AS4000
Wireless Local Loop System.

Operations and Maintenance

Fault Diagnostic Guide

605-0000-431
Issue 1.6 Date 3/2/99

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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

WARNING - HAZARDOUS VOLTAGES

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

Electro-Static Discharge ESD

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

NOTE

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

CE

The CE Symbol on the Airspan Products signifies that they have been certified according to the EMC directive 89/336/EEC. The products fulfil 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.

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Appendix 1: Central Terminal Rack Guide

SECTION 1 INTRODUCTION

1. Introduction

1.1. Purpose

This document gives a black box diagnostic view of the AS4000 equipment. The fault indication provided by the AS4000 is either via Sitespan event messages or visually by LED's on the equipment cards . This guide will provide a fault analysis based on the Sitespan fault indications and follow the process through to faulting at the CT/ST using the visual indications given on the cards.

1.2. Scope

The document covers the types of faults that the AS4000 can detect and respond with a notification message. The following sections will describe each fault in turn and its effects to the overall system operation and repair strategy.

1.3. Technical Support

ACC Technical Support is available 24 hours a day, 365 days a year.

Contact to be made to **ACC's Customer Service Help Desk** at following address by letter, facsimile or telephone:

Customer Service Help Desk
ACC Communication Ltd.
45 Riverside Way
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Middlesex
UB8 2YF

Tel: 01527402800
Fax: 01895467182

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SECTION 2:
VIEWING ALARMS USING AS8100 (SITESPAN)

1. Alarm Reports

A fault detected in the AS4000 system will be reported to the Sitespan by the Modem Shelf Controller Card in the Radio Link Terminal (CT).
All activity is reported as events on the system, alarms are events specific to faults on the system.

The diagram below shows the paths taken to the Sitespan Server or Site Controller PC by the events reported from the FRUs.

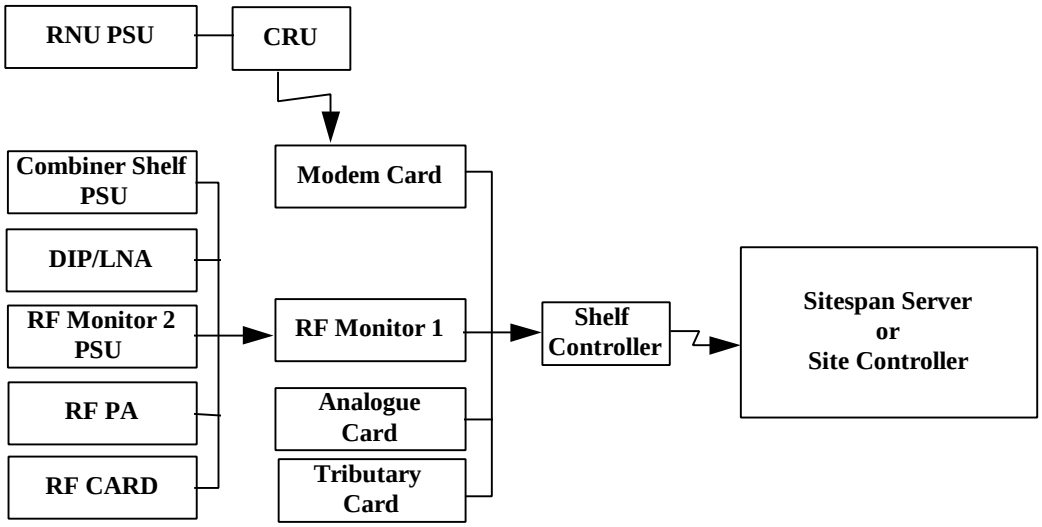


Figure 1-1. Event reporting paths from FRUs

To begin the fault finding, it is recommended to place the event/alarm message into the following categories:

a. FRU Failures
b. Services Related
c. Radio Link Availability

With each messages grouped into one of the above class, you are recommended to resolve the FRU failure first, and followed by checking the service related events, if these are still present after the first action has been completed. The FRU failure message is to inform the operator that the named FRU may be faulty and as a result, it may cause other failure/event to be raised. In most circumstances, the fault can be rectified by changing the named FRU.
In resolving the service related events, you are recommended to check the 2Mbit/s connection, ie have these 'Loss 2MBs Signalling', and/or '2MBs Clock Failure', and/or ' Loss of Frame

Alignment', and/or 'AIS', been reported. In addition to these, the system may also report 'Poor BER' messages on each radio link.

Assuming the PSTN network connection is working and the related event/alarm messages are cleared, you are recommended to check the subscriber terminal hardware and its deployed environment when 'Loss of Comms with ST', and/or 'Poor BER' message is reported.

Important Notes:

Analogue Card Failure:
When the AU card fails, the SC will send 'FRU failure' messages to the Sitespan to indicate each of its shelf elements (TU, Modem 1 to 8, AU and RF) is failing to respond. In this situation, the engineer can assume the AU has failed. (It is very unlikely that these messages will occur together).

 **Warning:** The Analogue Card is not 'hot plugable'. Power should be disconnected from the modem shelf before replacing the card. Replace the Analogue Card with a new one and then restore power to the modem shelf.

RF Card Failure. In the event of the RF card failure, the AU will report the RF card's failure to the Sitespan and all modem cards will report 'Loss of Comms with its STs' message.

Transmit Radio Failure: a 'FRU Failure' on the PA or RF card will imply the total radio failure and all modem cards in the modem shelves affected will report loss of comms with ST

Receive Radio Failure: a 'FRU Failure' on the LNA or RF card will imply the total radio failure as well.

 **Warning Monitor Card Removal:** Under no circumstances should both monitor cards be removed from a working system. Together they form a redundant power source to the CT RF Cards.

Inventory messages (such as card removal/insertion) may be the cause of a number of event messages.

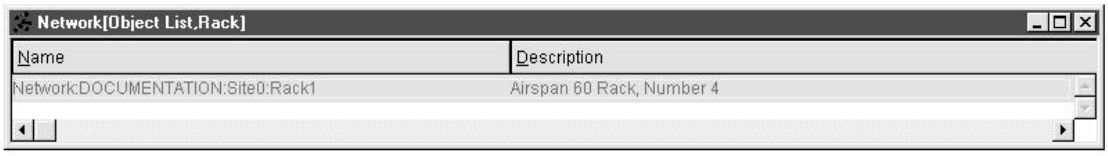
VIEWING ALARMS USING OBJECT LISTS

Use this procedure to view an alarm using the Object List View in Sitespan

STEP **PROCEDURE**

1. From the *View* menu, select *Object List*.

2. From the Select View Variant box, select the *Rack* view from the list. Click *OK*.



3. Racks with alarms will be shown in red. Select rack to be viewed by clicking mouse on text.

4. From the *View* Menu select *Alarms*

5. The Alarm View shows the current alarm status. Events when viewed as Objects in Sitespan are colour coded to help identify groups of alarms that occur:

Red : Persistent Alarm
Orange: Intermittent
Green: Clear

7. The table below summarises the alarm objects. Use the table reference shown in column 3 to process the alarm.

Alarm Object	Group	Reference
(Type)Shelf(N):Tributary Unit: System Clock Fail	CT TU Interface Failures	Section 3 Table 1.1
(Type)Shelf(N):Tributary Unit:2MBS Lost		
(Type)Shelf(N):Tributary Unit:Frame Alignment Lost		
(Type)Shelf(N):Tributary Unit:AIS		
(Type)Shelf(N):Shelf Controller:PSU Fail	CT FRU and Power Failures	Section 3 Table 1.2
(Type)Shelf(N):AnalogueCard: PSU Fail		
Combiner:PowerAmp(N):FRU Fail		
Combiner:PowerSupply(N):FRU Fail		
FRU failed (from any other address) Combiner:LowNoiseAmp:FRU Fail Combiner:Monitor:FRU Fail (Type)Shelf(N):Tributary Unit: FRU Fail (Type)Shelf(N):AnalogueCard: FRU Fail (Type)Shelf(N):Modem Card: FRU Fail		
(Type)Shelf(N):Shelf Controller:Lost Comms With EM	Management system communication failures	Section 3 Table 1.3
(Type)Shelf(N):Modem Card:Poor BER	ST and Radio Link Failures	Section 3 Table 1.4
(Type)Shelf(N):ST(n): Poor BER		
(Type)Shelf(N):ST(n): Link Unavailable		
(Type)Shelf(N):STPsu(n): Switch to Battery		
(Type)Shelf(N):STPsu(n): Low Battery		
(Type)Shelf(N):Modem Card:Lost Comms With ST		
(Type)Shelf(N):ST(n): RingerFail		
(Type)Shelf(N):STPsu(n): PSU Tamper		

Table 1. Alarm Reports

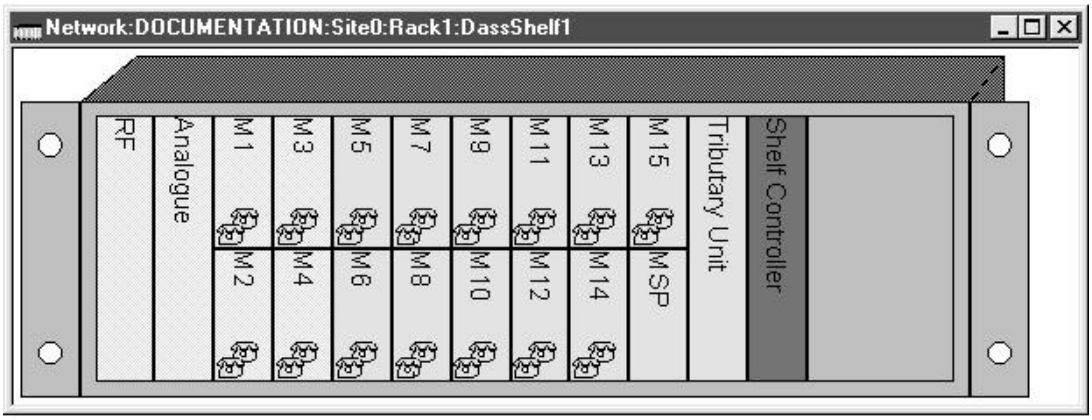
STOP THIS PROCEDURE IS NOW COMPLETE

VIEWING ALARMS USING GUI

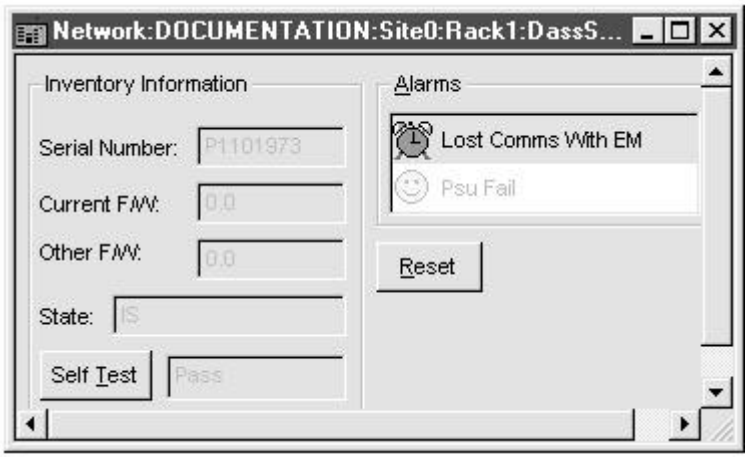
Use this DLP to view Alarms as a GUI.

STEP	PROCEDURE

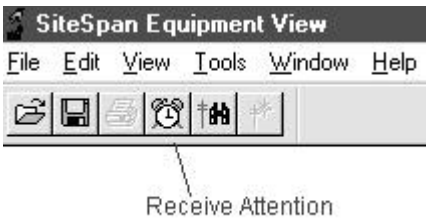
1. To view the alarms using the GUI views.
   a) Select Site View from Object List
   b) Double click the Site displaying the alarm(red) text. The Rack View appears with the shelf in alarm high-lighted in red.
   c) Double click the Shelf displaying the alarm(red). The Shelf View appears with the card in alarm highlighted in red.



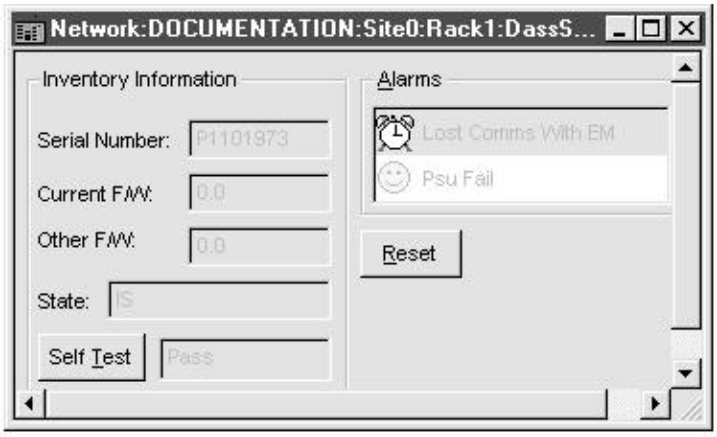
2. Double click card to produce the card view. The Card view below shows the Shelf Controller has lost comms with the Sitespan Server.



3. To Receive attention the alarm click the icon shown below.



4. The Alarm will then be shown as white in the Card View.



Alarm	Group	Reference
Tributary Unit:System Clock Fail	CT TU Interface Failures	Section 3 Table 1.1
Tributary Unit:2MBS Lost		
Tributary Unit: Frame Alignment Lost		
Tributary Unit:AIS		
Shelf Controller:PSU Fail	CT FRU and Power Failures	Section 3 Table 1.2
AnalogueCard: PSU Fail		
Combiner:Power Amp:FRU Fail		
Combiner:PowerSupply:FRU Fail		
FRU failed (from any other address) Combiner:LowNoiseAmp:FRU Fail Combiner:Monitor:FRU Fail Tributary Unit: FRU Fail AnalogueCard: FRU Fail (RF or Analogue Card) Modem Card: FRU Fail		
Shelf Controller:Lost Comms With EM	Management system communication failures	Section 3 Table 1.3
Modem Card:Poor BER	ST and Radio Link Failures	Section 3 Table 1.4
ST Poor BER		
ST: Link Unavailable		
ST: Switch to Battery		
ST: Low Battery		
Modem Card:Lost Comms With ST		
ST: RingerFail		
ST: PSU Tamper		

Table 2 Alarm Reports

STOP THIS PROCEDURE IS NOW COMPLETE

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SECTION3: AS8100 (SITESPAN) ALARMS: FAULT REFERENCE

2. Fault Reference Charts Sitespan Object List Indications

Alarm Object	FRU Type	Fault Type	Problem Type	Specific Problem	Event Type / Intermittency	Refer
(Type)Shelf(N):Tributary Unit:System Clock Fail	TU	TU Interface Failure	Equipment Malfunction	Input Transmission System Clock Fail	Equipment Alarm / No	1.1.1
(Type)Shelf(N):Tributary Unit:2MBS Lost	TU-0/L (outlet)	TU Interface Failure	Loss of Signal	Loss of Signal	Communications Alarm / No	1.1.2
(Type)Shelf(N):Tributary Unit: Frame Alignment Lost	TU-0/L (outlet)	TU Interface Failure	Loss of Frame	Loss of Frame Alignment	Communications Alarm / Yes	1.1.3
(Type)Shelf(N):Tributary Unit:AIS	TU-0/L (outlet)	TU Interface Failure	Loss of Signal	Receipt of AIS at TU	Communications Alarm / No	1.1.4

Table2. Alarms generated by TU interface failure.

Alarm Object	**FRU Type**	**Fault Type**	**Problem Type**	**Specific Problem**	**Event Type / Intermittency**	**Refer**
(Type)Shelf(N):Shelf Controller:PSU Fail	SC	PSU Failure	Power	SC PSU Failure	Equipment Alarm / No	1.1.5
(Type)Shelf(N):Analogue Card: PSU Fail	RIF *(RF / ANA)*	PSU Failure	Power	Analogue PSU. Failure	Equipment Alarm / No	1.1.6
Combiner:PowerAmp(N):FRU Fail	RIF	RF PA Failure	Equipment Malfunction	RF Combiner PA Failure	Equipment Alarm / No	1.1.7
Combiner:PowerSupply(N):FRU Fail'	PSU *(RF Combiner)*	PSU Failure	Power	RF Combiner PSU. Failure	Equipment Alarm / No	1.1.8
FRU failed (from any other address) Combiner:LowNoiseAmp: FRU Fail Combiner:Monitor:FRU Fail (Type)Shelf(N):Tributary Unit: FRU Fail (Type)Shelf(N):Analogue Card: FRU Fail♠ (Type)Shelf(N):Modem Card: FRU Fail	Appropriate Object	TU Failure RF/ANA Failure ♠ CT Modem Failure Combiner RF LNA Combiner Monitor	Equipment Malfunction	FRU Failed	Equipment Alarm / Yes	1.1.9

♠ **Note:** Sitespan views the RF and Analogue cards as one object , the LED indication will show which of the cards has failed.

Table 3 Alarms generated by FRU and PSU failures

Alarm Object	**FRU Type**	**Fault Type**	**Problem Type**	**Specific Problem**	**Event Type / Intermittency**	**Refer**
(Type)Shelf(N):Shelf Controller:Lost Comms With EM	Shelf Controller	SC Interface Failure	Communication Sub-System Failure	Loss of comms between SC and Site Controller/ Sitespan Server	Communications Alarm / No	1.1.10

Table 4. Alarms generated by loss of communications between Shelf Controller and Sitespan .

Alarm Object	**FRU Type**	**Fault Type**	**Problem Type**	**Specific Problem**	**Event Type / Intermittency**	**Refer**
(Type)Shelf(N):Modem Card:Lost Comms With ST	PSU *(ST)*	ST Failure	Communication Sub-System Failure	Loss of Comms with Dependant ST	Communications Alarm / Yes	1.1.11
(Type)Shelf(N):Modem Card:Poor BER	CT Modem	RIF Interface Failure	Communications Protocol Error	BER $<10^{-3}$ Uplink	Communication Alarm / Yes	1.1.12
(Type)Shelf(N):ST:Poor BER	ST	RIF Interface Failure	Communications Protocol Error	BER $<10^{-3}$ Downlink	Communication Alarm / Yes	1.1.12
(Type)Shelf(N):STPsu(n): Switch to Battery	PSU *(ST)*	PSU Failure	Power	Battery Unit Power Source Failure	Equipment Alarm / No	1.1.13
(Type)Shelf(N):STPsu(n): Low Battery	PSU *(ST)*	PSU Failure	Power	Battery Back-up Charge Unacceptable	Equipment Alarm / Yes	1.1.14
(Type)Shelf(N):STPsu(n): PSU Tamper	PSU *(ST)*	PSU Failure	Enclosure Door Open	PSU Door Open	Environmental Alarm / No	1.1.15
(Type)Shelf(N):ST(n): RingerFail	NTU Outlet	NTU Outlet Failure	Equipment Malfunction	Ringer Failure	Equipment Alarm / No	1.1.16

Table 5. Alarms generated by a Radio or CRU failure.

2.1. Alarm Messages: Sources, Conditions, Causes, and Actions

2.1.1. Transmission system clock fail

Message: 'Tributary Unit:System Clock Fail',
This alarm is usually associated with the following messages.
'2MBS Lost', 'Frame Alignment Lost', 'AIS'.

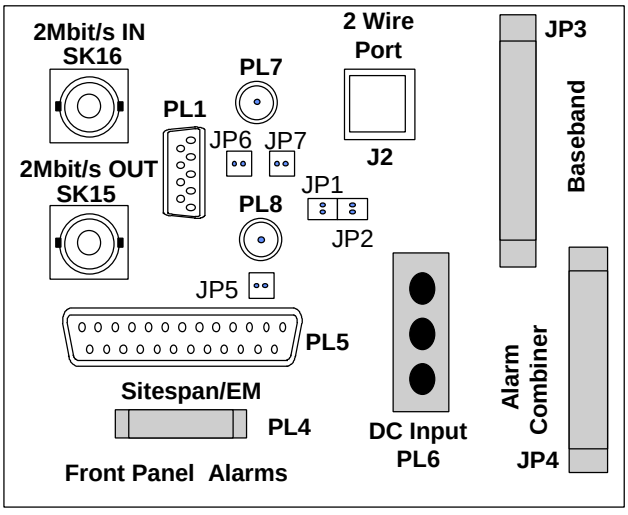
Source: 2Mbit/s connection to the CT modem shelf is not made.

Fault Condition: AS4000 has to use its internal clock, if the 2Mbit/s connection is broken to the exchange all calls will be dropped.

Likely Cause:
a. Wrong Tx/Rx connection.
b. Broken 2Mbit/s cable.
c. Exchange Problem

Consequential Effect:
(a). All active calls will be dropped.
(b). Call in progress LEDs on the CT modem card will be off irrespective of the call state.
(c). Due to the loss of network clock, there may be a single burst of poor BER messages from the CT Modems when the system changes over.

Repair Actions: Check connection from exchange to AS4000 shelf interface.
The 2Mbit/s OUT and IN connect to SK 15 & 16 or PL7 & 8 respectively on the modem shelf backplane



If the fault is in the exchange or the transmission network then the fault should be reported as external to the AS4000 system.

2.1.2. Loss of 2Mbit/s Signal

Message: 'Tributary Unit:2MBS Lost'
As a result of a loss of a 2Mbit/s input the following messages may appear.,
'System Clock Fail', 'Frame Alignment Lost', 'AIS'.

Source: TU, 2Mbit/s connection to the CT modem shelf.

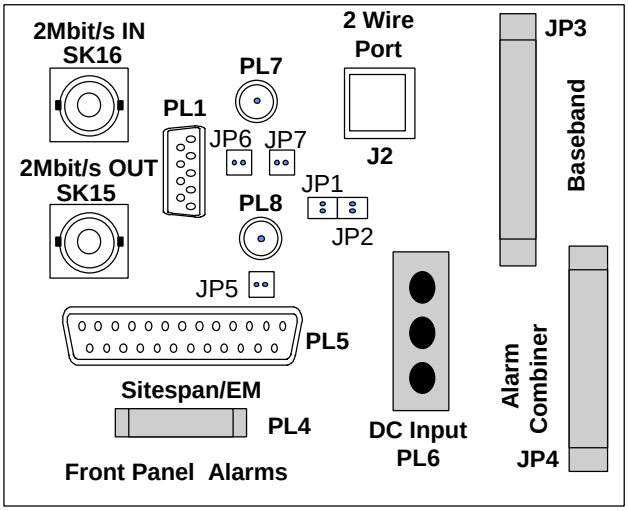
Fault Condition: AS4000 has to use its internal clock and all calls will be dropped.

Likely Cause: a. Wrong Tx/Rx connection.
b. Broken / Faulty 2Mbit/s cable.

Consequential Effect: a. All active calls will be dropped.
b. Call in progress LEDs on the CT modem card will be off irrespective of the call state.
c. Due to the loss of network clock, there may be a single burst of poor BER messages from the CT Modems when the system changes over to the internal clock source.

Repair Actions:

Check connection from exchange to AS4000 shelf interface.
The 2Mbit/s OUT and IN connect to SK 15 & 16 respectively on the modem shelf backplane



If the fault is in the exchange or transmission network then the fault should be reported as external to the AS4000 system.

2.1.3. Loss of Frame Alignment

Message: 'Tributary Unit: Frame Alignment Lost'

Source: 2Mbit/s Input to the CT modem shelf.

Fault Condition: Frame pattern in the 2Mbit/s signal to the CT modem shelf is corrupted.

Likely Cause: a. Fault in the exchange or transmission equipment.

Consequential Effect: a. All active calls will be dropped..
b. Call in progress LEDs on the CT modem card will be off irrespective of the call state.
c. Due to the loss of network clock, there will be a single burst of poor BER messages from the CT Modems when the system changes over to the internal clock source.

Repair Actions:

The fault is the result of the failure of the preceding transmission network or exchange and the supervisory systems for these need to be checked for alarm.

2.1.4. Rx AIS

Message: 'Tributary Unit:AIS'

Source: Exchange, 2Mbit/s connection to the CT modem shelf.

Fault Condition: No data path between the AS4000 and the Switch.

Likely Cause: a. Distant equipment is in alarm state.

Consequential Effect: a. All active calls will be dropped..
b. Call in progress LEDs on the CT modem card will be off irrespective of the call state.

Repair Actions: The fault is the result of the failure of the preceding transmission network or exchange and the supervisory systems for these need to be checked for alarm.

2.1.5. FRU Failed -From SC PSU

Message: 'Shelf Controller:PSU Fail'

Source: Shelf Controller PSU.

Fault Condition: PSU Fail

Likely Cause: Faulty PSU module.

.

Consequential Effect: The Analogue Card PSU provides back-up power supply for the shelf controller. Service should not be effected but the faulty SC should be replaced as soon as practical.

Repair Actions:

Replace faulty Shelf Controller. Refer to detailed level procedure DLP-004 in Section 4 for Changing the Shelf controller card

2.1.6. FRU Failed -From Analogue PSU

Message: 'AnalogueCard: PSU Fail'

Source: RF Analogue Card PSU.

Fault Condition: PSU Fail

Likely Cause: Faulty PSU module.

.

Consequential Effect: None as Shelf Controller PSU provides back-up power supply.

Repair Actions:

Replace faulty Analogue Card. Refer to detailed level procedure DLP-005 in Section 4

Note: 1. This card is not hot plugable.

2 When the modem shelf recovers a number of alarm events will be reported from the recovery of the radio link. However the clear alarm for the original analogue PSU failure will not be seen as the shelf controller has been reset by the modem shelf power down.

2.1.7. FRU Failed -From RF PA

Message: 'Combiner:PowerAmp(N):FRU Fail'

Source: One of the Power Amplifiers (PA) at CT Combiner Shelf.

Fault Condition: One of the two PAs in the combiner shelf is in alarm state.

Likely Cause: Faulty PA module.

.

Consequential Effect: A Loss of service to all users connected to associated modem shelf.

Repair Actions:

Replace faulty PA module. Refer to detailed level procedure DLP-011 in Section 4

Note: Removing the PA will also disconnect service to the other modem shelf using the same PA module.

2.1.8. FRU Failed -From RF Combiner PSU

Message: 'Combiner:PowerSupply(N):FRU Fail'

Source: One of the three PSU at CT Combiner Shelf.

Fault Condition: One of the three PSUs in the combiner shelf is in alarm state. In cases where only one PSU has been provided there will be a failure of the shelf connected to that PSU. In this case the fault is indistinguishable from an exchange supply failure.
If a group of intermittent alarms followed by set alarm for all RF combiner PSUs fitted (typically 2 or 3 if units not fitted they will be the state "ISENP") then it is likely that one of the DC power feeds to the rack has failed.

Likely Cause: Faulty PSU module.

.

Consequential Effect: A PSU will report failure to the Sitespan .

Repair Actions:

a) Individual 'Combiner:PowerSupply(N):FRU Fail' (probably preceded by an intermittent 'Combiner:PowerSupply(N):FRU Fail' Replace faulty PSU module. Refer to detailed level procedure DLP-012 in Section 4.

b) A group of 'Combiner:PowerSupply(N):FRU Fail' (probably preceded by an group of intermittent) check the DC supply feeds to the rack.

2.1.9. FRU Failure (Other)

'Message: Combiner:LowNoiseAmp:FRU Fail'
'Combiner:Monitor:FRU Fail'
'Tributary Unit: FRU Fail'
'AnalogueCard: FRU Fail'
'Modem Card: FRU Fail'

Source Individual card as specified in message.

Fault Condition: Card failure.

Likely Cause: a. Equipment Malfunction.

Consequential Effect: Dependant on the card failed.

Repair Actions: Replace failed card.

SC Card failure: Refer to DLP-004 in Section 4
Analogue Card Failure ♠: Refer to DLP-005 in Section 4
TU Card failure: Refer to DLP-006 in Section 4
CT Modem Failure Refer to DLP-007 in Section 4
RF Card failure Refer to DLP-009 in Section 4
RF/ LNA Failure Refer to DLP-010 in Section 4

♠ **Note:** The Analogue Card is not a 'hot plugable' card and there is no automatic system recovery. Before replacing the card the power will have to be disconnected from the shelf. After replacing the card the power is reconnected to recover the system.

2.1.10.Loss of communications with the Sitespan

Message: '(Type)Shelf(N):Shelf Controller:Lost Comms With EM'

Source: V.24 connection to the Sitespan PC

Fault Condition: The SC cannot forward its messages (urgent or non-urgent) to the Sitespan and has to use its internal buffer. Customer service is not effected unless the cause of the fault is failure of both DC inputs to the CT rack.

Likely Cause: a. the V.24 cable connected to the Sitespan Server / Site Controller PC has been disturbed.
b. Failure of both DC inputs to the CT rack.

Consequential Effect: a. SC buffer may over-fill and urgent messages will be lost if buffer starts to wrap-around.

Repair Actions:

a) Check V.24 cable connections from Modem Shelf (PL5) to Sitespan Server / Site Controller PC
Refer to detailed level procedure DLP-003 in Section 4
b) Failure of both DC inputs to the CT rack. Go to DLP-012 in Section 4

2.1.11. Loss of communications with ST

Message: 'Modem Card:Lost Comms With ST'

Source: CT modem, slots 3 - 10 in the CT modem shelf.

Fault Condition: A 'loss comms with ST' message is forwarded to the EM if the CT modem fails to establish a radio link with the ST.
This message is forwarded after a power-on reset of the CT rack/modem shelf.

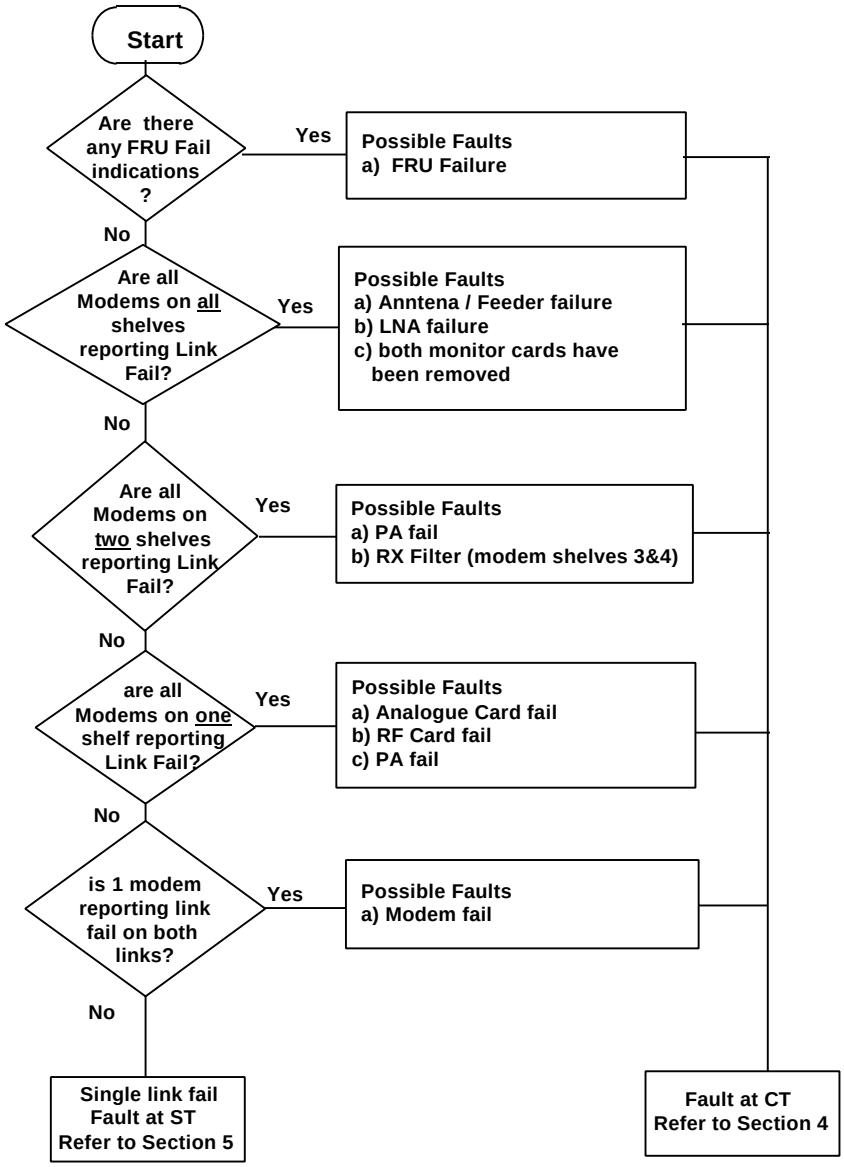
Likely Cause: a. Loss of communications with any dependent ST, i.e. loss of frame synchronisation and/or CMDA code synchronisation, detected by the CT modem, or by the ST and sent to the CT modem on the management channel when possible.
b. Radio path is blocked or the ST is faulty.

Consequential Effect: (a). If the message is generated due to the power on reset, an 'Alarm clear' message is sent to the Sitespan when the radio link is established with the ST.

(b). If the problem is due to a temporary radio blockage, an 'event clear' message is sent to the Sitespan when the radio path is cleared and the ST can re-establish the link.

Repair Actions: Use the flowchart on the next page to decide the probable cause and location of the failure.

- Establish whether one or many ST's are affected.
- If a number of STs are affected it is probable that the fault is at the CT.
- If STs are affected on more than one shelf it is probable that CT common components (Combining Shelf, Antenna, Feeder etc.) are the cause of the fault.



2.1.12.BER>10^{-3}

Message: 'Modem Card:Poor BER'
'ST(N):Poor BER'

Source: CT Modem in any slot form 3 to 10. or at ST.

Fault Condition: High noise level in the voice path. If a BER 10^{-3} is reported and indicates a link fail in one direction the alarm is previous information and the information relating to fail in the other direction has been unable to be sent back to the shelf controller.

Likely Cause:
a. Poor radio path
b. Radio path blockage

Consequential Effect:
a. Service is degraded and active call may be dropped.
b. Loss of communication with the ST (intermittent)

Repair Actions: Check the source of the alarm in . This will be 'ST(N):Poor BER' for a poor BER at the ST CRU receiver
or
'Modem Card:Poor BER' for a poor BER at the CT Modem card receiver.

CT Faults
If the fault is on the one modem only change the modem card. Go to DLP-007
If the fault indication is at the CT and there are also indications on other modem cards at the CT
a) check the CT antenna and feeder installation
b) check for interference source close to CT.

ST Faults
If ST fault Check AGC and PC value and go to Section 5

2.1.13.Switch-over to battery back-up

Message: 'Switch to Battery'

Source: ST PSU .

Fault Condition: Cannot detect mains input to the ST PSU.

Likely Cause: The mains supply has been disconnected or a power outage has occurred in the area.

Consequential Effect: A 'switch-over to battery' message is send to the element manager. If the power failure persists, another warning message 'Low Battery' will be sent. See 2.1.14

Repair Actions: There is no specific maintenance centre or repair action. The customer is responsible for the mains supply to the ST PSU.

2.1.14.Battery back-up charge drops below approximately 30% of full charge

Message:	'Low Battery'.
Source:	ST PSU .
Fault Condition:	Battery Charge drops below 30% of the charge. Low output voltage from the ST PSU.
Likely Cause:	Faulty battery and/or prolonged mains supply failure.
Consequential Effect:	A 'Battery Charge Drops Below 30% of the Charge' message is send to the element manager. If this condition persists, the CRU will not be able to maintain its operation. The time to failure from this point is indeterminate depending on the condition of the battery.
Repair Actions:	There is no specific maintenance centre or repair action. The customer is responsible for the mains supply to the ST PSU.

2.1.15.PSU Tampered

Message: 'PSU Tamper'

Source: ST PSU .

Fault Condition: None.

Likely Cause: ST PSU's cover has been opened or faulty detector. This may be as a result of planned work.

Consequential Effect: None.

Repair Actions: No specific action. But the existence of this alarm condition could be used to charge customer for a callout on any subsequent failure caused as the result of PSU tamper.

2.1.16. Ringer Failure

Message: 'RingerFail'

Source: ST CRU.

Fault Condition: No ringer output at CRU.

Likely Cause: CRU malfunction.

Consequential Effect: No Ringing to NTU

Repair Actions: Check that the problem is not in the phone by attaching a known good phone to the circuit.
If 'Ringer Fail' change CRU (refer to Detailed Level Procedures DLP-016 to DLP-020).

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SECTION 4: FAULT DIAGNOSIS CT

3. Faults at CT site

3.1. Visual

Visual indicators, in the form of Light Emitting Diodes (LED's) mounted on certain equipment items, show the status of that item. Each of the following modules within the CT equipment rack has an AMBER LED (except the TU) to indicate the unit is operating correctly and a RED LED to indicate that the unit is faulty:-

All PSU Modules
CT Modem Modules
RF Modules
Shelf Controllers
TU Module (does not contain a PSU no LEDs lit if operating correctly)
RF Combiner PA Modules
Analogue Cards
Monitor Card (MON1)

The RED LEDs on each unit will be illuminated on the appropriate module whenever the following fault conditions are detected:-

- Radio link failure
- Low RF output power at Combiner
- Rx link faulty on TU (Rx AIS - fault outside the AS4000 system)
- 2Mbit/s link failure
- Loss of communication with management system

Each of the Modem Cards has 2 **AMBER** LED's that are illuminated whenever the telephony channel between NTU and TU is open for subscriber traffic.

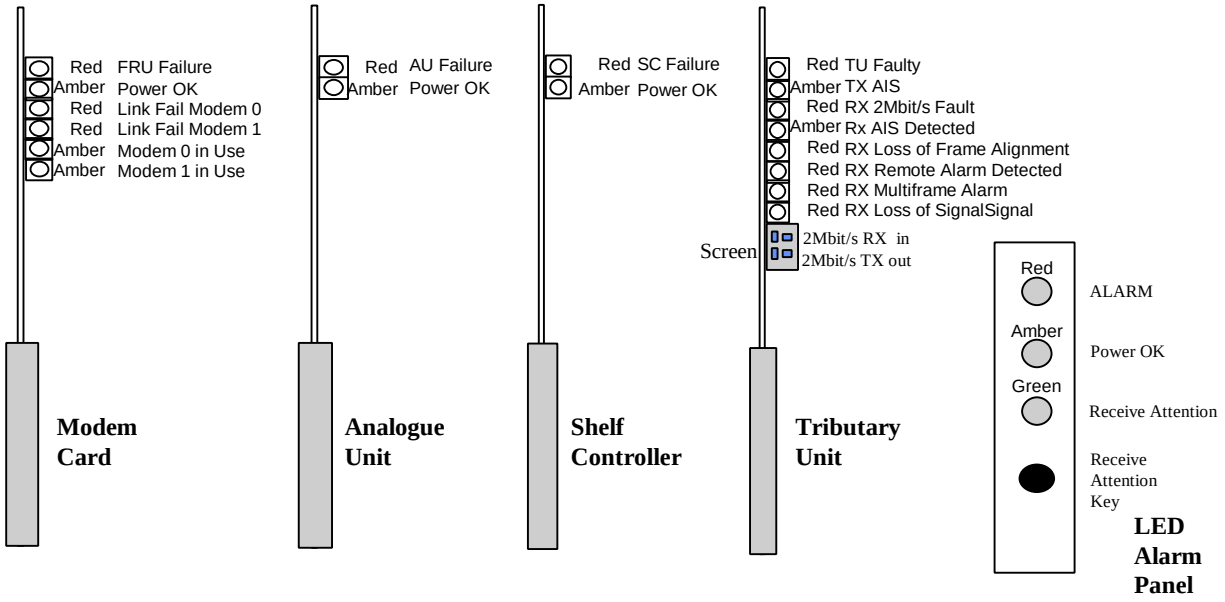

Figure 3-1 Modem Shelf Alarms

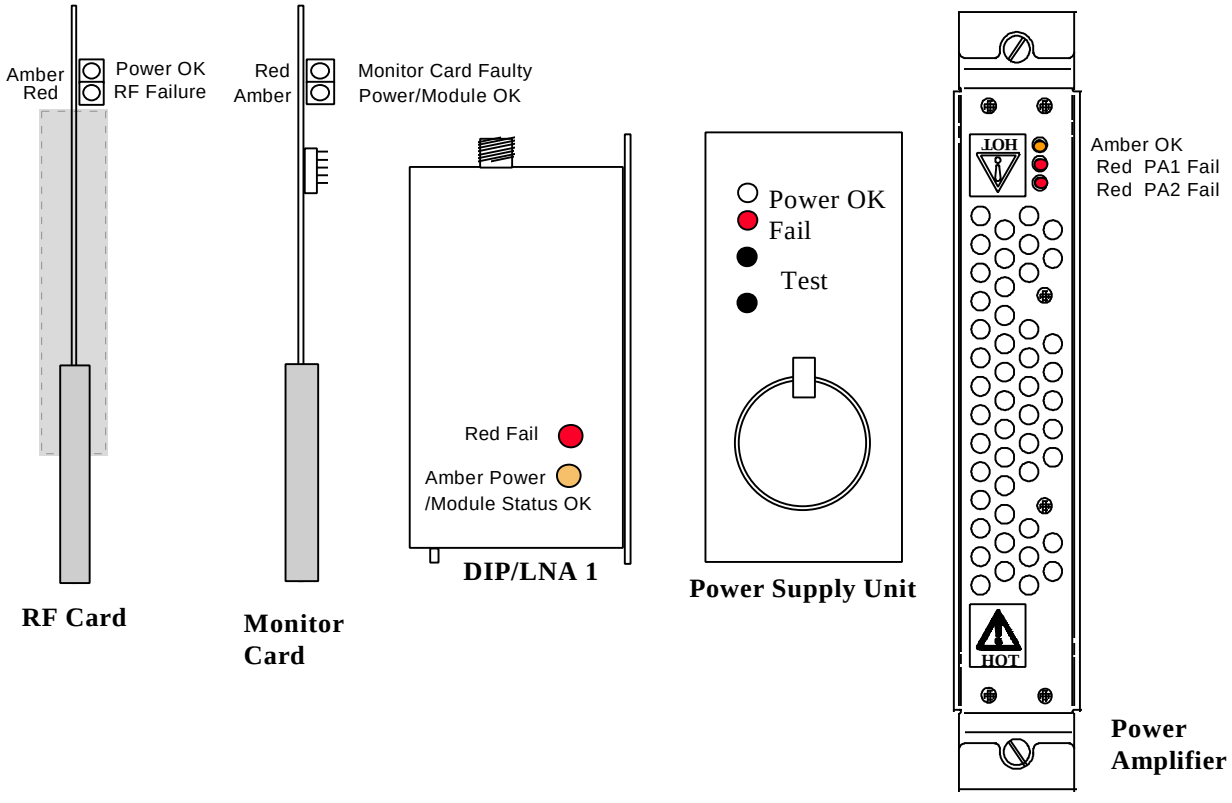

Figure 3-2. Combiner Shelf Alarms

Use this flowchart to locate the Detail Level Procedures (DLPs) that address the alarm issues by following the path to the ð indicating which DLP is relevant.

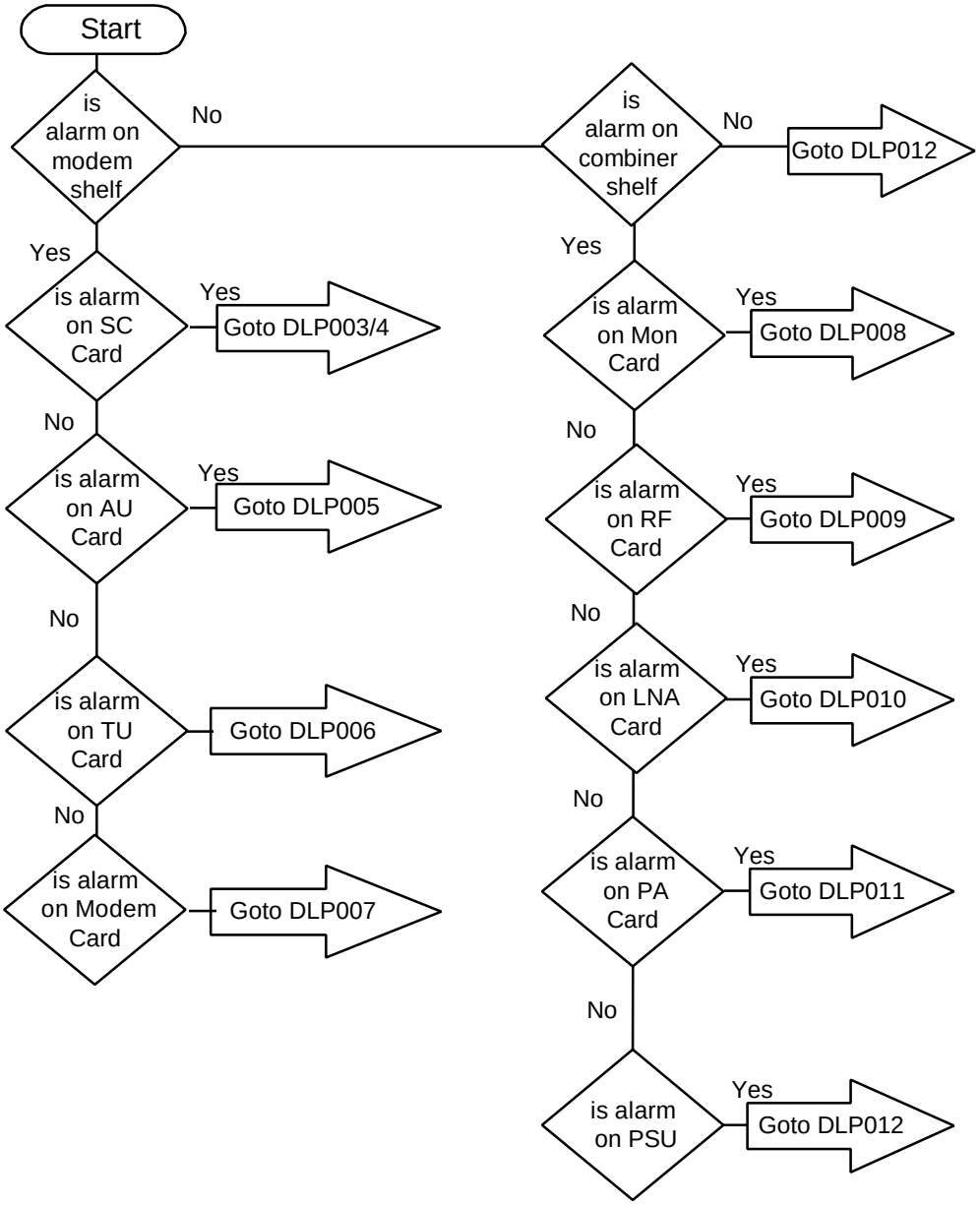

Chart 3-1 . Alarm Processing Flowchart.

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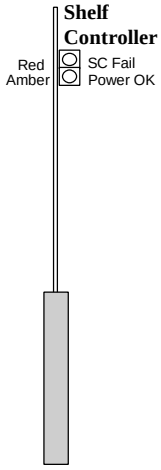
LOSS OF COMMS WITH SHELF CONTROLLER

Alarm Indications



AS8100 (Sitespan) 'Lost Comms With EM'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: SC Fail

Probable Cause

Link Faults

a). Loss of connection with Sitespan Server
b). Cable between Modem Shelf and PC/Server faulty

Card Faults

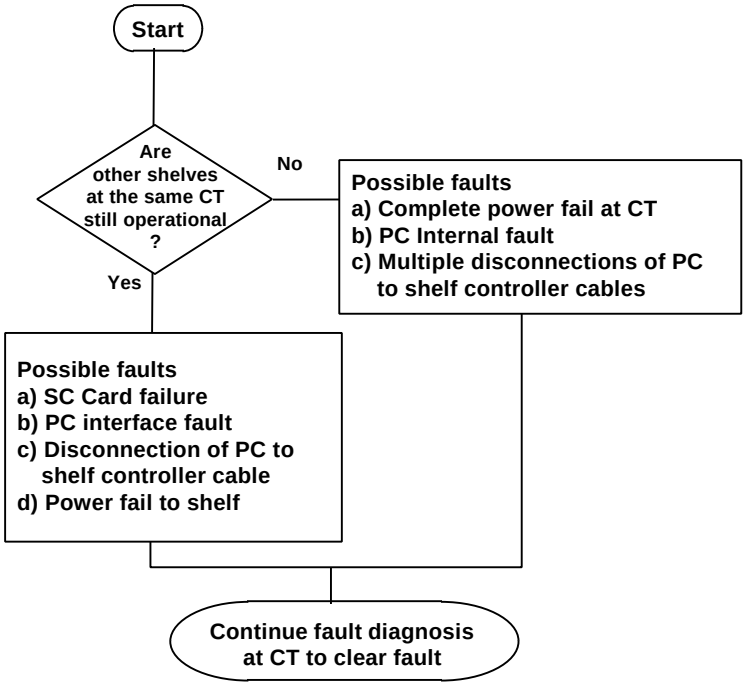
a). Faulty SC Card
b). PC Fault

Consequences

a). If connection is lost between shelf controller and management system then messages, controls and alarms will not be exchanged but the AS4000 equipment will functions as normal and service will not be interrupted.
The SC buffer may overfill and messages will be lost if buffer starts to wrap around.

b). A PSU failure within the SC Card will not cause any interruptions to service as the PSU within the AU card will enable the shelf to continue functioning.

Maintenance Clear Strategy
Loss of comms with Sitespan



STEP **PROCEDURE**

Observe full ESD precautions.

1. Using Sitespan :
   Check to see if there are other 'Loss of Comms' messages
   a) From other CTs. Most likely AS8100 (Sitespan) Interface problem.
   b) From other shelves on the same CT. Probably a port fault or complete power failure to the rack.

2. Further faulting will need to be at the CT site.

3. Using the Flow Chart above decide on possible faults.

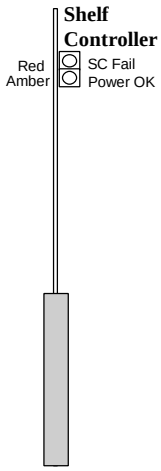
4. Check the items listed as possible faults and change/repair as required.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SHELF CONTROLLER (SC) ALARMS

Alarm Indications

AS8100 (Sitespan) : 'Shelf Controller:PSU Fail'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: SC Fail



Probable Cause

Card Faults

a). PSU failure within SC card
b). Faulty SC Card

Link Faults

a). Loss of connection with Sitespan
Go to DLP-003

Consequences

a). If connection is lost between shelf controller and management system then messages, controls and alarms will not be exchanged but the AS4000 equipment will functions as normal and service will not be interrupted.
The SC buffer may overfill and messages will be lost if buffer starts to wrap around.

b). A PSU failure within the SC Card will not cause any interruptions to service as the PSU within the AU card will enable the shelf to continue functioning.

Maintenance Clear Strategy
SC Card Faults

STEP **PROCEDURE**


Observe full ESD precautions.

1. During this procedure use antistatic precautions when handling cards.

2. Press Receive Attention on the modem shelf cover to suppress alarm.

3. Check that there is power to the shelf. (amber LEDs should be illuminated). If there is no power to the shelf use DLP-012 to diagnose power problem.

4. Check that the PC is functioning correctly.

5. Check that the interface plugs are securely fitted to the PC and the modem shelf backplane.

6. Check the Status and diagnosis of the SC card using the table below.

Status	SC Card LED		Diagnosis and repair Action
	Amber	Red	
Idle State	ON	ON	OK no messages being sent. Check that the card is in a genuine idle state If the card is in the idle state it is possible to stimulate it to send a message. If the combiner shelf PSUs indicate that they are OK (amber LED illuminated) and no fail indications. Switch off **one** of the DC input switches located on the combiner shelf. The three PSU fail lights will operate and PSU fail messages will be sent to the Sitespan . Check with the Sitespan to see if the messages are received. If the messages are not received check the connections to the PC, if these are OK change the Shelf Controller card.
Active State	ON	OFF	OK messages being sent to Sitespan for up to 3 mins before returning to idle state. If the card does not return to the idle state after 5 mins change the Shelf Controller card.
FRU fail	OFF	ON	FRU fail change Shelf Controller card
Dead	OFF	OFF	Shelf Controller card

7. If replacing with a new SC card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. This should not effect traffic using the shelf.

8. SC Red LED should now be extinguished and fault clear on alarm unit.
Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the Fail LED will flash until the co-processor initialisation is complete.

9. The new SC card will be downloaded with the shelf information from the Sitespan .

10. Check that an alarm is received at the Sitespan by switching off **one** of the DC input switches located on the combiner shelf. The three PSU fail lights will operate and PSU fail messages will be sent to the Sitespan . Restore the switch and check with the Sitespan to see if the messages are received and cleared.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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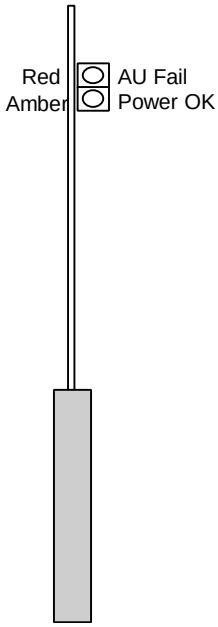
ANALOGUE UNIT (AU) ALARMS

Alarm Indications



AS8100 (Sitespan) : a) 'AnalogueCard: FRU Fail'
b) 'AnalogueCard: PSU Fail'

Note: Sitespan views the RF and Analogue cards as one object , the LED indication will show which of the cards has failed.
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: AU Fail
When the AU card fails, the SC will send 'FRU failure' messages to the Sitespan to indicate each of its shelf elements is failing to respond. In this situation, the engineer can assume the AU has failed (it is very unlikely that these messages will occur together).

Probable Cause

a) Card Fail
b) AU PSU Fail

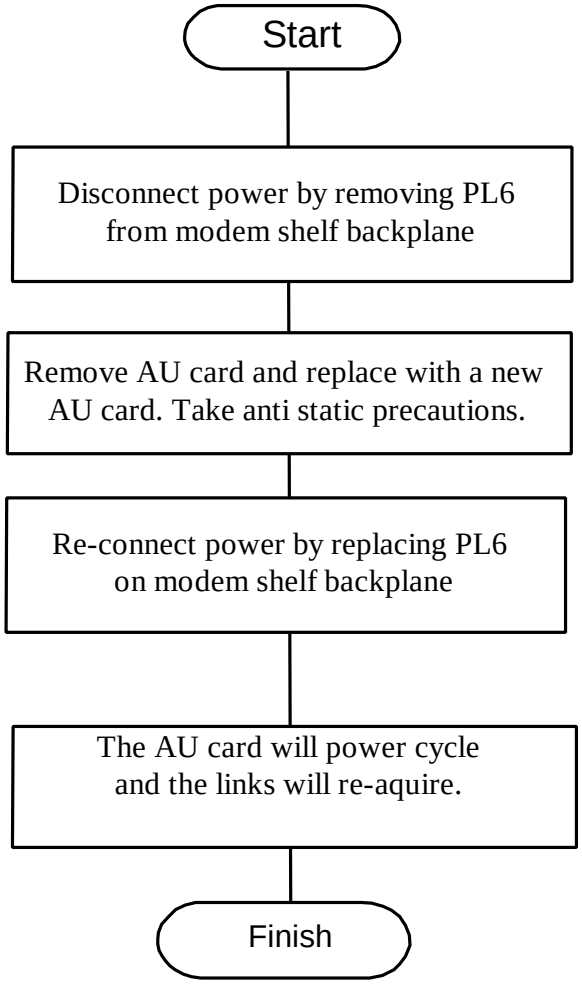
Note: If both the amber and red LEDs are lit then it is probable that the RF Card has failed.

Consequences

a) Card Fail: Failure of service for all subscribers.
b) AU PSU Fail: None as Shelf Controller PSU provides back-up power supply.

Note: The Analogue Card is not 'hot plugable' and after replacing it the modem shelf will need to be power cycled by disconnecting and re-connecting power to the shelf.

Maintenance Clear Strategy



STEP **PROCEDURE**

Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. The Analogue card is not ‘hot plugable’. Remove PL6 from the modem shelf backplane to disconnect power from the modem shelf. Use the board extractor lever to remove the card from the shelf. Observe full anti-static precautions.

3. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly.

4. Replace PL6 on the modem shelf backplane.

5. The modem shelf will automatically power cycle (2-3 mins) and the links will re-acquire.

6. Go to DLP-013 for 2.0 - 2.3GHz Band or DLP-014 for 3.4-3.6GHz Band to set the receiver sensitivity.

7. Send faulty card for repair (see Material Return and Repair).

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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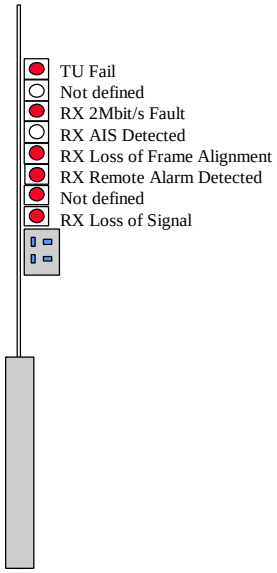
TRIBUTARY UNIT (TU) ALARMS

Alarm Indications

Rack: Major/Prompt

Modem Shelf Alarm Panel: Fault Alarm

Card Alarm:
a) TU Fail (TX AIS Output)
b) Not defined
c) RX 2 Mbit/s Fault
d) RX AIS Detected
e) RX Loss of Frame Alignment
f) RX Remote Alarm Detected
g) Not defined
h) RX Loss of Signal



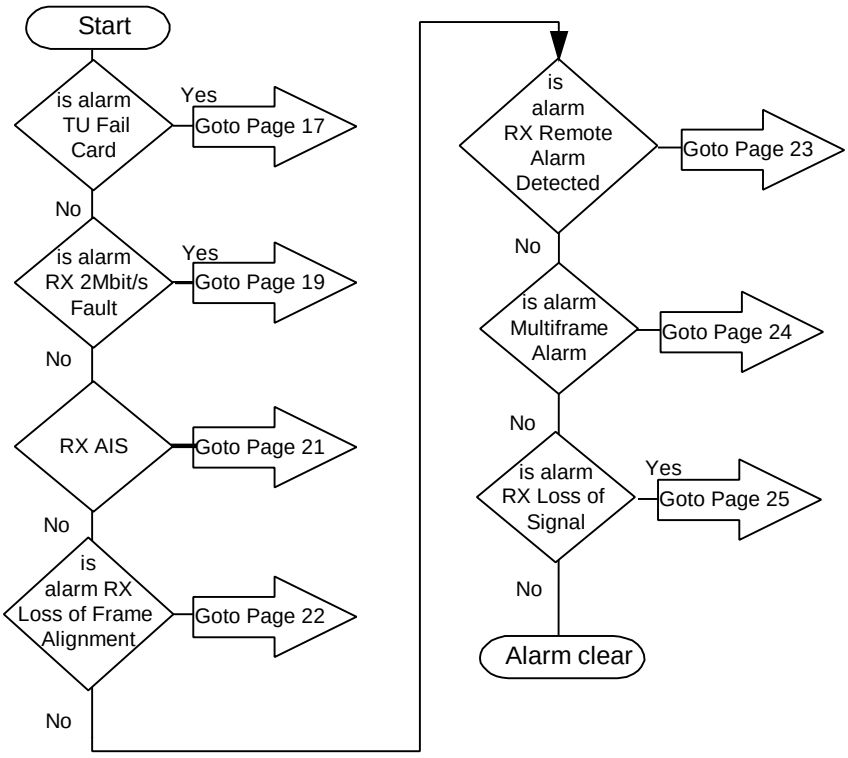
Faults on TU card may bring up multiple fail alarms, check the alarm indications given in the table.

Fault	AIS	2Mbit/s disconnect	Remote	Clock Fail
Alarm Indications				
Fru Fail				
Status				
2Mbit/s i/p fail	*	*		*
RX AIS	*			
LOF	*	*		
REMOTE			*	
Multiframe				
Loss of Signal		*		*

Consequences

Failure of service for all subscribers connected to the shelf.

Maintenance Clear Strategy



ALARM: TU FAIL

Alarm Indications

AS8100 (Sitespan) : 'Tributary Unit: FRU Fail'

Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: TU Fail

Probable Cause

Failure of the TU card.

Consequences

Loss of service to all subscribers on the modem shelf.

Maintenance Clear Strategy

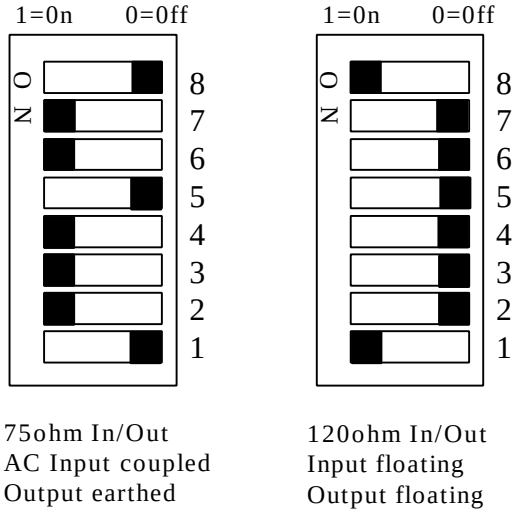
Change TU Card

STEP **PROCEDURE**

Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. Before inserting the Tributary Unit check that the DIL switch settings. The Tributary unit DIL switches should be set as in 1. and should be the same as the card being replaced.



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

Figure 3-4. DIL Switch (Typical Settings)

3. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

4. *Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the TU Status LED will flash until the co-processor initialisation is complete.*

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX 2MBIT/S FAIL

Alarm Indications

AS8100 (Sitespan) : 'Tributary Unit:2MBS Lost'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX 2 Mbit/s Fault

Probable Cause

a) Wrong TX/RX connection
b) Broken 2Mbit/s cable
c) Exchange problem

Consequences

1) Service failure to all subscribers connected to the modem shelf.
2) The call in progress LEDs on the CT modems will be off irrespective of the call state.

Maintenance Clear Strategy

STEP **PROCEDURE**


Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

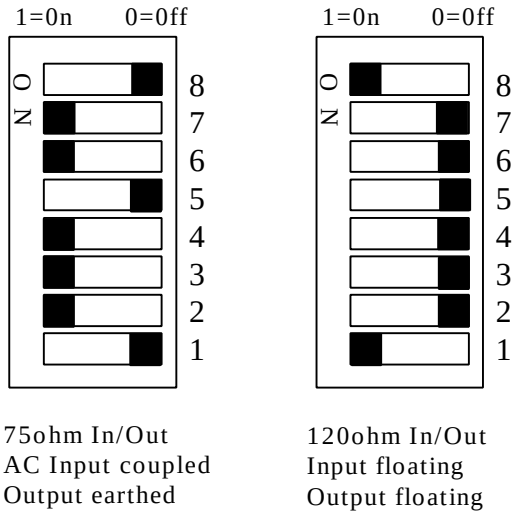
2. If digital tester available check the 2Mbit/s TX out at the Digital Distribution Frame (DDF). If the signal is not present the fault is in the exchange/ backhaul.

3. Use a digital tester to check the RX 2Mbit/s at test point on the front of the TU Card.

4. If 2Mbit/s is not detected at the TU card inspect coax connections to the DDF and backplane. Check the cable for open / short circuits etc. Replace faulty cable / connections.

5. If 2Mbit/s is detected at the TU card but RX 2Mbit/s Fail alarm still indicated change TU card.

6. Before inserting the Tributary Unit check that the DIL switch settings. The Tributary unit DIL switches should be set as in 1. and should be the same as the card being replaced.



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

Figure 3-6. DIL Switch (Typical Settings)

7. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

8. *Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the TU Status LED will flash until the co-processor initialisation is complete.*

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX AIS

Alarm Indications

AS8100 (Sitespan) : 'Tributary Unit:AIS'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX AIS Detected

Probable Cause

Exchange Problem

Consequences

Failure of all subscribers on the modem shelf.

Maintenance Clear Strategy

STEP	PROCEDURE

1. Report problem to exchange maintenance technician.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX LOSS OF FRAME ALIGNMENT

Alarm Indications

AS8100 (Sitespan) : 'Tributary Unit: Frame Alignment Lost'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX loss of Frame Alignment

Probable Cause

Unable to establish frame alignment due to problem in the exchange or backhaul.

Consequences

Failure of all subscribers on the modem shelf.

Maintenance Clear Strategy

STEP	PROCEDURE

1. Report problem to exchange maintenance technician.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX REMOTE ALARM DETECTED

Alarm Indications

AS8100 (Sitespan) : No indications
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX Remote Alarm Detected

Probable Cause

Exchange / backhaul problem

Consequences

Failure of all subscribers on the modem shelf.

Maintenance Clear Strategy

STEP	PROCEDURE

1. Report problem to exchange maintenance technician.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX MULTIFRAME ALIGNMENT

Alarm Indications

AS8100 (Sitespan) : For CAS signalling only. Not applicable to DASS system.
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX Multiframe Alarm

Probable Cause

Unable to establish frame 0 of multiframe (CAS Signalling) due to fault in the exchange.

Consequences

Failure of all subscribers on the modem shelf.

Maintenance Clear Strategy

STEP	PROCEDURE

1. Report problem to exchange maintenance technician.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

ALARM: RX LOSS OF SIGNAL

Alarm Indications

Sitespan:
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: RX loss of Signal

Probable Cause

a) Wrong TX/RX connection
b) Broken 2Mbit/s cable
c) Exchange problem

Consequences

1) Service failure to all subscribers connected to the modem shelf.
2) The call in progress LEDs on the CT modems will be off irrespective of the call state.

Maintenance Clear Strategy

STEP **PROCEDURE**


Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

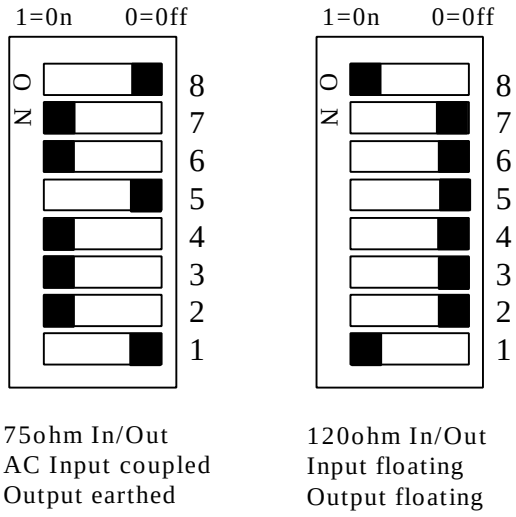
2. If digital tester available check the 2Mbit/s TX out at the Digital Distribution Frame (DDF). If the signal is not present the fault is in the exchange/ backhaul.

3. Use a digital tester to check the RX 2Mbit/s at test point on the front of the TU Card.

4. If 2Mbit/s is not detected at the TU card inspect coax connections to the DDF and backplane. Check the cable for open / short circuits etc. Replace faulty cable / connections.

5. If 2Mbit/s is detected at the TU card but RX 2Mbit/s Fail alarm still indicated change TU card.

6. Before inserting the Tributary Unit check that the DIL switch settings. The Tributary unit DIL switches should be set as in 1. and should be the same as the card being replaced.



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

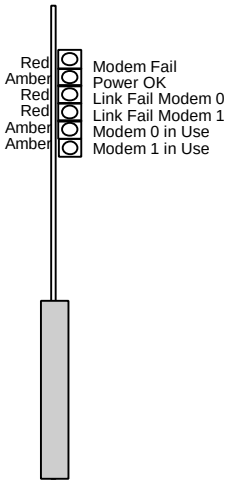
Figure 3-8. DIL Switch (Typical Settings)

7. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

8. *Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the TU Status LED will flash until the co-processor initialisation is complete.*

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

MODEM ALARMS



Alarm Indications

AS8100 (Sitespan) : 'Modem Card: FRU Fail'
'Modem Card:Lost Comms With ST'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: Modem Fail
Link Fail

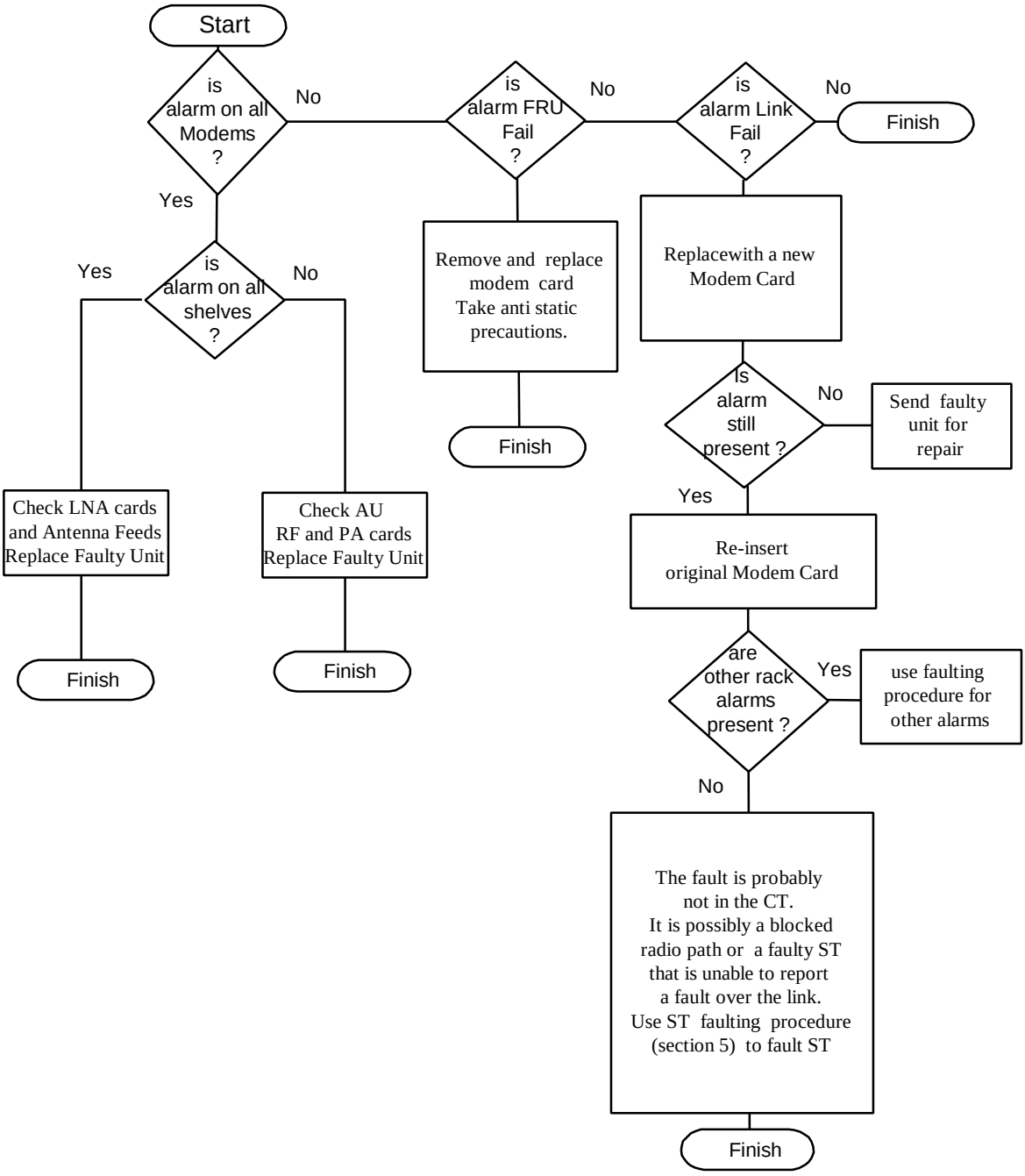
Probable Cause

a). Modem card failure
b). Failure of communication between ST and Modem
c). Failure of ST

Consequences

Loss of service to subscribers connected to the modem.

Maintenance Clear Strategy



STEP **PROCEDURE**


Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. If FRU fail change card. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

3. If modem link fail check if other modems are affected. If the problem is on all modems on the rack there is probably a common radio path fault (LNA /Feeder/ Antenna). If only one shelf is affected it is likely that there is a common card fault (RF /AU/PA). If only one modem is affected then the fault is either in the Modem or Radio Network Unit.

4. Check to see if other shelf / rack alarms are present to establish whether common radio path fault, common card fault or individual card fault.

5. If fault is card within the rack. Use the board extractor lever to remove the card from the shelf. Replace the card with a new one ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

6. If fault is still present re-insert the original modem. *Note: All LEDs will be illuminated for 2 s during module boot-up.*

7. If modem passes self test fault is probably at the ST. Use ST faulting procedure Section 5

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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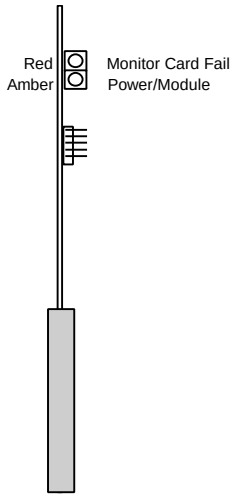
MONITOR CARD (MON) ALARMS

Alarm Indications

AS8100 (Sitespan) : 'Monitor:FRU Fail'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: Monitor Card Fail



Probable Cause

a). Card failure
b). Monitor Card PSU failure

Consequences

Messages/ alarms will not be passed from the monitor card to the SC cards.

Maintenance Clear Strategy

Change Monitor Card

STEP **PROCEDURE**


Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. Change Monitor card. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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RF CARD ALARMS

Alarm Indications

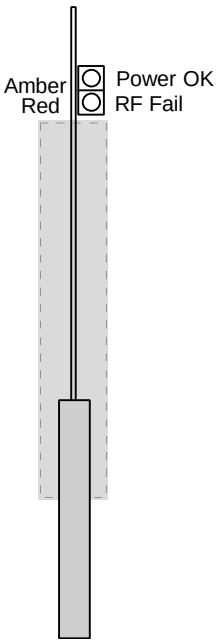
AS8100 (Sitespan) : 'AnalogueCard: FRU Fail'

Note: Sitespan views the RF and Analogue cards as one object , the LED indication will show which of the cards has failed.

Rack: Major/Prompt

Modem Shelf Alarm Panel: Fault Alarm

Card Alarm: RF Fail



Probable Cause

Failure of RF card.

Consequences:

Failure for all subscribers connected to the associated modem shelf.

Maintenance Clear Strategy

Change RF card.

STEP **PROCEDURE**

Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. Change RF Card. Use the board extractor lever to remove the card from the shelf. Insert the new card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Observe full anti-static precautions.

3. The RF card holds the values for the TX output power. It will automatically set the output power to the value stored in the card and then adjust the final output level. The time taken for the card to set the correct power output will therefore be dependent on the stored value and in the worst case will take up to two hours to regulate the level. The shelf should be left to soak for two hours before proceeding to step 4.

4. When the RF card is changed the receive sensitivity will need to be set as outlined in Section 6 (DLP-013 for 2.0 - 2.3GHz Band or DLP-014 for 3.4-3.6GHz Band).

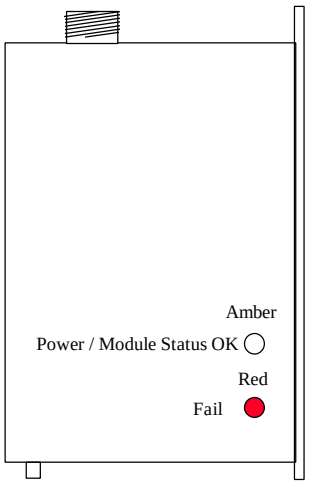
STOP. THIS PROCEDURE HAS BEEN COMPLETED.

LOW NOISE AMPLIFIER (LNA) ALARMS

Alarm Indications

AS8100 (Sitespan) : 'LowNoiseAmp:FRU Fail'

Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: LNA Fail



Probable Cause

LNA failure

Consequences:

Total loss of service to all subscribers.

Maintenance Clear Strategy

Change LNA

STEP **PROCEDURE**

Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.
2. Change LNA. Power should be removed from the rack using the two switches at the bottom right of the combiner shelf. Disconnect the 'N' Type antenna connector from the top of the card. Use the board extractor lever to remove the card from the shelf. Replace the card ensuring that the card is located within the shelf card guides. Use the extractor lever to ensure that the card locates properly. Connect the N type connector.
3. When the RF card is changed the receive sensitivity will need to be set as outlined in Section 6 (DLP-013 for 2.0 - 2.3GHZ BAND and S Band or DLP-014 for 3.4-3.6GHz Band).
4.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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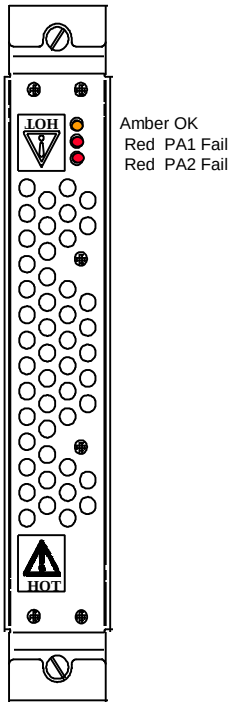
POWER AMPLIFIER (PA) ALARMS

Alarm Indications

AS8100 (Sitespan) : 'Combiner:PowerAmp(N):FRU Fail'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: PA Fail



Probable Cause

Faulty PA module

Consequences:

Loss of service to all users connected to associated modem shelf.

Maintenance Clear Strategy

Change PA

STEP **PROCEDURE**


Observe full ESD precautions.

1. Press Receive Attention on the modem shelf covers to suppress alarm.

2. Change PA module. Each PA Unit contains two Power Amplifiers, when the Power Amplifier is removed the traffic from two modem shelves will be disrupted. Use a screwdriver to release the screw twist retainers from the top and bottom of the PA (half a turn is sufficient). Use the handles to ease the card from the backplane connector. Use caution when handling the PA as the unit may be hot. Replace the card ensuring that the card is located within the shelf card guides. PA2 is inserted inverted. Use the extractor lever to ensure that the card locates properly. Use a screwdriver to secure the screw twist retainers at the top and bottom of the PA.

3. The PA will be set to the values contained in the RF card and will adjust its power output using the control loop.

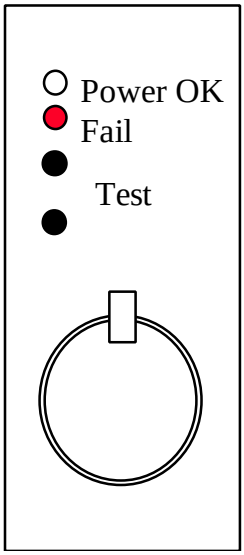
4. **Note.** All subscriber on both modem shelves associated with the PA Module will lose service as a result of removing a PA.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

POWER SUPPLY UNIT (PSU) ALARMS

Alarm Indications

AS8100 (Sitespan) : 'Combiner:PowerSupply(N):FRU Fail'
Rack: Major/Prompt
Modem Shelf Alarm Panel: Fault Alarm
Card Alarm: PSU Fail



Probable Cause

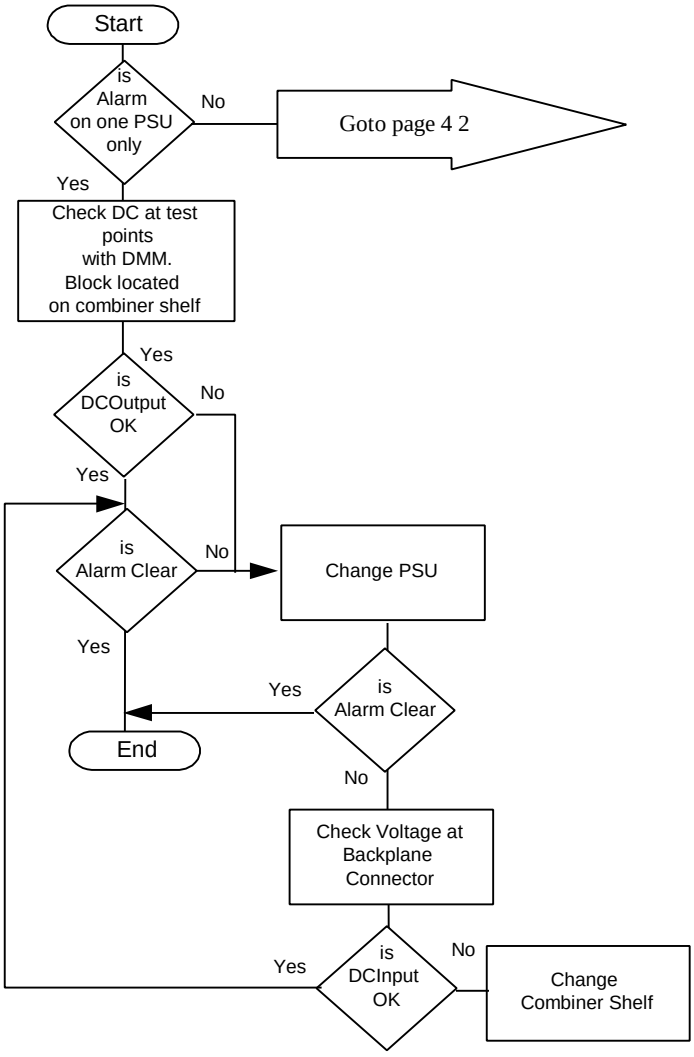
PSU failure.

Consequences:

None: Other PSUs will provide DC to rack.

Note. If the Sitespan reports 'Combiner:PowerSupply(N):FRU Fail' on **all** installed PSUs then one of the DC inputs to the rack has failed. Go to DC Input Alarms on page 42.

Maintenance Clear Strategy



STEP **PROCEDURE**

Observe full ESD precautions.

1. Press Receive Attention on the modem shelf cover to suppress alarm.

2. Use a DMM to check the output of the PSU at the voltage test output on the PSU front panel. The output should measure 13.5V ±100mV

3. If the output is present but an alarm still exists the monitor circuit within the PSU is likely to be faulty. Change the PSU. The PSUs operate in redundant mode. Removing a PSU will not affect the operation of the rack. Use the ring pull at the front of the PSU to assist with removal. Replace the card ensuring that the PSU is located within the shelf card guides.

4. If there is no output change the PSU.

5. Use a DMM to check the output of the new PSU at the voltage test output on the PSU front panel. The output should measure 13.5V ±100mV

6. If after changing the PSU alarm still exists then check that the voltage is present on the input to the PSU as it is most likely that there is a backplane fault. If the backplane is faulty change the Combiner Shelf.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

DC INPUT FAIL

Alarm Indications

a) AS8100 (Sitespan) : 'Shelf Controller:Lost Comms With EM'
Rack: Rack alarms indicated.
Shelf: **No shelf alarm indications**.
or

b) AS8100 (Sitespan) : 'Combiner:PowerSupply(N):FRU Fail'
(From all installed PSUs)
Rack: Rack alarms indicated.
Shelf: **All combiner shelves PSUs show fail**.

Probable Cause

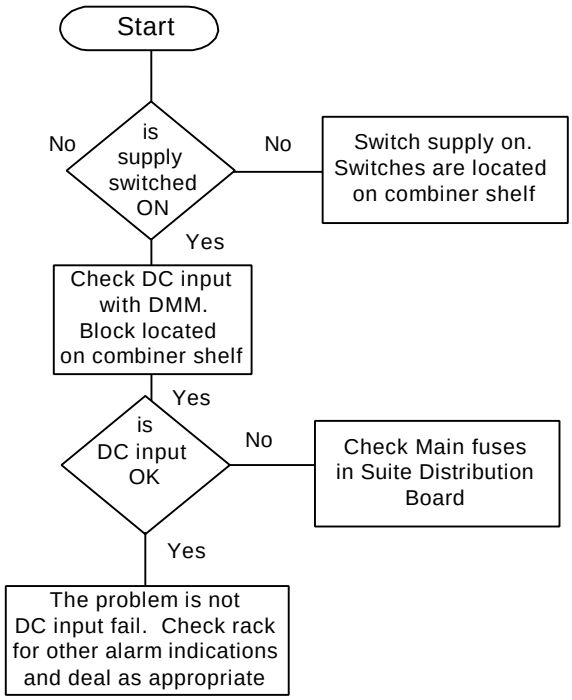
a) Failure of both DC inputs.
b) One of the DC inputs has failed.

Consequences

If only one DC supply is lost all three PSUs will report failure to the management system but the rack is still in operational state.

If both supplies are missing the Radio Link Terminal (CT) will cease to function.

Maintenance Clear Strategy



STEP **PROCEDURE**


Observe full ESD precautions.

1. Check that the two switches located in the lower right of the combiner shelf are switched on (UP).

2. If the Combiner Shelf PSUs all indicate fail then one of the DC inputs has failed If both supplies are gone the shelves will show no indications but the rack alarm will still be present.

3. Check that both of the Exchange DC supply is present by measuring the input voltage across the DC connection block (located besides switches) with a DMM. The voltage measured should be -21v to -60vDC. If the voltage is not present check the Suite Distribution Board fuses, and cables. Repair as required.

4. If DC supplies are present check for other alarms on shelf and deal as appropriate.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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SECTION 5: FAULT DIAGNOSTICS ST

4. Purpose of Section

This section is designed to assist with the location of faults occurring at the ST

It is expected that some ST problems will be triggered by a customer notification to the service provider. If a fault is reported by a customer it will help the process if the customer can provide alternative phone contact e.g. a neighbours phone.
In addition some questions to check on the mains supply status and whether the Amber LED on the AC PSU is ON(Type 2 PSU only) will be advantageous during the subsequent fault finding process.

Within the event log search output results a number or alarm patterns may be recognised to help diagnose the problem.

For single event alarms listed below reported at the Sitespan refer to the specific alarm message in section 3 as follows:-

1.1.18. Battery back-up charge drops below approximately 30% of full charge
1.1.19. PSU Tampered
1.1.20. Ringer Failure

5. AS8100 (Sitespan) Alarms Generated at the Subscriber Terminal

Shelf View

If the alarm is at the ST then the line/telephone symbols displayed on the Shelf View will be in Red.
Clicking on the line symbols brings up the Card View ST. Alternatively the ST View can be displayed by clicking on *ST View* when in Card View.

Card View - ST

The Card view in Figure 5-1 shows the status of the ST supported by Modem 2 on Modem Card 1. i.e. Poor Bit Error Rate. The (customer selected) colour of these alarm icons indicate whether they are; in service, faulty or receiving attention. This information is also reflected in the State box within the CRU Inventory Information box. Also shown are details of the Serial Number and Firmware Code of the ST.

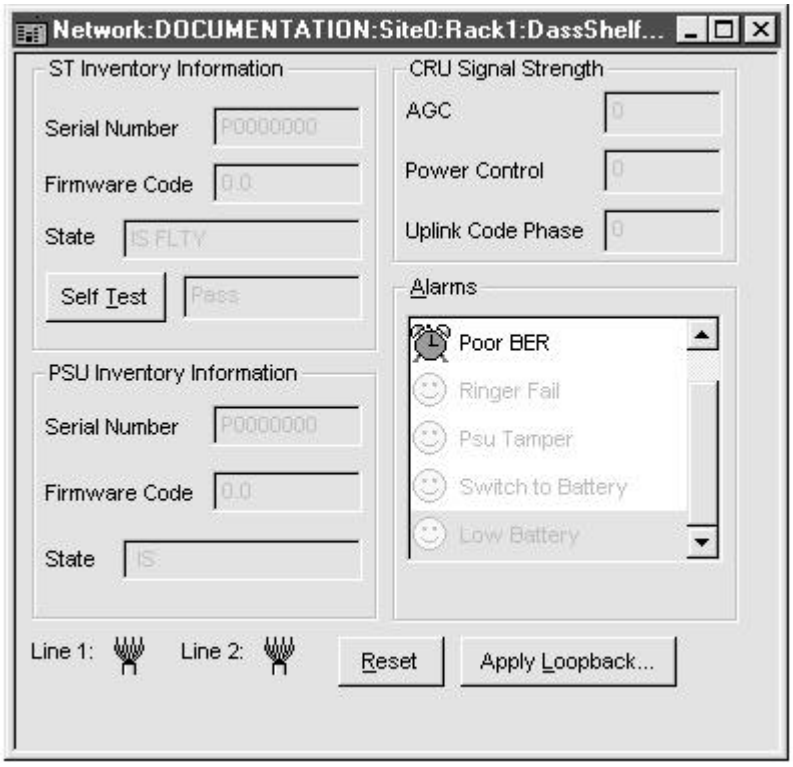


Figure 5-1. Alarms in Card View- ST

Alarm States for ST-V2 and ST- D128 are:

- Link Unavailable
- Poor Bit Error Rate (BER)

For ST-V2's using Type 2 PSU these additional alarms are reported

- PSU tamper
- Switch to battery
- Low battery

For other alarms the paragraphs on the next page will assist in clearing the fault

a) Alarm Indications

AS8100 (Sitespan) : 'Switch to Battery',
followed some hours later by 'Low Battery',
followed some tens of minutes later by 'Modem Card:Lost Comms With ST'.

Most Likely Fault Cause

Mains power disconnected from ACPSU. (Type 2 PSU).

Repair Actions

Ask customer to check mains supply. If OK and the yellow LED is Off send maintenance staff to the customers site with a new ACPSU. Go to DLP-022

b) Alarm indications

AS8100 (Sitespan) : 'Modem Card:Lost Comms With ST'.

Most Likely Fault Cause

a) If using Type 2 PSU. If this occurs as a single or in multiple occurrences without any 'Switch to Battery' indications send maintenance staff to check ST installation.

b) Other types of PSU suspect power / Power supply failure.

Repair Actions

Use flowchart process to locate fault and it is advisable to take replacement CRU Drop Cable and ACPSU.

c) Alarm Indications

AS8100 (Sitespan) : 'Poor BER' from ST CRU.

Most Likely Fault Cause

Multiple occurrences indicate a problem with the radio path.

Repair Actions

Send maintenance staff to check AGC and Power Control.

Checks to be made at the ST Site

The fault chart over shows a recommended faulting process for ST faults.

Check if 'side tone'(blow can be heard in earpiece) can be heard on the telephone. If 'side tone' present it suggests that the power has reached the CRU and that the VF wiring to the phone is OK. This eliminates immediate problems with the ACPSU and Drop Cable.

If 'side tone' present the PSU voltage should be checked with a DMM. The value should nominally be:
Type 1 PSU 36 volts with mains present.
Type 2 PSU 36 volts with mains present or 24 Volts on battery.

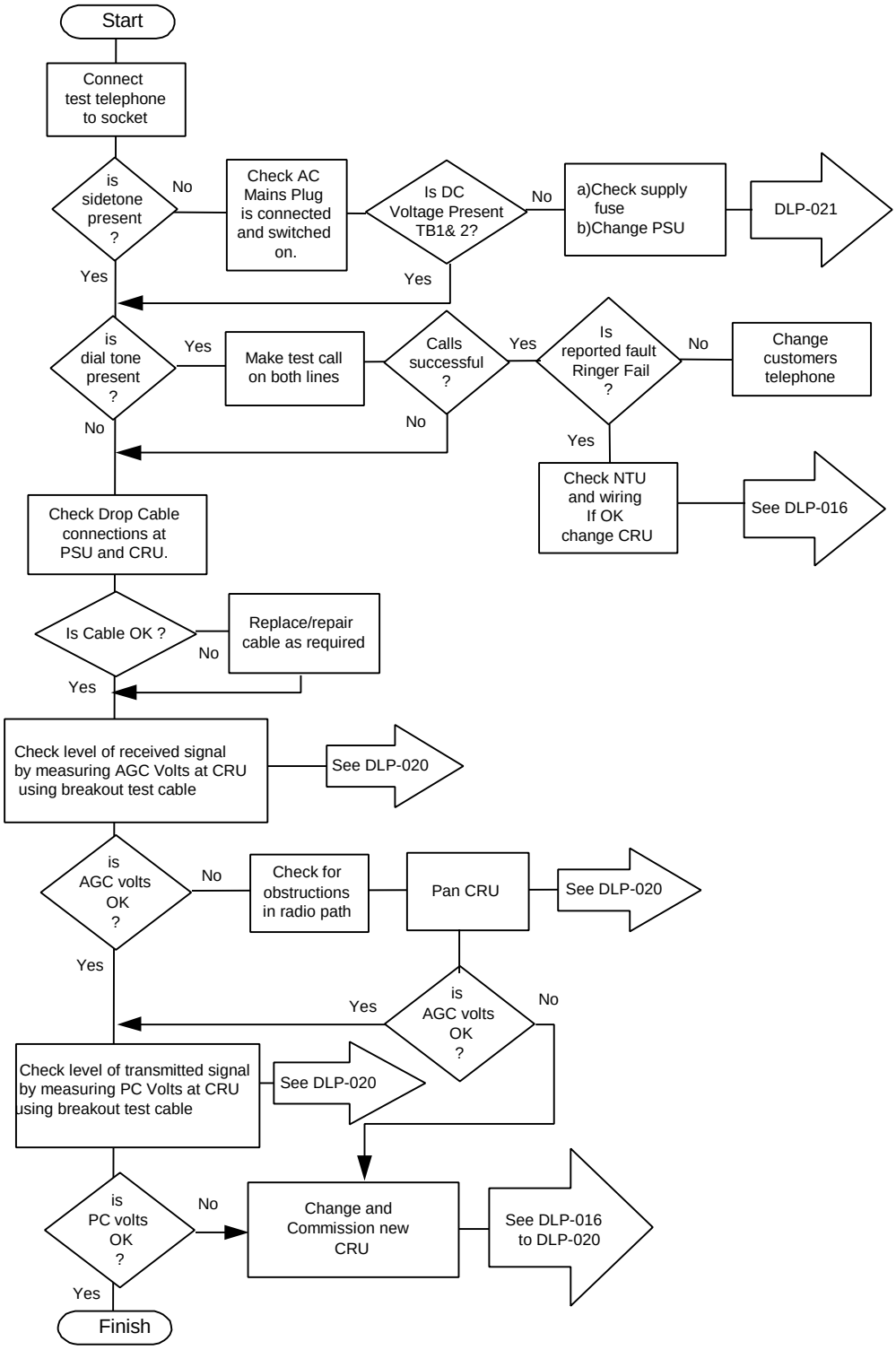
If the radio link is not established with the CT the behaviour of the AGC and PC voltage monitor points will show if a down link has been established and whether the uplink is trying to acquire. The values of AGC volts should be greater than the -98dBm level recorded on the CRU characterisation label and should be compared with the original commissioning results to see if there has been any significant change.
The value of PC volts should be greater than the +21dBm level recorded on the characterisation label.

AGC/PC State	Link State
AGC ramping	No downlink see Note 1
AGC stable and in specification	Downlink OK
PC 0Volts	No attempt to acquire uplink
PC ramping	Uplink trying to acquire
AGCs Stable and in specification	Link OK (Comms to the CT should be established under this condition)

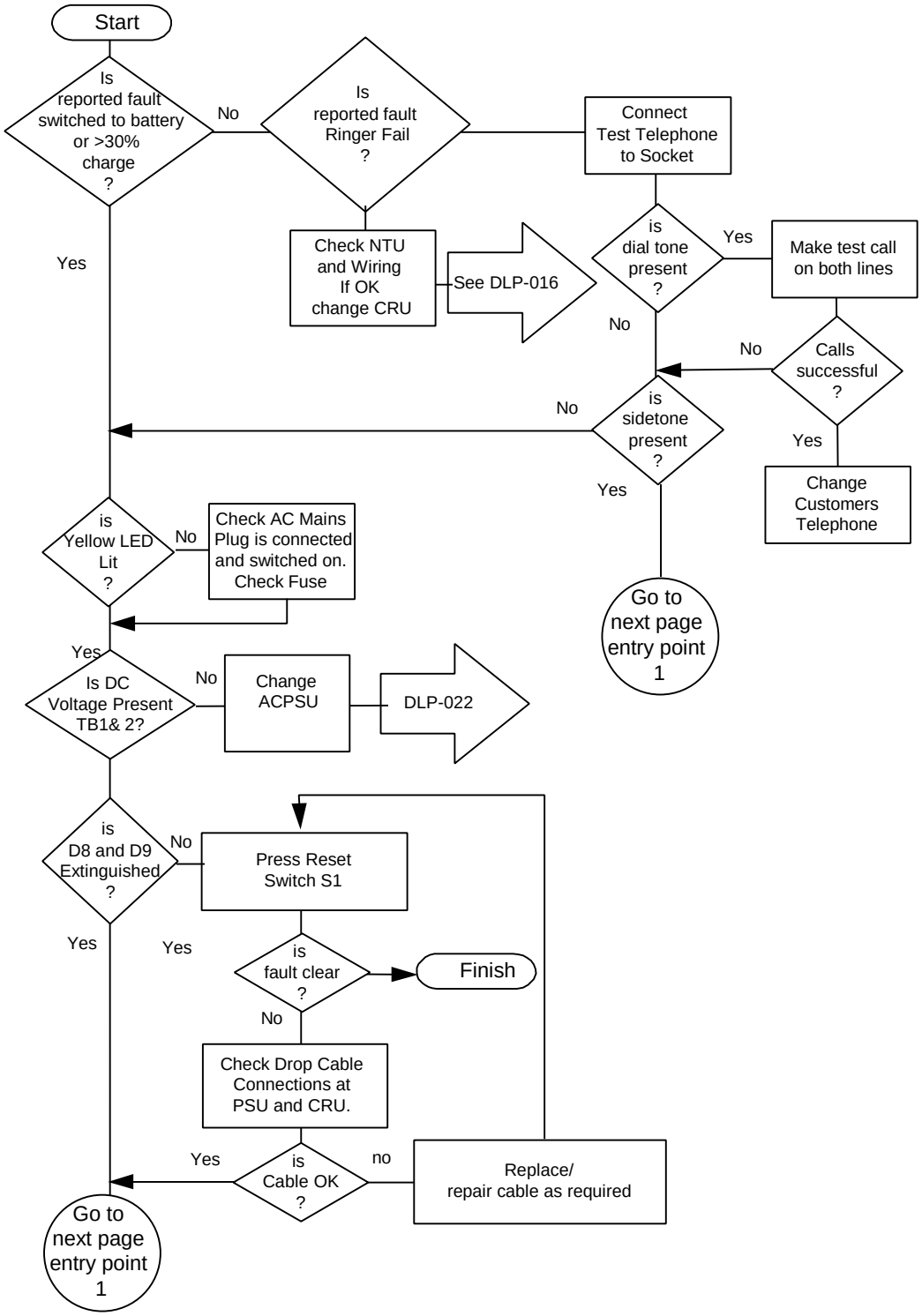
Table 6 AGC and PC Volts Indications

Note 1. If there is no downlink it is worth checking that other STs on the same modem shelf are not experiencing problems , if they are reconsider whether the fault is at the CT. If no other STs are affected check for path blockage. If the path is clear with no downlink change CRU. Go to DLP-016.

Fault Finding Type 1 PSU



Fault finding Type 2 PSU



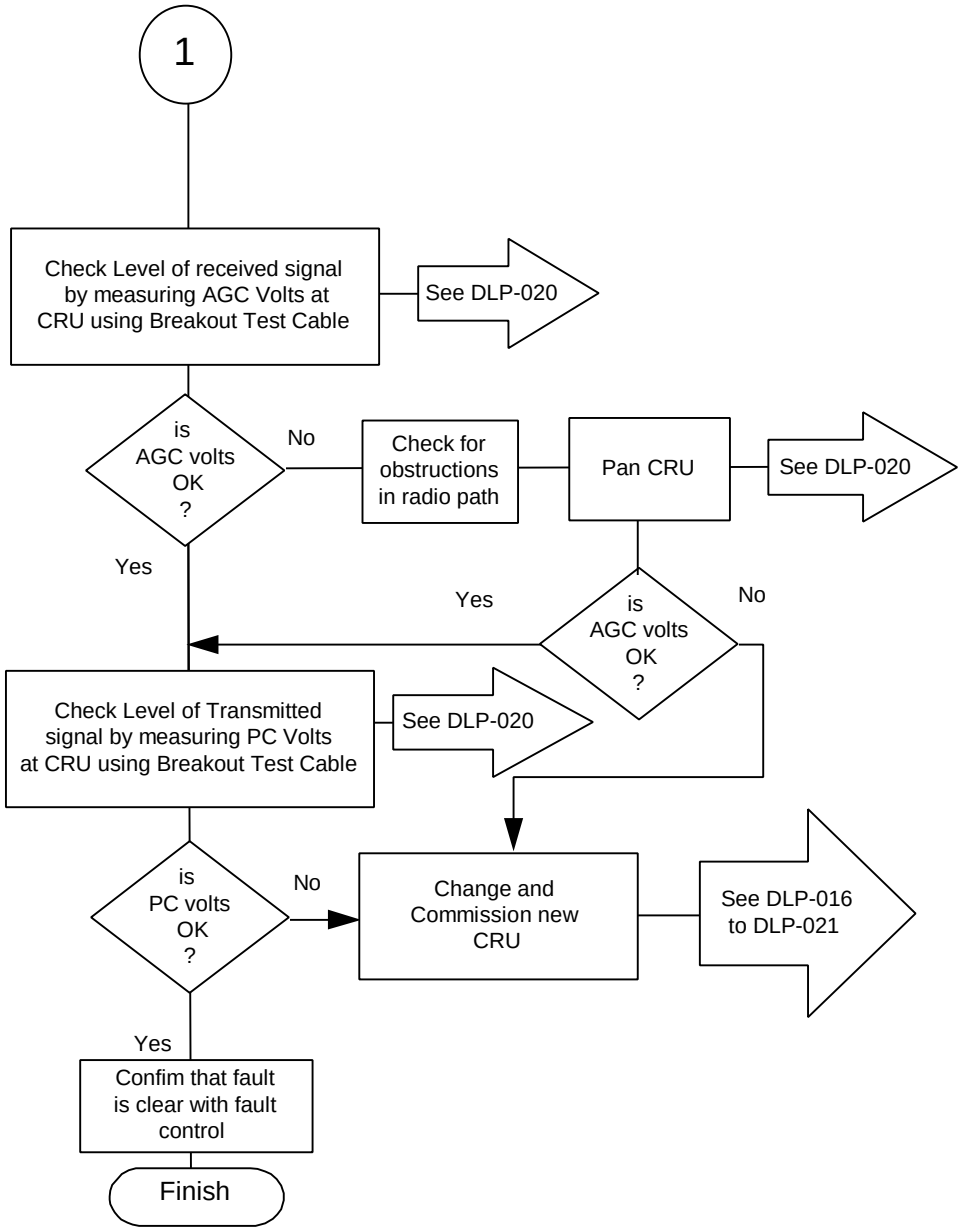


Chart 5-1. ST Faulting Process Flowchart

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SECTION 6 REPAIR PROCESSES

This section describes the repair processes to be used when repairing a fault as diagnosed using the previous sections.

Observe full ESD precautions.

Refer to Section 8 or the Materials Return and Repair Manual 156-035-600 for instructions on returning faulty Items.

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CT TX AND RX POWER SET-UP (2.0-2.3GHz AND 2.3-2.5GHz BAND) USING TEST CRU

6. Tools and equipment needed.

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

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

7. Set-up Procedure

STEP **PROCEDURE**


Observe full ESD precautions.

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

2. **Preparation**

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

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

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

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

e) Select a modem channel for the test. (The modem channel selected should be one that has an existing subscriber. Programme the test CRU (See DLP-017 or DLP-018/019) with the same programming information as that for the CRU at the ST associated with the modem under test.

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

g) Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on shelf interface connections located at the right hand side of each Modem Shelf.

3. Test TX Output Power.

This section describes the measurement of TX output power.

a) Disconnect the antenna.
b) If measuring the power output on shelf 1 and/or 2 connect the Power Meter to the N-Type connector on DIP/LNA1 at the top of the rack ready to measure the power output from shelves 1 and 2.
c) If measuring the power output on shelf 3 and/or 4 connect the Power Meter to the power meter to the N-Type connector on the TX filter card as shown in Figure 7-3.

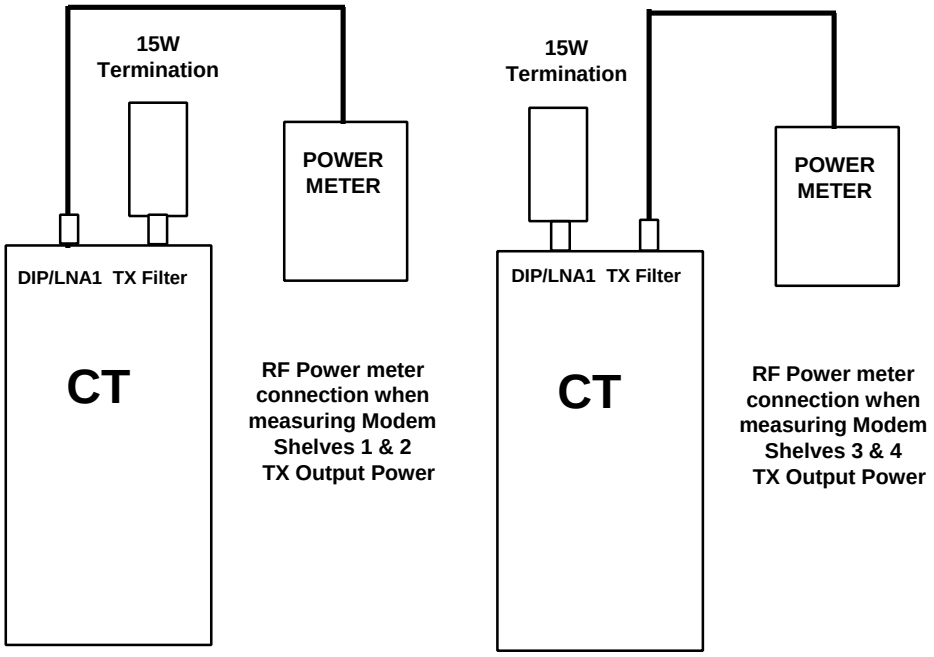

Figure 7-1. Power Level measurement Test Set-up

1. Restore power to the rack.

2. The TX output power level is maintained by a power control loop in the system. For the power loop to work the CT RF card needs to generate greater than +21.75dBm, this condition can be achieved by using Sitespan to set two users in service without any STs in operation. This forces the two modems (i.e. one modem card) to stay in the high rate acquisition mode. Two users provide an output of 24 ± 0.5dBm.

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

   Proceed as follows:
   a) Using the Sitespan select the RF Card view from the Shelf view. See Figure 7-7.
   b) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the Output power to 24 ± 0.5dBm.
   c) Record results
   d) Switch off rack. by placing <u>both</u> breakers in the off position.

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

7. Connecting Test CRU

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

a) Switch rack off by placing both breakers in the off position.
b) Disconnect terminations on DIP/LNA1 and TX filter.
c) Connect the cables and accessories to the CT rack for Modem Shelf setting up and functionality testing as detailed in Figure 7-3. Set the 0-11dB variable attenuator to a nominal value (8dB for 2.0 - 2.3GHz band systems or 7db for 2.3 - 2.5GHz band systems, the insertion loss of the test circuit should be 109dB between point a and b in Figure 7-3). In practice the setting of the attenuator will be a few dBs less than the nominal level to account for the actual cable, connector and splitter loss. Due to the microwave frequencies involved the commissioning items need to be calibrated for the channel frequencies to be used.

Note: If the TX Filter is not fitted terminate the port of Splitter A as shown in Figure 7-3.

d) Switch the power back on at the breakers.

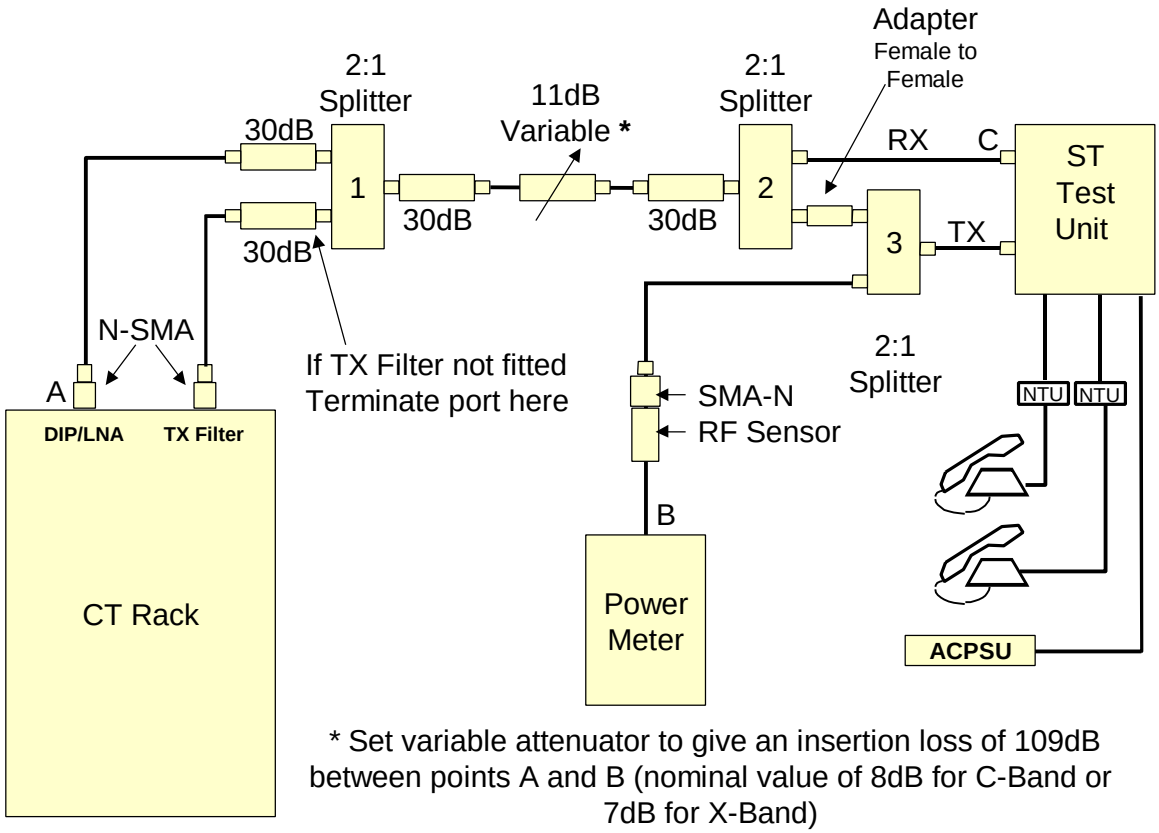

Figure 7-3. Test Set-Up Modem Shelves (2.0-2.3GHz and 2.3-2.5GHz Band)

e) Connect the cables and termination's to the Subscriber Terminal Test Unit (Test CRU) as shown in Figure 7-5.

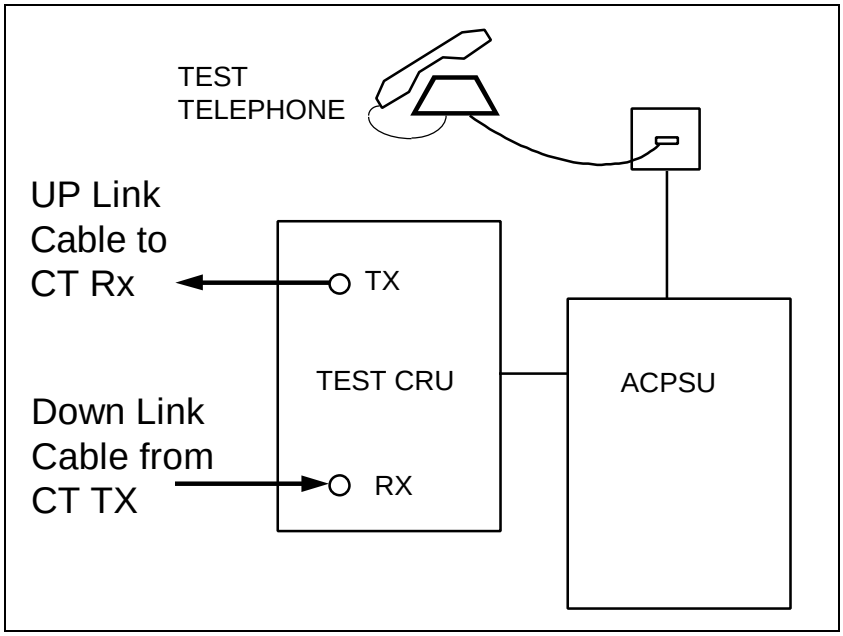

Figure 7-5. Test CRU Connections.

8. **Setting Of RX Gain Control**.

a) Connect the drop cable of the CRU and the telephony VF pairs to the AC PSU.
b) Connect the AC Mains supply cable to the AC PSU and power up the unit at the mains supply outlet socket.
c) On Sitespan , select the Analogue/RF card window to set the Receiver Gain control voltage in the RF Gain Adjust box. Click on the UP or DOWN buttons to set the gain control voltage to 1.4 Volts.

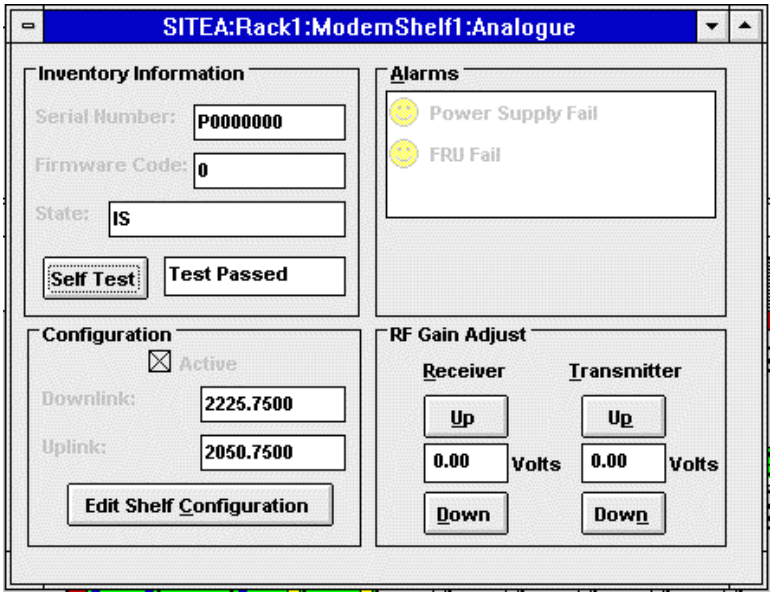

Figure 7-7. RF Gain Settings

8. Program the Test CRU with the correct code of the Modem circuit to be tested. The I & C document for the Subscriber Terminal, describes in detail the procedure to be followed for programming the Subscriber Terminal. (Type 2 PSU).

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

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

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

    Using the site controller as follows:

    a) Connect Sitespan to the modem shelf and configure the database.

    b) Select the Analogue card view, reduce in size and move to the corner of the screen so that the receiver gain adjustment may be manipulated

    c) Open *Subscriber View* from the *View* option.

    d) Ensure that the subscriber database is created for the installed Modems.

    e) Use the cursor to highlight the subscriber line for simulated off hook.

    f) Once the subscriber line is highlighted, use the cursor to select *Test View* under the *View* option.

    g) With the *Test View* opened, point and click the *Reserved Line* button. If the line is in idle state the test menu will be displayed.

h) From the test menu, point and click *ST Loopback* button.

i) Select the loopback direction as Towards Network and check TU through path on timeslot 1 and 2.

j) Once the above is configured point and click OK button. This will set the radio traffic mode: high rate and high power.

k) Once the test menu is available again leave the menu open, do not close or free line if the traffic mode is to be maintained.

12. Adjust the gain control voltage on Sitespan to achieve a RF Power level of nominally +8dBm for 2.0 - 2.3GHz Band or +7dBm for 2.3 - 2.5GHz BAND-Band on the RF Power meter. The exact reading should be 11dBm for 2.0 - 2.3GHz Band or 10dBm for 2.3 - 2.5GHZ BAND Band- the measured loss from point C to point B in Figure 7-3. Record the voltage and power level on the Test Result Sheet.

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

14. Putting the rack back in service

a) Switch the Test CRU and CT Rack OFF.
b) Remove the Test CRU and all interconnecting cables and accessories from the RF Output connectors on the CT.
c) Re-connect the Antenna /Feeder tails to the CT.
d) Connect the Element Manager cables to the 25 way EM/Sitespan port on the modem backplane
e) Re- connect the 2Mbit/s ports to the 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on the shelf interface connections located at the right hand side of each Modem Shelf.
f) Switch the CT Rack ON and wait for the system to complete the power-up self test sequence successfully.

This concludes the CT set-up tests.

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CT TX AND RX POWER SET-UP (3.4-3.6GHZ BAND)

Tools and equipment needed.

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

STEP **PROCEDURE**


Observe full ESD precautions.

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

2. **Preparation**

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

   b) Set up the Sitespan with an empty database Set the modem shelf properties (Shelf Frequency and PN codes) to the same as the existing modem shelf.

Failure to do this will result in the Sitespan overwriting the shelf controller with its last set values.

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

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

e) Select a modem channel for the test. (The modem channel selected should be one that has an existing subscriber. Programme the test CRU (See DLP-017/18) with the same programming information as that for the CRU at the ST associated with the modem under test.

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

g) Select the modem shelf to be tested. Disconnect the 2Mbit/s feeds to the shelf 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on shelf interface connections located at the right hand side of each Modem Shelf.

3. Test TX Output Power.

This section describes the measurement of TX output power.

a) Disconnect the antenna.
b) If measuring the power output on shelf 1 and/or 2 connect the Power Meter to the N-Type connector on DIP/LNA1 at the top of the rack ready to measure the power output from shelves 1 and 2.
c) If measuring the power output on shelf 3 and/or 4 connect the Power Meter to the power meter to the N-Type connector on the TX filter card as shown in Figure 7-9.

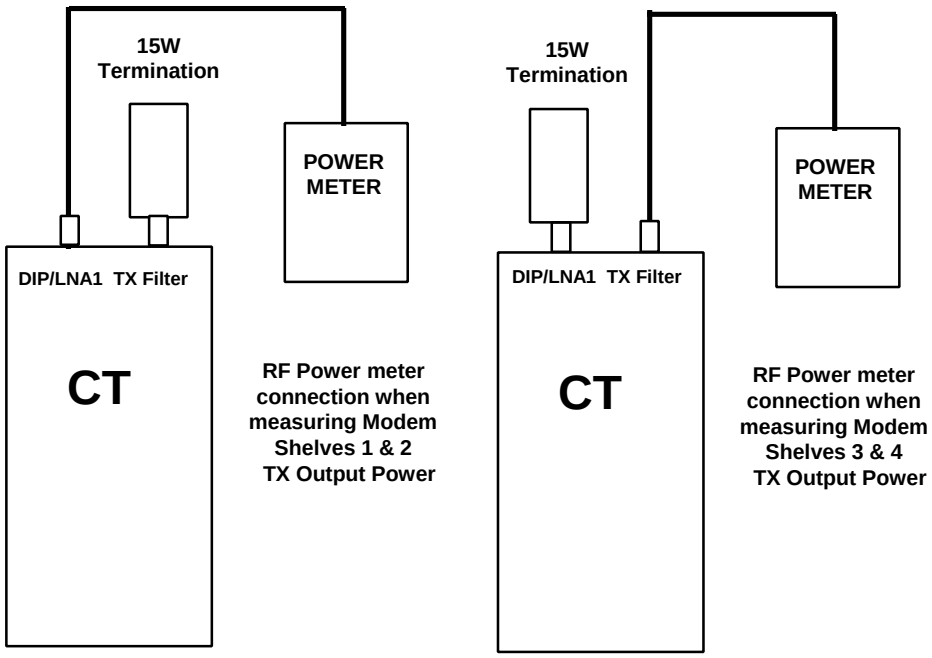


Figure 7-9. Power Level measurement Test Set-up

4. Restore power to the rack.

5. Put one modem into service and measure the output power. 18±0.5dB

6. The TX output power level is maintained by a power control loop in the system. For the power loop to work the CT RF card needs a power level greater than 21.75dB this can be achieved by using the Sitespan to set three users in service without any STs in operation. This forces the three modems (i.e. two modem cards) to stay in the high rate acquisition mode. Three users provide an output of 22.8dB± 0.5dBm.

7. For the CT to reach it's nominal output power from zero using the control loop would take a considerable length of time. To bypass this process, the power control loop may be overridden using the Sitespan to set the TX power the control voltage. Proceed as follows:
   a) Using the Sitespan select the RF Card view from the Shelf view. See Figure 7-7.
   b) Set the transmitter volts to 2.2 volts by using the Up/Down button. Observe that the auto levelling sets the Output power to 22.8± 0.5dBm. (note each click of the up/down button has to be communicated to the shelf controller and time should be allowed for this to happen).
   c) Record results
   d) Switch off rack. by placing both breakers in the off position.

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

Move quickly to the next test to minimise down time of existing circuits.

7. RX Sensitivity

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

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

Note: If the TX Filter is fitted terminate the TX 3/4 as shown in Figure 7-11.

d) Switch the power back on at the breakers.

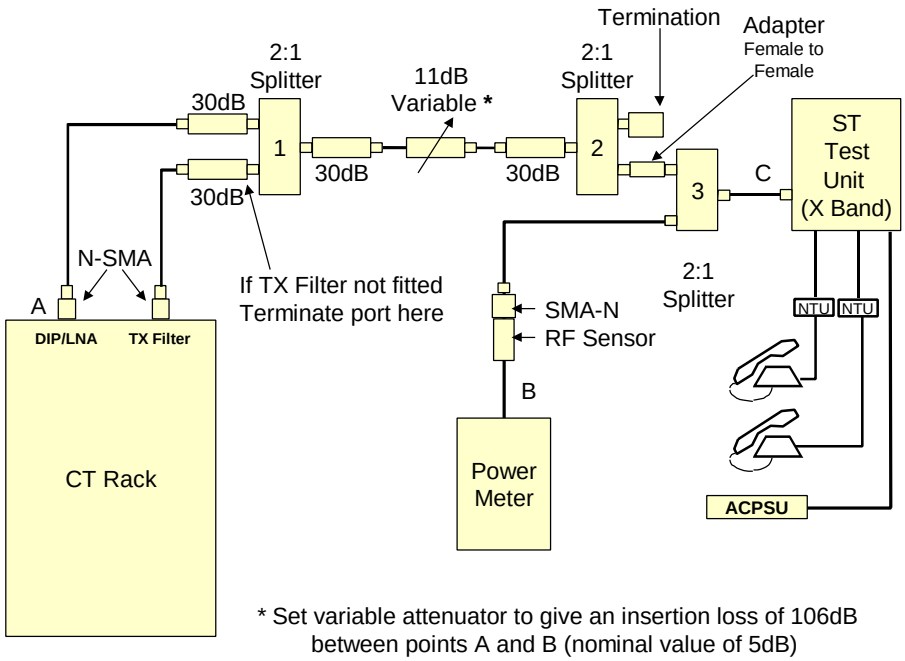


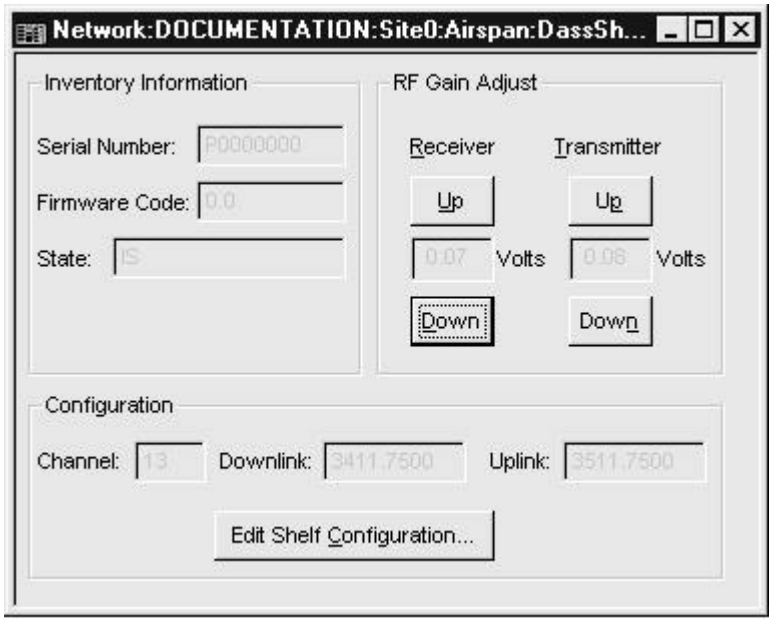
Figure 7-11. Test Set-Up Modem Shelves (3.4-3.6GHz Band)

8. **Setting Of RX Gain Control**.

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

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

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



8. Program the Test ST with the correct code of the first Modem circuit to be tested. Program the Test CRU with the correct code of the Modem circuit to be tested. The I & C document for the Subscriber Terminal, describes in detail the procedure to be followed for programming the Subscriber Terminal. (Type 2 PSU).

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

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

    It is not possible to maintain off hook conditions due to the system timing the phones out so the off hook condition must be simulated using the Sitespan as follows:

    a) Connect the Sitespan to the modem shelf and configure the database.

    b) Select the Analogue card view, reduce in size and move to the corner of the screen so that the receiver gain adjustment may be manipulated

    c) Open *Subscriber View* from the *View* option.

    d) Ensure that the subscriber database is created for the installed Modems.

e) Use the cursor to highlight the subscriber line for simulated off hook.

f) Once the subscriber line is highlighted, use the cursor to select *Test View* under the *View* option.

g) With the *Test View* opened, point and click the *Reserved Line* button. If the line is in idle state the test menu will be displayed.

h) From the test menu, point and click *ST Loopback* button.

i) Select the loopback direction as Towards Network and check TU through path on timeslot 1 and 2.

j) Once the above is configured point and click OK button. This will set the radio traffic mode: high rate and high power.

k) Once the test menu is available again leave the menu open, do not close or free line if the traffic mode is to be maintained.

5. Adjust the gain control voltage on the Sitespan to achieve a RF Power level of nominally +5dBm on the RF Power meter. The exact reading should be 8dBm ± 0.5dB minus the measured loss from point B to point C in Figure 7-3. Record the voltage and power level on the Test Result Sheet.

6. Remove the loopback by selecting *Loopback Off* and reset the *TU through path.* Click *OK* to deactivate the loopback. Close test menu and return to the *Subscriber View.*

7. Putting the rack back in service

a) Switch the Test CRU and CT Rack OFF.
b) Remove the Test CRU and all interconnecting cables and accessories from the RF Output connectors on the CT.
c) Re-connect the Antenna /Feeder tails to the CT.
d) Connect the Sitespan cables to the 25 way EM/Sitespan port on the modem backplane
e) Re- connect the 2Mbit/s ports to the 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on the shelf interface connections located at the right hand side of each Modem Shelf.
f) Switch the CT Rack ON and wait for the system to complete the power-up self test sequence successfully.

This concludes the CT set-up tests.

SETTING OF RX GAIN CONTROL USING LEVEL CONTROL UNIT.

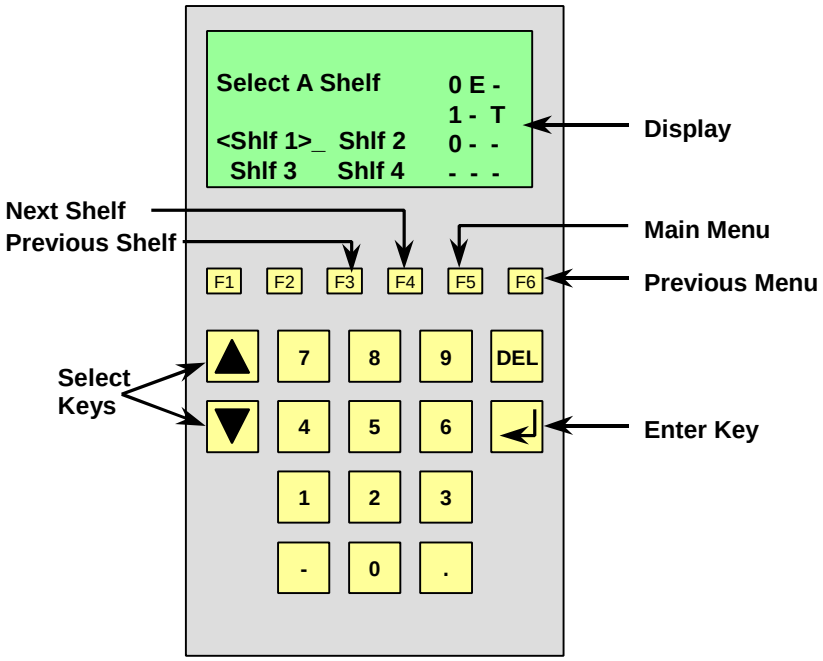
1. Setting Of RX Gain Control.

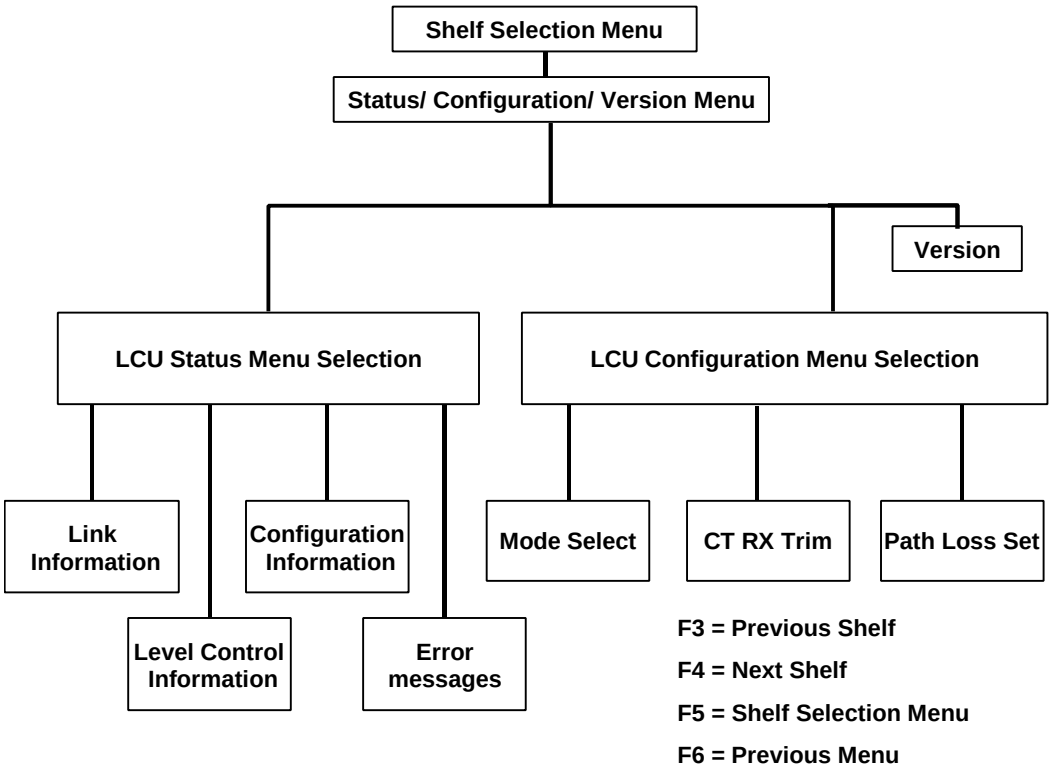
1. Ensure that the respective modem shelf is connected to the Sitespan by the 25 Way D-Type connector PL5 on the Modem Shelf Backplane.

2. Setting up RX sensitivity using the Level Control Unit

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

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





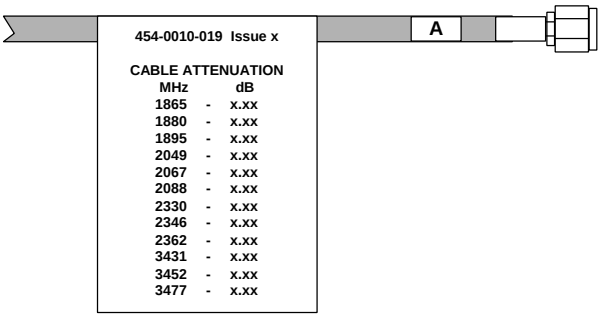
3. Select Configuration Set-up.

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

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

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

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



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

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

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

5. Key F6 to return to the previous menu

6. Select Mode Select.

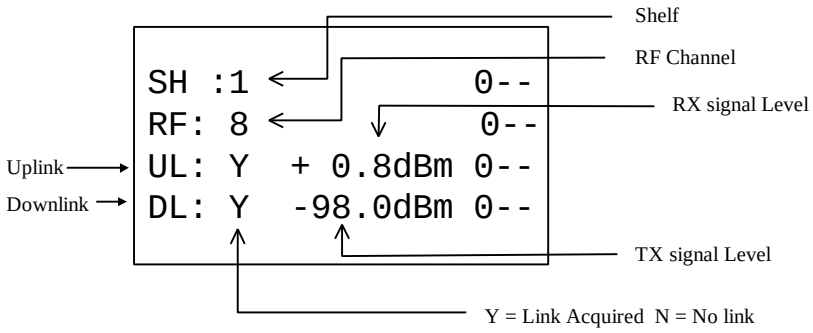
```
Shelf : 1      0E-
>Mode Select<  1-R
 Path Loss Set 0--
 CT RX Trim    ---
```

7. Set to Continuous

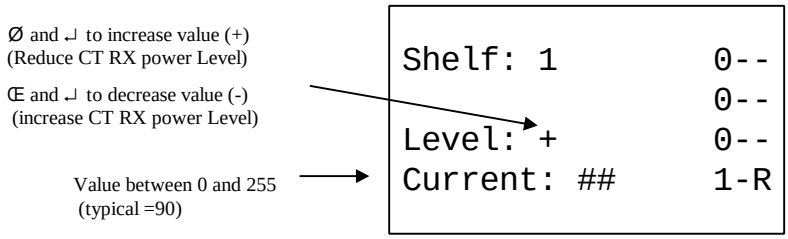
```
Mode SH:1       0E-
                1-T
Mode:Continuous 0--
                0--
```

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

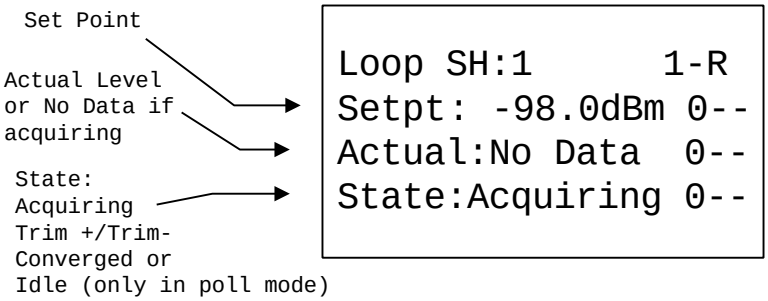
9. Select Status. Select the Link Menu.



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

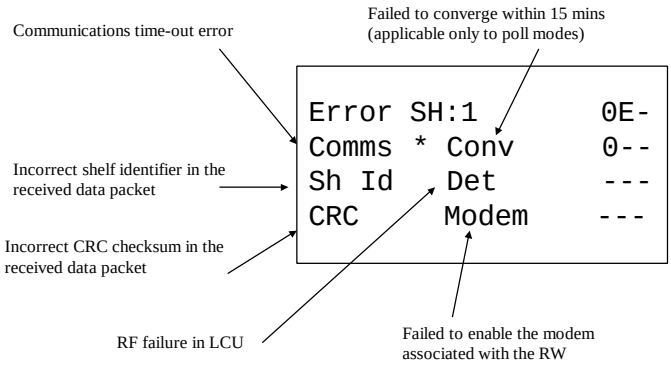


11. From the LCU Status Selection Menu select Loop.



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

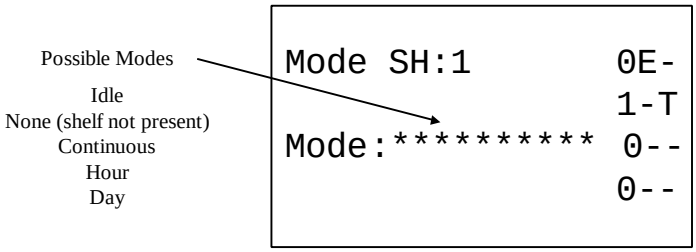
13. If any errors occur the LCU will stop the level control operation and set the operation mode to Idle automatically. When this occurs view the Error Menu for the source of this error.



14. Key F6 twice Select Configuration Set-up.

15. Select Mode Select.

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



17. Key F5 to return to the Shelf Selection Menu

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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CHANGING A CRU

Use this procedure to change the CRU.

Tools and equipment required

ITEM	DESCRIPTION	SIZE
01	Combination Spanner	13mm
02	Ratchet and Socket	17mm
03	Snake Eye Screwdriver	
04	Ladder - Triple	Fully Extended 7metre minimum
05	Soft Pencil	

STEP **PROCEDURE**

1. Before loosening the bolts it is necessary to mark the alignment position of the CRU on the CRU mounting bracket (See Figure 2-1. CRU Alignment Marking). This allows the new CRU to be installed with the alignment in the original position.

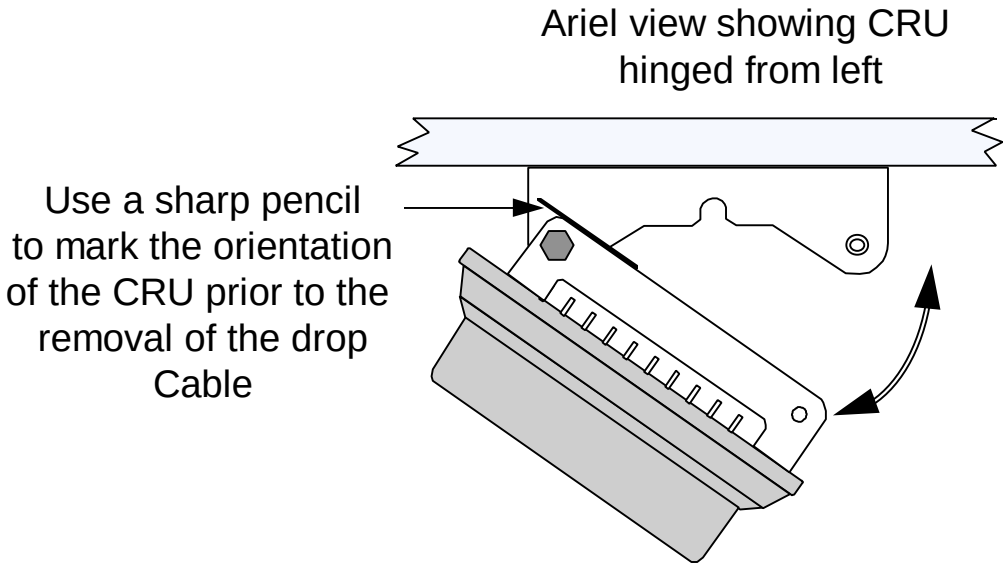

Figure 2-1. CRU Alignment Marking

2. Loosen the hinge bolts at the top and bottom of the mounting bracket. **Do Not** completely remove the bolts.

3. Turn the securing nut on the drop cable anti-clockwise to disconnect the drop cable from the CRU.

4. Fully unscrew the hinge bolts to remove the faulty CRU. Ensure that the CRU is fully supported when removing the bolts.

5. Secure New CRU with the hinge bolts. Do not fully tighten the bolts at this time.

6. Connect the drop cable to the CRU. Turn the securing nut on the drop cable fully clockwise.

7. Align the CRU to the alignment mark made in Step 1. Tighten the bolts

8. Go to DLP-017 for instructions on programming the CRU from a Telephone (V2 Type 2 PSU only) or DLP-018/19 for instructions on programming the CRU using STMON and then to DLP-020 to setup the CRU for service.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

PROGRAMMING THE ST-V2 CRU

TYPE 2 PSU USING A TELEPHONE

The following procedure will have to be completed before placing the ST into service.

Tools and equipment required

ITEM	DESCRIPTION	TYPE
03	Snake Eye Screwdriver	
09	Test Telephone	DTMF or LD

STEP **PROCEDURE**

ST Programming

1. Remove the cover from the ACPSU

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 2.

RF * 2/3 digits			PN 1 digit	RW 2 digits		Identity 6 digits	Check N°. 1 digit	Remote site location
1	0	6	1	0	1	000000	7	CRU1
*Note: Older CRUs will have a 2 digit RF code. Newer CRUs will have a 3 digit RF code.								

Table 2 CRU Programming Information

4. Initialisation

   To programme the CRU, depress the reset switch, SW4(S1 in early versions), in the AC PSU for approximately 3 seconds. LED D8(D1 in early versions) will begin flashing to indicate the CRU initialising and self test sequence. After approximately 10sec, the CRU initialising and self test sequence will be complete and the LED will be extinguished. LED D9(D1 in early versions) will still be illuminated.

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

5. Programming Sequence

Depress the Programming switch SW3(S2 in early versions). Lift the telephone handset Off-Hook and wait for the 3 sec continuous “programming start” tone of 1400 Hz, to be heard in the handset receiver.

Enter the respective ST programming code on the telephone keypad, within 40 seconds of depressing the install switch.

6. Code Acceptance

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

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

Replace the telephone handset.

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.

7. Equipment Reset

Depress the reset switch, SW4(S1 in early versions); The CRU will reset and re-boot itself in accordance with the programming code entered.

8. Replace and secure ACPSU cover. (leave cover off if going to DLP-020).

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

CONNECTING TO THE CRU USING STMON.

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

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

STEP **PROCEDURE**

Preliminary

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

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

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

Cable requirements

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

1. STMON communicates via the PC RS232 com port which connects to the ST drop cable. The PC may be attached to the Junction Box with a cable terminated as in Figure 5.

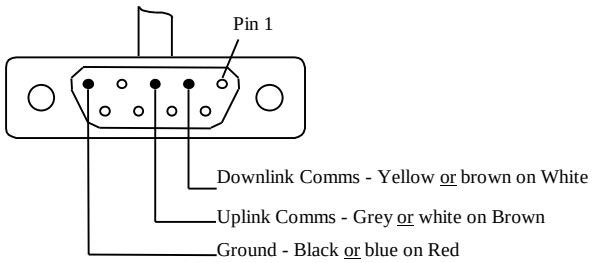

Figure 5. STMON PC Connection

2a) **Connecting to Junction Box (Type 1 PSU)**
The ST connection is made via a 3.5mm stereo jack socket located on the drop cable junction box. See Figure 6 below.

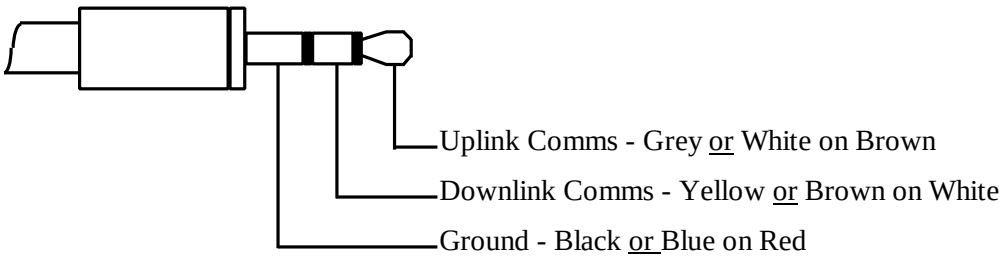

Figure 6. STMON Junction Box Connection

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

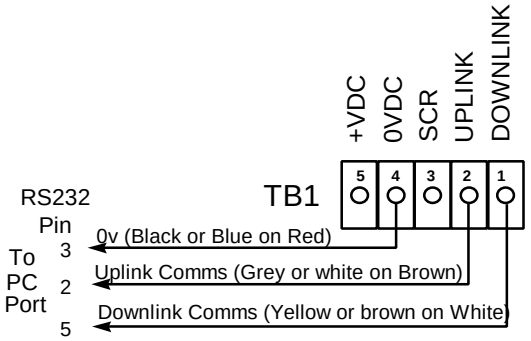

Figure 7. STMON Connections To Type 2 PSU

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

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

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

Table 3. VF AND ISDN configuration for STMON

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

Table 4. D128 Belden Cable configuration for STMON

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

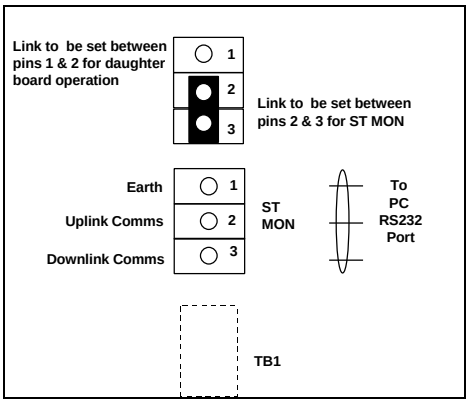

Figure 8. STMON Connections To Type 4 PSU only

Starting STMON

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

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

stmon /c com_port /f filename

All parameters are optional.

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

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

/m

Specifies monochrome display - useful for maximum contrast.

If the STMON panel shows a communications timeout alarm then;

1) Check cable connection.

2) Check PC Com port selection and if necessary quit STMON by pressing ESC and invoke using:

stmon /c com2

ST software build , channel codes and ST options will not be displayed unless the ST is power cycled after STMON is connected and invoked. If the ST is not power cycled then it is likely that the ST will not output STMON data - press F1 to request data.

Principle of operation

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

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

3. If a message is not received after five seconds, STMON reports a communications time-out alarm. The most likely cause for this event is that the ST has

automatically closed STMON communications - STMON support is reactivated by pressing F1. If after pressing F1 the comms time-out alarm does not clear then this indicates that there is a cable / com port selection fault or that the ST is faulty.

STMON display panel description

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

Table 5. Uplink Panel

	Uplink Panel
Link	Status of Uplink, either **No** link or link **OK**.
PC	Transmit Power Control level, 0.00 to 3.00, will be displayed if the calibration flag is ***NOT*** set if the calibration flag is set then the range will be 0-5 V. A low PC level indicates low transmit power and implies that the RF path is unstressed.
TX Power	The TX signal power will be displayed in the range of 0dBm to 25dBm only if the calibration flag is set , i.e. if NVRAM calibration is employed. If not 'uncalibrated' message will be displayed instead of transmitted signal power.

Table 6. Downlink Panel

	Downlink panel
Link	Status of Downlink, either **No** link or link **OK**.
AGC	Receive Automatic Gain Control level, 0.00 to 3.00, will be displayed if the calibration flag is ***NOT*** set if the calibration flag is set then the range will be 0-5 V.. A high AGC level indicates high received signal power and implies that the RF path is unstressed.
RX Power	The RX signal power will be displayed in the range of - 80dBm to -105dBm only if the calibration flag is set , i.e. if NVRAM calibration is employed. If not 'uncalibrated' message will be displayed instead of received signal power.
Errors /sec	Number of soft errors counted on the downlink averaged over one second. The soft error count does not directly correspond to a link Bit Error Rate as most soft errors are corrected by forward error correction, but this is a reasonable indication of data link quality. below gives atypical error count for a 15 user system - low error counts should be expected in systems populated with less than 15 users.

Table 7. Error Count

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

Table 8. ST Status Panel

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

Table 9. STMON Panel

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

Table 10. ST Build Status Panel

ST build status panel	
CRU channel code	Indicates channel code entered during installation - this information is updated on ST initialisation.
ST s/w ver	Indicates size the version number of the ST software build - this information is updated on ST initialisation.

Table 11. ST States

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

Table 12. Program Data Panel

Program Data Panel	
Digits	Accepts digits entered by the user during the STMON install

STMON log file

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

stmon /f log.txt

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

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

Individual fields are shown in .

Table 13. Log Fields

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

Table 14. Function Key Description

Key	Name	Function
F1	Open	Opens STMON communication between the PC and ST. Press F1 if connecting to an ST that is already powered up and operating.
F2	Close	Closes STMON communication between the PC and ST. Press F2 before disconnecting from an ST.
F3	Install	Invokes the **ST-V2** install mode. **Not valid for ST-I1 / ST-D128** With a telephone attached to either VF pairs, press F3 and lift the telephone handset. The install 'ready to proceed' tone is heard. The ST channel code may the be entered by pressing the appropriate digits on the telephone handset. When complete, hang up and wait for the ST to re-boot. Check that the correct channel code is displayed in the Build Status panel.
F4	Install	Invokes the STMON install mode. There are 2 install options, the RF channel/PN/RW installation and ST options installation. A cursor appears in the Program Data panel. **1. RF Channel/PN/RW install** Enter the ST programming code, e.g. 101207*9, then press <ENTER>. **2. ST options install** Enter the 3 digit ST install option code, eg #0009, then press <ENTER> In both cases the digits will be sent to the ST. If the ST accepts the digits a message will appear 'ST Install OK' otherwise either 'ST Install Failed' or 'No response' will appear. When complete, wait for the ST to re-boot. Check that the correct channel code or st options are displayed in the Build Status panel.
F5	STMON Help	Displays the help menu. This shows how to program STs that support the new 3 digit RF channel code and old 2 digit RF channel code. It also shows how to program the ST options.
ESC	Quit	Exits the STMON application.

PROGRAMMING THE CRU USING STMON

The following procedure will have to be completed before placing the ST into service. **(This procedure is based on using STMON Rev J or later.)**

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

For details on setting up and operating STMON see DLPs 011 and 012. All results must be entered on the Commissioning Test Result Sheet, see DLP-019. The table below shows the Part numbers and the Rev Level at which revised programming (3 Digit RF Code) was introduced.

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

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

STEP **PROCEDURE**

STMON ST Programming

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

2. Connect cable between Subscriber Terminal and PC as described in DLP-011.

3. From the DOS prompt start STMON by typing;

   stmon

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

   a) Check cable connection
   b) Check PC Com port selection and if necessary quit STMON by pressing ESC and invoke using;
   stmon /c com2

4. ST software build and channel codes are not displayed unless the ST is power cycled after STMON is connected and invoked. If ST is not power cycled then it is likely that the ST will not output STMON data - press **F1** to request data.

5. Press **F4** function key to install

6. Each CRU is initialised by entering a unique code. These codes are entered using STMON and should be provided by the RF planning office on a form similar to that shown in . A list of RF codes is provided at the end of this DLP.

Table 3 CRU Programming Information

RF * 2/3 digits			PN 1 digit	RW 2 digits		Identity 6 digits	Check N°. 1 digit	Remote site location
1	0	6	1	0	1	000000	7	CRU1
*Note: Older CRUs will have a 2 digit RF code. Newer CRUs will have a 3 digit RF code.								

7. The ST is programmed with the channel code, (e.g. 061010000007). Enter the ST channel code by pressing the appropriate digits on the keyboard.

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

Programming 12 and 16kHz SPM tones

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

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

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

Table 4. Function Key Description

Key	Name	Function
F1	Open	Opens STMON communication between the PC and ST. Press F1 if connecting to an ST that is already powered up and operating.
F2	Close	Closes STMON communication between the PC and ST. Press F2 before disconnecting from an ST.
F3	Install	Invokes the **ST-V2** install mode. **Not valid for ST-I1 / ST-D128**
F4	Install	Invokes the **ST-I1** and **D-128** install mode. It can also be used to program **ST-V2** without a telephone attached. Press F4 and. Enter he ST channel code by pressing the appropriate digits on the keyboard. When complete wait for the ST to reboot. Check that the correct channel code is displayed in the Build Status panel.
F5	Help	Displays the help menu. This shows how to program STs that support the new 3 digit RF channel code and old 2 digit RF channel code. It also shows how to program the ST options.
ESC	Quit	Exits the STMON application.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

RF Programming Codes for CRUs when using STMON Rev J

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

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

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

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

RF BAND	ST MON REV J RF BAND (1 digit) CHAN NO. (2 digits)	STMON < REV J CHAN NO (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
2.3 – 2.5GHz	**2 01**	31	2312.00	2406.00
2.3 – 2.5GHz	**2 02**	32	2316.00	2410.00
2.3 – 2.5GHz	**2 03**	33	2320.00	2414.00
2.3 – 2.5GHz	**2 04**	34	2324.00	2418.00
2.3 – 2.5GHz	**2 05**	35	2328.00	2422.00
2.3 – 2.5GHz	**2 06**	36	2332.00	2426.00
2.3 – 2.5GHz	**2 07**	37	2336.00	2430.00
2.3 – 2.5GHz	**2 08**	38	2340.00	2434.00
2.3 – 2.5GHz	**2 09**	39	2344.00	2438.00
2.3 – 2.5GHz	**2 10**	40	2348.00	2442.00
2.3 – 2.5GHz	**2 11**	41	2352.00	2446.00
2.3 – 2.5GHz	**2 12**	42	2356.00	2450.00
2.3 – 2.5GHz	**2 13**	43	2360.00	2454.00
2.3 – 2.5GHz	**2 14**	44	2364.00	2458.00
2.3 – 2.5GHz	**2 15**	45	2368.00	2462.00
2.3 – 2.5GHz	**2 16**	46	2372.00	2466.00
2.3 – 2.5GHz	**2 17**	47	2376.00	2470.00
2.3 – 2.5GHz	**2 18**	48	2380.00	2474.00
2.3 – 2.5GHz	**2 19**	49	2384.00	2478.00
Unused		50		
Unused		51		
Unused		52		
Unused		53		
3.4 – 3.6GHz	**4 00**	54	3411.75	3511.75
3.4 – 3.6GHz	**4 01**	55	3415.25	3515.25
3.4 – 3.6GHz	**4 02**	56	3418.75	3518.75
3.4 – 3.6GHz	**4 03**	57	3422.25	3522.25
3.4 – 3.6GHz	**4 04**	58	3425.75	3525.75
3.4 – 3.6GHz	**4 05**	59	3429.25	3529.25
3.4 – 3.6GHz	**4 06**	60	3432.75	3532.75
3.4 – 3.6GHz	**4 07**	61	3436.25	3536.25
3.4 – 3.6GHz	**4 08**	62	3439.75	3539.75
3.4 – 3.6GHz	**4 09**	63	3443.25	3543.25
3.4 – 3.6GHz	**4 10**	64	3446.75	3546.75
3.4 – 3.6GHz	**4 11**	65	3450.25	3550.25
3.4 – 3.6GHz	**4 12**	66	3453.75	3553.75
3.4 – 3.6GHz	**4 13**	67	3457.25	3557.25
3.4 – 3.6GHz	**4 14**	68	3460.75	3560.75
3.4 – 3.6GHz	**4 15**	69	3464.25	3564.25
3.4 – 3.6GHz	**4 16**	70	3467.75	3567.75
3.4 – 3.6GHz	**4 17**	71	3471.25	3571.25

RF BAND	ST MON REV J RF BAND (1 digit) CHAN NO. (2 digits)	STMON < REV J CHAN NO (2 digits)	UPLINK (MHz)	DOWNLINK (MHz)
3.4 – 3.6GHz	**4 18**	72	3474.75	3574.75
3.4 – 3.6GHz	**4 19**	73	3478.25	3578.25
3.4 – 3.6GHz	**4 20**	74	3481.75	3581.75
3.4 – 3.6GHz	**4 21**	75	3485.25	3585.25
3.4 – 3.6GHz	**4 22**	76	3488.75	3588.75
3.4 – 3.6GHz	**4 23**	77	3492.25	3592.25
3.4 – 3.6GHz	**4 24**	78	3495.75	3595.75
Unused		79		
Unused		80		
Unused		81		
Unused		82		
1.8-1.9GHz	**0 00**	-	1851.25	1931.25
1.8-1.9GHz	**0 01**		1853.75	1933.75
1.8-1.9GHz	**0 02**		1856.25	1936.25
1.8-1.9GHz	**0 03**		1858.75	1938.75
1.8-1.9GHz	**0 04**		1861.25	1941.25
1.8-1.9GHz	**0 05**		1863.75	1943.75
1.8-1.9GHz	**0 06**		1866.25	1946.25
1.8-1.9GHz	**0 07**		1868.75	1948.75
1.8-1.9GHz	**0 08**		1871.25	1951.25
1.8-1.9GHz	**0 09**		1873.75	1953.75
1.8-1.9GHz	**0 10**		1876.25	1956.25
1.8-1.9GHz	**0 11**		1878.75	1958.75
1.8-1.9GHz	**0 12**		1881.25	1961.25
1.8-1.9GHz	**0 13**		1883.75	1963.75
1.8-1.9GHz	**0 14**		1886.25	1966.25
1.8-1.9GHz	**0 15**		1888.75	1968.75
1.8-1.9GHz	**0 16**		1891.25	1971.25
1.8-1.9GHz	**0 17**		1893.75	1973.75
1.8-1.9GHz	**0 18**		1896.25	1976.25
1.8-1.9GHz	**0 19**		1898.75	1978.75
1.8-1.9GHz	**0 20**		1901.25	1981.25
1.8-1.9GHz	**0 21**		1903.75	1983.75
1.8-1.9GHz	**0 22**		1906.25	1986.25
1.8-1.9GHz	**0 23**		1908.75	1988.75

CRU MEASUREMENTS AND PANNING

The following procedure is used when checking CRU performance and re-aligning a CRU.

Tools and equipment required.

ITEM	DESCRIPTION	SIZE
01	Combination Spanner	13mm
02	Ratchet and Socket	17mm
03	Snake Eye Screwdriver	
04	Screwdriver	Pozidrive No 1 x 75mm
05	Screwdriver	Pozidrive No 2 x 199mm
06	Screwdriver	Pozidrive No 3 x 150mm
07	Screwdriver	Flat Blade 3mm x 100mm
08	Digital Multimeter	Fluke 77 or similar
09	Inline Test Adapter (connectorised CRU only) 2 adapters are provided per CT rack installation.	ACC454-0000-182
19	Soft Pencil	
11	Ladder - Triple	Fully Extended 7metre minimum

STEP **PROCEDURE**

1. Connecting the In Line Breakout Cable

1. Disconnect the drop cable from the CRU. If the position of the CRU does not allow the drop cable to be removed it may be necessary to loosen the hinge bolts on the CRU mounting bracket. Before loosening the bolts it is necessary to mark the alignment position of the CRU on the CRU mounting bracket. This allows it to be returned to the original position before measurements are made.

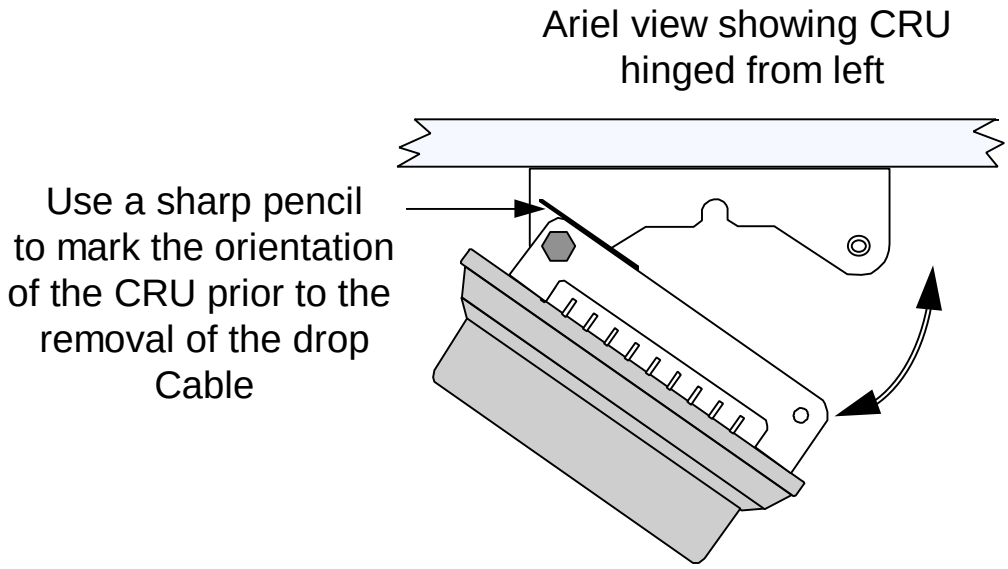

Figure 1-1. CRU Alignment Position Marking

2. Connect the in-line breakout cable to the CRU. Connect the other end to the drop cable. Re-position the CRU if it has been moved. Lock and secure the CRU in position by tightening the locking bolts on the CRU mounting bracket.

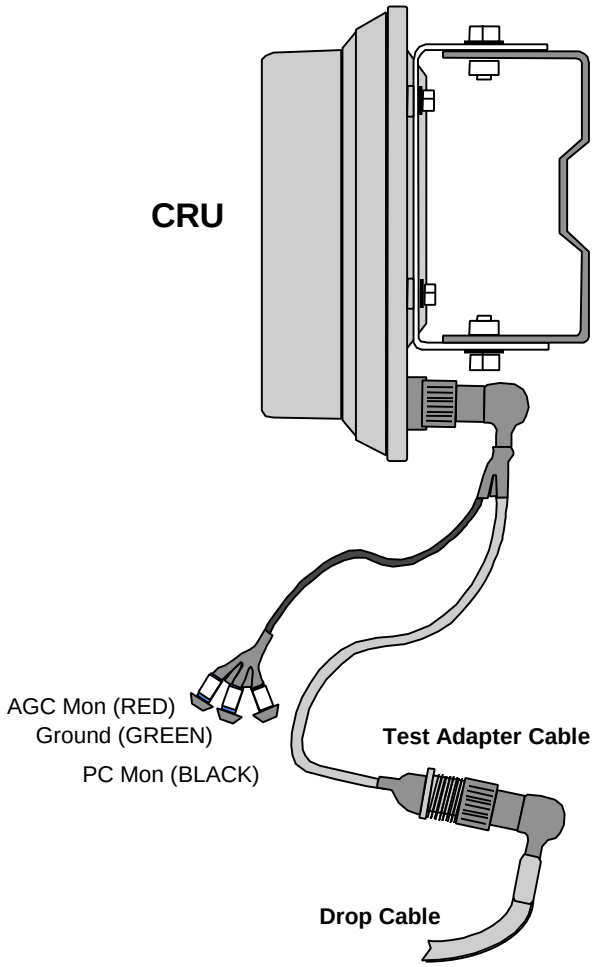

Figure 1-2. CRU Breakout Cable Test Socket

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

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

5. Once the R.F. link between the ST and CT has been successfully established In the AC PSU (type2) D9 will be extinguished. The RF link fail LED on the CT modem will also be extinguished.

CRU Characterisation

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

AGC Voltage Measurement

1. Using the DMM, measure the DC voltage between Ground (green) and the AGC Monitoring point, (red) on the breakout socket.

2. Check the label on the CRU to get an indication of the receive signal strength from the characterised readings to ensure that the required fade margins are attained; The higher the voltage the stronger the signal. The reading should indicate a receive strength greater than -98dBm. If the original test form is available check the value of the DC voltage against that on the test result sheet.

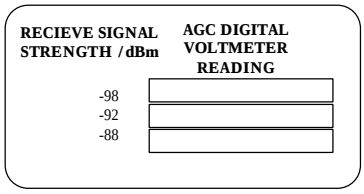

Figure 1-4. Label Detail: Receive AGC

3. CRU check the label on the CRU to get an indication of the RX signal strength. If there is any significant difference in AGC voltage from the original reading or the RX signal strength is less than -98 then check for any obstructions in the path and if necessary PAN the CRU to improve the RX signal strength.

CRU Panning

1. Using the DMM, Using the DMM, measure the DC voltage between Ground (green) and the AGC Monitoring point, (red) on the breakout socket. Whilst observing the voltage on the DMM, pan the CRU through the peak point, then pan back to it. If there is not sufficient panning range use the other mounting point on the CRU mounting bracket in order to pan through the peak. Check that the CRU does not break the CRU positioning criteria as shown in Figure 1-6.

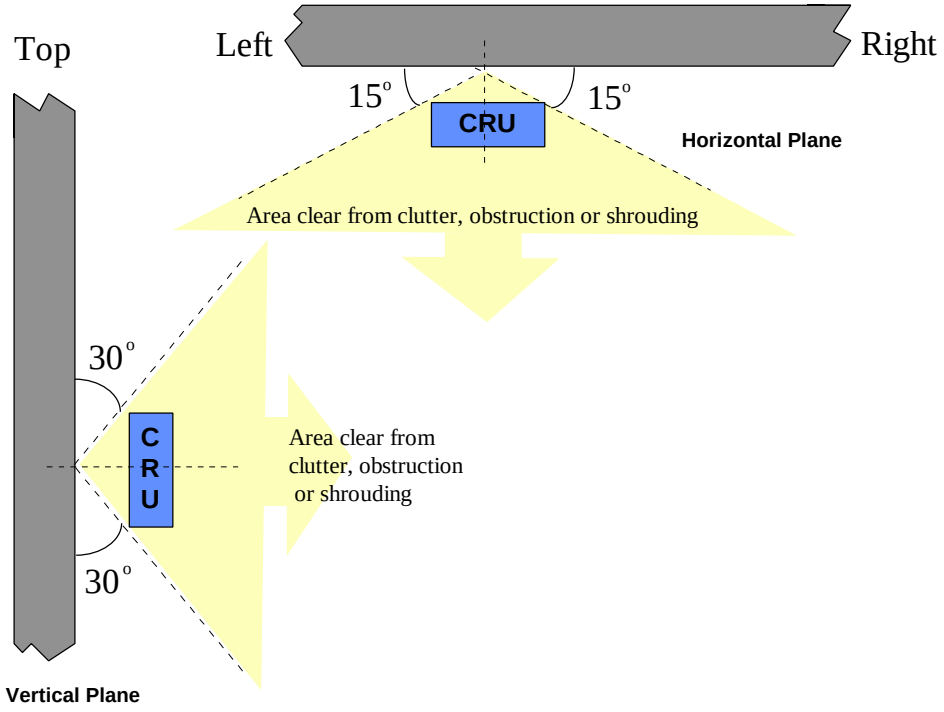

Figure 1-6. CRU Positioning

2. If it is not possible to get sufficient RX gain the CRU, and there are no obstructions, it may be faulty and should be changed.

Power Control Measurements

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

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

TRANSMIT SIGNAL STRENGTH /dBm	PC DIGITAL VOLTMETER READING
+21	
+15	
+11	

Table 5. Label Detail: Transmit Power Control (2.0 - 2.3GHz Band)

4. If the PC readings are not consistent with the receive fade margins then change the CRU.

5. Remove the in-line breakout test cable and re-connect the drop cable. If the CRU has to be moved to remove the in-line breakout test cable and re-connect the drop cable, then mark the orientation of the CRU on to the mounting bracket as described in paragraph 1.

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

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

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CHANGING THE TYPE 1 PSU.

The Type 1 PSU consists of an AC Brick Power Unit and a Junction Box.
The Type 1 PSU exists in both 24V and 30V versions ensure that if changing the PSU on a ST-D128 installation that a 30V Type 1 PSU is used.

STEP **PROCEDURE**

1. PSU (Type 1) Connection to the Junction Box

1. The PSU is free standing and should be placed near to the Junction Box in a non-hazardous location.

2. Cut the 3 pin socket off the DC output cable and trim and prepare ends for connection to the Junction Box as shown in Table 7 below.

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

Table 7. PSU (Type 1) to Junction Box Connections

2. AC Power Cord Installation

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

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

Notes:

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

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

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

CHANGING THE TYPE 2 PSU

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

Tools and equipment needed

ITEM	DESCRIPTION	SIZE
01	Snake Eye Screwdriver	
02	Screwdriver	Pozidrive No 1 x 75mm
03	Screwdriver	Pozidrive No 2 x 199mm
04	Screwdriver	Pozidrive No 3 x 150mm
05	Screwdriver	Flat Blade 3mm x 100mm
06	Digital Multimeter	Fluke 77 or similar
07	Test Telephone	

STEP **PROCEDURE**

1. Unplug the PSU from the AC supply.

2. Unscrew and remove the PSU front cover using a Snake-eye screwdriver.

3. Disconnect the drop cable and the NTU wiring.

4. Remove the faulty PSU by unscrewing the No 8 x 50mm screws that secure the unit to the wall.

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

6. Reconnect the drop cable and NTU wiring to the blocks TB1 and TB2. For connector detail see DLP-024 (Replacing the drop cable)

7. Plug the AC supply cord into the IEC connector on the PSU and secure with retaining clip.

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

9. Plug the PSU into the AC supply.

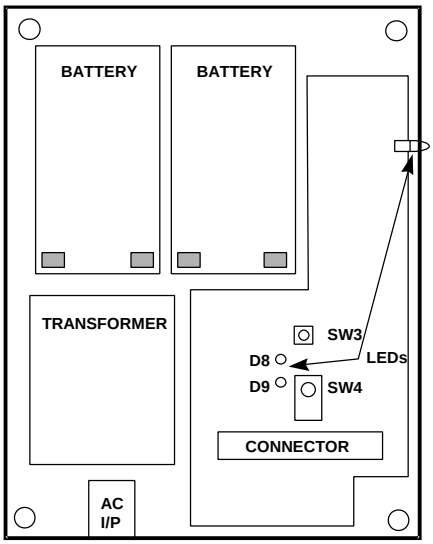

Figure 2-1. AC Power Supply Unit.

PSU earthing

Note: The PSU is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit. The functional earth for hazardous voltage test should be connected to TB1 terminal 2.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

.

CHANGING THE TYPE 4 PSU

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

8. Tools and equipment needed

ITEM	DESCRIPTION	SIZE
01	Snake Eye Screwdriver	
02	Screwdriver	Pozidrive No 1 x 75mm
03	Screwdriver	Pozidrive No 2 x 199mm
04	Screwdriver	Pozidrive No 3 x 150mm
05	Screwdriver	Flat Blade 3mm x 100mm
06	Digital Multimeter	Fluke 77 or similar
07	Test Telephone	

STEP **PROCEDURE**

1. Unplug the PSU from the AC supply.

2. Unscrew and remove the PSU front cover using a Snake-eye screwdriver.

3. Disconnect the drop cable and the NTU wiring.

4. Remove the faulty PSU by unscrewing the No 8 x 50mm screws that secure the unit to the wall.

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

6. Reconnect the drop cable and NTU wiring to the blocks TB1 and TB2. For connector detail see DLP-024 (Replacing the drop cable).

7. Plug the AC supply cord into the IEC connector on the PSU and secure with retaining clip.

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

together, then connect the red lead to the +ve terminal and the black lead to the -ve terminal.

9. Plug the PSU into the AC supply.

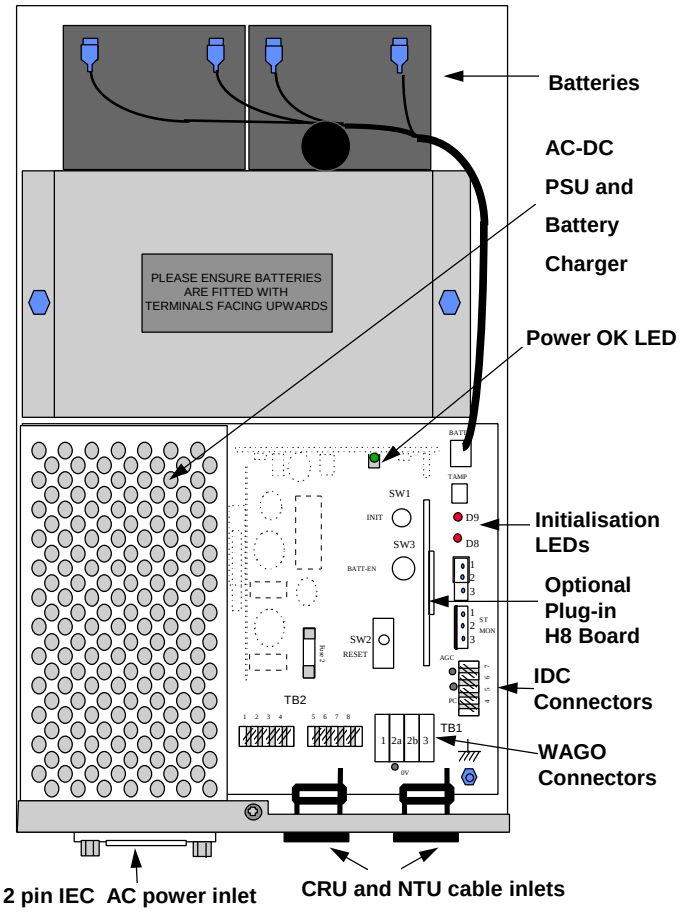

Figure 8-1. Type 4 AC Power Supply Unit.

PSU earthing

Note: The PSU is double insulated. It still has a 3-pin IEC socket and therefore uses a 3-wire cable and mains plug. There is no earth wire connected to the IEC socket inside the unit. The functional earth for hazardous voltage test should be connected to TB1 terminal 2.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

REPLACING THE DROP CABLE.

STEP **PROCEDURE**

1. Removal and replacement of faulty drop cable

1. Switch off power at the mains socket.
2. Disconnect Drop Cable wiring from Junction Box
3. Remove connector from CRU by turning anti-clockwise (If the CRU has to be moved in order to release the connector see DLP-016 for procedure to remove connector)
4. Cut away any tie wraps securing the cable and remove drop cable from cleats.
5. Run new drop cable and secure using cleats and tie wraps.
6. Connect the connector to the CRU ensuring that the original orientation is maintained.
7. Cut drop cable to length and strip and connect wires to Junction Box or PSU. as detailed below.

2. Drop Cable Termination at the PSU Type 1

At the Junction Box terminate the wires of the drop cable as shown in and the tables below.

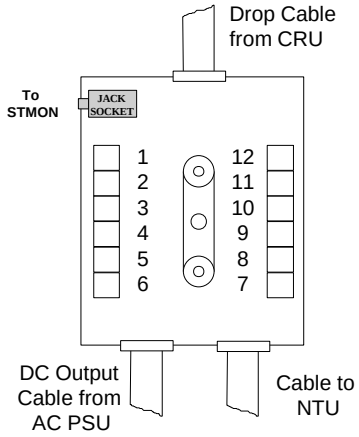

Figure 2-2. Junction Box Termination (Type 1 PSU)

Terminal	Function	Colour
1	System Data- Up	Grey
2	System Data- Down	Yellow
3	Ground	
4	+24V DC	Red
5	Ground	
6	0V	Black
7	VF2b	White
8	Vf2a	Blue
9	Not connected	
10	VF1a	Orange
11	VF1b	Violet
12	0V (Chassis Earth)	Screen

Table 1. ST-V2 Junction Box Connections

Terminal	Function	Colour
1	System Data- Up	Brown on White
2	System Data- Down	White on Brown
3	Logic 0V	Blue on Red
4	Battery +ve DC Volts	Slate on White
5	Ground	
6	0V	White on Slate
7	TX 2Mbit/s	Blue on White
8	TX 2Mbit/s	White on Blue
9	Not connected	
10	RX 2Mbit/s	Orange on White
11	RX 2Mbit/s	White on Orange
12	Ground (Chassis Earth)	Screen

Table 2. D128 Junction Box Connections

Terminal	Function	Colour
1	System Data- Up	Grey
2	System Data- Down	Yellow
3	Ground	
4	+24V DC	Red
5	Ground	
6	0V	Black
7	STX-	White
8	STX+	Blue
9	Not connected	
10	SRX-	Orange
11	SRX+	Violet
12	0V (Chassis Earth)	Screen

Table 3. ST-I1(ISDN) Junction Box Connections

3. Drop Cable Termination at the PSU Type 2

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

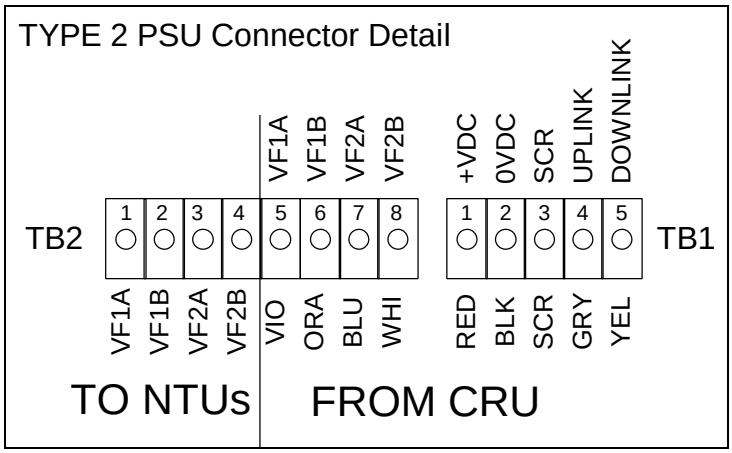

Figure 3-1. ST-V2 Drop Cable Connections to AC PSU (Type 2)

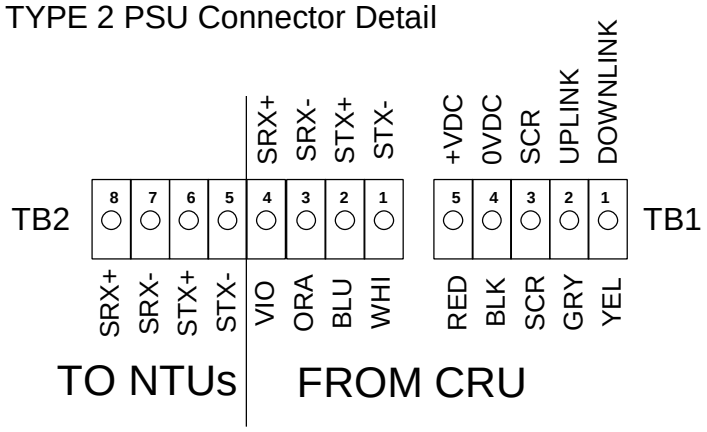

Figure 3-3. ISDN Drop Cable Connections to AC PSU (Type 2)

4. Drop Cable Termination at the PSU Type 4

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

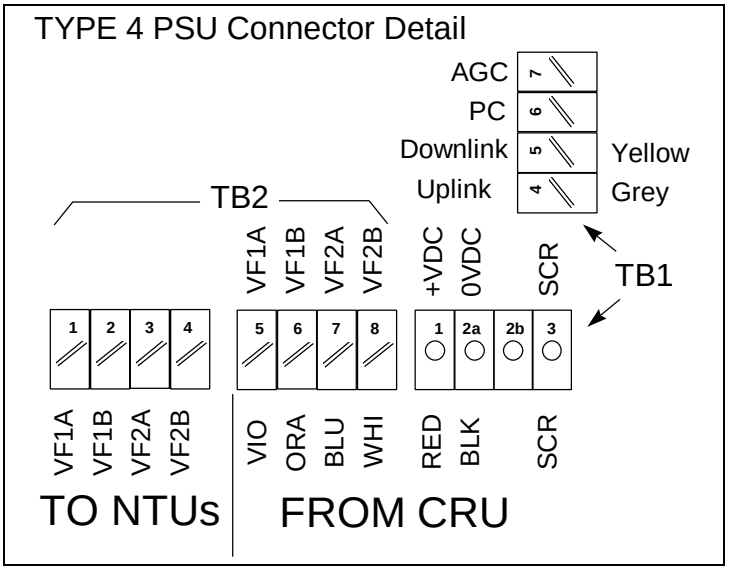

Figure 4-2. ST-V2 Drop Cable Connections to Type-4 PSU

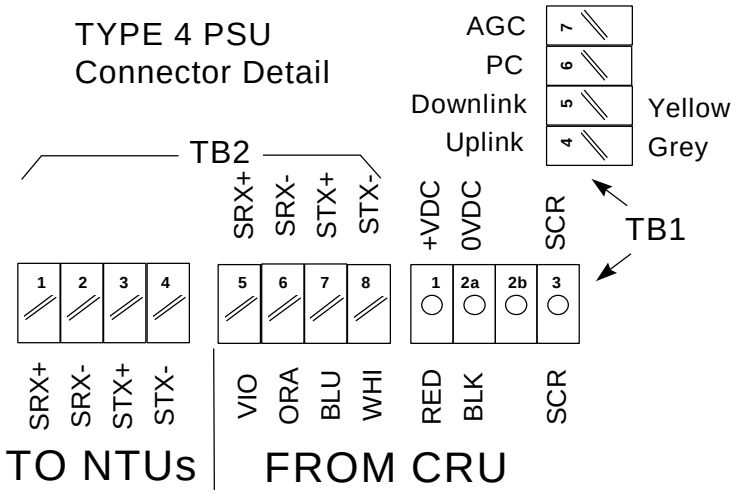

Figure 4-2. ST-I1 Drop Cable Connections to Type-4 PSU

5. Termination of NTUs

The V2 NTU cable (2 wire) is terminated as detailed in .

Table 1. NTU Terminations for ST-V2

Function	NTU Terminations	PSU Type 4 Terminal Block Terminations
VF1A	NTU1	TB2 terminal 1
VF1B	NTU1	TB2 terminal 2
VF2A	NTU2	TB2 terminal 3
VF2B	NTU2	TB2 terminal 4

The ISDN NTU cable (4 wire)for S interface TX and RX from NTU to the Junction Box, securing with 4mm cleats as required and terminate as detailed in Table 2.

Table 2. NTU Terminations for ISDN

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

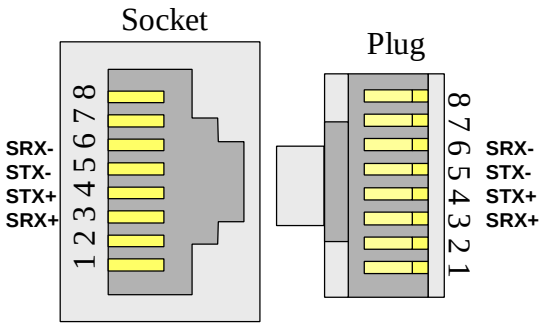

Figure 5-1. RJ45 ISDN Connections

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SECTION 7: OPERATIONAL PROCESSES

9. Purpose of Section

This section is designed to assist with setting the Modem shelf in service and adding subscribers to the system.

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CENTRAL TERMINAL CONFIGURATION

1. Quick Guide To System Configuration

When the CT equipment rack, the antenna/feeder and Sitespan have been installed and commissioned configuration of the Central Terminal can be carried out in order to connect the central office to the subscribers.
This is a quick guide to system configuration see Sitespan 605-0000-427 for detailed instructions.

The Sitespan controller allows the operator to set up and amend resource configurations in terms of:

- Field Replaceable Units (FRU'S)
- Channel assignment

Each card (or FRU) that electronically holds its serial number automatically reports it to the Sitespan on power up. This serial number is a unique identifier of the resource in question and cannot be changed after manufacture. Whenever an FRU is replaced, the controller of the FRU identifies the event and reports the serial number of the new FRU to Sitespan.

Before an AS4000 Central Terminal (ACT) will transmit, it must be configured with the appropriate communication channel details. The ACT is configured from Sitespan The Sitespan operator can input, amend and view the site management resource data as follows:

- Create, edit and delete:
  - Rack
  - Shelf
  - Shelf installation
  - Subscriber
- View:
  - Shelf
  - Card
  - Subscriber

The following procedures can be found in the AS8100 (Sitespan) Reference Manual for configuring an AS4000 rack. Prior to using these procedures connect the Equipment View to the server. Details can be found in the AS8100 (Sitespan) Reference Manual

2. Create an AS4000 Rack

1. Ensure that the site has been created and this view appears on screen Click the mouse in the Site window to highlight it as the active window.

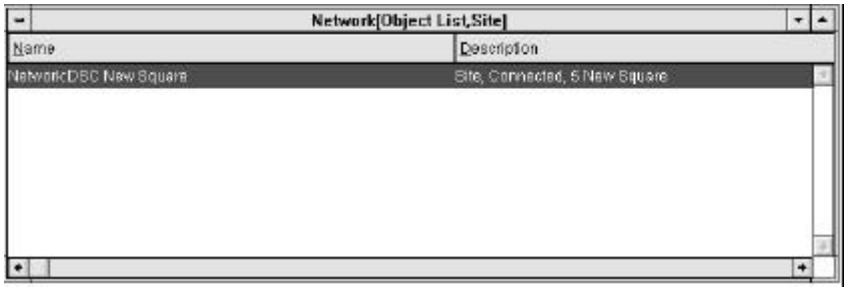


Figure 2-1. Site Object List

2. Select the site using the mouse. When selected the site is highlighted in dark blue.

3. From Menu Bar select *Edit.*

4. Select *Create Child Element*.

5. Select *Airspan 60 Rack* then click the *OK* button.

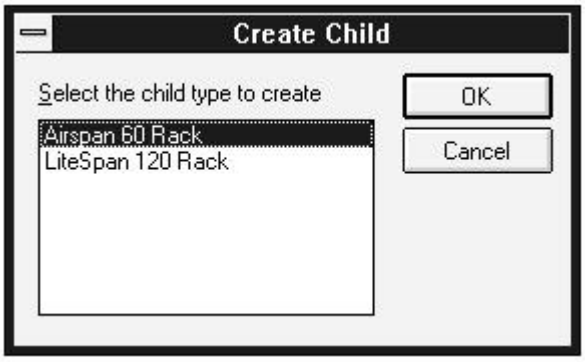


Figure 2-2. Create Rack

6. A rack will be shown in Site View with the RF Combiner shelf highlighted as active.

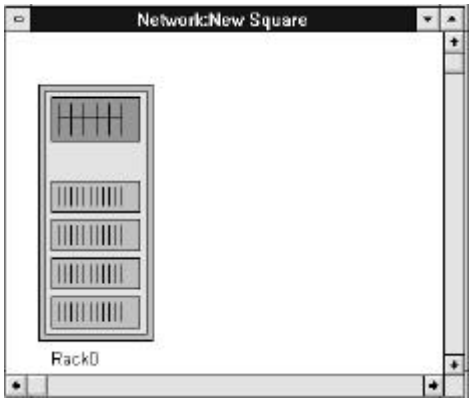


Figure 2-4. New Rack

7. Select a modem shelf by pointing at the shelf with the mouse and clicking. From the *Edit* menu select *Rack Properties*. The Edit Rack Properties window is displayed. Enter the rack name in the box and click on the OK button to edit the desired rack.

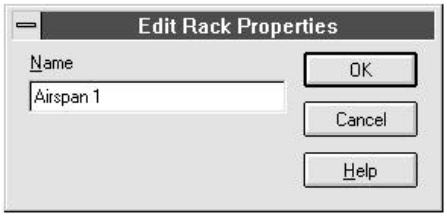
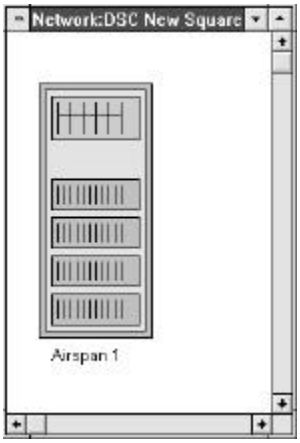


Figure 2-6. Edit Rack Properties

8. The rack appears with rack name inserted.



2.1. Create AS4000 Modem Shelf

1. Select the rack either by selecting *View,* and choosing *Site View* when in the network object list window.

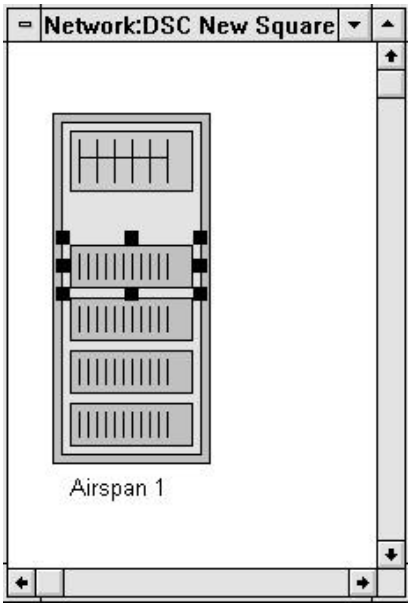


Figure 2-8. New Rack

2. Click on the desired Modem Shelf (1-4). The selected shelf will be highlighted with black markers.

3. From the *Edit* menu select: *Create Shelf*.

4. To create Shelf select the type of shelf to be created from the Create Child window and click on the OK button.

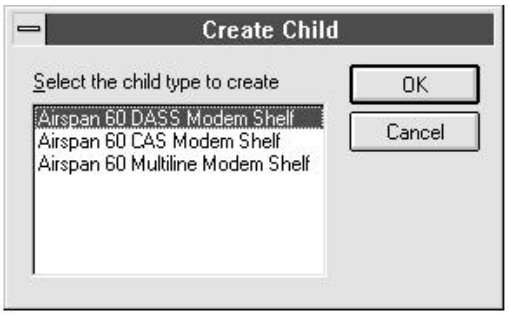


Figure 2-10. Create Shelf

5. Click the OK button to initiate the changes and return.

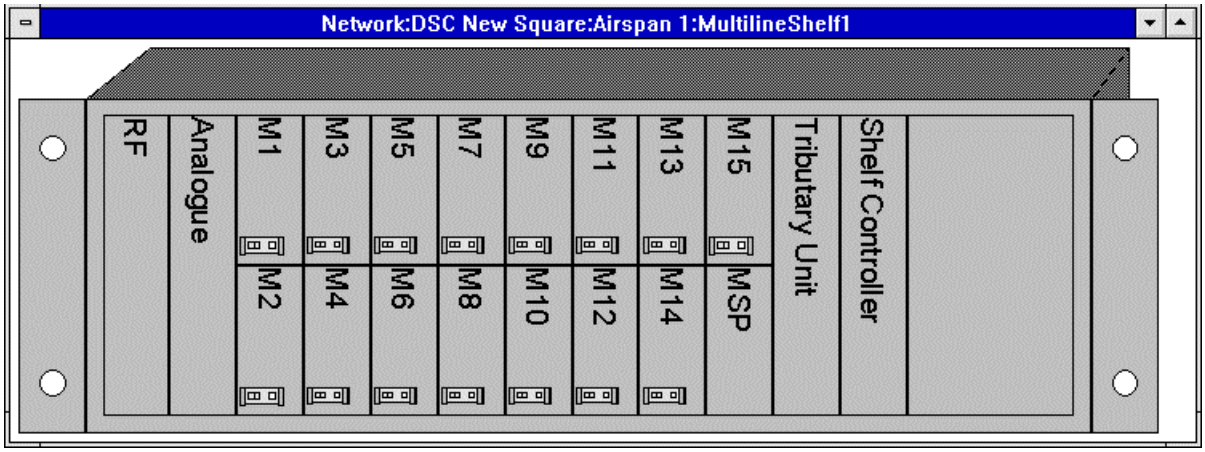


Figure 2-12. Newly created Shelf

2.2. Edit Modem Shelf Properties

1. Either display the shelf in Shelf View, or select the shelf on an Object List.

2. From the *Edit*, Menu choose *Airspan 60 Modem Shelf Properties.*

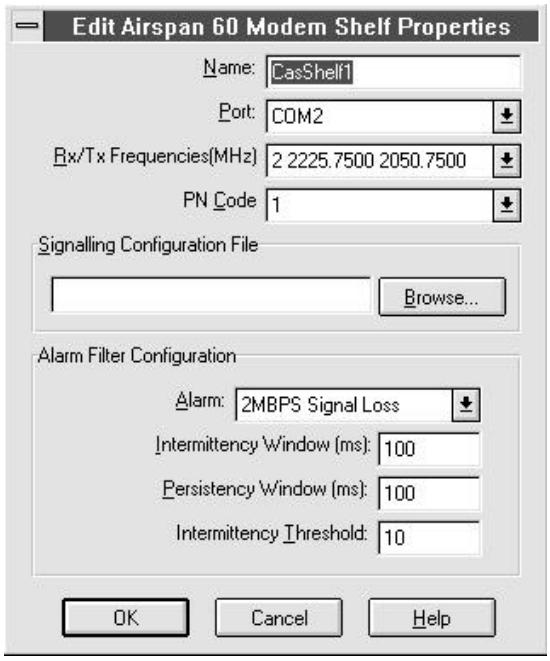


Figure 2-14. Edit Modem Shelf Properties

2. Enter the shelf name/number into the dialog box and click the OK button.

3. Select the COM Port by clicking ⊕ to drop the options box and choosing the appropriate communications/serial port on the **Server PC** that will connect to the shelf controller on the AS4000 rack (each modem shelf will require a different port). The

ports listed are those available on the Server machine; this may not necessarily be the machine running the Sitespan Equipment View.

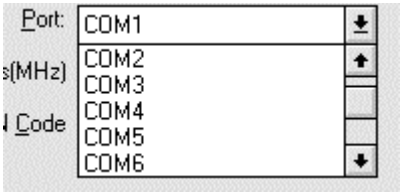


Figure 2-16. Select COM Port

4. Select Rx & Tx frequencies by clicking ⊑ to drop the options box and clicking the appropriate frequency pair on the drop down list. The frequency pairs are usually determined as part of the system planning process.

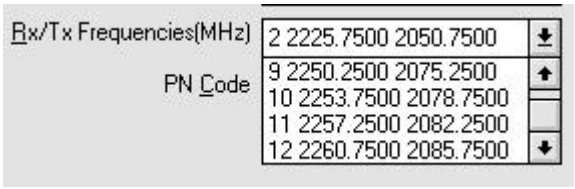


Figure 2-18. Select Frequency

5. Select the PN code (1-7) by clicking ⊑ to drop the options box and clicking the appropriate number from drop-down list. The PN codes are usually determined as part of the system planning process.

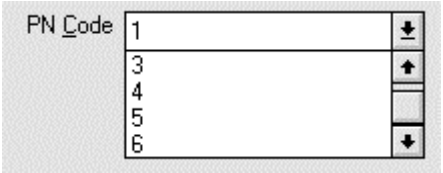


Figure 2-20. Select PN Code

6. The Alarm Filter Configuration section of the window allows the user to increase or decrease the sensitivity of the alarms. These are automatically set to default levels. To change the thresholds see The AS8100 (Sitespan) Reference Manual 605-0000-427 for details on setting alarm thresholds.

7. Click the OK button to get view of the fully configured shelf. The RF, Analogue, TU, SC and installed Modems are activated and will be highlighted in the active or alarm state.

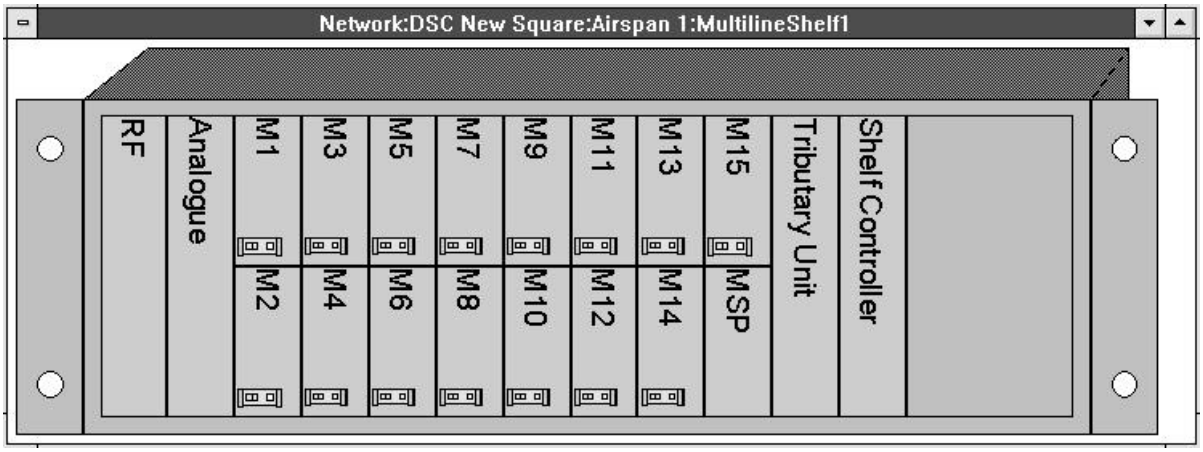


Figure 2-22. Active Shelf

Note: Allocation of Frequency and PN code will usually form part of the network planning and is not usually determined by an individual editing the shelf properties.

The Shelf is now fully operational and subscriber may be attached.

STOP THIS PROCEDURE IS NOW COMPLETE

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ADDING SUBSCRIBERS

1. Subscriber Creator Wizard

It is recommended when provisioning a shelf that the subscriber creator wizard is used to create default subscribers. When default subscribers have been created then provision details for each subscriber can amended to insert details.

1. Select the Site in which to create subscribers from the 'Network Site List'

2. From the tool bar, select the subscriber list icon  This will generate a listing of all available subscribers, if any.

3. From the 'Tools' pull-down menu, select 'Subscriber Creator Wizard'.

4. The 'Subscriber Creator' dialog box displays.

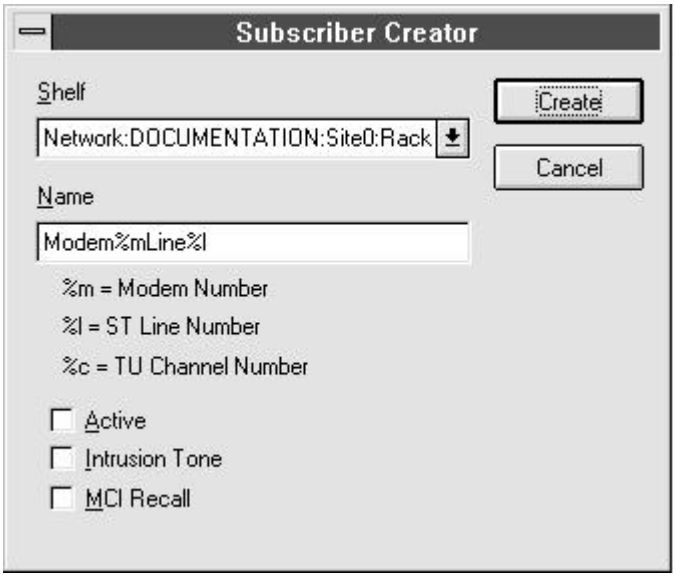


Figure 1-1 . Subscriber Creator

1. To choose the shelf to create subscribers on, click on Œ next to the Shelf field. A list of shelves displays. Click on the desired shelf.

2. No entry is needed in the name field. The Creator Wizard names the subscribers according to modem and line number.

3. Click the cursor in the Active box at the bottom of the dialog box to cause each subscriber to default to active if required.

4. Review the choices made. Click the ‘Create’ button to create the subscribers with information just entered.

5. The following subscriber view displays:

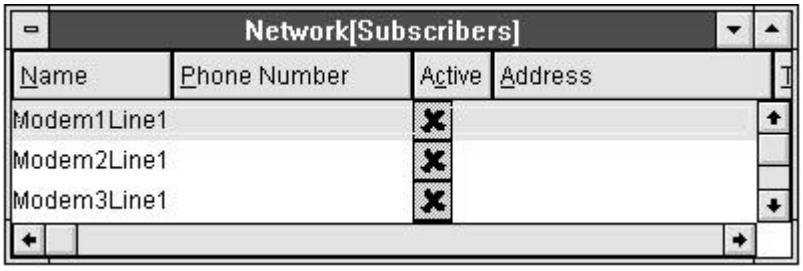


Figure 1-3. Default Subscriber List

2. Edit /Add Subscriber Details

1. Edit Subscriber dialog box can be edited by clicking the  button, by using the *Edit* Menu select *Create Subscriber*. and choosing Subscriber or by double clicking the mouse on the name field of the selected modem in the ‘Subscriber View’.

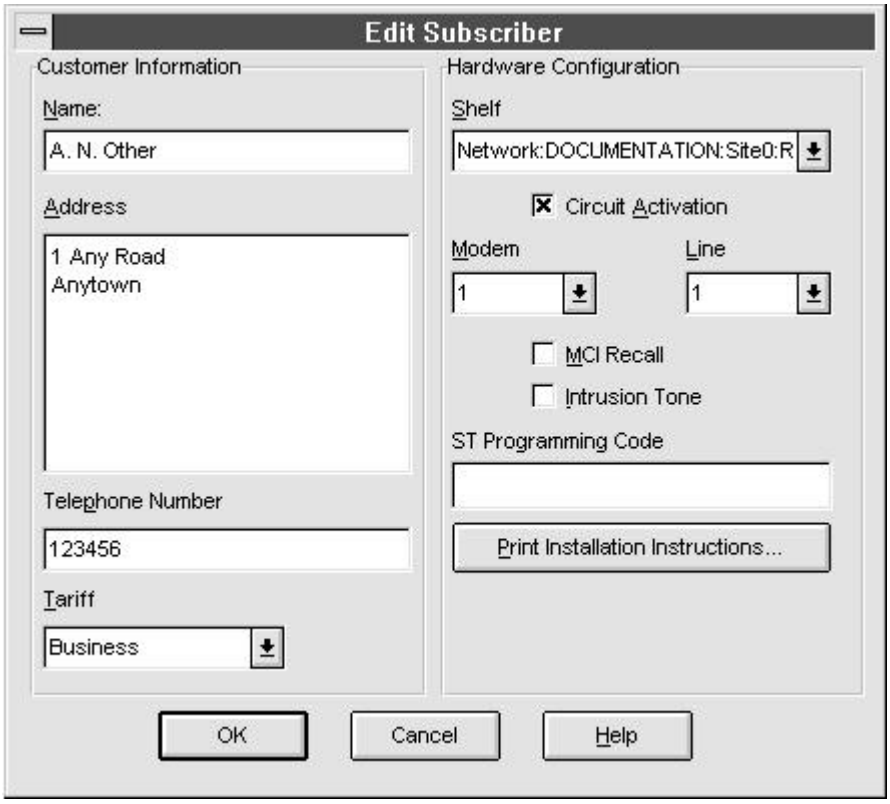


Figure 2-1. Edit Subscriber

2. Enter the customer information in the *Name, Address, and Telephone Number* fields. **Note:** to move to a new line in the address field use Ctrl and ↵.

3. Select the Tariff from the drop down menu. The inclusion of the tariff is for information only and does not set a tariff.

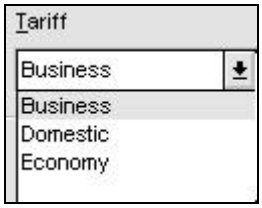


Figure 2-2. Tariff Indicator

4. Select the hardware configuration by selecting The *Shelf*, (the field may be dropped by clicking the mouse on the Œ) *Modem* and *Line* number. If the modem / line is already in use then the Sitespan will give a message, select a new modem / line.

Figure 2-4. Existing Subscriber Warning

5. Set the customers active by clicking in the circuit activation box (o). A x shows that the subscriber is in service.

6. Click OK to initiate the creation of the subscriber. The 'Network [Subscribers]' window shows the configuration details.

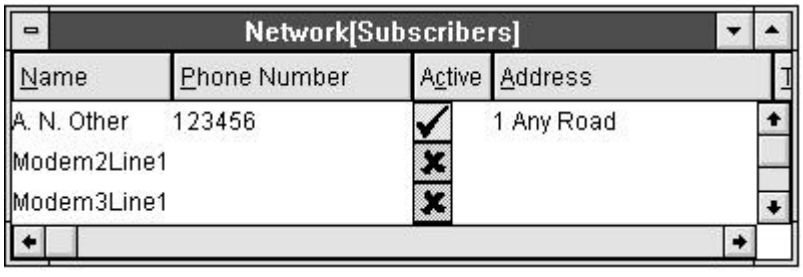


Figure 2-6. Created Subscriber

Precise details on configuration are to be found in the Sitespan Reference Document 605-0000-427.

STOP THIS PROCEDURE IS NOW COMPLETE

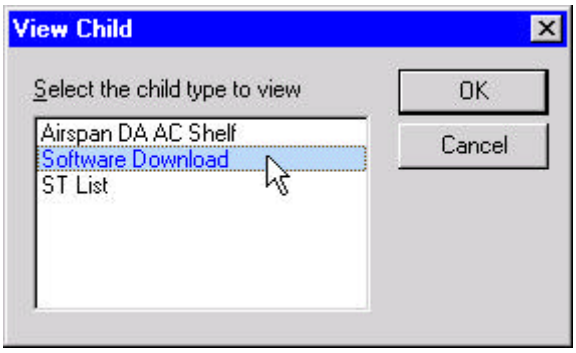
DOWNLOADING SOFTWARE

This DLP describes the procedure for downloading software from the server to the shelf controller. The Shelf controller holds two versions of software, current and other. When software is downloaded it is downloaded into other and then has to be switched to current. The shelf cards will not use the new software until they have been reset.

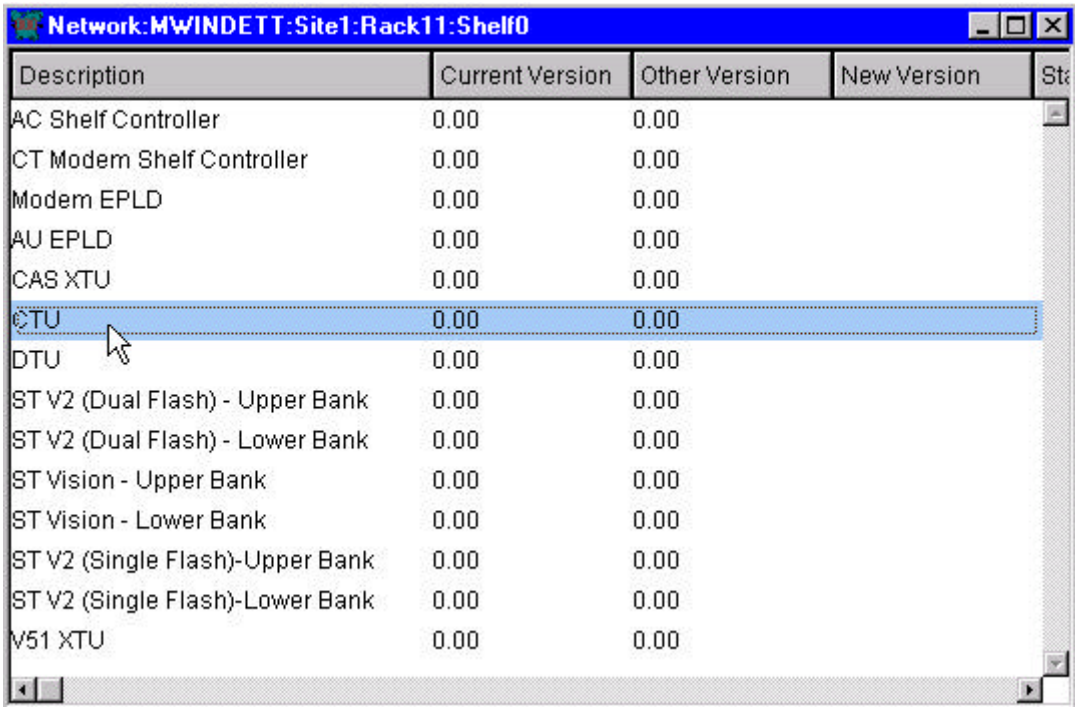
STEP **PROCEDURE**

Downloading to Shelf

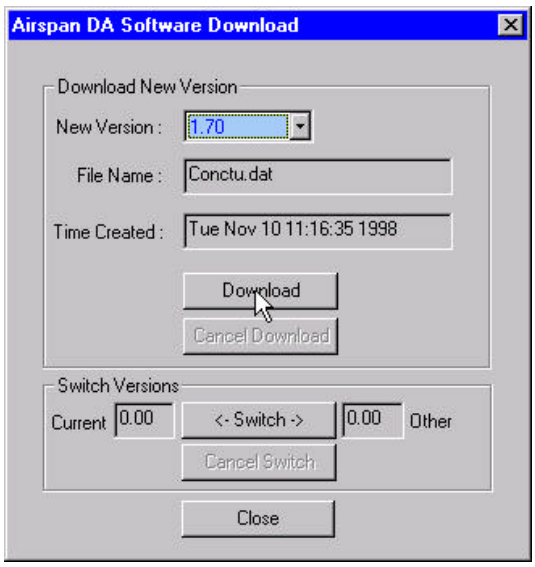
1. Display rack or shelf view, select *Update Server Files* from the *View* menu



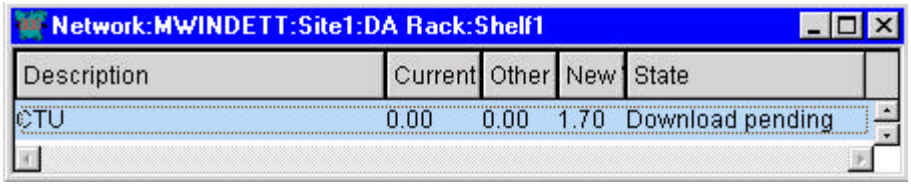
2. Highlight and double click software to download.



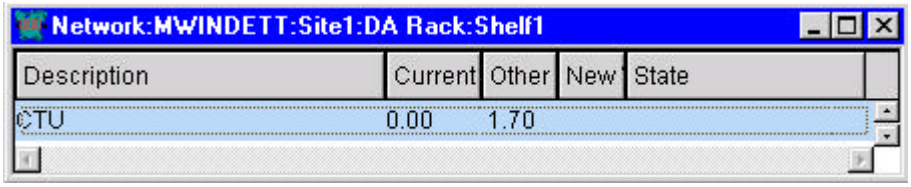
3. Click to download new version



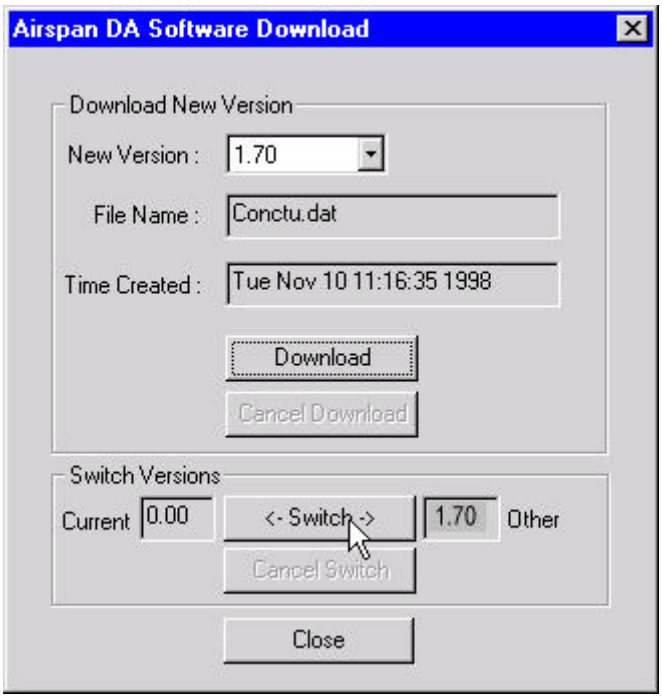
4. New version is downloaded to the Shelf Controller



5. When download is complete the window shows the new version installed as other.



6. To switch from current to other version highlight double click field to download and select <-*Switch*-> on *Software Download* window.



7. When the two versions are switched, reset the cards using the software to complete the software change.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

REPLACING A MODEM SHELF

Tools required

ITEM	DESCRIPTION	SIZE
04	Screwdriver	Pozidrive No 1 x 75mm
05	Screwdriver	Pozidrive No 2 x 199mm
06	Screwdriver	Pozidrive No 3 x 150mm
07	Screwdriver	Flat Blade 3mm x 100mm

STEP **PROCEDURE**


Observe full ESD precautions.

To replace a faulty Modem Shelf proceed as follows:

1. Removing the Shelf

a) Check the delivery of equipment and unpack following the procedures outlined in the CT I&C Manual
b) Remove the modem shelf front panel by disconnecting PL4
c) Remove the DC cable plug to the DC input socket PL6 and remove the crimped cable screen earth to the lug positioned alongside PL6. See Figure 1-4.
d) Remove the cards from the shelf and place on ESP mat or in ESP bags / containers
e) Remove the right hand side panel by unscrewing the six captive screws.
f) Remove the braided earth strap to the frame using a M4 screw and M4 nut as shown in Figure 1-4.
g) Remove ribbons to JP3 and JP4. See Figure 1-6
h) Remove the element manager connector from PL5.
i) Remove the 2Mbit/s IN (SK16 - BNC or PL7 - Type 43) and 2Mbit/s OUT (SK15 - BNC or PL8 - Type 43) connectors on the shelf interface connections located at the right hand side of each modem shelf. See Figure 1-8 and Figure 1-10.
j) Unscrew the four crosshead screws from the front of the modem shelf.
k) Remove modem shelf

2. Installing the Shelf

a) Unpack the new modem shelf and screw into position re-using the screws removed in 1.1 step 10.

Take care not to trap or damage any existing cables, cable forms or ribbons.

b) Connect the braided earth strap to the frame using a M4 screw and M4 nut as shown in Figure 1-4.

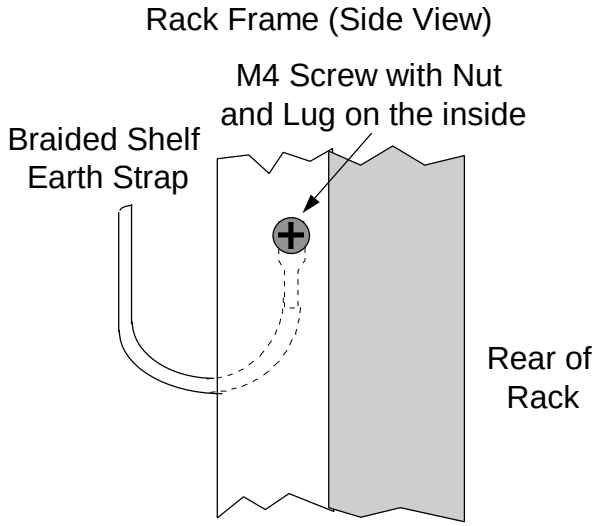


Figure 1-4. Shelf Earth Connection

c) Connect ribbons to JP3 and JP4. See Figure 1-8 and clip ribbons to the chassis as shown in Figure 1-6.

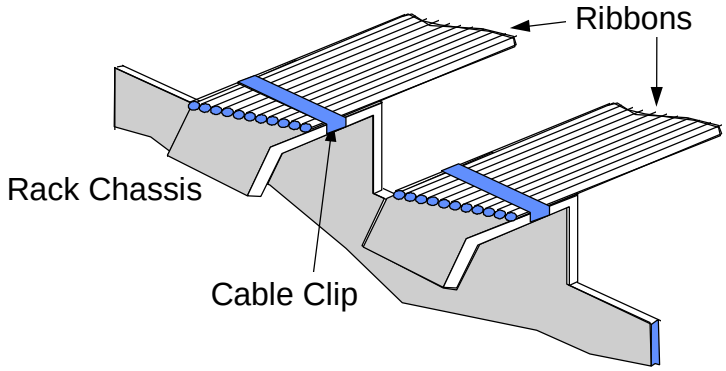


Figure 1-6. Securing Ribbon Cables

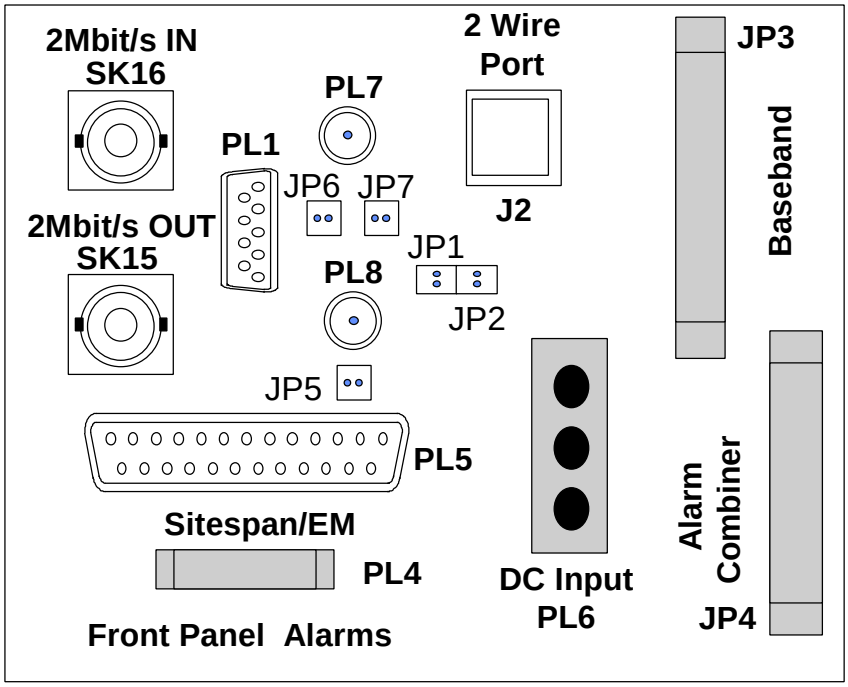


Figure 1-8. Shelf Interface Connections.

3. 2Mbit/s Cabling

a) Ensure that the 2Mbit/s grounding options are set. Default option is for JP5, JP6 and JP7 to be fitted with links.

b) Reconnect the 2Mbit/s OUT and IN to SK 15 & 16 respectively.

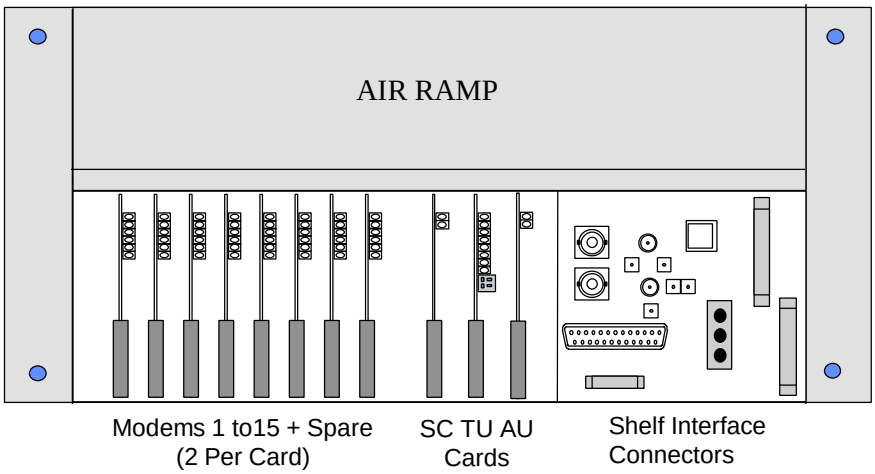


Figure 1-10. Modem Shelf

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

4. Set Shelf Identity
   a) Ensure that each shelf identity is set by the provision of links as shown in Table 2.

Shelf	JP1	JP2
1	On	On
2	Off	On
3	On	Off
4	Off	Off

Table 2. Shelf Identity Settings

5. Re-insert the cards into the shelf.
6. Connect DC cable plug to the DC input socket PL6 and connect the crimped cable screen earth to the lug positioned alongside PL6. See Figure 1-4. The shelf power cycles and sets itself into service.

STOP. THIS PROCEDURE HAS BEEN COMPLETED.

SECTION 8 EQUIPMENT RETURN FOR REPAIR

1. PACKING AND SHIPMENT

1.1. Circuit Board Assemblies

1.1.1. General

Circuit board assemblies must be individually boxed in ACC-approved shipping containers to properly protect them from static electricity damage.

1.1.2. Static Control Rules

ACC uses state-of-the-art semiconductors to obtain the fastest, most reliable operation. These new chips are more static sensitive than older Metal-Oxide Semiconductor (MOS) parts. Some of the new parts can be damaged by a static discharge as low as 250V. A person may generate enough static to damage a part and never feel the discharge. Proper procedures must be followed to control static.

1.1.3. Static Electricity Control

All sensitive Printed Circuit Boards (PCBs) must be handled at a static-safe work area. The minimum requirement is a workbench with a grounded work surface, a grounded floor mat, and a wrist strap. When a board is changed at the switch, a portable field service grounding kit must be used. Figure 1-1 shows the grounded workbench.

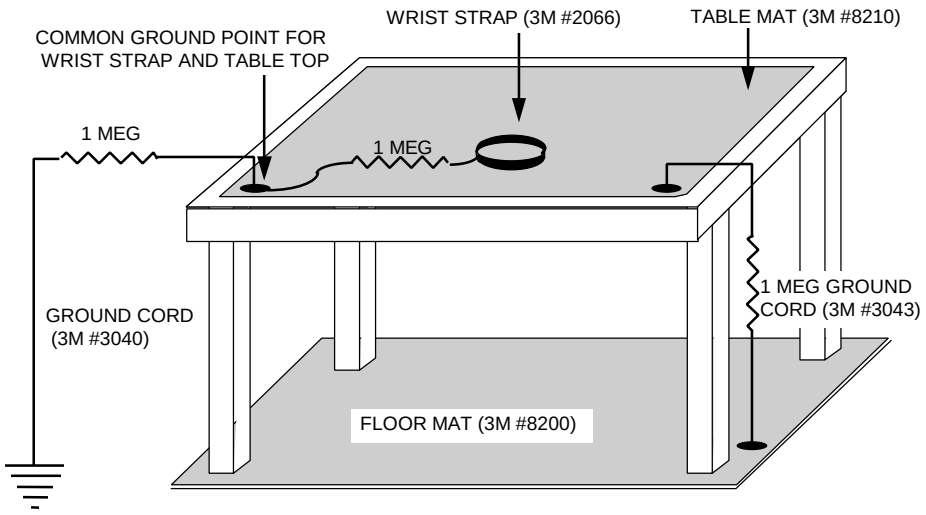


Figure 1-1. Printed Circuit Card Workstation

All boards must be transported in a static-shielding bag.

The following procedures reduce the possibility of static discharge damage:

- Wearing a wrist strap while handling PCBs.
- Attach the string of the ACC repair tag to the ejector/injector of the printed circuit board.
- Insert PCBs into approved static shielding bags with repair tags remaining outside the shielding bag. Do not insert repair tags into static shielding bags.
- Pack/unpack PCBs at a static-safe workbench.
- Transfer boards in a static-shielding bag or non-conductive board container.
- Properly ground storage shelves.
- Properly ground wrist straps worn by personnel while transferring boards to the storage shelves.

1.1.4. Shipping Boxes

Individually boxed boards must be placed into a larger packing case for shipment. Board boxes alone do not sufficiently protect against shipping damage.

WARNING: A box of boards must not contain other heavy items that could cause part damage.

Empty space in shipping cases must be filled with additional shipping boxes to prevent part movement and damage during handling.

1.2. Power Supplies And Peripherals

1.2.1. General

Each type of assembly must be shipped in its specifically designed packing box. Retain individual shipping containers for these items.
To prevent damage, all mechanical movable parts (such as disk heads and rotor) must be in the locked/secure position before handling/shipping.
All handling must be done only by handles and/or handholds so the equipment is not damaged.
All items must be accompanied by a completed ACC Repair Tag.

1.3. Shipment To ACC

1.3.1. General

Properly packed and documented parts must be returned to ACC. The sender is responsible for shipping costs and for tracking the shipment through timely receipt in an undamaged condition at ACC. Faulty or damaged items must be reported to ACC for return instructions at the address given in Material Return and Repair Procedure (605-0000-435) or:

TELEPHONE: +44 (0) 1527 402800

FAX: +44 (0) 1527 550956

E-Mail: support@airspan.com

1.4. Damaged Shipment

1.4.1. General

When a shipment is received with visible damage to the container, the receiving party shall document the damage and report it to the ACC Repair and Return Centre.
If concealed damage is found after acceptance of the shipment, the receiving party shall document the damage or non-functionality of the assembly and report it to the ACC Repair and Return Centre. Upon notice of such damage, ACC contacts the freight company to dispatch an agent to inspect the damaged shipment. The inspection report is sent to ACC, and the proper claim forms are initiated.

ACC Repair Tag

A tag is to be completed at the time of the failure and physically attached to the faulty unit. This tag will remain attached to the unit until it has been repaired and tested. The tag should have written on it to aid identification the following:

Customer Name
MRR Number
Product Number and description
Fault Symptom

3. Defective Equipment Information Form

Every returned item must be accompanied by a Defective Equipment Information Form. A blank form is provided in this DLP. Please photocopy and send with returned item

4. Material Return and Replacement Form

The Material Return & Replacement Form will be completed by Airspan Communications Limited and sent with the replacement units.

DEFECTIVE EQUIPMENT INFORMATION FORM

MRR Number (provided by ACL)	
Card/Assembly Description	
Part Number and Revision(if applicable)	
Serial Number	
Date Commissioned	
Date Fault Reported	
Location of Assembly in CT Rack	
Shelf	
Location of Subscriber Terminal	

SUBSCRIBER TERMINAL INFORMATION

Power Supply Type (e.g. Type I, II or IV)	
Rx AGC Voltage	
Tx PC Voltage	
ST Programming Code	
Description of Fault	
Comm Port OK?	
Line Voltage OK Line 1?	
Line Voltage OK Line 2?	

CENTRAL TERMINAL INFORMATION

Card Type	
Modem (Number)	
TU	
Analogue card	
RF Card	
Other (Specify Type)	
Description of Fault	
Sitespan Information	

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SECTION 9: GLOSSARY OF TERMS

9: Glossary of Terms

1. Glossary of Terms

1.1. Definitions

AS4000	Trade name for ACC digital radio system
NSE State	Functional State /Administrative State (e.g. In Service).
NSE Status	Equipment Status (e.g. Alarm.)
Rack	Frame for holding multiple electronic shelves, stacked vertically.
Shelf	Frame for holding multiple electronic cards, stacked horizontally.
System	A conglomeration of sub-systems that together provide a service.
Unit	A uniquely identifiable physical module.
V.24	ITU 25 pin D-type interface
X.25	ITU packet switching protocol
2Mbit/s	2.048 Mega bits per second network interface. Divided into 32 x 64 kbit/s channels and used to support a variety of network communication protocols, depending on the switch involved.

1.2. Acronyms

The following acronyms are used in this document:

AIS	Alarm Indication Signal
ALM	Alarm
BER	Bit Error Ratio
CDMA	Code Division Multiple Access
CH	Channel
Comms	Communications
CRU	Customer Radio Unit
Ctrl	Control
DC	Direct Current
DIP	Diplexer
DN	Directory Number
DP	Distribution Point
DRS	Digital Radio System
EM	Element Manager/ AS8100 (Sitespan)
ENP	Equipment Not Present
FA	Frame Alignment
FRU	Field Replaceable Unit
I/P	Input
IS	In Service
LED	Light Emitting Diode
LNA	Low Noise Amplifier

MON	Monitor
NSE	Network Sub Element
PA	Power Amplifier
PAD	Packet Assembler/ Disassembler
PSU	Power Supply Unit
RF	Radio Frequency
RFA	Radio Frequency Analogue
RIF	Radio Interface
CT	Central Terminal
ST	Subscriber terminal
Rx	Receive
SC	Shelf Controller
SMF	Shelf Management Function
SP	Spare
Subscriber	The customer of the network operator
TU	Tributary Unit
Tx	Transmit

SECTION 10: INDEX AND TABLES

Index and tables

1. Figures and Tables

Tables Chapter/ Page

SECTION 11: DOCUMENTATION

1. Documentation

1.1. History

Issue	Date	Author	Issue Details
Dr 1.0	28/8/96	M. Windett	Initial Release derived from WD005-9800-001 Draft 1.0 Joe Yeung
Dr.1.1	31/10/96	M. Windett	Updates to all sections
1.0	21/11/96	M. Windett	Update
1.1	15/1/97	M. Windett	Addition to section 2,3,4 &8
1.2	30/7/97	M. Windett	Update and revision
1.3	19/7/98	M. Windett	Update and structure revision
1.4	28/8/98	M. Windett	Update and New Logo and product naming DLP017 added. Old DLP017 moved to DLP 027
1.5	25/11/98	M. Windett	Update DLP15RX gain using LCU
1.6	2-2-99	M Windett	Update for ST Mon J and code download

Table 2. Revision History

1.2. Related Documentation

605-0000-430	System Overview
605-0000-432	Central Terminal - Installation & Commissioning
605-0000-433	Central Terminal - Antenna/Feeder Installation & Commissioning
605-0000-434	Subscriber Terminal - Installation & Commissioning
605-0000-437	D128 Terminal Converter
605-0000-435	Material Return and Repair
605-0000-427	Sitespan 2.5

1.3. User Response Form

Mail: ACC Limited
Cambridge House
Oxford Road
Uxbridge
Middlesex
UB8 1UN

Fax: (44) 0178-488-2028

Document Rating	Excellent	Good	Average	Below Average	Poor
Accuracy / Completeness	q	q	q	q	q
Clarity / Organisation	q	q	q	q	q
Figures	q	q	q	q	q
Table of contents/index	q	q	q	q	q

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

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

Please Complete the following for acknowledgement/response:

Name: ..... Address .....
Company ....
Job Title ....
Department ....
Telephone ....

Thank you for your co-operation and assistance.

APPENDIX 1 CENTRAL TERMINAL RACK GUIDE

1. Overview

This Appendix is designed to be associated with the CT Rack as an aid to locating components and alarms for the faulting technician.
The Central Terminal (CT) has a number of maintenance-related aids that are integrated with the rack equipment and which provide local access to and information related to that equipment.
All Field Replaceable Units (FRU's), with the exception of the Analogue and RF cards in the CT rack can be plugged into the rack without removing input power. ("Hot Plugging"), however users will be disrupted if the unit is involved in the transport of that call. If the Analogue and RF cards are replaced the shelf will need to be power cycled in order to initialise the card.

2. LED Visual Indicators

Visual indicators, in the form of light emitting diodes (LED's) mounted on certain equipment items, show the status of that item.
Each of the following modules within the CT equipment rack has an **AMBER** LED to indicate that the unit is operating correctly and a **RED** LED to indicate that the unit is faulty. (The red indication is illuminated only when the module in question has failed. It is not illuminated when the unit is non-operational for other reasons, for example a fault with a different FRU which prevents normal operation on the system):

- All PSU Modules
- CT Modem Cards
- RF Cards
- Shelf Controllers
- RF PA Modules
- Analogue Cards

In addition to these specific module and card status indications, a number of **RED** LED's are illuminated on the appropriate FRU whenever the following fault conditions are detected:-

- Radio link failure
- Low RF output power at Combiner
- Rx link faulty on TU (Rx AIS - fault outside the AS4000 system)
- 2Mbit/s link failure
- Loss of communication with management system

Each of the Modem Cards has 2 **AMBER** LED's that are illuminated whenever the telephony channel between NTU and TU is open for subscriber traffic.

3. System Layouts And Diagrams

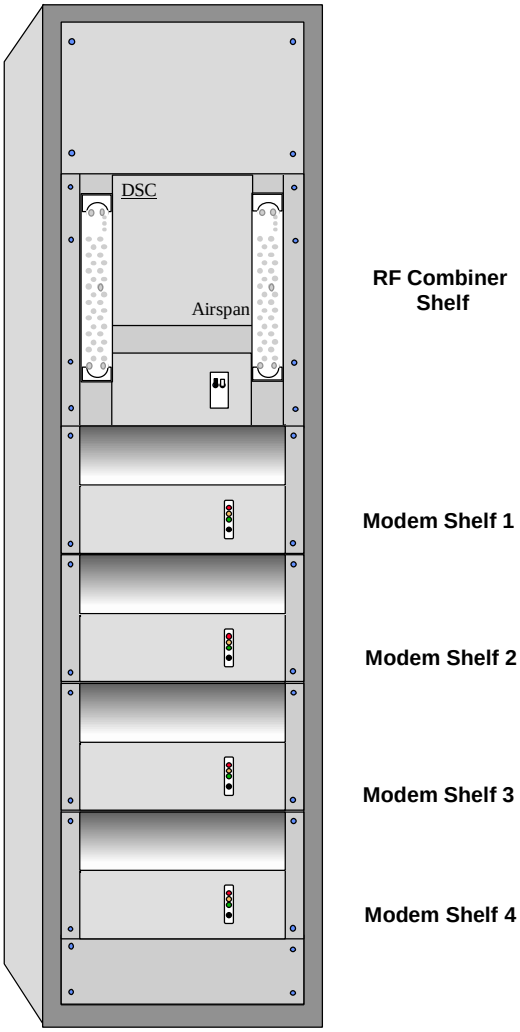


Figure 3-1. AS4000 CT Rack

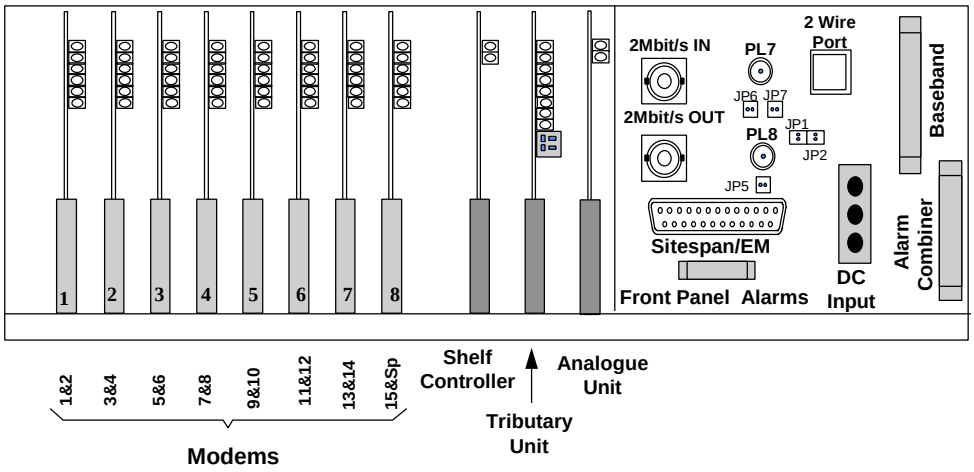


Figure 3-2. Detailed View of AS4000 CT Modem Shelf

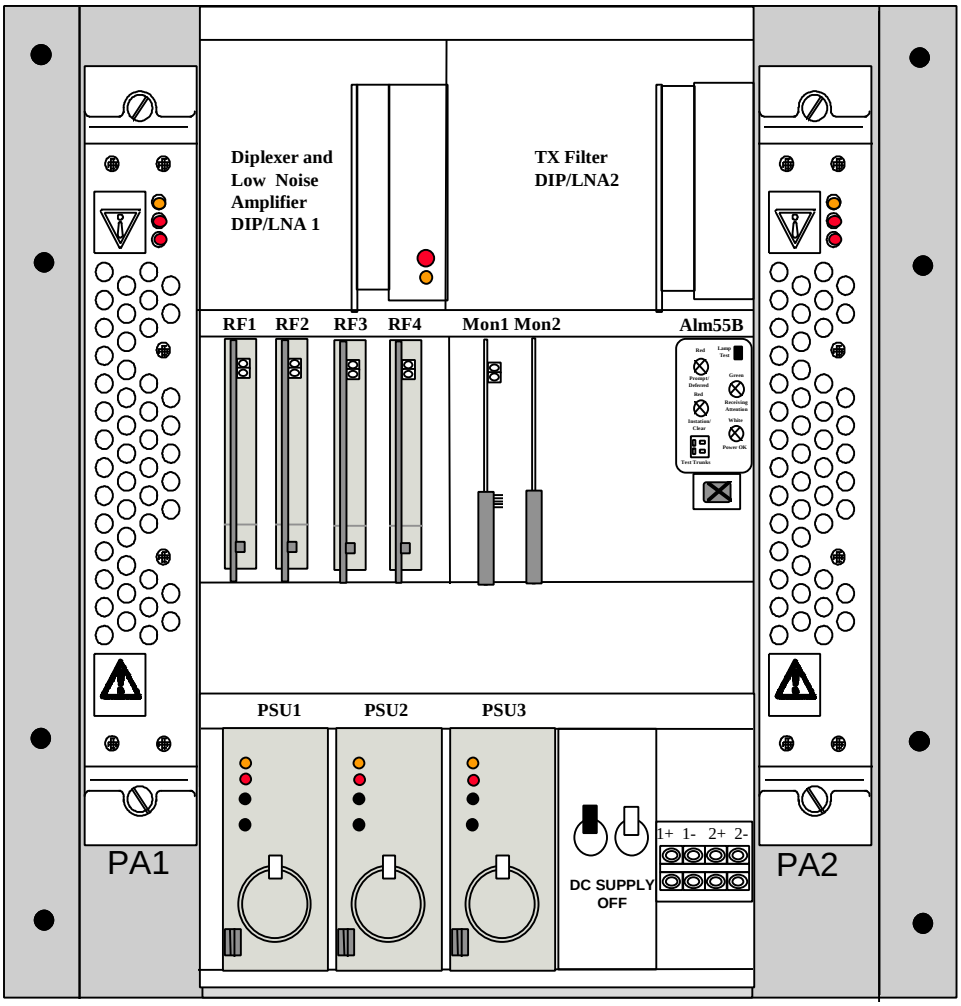


Figure 3-4. Detailed View of AS4000 CT Combiner Shelf

Figure 3-6 shows the location of the LED's on the RF combiner shelf cards.

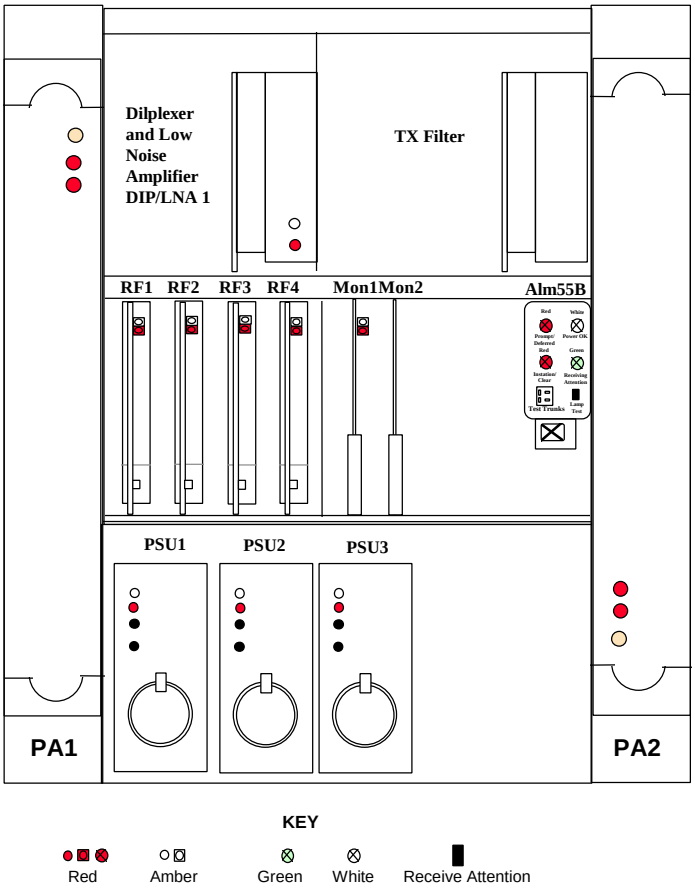


Figure 3-6. RF Combiner Shelf - LED Layout

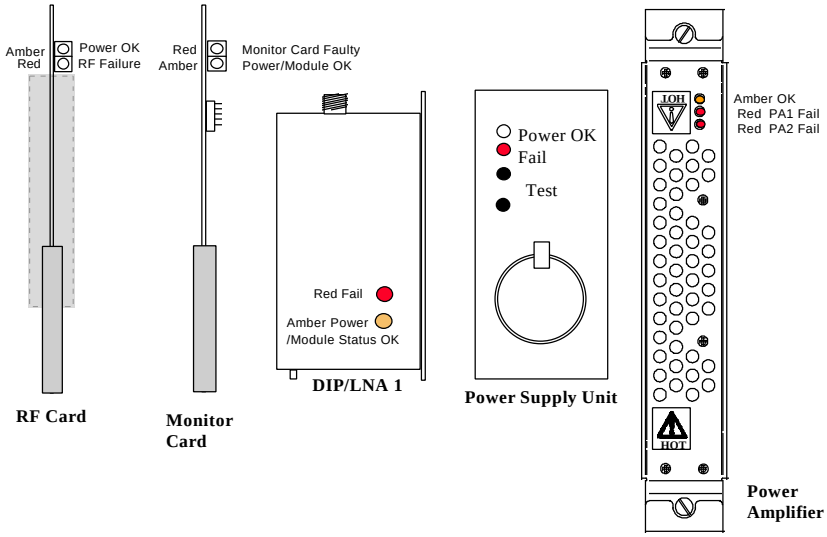


Figure 3-8. Combiner Shelf Alarms

Table 2 gives a detailed description of the LED indications

LED	Indication	Description
Low Noise Amplifier		
Amber	Power OK	Indicates power OK
Red	Fail	Indicates output overloaded, or temperature limit exceeded, or power failure
Monitor Card 1		
Amber	Power OK	Indicates power OK
Red	FRU Fail	RF Combiner Shelf Power Amplifier fault, or Combiner Shelf PSU 1–3 fault
RF Card		
Amber	Power OK	Indicates power OK
Red	Fail	Power supply unit out of limits
PSU		
Amber	Power OK	Indicates power OK
Red	Fail	PSU output fail
Power Amplifier		
Amber	Power OK	
Red	Amplifier 1 Fail	
Red	Amplifier 2 Fail	
Note PA 2 is inserted inverted into the combining shelf and the alarm indications will be bottom to top.		

Table 2. LED Indications - RF Combiner Shelf

3.1.1. Power Amplifiers

PA 2 is inserted inverted into the combining shelf. The alarm LEDs are at the bottom of the PA and the alarm indications will be bottom to top (see Figure 3-6).

3.1.2. PSU

An Amber LED on the front panel of the PSU (see Figure 6.3) indicates that the PSU is working satisfactorily.

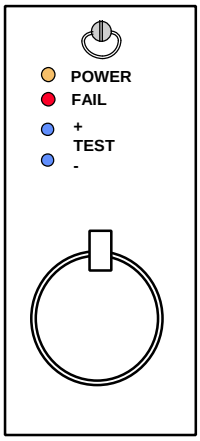


Figure 3-10. Power Supply Unit Front Panel

Test points are provided on each PSU front panel to allow the following parameter to be measured as a DC level (see Figure 3-10).

Output voltage of each PSU (nominally 13.5V).

3.2. Modem Shelf Alarms

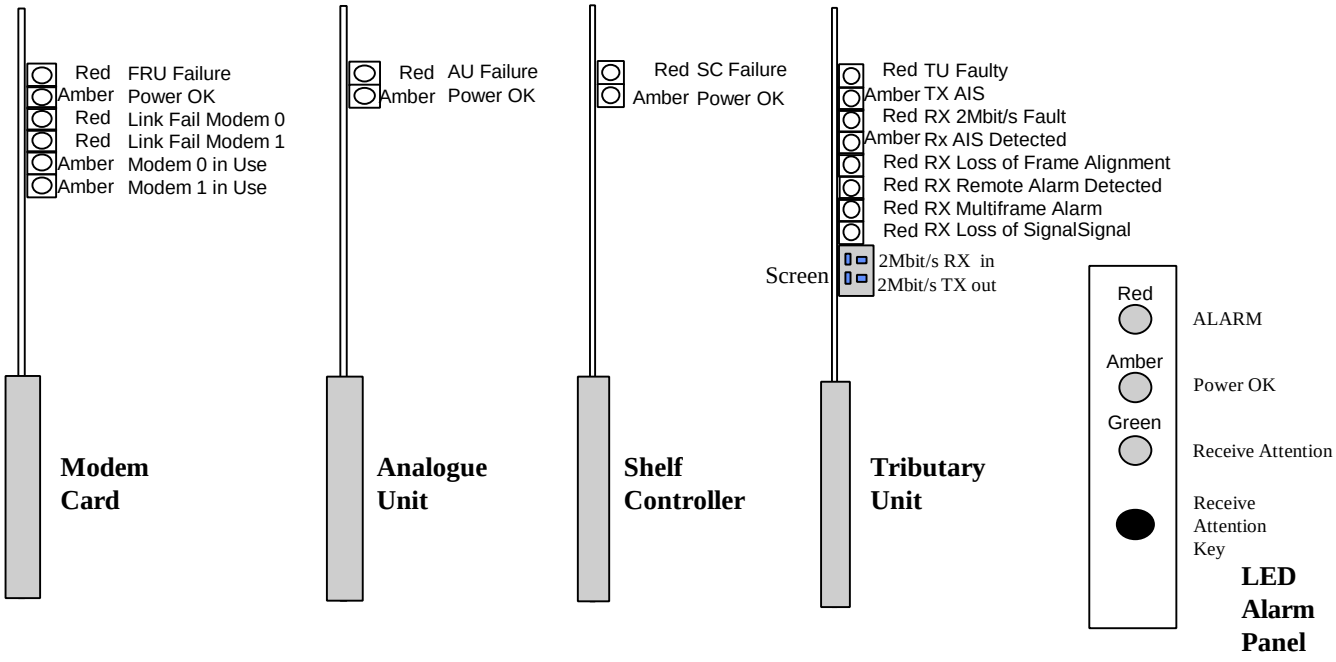


Figure 3-12. Modem Shelf Alarm Indications

The tables on the following pages give detailed descriptions of the LED indications.

Analogue Card		
Red	FRU fail	On-board PSU failure, or RF Module failure (on configuration), or Module in wrong slot
Amber	Power OK	Indicates on-board PSU OK

Table 2. LED Indications - Analogue Card

Modem Cards (Mod 1&2 to Mod 15&SP)		
Red	FRU fail	Fault on modem card
Amber	Power OK	Indicates on-board PSU OK
Red	Link fail	Radio failure (modem 0) loss of frame alignment.
Red	Link fail	Radio failure (modem 1) loss of frame alignment
Amber	Modem 0 in use	Call in progress
Amber	Modem 1 in use	Call in progress
Note: all LEDs will be illuminated for 2 s during module boot-up		

Table 4. LED Indications - Modem Card

TU Card		
Red	FRU Fail	Fault on TU module
Amber	Status	
Red	2 Mbit/s input fail	Unable to detect incoming 2 Mbit/s due to cable or signal fault
Amber	Rx AIS	AIS detected. Indicates fault in other interconnecting systems
Red	Loss of Frame alignment	Loss of frame alignment (from 2 Mbit/s stream)
Red	Remote alarm	Remote alarm detected from far end 2Mbit/s equipment
Red	Multi frame alarm	Unable to detect incoming multi frame
Red	Loss of signal	No input to AS4000
Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the TU Status LED will flash until the co-processor initialisation is complete.		

Table 6. LED Indications - TU Card

SC Card		
LED	**Indication**	**Description**
Red	FRU fail	Self-test fault, card failure or loss of comms
Amber	Power OK	Indicated on-board PSU is OK
Note: All LEDs will be illuminated for 2 s during module boot-up. After successful boot-up, the Fail LED will flash until the co-processor initialisation is complete		

Table 8. LED Indications - SC Card

LED/Alarm Panel		
Red	Fault	Indicates fail indication somewhere on rack
Amber	OK	Indicates power OK
Green	Receive attention	Receiving attention (receive attention key operated)

Table 10. LED Indications - LED Alarm Panel Card

Additional information regarding the functions of the LEDs and the receive attention key are as follows:

Red LED	**Amber LED**	**Green LED**	**Receive Attention Key**	**Comments**
Off	On	Off	–	Power OK and no other faults.
On On On	Off On Off	Off Off Off	– Operated –	PSU Fault PSU fault unable to rec attn. due to safety reasons
On Off	On On	Off Off	– –	Indicates fault Fault ceased before rec attn key operated
On Off Off	On On On	Off On Off	– Operated Fault Fixed	Fault other than PSU fault Rx attention key on panel No fault state
On Off On Off	On On On On	Off On On Off	– Operated –	Fault other than PSU fault. Rx attention key pressed Second fault has occurred while the first fault is being attended. When all faults have been cleared

Table 3-12. LED/Alarm Panel Card - LED Combinations

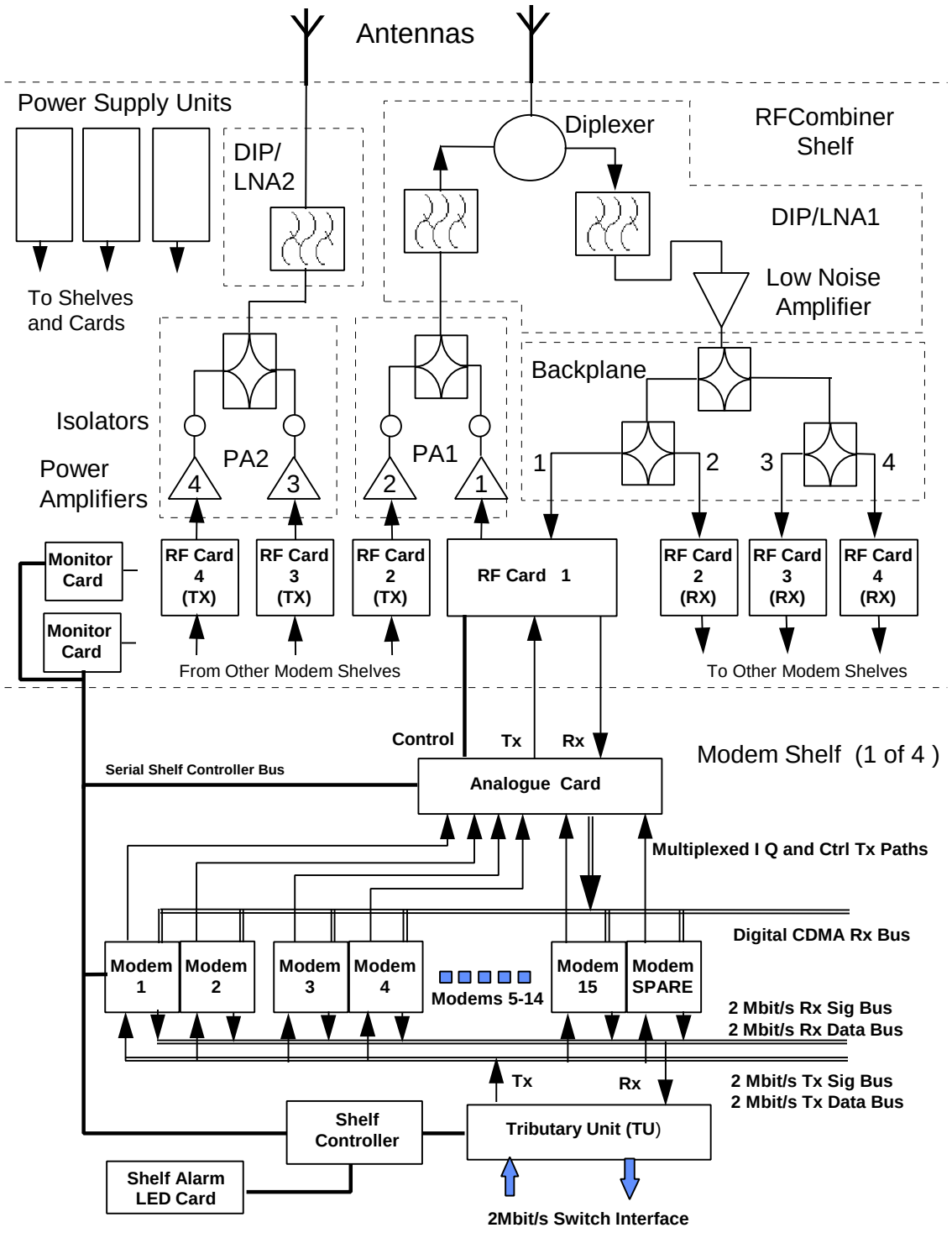
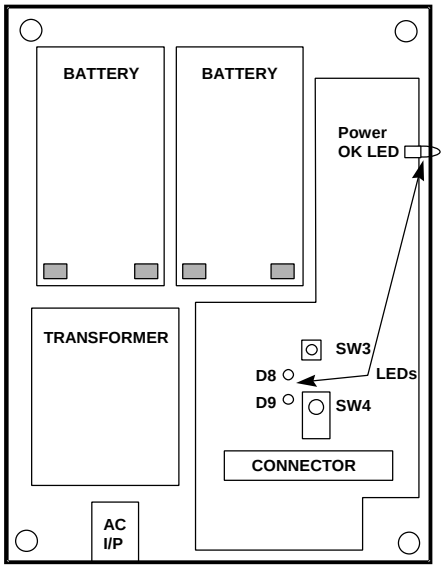


Figure 3-14. AS4000 CT Block Diagram



AC Power Supply Unit
SW4 (S1) Reset Switch
SW3 (S2) Programming Switch
D8 (S3) Initialising and Self Test
D9 (S4) Initialised OK
References in brackets refer to numbering on early versions of the PSU

Figure 3-16. AS4000 ST ACPSU

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