is within the limits specified on the test results sheet.

Record the measured voltage on the test results sheet.

2. Switching on the rack. (Test 1b)

Switch the CT rack **ON** by placing both breakers up and wait for the system to complete the power-up self test sequence. The two breakers duplicate power to each shelf and the shelves will still function if one power supply fails though the LED indicators on the power supplies will not be on.

Using the DMM check that DC voltage supply across the input (1& 2 for Supply 1 and 3 & 4 for supply 2) is still within the specified limits and record on the test results sheet.

3. PSU Voltage: (Test 2)

Using the DMM, measure and record the DC voltage at the front panel test points on each of the PSU's on the RF Combiner Shelf. (Figure 30).

Ensure that the voltage measured is +13.5V DC +/- 500mV.

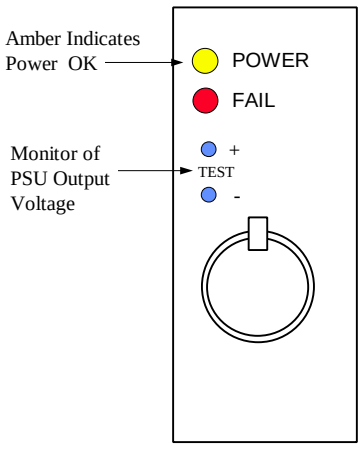

Figure 30. PSU Voltage Test.

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CONFIGURATION AND SYSTEM SET-UP

This section sets up the parameters for the system and the connection to Sitespan.

Refer to the Sitespan Manual, document no. 605-0000-427 for the detailed configuration and set up procedures of the AS4000 System.

Note

For a new installation where the antennas are not yet connected a 15W load should be fitted to the appropriate port. DIP/LNA for modem shelves 1&2 or TX filter port for modem shelves 3 or 4. The load on the DIP/LNA can be connected after the 80dB Coupler if it is fitted.

1. Disconnect 2Mbit/s feeds

Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN and 2Mbit/s OUT connectors on shelf interface connections located at the right hand side of each Modem Shelf. Place a loop cable between the 2Mbit/s IN and 2Mbit/s OUT to condition the TU Card alarm system. Leave loop for about 10 seconds before removing the loop cable.

2. Alarm and Status Indications (Test 3)

Verify that the alarms and status indications (LED's) on the system comply with those detailed in the following tables.

Note: The following tables are set in order of appearance on the front of the card reading from top to bottom.

RF Combiner Shelf

Low Noise Amplifier

Cct. Des.	Colour	Description	Status
	Amber	Power/Module Status OK	ON
	Red	Power Fault	OFF

Table 8. RF Combiner Shelf DIP/LNA1 Card LED Indications.

RF Card [RF]

Cct. Des.	Colour	Description	Status
D6	Amber	Power/Module Status OK	ON
D5	Red	Power Fault	OFF

Table 9. RF Combiner Shelf RF Card LED Indications.

Shelf Monitor

Cct. Des.	Colour	Description	Status
D1	Red	Power Fault/PA Module Fault	OFF
D2	Amber	Power/Module Status OK	ON

Table 10. RF Combiner Shelf Monitor Card 1 LED Indications.

Power Amplifier[PA]

Cct. Des.*	Colour	Description	Status
	Amber	Power/Module Status OK	ON
	Red	Power Fault/PA Module 1 Fault	OFF
	Red	Power Fault/PA Module 2 Fault	OFF

Table 11. RF Combiner Shelf PA Card LED Indications.

* PA 2 is inserted inverted and the alarm indicators are also inverted

Power Supply Unit [PSU]

Cct. Des.	Colour	Description	Status
	Amber	Power OK	ON
	Red	Power Fail	OFF

Table 12. RF Combiner Shelf PSU Card LED Indications.

Modem Shelf

Shelf Controller [SC] (If fitted)

Cct. Des.	Colour	Description	Status
D23	Red	Power Fault, or Self Test Fault or Sitespan not connected.	ON
D24	Amber	Power/Module Status OK	ON

Table 13. Modem Shelf Controller Card LED Indications.

Note: In normal operation the Sitespan not connected (Red) LED will be flashing every 10 seconds at any time that the card is not sending or receiving data from the Sitespan. The LED will be extinguished when the Sitespan is polling i.e. for about 30 seconds in a 10 minute cycle

Tributary Card [TU]

Cct. Des.	Colour	Description	Status
D1	Red	TU Fail Tx AIS Output	OFF
D2	Amber	No Function	OFF
D3	Red	Incoming 2Mbit/s Fault	ON
D4	Amber	RX AIS detected	OFF
D7	Red	Loss of Frame Alignment	ON
D8	Red	Outgoing 2Mbit/s Loss	OFF
D5	Red	No Function	OFF
D6	Red	Incoming Signal to AS4000 not present	ON

Table 14. Modem Shelf Tributary Unit Card LED Indications.

Analogue Card [AU]

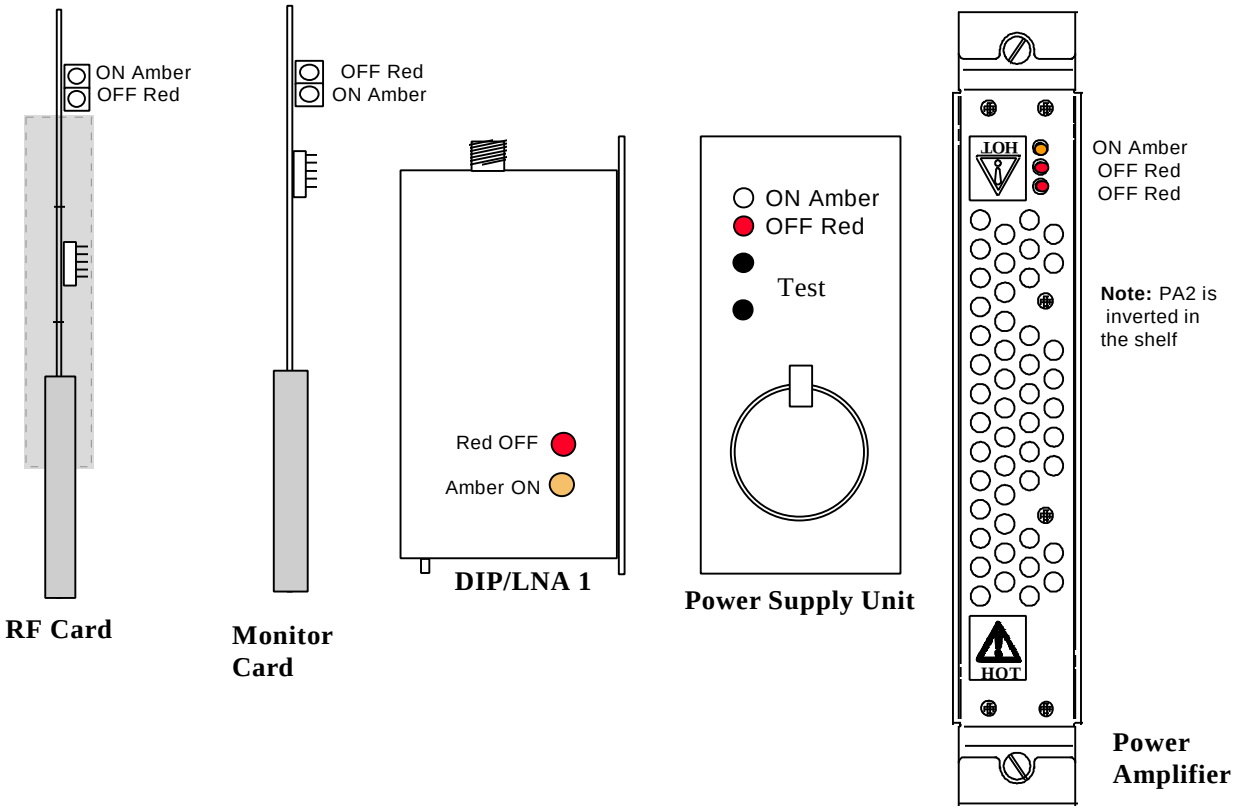
Cct. Des.	Colour	Description	Status
D5	Red	Power Fault, or Self Test Fault	OFF
D6	Amber	Power/Module Status OK	ON

Table 15. Modem Shelf Analogue Card LED Indications.

Modem Card [MU] (If fitted)

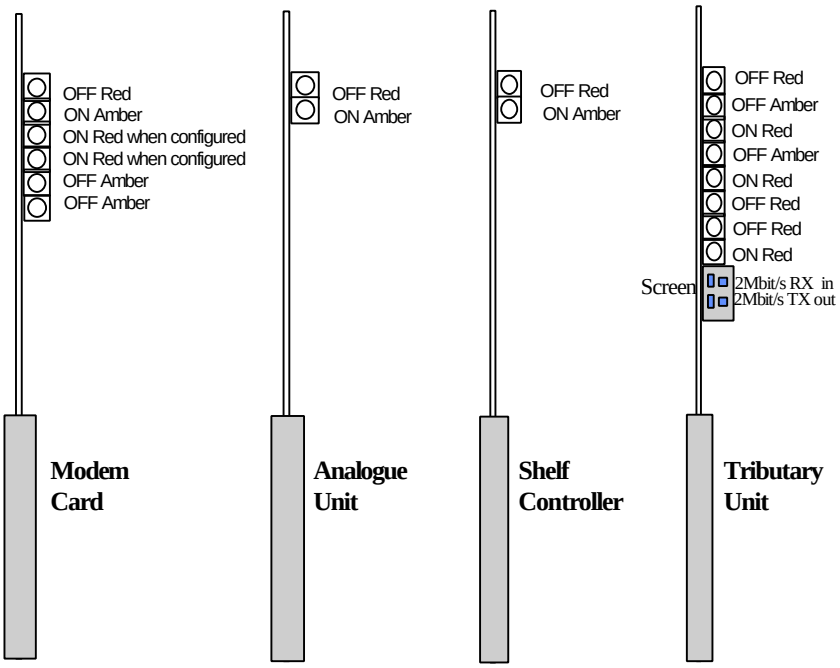
Cct. Des.	Colour	Description	Status
D3	Red	Power Fault	OFF
D4	Amber	Power/Module Status OK	ON
D1	Red	RF Link Fail (Modems 1, 3, 5, 7, 9, 11, 13, or 15)	OFF
D2	Red	RF Link Fail (Modems 2, 4, 6, 8, 10, 12, 14,)	OFF
D5	Amber	Call in Progress (Modems 1, 3, 5, 7, 9, 11, 13, or 15)	OFF
D6	Amber	Call in Progress (Modems 2, 4, 6, 8, 10, 12, 14,)	OFF

Table 16. Modem Shelf Modem Card LED Indications.



Note: LED function detailed in tables 8 to 12.

Figure 31. Combining Shelf Alarm Indications



Note: LED function detailed in tables 13 to 16.

Figure 32. Modem Shelf Alarm Indications

3. Insert Test Modem Card

Insert a test modem card into the first modem position of the modem shelf under test. The test modem can be any modem from the modem card set or a card that is reserved for commissioning test activity.

4. Configuration and System Set-up

Connect the allocated output port of the Sitespan Server to the 25 Way D-Type connector PL5 on the respective Modem Shelf Backplane (AS4000 Release 3), Or modem shelf interface panel (AS4000 Release 4).

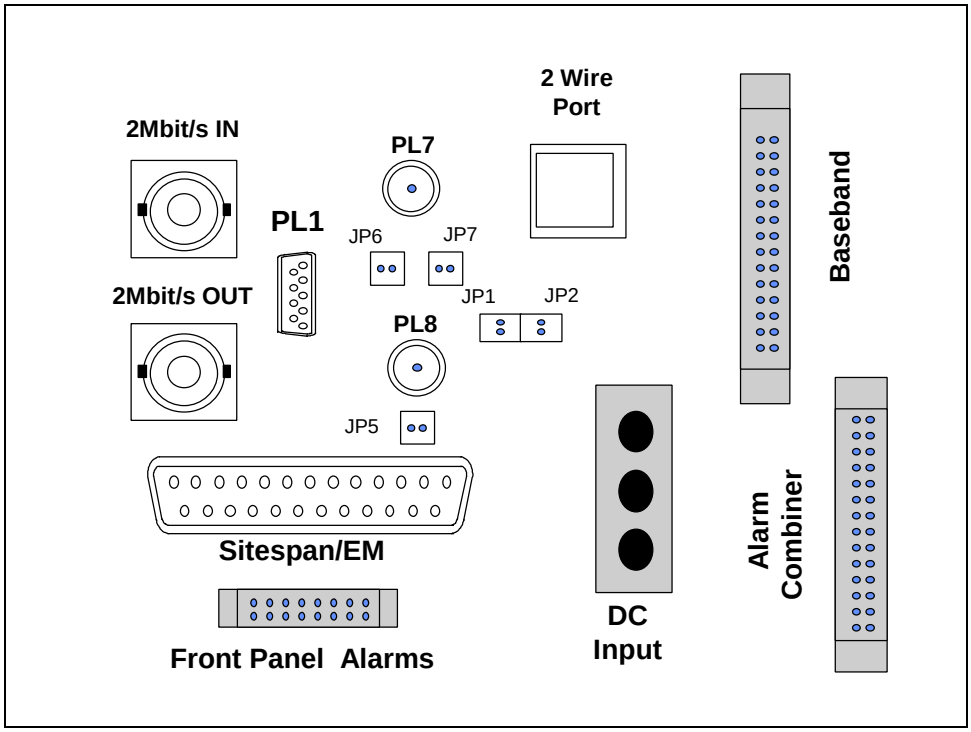


Figure 33. Sitespan connections to modem shelf backplane Release 3

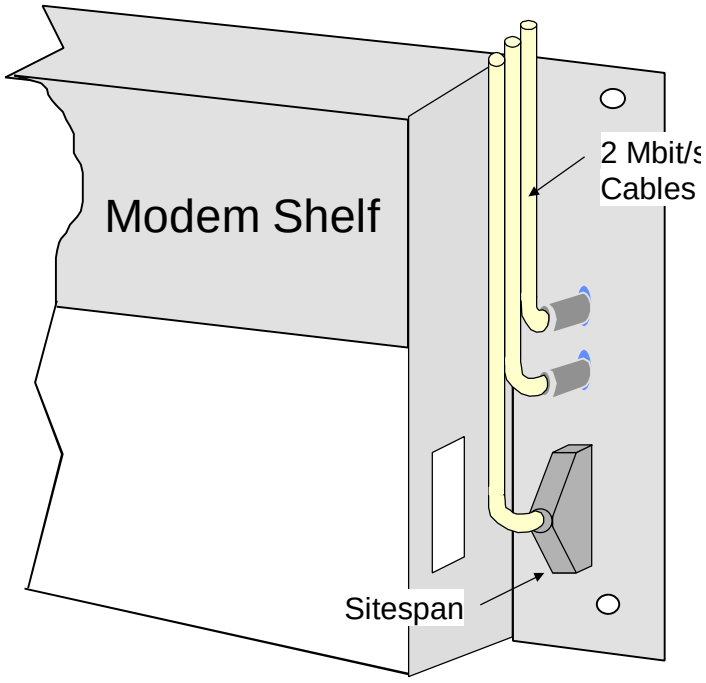


Figure 34. Sitespan connections to modem shelf Release 4

Using Sitespan, configure all cards according to customers frequency and power requirements as follows:

1) Create the Site name or identity.
2) Create the Rack and allocate the rack name or identity.
3) Select the desired Modem Shelf and create the shelf properties:
    a) Allocate the shelf name or identity
    b) Select the required RX/TX frequency pair
    c) Select the required PN code
    d) Select COM Port.

Note. The RX/TX frequency pair and the PN codes are provided by network planning. It is important that the correct information is input so as not to breach licensing regulations and cause interference with other systems.

4) Select the Modem Shelf window and confirm **COM** status between Sitespan and the Shelf Controller.
5) Open Shelf View and from the *Edit* menu, select the analogue card, choose *Edit Analogue Card Properties*, and place the Analogue Card In Service (IS). Repeat for the TU Card.
6) On the Analogue/RF card, confirm that the shelf frequency requirements comply with that specified by the customer.
7) From the View menu choose Subscribers. From the Edit Menu choose Create Subscriber. Allocate subscribers to lines 1 and 2 of each modem circuit placed in service.
8) Open Shelf View on the shelf under test and select a modem card, from the *Edit* menu choose *Edit Modem Properties* and place the modem card In Service (IS). Open the Edit Subscriber window and activate 2 users on the modem. Ensure that the respective red RF Link Fail LED is lit on each Modem circuit placed in service.

5. Self Test (Test 4)

Execute the self test function (using Sitespan) on each card and ensure that it passes. Replace any faulty cards.

6. System Soak

The system must have been switched on for at least two hours from the initial power on to ensure that it is fully warmed up before proceeding any further. If testing a number of modem shelves there is no need to wait a further two hours before testing the subsequent shelves.

7. Reset RF Card

Remove and re-insert the RF card. This action will stimulate the Analogue Card to download configuration details to the RF card and ensure that the card is set correctly for commissioning.

Note
CT AGC/PC values set via the Sitespan are not be stored in the NVRAM of the RF unless it is power cycled. In normal commissioning operation, this does not cause any problem because when the rack is power cycled, the RF cards are reset, the AGC/PC values will be stored. However if a modem shelf is reset and not the rack, then the RF cards are not reset and the commissioned values will be lost. After any power down of a modem shelf:
A) hot plug the RF card, (trigger the saving of the commissioned values)
B) power cycle the shelf (clears the RF alarms)

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TEST TX OUTPUT POWER 2.0-2.3GHZ AND 2.3-2.5GHZ BANDS

1. Test TX Output Power (Test 5)

Note: If adding a shelf and rack is in service omit this test

This section describes the measurement of TX output power. It involves powering down and disconnecting the antenna. In existing installations this involves loss of service to all users. Steps should be taken to minimise disruption if the rack has existing users by completing the rest of the commissioning quickly.

1. Switch rack off by placing both breakers in the off position.

2. In existing installations disconnect antennas or in new installations remove the load from the port to be tested. Connect Power Meter to the N-Type connector on the coupler attached to the DIP/LNA at the top of the rack ready to measure the power output from shelves 1 and 2, or to the N-type connector on the coupler attached to the TX filter for shelves 3 and 4. The port not under test should be terminated with a 15W termination.

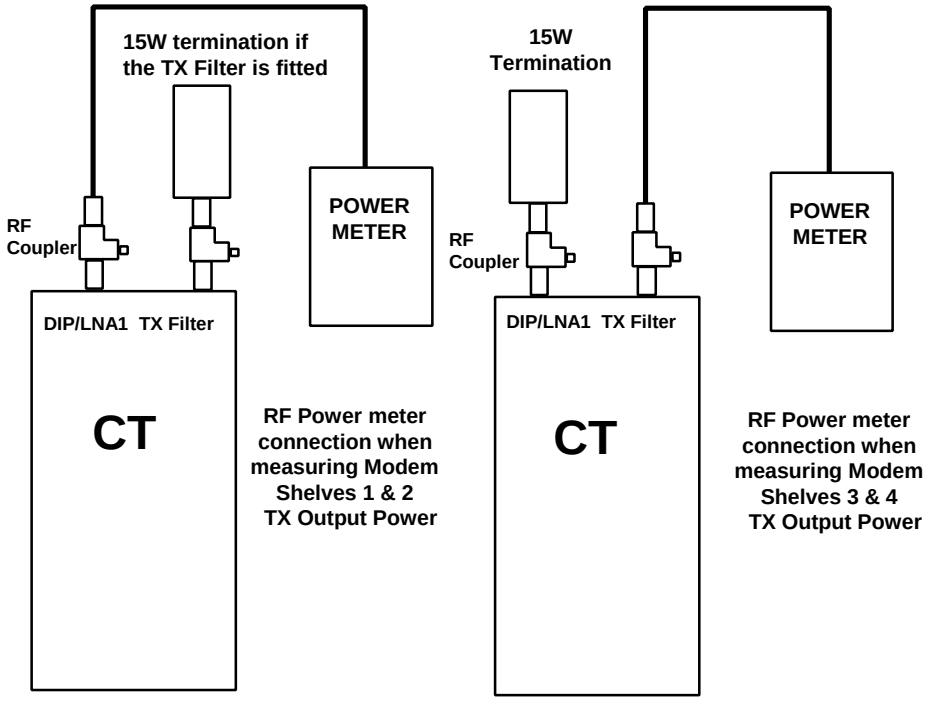


Figure 35. Power Level measurement Test Set-up

3. Ensure that modems are not inserted in any shelf. Disconnect any modems that are inserted by using the board extractor lever to unseat the board from the backplane and sliding forward in the card guides. There is no need to completely remove the modem from the shelf.

4. Insert one modem card into the position 1 of the modem shelf under test.
   The single user output power is 21dBm (2.0-2.3GHz and 2.3-2.5GHz Band)
   The TX output power is maintained by a power control loop in the system. For the power loop to work the CT RF card needs to generate greater than +21.75dBm, this condition can be achieved by using Sitespan to set two users in service without any STs in operation. This forces the two modems (i.e. one modem card) to stay in the high power acquisition mode. Two users provide an output of 24 ± 1.0dBm. Measured Value will be 23.5 ± 1.0dBm (0.5dB Coupler Loss).

5. For the CT to reach it's nominal output power from zero using the control loop would take a considerable length of time. To bypass this process, the power control loop may be overridden using Sitespan to set the TX power the control voltage. Proceed as follows:

   a) Using the Sitespan select the RF Card view from the Shelf view.

   b) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the output power to 24 ± 1.0dBm. This is actually measured with a power meter at the antenna output port of the 80dB coupler connected to the DIP/LNA and hence the measured power limit is 23.5 ± 1.0 dBm due to the insertion loss of the coupler.
   c) Record the test result on the test form.

This Test should be repeated for the output of the TX filter if fitted.

Re connect Antenna(S) to the couplers.

Return to DLP-010 and continue the commissioning process

SETTING OF RX GAIN CONTROL USING LEVEL CONTROL UNIT.

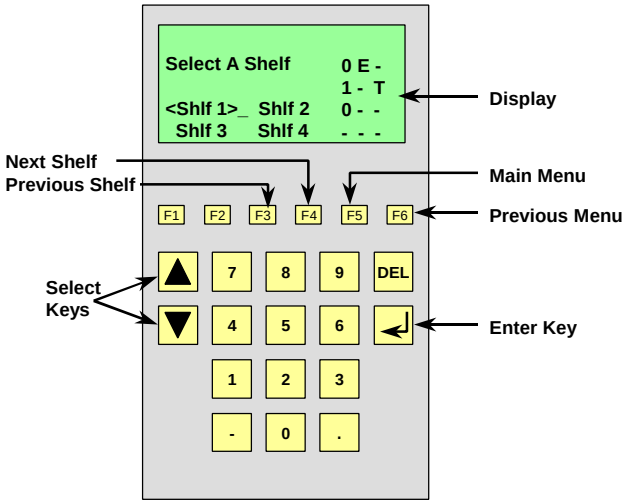
1. Setting Of RX Gain Control. (Test 6)

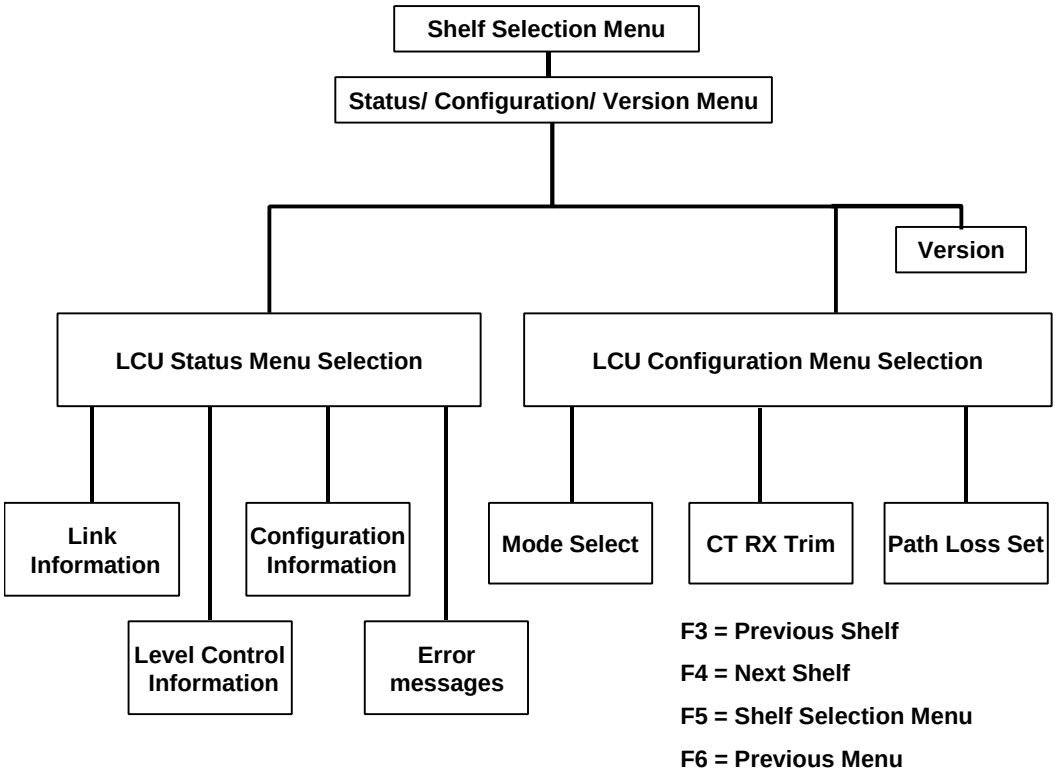
1. Ensure that the respective modem shelf is connected to the Sitespan by the 25 Way D-Type connector PL5 on the Modem Shelf Backplane.

2. Setting up RX sensitivity using the Level Control Unit

1. Use Sitespan to enter the set point for the required receive levels. If no set point is set the unit will default to -98dBm.

2. From the shelf selection menu, using the keypad select a Shelf. Use arrow keys to scroll between options and enter key to select.





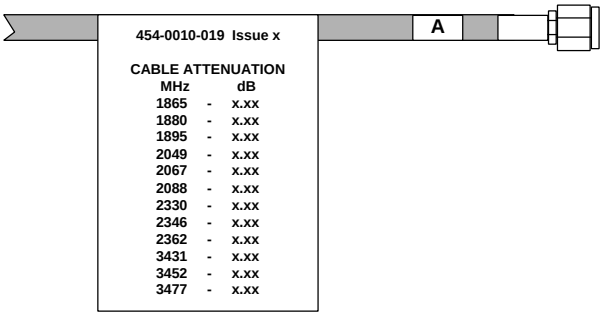
3. Select Configuration Set-up.

```
SH: 1          0--
               0--
>Configure<    0--
 Status   Ver  ---
```

4. If the LCU is being set-up for the first time Select Path Loss Set.

```
Shelf: 1 & 2    1-T
                0--
Loss (dB):###.# 0--
                0--
```

Enter the sum of the component losses for the system.
The losses for the cable are recorded on a cable attenuation record attached to the top of the cable. Cable A is supporting modem shelves one and two. Cable B is supporting modem shelves three and four.



The coupler loss is recorded on the coupler using a similar label and the internal loss for the LCU is recorded on a Label on the LCU.

The path loss entered using the hand held terminal is the loss occurring in the transmitted signal from the LCU before reaching the CT LNA. Therefore path loss for signals to all shelves is the same.

The path loss for both modem shelves 1&2 and 3&4 = Loss coupler (LNA) + loss Cable + internal loss of LCU.

5. Key F6 to return to the previous menu

6. Select Mode Select.

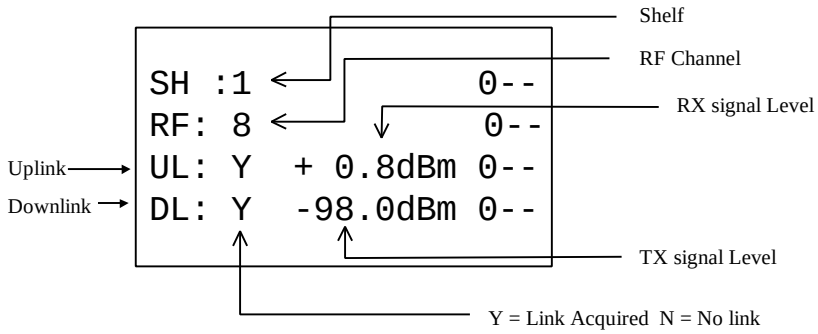
```
Shelf : 1      0E-
>Mode Select<  1-R
 Path Loss Set 0--
 CT RX Trim    ---
```

7. Set to Continuous

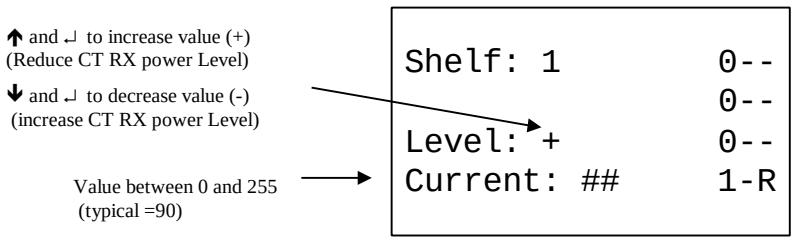
```
Mode SH:1       0E-
                1-T
Mode:Continuous 0--
                0--
```

8. Key F6 twice to return to the Status/Configuration Selection Menu.

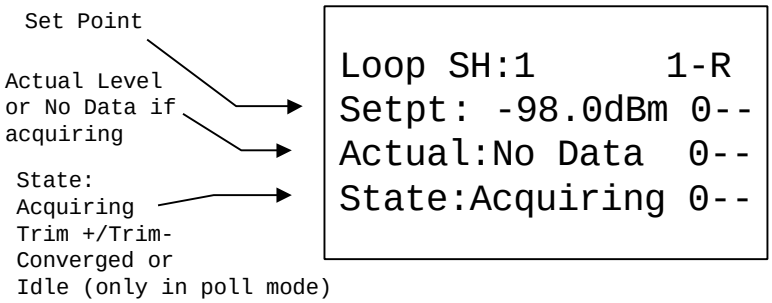
9. Select Status. Select the Link Menu.



Wait for both uplink and downlink signal acquisition. If a downlink is acquired but no uplink is established go to the Trim Menu (Status/Configuration selection menu and select configure Menu and select CT RX Trim Menu)and adjust the CT RX level to establish uplink.

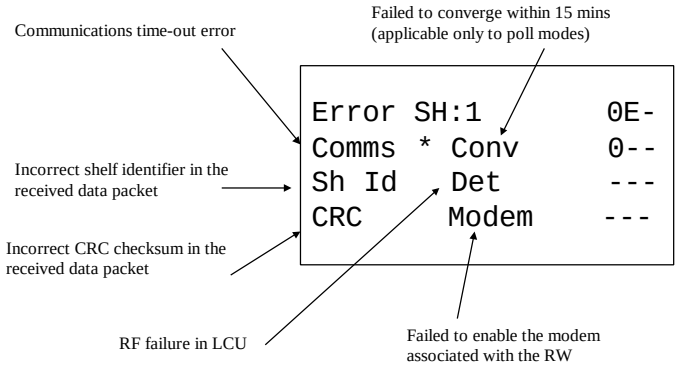


10. From the LCU Status Selection Menu select Loop.



11. Wait for the link to converge. When the CT RX level loop to converge. When it converges, 'Converged' state will be displayed. If the shelf has not converged within 3 minutes after link acquisition check the shelf configuration.

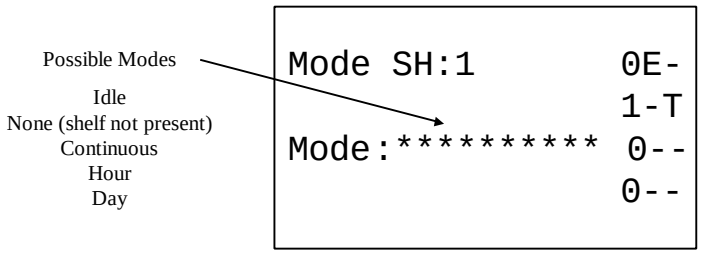
If any errors occur the LCU will stop the level control operation and set the operation mode to Idle automatically. When this occurs view the Error Menu for the source of this error.



12. Key F6 twice Select Configuration Set-up.

13. Select Mode Select.

14. Set to the required polling interval 1 hour, 1 day, or Idle. If the shelf is left in continuous mode it will revert to idle mode after 1 hour.



15. Key F5 to return to the Shelf Selection Menu

3. Re-Connecting The 2Mbit/s Ports On The Modem Shelf.

Place a loop cable between the 2Mbit/s IN and 2Mbit/s OUT to condition the TU Card alarm system. Leave loop for about 10 seconds before removing the loop cable.

Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.

If a switch is available and VF POTS are to be tested go to DLP-017.

4. Remove Test Modem

Remove Test modem and place in the next shelf
If this is the last shelf to be tested return to DLP-010 and continue the commissioning process.

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CT TX AND RX POWER SET-UP (2.0-2.3GHZ BAND) USING TEST CRU

Note: This method of setting up the CT should be used if a Level Control Unit is not available.

1. Tools and equipment needed.

Item	Description	Recommended Model	Quantity
1	Digital Multimeter	Fluke 77	1
2	Test CRU	ACC("Battleship CRU") Part No.: 503-0300-001	1
3	30dB Attenuators; 1W	Suhner 6830-19-A	4
6	11dB Variable Attenuator	HP8499B	1
7	2 Way Power Divider	Narda 4313-2	3
8	50 ohm Termination 1W	Suhner 65 SMA-50-0-1	1
9	50 ohm Termination 15W	Suhner 6515.17.A	1
10	Adaptor; N-SMA	Suhner 33N-SMA-50-1	2
11	Adaptor; N-SMA	Suhner 31N-SMA-50-1	1
12	Adaptor; Female-Female	Suhner 32 SMA-50-0-1	1
13	Co-ax Cables	Suhner Sucoflex 104; 0.5m	5
		Suhner Sucoflex 104; 4.0m	2
14	RF Power Meter	Marconi 6970	1
15	Power Sensor	Marconi 6932	1

STEP **PROCEDURE**


Observe full ESD precautions.

2. Note:

The system may be commissioned using either a Voice or a Data CRU as a test CRU. IF using a Data CRU, it should be programmed using STMON (see 605-0000-436 for details) and not a test telephone in step 6(e). If a Data CRU is being used for commissioning then steps 6(f) and 6(h) are not necessary.

3. Preparation

a) System Soak The system must be switched on for at least 2 hours to ensure that it is fully warmed up before proceeding any further. To minimise the down time the test equipment can be prepared during this time ready for testing.

b) Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN and 2Mbit/s OUT connectors on shelf interface connections located at the right hand side of each Modem Shelf.

c) Disconnect the Sitespan cables from the 25 way Sitespan port on the modem backplane

d) Set up Sitespan with an empty database Set the modem shelf properties (Shelf Frequency and PN codes) to the same as the existing modem shelf. Failure to do this will result in Sitespan overwriting the shelf controller with its last set values.

e) Connect Sitespan to the 25 way Sitespan port on the modem backplane

f) Select a modem channel for the test. (The modem channel selected should be one that has an existing subscriber.

g) Switch rack off by placing both breakers in the off position. . This involves loss of service to all users. Steps should be taken to minimise disruption by completing the set-up quickly

4. Test TX Output Power. (Test 5)

This section describes the measurement of TX output power.

a) Disconnect the antenna.
b) If measuring the power output on shelf 1 and/or 2 connect the Power Meter to the N-Type connector on DIP/LNA1 or to the antenna port of the coupler if fitted at the top of the rack ready to measure the power output from shelves 1 and 2
c) If measuring the power output on shelf 3 and/or 4 connect the Power Meter to the power meter to the N-Type connector on the TX filter card as shown in Figure 36. or to the antenna port of the coupler if fitted

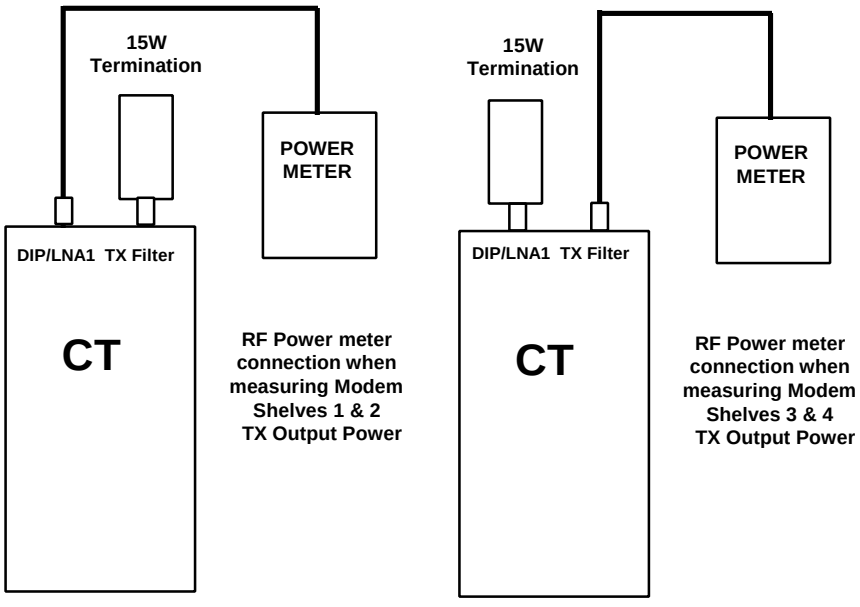

Figure 36. Power Level measurement Test Set-up

d) Restore power to the rack.
e) The single user output power is 21dB.
The TX output power level is maintained by a power control loop in the system. For the power loop to work the CT RF card needs to generate greater than +21.75dBm, this condition can be achieved by using the Sitespan to set two users in service without any STs in operation. This forces the two modems (i.e. one modem card) to stay in the high rate acquisition mode. Two users provide an output of 24 ± 1.0dBm.
f) For the CT to reach its nominal output power from zero using the control loop would take a considerable length of time. To bypass this process, the power control loop may be overridden using the Sitespan to set the TX power the control voltage.
g) Using the Sitespan select the RF Card view from the Shelf view.
h) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the Output power to 24 ± 1.0dBm.
i) Record results
j) Switch off rack. by placing both breakers in the off position.
k) Ensure that the power Output is at steady level before setting up the RX gain control.

5. Connecting Test CRU

The purpose of this test is to enable the RX sensitivity at the CT to be set to -98dBm to within 1dB. This section provides details of the test set-up for the setting of the RX gain control.

a) Set up the test equipment in preparation to connect to the shelf.

b) Programme the test CRU as follows with the same programming information as that for the CRU at the ST associated with the modem under test.

- Remove the cover from the PSU
- Connect an MF or LD type telephone to the NTU
- To program the ST, depress the reset switch, (Type2 SW4 Type 4 SW2), in the PSU for approximately 3 seconds. LED D8 will begin flashing to indicate the CRU initialising and self test sequence. 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.
- Depress the Programming switch (Type2 SW3 Type 4 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.
- Enter the respective ST programming code on the telephone keypad, within 40 seconds of depressing the install switch. 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 sec on, and less than 1 sec off, for a duration of 5 sec.

- 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. Replace the telephone handset.
- Depress the reset switch, (Type2 SW4 Type 4 SW2); The CRU will reset and re-boot itself in accordance with the programming code entered.

c) Switch rack off by placing <u>both</u> breakers in the off position.
d) Disconnect terminations on DIP/LNA1 and TX filter.
e) Connect the cables and accessories to the CT rack for Modem Shelf setting up and functionality testing as detailed in Figure 37. Set the 0-11dB variable attenuator to a nominal 8dB (the insertion loss of the test circuit should be 109dB between point A and B in Figure 37. In practice the setting of the attenuator will be a few dBs less than the 8dB to account for the actual cable, connector and splitter loss. Due to the microwave frequencies involved the commissioning items need to be calibrated for the channel frequencies to be used.

Note: If the TX Filter is not fitted for shelves 3&4 terminate the port of Splitter 1 as shown in Figure 37

f) Switch the power back on at the breakers.

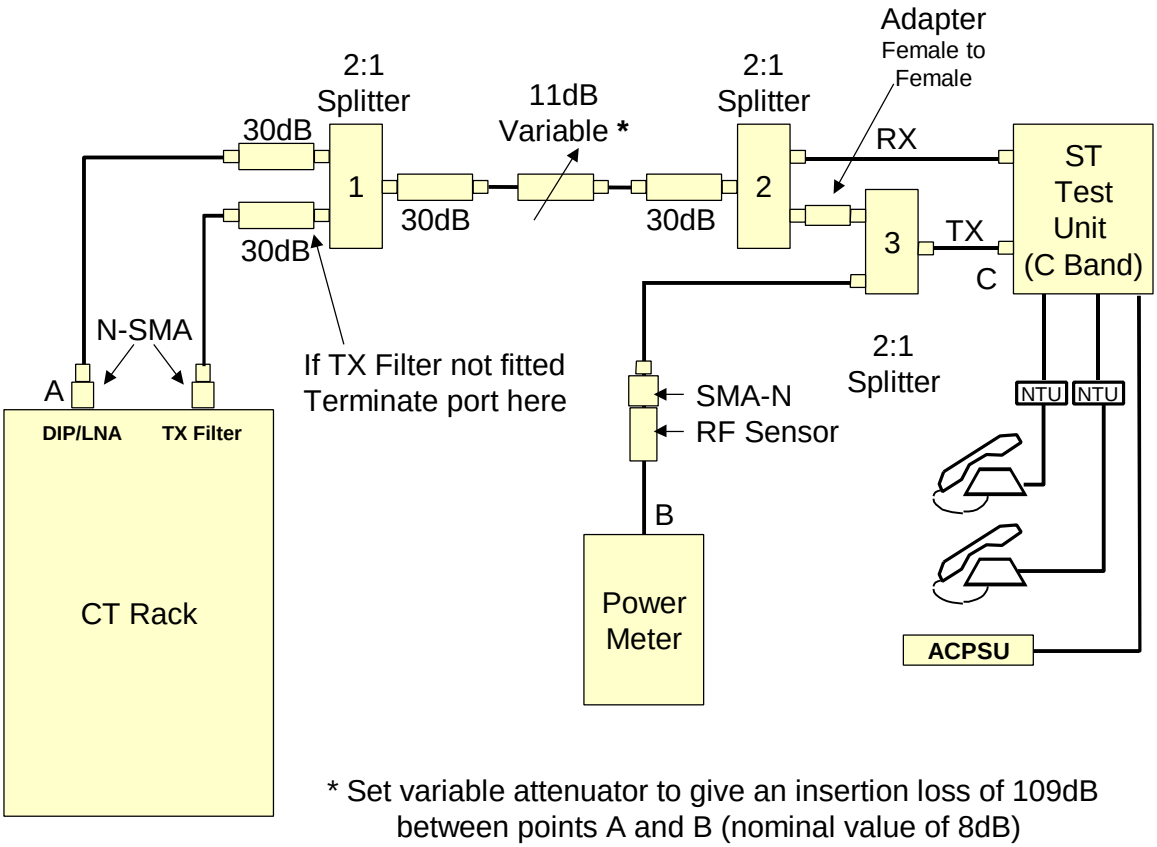

Figure 37. Test Set-Up Modem Shelves (2.0-2.3GHz Band)

a) Connect the cables and termination's to the Test CRU as shown in Figure 38.
b) Connect the drop cable of the CRU and the telephony VF pairs to the AC PSU.

c) Connect the AC Mains supply cable to the AC PSU and power up the unit at the mains supply outlet socket.

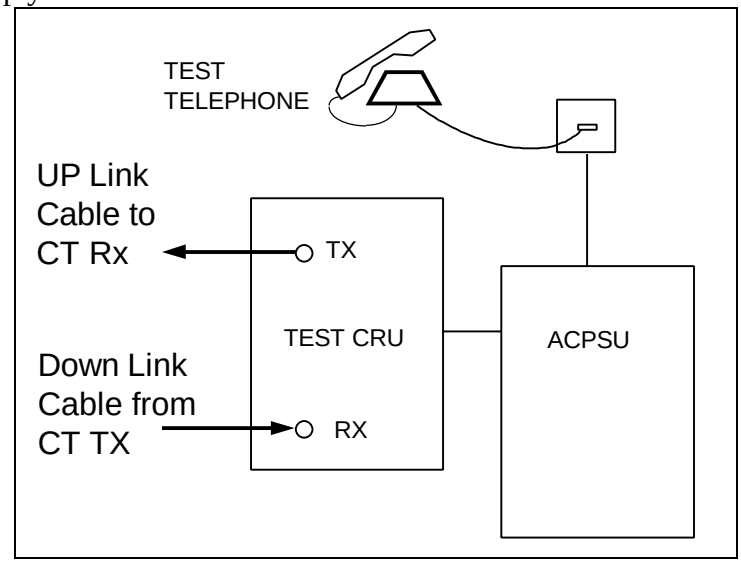

Figure 38. Test CRU Connections.

6. Setting Of RX Gain Control.

a) On Sitespan , select the Analogue/RF card window to set the Receiver Gain control voltage in the RF Gain Adjust box. Click on the UP or DOWN buttons to set the gain control voltage to 1.4 Volts.

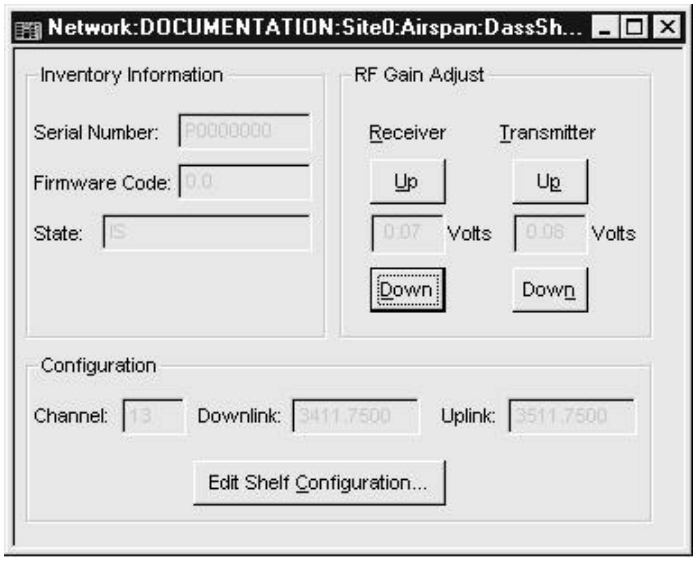

Figure 39. RF Gain Settings

b) Ensure that the Test CRU has acquired an RF link. The RF link has acquired when the Red, RF Link Fail LED is extinguished on the respective modem under test and the small amber LED's on the modem board are on.

c) Take the test phone off hook to achieve correct power levels.

d) It is not possible to maintain off hook conditions due to the system timing the phones out so the off hook condition must be simulated

Using the Sitespan as follows:

- Connect Sitespan to the modem shelf and configure the database.
- Select the Analogue card view, reduce in size and move to the corner of the screen so that the receiver gain adjustment may be manipulated
- Open *Subscriber View* from the *View* option.
- Ensure that the subscriber database is created for the installed Modems.
- Use the cursor to highlight the subscriber line for simulated off hook.
- Once the subscriber line is highlighted, use the cursor to select *Test View* under the *View* option.
- With the *Test View* opened, point and click the *Reserved Line* button. If the line is in idle state the test menu will be displayed.
- From the test menu, point and click *ST Loopback* button.
- Select the loopback direction as Towards Network and check TU through path on timeslot 1 and 2.
- Once the above is configured point and click OK button. This will set the radio traffic mode: high rate and high power.
- Once the test menu is available again leave the menu open, do not close or free line if the traffic mode is to be maintained.

g) Adjust the gain control voltage on Sitespan to achieve a RF Power level of nominally +8dBm on the RF Power meter. The exact reading should be 11dbm the measured loss from point C to point B (approximately 3dB) as shown in Figure 37 Record the voltage and power level on the Test Result Sheet.

h) Remove the loopback by selecting Loopback Off and OK to deactivate the loopback. Close test menu and return to the Subscriber View.

i) Putting the rack back in service

- Switch the Test CRU and CT Rack OFF.
- Remove the Test CRU and all interconnecting cables and accessories from the RF Output connectors on the CT.
- Re-connect the Antenna /Feeder tails to the CT.
- Connect the Sitespan cables to the 25 way Sitespan port on the modem backplane
- Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.
- Switch the CT Rack ON and wait for the system to complete the power-up self test sequence successfully.

7. Re-Connecting The 2Mbit/s Ports On The Modem Shelf.

Place a loop cable between the 2Mbit/s IN and 2Mbit/s OUT to condition the TU Card alarm system. Leave loop for about 10 seconds before removing the loop cable.

Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.

8. Remove Test Modem

Remove Test modem and place in the next shelf to be tested go to DLP-012.
If this is the last shelf to be tested return to DLP-010 and continue the commissioning process.

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CT TX AND RX POWER SET-UP (2.3-2.5GHZ BAND) USING TEST CRU

Note: This method of setting up the CT should be used if a Level Control Unit is not available.

1. Tools and equipment needed.

Item	Description	Recommended Model	Quantity
1	Digital Multimeter	Fluke 77	1
2	Test CRU	ACC("Battleship CRU") Part No.: 503-0300-001	1
3	30dB Attenuators; 1W	Suhner 6830-19-A	4
6	11dB Variable Attenuator	HP8499B	1
7	2 Way Power Divider	Narda 4313-2	3
8	50 ohm Termination 1W	Suhner 65 SMA-50-0-1	1
9	50 ohm Termination 15W	Suhner 6515.17.A	1
10	Adaptor; N-SMA	Suhner 33N-SMA-50-1	2
11	Adaptor; N-SMA	Suhner 31N-SMA-50-1	1
12	Adaptor; Female-Female	Suhner 32 SMA-50-0-1	1
13	Co-ax Cables	Suhner Sucoflex 104; 0.5m	5
		Suhner Sucoflex 104; 4.0m	2
14	RF Power Meter	Marconi 6970	1
15	Power Sensor	Marconi 6932	1

STEP **PROCEDURE**


Observe full ESD precautions.

2. Note:

The system may be commissioned using either a Voice or a Data CRU as a test CRU. IF using a Data CRU, it should be programmed using STMON (see 605-0000-436 for details) and not a test telephone in step 6(e). If a Data CRU is being used for commissioning then steps 6(f) and 6(h) are not necessary.

3. Preparation

a) System Soak The system must be switched on for at least 2 hours to ensure that it is fully warmed up before proceeding any further. To minimise the down time the test equipment can be prepared during this time ready for testing.

b) Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN and 2Mbit/s OUT connectors on shelf interface connections located at the right hand side of each Modem Shelf.

c) Disconnect the Sitespan cables from the 25 way EM/Sitespan port on the modem backplane

d) Set up Sitespan with an empty database set the modem shelf properties (Shelf Frequency and PN codes) to the same as the existing modem shelf. Failure to do this will result in Sitespan overwriting the shelf controller with its last set values.

e) Connect Sitespan to the 25 way EM/Sitespan port on the modem backplane

f) Select a modem channel for the test. (The modem channel selected should be one that has an existing subscriber.

g) Switch rack off by placing both breakers in the off position. . This involves loss of service to all users. Steps should be taken to minimise disruption by completing the set-up quickly

4. Test TX Output Power. (Test 5)

This section describes the measurement of TX output power.

a) Disconnect the antenna.

b) If measuring the power output on shelf 1 and/or 2 connect the Power Meter to the N-Type connector on DIP/LNA1 or to the antenna port of the coupler if fitted at the top of the rack ready to measure the power output from shelves 1 and 2

c) If measuring the power output on shelf 3 and/or 4 connect the Power Meter to the power meter to the N-Type connector on the TX filter card as shown in Figure 36. or to the antenna port of the coupler if fitted

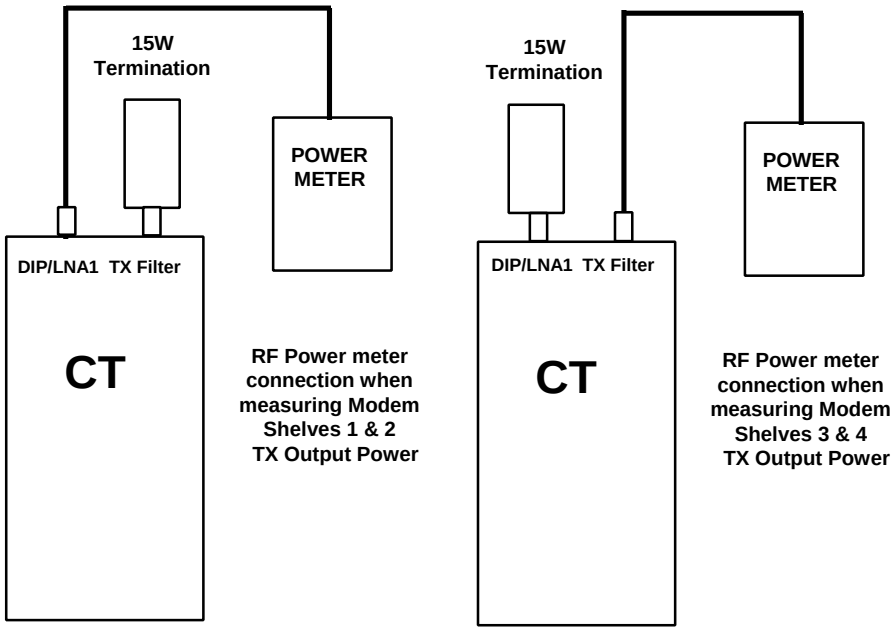

Figure 40. Power Level measurement Test Set-up

d) Restore power to the rack.

e) The single user output power is 21dBm. The TX output power level is maintained by a power control loop in the system. For the power loop to work the CT RF card needs to generate greater than +21.75dBm, this condition can be achieved by using the Sitespan to set two users in service without any STs in operation. This forces the two modems (i.e. one modem card) to stay in the high rate acquisition mode. Two users provide an output of 24 ± 1.0dBm.

f) For the CT to reach its nominal output power from zero using the control loop would take a considerable length of time. To bypass this process, the power control loop may be overridden using the Sitespan to set the TX power the control voltage.

g) Using the Sitespan select the RF Card view from the Shelf view.

h) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the Output power to 24 ± 1.0dBm.

i) Record results

j) Switch off rack. by placing both breakers in the off position.

k) Ensure that the power Output is at steady level before setting up the RX gain control.

5. Connecting Test CRU

The purpose of this test is to enable the RX sensitivity at the CT to be set to -98dBm to within 1dB. This section provides details of the test set-up for the setting of the RX gain control.

a) Set up the test equipment in preparation to connect to the shelf.

b) If using a voice test CRU then programme the CRU as follows with the same programming information as that for the CRU at the ST associated with the modem under test. If using a Data CRU program the CRU using STMON then go to step 5(c).

- Remove the cover from the PSU
- Connect an MF or LD type telephone to the NTU
- To program the ST, depress the reset switch, (Type2 SW4 Type 4 SW2), in the PSU for approximately 3 seconds. LED D8 will begin flashing to indicate the CRU initialising and self test sequence. 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.
- Depress the Programming switch (Type2 SW3 Type 4 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.
- Enter the respective ST programming code on the telephone keypad, within 40 seconds of depressing the install switch. 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 sec on, and less than 1 sec off, for a duration of 5 sec.
- 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. Replace the telephone handset.
- Depress the reset switch, (Type2 SW4 Type 4 SW2); The CRU will reset and re-boot itself in accordance with the programming code entered.

c) Switch rack off by placing <u>both</u> breakers in the off position.

d) Disconnect terminations on DIP/LNA1 and TX filter.

e) Connect the cables and accessories to the CT rack for Modem Shelf setting up and functionality testing as detailed in Figure 37. Set the 0-11dB variable attenuator to a nominal 7dB (the insertion loss of the test circuit should be 109dB between point a and b in Figure 37. In practice the setting of the attenuator will be a few dBs less than the 7dB to account for the actual cable, connector and splitter loss. Due to the microwave frequencies involved the commissioning items need to be calibrated for the channel frequencies to be used.

Note: If the TX Filter is not fitted terminate the port of Splitter A as shown in Figure 37

f) Switch the power back on at the breakers.

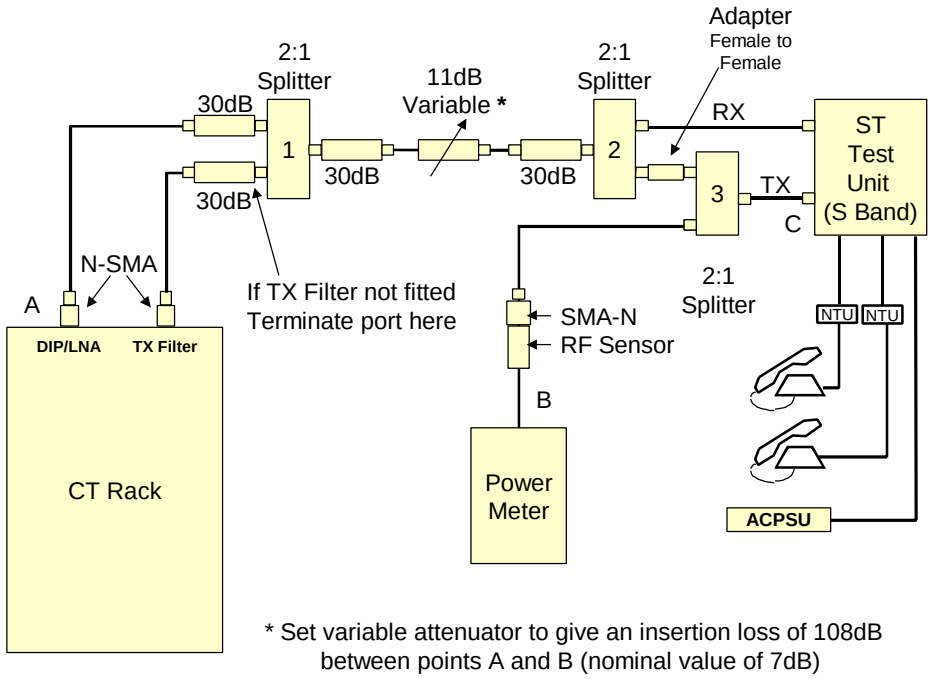

Figure 41. Test Set-Up Modem Shelves (2.3-2.5GHz Band)

g) Connect the cables and terminations to the Test CRU as shown in Figure 38.
h) Connect the drop cable of the CRU and the telephony VF pairs to the AC PSU.
i) Connect the AC Mains supply cable to the AC PSU and power up the unit at the mains supply outlet socket.

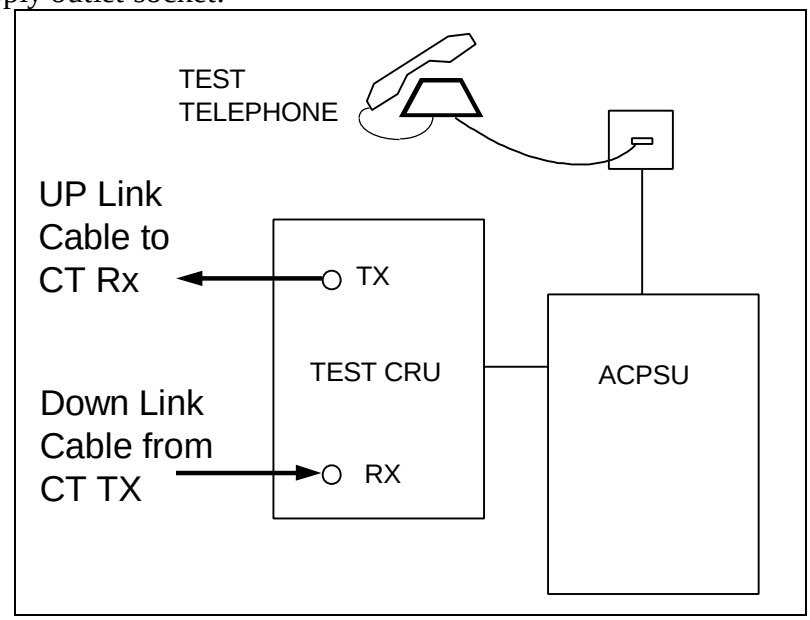

Figure 42. Test CRU Connections.

6. Setting Of RX Gain Control.

a) On Sitespan, select the Analogue/RF card window to set the Receiver Gain control voltage in the RF Gain Adjust box. Click on the UP or DOWN buttons to set the gain control voltage to 1.4 Volts.

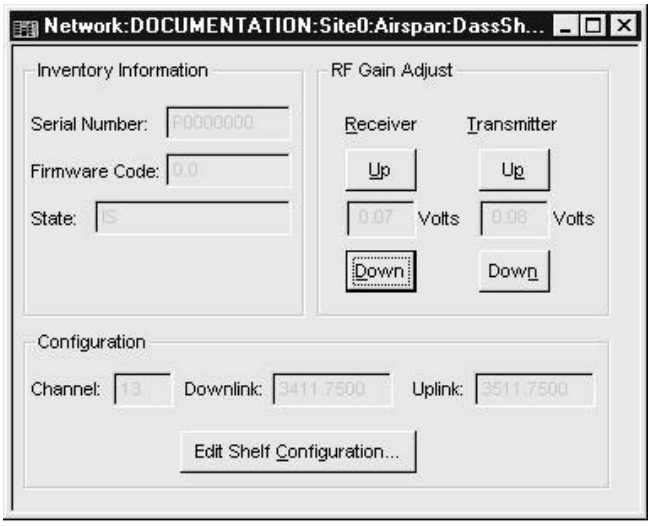

Figure 43. RF Gain Settings

b) Ensure that the Test CRU has acquired a RF link. The RF link has acquired when the Red, RF Link Fail LED is extinguished on the respective modem under test and the small amber LED's on the modem board are on.

c) If using a Voice CRU take the test phone off hook to achieve correct power levels. A Data CRU automatically acquires at high rate.

d) If using a Voice CRU it may not be possible to maintain off hook conditions due to the system timing the phones out so the off hook condition must be simulated Using the Sitespan as follows:

- Connect Sitespan to the modem shelf and configure the database.
- Select the Analogue card view, reduce in size and move to the corner of the screen so that the receiver gain adjustment may be manipulated
- Open *Subscriber View* from the *View* option.
- Ensure that the subscriber database is created for the installed Modems.
- Use the cursor to highlight the subscriber line for simulated off hook.
- Once the subscriber line is highlighted, use the cursor to select *Test View* under the *View* option.
- With the *Test View* opened, point and click the *Reserved Line* button. If the line is in idle state the test menu will be displayed.
- From the test menu, point and click *ST Loopback* button.
- Select the loopback direction as Towards Network and check TU through path on timeslot 1 and 2.

- Once the above is configured point and click OK button. This will set the radio traffic mode: high rate and high power.
- Once the test menu is available again leave the menu open, do not close or free line if the traffic mode is to be maintained.

e) Adjust the gain control voltage on Sitespan to achieve a RF Power level of nominally +7dBm on the RF Power meter. The exact reading should be 10dBm - the measured loss from point C to point B (approximately 3dB) in Figure 41. Record the voltage and power level on the Test Result Sheet.

f) Remove the loopback by selecting Loopback Off and OK to deactivate the loopback. Close test menu and return to the Subscriber View.

g) Putting the rack back in service

- Switch the Test CRU and CT Rack OFF.
- Remove the Test CRU and all interconnecting cables and accessories from the RF Output connectors on the CT.
- Re-connect the Antenna /Feeder tails to the CT.
- Connect the Sitespan cables to the 25 way Sitespan port on the modem backplane
- Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.
- Switch the CT Rack ON and wait for the system to complete the power-up self test sequence successfully.

7. Re-Connecting The 2Mbit/s Ports To The Modem Shelf.

Place a loop cable between the 2Mbit/s IN and 2Mbit/s OUT to condition the TU Card alarm system. Leave loop for about 10 seconds before removing the loop cable.

Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.

8. Remove Test Modem

Remove Test modem and place in the next shelf to be tested go to DLP-012.
If this is the last shelf to be tested return to DLP-010 and continue the commissioning process.

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SETTING OF 3.4-3.6GHZ BAND TX AND RX GAIN CONTROL USING TEST CRU.

9. Tools and equipment needed.

Item	Description	Recommended Model	Quantity
1	Digital Multimeter	Fluke 77	1
2	Test CRU	ACC("Battleship CRU") Part No.: 503-0300-001	1
3	30dB Attenuators; 1W	Suhner 6830-19-A	4
6	11dB Variable Attenuator	HP8499B	1
7	2 Way Power Divider	Narda 4313-2	3
8	50 ohm Termination 1W	Suhner 65 SMA-50-0-1	1
9	50 ohm Termination 15W	Suhner 6515.17.A	1
10	Adaptor; N-SMA	Suhner 33N-SMA-50-1	2
11	Adaptor; N-SMA	Suhner 31N-SMA-50-1	1
12	Adaptor; Female-Female	Suhner 32 SMA-50-0-1	1
13	Co-ax Cables	Suhner Sucoflex 104; 0.5m	5
		Suhner Sucoflex 104; 4.0m	2
14	RF Power Meter	Marconi 6970	1
15	Power Sensor	Marconi 6932	1

STEP **PROCEDURE**


Observe full ESD precautions.

10.Note:

The system may be commissioned using either a Voice or a Data CRU as a test CRU. IF using a Data CRU, it should be programmed using STMON (see 605-0000-436 for details) and not a test telephone in step 6(e). If a Data CRU is being used for commissioning steps 6(f) and 6(h) are not necessary.

11.Preparation

a) System Soak The system must be switched on for at least 2 hours to ensure that it is fully warmed up before proceeding any further. To minimise the down time the test equipment can be prepared during this time ready for testing.

b) Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN and 2Mbit/s OUT connectors on shelf interface connections located at the right hand side of each Modem Shelf.

c) Disconnect the Sitespan cables from the 25 way EM/Sitespan port on the modem backplane

d) Set up Sitespan with an empty database Set the modem shelf properties (Shelf Frequency and PN codes) to the same as the existing modem shelf. Failure to do this will result in Sitespan overwriting the shelf controller with its last set values.

e) Connect Sitespan to the 25 way EM/Sitespan port on the modem backplane

f) Select a modem channel for the test. (The modem channel selected should be one that has an existing subscriber.

g) Switch rack off by placing both breakers in the off position. . This involves loss of service to all users. Steps should be taken to minimise disruption by completing the set-up quickly

12. Test TX Output Power. (Test 5)

This section describes the measurement of TX output power.

a) Disconnect the antenna.
b) If measuring the power output on shelf 1 and/or 2 connect the Power Meter to the N-Type connector on DIP/LNA1 or to the antenna port of the coupler if fitted at the top of the rack ready to measure the power output from shelves 1 and 2
c) If measuring the power output on shelf 3 and/or 4 connect the Power Meter to the power meter to the N-Type connector on the TX filter card as shown in Figure 36. or to the antenna port of the coupler if fitted

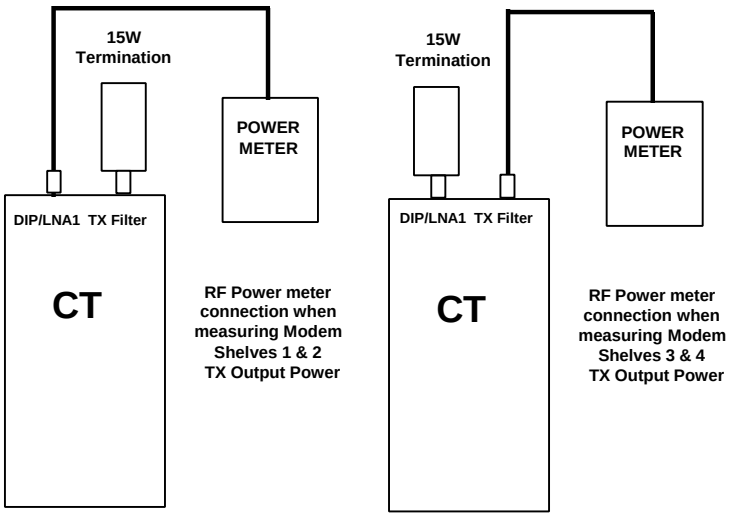

Figure 44. Power Level measurement Test Set-up

d) Restore power to the rack.

e) The single user output is 18dbm. The TX output power level is maintained by a power control loop in the system. For the power loop to work the CT RF card needs to generate greater than +21.75dBm, this condition can be achieved by using the Sitespan to set four users in service without any STs in operation. This forces the four modems (i.e. two modem cards) to stay in the high power acquisition mode. Four users provide an output of 24.26 +/- 1.0dBm.
f) For the CT to reach its nominal output power from zero using the control loop would take a considerable length of time. To bypass this process, the power control loop may be overridden using the Sitespan to set the TX power the control voltage.
g) Using the Sitespan select the RF Card view from the Shelf view.
h) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the Output power to 24.26 +/- 1.0dBm.
i) Record results
j) Switch off rack. by placing both breakers in the off position.
k) Ensure that the power Output is at steady level before setting up the RX gain control.

13. Connecting Test CRU

The purpose of this test is to enable the RX sensitivity to be set to -98dBm to within 1dB. This section provides details of the test set-up for the setting of the RX gain control.

a) Switch rack off by placing both breakers in the off position.
b) Disconnect terminations on DIP/LNA1 and TX filter.
c) Connect the cables and accessories to the CT rack for Modem Shelf setting up and functionality testing as detailed below. Set the 0-11dB variable attenuator to a nominal 5dB (the insertion loss of the test circuit should be 106dB between point A and B.

Note: If the TX Filter is fitted terminate the TX 3/4 as shown in Figure 45.

d) Switch the power back on at the breakers.

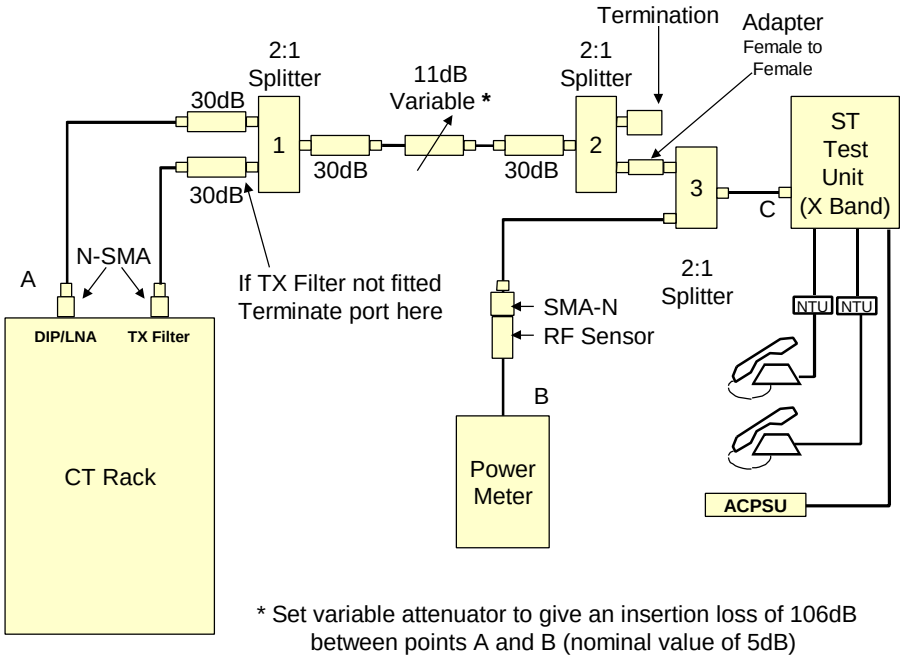

Figure 45. Test Set-Up Modem Shelves (3.4-3.6GHz band)

14. Setting Of RX Gain Control (Test 6).

a) Connect the drop cable of the CRU and if using a voice CRU the telephony VF pairs to the AC PSU.

b) Connect the AC Mains supply cable to the AC PSU and power up the unit at the mains supply outlet socket.

c) On the Sitespan, select the Analogue/RF card window to set the Receiver Gain control voltage in the RF Gain Adjust box. Click on the UP or DOWN buttons to set the gain control voltage to 1.4 Volts.

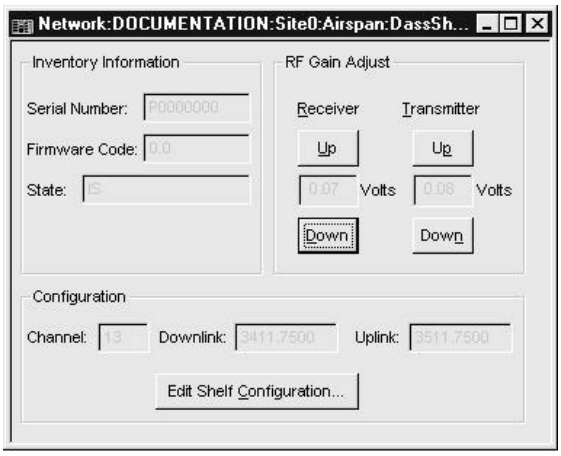

Figure 46. Setting Receiver Sensitivity

d) If using a voice test CRU then programme the CRU as follows with the same programming information as that for the CRU at the ST associated with the modem under test. If using a Data CRU program the CRU using STMON then go to step 5(e).

- Remove the cover from the PSU
- Connect an MF or LD type telephone to the NTU
- To program the ST, depress the reset switch, (Type2 SW4 Type 4 SW2), in the PSU for approximately 3 seconds. LED D8 will begin flashing to indicate the CRU initialising and self test sequence. 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.
- Depress the Programming switch (Type2 SW3 Type 4 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.
- Enter the respective ST programming code on the telephone keypad, within 40 seconds of depressing the install switch. 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 sec on, and less than 1 sec off, for a duration of 5 sec.
- 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. Replace the telephone handset.
- Depress the reset switch, (Type2 SW4 Type 4 SW2); The CRU will reset and re-boot itself in accordance with the programming code entered.

e) At the end of the programming sequence, allow the Test CRU to acquire a RF link. The RF link has acquired when the Red, RF Link Fail LED is extinguished on the respective modem under test and the small amber LED's on the modem board are on.

f) If using a Voice CRU take the test phone off hook to achieve correct power levels. A Data CRU automatically acquires at high rate.

g) If necessary adjust the gain control voltage on the Sitespan to achieve a RF Power level of nominally +5dBm on the RF Power meter. The exact reading should be 8dBm ± 0.5dB minus the measured loss from point B to point C in Figure 45. Record the voltage and power level on the Test Result Sheet.

h) Place phone on hook.

15. Re-Connecting 2Mbit/s Ports To The Modem Shelf.

Place a loop cable between the 2Mbit/s IN and 2Mbit/s OUT to condition the TU Card alarm system. Leave loop for about 10 seconds before removing the loop cable.

Re- connect the 2Mbit/s ports to the 2Mbit/s IN connectors on the shelf interface connections located at the right hand side of each Modem Shelf.

16.Remove Test Modem

Remove Test modem and place in the next shelf to be tested go to DLP-012
If this is the last shelf to be tested, return to DLP-010 and continue the commissioning process.

VF TESTS.

1. Functionality Tests (Test 7SC)

If using the shelf controller and switched POTS are available then it is possible to perform the following telephony tests.

a) Dial Tone Present

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

b) Outgoing Call

Initiate a call from the test 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.

c) Incoming Call

Initiate a return call from the CT Office to the test telephone.

Ensure that the call can be successfully set up and that line quality is good.

d) Call in Progress LED's

Confirm that the amber, Call In Progress LED on each respective Modem is lit when the telephone handset is Off-Hook; and also when a call connection is made when receiving an incoming call.

On completion of each call, confirm that the amber LED is extinguished when the handset is replaced.

VF 2 Test Calls Transfer the test telephone to VF pair 2.

Repeat This DLP for VF pair 2.

For each Modem circuit placed in service, re-programme the Test SC with the respective programming code and repeat the above functionality tests.

Record all the results on the Test Result Sheet (DLP 21).

2. Remove Test Modem

Remove Test modem and place in the next shelf
DLP-010 and continue the commissioning process.

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SETTING THE RACK INTO SERVICE.

1. Setting the rack into service:

Switch off power at the Breakers

Remove all test equipment

2. Connecting Antenna Feeder Tails

In new installations the protective boots of the antenna feeder tails free ends should be kept in position until the tail is actually connected.

Form one of the tails carefully (avoid tight bends minimum bend radius is 125mm), to connect with the N-type sockets on the Coupler on top of the DIP/LNA module in the Combiner Shelf. See Figure 47. If PA2 and the TX filter units are fitted the second antenna should be connected to the TX filter unit. See Figure 47.

Note: See Antenna and Feeder Installation and Commissioning Procedure, 605-0000-433 for details of feeder grounding.

3. Using a single Antenna

If modem shelves 3 and 4 are not installed it is possible to install only 1 antenna and connect the feeder to the output port of DIP/LNA1 Unit.

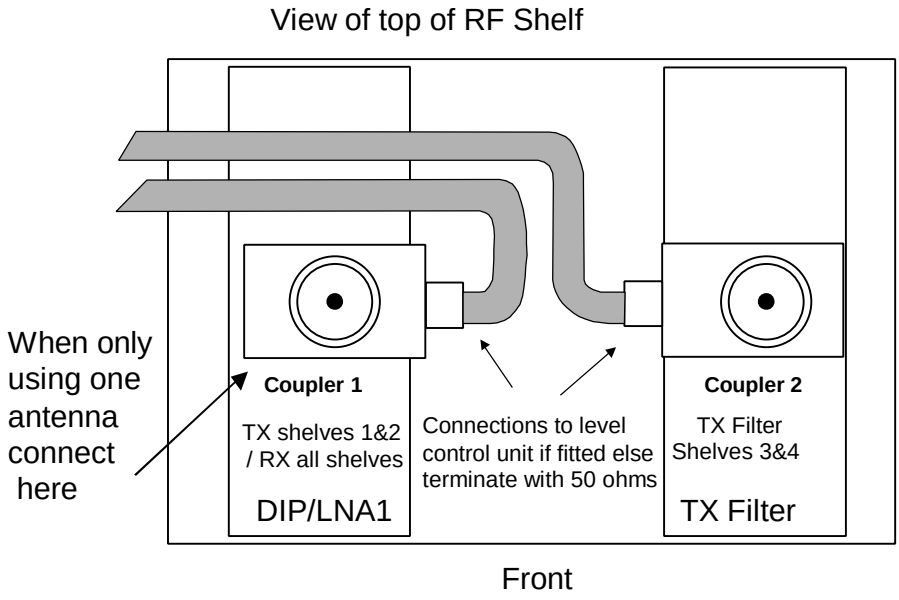

Figure 47. RF Antenna Connections

4. Termination Of Spare RF Ports

All RF ports should be terminated if not connected.

If the Combiner Shelf is not equipped with a TX Filter, it is also recommended that the second antenna should be terminated with a 50Ω termination. The Termination can either be at the base of the dipole if only one feeder is fitted, or at the base of the second feeder if the second feeder has been provided in readiness for future shelf expansion.

5. Switch on Rack

Re-insert any modems disconnected from backplane during commissioning.

Switch the power back on at the breakers.

THIS CONCLUDES THE CENTRAL TERMINAL COMMISSIONING TESTS.

RESERVED FOR FUTURE USE.

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SET UP CHANNEL BANK.

1. Setting Up AS4000 To Use Litespan-120 (LS-120) Channel Bank

Use the following procedure to set up the AS4000 rack when connecting to the LS120 Channel Bank. To set up the LS120 refer to the Litespan LS120 documentation.

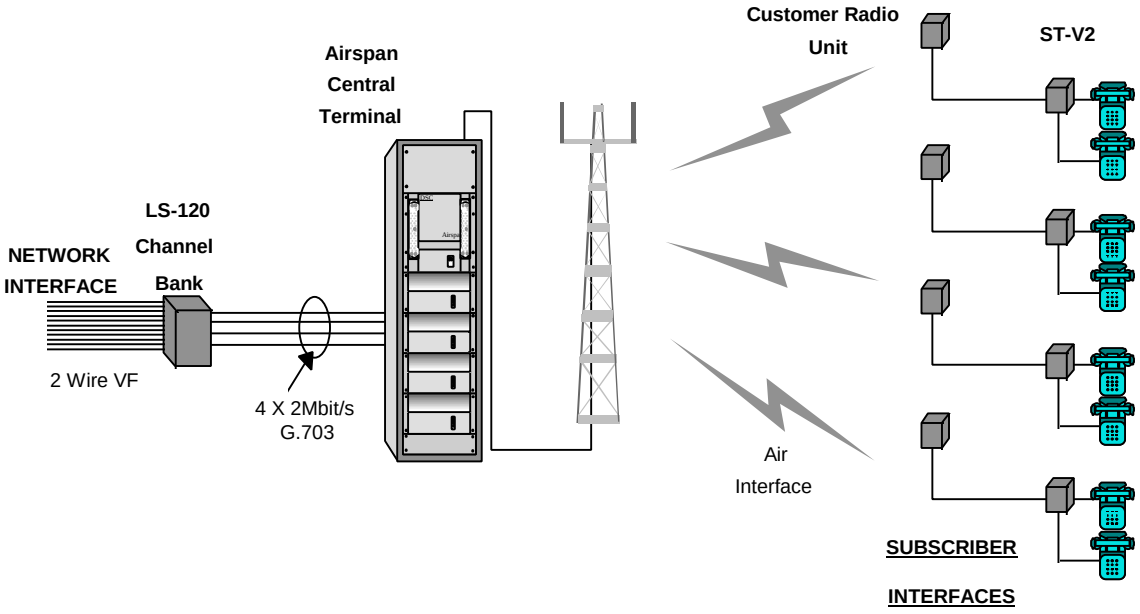

Figure 48. AS4000 using LS120 as a Channel Bank

1.1. Cable Termination E1 Tx and Rx

Make sure that a cable extends from the LS120 backplane connector J1 to the FAP for wideband or E1 connectivity. Connect one E1 coax feeder cable from the AS4000 Central Terminal E1 transmit connection to the LS120 J9A RCV connection. Connect one E1 coax feeder cable from the AS4000 Central Terminal E1 receive connection to the LS120 J10A XMIT connection. For additional modem shelves, connect each succeeding shelf to J9/J10 pairs as above. (See Alcatel LS120 documentation).

1.2. Set up AS4000

The AS4000 Shelf Configuration File should be set as follows when connecting to a LS120 Channel Bank
Connect the Sitespan to the AS CT.
Open Sitespan

1.3. Signalling File Configuration Using Sitespan

1. Connect the Equipment View to the Server.

2. Select shelf from object list.

3. From the *Edit* Menu select *Airspan 60 CAS Modem Shelf Properties.*

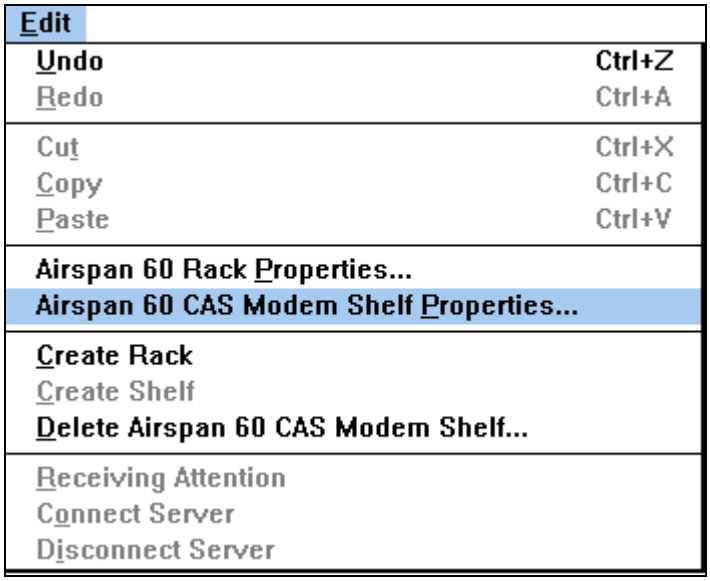

Figure 49. Edit Menu

4. In the *Edit Airspan 60 Modem Shelf Properties* window click the mouse on the *Signalling Configuration File* field. Locate the file LS120.sgf and click to enter file name in window. The signalling configuration is loaded into the Shelf. The signalling file must be located in the Sigfiles directory located in the root of the Sitespan drive, If a .sgf is not available create the LS120.sgf using the Signalling File Editor and copy to Sigfiles.

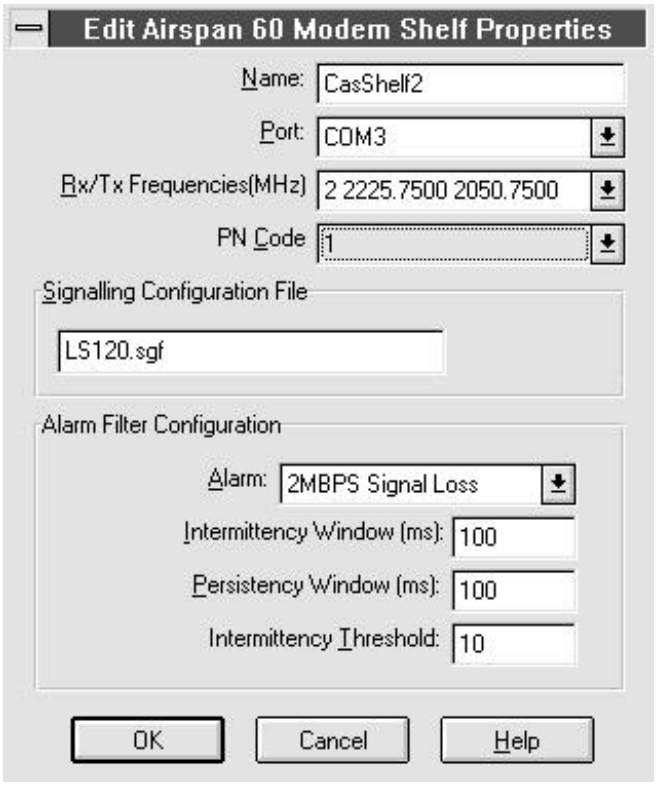

Figure 50. Modem Shelf Properties

5. Click OK to complete the process.

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TEST RESULTS.

The Flowcharts produced in DLP 10 are reproduced here to assist with the commissioning process. Please Photocopy Test forms and produce a duplicate set for the customer and ACC

1. Commissioning Using Level Control Unit

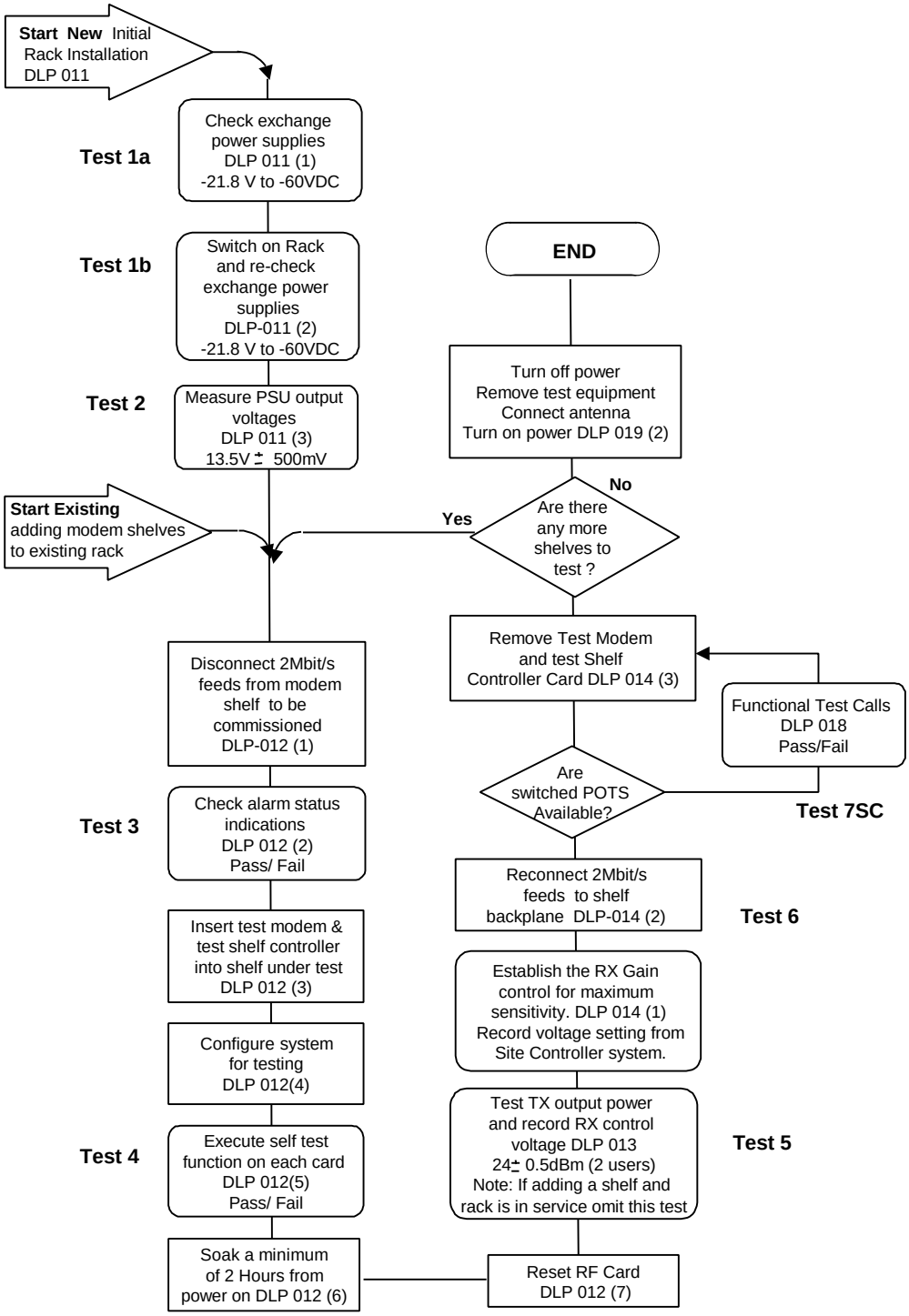

Chart 6. Commissioning ALL-Bands connecting to Sitespan using Level Control Unit.

2. Commissioning 2.0-2.3GHz Band Using Test CRU

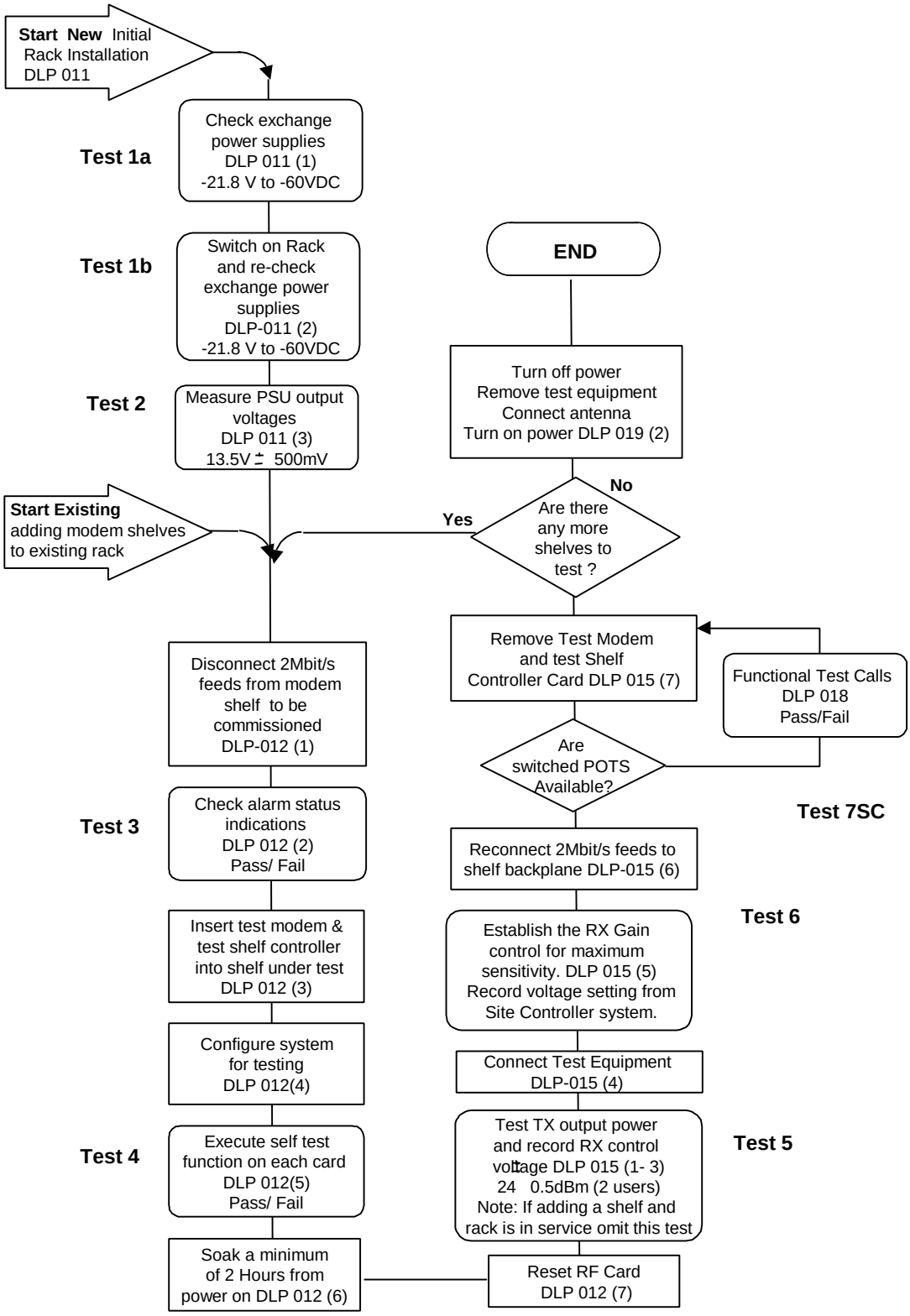

Chart 7. Commissioning 2.0-2.3GHz Band connecting to Sitespan using Test CRU.

3. Commissioning 2.3-2.5GHz Band Using Test CRU

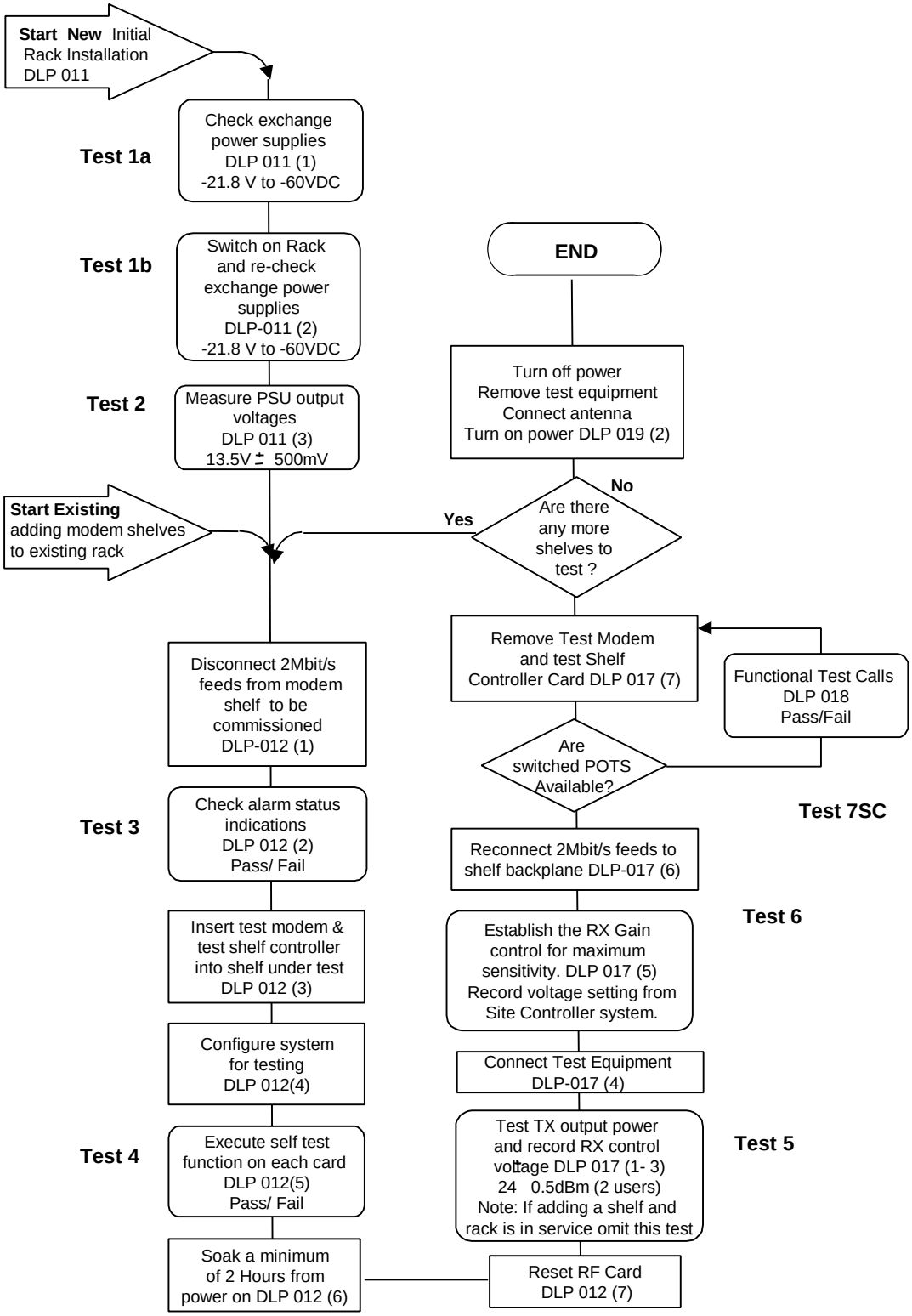

Chart 8. Commissioning 2.3-2.5GHz Band connecting to Sitespan using Test CRU.

Commissioning 3.4-3.6GHz Band Using Test CRU

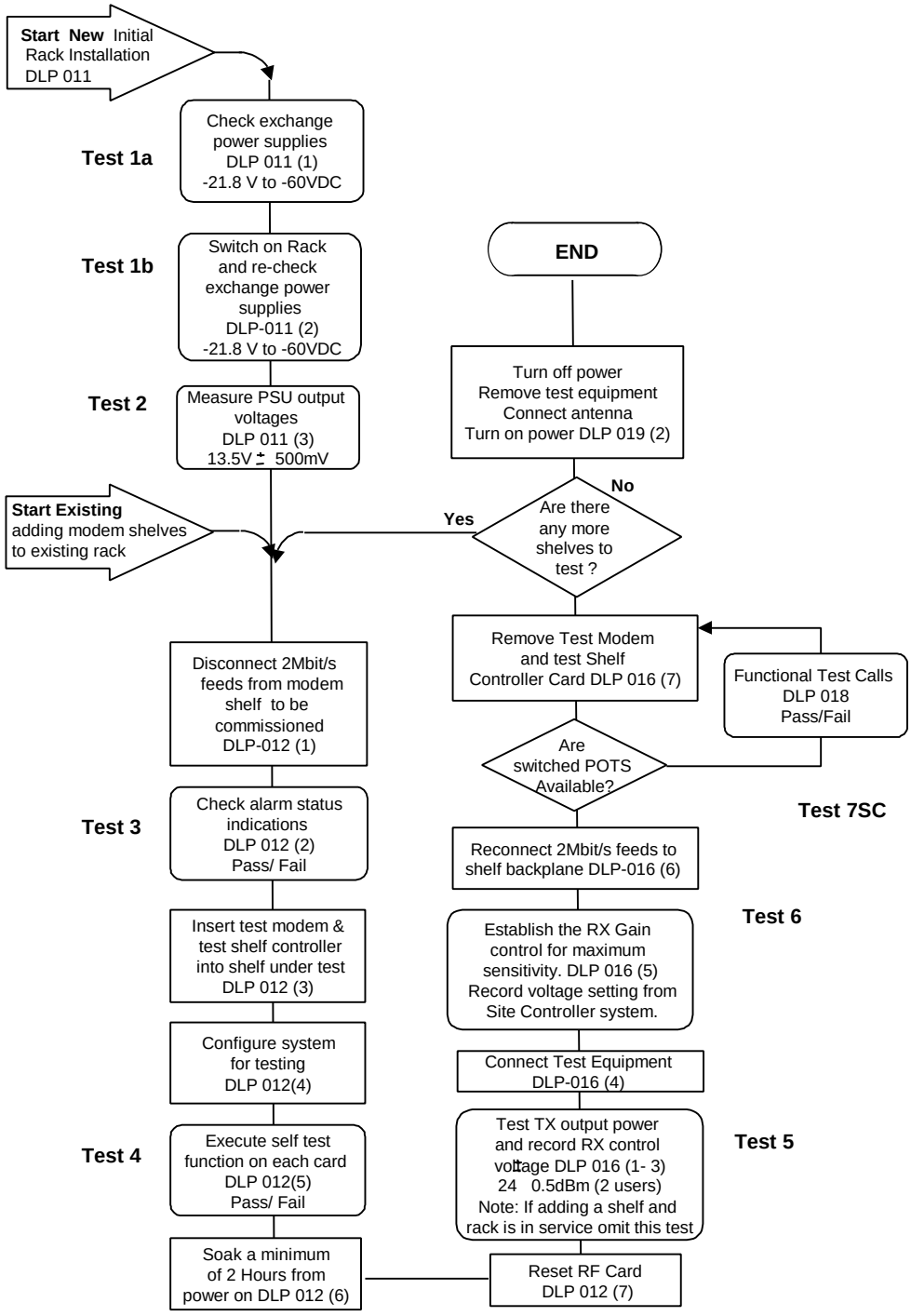

Chart 9. Commissioning 3.4-3.6GHz Band connecting to Sitespan using Test CRU.

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2.4. Test Equipment Calibration

Item	Description	Model	Serial No	Calibration Date
1	Digital Multimeter			
2	30dB Attenuators; 1W			
3	30dB Attenuators; 1W			
4	30dB Attenuators; 1W			
5	30dB Attenuators; 1W			
6	11dB Variable Attenuator			
7	RF Power Meter			
8	Power Sensor			
9	Test Modem Card (if used)	n/a		n/a
10	Test CRU or LCU	n/a		n/a

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CUSTOMER:.....
SITE LOCATION:.....
RACK ID:.....
ENGINEER: .....
DATE:.....

Card Type	**Serial Number**	**Rev Level**
Combiner Shelf		
RF DIP/LNA1		
RF TX Filter		
RF Card 1		
RF Card 2		
RF Card 3		
RF Card 4		
PA1		
PA2		
MON1		
MON2		
PSU1		
PSU2		
PSU3		
Modem Shelf 1		
TU		
AU		
SC		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem 7		
Modem 8		

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Rack ID.....

Card Type	Serial Number	Rev Level
Modem Shelf 2		
TU		
AU		
SC		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem 7		
Modem 8		
Modem Shelf 3		
TU		
AU		
SC		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem 7		
Modem 8		
Modem Shelf 4		
TU		
AU		
SC		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem 7		
Modem 8		

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Rack ID.....

PARA	TASK / TEST		LIMIT	RESULT
DLP-001	Site Inspection & Verification			
DLP 005 or DLP 006	2 Mbit/s Cabling	Modem Shelf 1		
		Modem Shelf 2		
		Modem Shelf 3		
		Modem Shelf 4		
DLP11	**System Commissioning Tests**			
DLP11 (1)	**Test 1a** Exchange DC Voltage Supply 1		-21.8 to -60.0V DC	
	Supply 2			
DLP11 (2)	**Test 1b** Exchange DC Voltage Supply 1		-21.8 to -60.0V DC	
	Supply 2			
DLP11 (3)	**Test 2** PSU 1 Output Voltage		13.5 VDC ; +/-500mV	
	PSU 2 Output Voltage		13.5 VDC ; +/-500mV	
	PSU 3 Output Voltage		13.5 VDC ; +/-500mV	
DLP12	Power Up and Self Test			
DLP12 (2)	**Test 3** Alarms and Indications	Modem Shelf 1 SC Card TU Card AU Card Modems(if fitted)		Pass /Fail
		Modem Shelf 2 SC Card TU Card AU Card Modems(if fitted)		
		Modem Shelf 3 SC Card TU Card AU Card Modems(if fitted)		
		Modem Shelf 4 SC Card TU Card AU Card Modems(if fitted)		

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Rack ID.....

PARA	TASK / TEST	RESULT
DLP12 (2) **Test 3 contd.**	RF Combiner Shelf PA Modules Dip/LNA RF Cards Monitor Cards	
	PSU	
DLP12 (4) **Test 4** DLP12 (5) System Configuration Self test from Sitespan	Modem Shelf 1 RF Card	
	Analogue Card	
	TU Card	
	SC Card	
	(Test) Modem Card	
	Modem Shelf 2 RF Card	
	Analogue Card	
	TU Card	
	SC Card	
	(Test) Modem Card	
	Modem Shelf 3 RF Card	
	Analogue Card	
	TU Card	
	SC Card	
	(Test) Modem Card	
	Modem Shelf 4 RF Card	
	Analogue Card	
	TU Card	
	SC Card	
	(Test) Modem Card	

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Rack ID.....

Test 5

Modem Shelf	1	2	3	4
Tx output power level				
Number of users				
TX Voltage Level				

Test 6

Modem Shelf	1	2	3	4
ST TX Output Power Level				
Coupler Loss(on label)ϕ				
LCU Cable Loss(on label)				
LCU Characterised Loss (on label)ϕ				
LCU Path Loss				
RX Gain Control Voltage				

f Measurements only when commissioning using coupler and Level Control Unit

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Rack ID.......................

MODEM SHELF: Working to ST-V2 only

CHAPTER	FUNCTION / TEST			LIMIT	RESULT
DLP17	**Test 7SC Functionality Tests** **Modem Circuit Number:**				
a	Telephony Tests	VF pair 1	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
a	Telephony Tests	VF pair 2	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
d	Call in Progress LED Indications				
	Modem Circuit Number:				
a	Telephony Tests	VF pair 1	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
a	Telephony Tests	VF pair 2	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
d	Call in Progress LED Indications				
	Modem Circuit Number:				
a	Telephony Tests	VF pair 1	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
a	Telephony Tests	VF pair 2	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
d	Call in Progress LED Indications				
	Modem Circuit Number:				
a	Telephony Tests	VF pair 1	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
a	Telephony Tests	VF pair 2	Dial Tone		
b			Outgoing Call		
c			Incoming Call		
d	Call In Progress LED Indications				

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SITE ACCEPTANCE

1. Site Acceptance

1.1. Site Inspection

Check all work areas are free of debris i.e. cable off-cuts, braid, dust and packaging and that the site is as found.

2. Site Acceptance Forms

2.1. Purpose

ACC and customer copies of site acceptance forms are provided on the following pages.

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AS4000- WIRELESS FIXED ACCESS SYSTEM CT 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.

.....
.....
.....

Customer Representative
Name:_____ **Position:**_____ **Date:**_____ **Signature:**_____
ACC Representative
Name:_____ **Position:**_____ **Date:**_____ **Signature:**_____

ACC COPY

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AS4000- WIRELESS FIXED ACCESS SYSTEM CT 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.

.....
.....
.....

Customer Representative
Name:_____ **Position:**_____ **Date:**_____ **Signature:**_____
ACC Representative
Name:_____ **Position:**_____ **Date:**_____ **Signature:**_____

CUSTOMER COPY

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