AS4000
Wireless Local Loop System

Demand Assignment
Central Terminal
Installation and Commissioning

605-0000-452

Issue 1.3dr Date 7/02/00

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2.
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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 any power cord and do not locate the product where persons could step or walk on a 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.

CAUTION PA INSERTION

Care should be taken when installing PAs to ensure that the card connector mates with the backplane connector correctly. Any attempt to ram the card home or force the card into he slot may cause damage to the connector. Insert the card until the connectors engage, ease the card into the backplane until fully engaged. Lock top and bottom with a screwdriver. If resistance is met remove the card and reinsert. If difficulty persists contact the Airspan service centre.

CAUTION DIP/LNA INSERTION

Care should be taken when installing DIP/LNAs to ensure that the card connector mates with the backplane connector correctly. Any attempt to ram the card home or force the card into he slot may cause damage to the connector. The board extractor levers mat be used to assist with insertion, when the card is home press the body of the DIP/LNA to ensure that the connector is fully engaged. If resistance is met remove the card and reinsert. If difficulty persists contact the Airspan service centre

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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1.0	Initial Document	All
1.1 April 99	Commissioning details added	DLPs6-17 and Appendix's
1.2 August 99	Update to commissioning for Sitespan 3.4	DLPs 6-14
1.3 December 99	Modification to commissioning process	DLPs 6-12

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Abbreviations

AC	Alternating Current
AGC	Automatic Gain Control
AU	Analogue Unit
A/D	Analogue/Digital
CPE	Customer Premises Equipment
CRU	Customer Radio Unit
CT	Central Terminal
CTU	Concentrated Tributary Unit (Access Terminal Shelves)
CU	Compression Unit
DA	Demand Assignment
DC	Direct Current
DMM	Digital Multi Meter
DRS	Digital Radio System
DTU	Demand Assignment Tributary Unit
FA	Fixed Assignment
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union -Telecommunications
LD	Loop Disconnect
LED	Light Emitting Diode
MF	Multi-Frequency
MSTP	Modem Shelf Termination Panel
MU	Modem Unit
NTU	Network Termination Unit
PC	Power Control
PSU	Power Supply Unit
RF	Radio Frequency
SC	Shelf Controller
SPU	Signalling Processing Unit
ST	Subscriber Terminal
Rx	Receive
Tx	Transmit
TU8	Tributary Unit Eight E1 ports
VDU	Video Display Unit
VF	Voice Frequency
XTU	Exchange Tributary Unit (E1 protocol: CAS, V5.1, V5.2)

Related Documentation

605-0000-450	System Overview
605-0000-451	System Operations and Maintenance Manual
605-0000-453	Access Concentrator - Installation & Commissioning
605-0000-433	Central Terminal - Antenna/Feeder Installation & Commissioning
605-0000-454	Subscriber Terminal - Installation & Commissioning
605-0000-437	D128 Terminal Converter
605-0000-435	Material Return and Repair
605-0000-427	Sitespan

INTRODUCTION

1. Purpose of Document

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

2. Prerequisite skills

Personnel installing and commissioning the AS4000 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 AS4000 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: 44 (0)1527 402800

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
- Task 5 — Module/Card insertion
- Task 6 — System Test
- Task 7 — Test Results
- Task 8 — Connection to management system.
- Task 9 — Work Area Inspection and Cleaning
- Task 10 — Acceptance Procedure

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
TX filter	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 @ 540W
DC Input Current (Fully populated CT Rack)	25 Amps max. @ -21V DC 11.5 Amps max. @ -48V DC 9 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.

1.1. RF Parameters

1.1.1. 2.0-2.3GHz Band

RF PARAMETERS	
Transmit Power (Average): 1 active channel 15 active channels	 +21dBm +32.75dBm ±1.5dB
Omni Antenna System Gain	10.5dBi. Minimum
Return Loss at antenna	14dB
Frequency Range	1.8 to 3.6 GHz
Azimuth	360°
Beam Width at 3dB	±2°
Typical Feeder Loss	4dB max. (50m LDF5-50)
EiRP (Average)	+39.25dBm (15 active channels)

Table 4. RF Parameters.

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.
- Pozidrive: 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	50 ohm Termination 15W	Suhner 6515.17.A	2
3	Frequency Generator up to 2.1GHz	Signal Generator MI2024	1
4	Test Lead for TU Card	ACC proprietary item	1
5	Coupler Test Lead	Lead with SMA connector	1
6	RF Power Meter	Marconi 6970	1
7	Power Sensor	Marconi 6932	1

Table 1-1. Required Test Equipment.

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

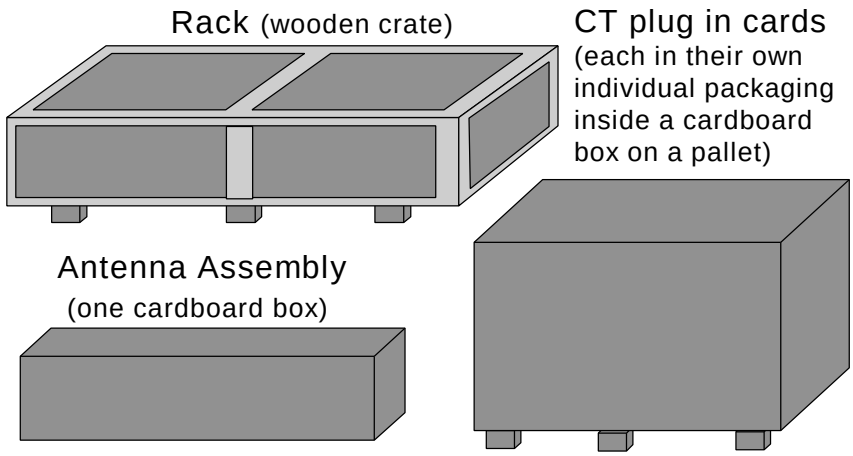

Figure 1. Packaging for CT Site

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 section 0 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.

RACK INSTALLATION

1. Positioning and Securing Racks

1.1. Rack Preparation

Important: If the installation consists of two racks (four modem shelves), or an expansion rack is being installed to expand the capacity of an existing CT Rack, remove the knock out panels from the side of the racks. Place the protection strip in the hole to protect the inter-rack cabling. This operation cannot be done after the racks are positioned together.

1.2. 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.

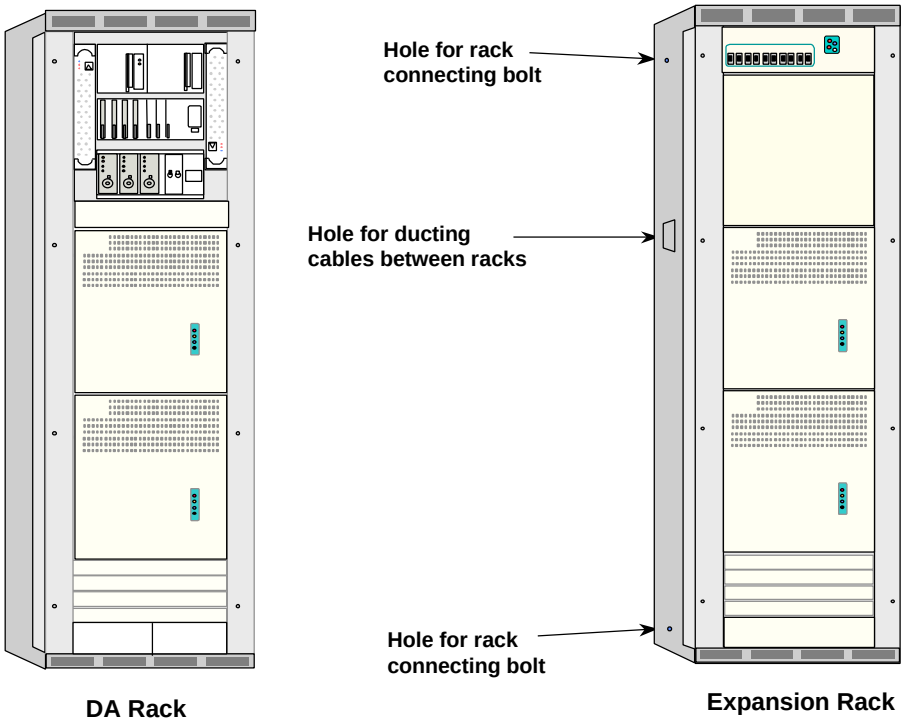

Figure 2. Central Terminal Racks.

1.3. 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 DA Rack over the four holes and screw the four (supplied) M12 screws through washers to secure the rack base. Repeat the process for the Expansion Rack if provided. Join the racks together with 12mm nuts and bolts placed through the holes at the top and bottom of the side panels

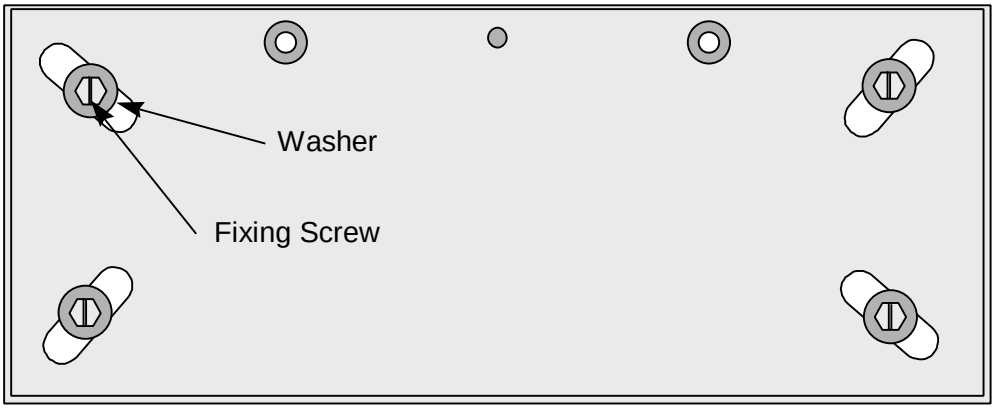

Figure 3. Securing Rack Base

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.

1.4. 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.

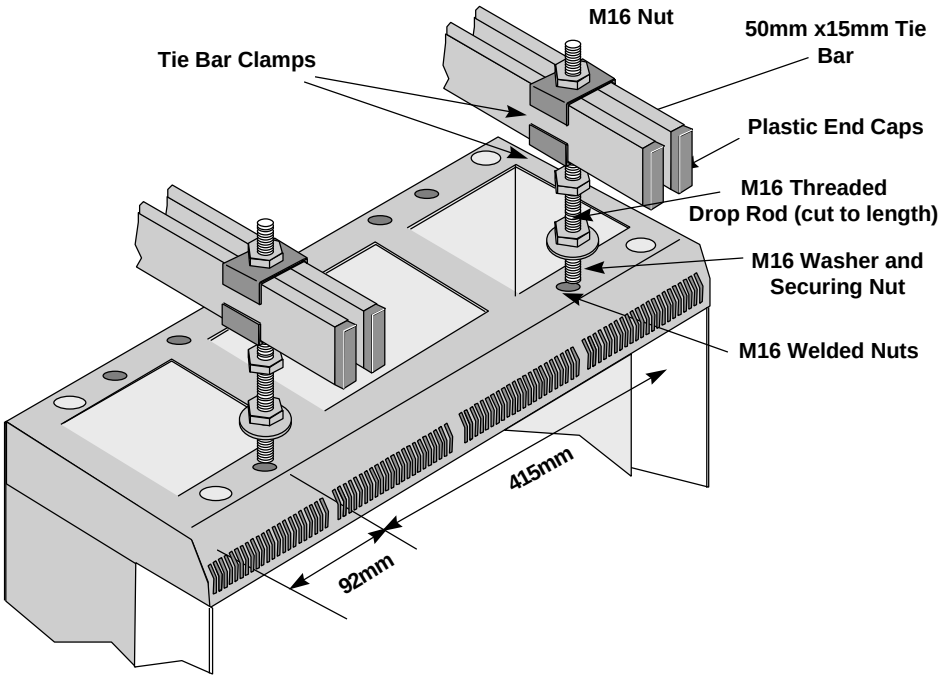

Figure 4. Typical Overhead Ironwork Support

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.

1.5. 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.

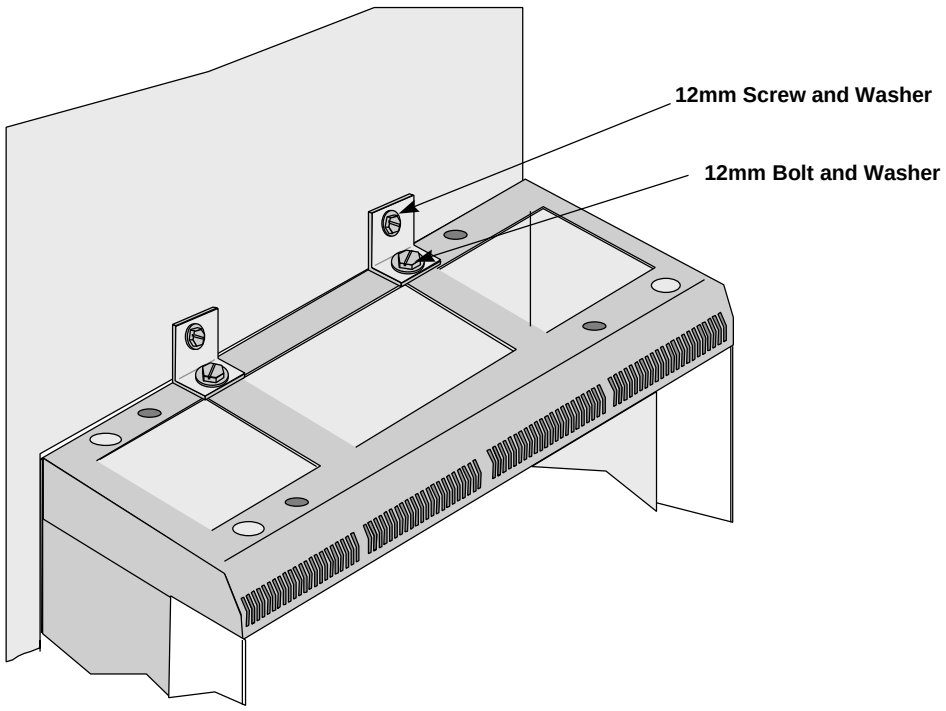

Figure 5. Securing Rack To Wall

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 paragraph 1.3.

CENTRAL TERMINAL DA RACK 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 2. 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 2. 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 6

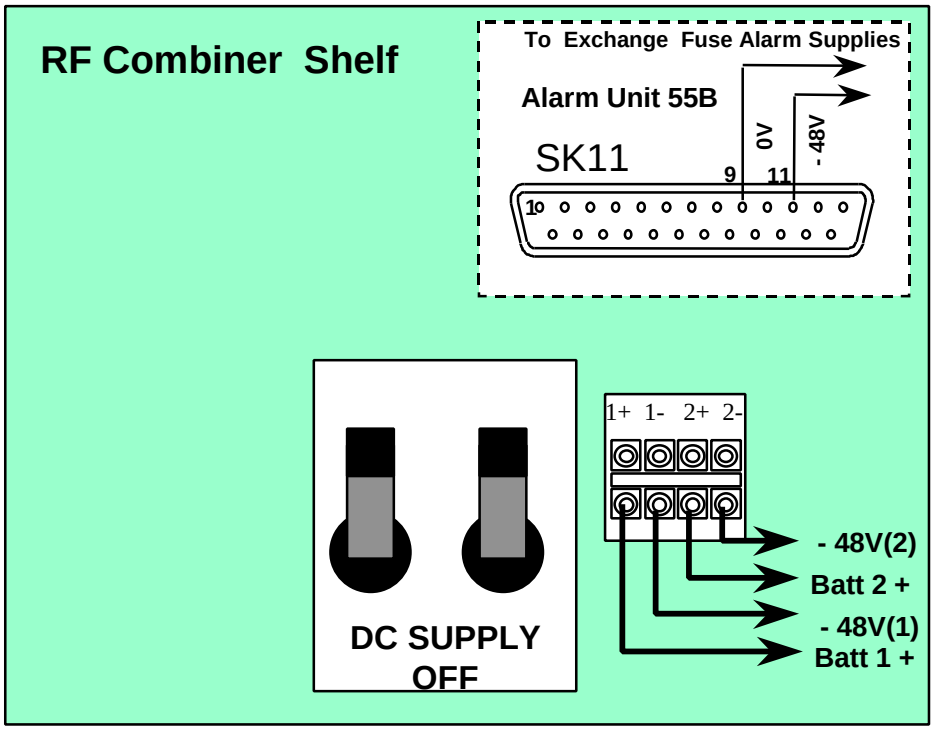

Figure 6. DC Termination On Combiner Shelf.

1.1. Rack Earthing

Using the site survey, locate the building central [safety] grounding point. Run an earth cable rated at 30A. to each rack and connect it to the centre earth stud located at the top or bottom (not both) of the rack. See Figure 7. These points are labelled with the IEC Earth symbol. ⏚.

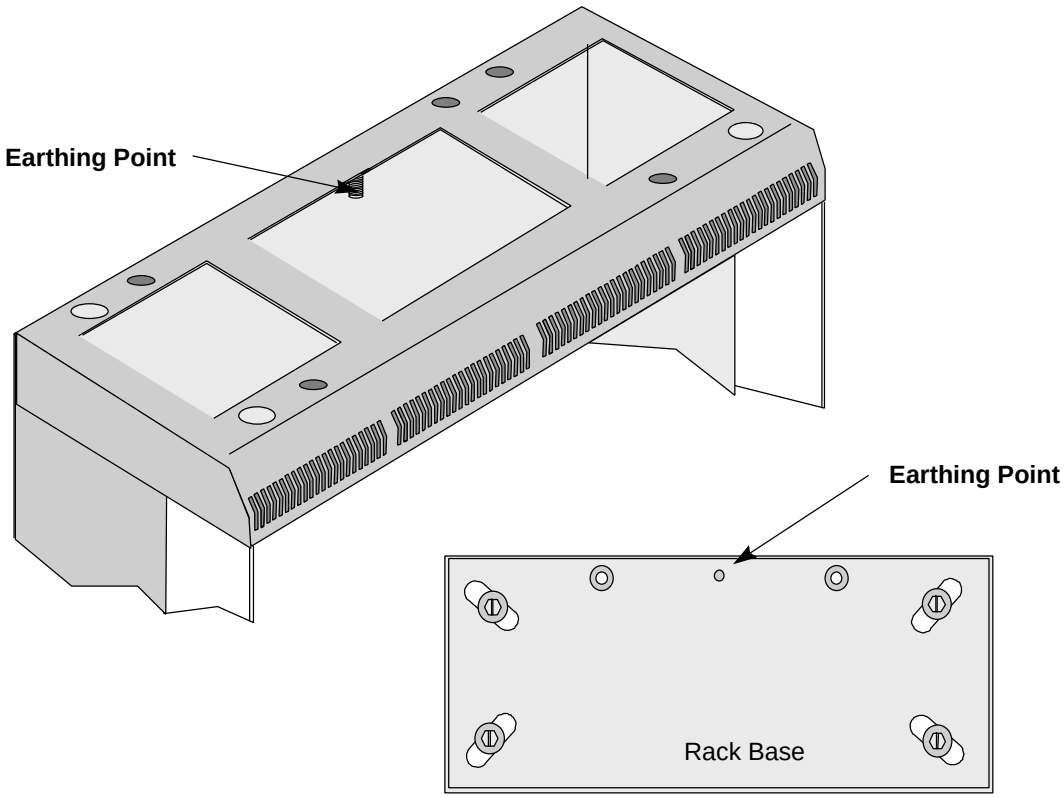

Figure 7. Rack Earthing

Warning: No other external safety earth connections may 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

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. 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 8. 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.

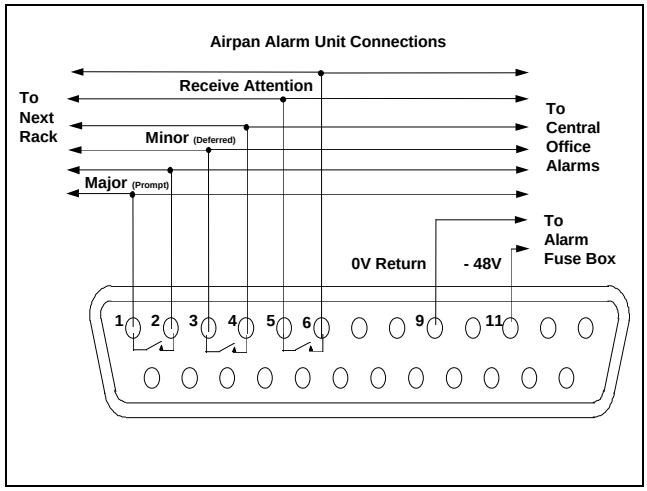

Figure 8. AS4000 Alarm Unit Connections

Connect the station alarm cable to the backplane of the combiner shelf. See Figure 9.

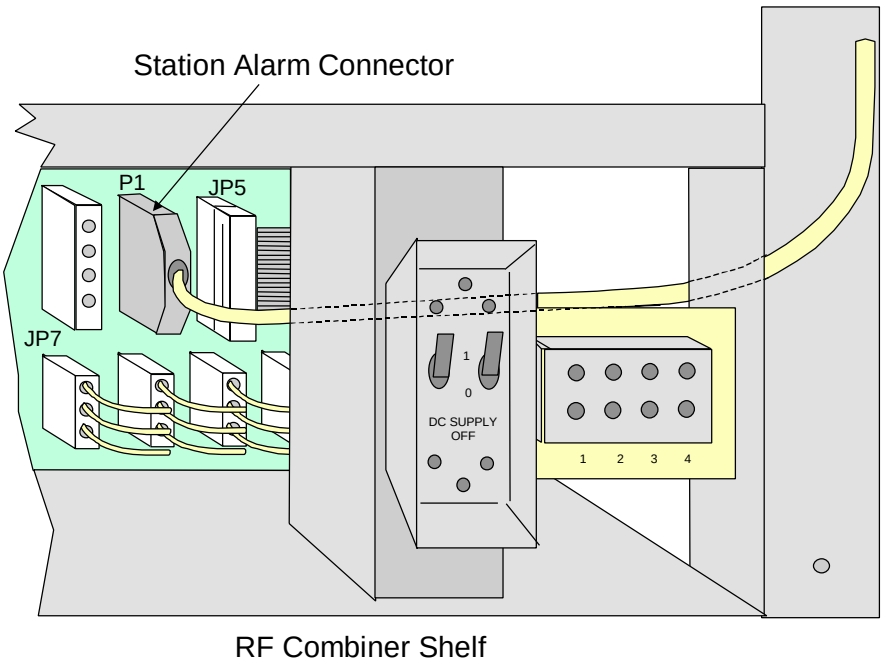

Figure 9. Station Alarm Connection

3. 2Mbit/s Cabling

From the site survey, confirm the location of the Digital Distribution Frame (DDF) if a DDF is to be used or the Backhaul/Access Concentrator if the 2Mbit/s feeds are fed direct to the equipment. The length of 2Mbit/s feeds should not exceed 250 metres

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

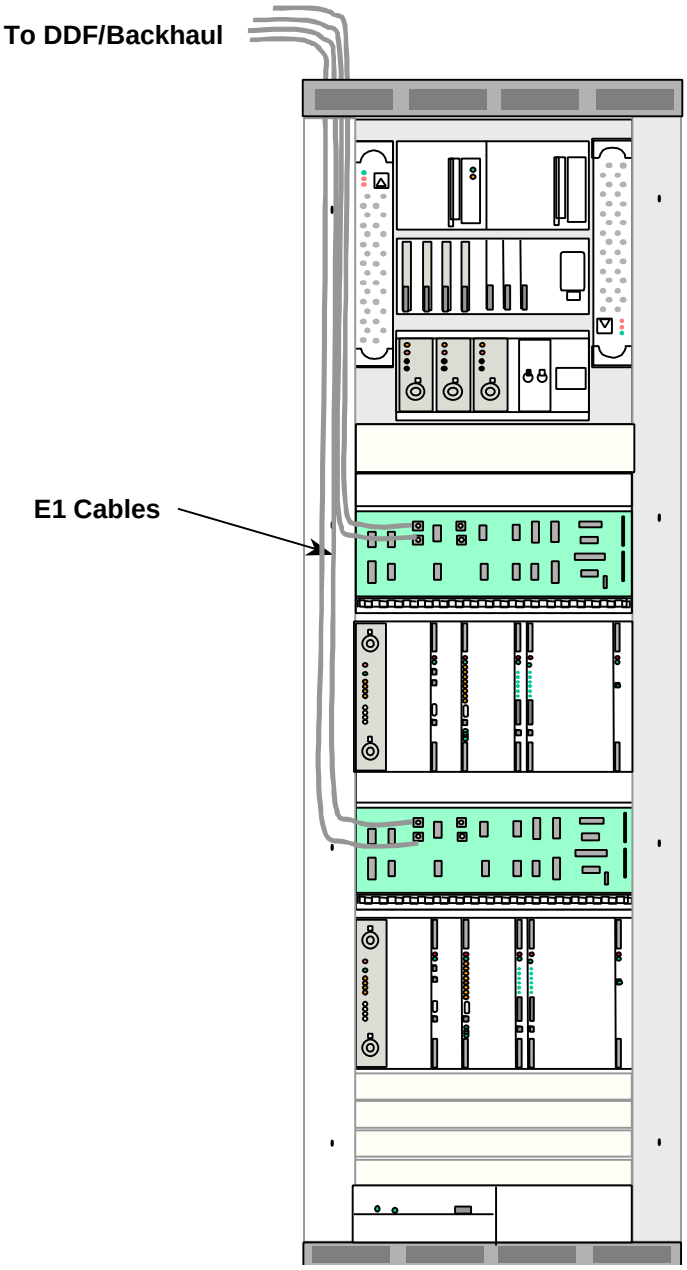

Figure 10. E1 Rack Cable Runs

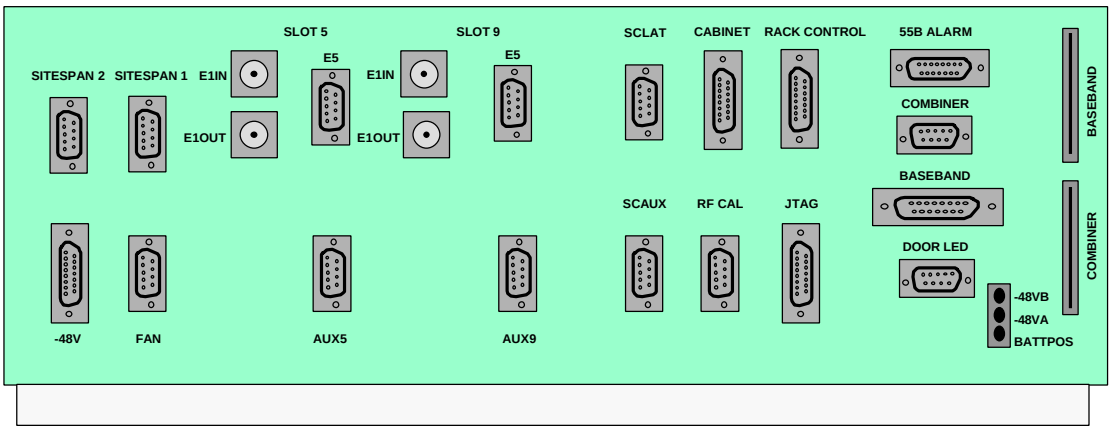

Figure 11. Shelf Interface Connections.

75 Ohm Connections

Run the 2Mbit/s co-axial cables from the modem shelf to the allocated positions on the DDF/Backhaul. (Two cables per shelf in normal working, four cables per shelf in protected mode). 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 2Mbit/s cables through the top left hand side of the rack , and down the front of the rack.

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

Terminate all cables with BNC co-axial connectors.

Connect the 2Mbit/s ports on the DDF to E1IN Slot 5 and E1OUT Slot 5 BNC connectors on shelf interface connections located on the modem shelf interface panel. If using protected mode connect the other 2Mbit/s cables to E1IN Slot 9 and E1OUT Slot 9 connectors on the same panel. See Figure 11

Ensure that the respective 2Mbit/s ports have been configured on the DDF/Backhaul

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

120 Ohm Connections

Run the 2Mbit/s 120 ohm cables from the modem shelf to the allocated positions on the DDF/Backhaul. 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 2Mbit/s cables through the top left-hand side of the rack, and down the front of the rack.

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

Terminate all cables with 9 pin D-Type connectors. Terminate as detailed in Figure 12.

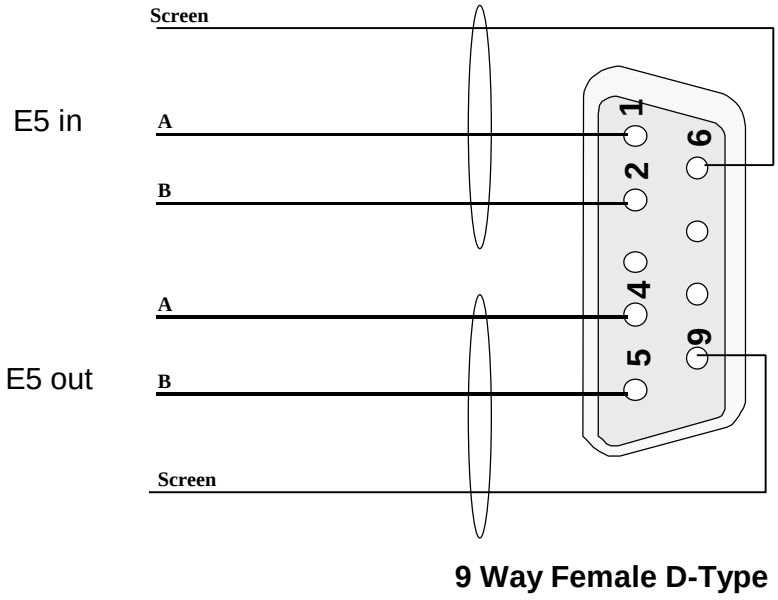

Figure 12. 120 ohm connection to CT modem shelf.

Connect the 2Mbit/s ports on the DDF to P7 connectors on shelf interface connections located on the modem shelf interface panel. If using protected mode connect the other 2Mbit/s cables to P9 connectors on the same panel. See Figure 11

Ensure that the respective 2Mbit/s ports have been configured on the DDF/Backhaul

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

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CENTRAL TERMINAL EXPANSION RACK CABLING

1. DC Power

The cables for the negative DC battery feeds, the 0V returns and the rack ground are detailed in Table 3. 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 3. 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 3. 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 the CT modem 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, into the fuse and alarm panel

Remove clear plastic cover protecting the DC input terminals. Trim cables and strip 7mm. Crimp a spade terminal or terminal ring onto the wire and attach to terminals inside the Fuse and Alarm panel at the appropriate connection points. The negative supplies go to Termination Block 1 & 4. The positive battery returns go to 2 & 5. See Figure 13 Replace clear plastic cover protecting the DC input terminals.

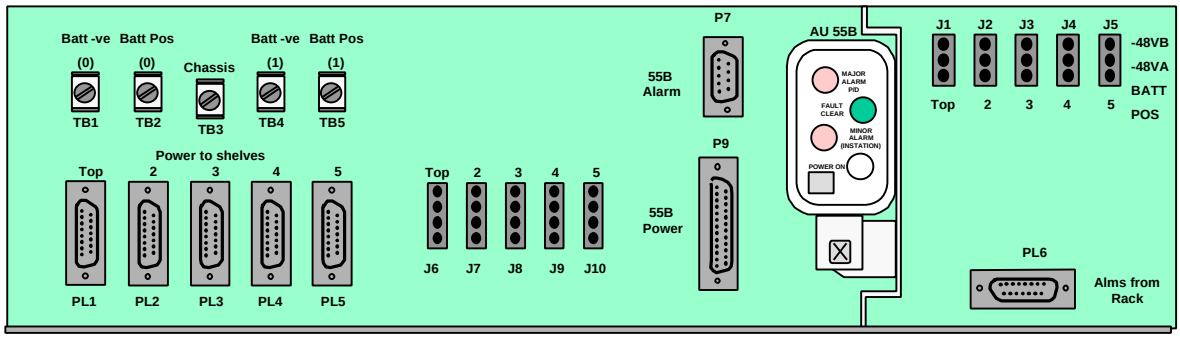


Figure 13. DC Termination On Combiner Shelf.

1.1. Rack Earthing

Using the site survey, locate the building central [safety] grounding point. Run an earth cable rated at 30A. to each rack and connect it to the centre earth stud located at the top or bottom (not both) of the rack. See Figure 7. These points are labelled with the IEC Earth symbol. ⏚.

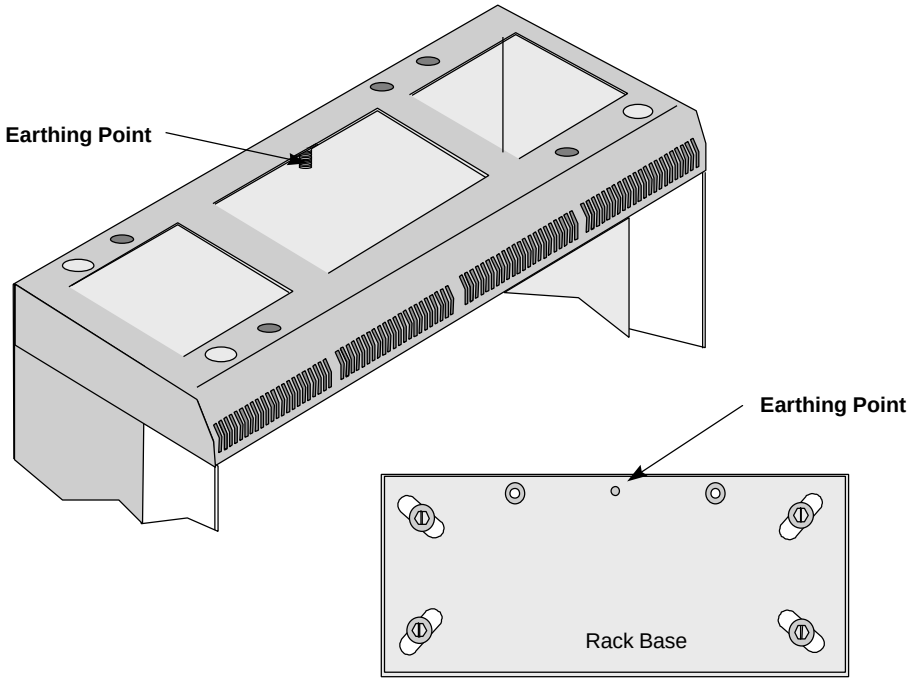


Figure 14. Rack Earthing

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

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. Alarm Unit (Type 55B) External Connections

Run and terminate alarm cables from the AU55B in the combiner shelf alarm scheme on the 25 way D-Type connector as shown in Figure 15. 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, the alarm unit can be plugged connected from the D-type connector on the AU55B to P9 in the Fuse and alarm panel.

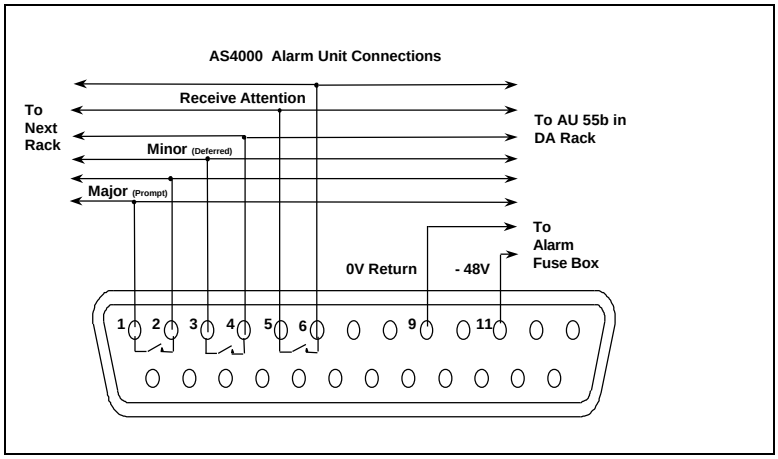


Figure 15. AS4000 Alarm Unit Connections

The 10 way alarm ribbon from the AU55B should be connected to P7 on the alarm panel.

3. 2Mbit/s Cabling

From the site survey, confirm the location of the Digital Distribution Frame (DDF) if a DDF is to be used or the Backhaul/Access Concentrator if the 2Mbit/s feeds are fed direct to the equipment. The length of 2Mbit/s feeds should not exceed 250 metres

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

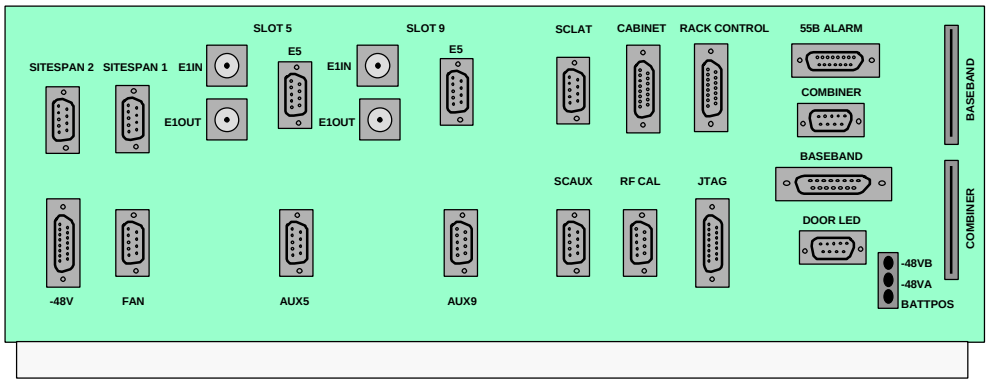


Figure 16. Shelf Interface Connections.

75 Ohm Connections

Run the 2Mbit/s co-axial cables from the modem shelf to the allocated positions on the DDF/Backhaul. (Two cables per shelf in normal working, four cables per shelf in protected mode). 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 2Mbit/s cables through the top left hand side of the rack , and down the front of the rack.

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

Terminate all cables with BNC co-axial connectors.

Connect the 2Mbit/s ports on the DDF to E1IN Slot 5 and E1OUT Slot 5 BNC connectors on shelf interface connections located on the modem shelf interface panel. If using protected mode connect the other 2Mbit/s cables to E1IN Slot 9 and E1OUT Slot 9 connectors on the same panel. See Figure 11

Ensure that the respective 2Mbit/s ports have been configured on the DDF/Backhaul

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

120 Ohm Connections

Run the 2Mbit/s 120 ohm cables from the modem shelf to the allocated positions on the DDF/Backhaul. 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 2Mbit/s cables through the top left-hand side of the rack, and down the front of the rack.

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

Terminate all cables with 9 pin D-Type connectors. Terminate as detailed in Figure 12.

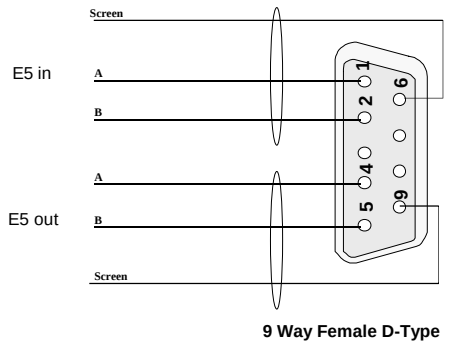


Figure 17. 120 ohm connection to CT modem shelf.

Connect the 2Mbit/s ports on the DDF to P7 connectors on shelf interface connections located on the modem shelf interface panel. If using protected mode connect the other 2Mbit/s cables to P9 connectors on the same panel. See Figure 11

Ensure that the respective 2Mbit/s ports have been configured on the DDF/Backhaul

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

4. Inter-rack connections

1. Remove the blank panel located immediately below the combiner shelf on the DA Rack

2. Run a Baseband ribbon cable from each modem shelf in the Expansion Rack to the combiner shelf via the hole created by the removal of the breakout sections during the rack installation.

3. Insert the connector into the Baseband socket on the Modem Interface shelf (see Figure 18) and into the appropriate socket on the Combiner Shelf backplane (the sockets are located behind the switches).

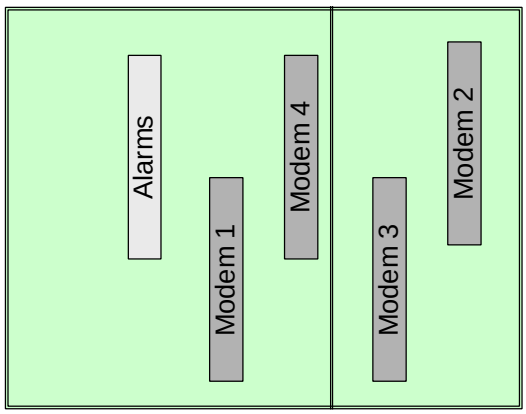


Figure 18. Combiner Shelf Ribbon Connections

4. Run the alarm bus ribbon from the Alarm and Breaker panel to the Alarm Bus socket in the DA Rack wiring loom.

CARD INSTALLATION

The CT rack is shipped with shelves fitted to customer requirements and internal cabling complete.

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

CAUTION PA INSERTION

Care should be taken when installing PAs to ensure that the card connector mates with the backplane connector correctly. Any attempt to ram the card home or force the card into he slot may cause damage to the connector. Insert the card until the connectors engage, ease the card into the backplane until fully engaged. Lock top and bottom with a screwdriver. If resistance is met, remove the card and reinsert. If difficulty persists contact the Airspan service centre.

CAUTION DIP/LNA INSERTION

Care should be taken when installing DIP/LNAs to ensure that the card connector mates with the backplane connector correctly. Any attempt to ram the card home or force the card into he slot may cause damage to the connector. The board extractor levers mat be used to assist with insertion, when the card is home press the body of the DIP/LNA to ensure that the connector is fully engaged. If resistance is met remove the card and reinsert. If difficulty persists contact the Airspan service centre.

1. Preliminary

In a new installation ensure that the CT Circuit Breakers located on the lower assembly of the Combiner Shelf are set to the OFF position.(Down) See Figure 19 and that the breakers on the Fuse and Alarm panel of the Expansion Rack are switched are set to the OFF position (down) See Figure 20.

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

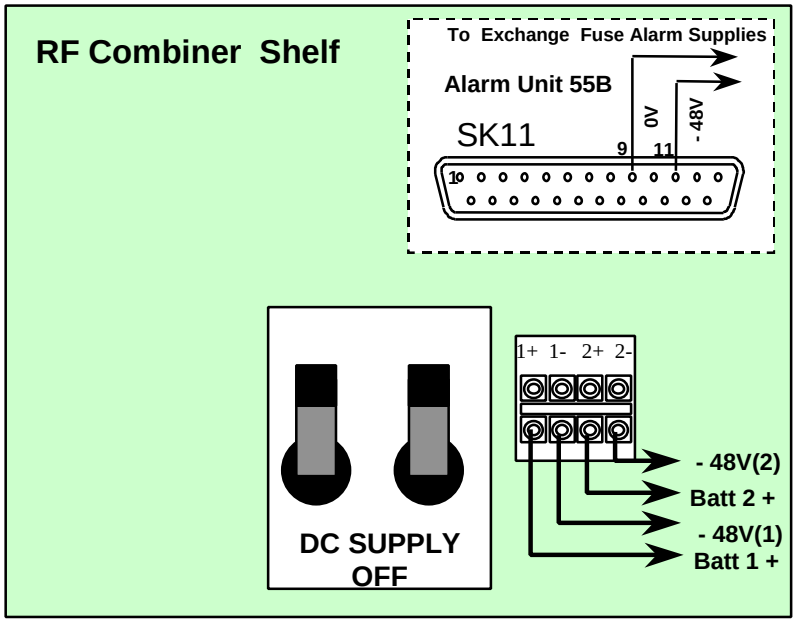


Figure 19. Part of RF Combiner Shelf showing Circuit Breakers.

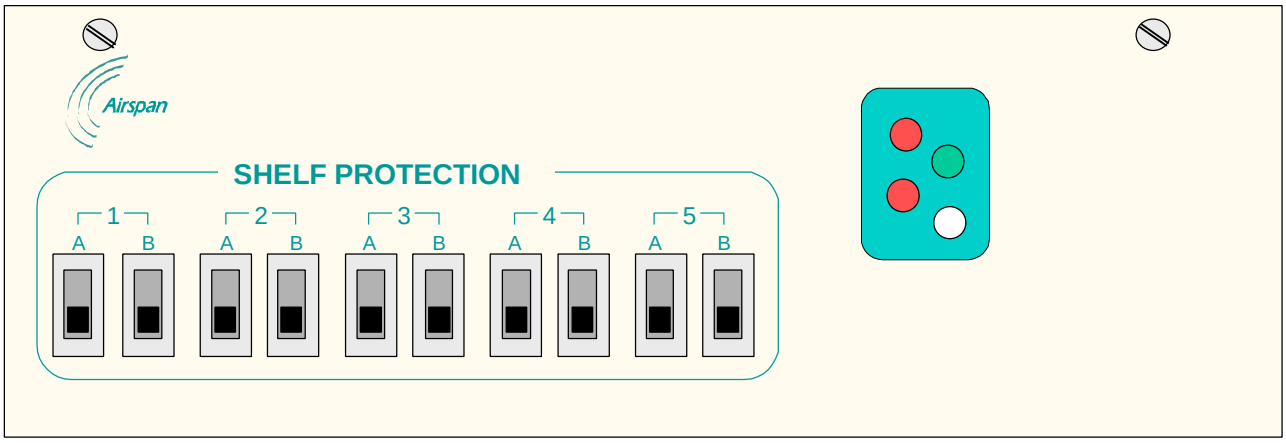
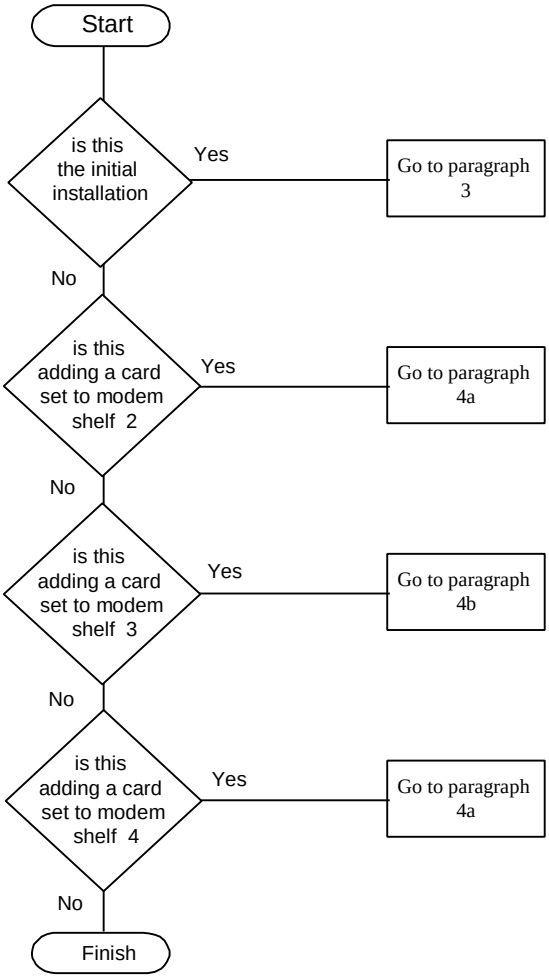


Figure 20. Expansion Rack Fuse and Alarm Panel

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

2. Card Insertion

Insert the cards into the shelves, recording the serial numbers and revision status in the test form. See DLP-013.



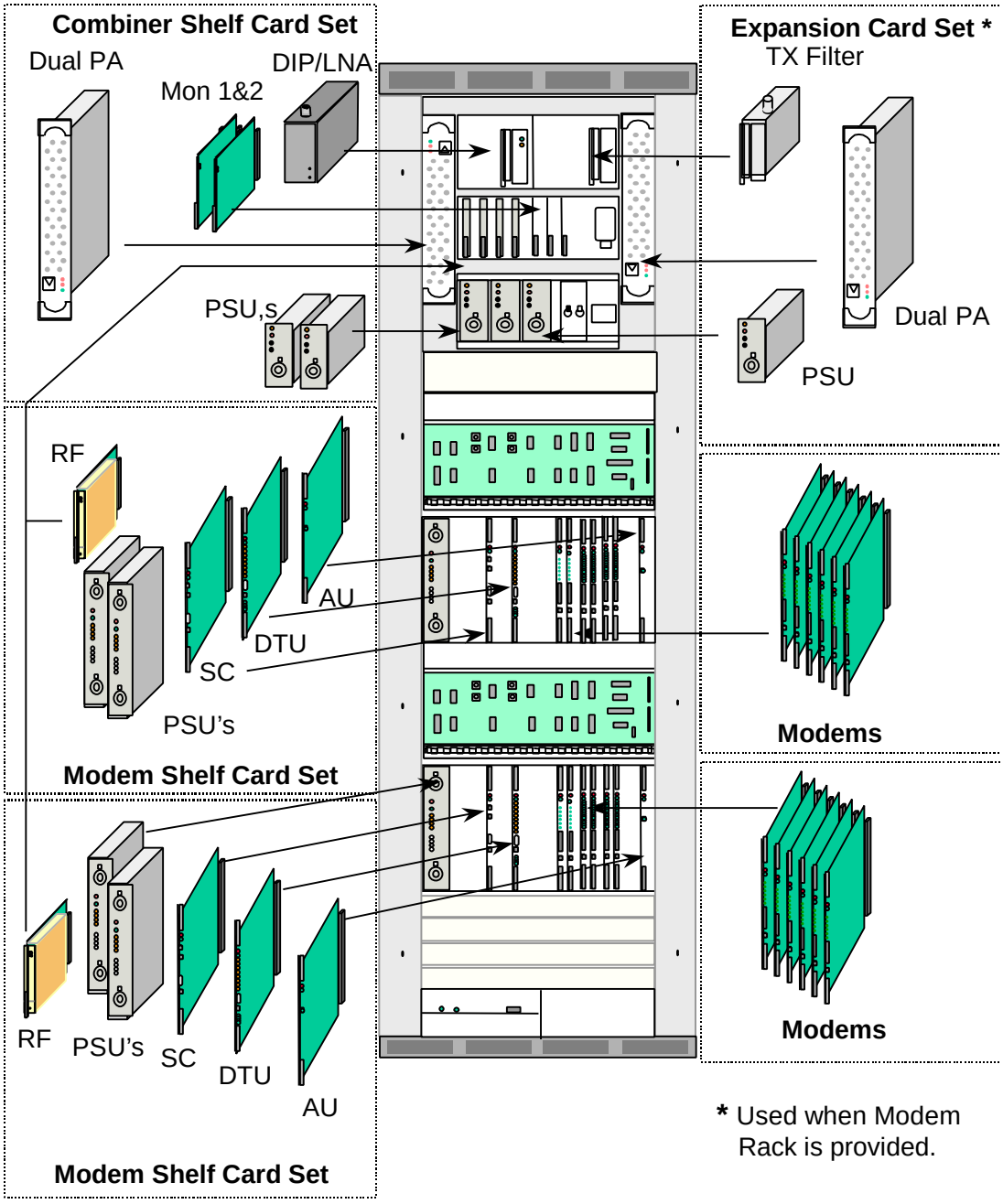


Figure 21. Card Insertion DA Rack

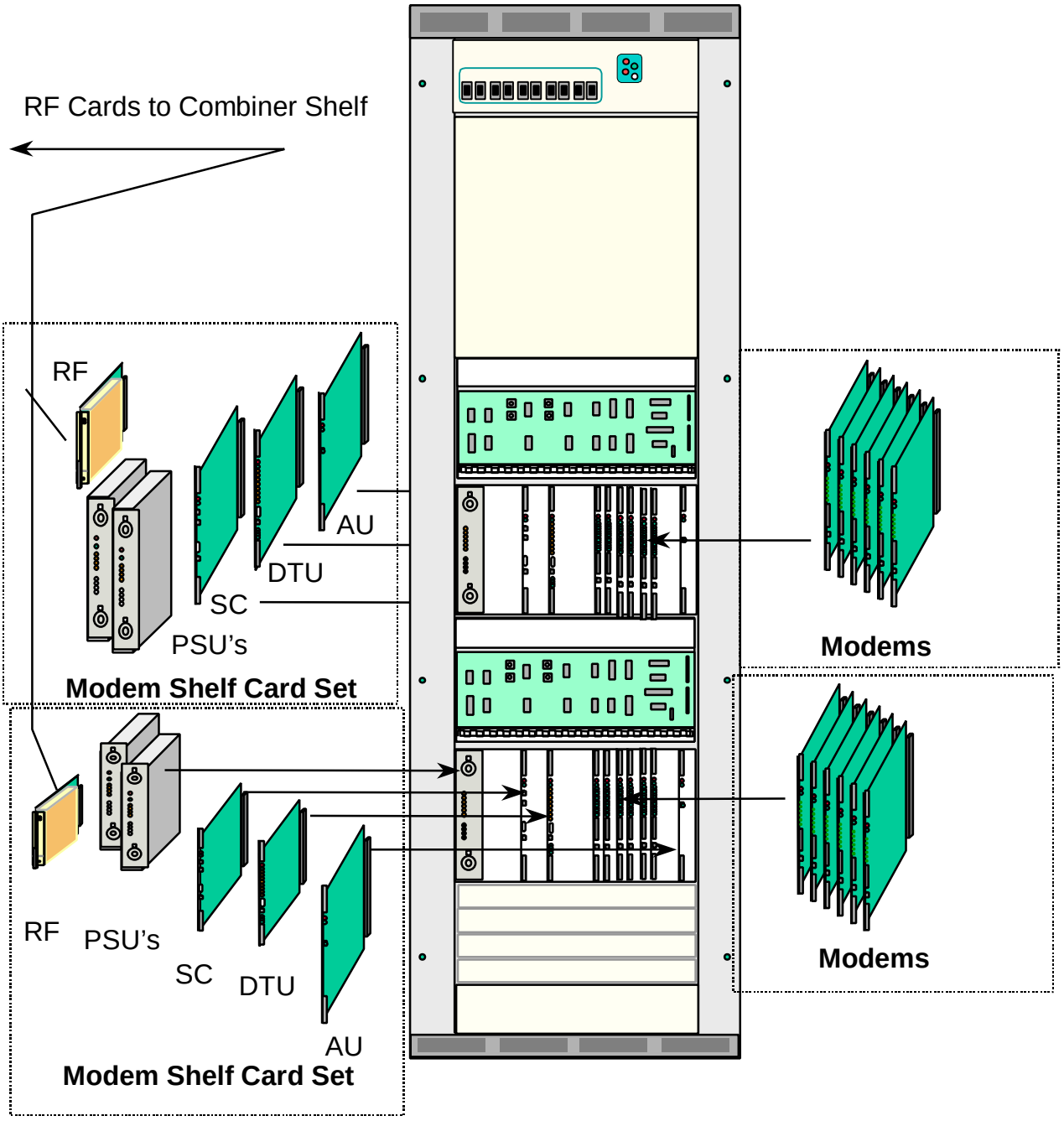


Figure 22. Card Insertion Expansion Rack

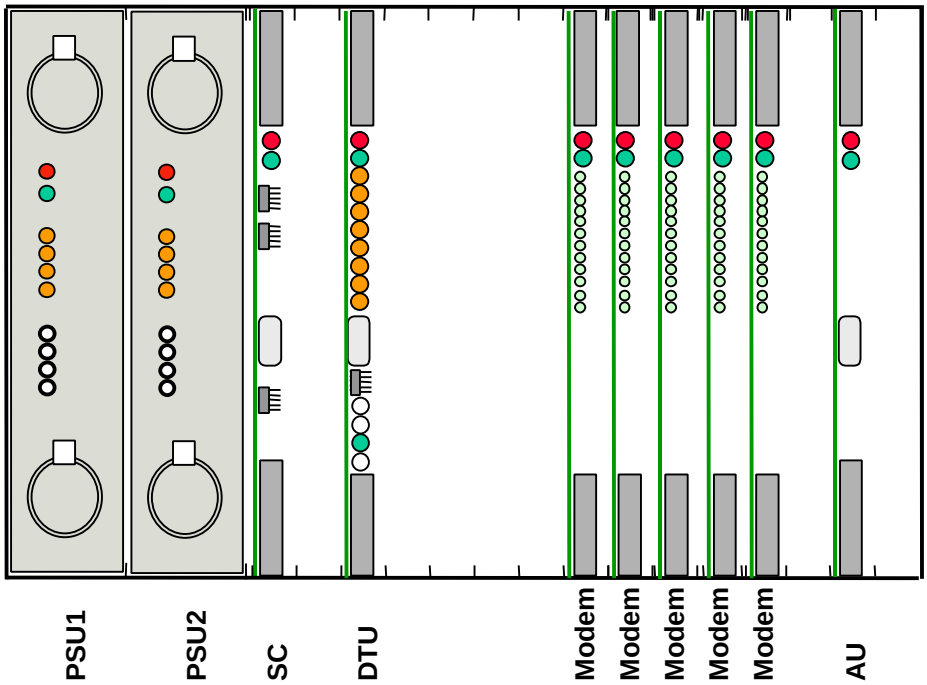


Figure 23. Card installation for DA Modem Shelf

3. Card Provision for New Installation

STEP	PROCEDURE

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.

1. Fit Cards in RF Combiner Shelf

   a) For an installation of Combiner Rack

   Insert the following modules and secure:-

   - 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)

2. If an Expansion Rack has been installed also insert the following modules in the RF combiner shelf located in the DA CT Rack and secure:-

   - 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

3. For each modem 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 Analogue Card (AU)
   - 1 x Demand Assignment Tributary Card (DTU).
   - 1 x Shelf Controller (SC)

4. Fit RF Coupler if using a DACU

1. Fit RF Coupler for connection of systems to the DA Control Unit for commissioning.

2. An 30dB coupler should be fitted to the male N-Type connector at the top of the DIP/LNA1 and the TX filter (if fitted). Port J1 fits onto the DIP/LNA 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. Note some 3.4-3.6GHz systems may not have couplers fitted.

5. Connect Antenna

If the Rack is fitted with couplers connect antenna at this stage. Do not connect antenna at this stage on systems without couplers fitted.

5.1. Two Antenna Installations

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 24. If PA2 and the DIP/LNA2/TX filter units are fitted the second antenna should be connected to the TX filter unit. See Figure 24.

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

5.2. Single Antenna Installations

1. 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.

2. If the Combiner Shelf is not equipped with DIP/LNA2 or TX Filter, it is recommended that the second antenna should be terminated with a 50Ω termination. The termination can be made either 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.

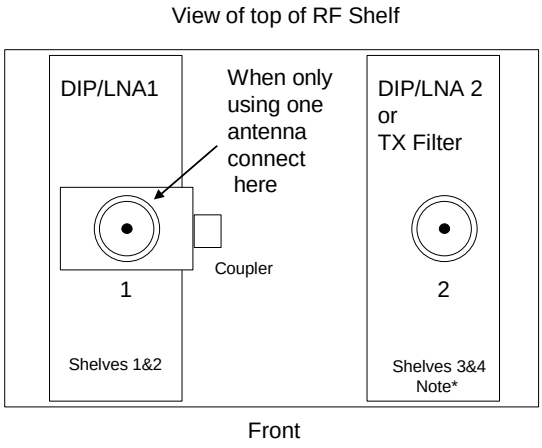


Figure 24. RF Antenna Connections

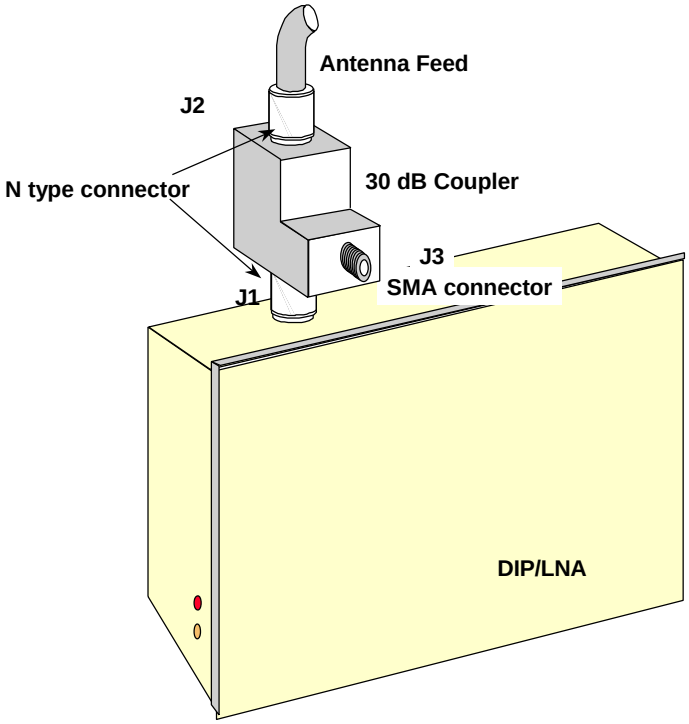


Figure 25. Coupler Connection

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

6. Card Provision into existing installation

STEP **PROCEDURE**

a) Shelf (Top shelf of expansion Rack)

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

   Insert the following cards into the Combiner Shelf (located in the DA CT Rack):-

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

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

Insert the following cards into the Modem Shelf:-

- 1 x Analogue Card (AU)
- 1 x Demand Assignment Tributary Card (DTU).

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.

Now go to DLP-006 and from the flowchart proceed from point labelled 'Start Existing'.

b) Shelf 2 (CT Rack) or Shelf 4 (Expansion Rack)

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

   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 Analogue Card (AU)
   - 1 x Demand Assignment Tributary Card (DTU).

   Note: Test Modem

   A 'test modem' is also required. Any modem card supplied with the equipment will suffice for this purpose.

   Now go to DLP-006 and from the flowchart proceed from point labelled 'Start Existing'.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

COMMISSIONING TESTS

1. General

The following procedures need to be carried out in order to verify the functionality and operation of all cards fitted into the Central Terminal Racks prior to placing the AS4000 system into service.

If during testing, a fault occurs preventing the continuation of the test, the faulty module or card should be replaced and the test repeated for the card and all tests that are affected by the performance of that card.

All results must be entered on the Commissioning Test Result Sheet (DLP-013). Test forms should be photocopied as needed, ensure that sufficient copies of the Modem Functionality Tests sheet are available prior to the commencement of commissioning tests.

2. Commissioning rack

The chart below shows the commissioning and testing process. The reference in brackets is the corresponding paragraph in the text. 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.

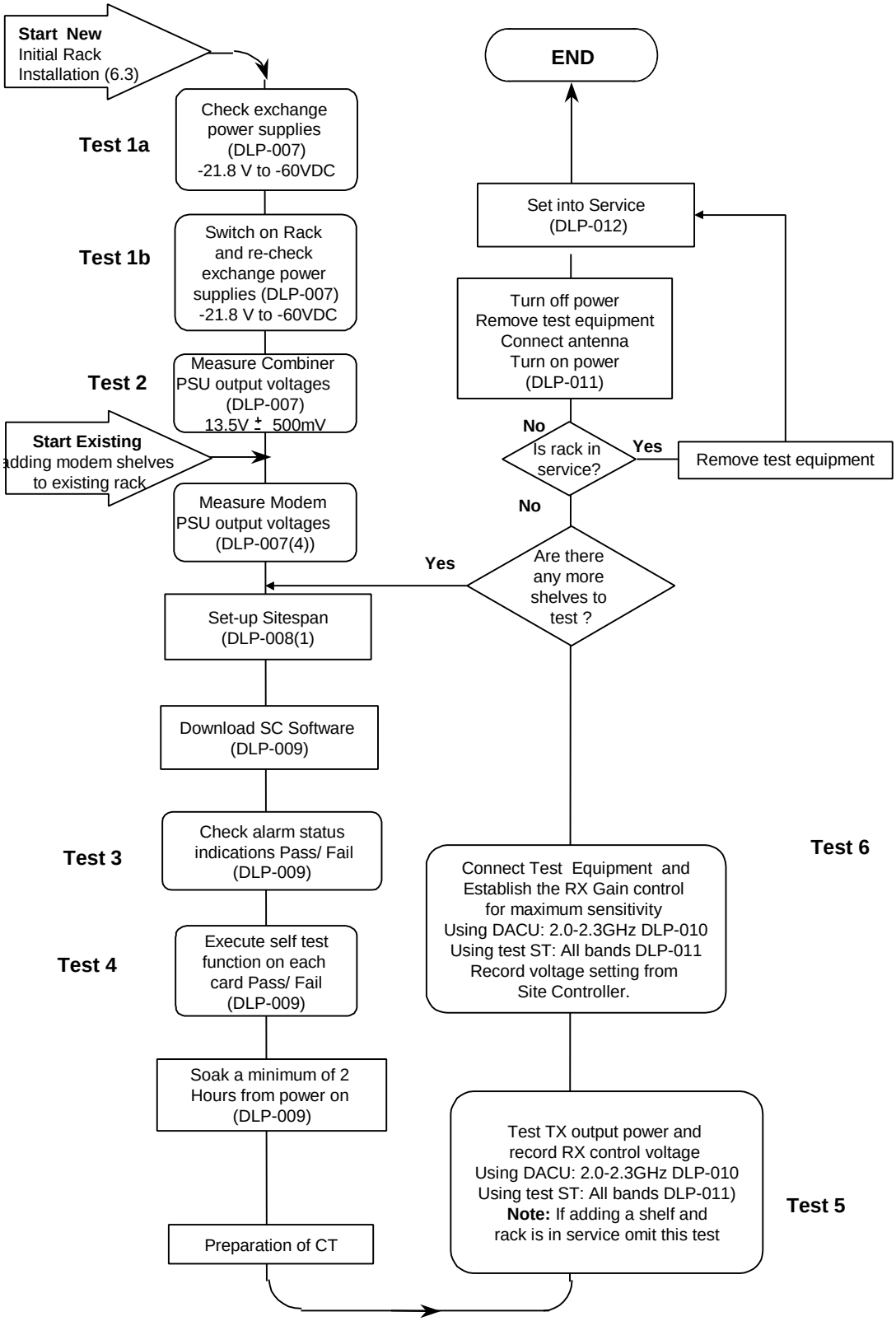


Chart 1 Configuration and Test Procedure

TURN-UP AND DC MEASUREMENTS

STEP **PROCEDURE**

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.

DA CT Rack

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.

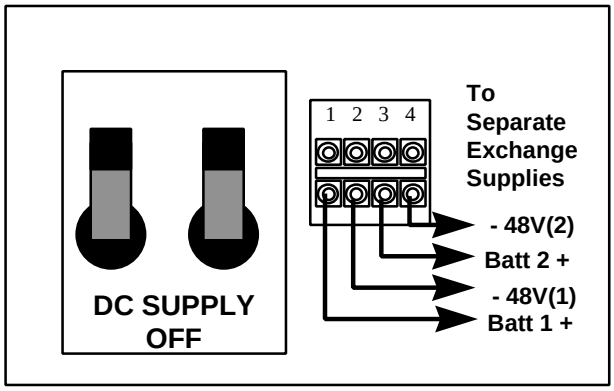


Figure 26. Test Voltage (CT Rack)

Expansion Rack

Unscrew retaining screws on the face of the Fuse and Alarm Panel. Hinge forward the panel and using the DMM measure and record the Exchange DC voltage supply across the input terminals (TB1(-); TB2+;.for Supply 1 and TB4(-); TB5(+) 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.

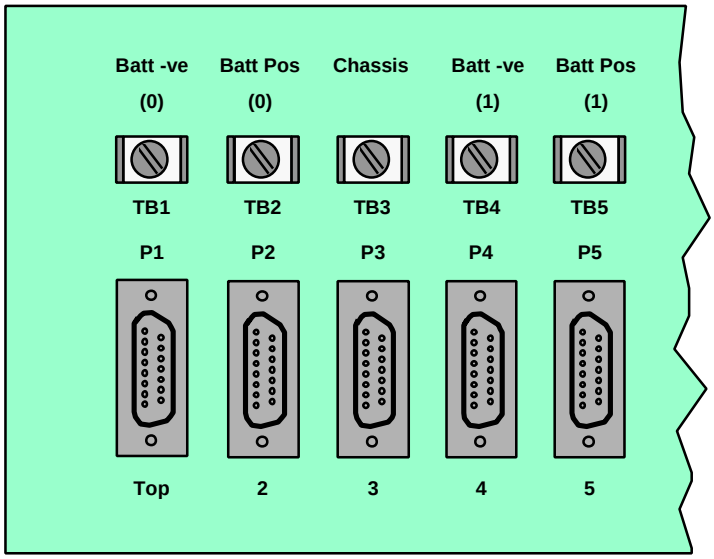


Figure 27. Test Voltage (Expansion Rack)

Record the measured voltage on the test results sheet.

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

DA Rack

Switch the CT Combiner Rack **ON** by placing both breakers up and wait for the system to complete the power-up self test sequence successfully. 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 the DC voltage supply across the input terminals (1+ & 1- for Supply 1 and 2 + & 2- for supply 2) is still within the specified limits and record on the test results sheet.

Expansion Rack

Switch the CT Expansion Rack **ON** by placing both breakers up and wait for the system to complete the power-up self test sequence successfully. 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 the DC voltage supply across the input terminals (TB1(-); TB2+;.for Supply 1 and TB4(-); TB5(+) 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.

3. PSU Voltage Combiner Shelves: (Test 2)

Using the DMM, measure and record the DC voltage at the front panel test points on each of the PSUs on the RF Combiner Shelf. (Figure 26)

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

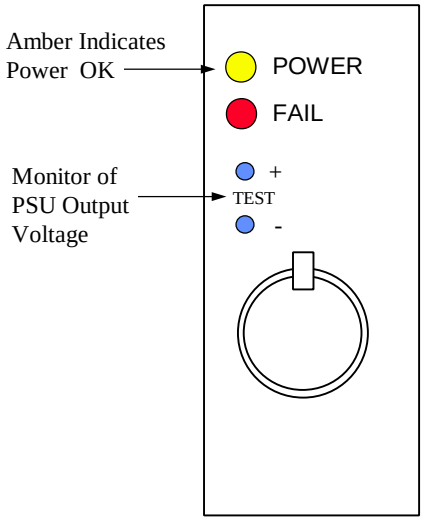


Figure 28. PSU Voltage Test.

4. PSU Voltage Modem Shelves: (Test 2a)

Using the DMM, measure and record the DC voltage at the front panel test points on each of the PSUs on the Modem Shelf.

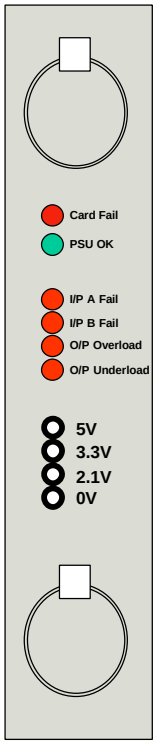


Figure 29. Modem Shelf PSU

Ensure that the voltages measured are within the limit shown in Table 4. Record the results in test form.

Voltage	Upper Limit	Lower Limit
5V DC	5.25V	4.75V
3.3V DC	3.0V	3.3V
2.1V DC	2.1V	2V

Table 4

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SETTING UP SYSTEM USING SITESPAN

Note: Sitespan should have been set up when commissioning the AC, but in the event that the CT is being commissioned before the AC, the Sitespan set up has been also included in this document.

Within Sitespan, both the racks and the shelves must be 'built' before the rack can be powered up.

Do not connect Sitespan to the rack at this stage.

The following steps must be followed:

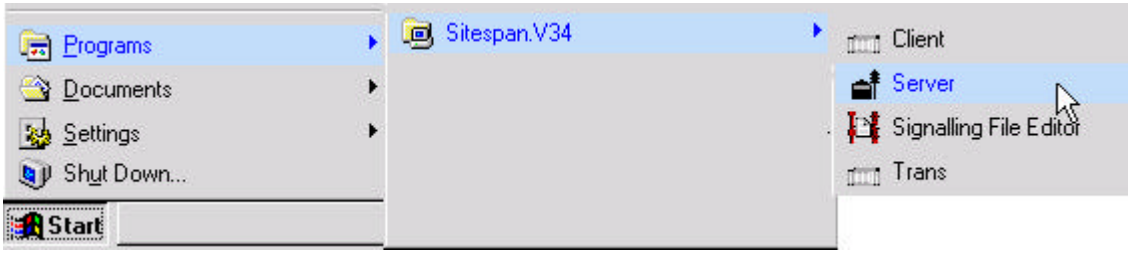
STEP **PROCEDURE**

1. Setting up Site Configuration on Sitespan

Before the system can be configured, Sitespan Version 3.4 Build 4 or later must be installed on the dedicated PC. Before installing, ensure that the PC is running Windows NT service pack 3 or later is set to run RAS and has a spare comms port or Digiport available. **Note** If the Sitespan managing an existing network is to be updated from a previous version then the current database must be updated prior to running the V3.4 version. See Appendix 4 for details of running the transfer program. For details on installing Sitespan software see the Sitespan User Guide 605-0000-426

1. Sitespan can then be started as follows:

2. Start the Server by selecting 'server' from the 'start menu' (In the 'Sitespan V34' folder, under programs)

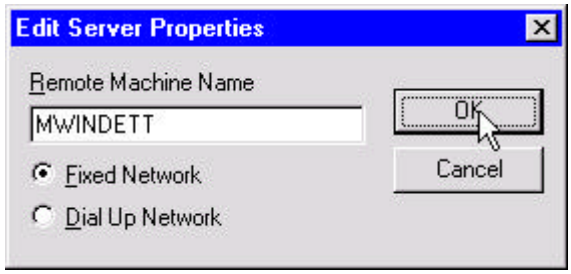


3. Start the Client by selecting 'client' from the 'start menu' (In the 'Sitespan V34' folder, under programs)

4. From the client view, open 'template.ssd' from the file menu

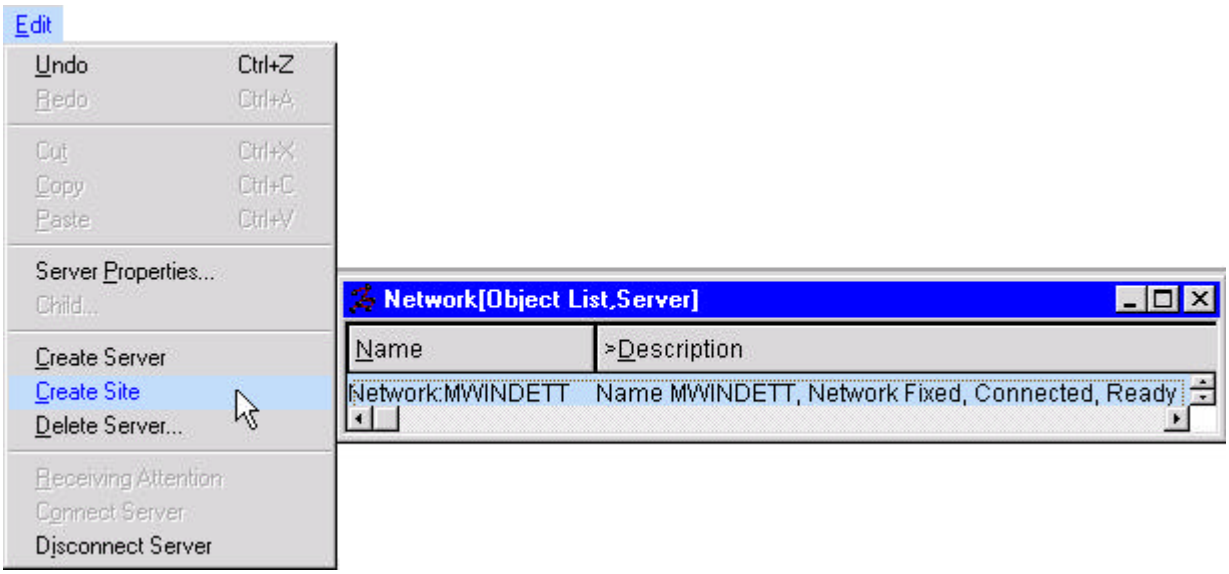
5. Highlight the 'object list, server' and 'create server' from the 'edit menu'

6. If using the fixed network, select the name or ID number of the PC that Sitespan is running on.

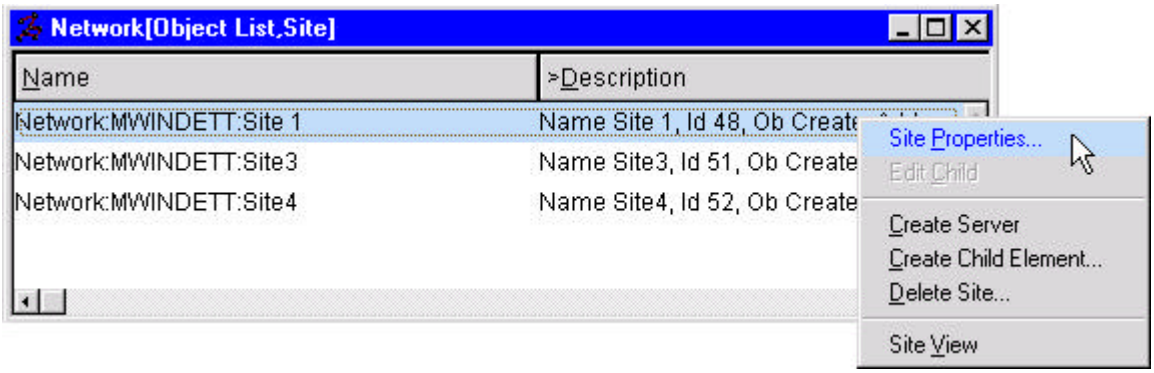


7. Select the server on the Server object list with the mouse. If the server is not selected connection is not possible. Connect the server from the 'edit menu'

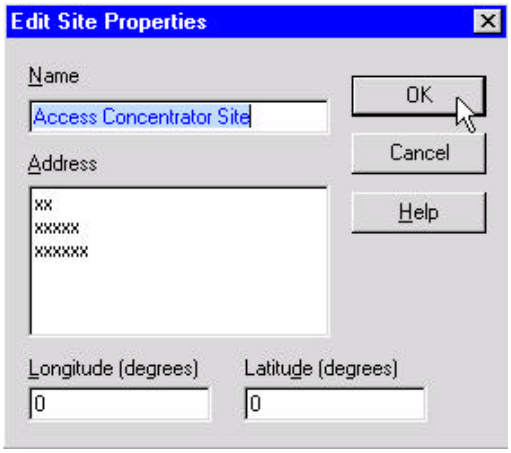
8. To create the AC Site select the server from the object list(listed in View Menu) and select Create Site from the 'edit menu'



9. From the Object List, Site click right mouse button and select Site Properties



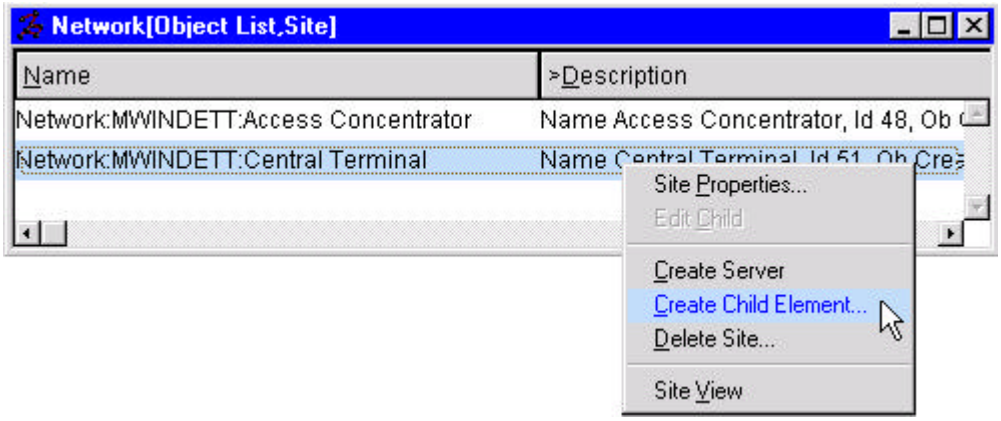
10. Enter Site details



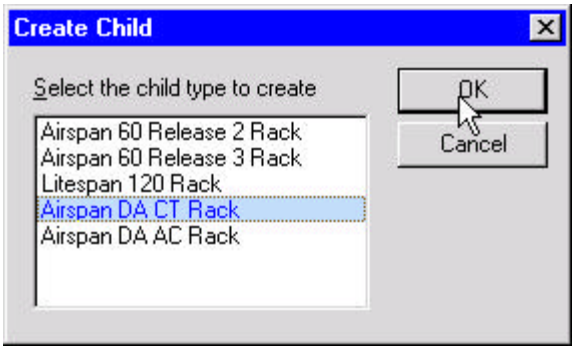
11. Repeat Steps 8-10 for each of the CT sites.

2. Setting up CT Rack and Shelf configuration on Sitespan

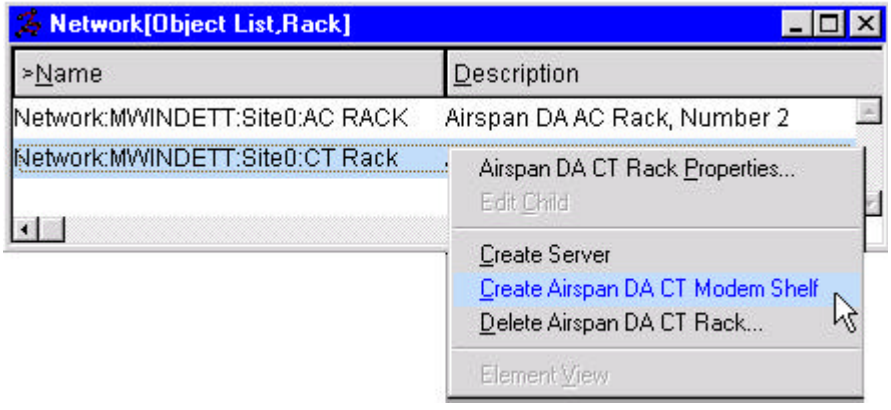
1. Highlight the site, click right mouse button and select '*Create Child Element*'



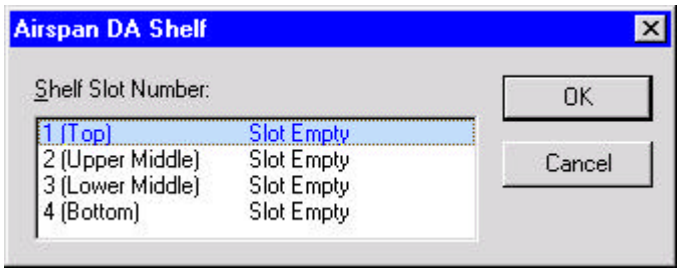
2. Select '*Airspan DA CT rack*'



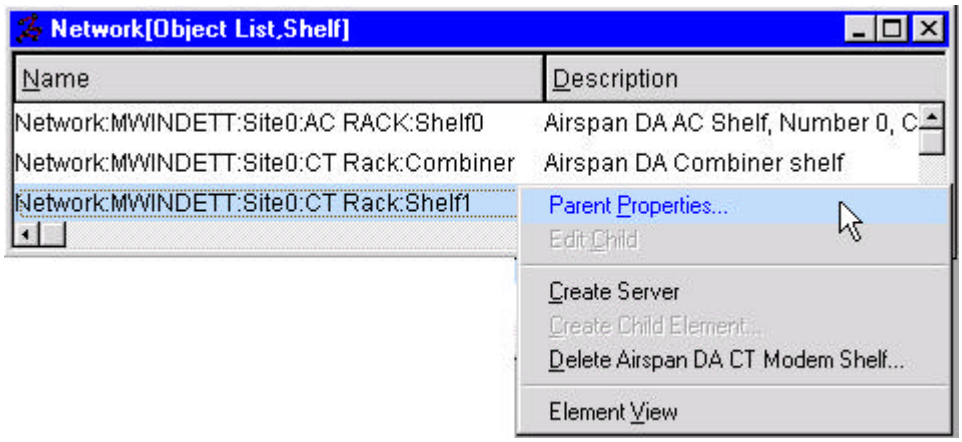
3. Highlight the rack in Object List, and create '*Airspan DA CT modem shelf*' from the 'edit menu'



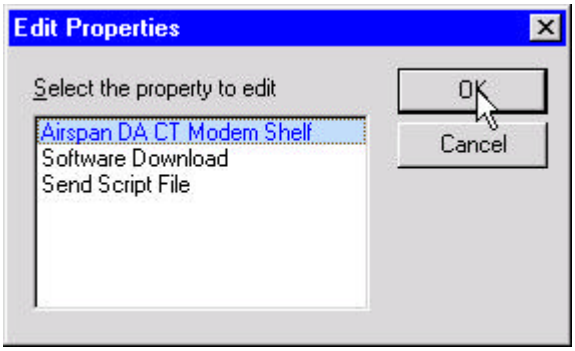
4. Select '*1 (Top)* ' (to set up modem shelf 1)



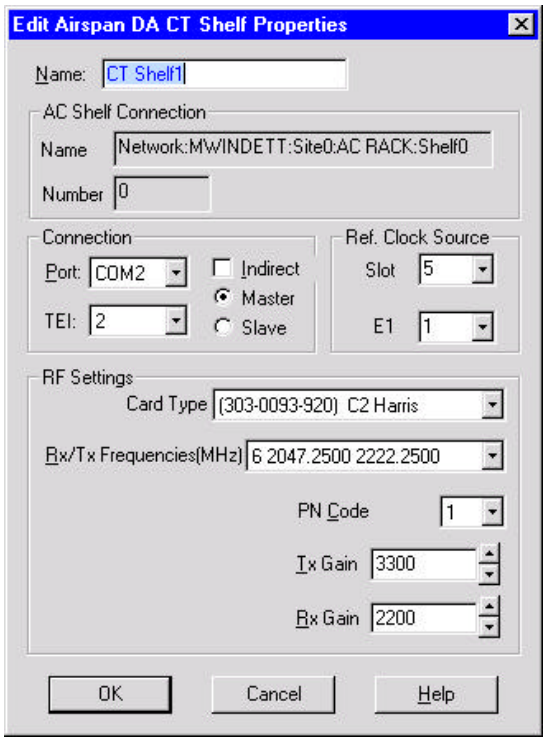
5. Highlight shelf, and edit 'parent properties'



6. Select '*Airspan DA CT Modem Shelf*'



7. Select Com port and unique TEI identifier to communicate with the AC shelf.

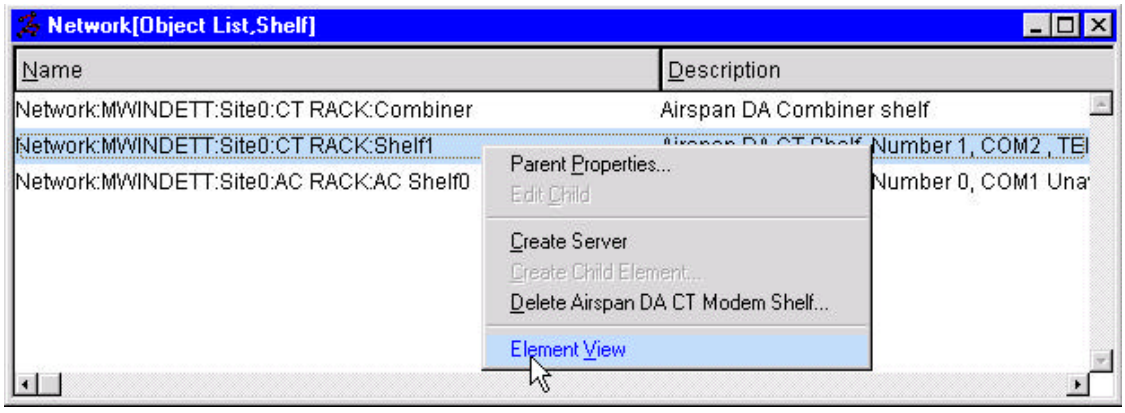


8. Set the reference clock source to the DTU connected to the CTU in the AC rack from where the clock source is derived. This is usually Slot 5 E1-1 for 75ohm Backhaul or Slot 5 E1-5 for 120ohm Backhaul. Enter the RF card type, Frequency and PN Code and set the TX gain to 3300 and the RX gain to 2200 (these are nominal values and are fine tuned when the RX sensitivity is set).

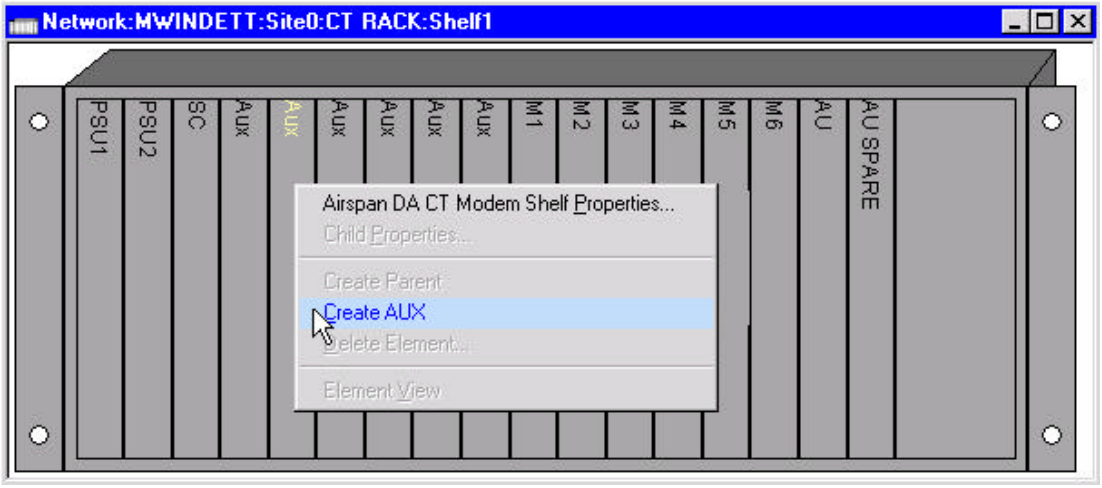
3. Assign Central terminal Card Slots

3.1. DTU Card

1. Highlight shelf, click right mouse button, click ‘element view’, and select ‘*Airspan DA CT Modem Shelf*’

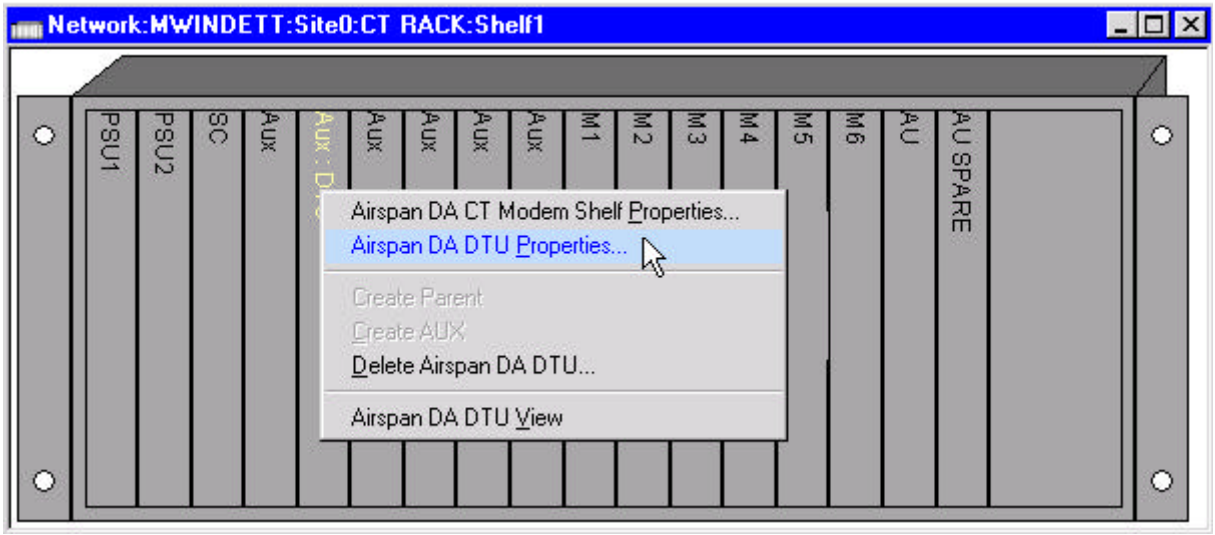


2. Highlight slot 5 for the DTU (Slot 5 is the first slot available for assigning as a DTU) and click right mouse button select 'Create Aux' from the 'edit menu'

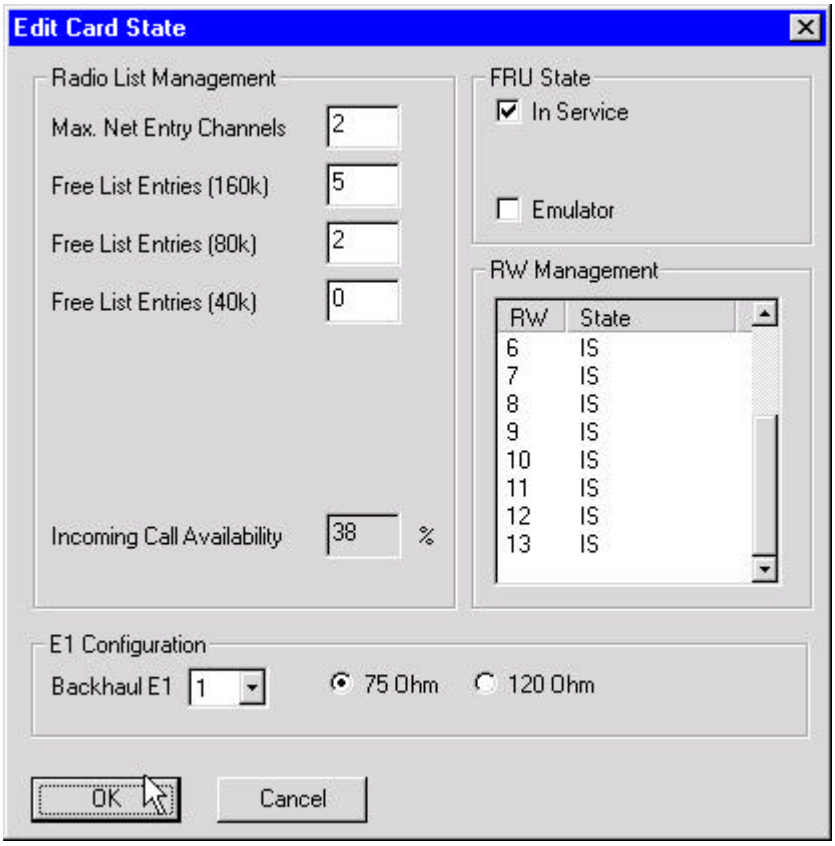


3. Select '*Airspan DA DTU*'

4. Display the shelf view and select the DTU card. Click right mouse button and select '*Airspan DA DTU Properties*'.

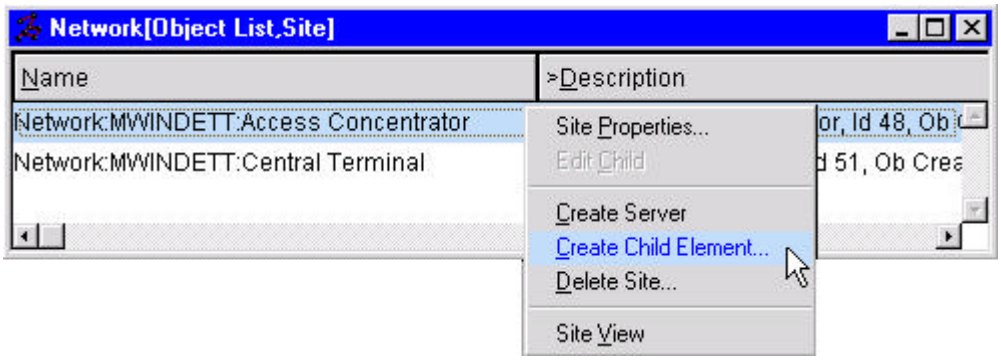


5. Set the impedance of the backhaul connections and the backhaul link used to connect the CTU and DTU. Set the Freelist entries to 5 for 160k and 2 for 80k.

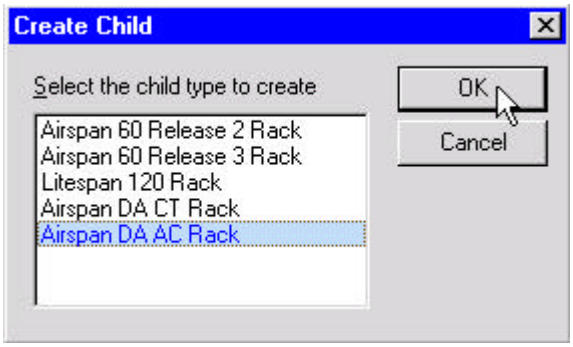


4. Setting up AC Rack and Shelf configuration on Sitespan

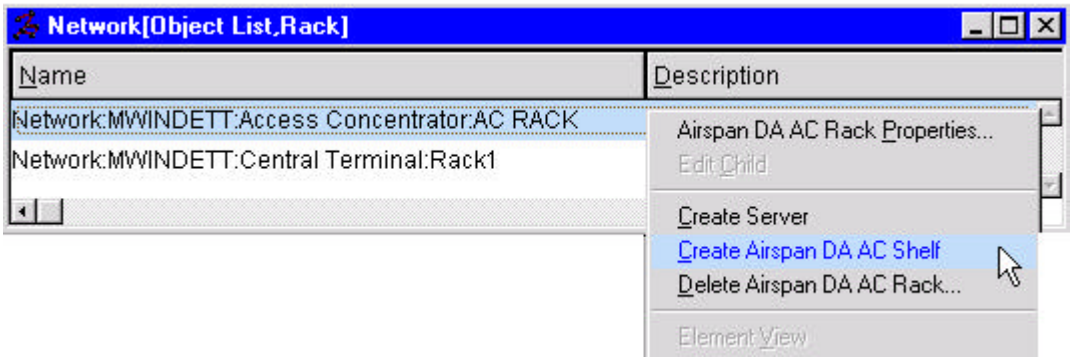
1. Highlight the site, click right mouse button and select '*Create Child Element*'



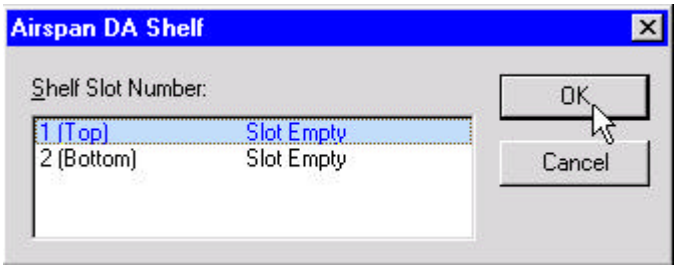
2. Select *Airspan AC Rack*



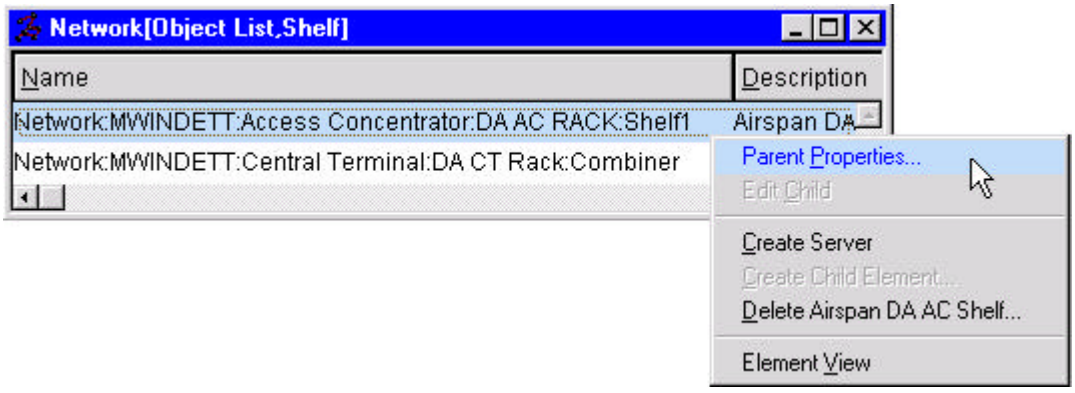
3. Highlight the rack in Object List, click right mouse button and select create '*Airspan DA AC shelf*'



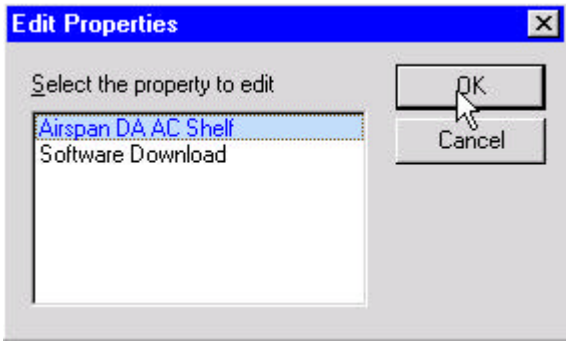
4. Select the position for the AC shelf.



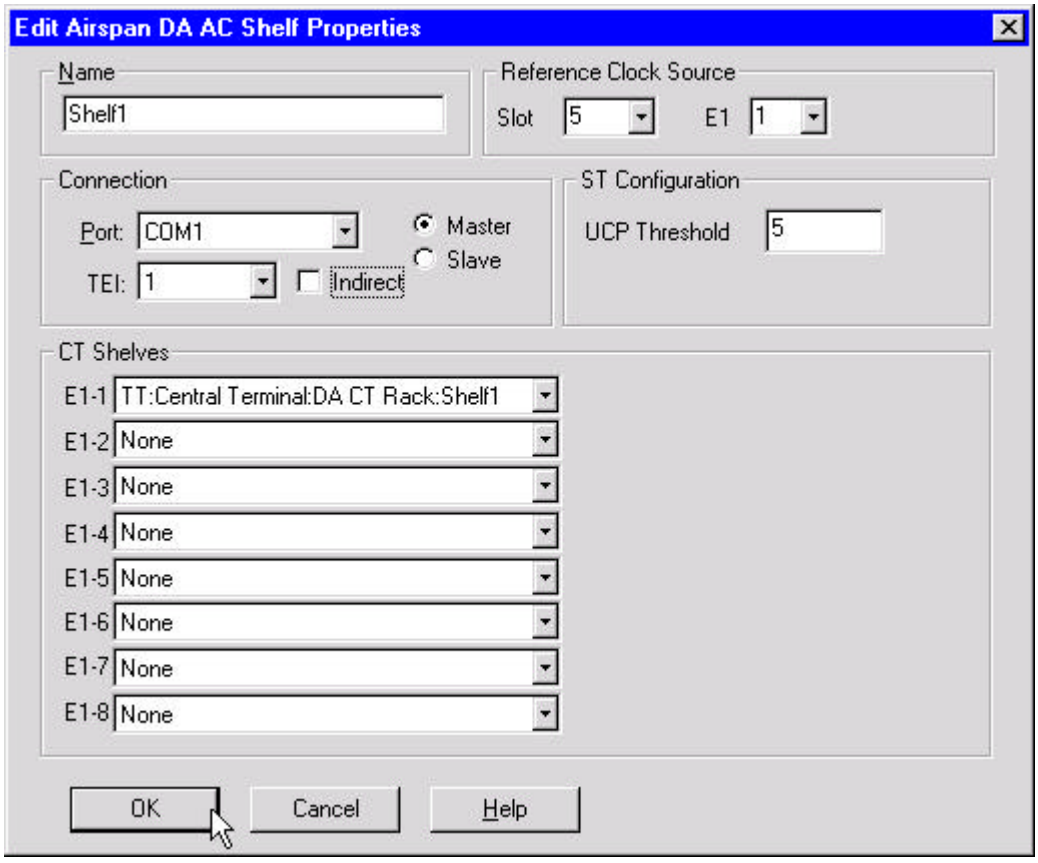
5. From the object list shelf click right mouse button and select *Parent Properties*



6. Choose *Airspan DA AC Shelf*

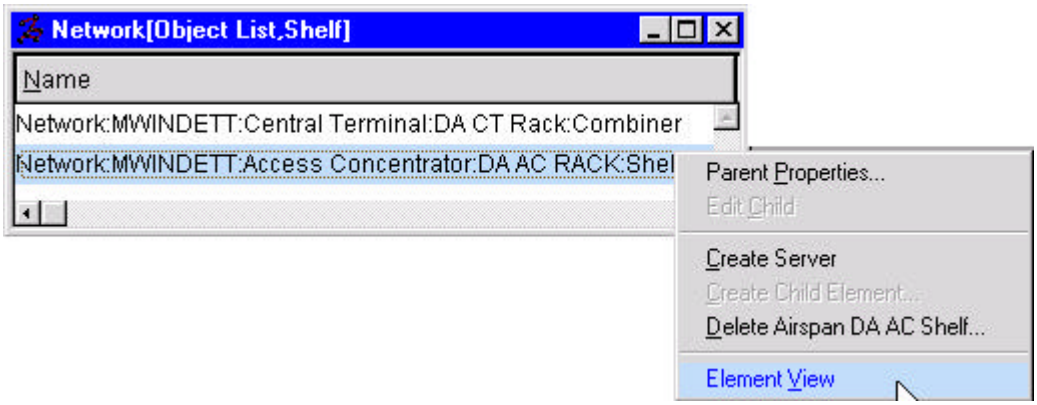


7. Enter Shelf Name, Reference Clock Source to derive timing from the network. This is usually the first E1 on the first XTU card i.e slot 5 E1-1. The Com Port is the Sitespan PC port connected to the AC shelf. The TEI must be a unique number within the system. The shelf object list shows what TEIs have been allocated to each shelf. Leave the indirect box unchecked. The UCP threshold is used to detect changes in code phase and should be set between 3-5 to avoid unnecessary alarms. The CT shelves connected to the Access Concentrator are allocated to the E1 link connecting them, drop window and select shelf.

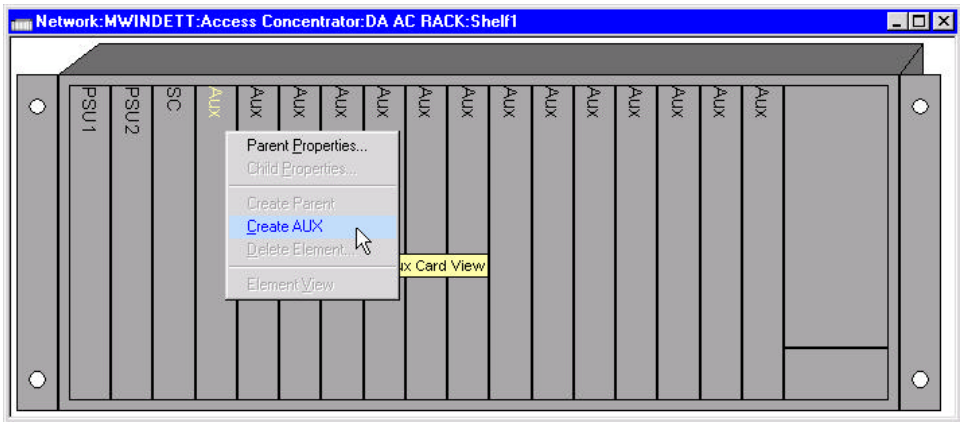


5. Assign Access Concentrator Card Slots

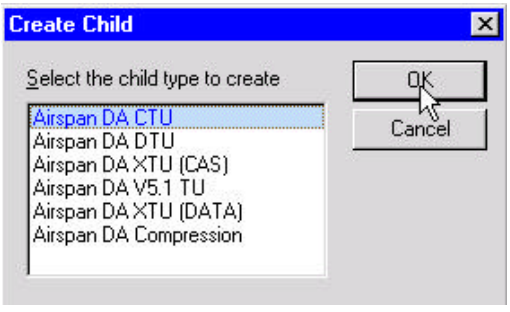
1. From Object List, Shelf select Access Concentrator, click right mouse button and select *Element View*



2. Position mouse over Aux card position to insert card, click right mouse button and select *Create AUX*



3. Select the child type to create.

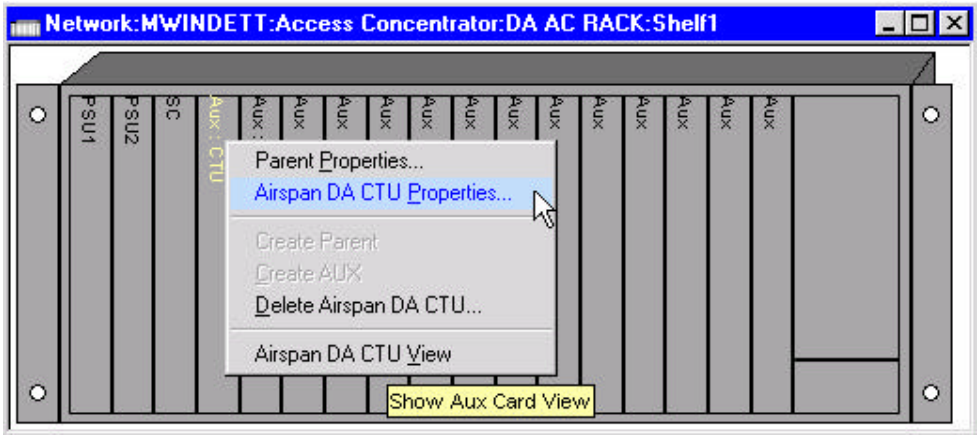


4. Repeat steps 1 to 3 for all cards to be installed in the shelf.

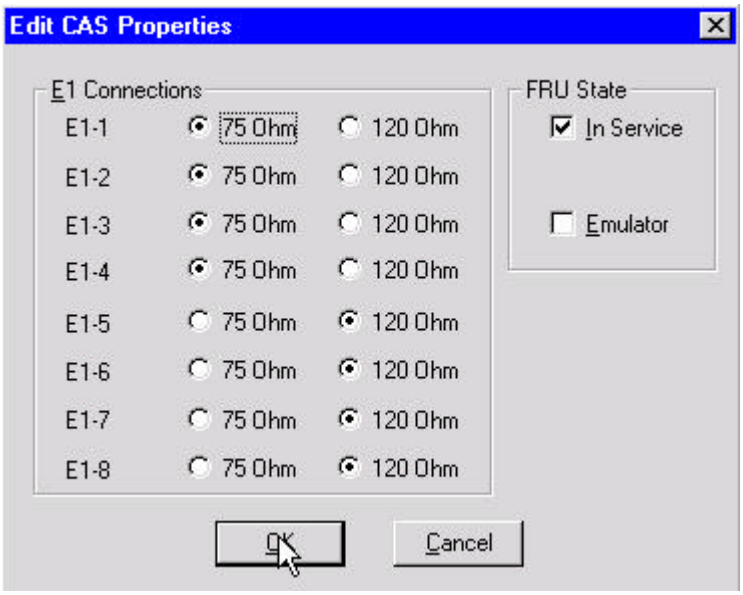
6. Configure AC Cards

6.1. CTU

1. Position mouse over CTU card position to insert card, click right mouse button and select *Airspan CTU Properties*

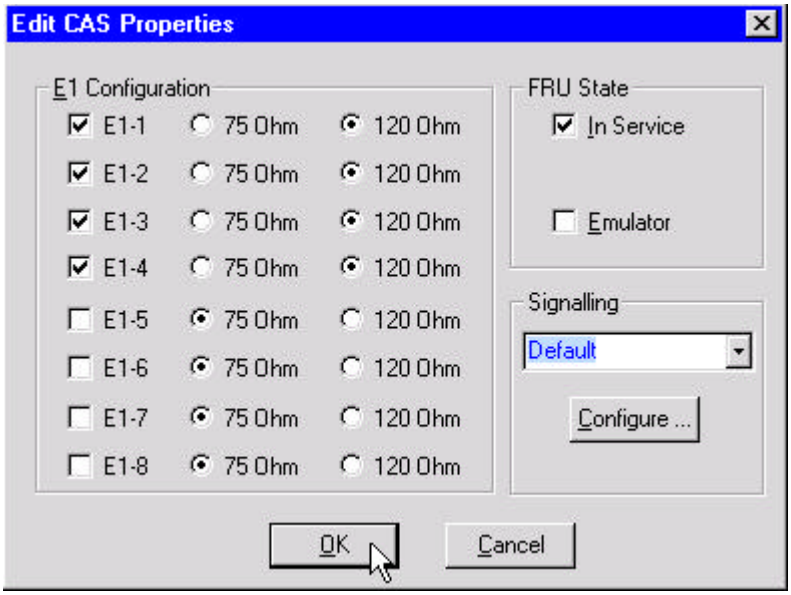


2. Select the Impedance of the E1 connections to the Central Terminal. Repeat for other CTU cards.



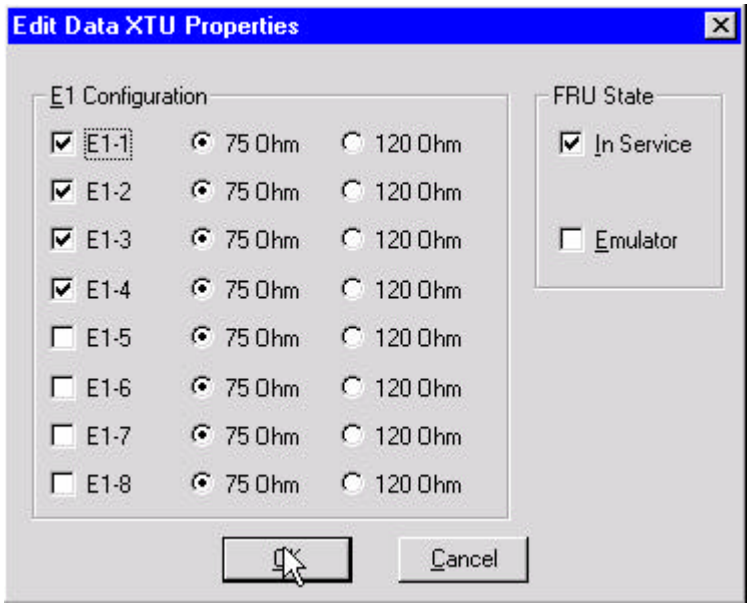
6.2. CAS

1. With Shelf view displayed. Position mouse over the CAS Card(if CAS card installed) position to insert card, click right mouse button and select *Airspan CAS Properties*. Click left mouse button in the box alongside each E1 link provisioned to the Switch. Set the impedance of each link. If special signalling features are required, click the Configure button and enter the parameters. Repeat for other CAS cards.



6.3. DATA

1. With Shelf view displayed. Position mouse over the DATA Card (if DATA card installed) position to insert card, click right mouse button and select *Airspan DATA Properties*. Click left mouse button in the box alongside each E1 link provisioned to the Switch. Set the impedance of each link. If special signalling features are required, click the Configure button and enter the parameters. Repeat for other DATA cards.

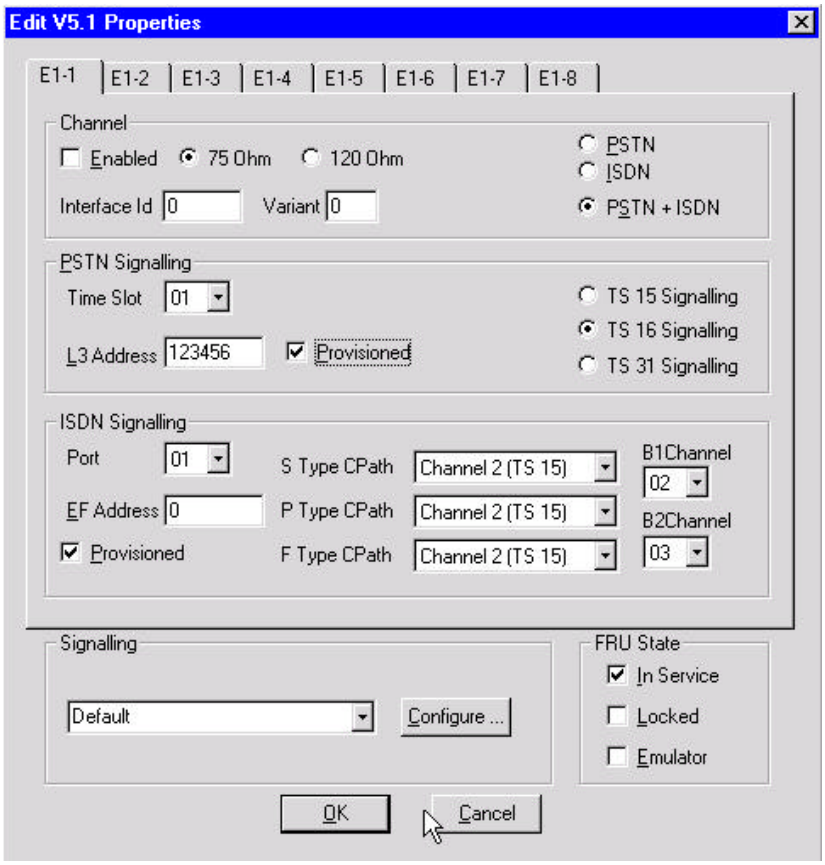


6.4. V5.1

1. With Shelf view displayed. Position mouse over the V5.1 Card (if V5.1 card installed) position to insert card, click right mouse button and select *Airspan V5.1 Properties*. Click left mouse button on each E1 linkTab provisioned to the Switch. Enable Channel, set the impedance of each link. Enter Interface ID and Variant Number (these must match those provided at the switch). Select the service type (PSTN, ISDN or Mixed).

   A) PSTN. Select the Timeslot 15,16 or 31 for signalling Each PSTN signalling Time Slot must be allocated a L3 address Number (these must also match those provided at the switch). Select each time slot in turn and enter the L3 number. If special signalling features are required, click the Configure button and enter the parameters. Repeat for other V5.1 cards.

   B) ISDN Set the port and EF addresses Number (these must match those provided at the switch). The S, P and F type Cpaths can use the sane timeslot Common Channel signalling Path as the PSTN or may use a different time slot (these must match those provided at the switch).



STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SHELF CONTROLLER SOFTWARE DOWNLOADS

STEP **PROCEDURE**

1. Shelf Controller Software Downloads

The SC must be loaded with the latest Shelf Controller and TU software to ensure that the cards operate correctly. All the software for the cards in the shelf is downloaded and stored in the SC card. . All of the software versions are downloaded to the SC irrespective of whether the SC is an AC SC or a CT SC. This is useful for fault finding

1. Before downloading the latest software it **must** be placed in the 'download' directory created in the root directory on the Sitespan PC when Sitespan was installed. The SC is capable of storing two sets of configuration files

2. Connect Sitespan to the backplane modem shelf to be configured. Sitespan is connected to P5 (labelled 'Sitespan 1')

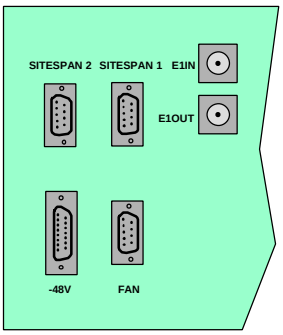
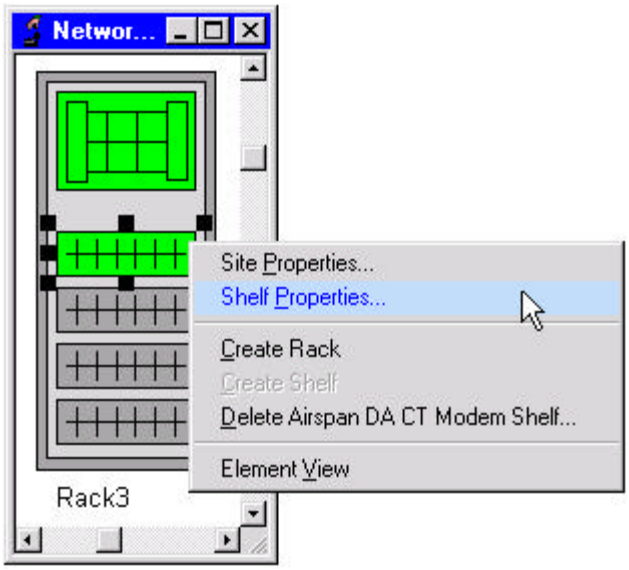
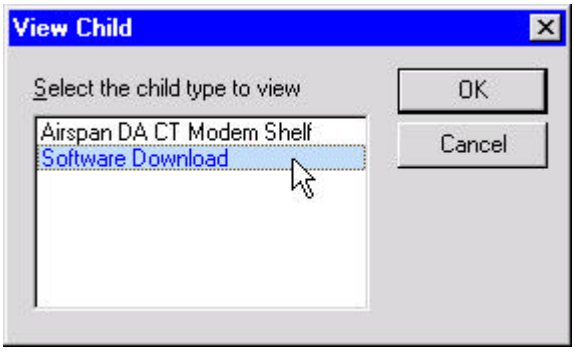


Figure 30. Modem Shelf Backplane

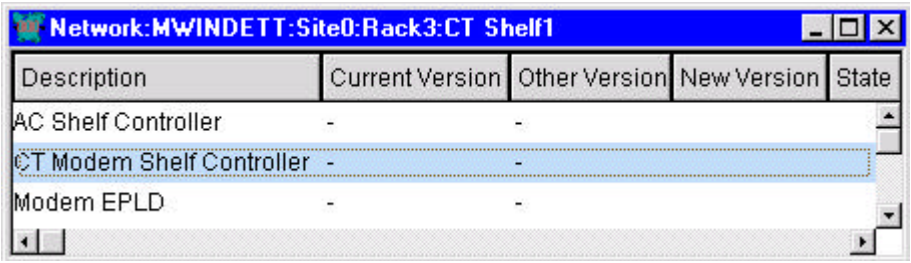
3. The following procedure must be followed on Sitespan to download the software to the SC card: Highlight shelf, click right mouse button and edit 'Shelf Properties'.



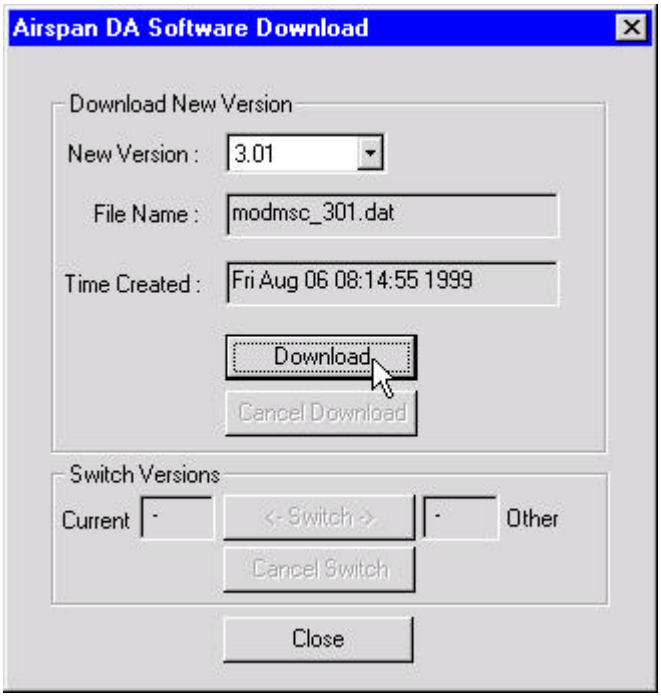
4. Select ‘Software Downloads’



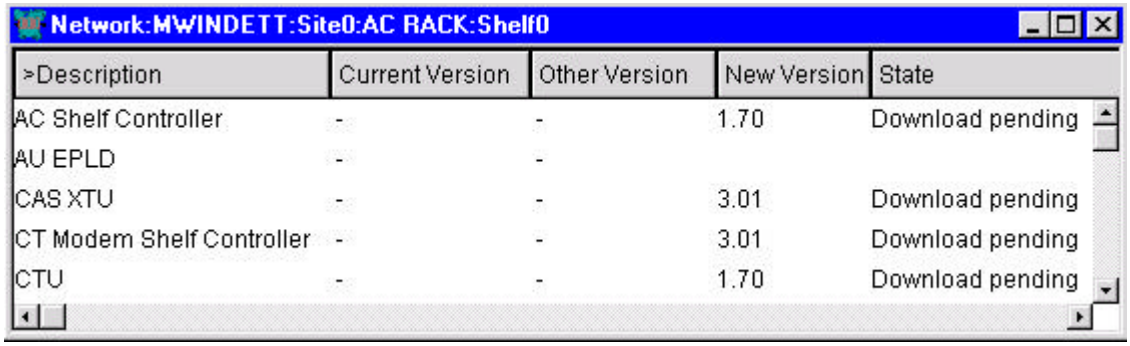
5. ‘Double click’ the type of SC that relates to the shelf selected.



6. Check that the version for download is the latest version, select ‘download’.



7. Repeat steps 5 and 6 for all the software files to be loaded. Download progress is shown on the main software download screen. Files waiting to be downloaded will show Download pending in the object list.



8. Wait for the download to complete which could take several hours.

9. Once the software downloads are complete, reset by ‘hot plugging’ the Shelf Controller Card

10. After switching the software for the rest of the cards in the shelf, each card must be reset from Sitespan. This is achieved by opening up the card view by ‘double clicking’ the card, and selecting ‘reset’

All of the software versions are downloaded to the SC irrespective of whether the SC is an AC SC or a CT SC. This is useful for fault finding

11. All the cards on the modem shelf now boot-up.

12. The TU cards l display the following LED sequence:

    Note: The boot-up procedure for these cards takes approximately 15minutes.

    a) Red LED, amber LEDs & green surface mount LEDs all ON. Green LED FLASHING
    b) Red LED ON, green LED FLASHING, amber LEDs OFF & green surface mount LEDs showing download progress.
    c) Green LED ON, green surface mount LEDs indicate card configuration as shown below

LED	DTU
1 Top	OFF
2	OFF
3	ON
4 Bottom	OFF

13. The rest of the cards displays the following LED sequence:

    Note: The boot-up procedure for these cards takes a couple of minutes

    a) Red LED ON & green LED FLASHING
    b) Green LED ON

14. If the cards do not boot-up correctly, which is indicated if any of the cards display a flashing red or continuous red LED only, follow the procedure in Appendix 3

STEP **PROCEDURE**

2. Alarm and Status Indications (Test 3)

1. 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			
Position	Colour	Description	Status
Top 1	Amber	Power/Module Status OK	ON
2	Red	Power Fault	OFF

RF Card [RF]			
Position	Colour	Description	Status
Top 1	Amber	Power/Module Status OK	ON

2	Red	Power Fault	OFF

Shelf Monitor			
Position	Colour	Description	Status
Top 1	Red	Power Fault/PA Module Fault	OFF
2	Amber	Power/Module Status OK	ON

Power Amplifier[PA]			
Position	Colour	Description	Status
Top 1	Amber	Power/Module Status OK	ON
2	Red	Power Fault/PA Module 1 Fault	OFF
3	Red	Power Fault/PA Module 2 Fault	OFF

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

Power Supply Unit [PSU]			
Position	Colour	Description	Status
Top 1	Amber	Power OK	ON
2	Red	Power Fail	OFF

Table 5. RF Combiner Shelf Card LED Indications.

Modem Shelf Card LEDs.

In normal state all LED's will be OFF, an LED come ON to indicate action is required.

MODEM			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	Card failure LED, which shall be alight if the card self test fails, or if commanded by the SC.	OFF
2	Green	Card busy LED, to indicate live traffic is present and should not be removed.	ON
3	Red	Link failure Trinity 1	OFF
4	Red	Link failure Trinity 2	OFF
5	Red	Link failure Trinity 3	OFF
6	Red	Link failure Trinity 4	OFF
7	Red	Link failure Trinity 5	OFF
8	Red	Link failure Trinity 6	OFF
9	Red	Link failure Trinity 7	OFF
10	Red	Link failure Trinity 8	OFF
11	Red	Link failure Trinity 9	OFF
12	Red	Link failure Trinity 10	OFF
13	Red	Link failure Trinity 11	OFF
14	Red	Link failure Trinity 12	OFF

TU8			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	Card failure LED, which shall be alight if the card self test fails, or if commanded by the SC.	OFF
2	Green	Card busy LED, to indicate live traffic is present and should not be removed.	ON
3	Red/yellow	E1 port 1 Alarm	*
4	Red/yellow	E1 port 2 Alarm	*
5	Red/yellow	E1 port 3 Alarm	*
6	Red/yellow	E1 port 4 Alarm	*
7	Red/yellow	E1 port 5 Alarm	*
8	Red/yellow	E1 port 6 Alarm	*
9	Red/yellow	E1 port 7 Alarm	*
10	Red/yellow	E1 port 8 Alarm	*

LED Orange if 2Mbit/s is not being sent, Red if 2Mbit/s not received.

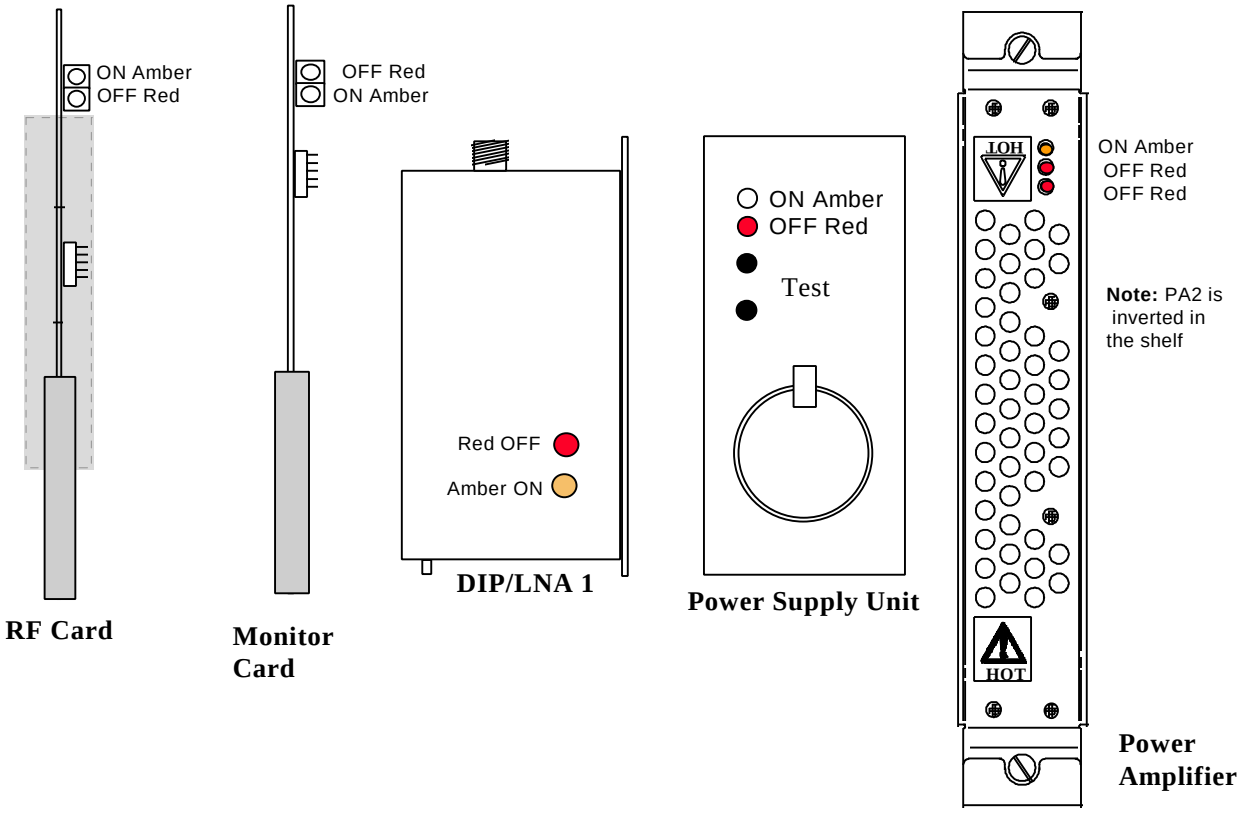
AU			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	Card failure LED, which shall be alight if the card self test fails, or if commanded by the SC.	OFF
2	Green	OK Card is Active..	ON

CU			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	Card failure LED, which shall be alight if the card self test fails, or if commanded by the SC.	OFF
2	Green	Card busy LED, to indicate live traffic is present and should not be removed.	OFF

SC			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	Card failure LED, which shall be alight if the card self test fails	OFF
		OK Card is Active.	

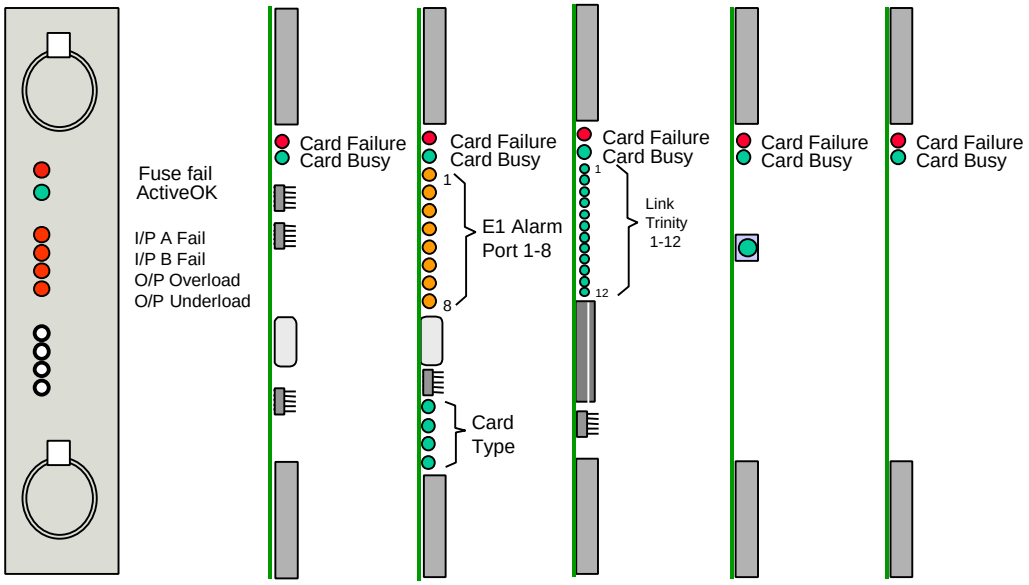
PSU			
Position	**Colour**	**Description**	**Status**
TOP 1	Red	FUSE FAIL which shall be alight if either input fuse has blown.	OFF
2	Green	OK Card is Active.	ON
3	Red	I/P A FAIL input voltage A (BATTNEG0) not present	OFF
4	Red	I/P B FAIL input voltage B (BATTNEG1) not present	OFF
5	Red	O/P OVERLOAD.	OFF
6	Red	O/P UNDERLOAD	OFF

Table 6. Modem Shelf Card LED Indications.



Note: LED function detailed in Table 5

Figure 31. Combining Shelf Alarm Indications



Note: LED function detailed in Table 6.

STEP	PROCEDURE

3. Self Test (Test 4)

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

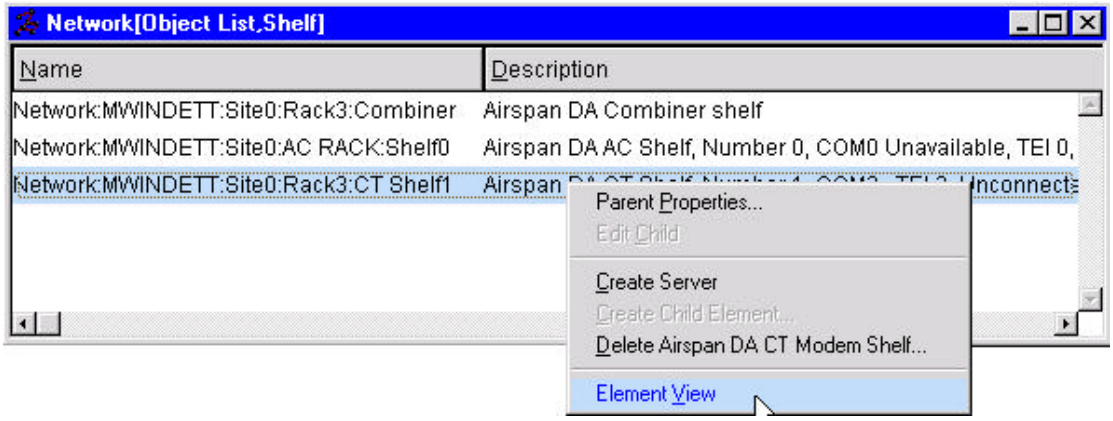
4. System Soak

1. 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.

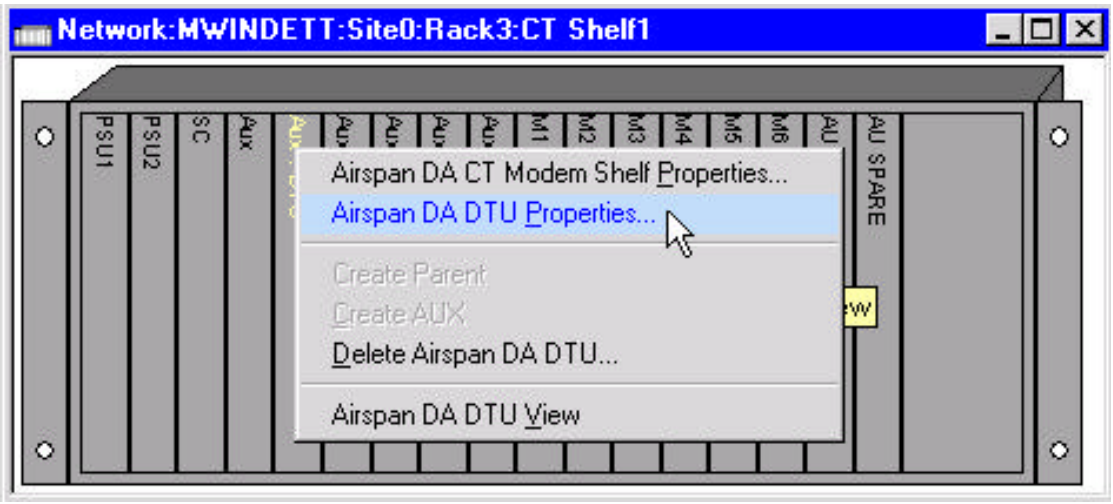
5. Preparation for Commissioning at the Central Terminal

To make it possible for the test CRU/DACU to acquire a link the RW Management and Net Entry has to be set as follows:

15. From the object list shelf select the modem shelf, click right mouse button and select the ‘element view’



16. Select the DTU on the modem shelf and click right mouse button, select Airspan DTU properties



17. In the Edit card state window set max net entry channels to 1, set the number of Free list entries at 160K 80K and 40K to 0.

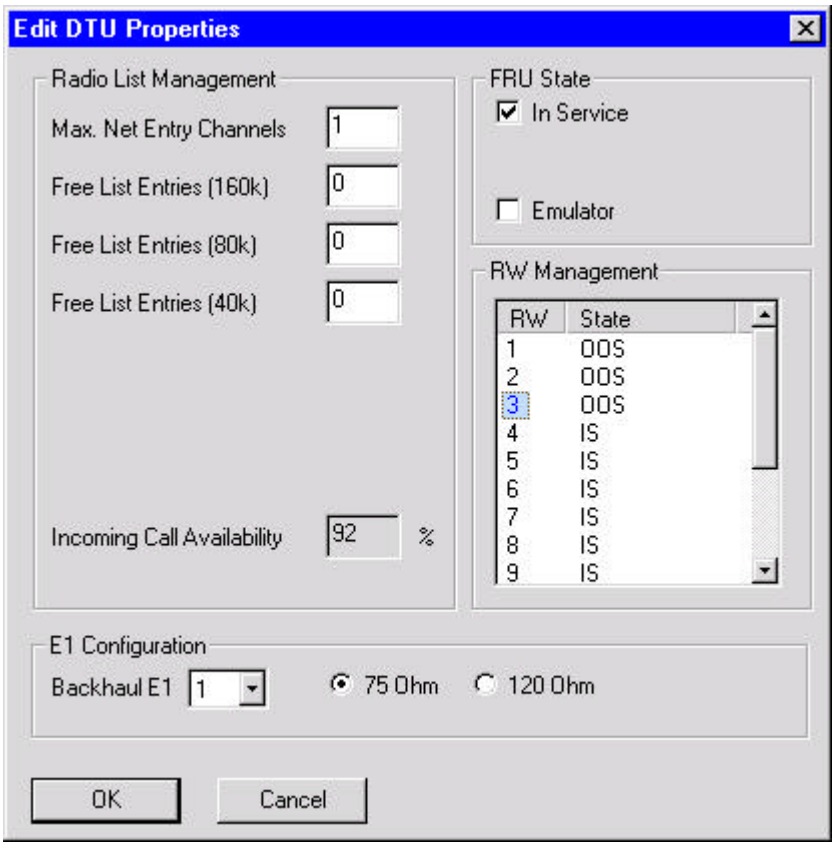
18. In order to acquire a test radio link using an ST, Sitespan must be used to place RW codes 'Out of Service' (OOS) for either 10k or 160k bandwidths. These can be selected from the DTU card properties. The options for each RW code are:

    - IS - The RW is in service
    - OOS - This takes the RW out of service.
    - OOS(10k) - This puts the RW in Test Mode, allocating a 10kbit/s bandwidth.
    - OOS(160k) - This puts the RW in Test Mode, allocating a 160kbit/s bandwidth.

    The DTU card view shows all of the RW codes, and their current state within the system (i.e. OOS or IS).

IMPORTANT NOTE: *An RW code can only be placed Out of Service if it is currently not in use by the system (See GRD). Before proceeding, it is important that the DTU card view is checked, to ensure that the RW code is in the desired state.*

19. In the RW management window place the mouse pointer over the IS for RW 1 click left mouse button until OOS is selected. Repeat for RW2 and RW3 to prepare for commissioning. Once RW codes have been reserved for Test links, the ST can be programmed in the usual method, although the RW channels that the 10kbit/s and 160kbit/s links are acquired on, must be the same as the ones set-up in the DTU card properties (i.e. NOT RW 15!).



STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SETTING THE RECEIVE SENSITIVITY USING DA COMMISSIONING UNIT (DACU) 2.0-2.3MHZ BAND ONLY

1. Setting Up The DACU

1. Ensure that Sitespan has been set up as in DLP-009.

2. The DA Commissioning Unit (DACU) is used during system commissioning and routine maintenance. The Commissioning Unit acquires a full low rate RF downlink / uplink through RF cabling coupled into the CT transmit / receive antenna ports. The RF receive level is adjusted as required using Sitespan. For details on the operation of the unit see 605-0000-455 DA Central Terminal Commissioning Unit Operators Manual

3. The Commissioning Unit is set up as in Figure 32

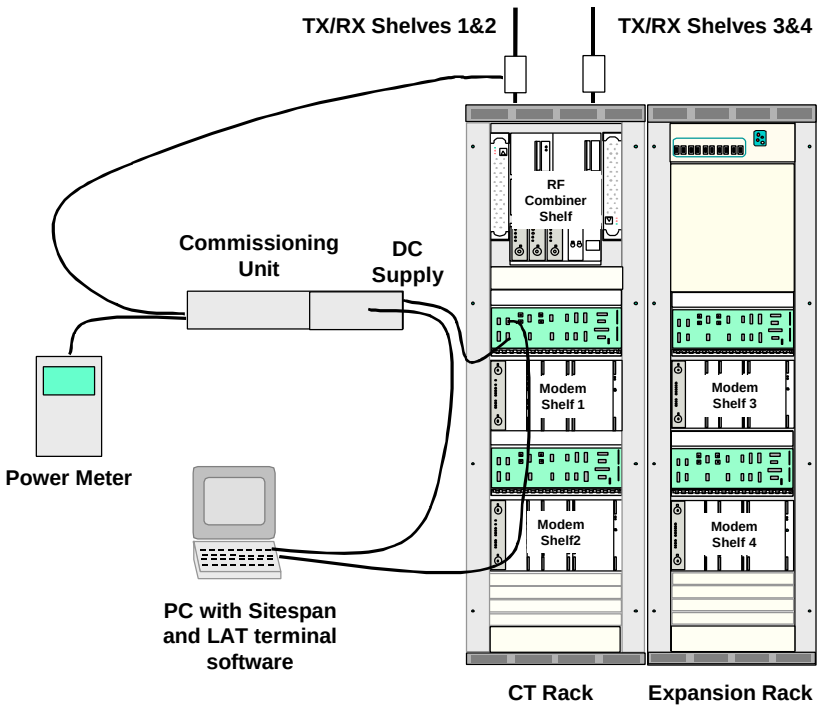
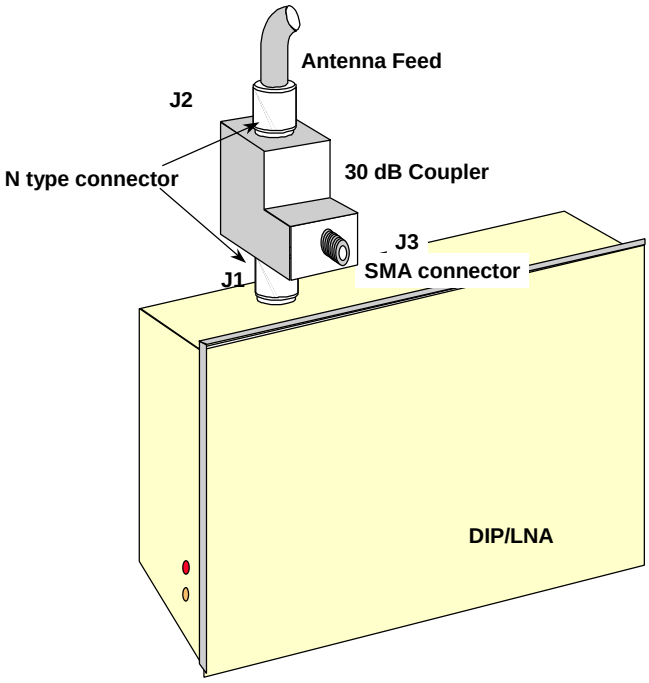


Figure 32 DACU Connections to AS4000 DA CT Rack

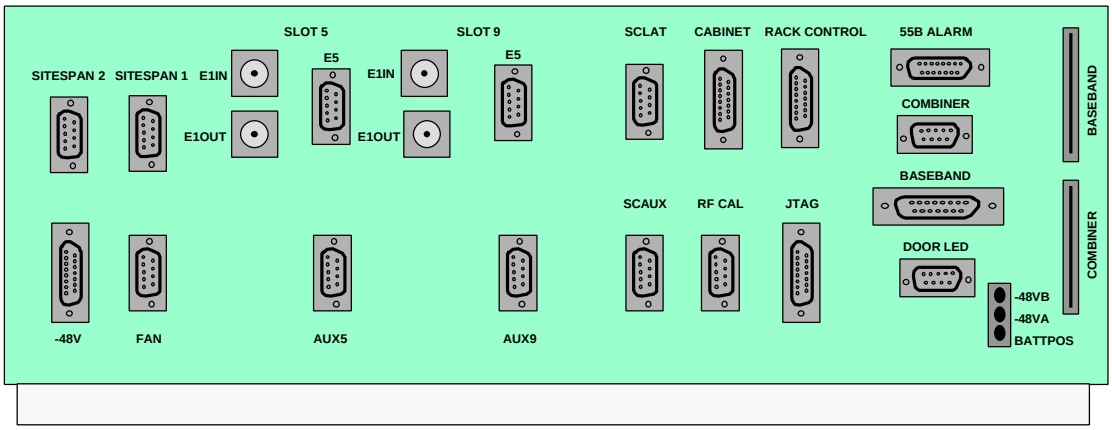
1.1. RF Interconnect

The Commissioning Unit has two RF ports (SMA connectors 50 Ohm impedance) and is connected to the RF antenna port using one length of RF cable and one coupler per antenna port. Unused ports are terminated using 50 ohm RF loads. All couplers and cables are marked to show insertion loss.



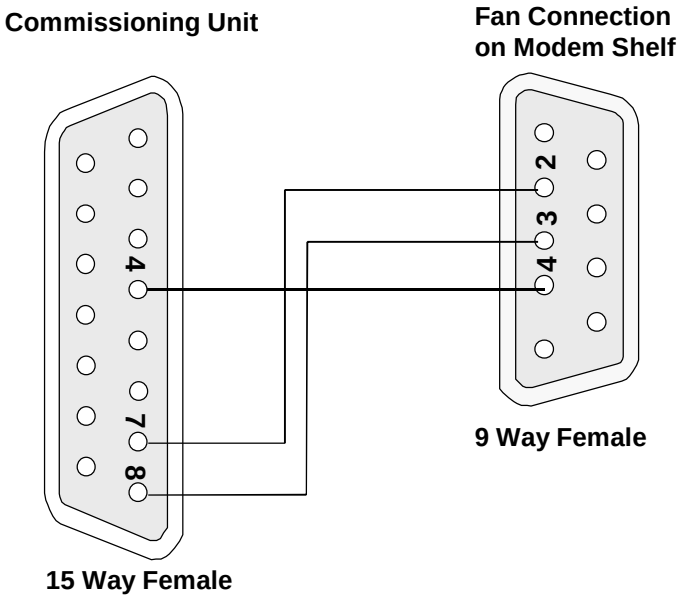
1.2. Shelf Controller Communications

On DACT racks cables with 9 pin D type adapters allow communication from the management system port of each modem shelf to the Commissioning Unit. A female 25 pin D type connection is presented on the adapter for connection to the Sitespan Management system.



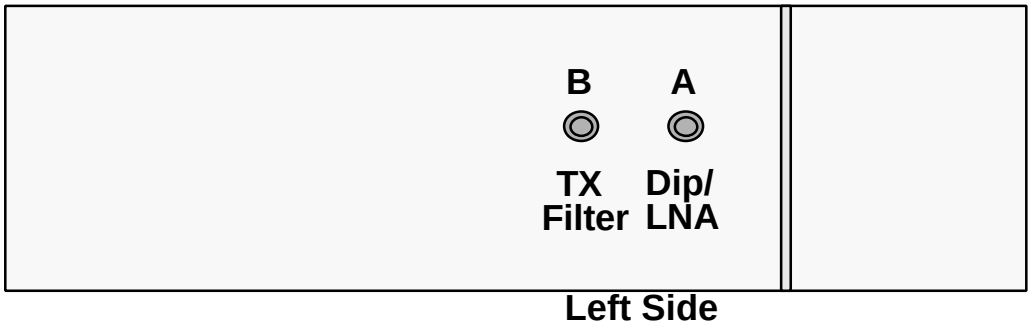
1.3. DC Connections

The DC Supply is connected to a 15 way D-type connector on the right side of the unit. The Battery return is connected to pin 4 and duplicated supplies to Batt-ve(0) to pin 8 and Batt-ve(1) to pin 7 . The DC supply can be obtained from the FAN D-Type connector (P17) on the Modem Shelf connector panel.



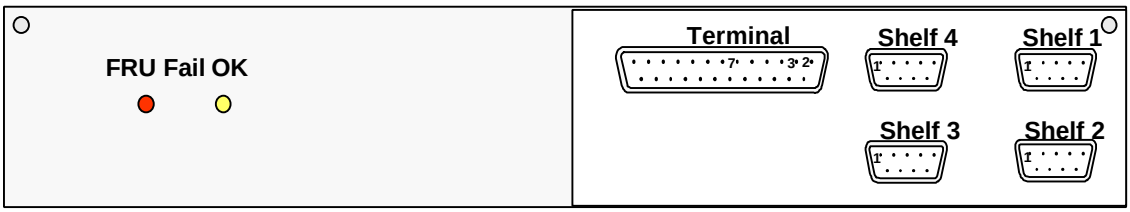
1.4. Connect Power Meter

The Power meter is connected to the transmit port on the DACU



1.5. Connect LAT Terminal

Connect LAT terminal to the terminal Port on the DACU



2. Forcing the DA Commissioning Unit to acquire a link

1. Ensure that the DTU has been set as in DLP-009 step 5.

2. The 'LK' command forces the DACU to acquire a link as follows:

	RW Code	PN Code	Up Link Rate *	Down Link Rate*	Overlay code	Frequency channel number within channel plan
LK	8	1	4	4	0	9

* The rate at which the link will acquire is defined as follows:

1: 10kbit/s
2 40kbit/s
3 80kbit/s
4: 160kbit/s

3. With the LAT connected to the DACU, ensure that it has booted-up, type:
   TE 0 Puts DACU into test mode
   W 426 Watch the link state
   LK F 1 1 1 0 9 Acquire a downlink on TLAC (in this example RW 15, at 10kbit/s channel 9)
   LK 8 1 4 4 0 9 Acquire a downlink and uplink on TTC (in this example RW 8 at 160kbit/s channel 9

4. During these commands, the link status 'watch' should return the states as described in paragraph 2. The final state should be '**0B0B**'

5. The DACU now acquires, if the DACU fails to acquire it is faulty.

6. Measure and record output power.

3. Rx Sensitivity

1. Program the DACU to the correct frequency, PN code and ID number

2. Set RW

   - **WU I** <stid> <pn> **0 1**
   (Stid is in HEX, 17 dec = 11 hex)
   (pn is 1 in most cases)

3. Write data into ST:

   - **WU W**

4. Once the DACU has booted-up, put it into test mode by typing: **TE 0**

5. A configured DACU cannot maintain its uplink without being registered by the management system. The DACU becomes registered when its ESN is entered into the management system database. A registered ST can acquire the uplink and maintain periodic information exchange with the shelf's SC.
   For testing type in the code relating to the system as set up i.e. **LK 7 1 4 4 0 9** where the first digit represents the RW code. The second digit the PN code. The third digit the uplink modem rate (1 = 10kbit/s: 2 = 40kbit/s: 3 = 80kbits/s: 4 = 160kbit/s). The fourth digit is the downlink rate (1 = 10kbit/s: 2 = 40kbit/s: 3 = 80kbits/s: 4 = 160kbit/s), The fifth digit is the overlay code (0 = default) and the final digit is the RF channel within the RF operating band. In the example above the DACU is forced to acquire on RW 7, PN 1, with Uplink and Downlink of 160kbit/s, using RF channel 9 within the RF band

6. Type **W 426** to monitor link state

7. The DACU will return with:

Display	Interpretation
D: 0426 0000	No Link
D: 0426 0101	Downlink Acquired
D: 0426 0303	Uplink Acquired (transitory state)
D: 0426 0B0B	Uplink Acquired
D: 0426 0808	* Downlink has failed
D: 0426 0909	* Uplink has failed
***Note:** relate to a link failure	

8. Once the DACU acquires the link, the RX gain can be commissioned. If the link does not acquire, then it will be necessary to change the RX gain through Sitespan.

9. Using Sitespan highlight the shelf, and edit 'parent properties'.

10. Select 'Airspan DA CT modem shelf'.

11. Adjust the 'Rx Gain' and select 'OK'.

    Note: To start with, set the RX gain to around 2200.

12. Check the output power of the DACU, and repeat step 11 until the output power reaches **+7.00dBm** taking into account the cable loss.

13. Record the result.

14. Power off the DACU.

15. With the LAT connected to the DTU, restore the DTU from test mode by typing **TE 1.**

16. Disconnect the RF cables from the rack and connect the Antenna. The rack is now fully commissioned.

4. Restoring shelf connections

1. Remove the test equipment and connecting cables.

2. Replace the Shelf covers and the protective cap on the coupler

3. Go to DLP-016.

POWER MEASUREMENTS AND RX SENSITIVITY

Test TX Output Power (Test 5)

Tools and equipment needed.

Item	Description	Recommended Model	Quantity
1	Digital Multimeter	Fluke 77	1
2	ST Test Unit,	SIU with Modified Antenna at appropriate band	1
3	30dB Attenuators; 1W	Suhner 6830-19-A	2
4	30dB Attenuators; 2W	Hewlett Packard 8491A	2
5	3dB Attenuator; 2W	Suhner 6803-19-A	1
6	60dB Variable Attenuator	Weinschel 940-60-11	1
7	2 Way Power Divider	Narda 4313-2	3
8	50 ohm Termination 1W	Suhner 65 SMA-50-0-1	2
9	50 ohm Termination 15W	Suhner 6515.17.A	2
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 31 SMA-50-0-1	4
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**

1. CT Output Power

Note: This test is only required on initial installation. If adding a shelf and rack is in service omit this test.

In order to commission the Output power of the rack, a Power Meter must be connected to the N-Type connector on DIP/LNA 1 at the top of the rack.

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

2. Connect Power Meter to the N-Type connector on DIP/LNA1 at the top of the rack ready to measure the power output. The output from shelves 1 and 2 is on DIP/LNA1. The output from shelves 3 and 4 (the modem shelves are located in the expansion rack) is on the DIP/LNA2 or TX filter. The port not under test should be terminated with a 15W termination.

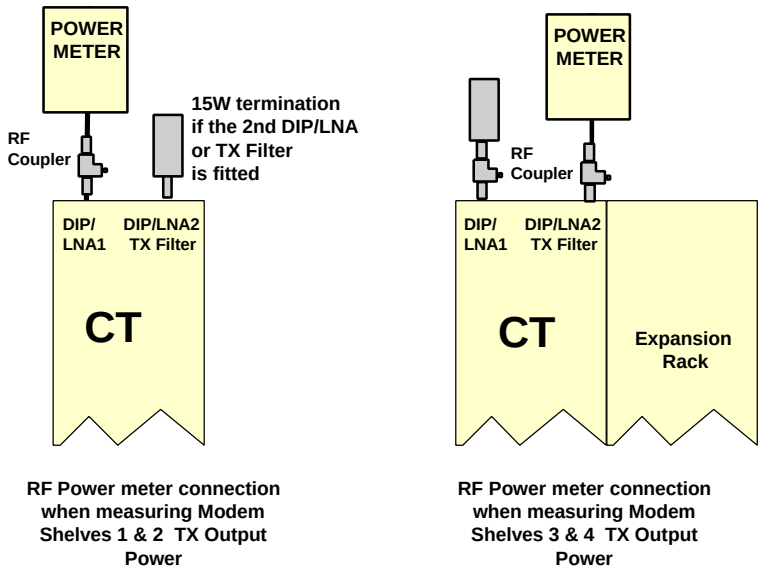


Figure 33. Power Level measurement Test Set-Up

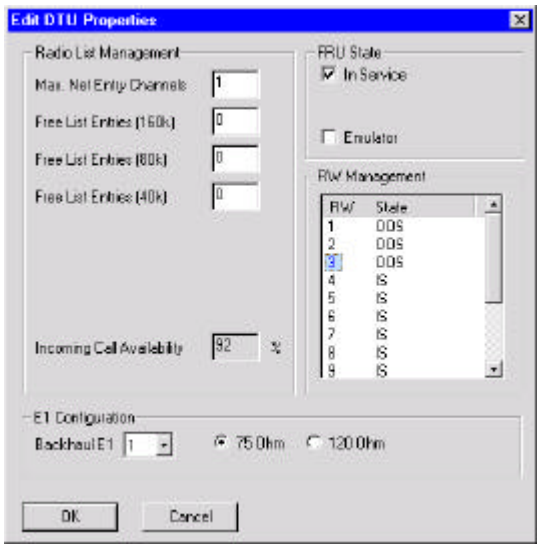
Measure the output of shelf 1. (this test is repeated for other installed shelves)

The following procedure must be followed:

1. Remove modem cards 2 – 5, leaving only one modem card, inserted in slot 10

2. Connect Sitespan to the shelf under test and set for commissioning. See DLP-010

3. Prior to commissioning the DTU properties should be set In the *Edit DTU Properties* window set max net entry channels to 1, set the number of Free list entries at 160K 80K and 40K to 0. In the RW management window place the mouse pointer over the IS for RW 1 click left mouse button until OOS is selected. Repeat for RW2 and RW3.



4. The reading on the power reading should be approximately 0dbm. (note: in some circumstances the net entry may remain active if this is the case the power reading will be the same as the output for a single user)

5. Set the RW1 to OOS160k. The output rises to the output power for 1 user (21 dBm for 2.0-2.3GHz , 2.3-2.5GHz , and 1.8-1.9GHz Band and 18dbm for 3.4-3.6GHz Band).

6. Set RW2 to OOS160k and the power output should rise by 3dB.

7. Set RW3 to OOS160k and the power output should rise by another 4.8dB.

8. Adjust TX Gain for the band of the system under test following the appropriate step below: 2.0-2.3GHz , 2.3-2.5GHz , and 1.8-1.9GHz Band step 5: 3.4-3.6GHz step 6

9. **2.0-2.3GHz Band, 2.3-2.5GHz Band and 1.8-1.9GHz Band.** Adjust the output power to **+25.77dBm**. This is equivalent to three downlinks, each with a power of +21dBm:

   a) Using Sitespan highlight the shelf, and edit ‘parent properties’
   b) Select ‘Airspan DA CT modem shelf’
   c) Adjust the ‘Tx Gain’ and select ‘OK’

   Note: To start with, set the TX gain to around 3300.
   Check the output power, and repeat step 5c until the output power reaches **+25.77dBm**

10. **3.4-3.6GHz Band** Adjust the output power to +22.77dBm. This is equivalent to three downlinks, each with a power of +18dBm:

    a) Using Sitespan highlight the shelf, and edit ‘shelf properties’
    b) Select ‘Airspan DA CT modem shelf’
    c) Adjust the ‘Tx Gain’ and select ‘OK’

    Note: To start with, set the TX gain to around 3300.
    Check the output power, and repeat step 6c until the output power reaches **+22.77dBm**

11. Record the result (see DLP-013)

12. Re-insert all of the modem cards back into the shelf.

13. Repeat for all other modem shelves

14. Reboot rack by switching rack off at the breakers on the combiner shelf Both breakers need to be switched. Then restore power to the Rack by switching rack on at the breakers on the combiner shelf.

STEP **PROCEDURE**

2. Rx Sensitivity (Test 6)

1. To set the receive sensitivity, first set up a test network for the Band under test as shown in Figure 34 and Figure 35 below. The Figures below show the test equipment connected directly to the outputs of the DIP/LNA and TX filter as would be the case for systems without coupler.

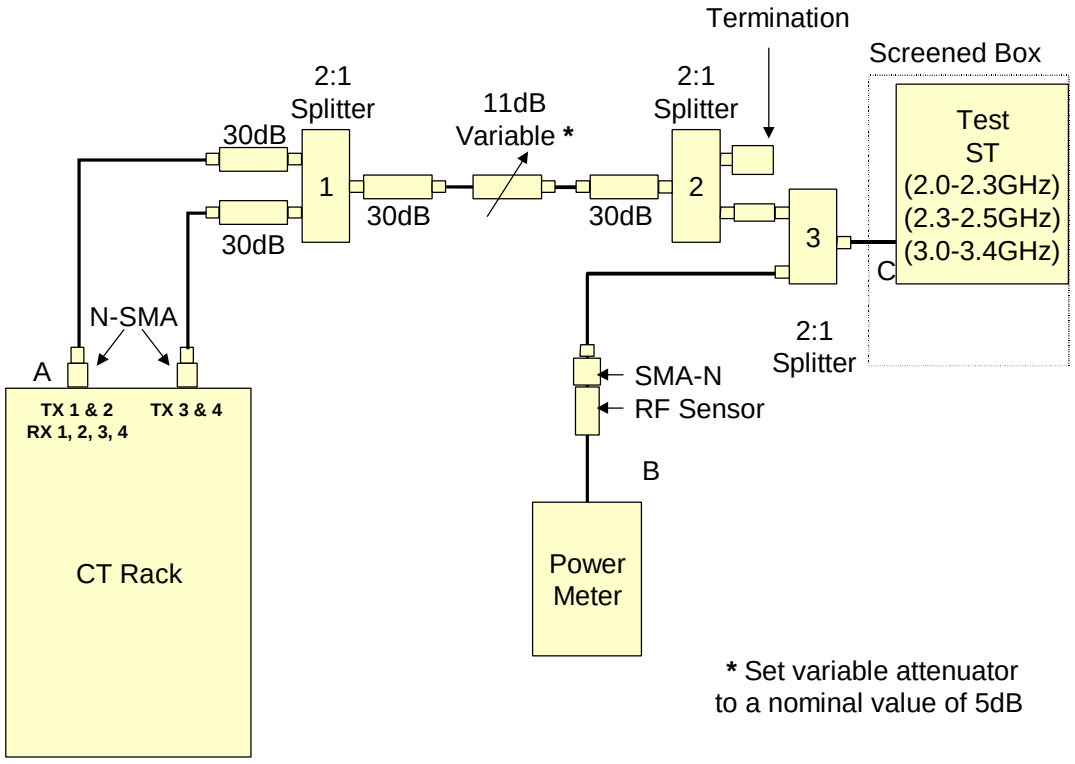


Figure 34. Test Set-up 2.0-2.3GHz, 3.4-3.6GHz, and 2.3-2.5GHz Bands.

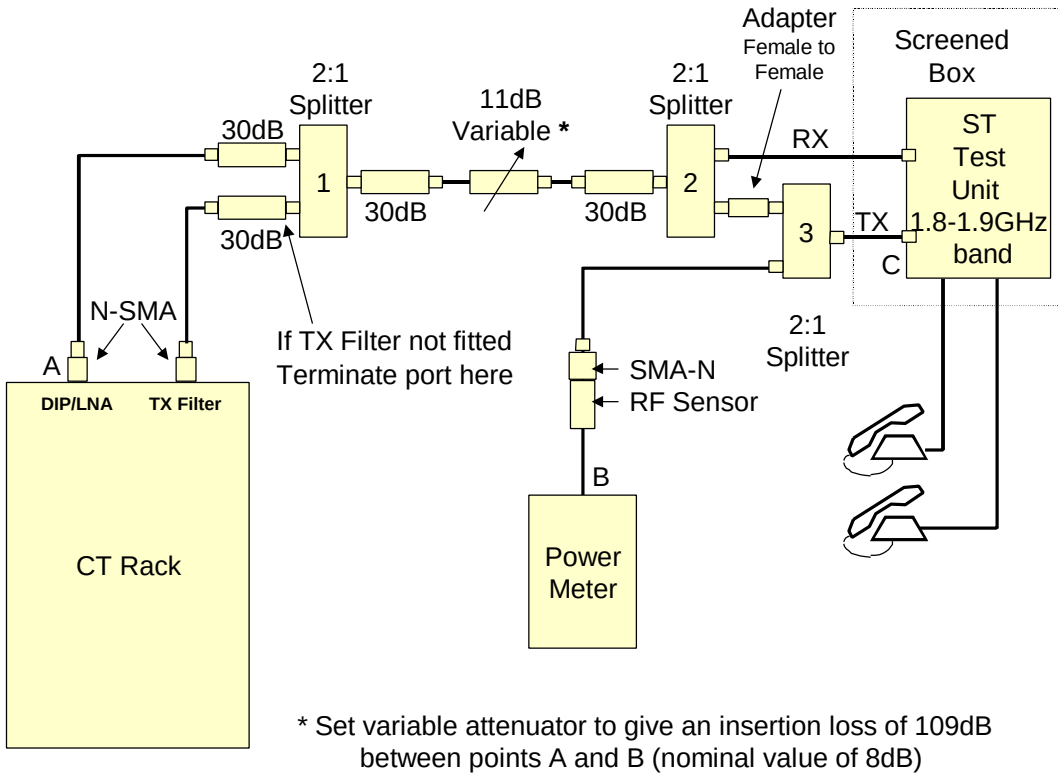


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Figure 35. Test Set-up 1.8-1.9GHz Band

2. The variable attenuator must be set so that the TOTAL PATH LOSS between the output of the DA CT rack, and the Uplink port of the test ST (for 1.8-1.9 GHz = **109dB,** for 2.0-2.3GHz, 2.3-2.5GHz, and 3.4-3.6GHz =**106db**). In order to achieve this, the set-up must be calibrated so that the cable loss is taken into account. It is also important for the ST to be screened as shown in the diagram. Once set-up, follow the procedure below:

3. Power-up the ST.

4. Program the ST to the correct frequency, PN code and ID number by using the STMON for Windows

5. Once the ST has booted-up, put ST into test mode by typing: **TE 0**

6. Type **W 426** to monitor link state

7. The ST will return link state and update at anytime the link state changes, the values of the link state can be:

Display	Interpretation
D: 0426 0000	No Link
D: 0426 0101	Downlink Acquired
D: 0426 0303	Uplink Acquired (transitory state)
D: 0426 0B0B	Uplink Acquired
D: 0426 0808	* Downlink has failed
D: 0426 0909	* Uplink has failed
***Note:** relate to a link failure	

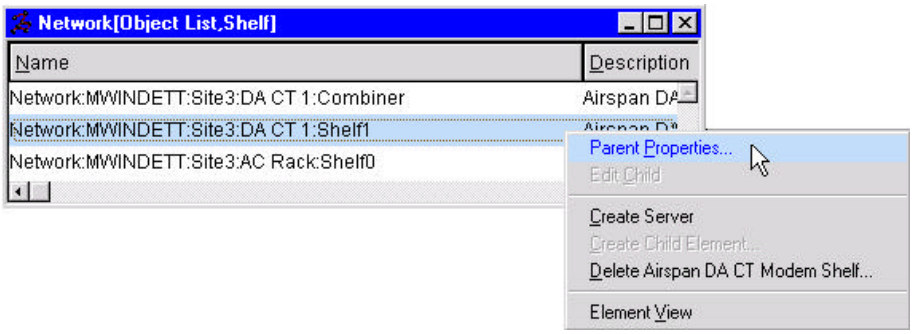
8. To establish a test link use LK command, LK The format of the command is LK(RW)(PN)(Uplink modem rate)(Downlink rate)(Overlay Code)(RF channel) The third digit the uplink modem rate (1 = 10kbit/s: 2 = 40kbit/s: 3 = 80kbits/s: 4 = 160kbit/s). The fourth digit is the downlink rate (1 = 10kbit/s: 2 = 40kbit/s: 3 = 80kbits/s: 4 = 160kbit/s), an example would be LK 7 1 4 4 0 9 would be an ST is forced to acquire on RW 7, PN 1, with Uplink and Downlink of 160kbit/s, using RF channel 9 within the RF band

9. Obtain a 10kbit/s Uplink and down link on RW15. Type **LK F 1 1 1 0 9**.

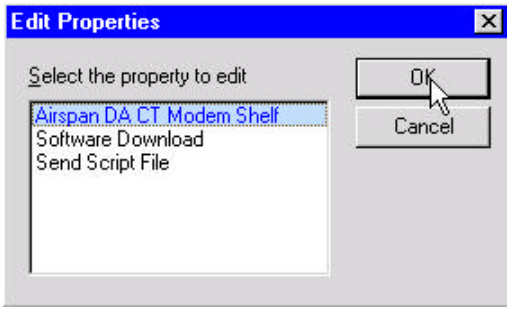
10. Obtain a 160kbit/s uplink and downlink on a RW that has previously been set into OOS(160K) mode. Type **LK (RW) 1 4 4 0 (RF Channel)**

11. Once the ST acquires the link, the RX gain can be commissioned. If the link does not acquire, then it will be necessary to change the RX gain through Sitespan.

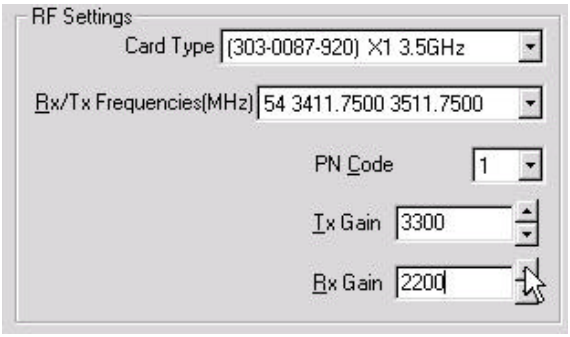
12. Using Sitespan highlight the shelf, click right mouse button and select 'Parent Properties'.



13. Select 'Airspan DA CT modem shelf'.



14. Adjust the 'Rx Gain' and select 'OK'.
    Note: To start with, set the RX gain to around 2200. and click right mouse button on↑ and ↓ at the side of the RX Gain Box to increase and Decrease reading at the power meter. Check the output power of the ST, and repeat until the output power reaches optimum level (for 1.8 GHz bands = **+11.00dBm,** for 2.0-2.3GHz, 2.3-2.5GHz and3.4-3.6GHz = **+8.00dBm)** remembering to account for the splitter loss.



15. Record the result.

16. Power off the ST.

17. With the LAT connected to the DTU, restore the DTU from test mode by typing **TE 1.**

18. Go to DLP-012.

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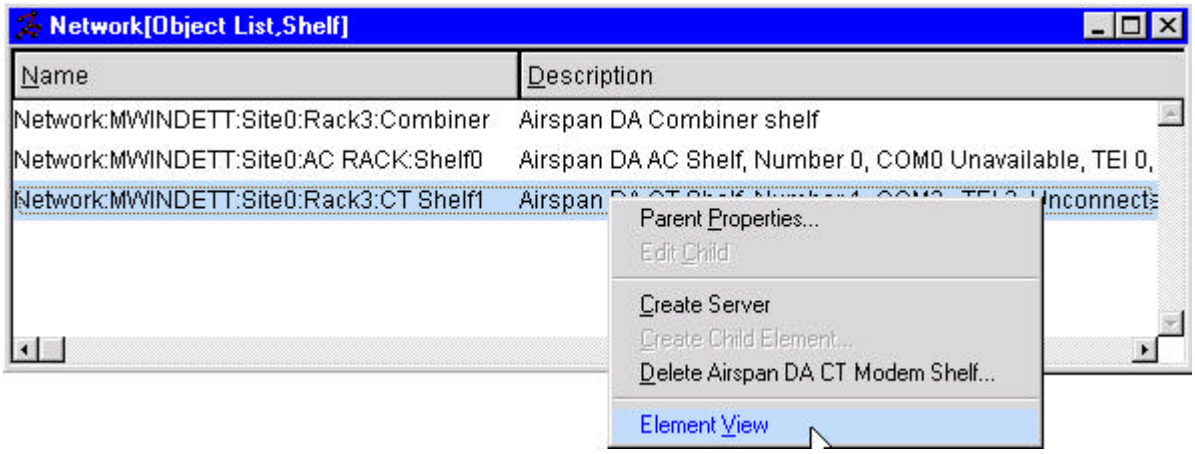
SETTING THE SYSTEM INTO SERVICE

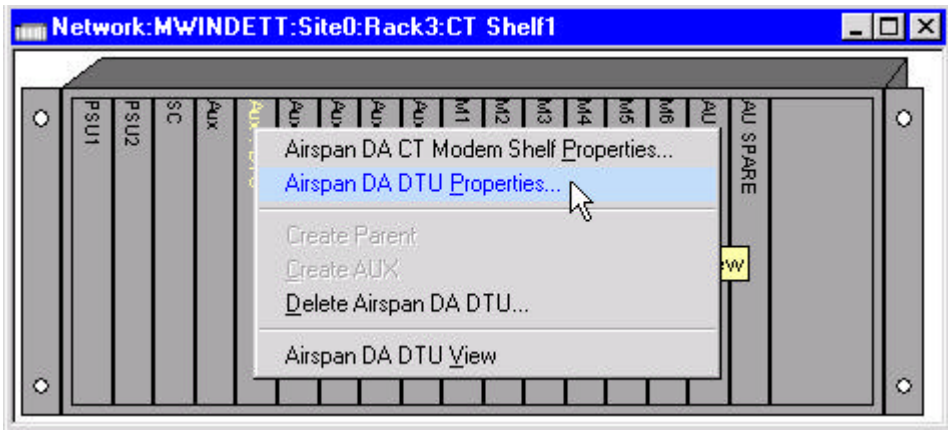
STEP **PROCEDURE**

1. Set E1 link to Access Concentrator

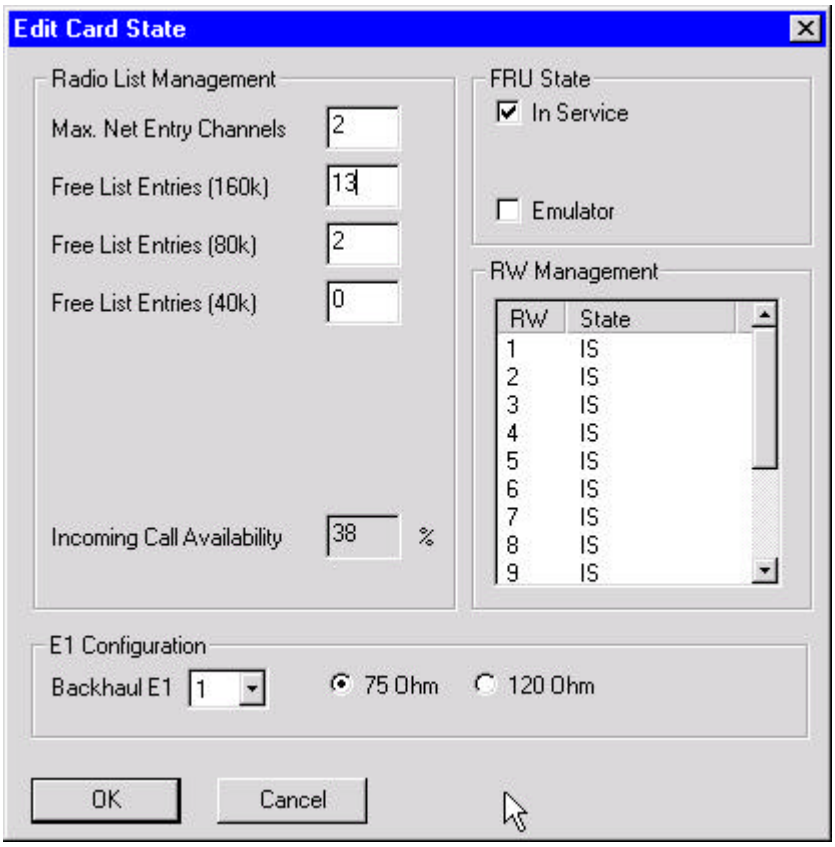
1. From the object list shelf select the modem shelf, click right mouse button and select the 'element view'



2. Select the DTU on the modem shelf and click right mouse button, select Airspan DTU properties

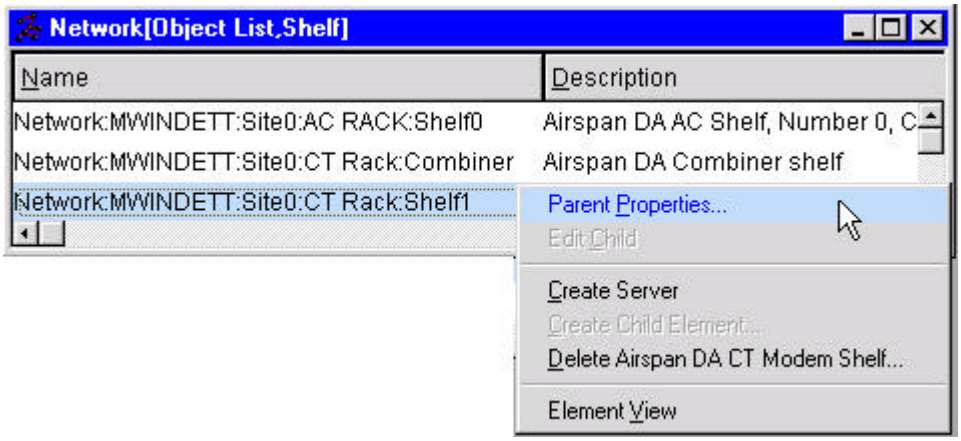


3. In the Edit card state window increase the number of Free list entries at 160k to 13

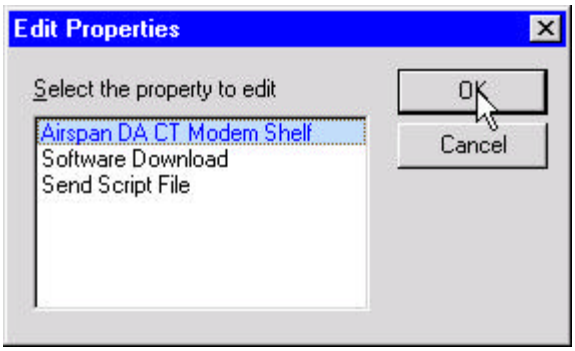


2. Set Sitespan to use direct Com

1. Highlight shelf, click right mouse button and edit 'parent properties'

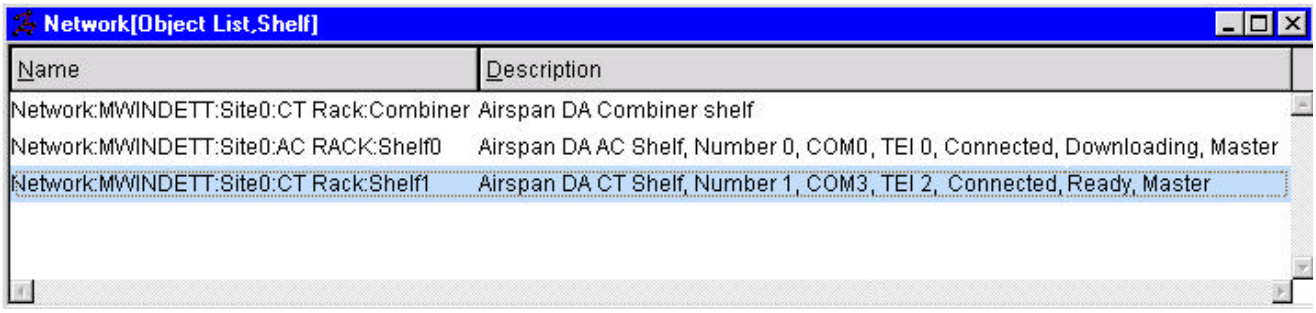


2. Select '*Airspan DA CT Modem Shelf*'

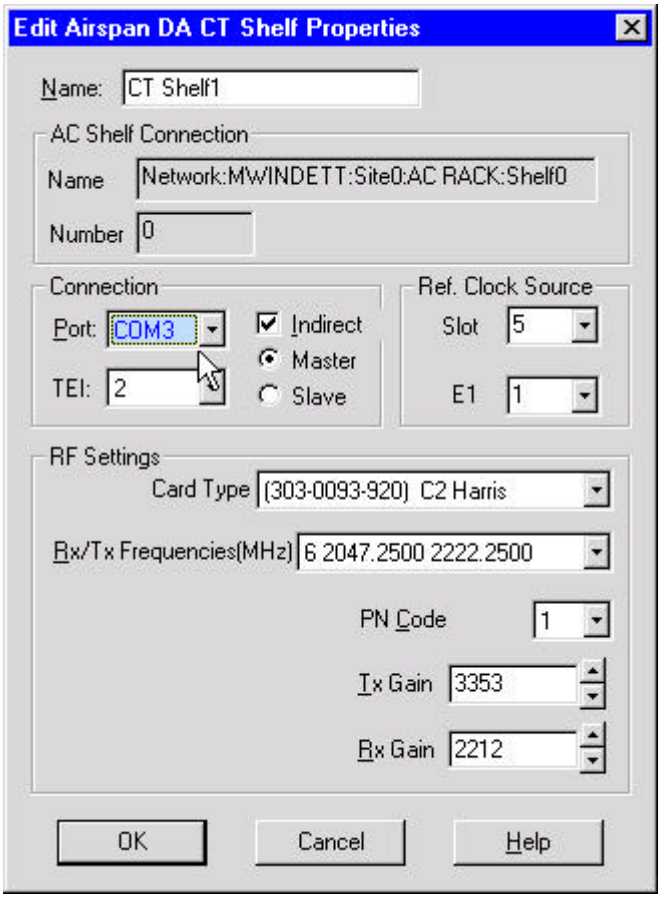


3. Set connection to Indirect by checking the indirect box and set the Port to the com port on the Sitespan PC connected to the Access concentrator Shelf.

4. View the Shelf Object List and check that Management Communications are connected and ready. If software is still downloading wait for download to finish before attempting any other Sitespan Operations. Check that there are no alarms on the shelf ie Object text is black not red.

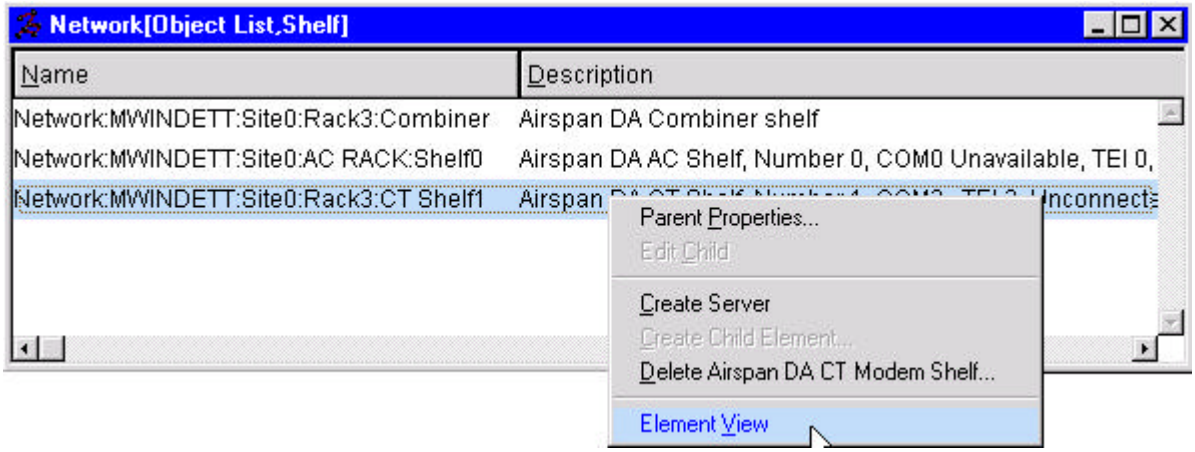


5.

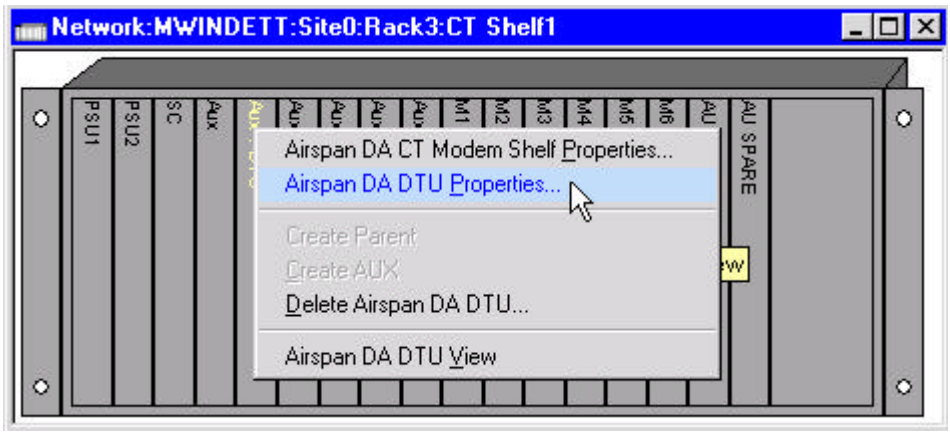


3. Reset Free list Entries

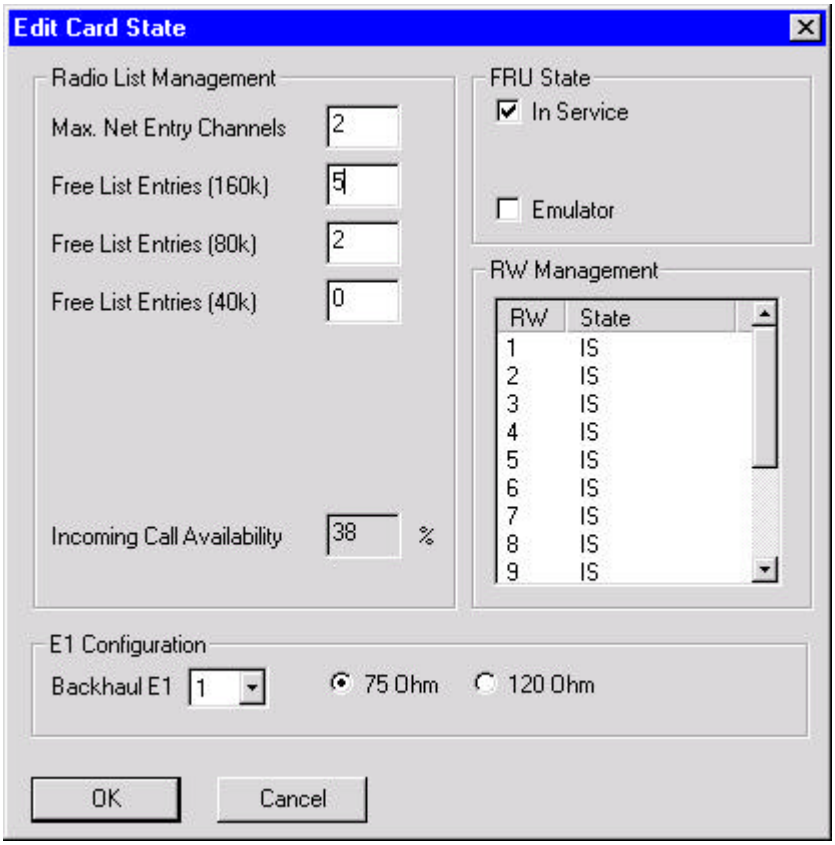
1. From the object list shelf select the modem shelf, click right mouse button and select the 'element view'



2. Select the DTU on the modem shelf and click right mouse button, select Airspan DTU properties

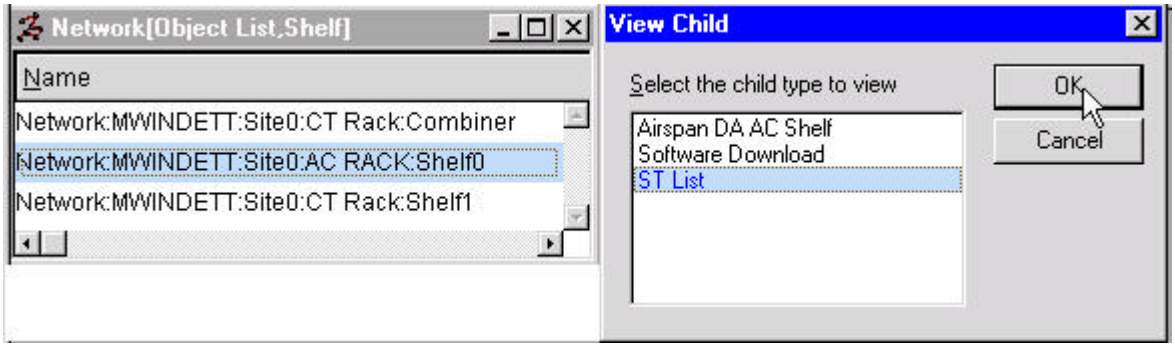


3. In the Edit card state window set the number of Free list entries at 160k to 5 and restore the RW states to IS(in service)

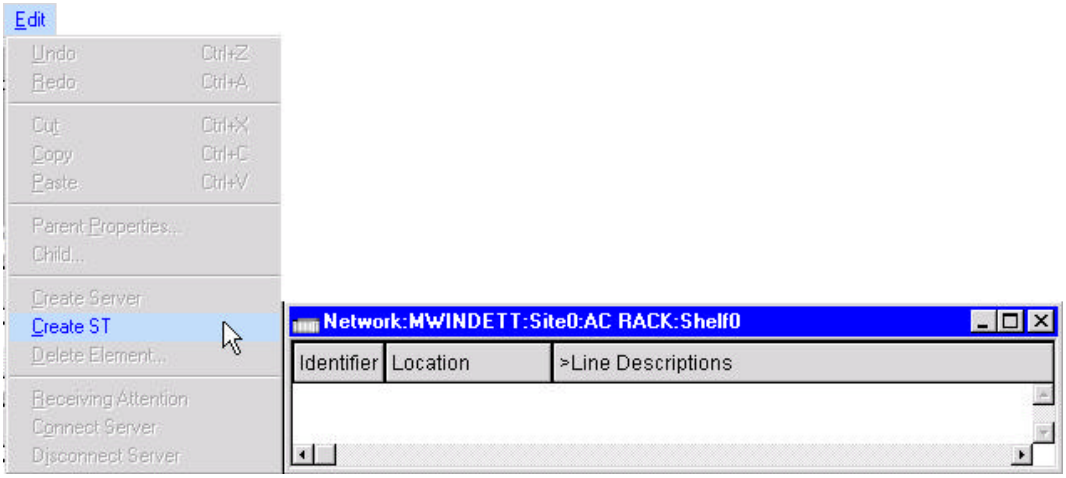


4. Check ST Acquisition

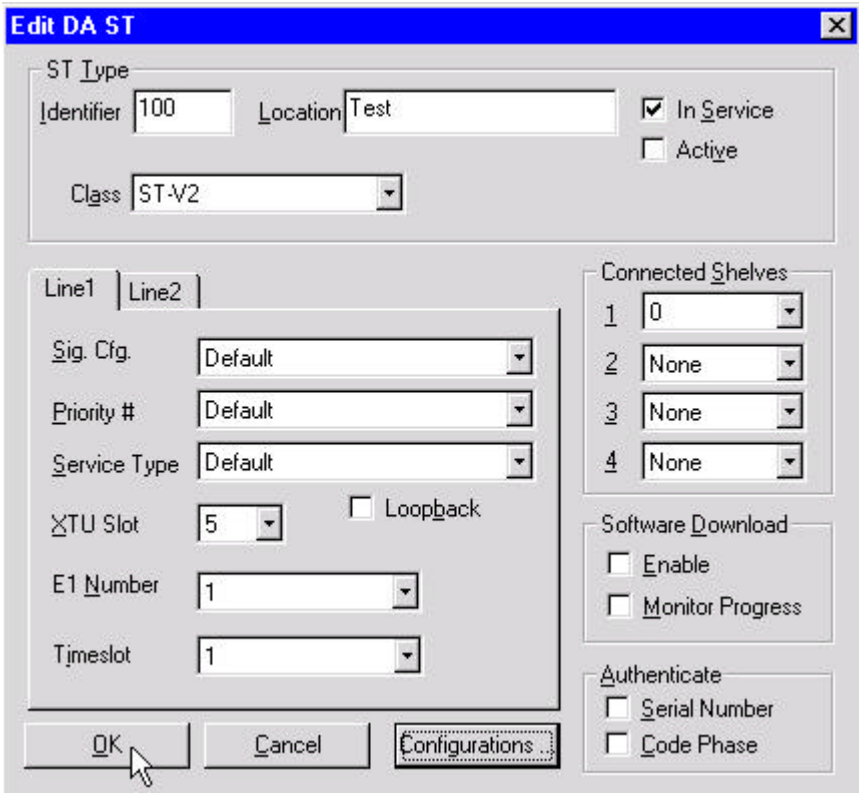
1. Set up database record for the Test ST. From Object List, Shelf click right mouse button on shelf and select *Element View*, select ST List.



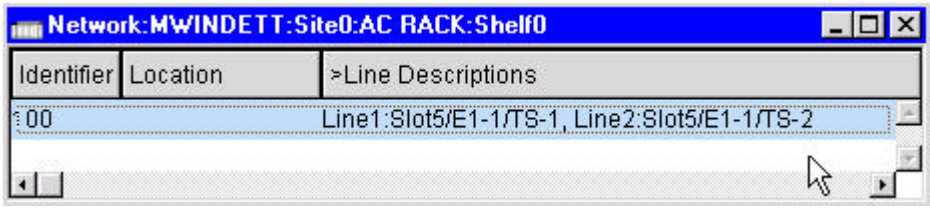
2. From Edit menu select Create ST



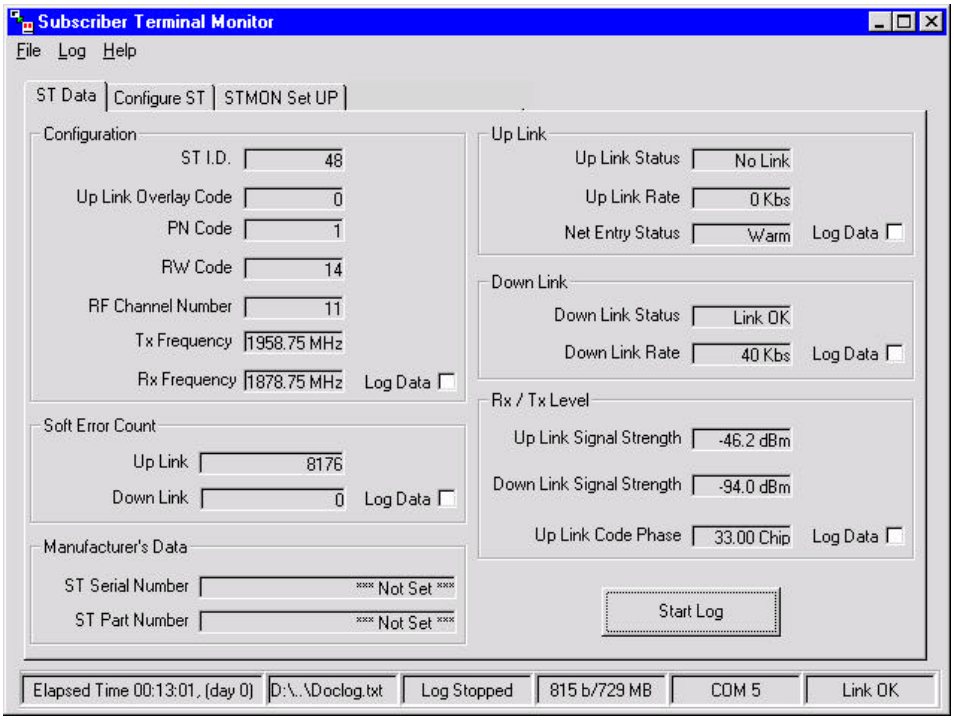
3. Configure ST



4. The ST appears on the ST list



5. Connect STMON for windows to the Test ST. Details of connection and use of STMON for windows are contained in 605-0000-470 STMON for Windows User Guide.



6. Start Check that the ST is getting an invite and can connect to the system.

7. Repeat for other Modem Shelves

8. Remove Test ST from the ST list.

5. Remove Test Equipment

1. Remove the Test CRU and all interconnecting cables and accessories from the RF Output connectors on the Central Terminal.

2. Connect Antenna if not already connected.

3. Replace the Shelf covers and the protective cap on the coupler if fitted.

THIS CONCLUDES THE CENTRAL TERMINAL COMMISSIONING TESTS.

COMMISSIONING TEST RESULTS

1. Commissioning Test Results

Please photocopy test results sheet for use with each system

1.1. Test Equipment Calibration

Item	Description	Model	Serial No	Calibration Date
1	Digital Multimeter			
2	30dB Attenuators; 1W			
3	30dB Attenuators; 1W			
4	30dB Attenuators; 2W			
5	30dB Attenuators; 2W			
6	3dB Attenuator; 2W			
7	60dB Variable Attenuator			
8	RF Power Meter			
9	Power Sensor			
10	Test Modem Card (if used)	n/a		n/a
11	Test SC Card (if used)	n/a		n/a
12	Test ST	n/a		n/a

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		
AU		
SC		
PSU 1		
PSU 2		
DTU		
DTU		
DTU		
DTU		
DTU		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		

Rack ID.....

Card Type	**Serial Number**	**Rev Level**
Modem Shelf 2		
AU		
SC		
PSU 1		
PSU 2		
DTU		
DTU		
DTU		
DTU		
DTU		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem Shelf 3		
AU		
SC		
PSU 1		
PSU 2		
DTU		
DTU		
DTU		
DTU		
DTU		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		
Modem Shelf 4		
AU		
SC		
PSU 1		
PSU 2		
DTU		
DTU		
DTU		

Card Type	**Serial Number**	**Rev Level**
DTU		
DTU		
Modem 1		
Modem 2		
Modem 3		
Modem 4		
Modem 5		
Modem 6		

Rack ID.....

PARA	TASK / TEST		LIMIT	RESULT
	Site Inspection & Verification			
	2 Mbit/s Cabling	Modem Shelf 1		
		Modem Shelf 2		
		Modem Shelf 3		
		Modem Shelf 4		
	System Commissioning Tests			
	Test 1a Exchange DC Voltage CT Rack Supply 1		-21.8 to -60.0V DC	
	CT Rack Supply 2			
	Expansion Rack Supply 1			
	Expansion Rack Supply 2			
	Test 1a Exchange DC Voltage CT Rack Supply 1		-21.8 to -60.0V DC	
	CT Rack Supply 2			
	Expansion Rack Supply 1			
	Expansion Rack Supply 2			
	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	
	Modem Shelf 1 PSU1		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 1 PSU2		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 2 PSU1		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 2 PSU2		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 3 PSU1 In Expansion Rack		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 3 PSU2 In Expansion Rack		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 4 PSU1 In Expansion Rack		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	
	Modem Shelf 4 PSU2 In Expansion Rack		5V DC + 250mV 3.3V DC +0mV-300mV 2.1V DC+0mV-100mV	

Rack ID.....

PARA.	TASK / TEST		LIMIT	RESULT
	Power Up and Self Test			
	Test 3 Alarms and Indications	Modem Shelf 1 SC Card AU Card DTU Cards Modems(if fitted)		Pass /Fail
		Modem Shelf 2 SC Card AU Card DTU Cards Modems(if fitted)		
		Expansion Rack Modem Shelf 3 SC Card AU Card DTU Cards Modems(if fitted)		
		Expansion Rack Modem Shelf 4 SC Card AU Card DTU Cards Modems(if fitted)		
		RF Combiner Shelf PA Modules Dip/LNA RF Cards Monitor Cards		
		PSUs		

Rack ID…..

PARA.	TASK / TEST		RESULT
see flow chart	**Test 4** System Configuration Self test from Sitespan	Modem Shelf 1 RF Card	
		Analogue Card	
		DTU Cards	
		SC Card	
		(Test) Modem Card	
		Modem Shelf 2 RF Card	
		Analogue Card	
		DTU Card	
		SC Card	
		(Test) Modem Card	
		Modem Shelf 3 RF Card	
		Analogue Card	
		DTU Card	
		SC Card	
		(Test) Modem Card	
		Modem Shelf 4 RF Card	
		Analogue Card	
		DTU Cards	
		SC Card	
		(Test) Modem Card	

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				
RX Gain Control Voltage				

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SITE ACCEPTANCE

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 DA SYSTEM CT ACCEPTANCE FORM

CONTRACT OR CUSTOMER'S REF. NO:.....

AIRSPAN COMMUNICATIONS CORPORATION 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 DA SYSTEM CT ACCEPTANCE FORM

CONTRACT OR CUSTOMER'S REF. NO:.....

AIRSPAN COMMUNICATIONS CORPORATION 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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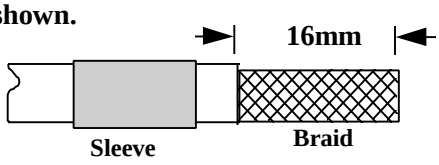
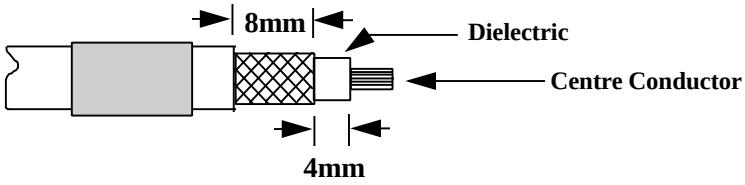
APPENDIX 1

Appendix 1 BNC Terminations to Coax

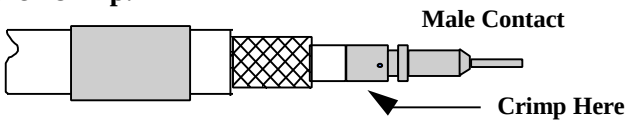
1. **Slide metal crimp sleeve over cable,trim outer sheath from cable as shown.**



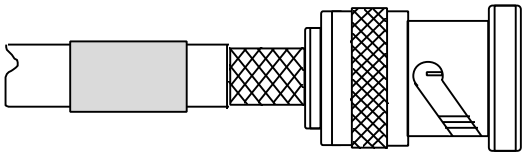
2. **Trim back braid and dielectric to the dimensions as shown.**



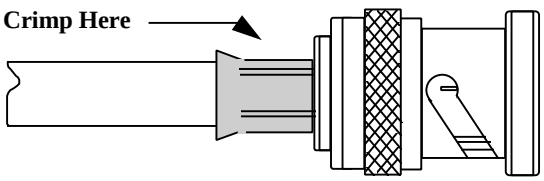
3. **Fit contact over the centre conductor to butt against the dilectric, then crimp.**



4. **Press sub-assembly into body, until contact clicks into place and ensuring that the knurled ferrule is inserted between the dilectric and braid**



5. **Slide the sleeve along the cable, until it butts against the body sub-assembly. Crimp using VQ die.**



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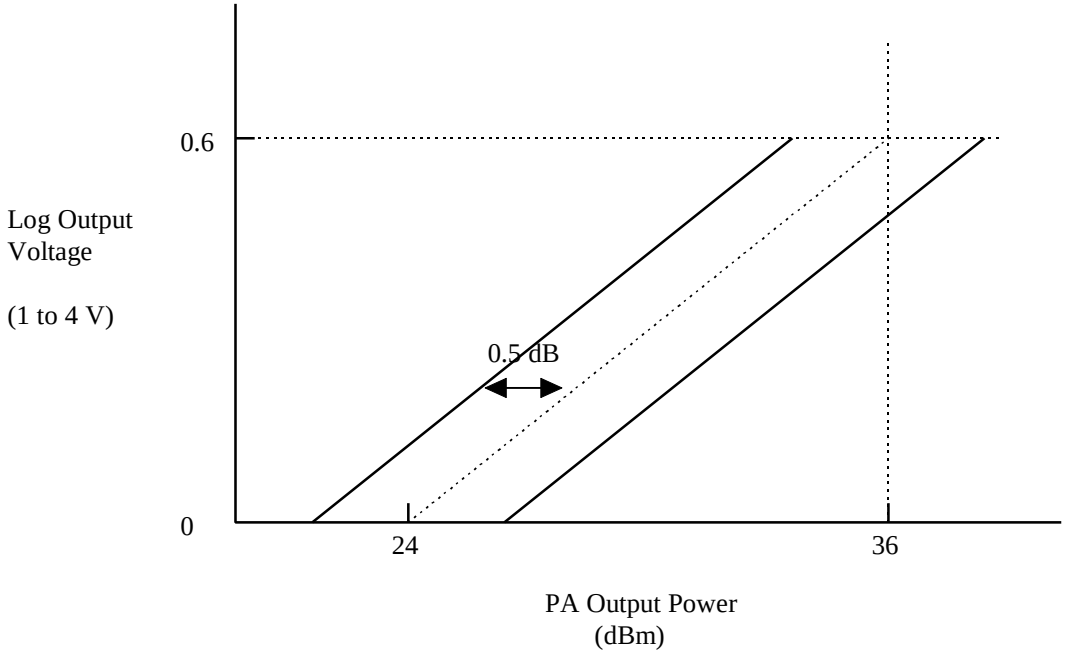
PROCEDURE IN CASE OF POWER CONTROL LOOP FAILURE

1. Output Power Level Detection

The PA module must detect the average transmit power level over the amplitude range +24 dBm to +36 dBm per each PA within assembly.

The output power detector should provide a voltage output in the range 1V to 4V into a load of >10k ohms, for average output power of 24 dBm to 36 dBm. This voltage should never rise above 5.3V. The voltage characteristic should fall within the following mask across all temperature, Tx Band frequency and production tolerances:



If the Power Control Loop is not functioning correctly check the following:

If using 3.4-3.6GHz-band the PA MUST be the modified Amplidyne PA marked xxxxxxx rev C2. Or later on earlier revisions the PCL does not work correctly. The rev C1has a 3db lower o/p power although the mappings are correct. Prior to Rev C1 the mappings were different.

Check that the Combiner Monitor F/W is 696-3000-162 rev F or G.
Check that the Shelf Controller F/W is 696-3000-272/273 rev B or rev C.
Check that JP1 and JP2 are selected for the appropriate shelf number. This is essential to the operation of the PCL.

	JP1	**JP2**

Shelf 1	ON	ON
Shelf 2	OFF	ON
Shelf 3	ON	OFF
Shelf 4	OFF	OFF

If the above are correct check the PA's output by measuring the voltages on the Combiner Monitor monitor points. The 5 monitor points shown in the table below.

PA1	Shelf 3 PA output.
PA2	Shelf 2 PA output.
PA3	Shelf 1 PA output.
PA4	Shelf 4 PA output.
GND	

Connect a voltmeter between the appropriate monitor point and GND read the voltage. The range is between 1 and 4 volts depending on how many users are enabled.The approximate values are shown in the table below.

Volts	**Number of Users**
1.16	2 users
1.95	4 users
2.88	6 users
3.08	8 users
3.4	10 users
3.6	12 users

i.e. For Shelf 1 connect the voltmeter between GND and monitor point labeled PA 3. This voltage changes when the Tx output is increased / decreased using Sitespan. If the voltage does not change measure the other 3 monitor points to see if they change. If other monitor points change then:

a) The PA may be an earlier 3.4-3.6GHz-band PA The monitor points will be as described below.

If this is the case do not enable PCL (remove the monitor card or fit the 3.4-3.6GHz-band CBM F/W 696-3000-268 rev B)

PA1	Shelf 4
PA2	Shelf 1
PA3	Shelf 2
PA4	Shelf 3
GND	

b) The PA may be faulty. In this case return the faulty PA using the Material Return and Repair procedure 605-0000-435

PROCEDURE IN CASE OF CARD BOOT-UP FAILURE

1. Procedure in case of card boot-up failure

If the cards inserted into the shelf do not boot-up, the top red LED on the card will be either continuously ON or FLASHING. The following steps should be followed:

1. Check cards are properly inserted into the shelf, in the correct positions.
2. Reset the SC card using Sitespan, under the card view.

If the card will still not boot-up, then it is necessary to try and reset the shelf backplane configuration. In order to achieve this, a number of text files will be required to download to the SC. Ensure they are available before continuing. The files required are as follows:

For the CT:-

SetTUinv.txt
Mdsetinv.txt
Ausetinv.txt

Now the following procedure can be followed:

1. Disconnect Sitespan from the shelf containing cards that will not boot-up.
2. Connect the LAT cable to the SC card
3. Send the text files for the correct shelf, one after another using Terminal.
4. Once completed, type the following:

TI 118

EA 118:0/119:0

ES 0

5. Wait 2 – 3 minutes for the process to complete.
6. Reset the SC by shorting Pins 2 & 3
7. Wait for 3 minutes

The result will be the SC with a green LED ON, and all the other cards with FLASHING red LEDs

8. Re-Connect Sitespan

The cards on the shelf should now boot-up. If the cards will still not boot-up, then it is likely that one of the cards is faulty. Try replacing the one of the cards and starting the procedure again.

NOTE: Try swapping the SC cards between the AC and the CT shelf, because all the latest software should be installed on both cards. This way it is easy to tell if the SC card is faulty or not.

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

The ST-V2 should be programmed prior to commissioning. This procedure should be used if programming the system using a test telephone.

STEP **PROCEDURE**

1. ST Programming

1. Remove the cover from the PSU
2. Connect an MF or LD type telephone to the NTU
3. Each CRU is initialised by entering a unique code. These codes are entered using the telephone and should be provided by the RF planning office on a form similar to that shown in Table 7.

Table 7. CRU Programming Information

Mode DA=1	RF 3 digits			PN 1 digit	Identity 9 digits	Check N°. 1 digit	Remote site location
1	0	0	6	1	000000000	7	CRU1

4. 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.
5. Take phone off hook and key # * # using the DTMF keypad
6. Enter Mode by keying 1 for DA or 2 for FA
7. Enter RF code (3 digits)
8. Enter PN code
9. If the CRU is to be used in fixed assigned mode enter the RW code (2 digits)
10. Enter the identity (9 digits)
11. Use * to end programming

a) Enter check digit

b) Upon successful installation, the “code accepted” tone is heard in the handset receiver, consisting of 1400 Hz pulses for 1 sec on; 1 sec off, for 5 seconds. For a failed installation, 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 5 seconds. If the ST fails to accept the programming code after a second attempt, confirm with the network planning staff that the correct code is being used. Should the ST still fail to accept the code, the ST will need to be replaced.

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

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

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

RF # 2/3 digits			PN 1 digit	Identity 6 digits	Check N°. 1 digit
1	0	5	1	* or 000000	6

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

RF BAND	CHANNEL NUMBER L	M	U	RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
2.0 – 2.3GHz	1			**1 00**	2029.75	2204.75
2.0 – 2.3GHz	2			**1 01**	2033.25	2208.25
2.0 – 2.3GHz	3			**1 02**	2036.75	2211.75
2.0 – 2.3GHz	4			**1 03**	2040.25	2215.25
2.0 – 2.3GHz	5			**1 04**	2043.75	2218.75
2.0 – 2.3GHz	6			**1 05**	2047.25	2222.25
2.0 – 2.3GHz	7	1		**1 06**	2050.75	2225.75
2.0 – 2.3GHz	8	2		**1 07**	2054.25	2229.25
2.0 – 2.3GHz	9	3		**1 08**	2057.75	2232.75
2.0 – 2.3GHz	10	4		**1 09**	2061.25	2236.25
2.0 – 2.3GHz	11	5		**1 10**	2064.75	2239.75
2.0 – 2.3GHz	12	6	1	**1 11**	2068.25	2243.25
2.0 – 2.3GHz		7	2	**1 12**	2071.75	2246.75
2.0 – 2.3GHz		8	3	**1 13**	2075.25	2250.25
2.0 – 2.3GHz		9	4	**1 14**	2078.75	2253.75
2.0 – 2.3GHz		10	5	**1 15**	2082.25	2257.25
2.0 – 2.3GHz		11	6	**1 16**	2085.75	2260.75
2.0 – 2.3GHz		12	7	**1 17**	2089.25	2264.25
2.0 – 2.3GHz			8	**1 18**	2092.75	2267.75
2.0 – 2.3GHz			9	**1 19**	2096.25	2271.25
2.0 – 2.3GHz			10	**1 20**	2099.75	2274.75
2.0 – 2.3GHz			11	**1 21**	2103.25	2278.25
2.0 – 2.3GHz			12	**1 22**	2106.75	2281.75
2.3 – 2.5GHz	1			**2 00**	2308.00	2402.00
2.3 – 2.5GHz	2			**2 01**	2312.00	2406.00
2.3 – 2.5GHz	3			**2 02**	2316.00	2410.00
2.3 – 2.5GHz	4			**2 03**	2320.00	2414.00
2.3 – 2.5GHz	5			**2 04**	2324.00	2418.00
2.3 – 2.5GHz	6			**2 05**	2328.00	2422.00
2.3 – 2.5GHz	7			**2 06**	2332.00	2426.00
2.3 – 2.5GHz	8			**2 07**	2336.00	2430.00

RF BAND	CHANNEL NUMBER L	M	U	RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
2.3 – 2.5GHz	9		1	**2 08**	2340.00	2434.00
2.3 – 2.5GHz	10		2	**2 09**	2344.00	2438.00
2.3 – 2.5GHz	11		3	**2 10**	2348.00	2442.00
2.3 – 2.5GHz	12		4	**2 11**	2352.00	2446.00
2.3 – 2.5GHz			5	**2 12**	2356.00	2450.00
2.3 – 2.5GHz			6	**2 13**	2360.00	2454.00
2.3 – 2.5GHz			7	**2 14**	2364.00	2458.00
2.3 – 2.5GHz			8	**2 15**	2368.00	2462.00
2.3 – 2.5GHz			9	**2 16**	2372.00	2466.00
2.3 – 2.5GHz			10	**2 17**	2376.00	2470.00
2.3 – 2.5GHz			11	**2 18**	2380.00	2474.00
2.3 – 2.5GHz			12	**2 19**	2384.00	2478.00
3.4 – 3.6GHz	1			**4 00**	3411.75	3511.75
3.4 – 3.6GHz	2			**4 01**	3415.25	3515.25
3.4 – 3.6GHz	3			**4 02**	3418.75	3518.75
3.4 – 3.6GHz	4			**4 03**	3422.25	3522.25
3.4 – 3.6GHz	5			**4 04**	3425.75	3525.75
3.4 – 3.6GHz	6			**4 05**	3429.25	3529.25
3.4 – 3.6GHz	7			**4 06**	3432.75	3532.75
3.4 – 3.6GHz	8			**4 07**	3436.25	3536.25
3.4 – 3.6GHz	9			**4 08**	3439.75	3539.75
3.4 – 3.6GHz	10			**4 09**	3443.25	3543.25
3.4 – 3.6GHz	11			**4 10**	3446.75	3546.75
3.4 – 3.6GHz	12			**4 11**	3450.25	3550.25
3.4 – 3.6GHz				**4 12**	3453.75	3553.75
3.4 – 3.6GHz			1	**4 13**	3457.25	3557.25
3.4 – 3.6GHz			2	**4 14**	3460.75	3560.75
3.4 – 3.6GHz			3	**4 15**	3464.25	3564.25
3.4 – 3.6GHz			4	**4 16**	3467.75	3567.75
3.4 – 3.6GHz			5	**4 17**	3471.25	3571.25
3.4 – 3.6GHz			6	**4 18**	3474.75	3574.75
3.4 – 3.6GHz			7	**4 19**	3478.25	3578.25
3.4 – 3.6GHz			8	**4 20**	3481.75	3581.75
3.4 – 3.6GHz			9	**4 21**	3485.25	3585.25
3.4 – 3.6GHz			10	**4 22**	3488.75	3588.75
3.4 – 3.6GHz			11	**4 23**	3492.25	3592.25
3.4 – 3.6GHz			12	**4 24**	3495.75	3595.75
1.8-1.9GHz	1			**0 00**	1851.25	1931.25
1.8-1.9GHz	2			**0 01**	1853.75	1933.75
1.8-1.9GHz	3			**0 02**	1856.25	1936.25
1.8-1.9GHz	4			**0 03**	1858.75	1938.75

RF BAND	CHANNEL NUMBER L	M	U	RF BAND (1 digit) CHAN NO. (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
1.8-1.9GHz	5			**0 04**	1861.25	1941.25
1.8-1.9GHz	6			**0 05**	1863.75	1943.75
1.8-1.9GHz	7			**0 06**	1866.25	1946.25
1.8-1.9GHz	8			**0 07**	1868.75	1948.75
1.8-1.9GHz	9			**0 08**	1871.25	1951.25
1.8-1.9GHz	10			**0 09**	1873.75	1953.75
1.8-1.9GHz	11			**0 10**	1876.25	1956.25
1.8-1.9GHz	12			**0 11**	1878.75	1958.75
1.8-1.9GHz			1	**0 12**	1881.25	1961.25
1.8-1.9GHz			2	**0 13**	1883.75	1963.75
1.8-1.9GHz			3	**0 14**	1886.25	1966.25
1.8-1.9GHz			4	**0 15**	1888.75	1968.75
1.8-1.9GHz			5	**0 16**	1891.25	1971.25
1.8-1.9GHz			6	**0 17**	1893.75	1973.75
1.8-1.9GHz			7	**0 18**	1896.25	1976.25
1.8-1.9GHz			8	**0 19**	1898.75	1978.75
1.8-1.9GHz			9	**0 20**	1901.25	1981.25
1.8-1.9GHz			10	**0 21**	1903.75	1983.75
1.8-1.9GHz			11	**0 22**	1906.25	1986.25
1.8-1.9GHz			12	**0 23**	1908.75	1988.75

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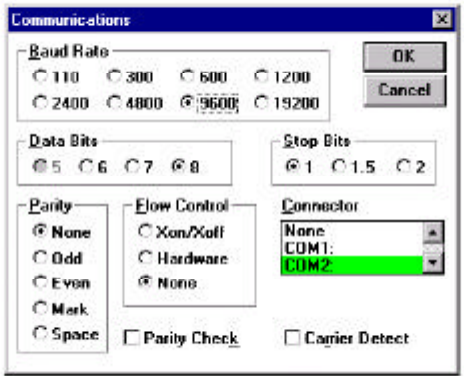
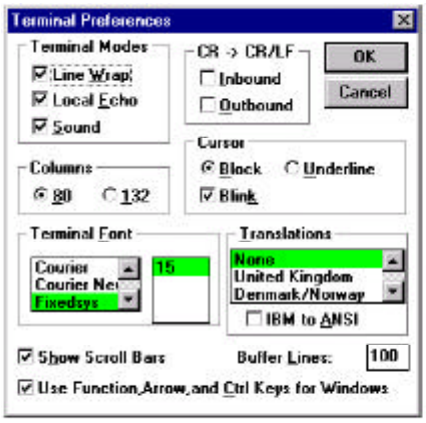
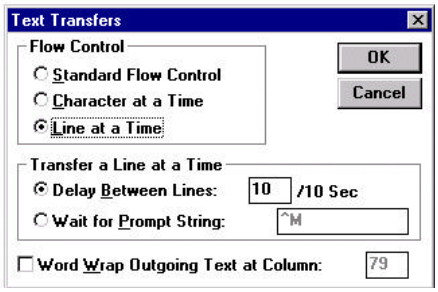
LAT SETTINGS

1. LAT connected to SC

The following pictures show the Terminal Settings used when connecting a LAT terminal to the Shelf Controller:

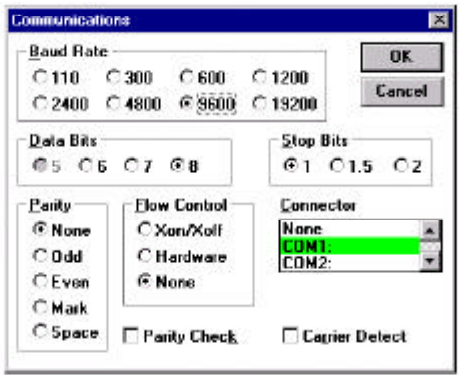


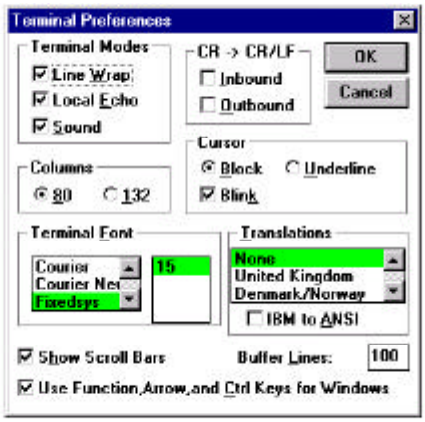


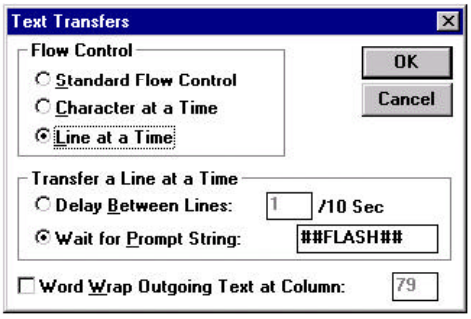


2. LAT connected to an ST

The following pictures show the Terminal settings when connected to an ST:







SETTING-UP SHELF BACKPLANE

The CT modem shelf backplane is configured in the factory. Use this procedure if the shelf configuration has not been done or if the EEPROM has become corrupt.
Note: Sitespan should not be connected during this procedure

STEP **PROCEDURE**

1. LAT Settings

The following commands are entered using a terminal emulator and an RS232 cable to the LAT (local access terminal) port on the front of the DA cards. The preferred emulator is TERMINAL.EXE which came as part of the Windows 3.1 package. This is a simple to use emulator, which has the advantage of being able to sent text files 'one line at a time' and pause until a specified prompt is returned.

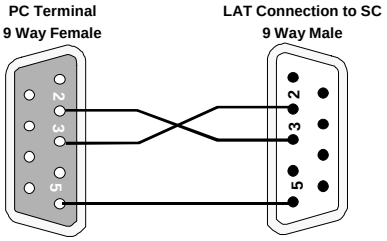
The terminal settings to connect to a LAT are:
Baud: 9600
Data: 8
Parity: None
Stop: 1 bit
Flow: None (not Xon / Xoff)

The terminal is also used to connect to the ST H8 LAT and the Trinity LAT. If connecting to the Trinity, change the Baud rate to 19200, and put a 'check' in the box labelled 'inbound' in the CR -> CR/LF section of the terminal preferences.

To send script files into the SC LAT, the settings of the 'text transfers' options should be set to 'line at a time', and 'wait for prompt string:'. The prompt string is Acc> for the SC LAT, and ##FLASH## when sending new software to the ST.

2. Setting-up Shelf Backplane

1. Connect LAT cable to the Shelf Controller (SC) of each shelf in turn. The cable configuration for the LAT cable is shown below.



2. Set up Terminal window to communicate with the SC cards. See Appendix 1 for details on configuring LAT terminal.

3. Power-up the shelf to be configured

4. Initially the shelf has no configuration stored on the backplane flash, and so the SC card displayed a flashing red LED

5. Using the terminal window, type the following: (note _ represents a space)

   EA_5A:0/5F:0
   EG
   SC returns: OK: 00 00 00
   ES_01:02:00 *To configure the backplane for the Central Terminal*

6. To ensure that the NVRAM is clear on the shelf controller enter the following from the LAT terminal:
   TI_118
   EA_118:0/119:0
   ES_0

7. Reset rack by hot pluging the Shelf Controller Card

8. The system boots up. Under the terminal window, the ‘Shelf Controller Bootstrap’ message appears, followed by the ‘Modem shelf controller’. This should agree with the configuration of the backplane flash in step 5.

9. If the EEPROM is not formatted then the LAT displays ‘EEPROM was not formatted on this shelf, starting new format. This automatically formats the EEPROM.

10. The red LED on the SC card should stop flashing and the green LED should remain constant.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.