



# **AS4000**

# **Wireless Local Loop System**

## **Survey Tool**

AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## Safety Instructions - Warnings and Cautions

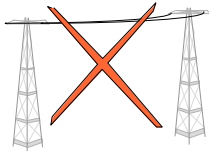


### SAFETY

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



2. Hard hats should be worn at all times whilst using the survey tool.



3. Do not use survey tool under power cables.



4. Use manual Handling techniques and procedures when lifting and moving equipment.



5. Do not use the survey tool in high winds

6. Beware of overhanging eaves when raising the survey tool

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

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AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## User Response Form

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<b>Document Rating</b>	Excellent	Good	Average	Below Average	Poor
Accuracy / Completeness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clarity / Organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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The nature of this response is      Addition     Deletion     Correction

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

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Thank you for your co-operation and assistance.

AS4000 Survey Tool	<b>Preface</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>ICL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## ISSUE CONTROL LIST

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<b>Title</b>	<b>Issue</b>	<b>Date</b>	<b>Issue Details</b>
Title Page	1.4	December 1998	Update
ICL-001	1.4	December 1998	Update
IXL-001	1.4	December 1998	Update
TAD-001	1.4	December 1998	
TAD-002	1.4	December 1998	
TAD-003	1.4	December 1998	
TAD-003	1.4	December 1998	
DLP-001	1.4	December 1998	
DLP-002	1.4	December 1998	
DLP-003	1.4	December 1998	Update
DLP-004	1.4	December 1998	
DLP-005	1.4	December 1998	
DLP-006	1.4	December 1998	
Appendix A	1.4	December 1998	Update
Appendix B	1.4	December 1998	
Appendix C	1.4	December 1998	
Appendix D	1.4	December 1998	

AS4000 Survey Tool	<b>ICL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

CHANGE TYPE/DATE	PURPOSE	SECTIONS AFFECTED
<b>Issue #, Month Year</b>		
Dr 1.1 February 98	Update	TAD-002, DLPs-001, 004, 005, 006, Appendix A, Appendix B
Dr 1.2 April 1998	New Mast Design	TAD-002, DLPs-001, 004, 005, 006
1.2. July 1998	Update to Mast design and Test Box design	All
1.3 August 1998	Update	Appendix E added. Logo changed
1.4 December 1998	New Test Box Design	DLP-002, Appendix E
1.5 April 1999	CRU Programming Changes	DLP-003. Appendix F added.



AS4000 Survey Tool	<b>IXL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## INDEX TASK LIST

**Preface:**

**Safety Instructions Warnings and Cautions**

User Response Form

**ACCESS: ICL, IXL**

**Issue Control List** .....ICL-001

**Index Task List** .....IXL-001

**TASK ANALYSIS: TAD**

**Introduction**..... TAD-001

**1. Introduction**..... 1

1.1. Purpose Of Document..... 1

1.2. Scope of Document..... 1

**2 Safety**..... 1

**3. Related Documentation** ..... 2

**AS4000 Survey Tool** ..... TAD-002

**1. Introduction** ..... 1

**2. Equipment Needed** ..... 1

**3. Preparation at Central Terminal (RLT)**..... 2

**4. Testing Process**..... 2

**Specifications** ..... TAD-003

**1. Mast Specifications** ..... 1

**2. Tripod Stand**..... 1

**Preparatory Tasks** ..... TAD-004

**DETAIL LEVEL PROCEDURES: DLP**

**Erecting the Telescopic Mast** .....DLP-001

**1. Preparing the tripod base**..... 1

**2. Attaching the Headload and Telescopic Mast** ..... 3

**3. Raising the mast**..... 6

**Guying the mast** ..... 7

**Repositioning the mast** ..... 7

**Test Box Set Up Procedure** .....DLP-002

**Programming the CRU** .....DLP-003

**1. CRU Programming**..... 1

**Panning the CRU** .....DLP-004

**1. CRU Characterisation**..... 1

**3. AGC Voltage Recording**..... 1

**4. Power Control Recording**..... 2

**CRU Panning**..... 2

**Survey Test Result** .....DLP-005

All CRUs..... 2

**Dismantling Survey Tool** .....DLP-006

**Survey Tool Maintenance** .....Appendix A

AS4000 Survey Tool	<b>IXL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

<b>1. Charging Batteries.....</b>	<b>1</b>
<b>2. Changing Batteries .....</b>	<b>1</b>
<b>3. Equipment Return.....</b>	<b>2</b>
<b>Sample Survey Test Result .....</b>	<b>Appendix B</b>
All CRUs.....	2
<b>Angle Template .....</b>	<b>Appendix C</b>
<b>Survey Tool Information .....</b>	<b>Appendix D</b>
<b>Survey Checklist .....</b>	<b>Appendix E</b>
<b>RF Programming Codes .....</b>	<b>Appendix F</b>

### List of Figures

<b>FIGURES</b>	<b>PAGE</b>
Figure 1. Related Documentation .....	2
TAD-004	
Figure 2. CRU Positioning .....	2
DLP-001	
Figure 3 Folded Mast Base .....	1
Figure 4. Locking the Legs.....	2
Figure 5. Setting-Up The Feet .....	2
Figure 6. Tripod Base Erected.....	3
Figure 7. Headload CRU .....	3
Figure 8. Securing The Mast To The Base.....	4
Figure 9. CRU Mounted On Mast.....	5
Figure 10. Mast Showing Two Sections Extended.....	6
Figure 11. Survey Test Box.....	1
Figure 12. CRU Programming Information.....	1
DLP-004	
Figure 13. Label Detail: Receive AGC .....	1
Figure 14. Label Detail: Transmit Power Control .....	2
DLP-006	
Figure 15. Mast and Tripod .....	1
Figure 16 Folded Mast Base .....	2
Appendix A	
Figure 17. Charger .....	1
Figure 18. Internal View of the Test Box.....	2

AS4000 Survey Tool	<b>IXL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## Abbreviations

AGC	Automatic Gain Control
CRU	Customer Radio Unit
CT	Central Terminal (RLT)
DC	Direct Current
DN	Directory Number
DVM	Digital Voltmeter
LED	Light Emitting Diode
N/A	Not Applicable
NTU	Network Termination Unit
PC	Power Control
PSU	Power Supply Unit
RF	Radio Frequency
RLT	Radio Link Terminal
RNU	Radio Network Unit
Rx	Receive
Subscriber	Customer
ST	Subscriber Terminal (RNU)
Tx	Transmit
VF	Voice Frequency
1pC	One per Customer

AS4000 Survey Tool	<b>IXL-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>TAD-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## INTRODUCTION AND SAFETY

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### **1. 1. Introduction**

#### **1.1 1.1. Purpose Of Document**

This document is used to provide the reader with user instructions for the use of the AS4000 Survey Equipment.

#### **1.2 1.2. Scope of Document**

This document gives a brief description of the set up and operation of the AS4000 Survey Tool when used for planning the location of a CRU at the Subscriber Terminal.

### **2. 2. Safety**

1. Safety helmets should be worn when within 10 metres of the telescopic mast

AS4000 Survey Tool	<b>TAD-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

**3. 3. Related Documentation**

<b>New Document Number</b>	<b>Old Document Number</b>	<b>Title</b>
605-0000-430	152-031-100	System Overview
605-0000-431	156-031-800	System Operations and Maintenance Manual
605-0000-435	156-035-600	Material Return and Repair
605-0000-436	157-036-200	Subscriber Terminal Installation & Commissioning

**Figure 1. Related Documentation**





AS4000 Survey Tool	<b>TAD-002</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## AS4000 SURVEY TOOL.

### 4. 1. Introduction

The survey tool provides for the efficient planning of CRU location at the Subscriber Terminal (RNU). It may also be used as a tool for surveying the signal coverage area of a given Central Terminal (RLT) e.g. along existing pole routes. It consists of a telescopic mast attached to a tripod base, CRU, Drop Cable, and a Test Box. The mast is erected as near to a probable CRU location as possible and is raised to the mounting height of the CRU. The CRU is panned to assess the signal strength at that location. The test box gives a readout of the values of AGC and Power Control readings that can be related to the levels recorded on the CRU calibration label. Details of the position, height, and panning angle can then be recorded for use by the installer.

### 5. 2. Equipment Needed

Lightweight Telescopic Mast	Clark S QT 9M/HP
Tripod Base	Clark P/N 11341
CRU mounted on Headload Pole	ST-V2
Guy Ropes	
Drop Cable	25 metre 6 Pair
Test Box	Airspan
Measuring Tape (Snap lock clip for this is attached to the back of the CRU)	10 Metres minimum preferably cloth
Compass	Orienteering Compass
Detailed map showing location of Central Terminal (RLT)	
Sprit Level	
Test Telephone	MF Telephone
Velcro Ties	
Rubber Gloves	
Adjustable Spanner	
Angle template (See Appendix C)	
Hard Hats	
17mm Spanner	

#### Optional

GPS Receiver	
Polaroid camera	
Footpads for Mast feet when tripod placed on soft ground	Board 25cm Square
Spare 'Long' leg for the tripod	Not yet available future development.
Cordon Tape	

AS4000 Survey Tool	<b>TAD-002</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

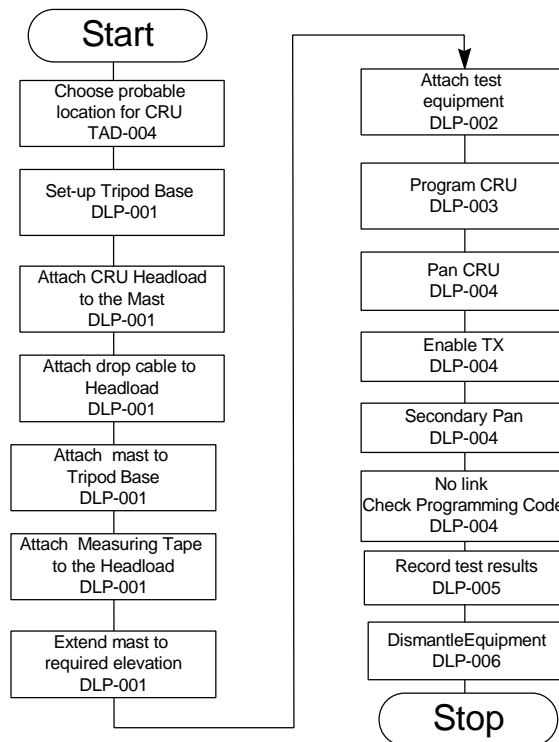
Traffic cones	
Weather Protection Tent	

## 6. Preparation at Central Terminal (RLT)

1. Before using the survey tool ensure that the Central Terminal is functional. See CT I&C manual 605-0000-432.
2. A modem should be set in service. Note the RF Frequency and modem number as these details will be needed when programming the CRU. For details on steps required to place modem in service see CT I&C manual 605-0000-432.

## 7. 4. Testing Process

The chart below details the stages of the testing process.





AS4000 Survey Tool	<b>TAD-003</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## SPECIFICATIONS

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### 8. 1. Mast Specifications

Extended Height	8.7 metres (without headload)
Retracted Height	1.96 metres (without headload)
Bottom Section	76.2mm
Top Section	44.5mm
No of Sections	6
Max. Headload Recommended	10 kg
Weight of Mast	12.2 kg
Maximum Safe Wind Speed Unguyed (1000sq cm Headload Side Area)	24km/h
Maximum Safe Wind Speed guyed (1000sq cm Headload Side Area)	70km/h
Time to Retract Mast	25secs

### 9. 2. Tripod Stand

Extended Base Diameter	2 metres
Weight	26.5kg

AS4000 Survey Tool	<b>TAD-003</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>TAD-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## PREPARATON AT CT

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### 1. Pre-requisites

#### 1.1 AS4000 FA Voice Shelves

There are no prerequisites for FA voice Shelves

Notes:

- 1) Free choice of RW codes (1-15) for testing. (RW15 recommended as reserved code for survey work).
- 2) Network access to the 64kbits/s loopback for BER testing has to be arranged to support link BER testing (see Figures 1, 2, and 3 ). Airspan recommend the use of RW15 as the designated survey channel so that time slot access and switch port mappings can be pre defined. For RW15 the loopback channel will be on TS31 of the PCM stream from the Modem Shelf towards the switch.
- 3) Normal Sitespan test options are available to select test loops on both 64kbit/s channels back towards the network if required. –This is done by reserving the channel on TU, select the required loopback mode and applying the loopback.

#### 1.2 AS4000 FA ISDN Shelves

There are no prerequisites for FA ISDN Shelves

Notes

- 1) Free choice of RW codes (1-15) for testing. (RW15 recommended as reserved code for survey work).
- 2) Network access to the 64kbits/s loopback for BER testing has to be arranged to support link BER testing (see Figures 1, 2, and 3 ). Airspan recommend the use of RW15 as the designated survey channel so that time slot access and switch port mappings can be pre defined. For RW15 the loopback channel will be on TS31 of the PCM stream from the Modem Shelf towards the switch.

AS4000 Survey Tool	<b>TAD-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

### 1.3 AS4000 FA Data Shelves

#### **CT Modem Card:**

To operate the Survey Tool on a data shelf a change of one modem card per FA modem shelf is required from part no. 303-0039-900 to part no. 303-0039-903.

Airspan recommend that RW15 is always used for surveying and that modem card 8 is replaced.

#### **Shelf Controller Card:**

To accompany the change of Modem Card the Shelf Controller Firmware should be checked and upgraded if necessary to bring the Shelf Controller to 303-004-903 Rev D.

Firmware for testing.	Flash	U21	696-3000-272D
		U19	696-3000-273D
		U15	696-3000-272D
		U12	696-3000-273D
	H8	U20	696-3000-072F

Replacing Modem 8 also enables the FA Level Control Unit to function on this shelf (actually operating on RW16). To prevent false automatic switch over to RW16 the modem sparing function should be disabled via the Shelf Controller LAT port at the time of installation.

#### Notes:

- 1) The Survey Tool should function correctly with either a 303-0041-905 TU card or a 303-0004-915 TU card in the Data Modem Shelf.

AS4000 Survey Tool	<b>TAD-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>TAD-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## CRU SITE SELECTION

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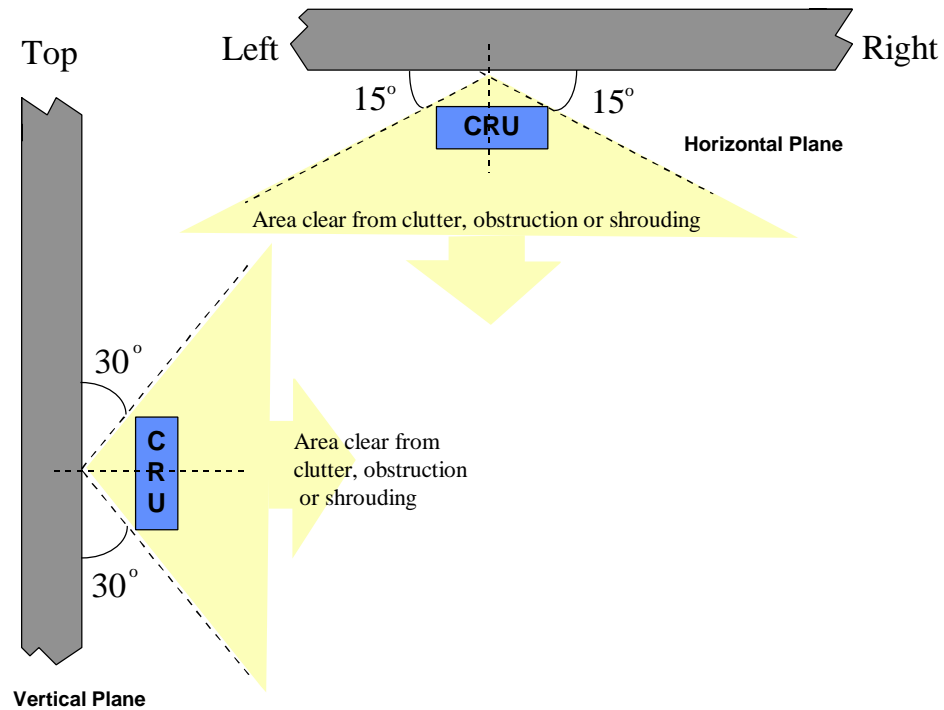
1. The following factors should be taken into account to determine the installation position for the CRU:
  - a) The CRU should be installed as high as possible on the wall facing in the direction of the CT. Mounting height should normally be 5-7 metres above ground level.
  - b) Inspect the suitability of the wall structure for the installation position of the CRU mounting.

Typical acceptable structures are:-

    - Secure brick walls
    - Concrete cladding covering Building Blocks
    - Metal / Wooden pole, with suitable bracket.
  - d) For efficient and reliable service it is suggested that the external mounting location of the CRU be chosen such that once 'panned' for optimum signal level it observes the following criteria:-
    - Avoid aligning the CRU directly toward an obstruction within a distance of 15 metres from the CRU installation point.
    - Avoid obstructions such as adjacent walls or overhanging roof eaves, within 15° in the horizontal plane (see figure 1) and 30° in the vertical plane (see figure 2).
    - Ensure adequate clearance is allowed for 'panning' the CRU.
    - The CRU is capable of being 'panned' with at least 15° of adjustment either side of the direction of the CT Antenna.
    - Note: Trees exceeding a distance of 50 metres from the CRU are considered to have a minimum impact to the units performance.
2. In circumstances when these criteria above cannot be met. e.g. the panned angle violates the criteria set out above then it is recommended to mount the CRU on a pole located near to the property. The maximum length of drop cable is 80 metres and the distance from the dwelling to the pole should not exceed 40 metres. The survey tool should be used to locate a suitable position for the pole.



AS4000 Survey Tool	<b>TAD-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



**Figure 2. CRU Positioning**

3. Check how the drop cable is to enter the dwelling and confirm with the customer the following:-

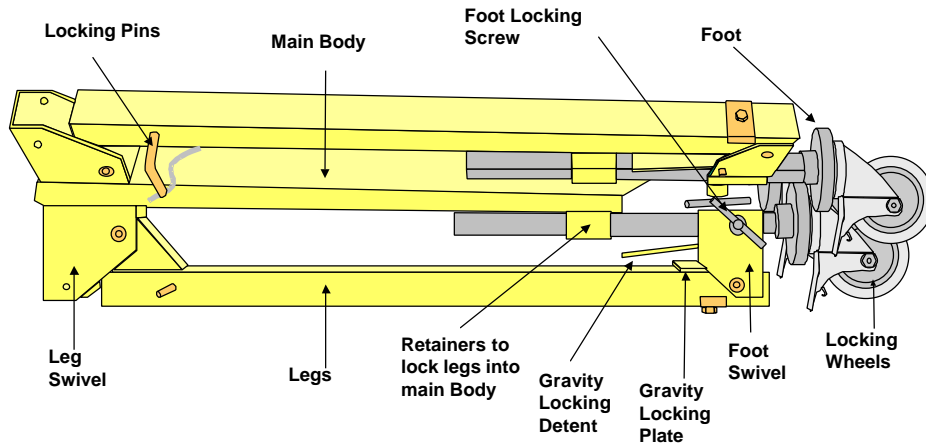
- Suitability of the CRU position.
- Entry point of the Drop Cable to the site.

## ERECTING THE TRIPOD STAND AND TELESCOPIC MAST

When using the Tripod Mast adequate safety precautions should be taken to ensure the safe use of the mast. These include the use of cordon tape and cones to restrict access to the survey area.

### 2. 1. Preparing the tripod base

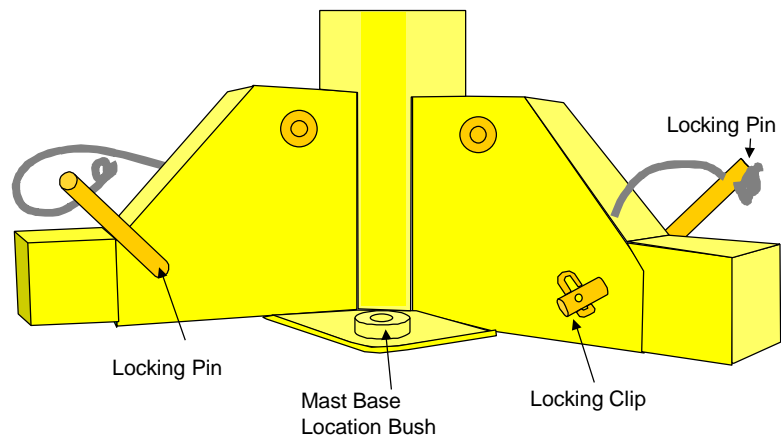
1. Check that all items of equipment as listed in TAD-002 are available.
2. Using map identify the location and bearing from the ST location to the Central Terminal serving the area. Identify most probable position for mounting CRU. Position the telescopic mast as near to that location as possible. If the tripod cannot be positioned at the selected location the tripod should be erected in line with the radio path in front of the location. More than 10 metres in front of the location will reduce the reliability of the results.
3. Ensure that the feet are fully engaged in the main body of the mast and safely retained.



**Figure 3 Folded Mast Base**

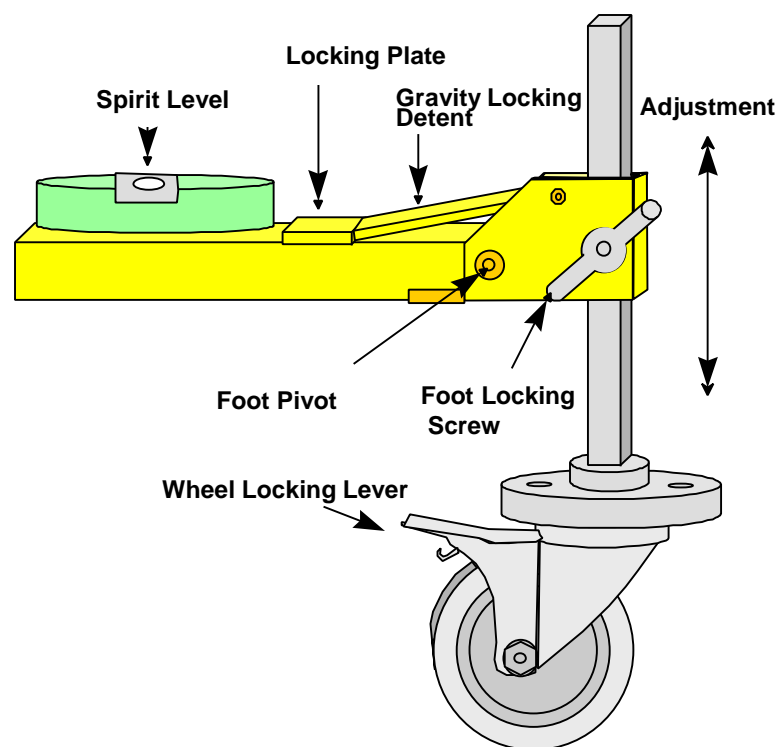
4. Carry the tripod base to the proposed location.
5. Turn foot locking screws anti-clockwise to release feet. Pull feet clear of the retainers to release the legs. See Figure 3.
6. Withdraw the locking pins and swivel the legs into position, Use the locking pins to lock the legs into the leg swivels. Twist the locking clip at right angles to the pin to prevent the pin falling out. It may be necessary on soft ground to provide a board to give extra support to the tripod wheels.

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



**Figure 4. Locking the Legs**

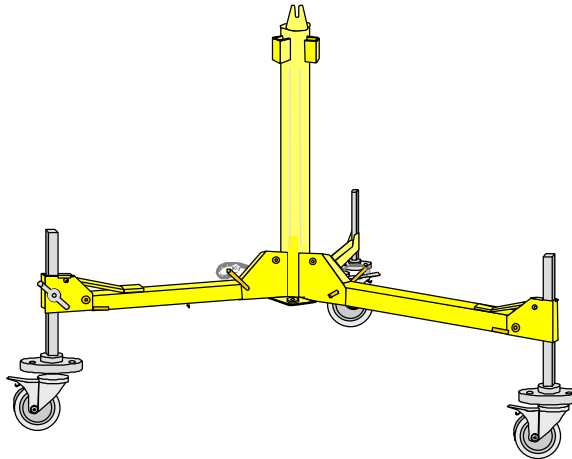
7. Twist the feet into position ensuring that the gravity locking detent is latched behind the locking plate. See Figure 5.
8. Adjust the leg for level using a spirit level. The leg is adjusted by loosening the foot locking screw and raising or lowering the feet until the leg is level. Secure the foot by fully tightening the foot locking screw. Each leg should be adjusted to ensure that the tripod is stable and should be checked again for level before continuing with the mast attachment.



**Figure 5. Setting-Up The Feet**

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

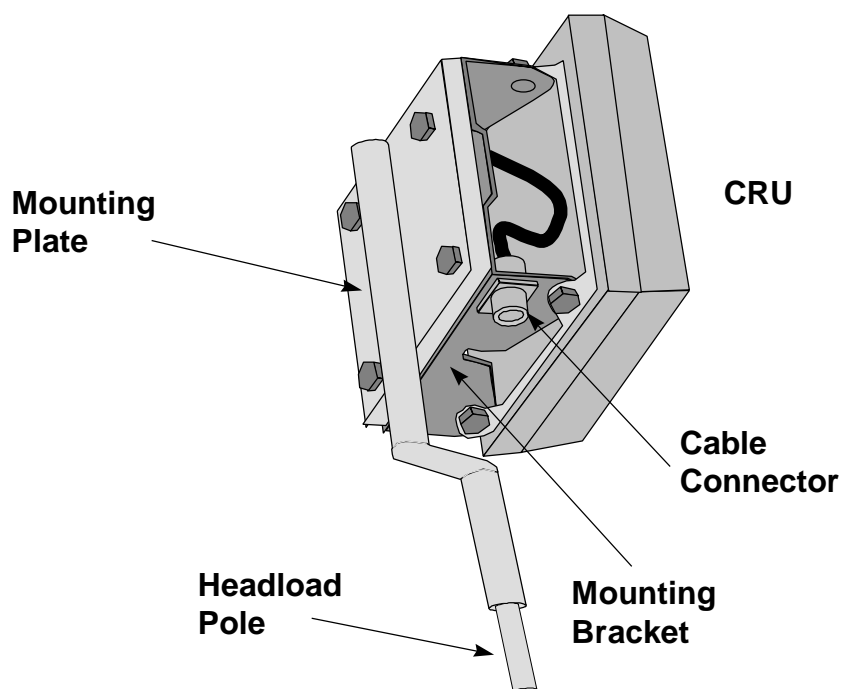
9. Manoeuvre the tripod to the survey location. Lock the wheels by pressing the wheel locking levers firmly down until they lock into position.



**Figure 6. Tripod Base Erected**

### **3. 2. Attaching the Headload and Telescopic Mast**

1. The CRU is ready mounted on a headload pole. See Figure 7.

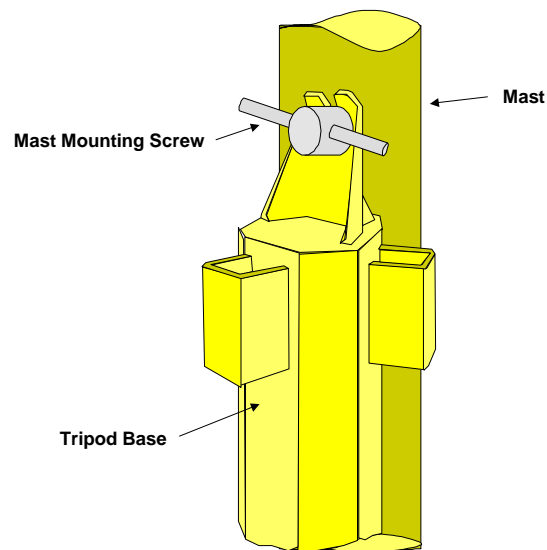


**Figure 7. Headload CRU**

2. Connect the drop cable to the connector mounted on the underside of the CRU mounting Bracket. Care should be taken to ensure that the connector locates correctly. Lock the connector by twisting clockwise.

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

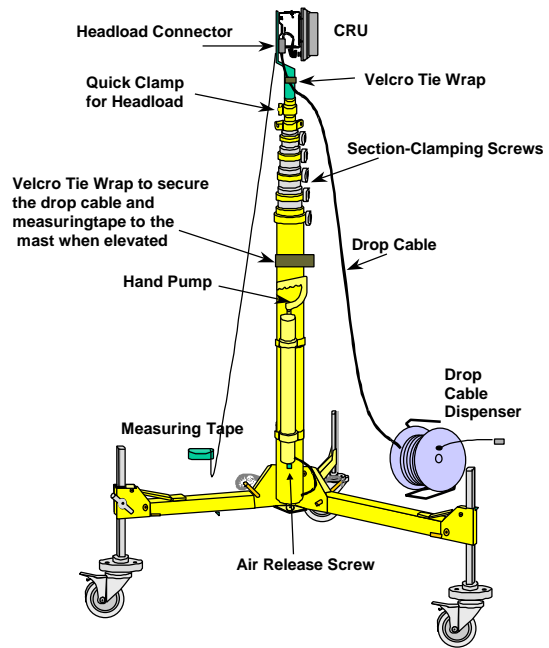
3. Attach the free end of a measuring tape using the clip attached to the CRU mounting to the bracket.
4. Place the pole in the top section of the mast and tighten the pole using the quick clamp.
5. Place the pin at the base of the mast into the bush on the base. Secure the mast to the base using the mast mounting screw as shown in Figure 8.



**Figure 8. Securing The Mast To The Base.**

6. Secure the drop cable and measuring tape with Velcro ties to the CRU mounting bracket. See Figure 9.
7. Attach the guy ropes to the guy collar if:
  - a) it is anticipated that the mast is to be left in situ for some time
  - b) ground stability is suspect
  - c) there are high winds

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

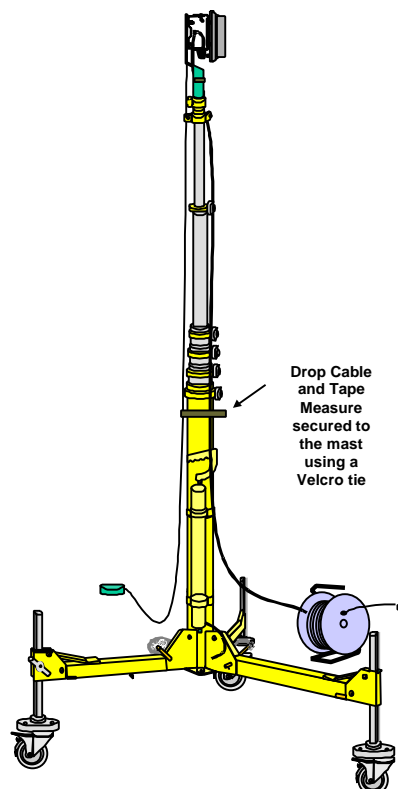


**Figure 9. CRU Mounted On Mast**

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

#### 4. 3. Raising the mast

1. When raising the mast, ensure hard hats are worn and keep a careful watch on the CRU as it is being raised, ensure that it will not knock any windows, or hit the roof. Beware of overhead cables. The extending sections of the mast are greased and rubber gloves should be worn when extending or manipulating sections of the mast.
2. Ensure that the air release screw is closed. See Figure 9.
3. Before raising the top section of the mast lock all sections by turning the section clamping screws clockwise.
4. Using the hand pump raise the top section of the mast. When the section is fully extended secure the section by tightening the section clamping screw.
5. Release the clamping screw on the next section of the mast. Raise the section using the hand pump. Secure the section by tightening the section clamping screws and continue this process until the CRU reaches the pre-determined height Use rules outlined in TAD-004. Secure all clamping screws.



**Figure 10. Mast Showing Two Sections Extended**

AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## **5. Guying the mast**

If guy ropes have been attached to the mast in windy conditions (gusting or winds in excess of 24km/hr.) then secure the guys to stakes or other suitable fixing points. (e.g. poles)

## **6. Repositioning the mast**

1. If the mast needs to be repositioned at anytime it will need to be fully retracted before moving.
2. Proceed to Test Box Set Up Procedure DLP-002.

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**



AS4000 Survey Tool	<b>DLP-001</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>DLP-002</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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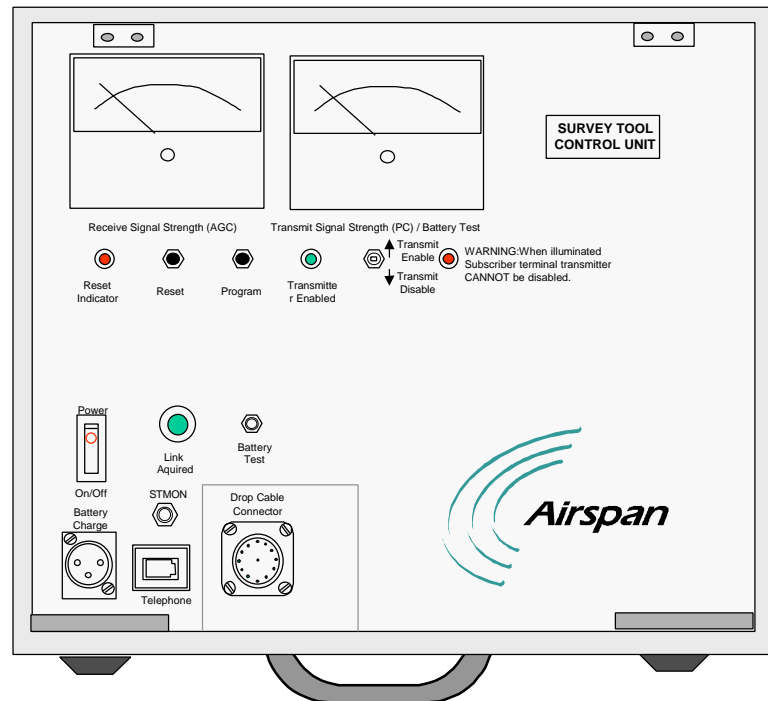
## TEST BOX SET UP PROCEDURE

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The test box is designed with a splash proof cover but is not designed to be waterproof. In rainy conditions it should be afforded improved weather protection.

---

1. The test box contains two rechargeable batteries sufficient for approximately 3 hours use. Power (24V DC) may also be supplied through the battery charge sockets at the side of the unit.



**Figure 11. Survey Test Box**

2. Ensure that the Power is switched off and the TX switch is set to **TX Disabled**.
3. Once the mast has been elevated to the required height additional cable maybe payed off the spool if a location to one side is more appropriate for the test box. The maximum cable length is 25metres.
4. Typically the test box is operated lying flat between two of the tripod legs so that it can be easily seen when panning the CRU.
5. Connect the drop cable to the socket at the side of the test box ensuring that the plug is oriented correctly in the socket.

AS4000 Survey Tool	<b>DLP-002</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

6. Connect a Test Telephone to socket labelled Phone A. (the socket labelled Phone B is not enabled).
4. Program the CRU as detailed in DLP-003.

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**



AS4000 Survey Tool	<b>DLP-003</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## PROGRAMMING THE CRU

The CRU should be programmed prior to using the survey tool.

STEP	PROCEDURE
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### 7. 1. CRU Programming

1. Switch on the power at the test box.
2. Ensure Indicator A is not illuminated. If Indicator A is illuminated the Test Box is connected to an unmodified CRU and the TX output will not be disabled when the TX disable switch is operated.
3. Connect an MF or LD type telephone to the socket labelled Phone A.
4. Each CRU is initialised by entering a unique code. These codes are entered using the telephone and should be allocated by the RF planning office, or a programming code may be set up as shown in Figure 12.

**Figure 12. CRU Programming Information**

RF	PN	RW	Identity	Check N <sup>o</sup> .	Remote site location
2	1	2	6	1 digit	
digits	digit	digits	digits		
0	8	2	1 4	000000	4
					CRU1

RF is the frequency (in the example above frequency = 8)  
 PN is the PN code (in the example above = 2 )  
 RW code is the user number (in the example above =14)  
 Identity can be set to 000000 (\* may also be entered in place of the identity)  
 The check digit is the units column sum of all the digits minus one in this example 8+2+1+4=15 therefore the units column contains the figure 5 subtract 1 = 4  
 Therefore the check digit is 4.

See appendix F for further details of RF codes and CRU programming

5. Ensure the TX switch is set to TX disabled.
6. Switching on initiates the reset sequence. The red reset LED flashes to indicate the CRU initialising and self test sequence. Note if the red LED glows permanently then there is no connection to the CRU, check all connections.
7. After approximately 10 sec, the CRU initialising and self test sequence will be complete and the Reset LED will be extinguished. The Link Acquired LED will not yet illuminate.

AS4000 Survey Tool	<b>DLP-003</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

8. Depress the Programming Button. Lift the telephone handset off-hook and wait for the 2-3 sec continuous “programming start” tone of 1400 Hz, to be heard in the handset receiver.
9. Enter the respective CRU programming code on the telephone keypad, within 40 seconds of depressing the install switch.
10. 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 300ms on, and 300ms off, for a duration of 5 sec.
11. 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.
12. If the CRU fails to accept the programming code after a second attempt, confirm with the network planning staff that the correct code is being used.
13. Should the CRU still fail to accept the code, Check the battery voltage by depressing the battery test voltage, this shall give a meter deflection of 1 volt or greater indicating a battery terminal voltage of 20 volts or greater
14. Replace the telephone handset. The CRU will reset and re-boot itself in accordance with the programming code entered. The red reset LED flashes during the reboot.
15. Proceed to DLP-004 for details on panning the CRU.

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**



AS4000 Survey Tool	<b>DLP-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## PANNING THE CRU

---

The following procedure will have to be completed before placing the AS4000 system into service. All results must be entered on the Survey Test Result form, see DLP-005.

---

STEP	PROCEDURE
------	-----------

---

### 1. CRU Characterisation

The 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.

### 2. AGC Voltage Recording

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.

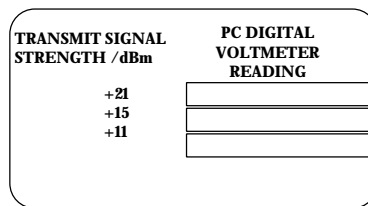
RECEIVE SIGNAL STRENGTH / dBm	AGC DIGITAL VOLTMETER READING
-98	<input type="text"/>
-92	<input type="text"/>
-88	<input type="text"/>

Figure 13. Label Detail: Receive AGC

AS4000 Survey Tool	<b>DLP-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

### 3. Power Control Recording

1. The voltage measured is a relative indication of the transmit power level: The lower the voltage the higher the output power level. This is only valid when the link LED is lit - only possible with TX enabled.
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.



**Figure 14. Label Detail: Transmit Power Control**

### 4. CRU Panning

1. Ensure that the steps outlined in DLP-003 are completed before commencing this DLP.
2. Observe the AGC meter on the test box and read the DC voltage on the meter. The voltage measured is a relative indication of the received signal strength; The lower the voltage the weaker the RX signal, and vice versa. If no link double check that the programming code is the correct one and that it has been entered correctly
3. Whilst observing the voltage on the meter, pan the CRU through the peak point, then pan back to it. The CRU is panned by releasing the section clamping screw from the lowest extending section of the mast and twisting the extended sections by hand through the panning range. Rubber gloves should be worn when rotating mast to avoid contact with the mast lubricating grease. When the optimum position has been reached the section should be locked using the section clamping screw.
4. If the AGC value indicates less than 10dB fade margin (from the values shown on the testhead CRU), then another position must be found.  
If AGC value indicates greater than 10dB fade margin switch on the transmitter by setting the TX Switch to the TX enabled position. Note: The CRU will automatically reset and begin the link acquisition process.
5. After approximately 30 seconds the AGC meter should return to the same value as prior to switching on the transmitter. Within 5mins (typically 1.5mins ) the Link LED lights up to show that a link has been acquired.
6. Record The AGC and PC voltages and estimate the angle between CRU and wall it is to be mounted on. The assessment of angle may be assisted by the use of the Angle Template described in Appendix C.

AS4000 Survey Tool	<b>DLP-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

7. If the PC value indicates a fade margin of less than 10dB. Use a second pan to accurately find the maximum for both AGC and PC. Pan slowly and limit the panning to approximately  $\pm 15^\circ$  from the initial position to prevent losing the link. If the link drops restore to an approximate maximum and repeat the panning process. Record the AGC and PV values again if different from first pan. and estimate the angle between CRU and wall it is to be mounted on.
8. If the link fails to acquire check the fade margins (see below). If the signal strength is insufficient for the CRU to acquire check that the panning angle does not violate the site selection criteria set out in TAD-004. If the criteria are violated another position needs to be found to mount the CRU.

## 5. BER Testing

1. Network Access to the 64kbit/s loopback for BER testing has to be arranged to support link BER testing (see Figures 1, 2, and 3). The looped timeslot is TS31 when using RW15 ( on modem card 8).

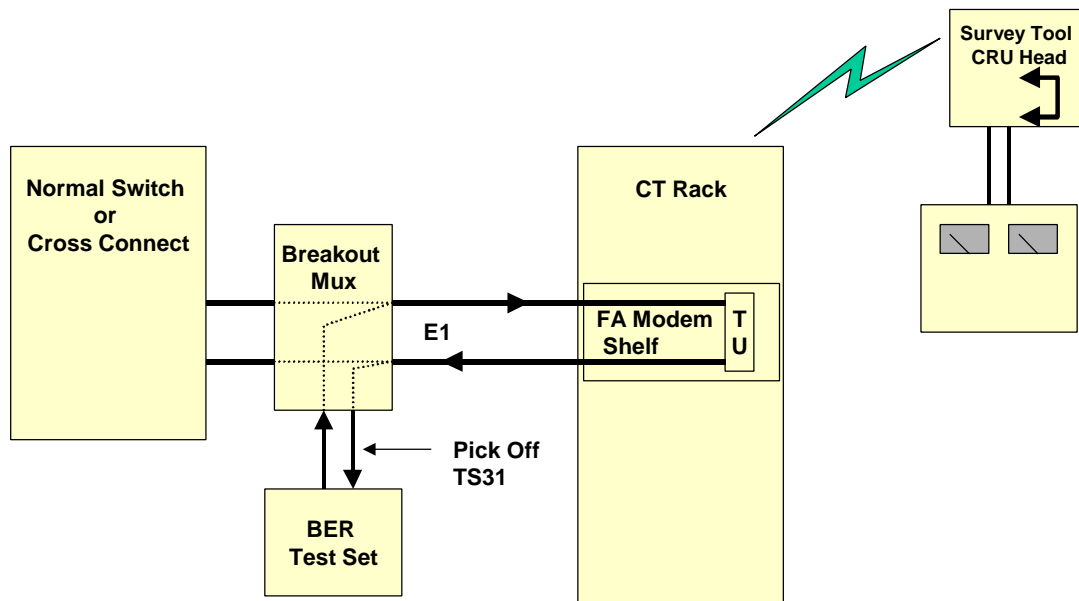
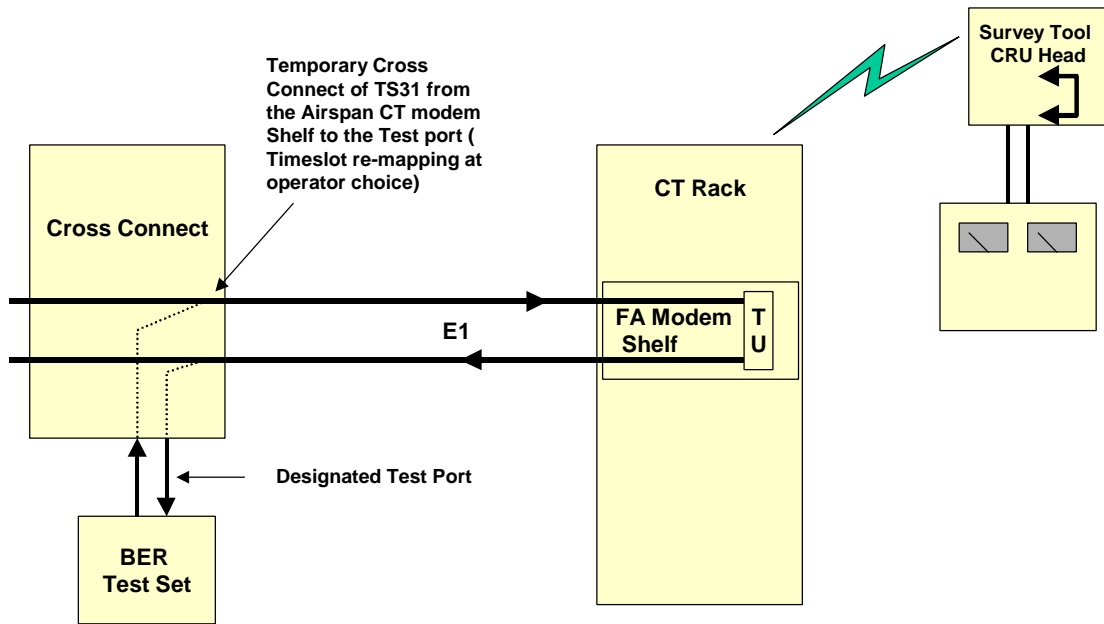


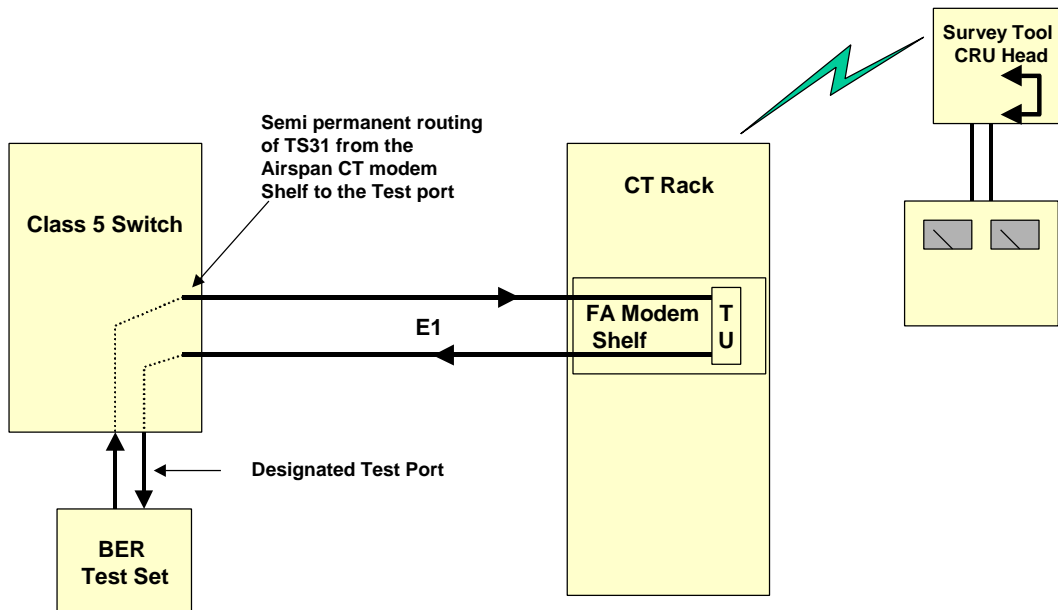
Figure 15. BER testing using a Breakout Mux



AS4000 Survey Tool	<b>DLP-004</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



**Figure 16 BER testing using a Cross Connect**



**Figure 17. BER testing using a Class 5 Switch**

9. Turn off the transmitter by switching the TX power to **Disable**.
10. Switch off the test box to preserve battery as soon as the readings have been recorded.
11. Proceed to DLP-006.

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**



AS4000 Survey Tool	<b>DLP-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## SURVEY TEST RESULT

This Survey Test Result sheet should be photocopied to provide a result s sheet for each location Surveyed

Location of RLT ..... Map Grid References.....  
 RLAddress .....  
 .....  
 .....

Location of RNU ..... Map Grid References.....  
 RNU Address .....  
 .....  
 .....

RNU Programming code (12 digits) .....

AGC Volts .....  
 RX Fade Margin (determined from characterisation label.). tick if greater than 10dB

PC Volts.....  
 TX Fade Margin (determined from characterisation label.). tick if greater than 10dB

Good/bad to install

Wall / Pole Mount (delete as required)

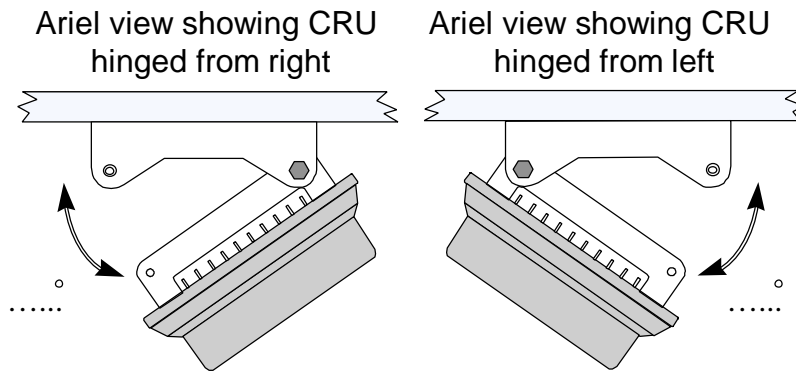
CRU height from ground .....metres

Serial Number of the Test Head CRU used for this survey measurement  
 (see Appendix D)

AS4000 Survey Tool	<b>DLP-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

**Wall Mount Only**

Record the estimated angle between the CRU and wall (as seen from above the CRU) on the diagram below strike out the hinge option that does not apply.



Left or Right hinge should be chosen to facilitate panning in the direction of the CT Antenna

**Polemount Only**

Record CT bearing and position of pole

**5.1 All CRUs**

Description of CRU Mounting Position:

Site Plan

The Site Plan should include outline plan of the building/pole position, bearing for RL T, position for CRU and reference to North

AS4000 Survey Tool	<b>DLP-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

Site View

Attach Polaroid photograph marked with position of CRU

AS4000 Survey Tool	<b>DLP-005</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

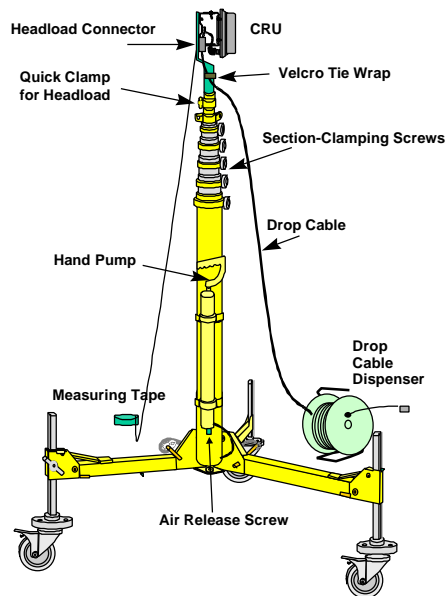
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AS4000 Survey Tool	<b>DLP-006</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

## DISMANTLING SURVEY TOOL

1. When the survey is complete and results have been recorded dismantle the equipment as follows:
2. Ensure TX switch is in the **disable** position.
3. Ensure Test Box is switched off.
4. Disconnect the test telephone from the test box.
5. Disconnect the test box from the drop cable. Secure the free end of the cable to the retaining clips so that the spool is free to rotate.

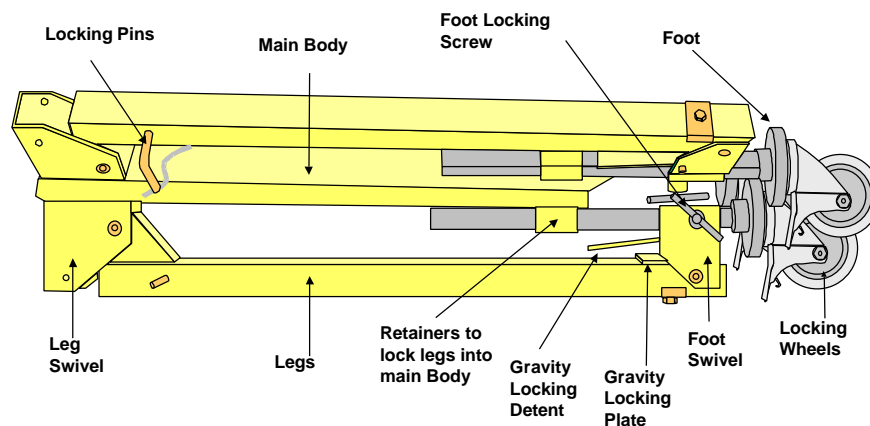


**Figure 18. Mast and Tripod**

6. Unlock the lowest raised section of the mast by turning the section clamping screw anti-clockwise. Turn the air release screw anti-clockwise and slowly release the air so that the section lowers itself. When raising and lowering the mast, the CRU must not be dropped/lowered erratically.
7. When the section is fully lowered, re-tighten the air release screw and re-tighten the section clamping screw. Sections may drop together and care should be taken not to injure fingers. (Gloves should be worn).
8. Feed the slack drop cable back into the dispenser and the slack measuring tape back into the tape reel.
9. Repeat steps 4, 5 and 6 for all raised Sections of the mast.

AS4000 Survey Tool	<b>DLP- 006</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

10. When the sections are fully lowered re- tighten the air release screw.
11. Remove all guys from the Guy Collar and safely stow away.
12. When the mast is fully lowered remove the telescopic mast by unscrewing the mast mounting screw. (replace the screw back into the threaded holes for safekeeping.
13. Disconnect the drop cable at the Headload. Feed the slack drop cable back into the dispenser.
14. Remove the measuring tape and feed slack measuring tape back into the tape reel.
15. Remove the head end load by releasing the quick clamp and extracting the spigot from the end of the mast of the mast.
16. Unlock the wheels by raising the locking mechanism on each wheel and manoeuvre the tripod base to a suitable position for folding.
17. Loosen foot locking screw
18. Remove leg locking pin and rotate leg to the tripod body. Release gravity locking detent and turn the foot parallel to the body of the mast.
19. Slide the foot into leg retainer and re-tighten the foot locking screw.
20. Repeat for the other legs.



**Figure 19 Folded Mast Base**

21. Place tripod in carrying bag.
22. Remove all safety barriers and clear the site of any debris.

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**



AS4000 Survey Tool	<b>Appendix A</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

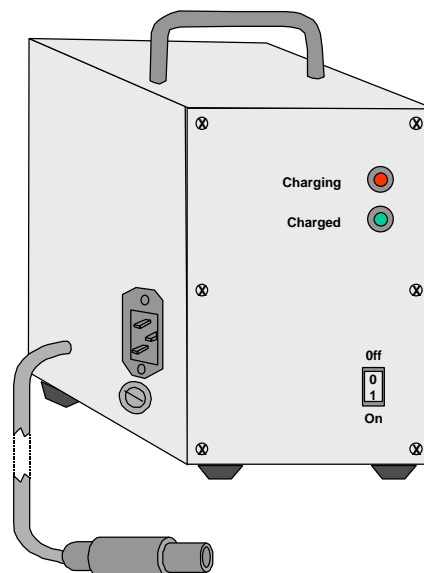
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## APPENDIX A SURVEY TOOL MAINTENANCE

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### 6. 1. Charging Batteries

1. The Batteries need recharging after approximately 3 hours use. Approximately 7 hours of charging are needed to fully recharge the batteries.
2. The batteries are charged by connecting the battery charger to the two colour coded sockets at the side of the unit.



**Figure 20. Charger**

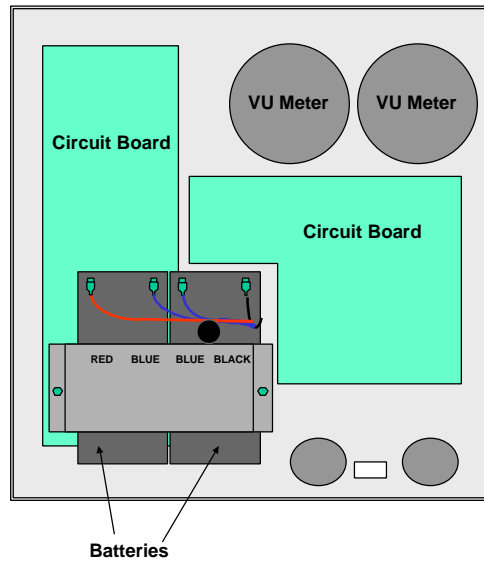
**Note** The unit may also be powered by connecting a 24 Volt DC supply to the battery charging socket.

### 7. 2. Changing Batteries

1. Remove top of unit by unscrewing the eight retaining screws.
2. Disconnect leads from the batteries noting carefully the position of each lead.
3. Remove battery retaining brackets by undoing the retaining nuts.
4. Replace Batteries and secure with the retaining brackets.
5. Reconnect leads to the battery.
6. Replace top cover



AS4000 Survey Tool	<b>Appendix A</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



**Figure 21. Internal View of the Test Box**

### **8. 3. Equipment Return**

1. Any faulty test equipment should be returned to Airspan The return address can be found in the Material Return and Repair Manual 605-0000-435.



AS4000 Survey Tool	<b>Appendix B</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## SAMPLE SURVEY TEST RESULT

---

Location of RLT ..... Map Grid References.....  
 RLAddress .....  
 .....  
 .....  
 .....

Location of RNU ..... Map Grid References.....  
 RNU Address .....  
 .....  
 .....  
 .....

RNU Programming code (12 digits) .....

AGC Volts .....  
 RX Fade Margin (determined from characterisation label.). tick if greater than 10dB

PC Volts.....  
 TX Fade Margin (determined from characterisation label.). tick if greater than 10dB

Good/bad to install

Wall / Pole Mount (delete as required)

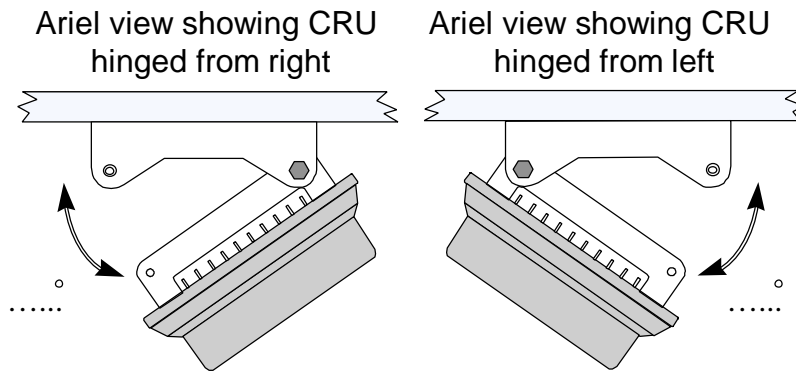
CRU height from ground .....metres

Serial Number of the Test Head CRU used for this survey  
 measurement  
 (see Appendix D)

AS4000 Survey Tool	<b>Appendix B</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

**Wall Mount Only**

Record the estimated angle between the CRU and wall (as seen from above the CRU) on the diagram below strike out the hinge option that does not apply.



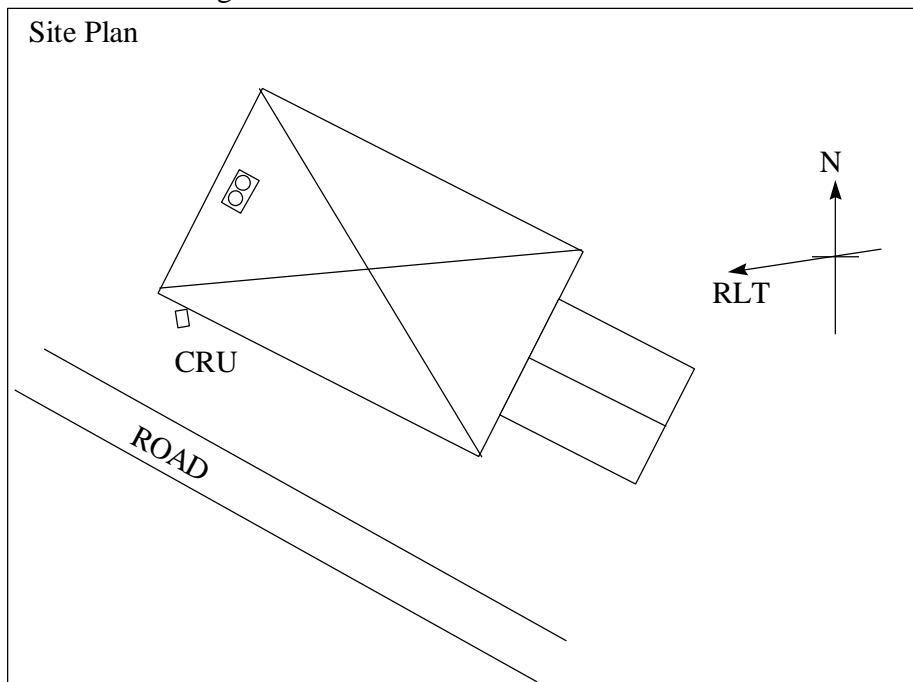
Left or Right hinge should be chosen to facilitate panning in the direction of the CT Antenna

**Polemount Only**

Record CT bearing and position of pole

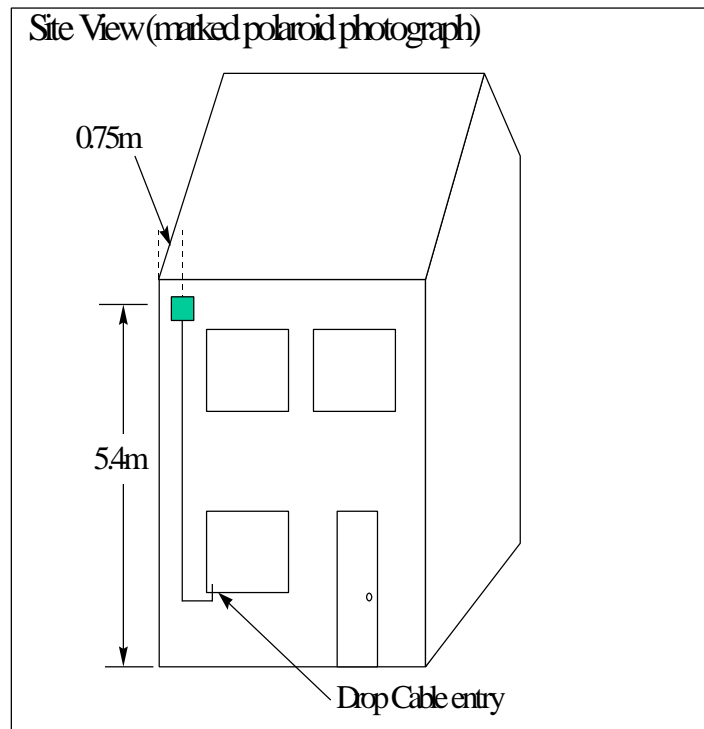
**8.1 All CRUs**

Description of CRU Mounting Position:



The Site Plan should include outline plan of the building, bearing for RLT, position for CRU and reference to North

AS4000 Survey Tool	<b>Appendix B</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



The Site View should contain the CRU mounting position.

AS4000 Survey Tool	<b>Appendix B</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

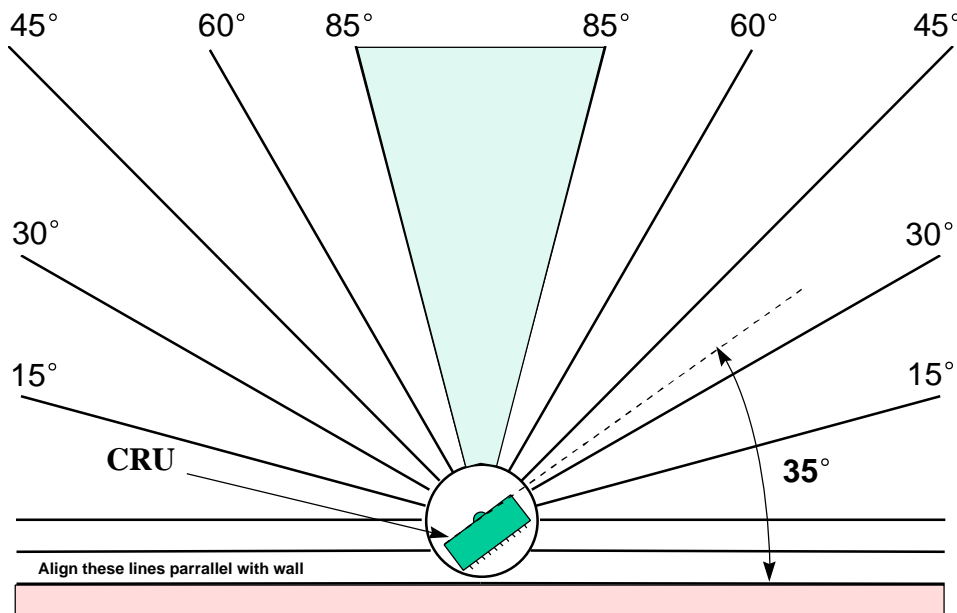
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## ANGLE TEMPLATE

The angle template is designed to assist in measuring the panning angle of the CRU

### Instructions for Use

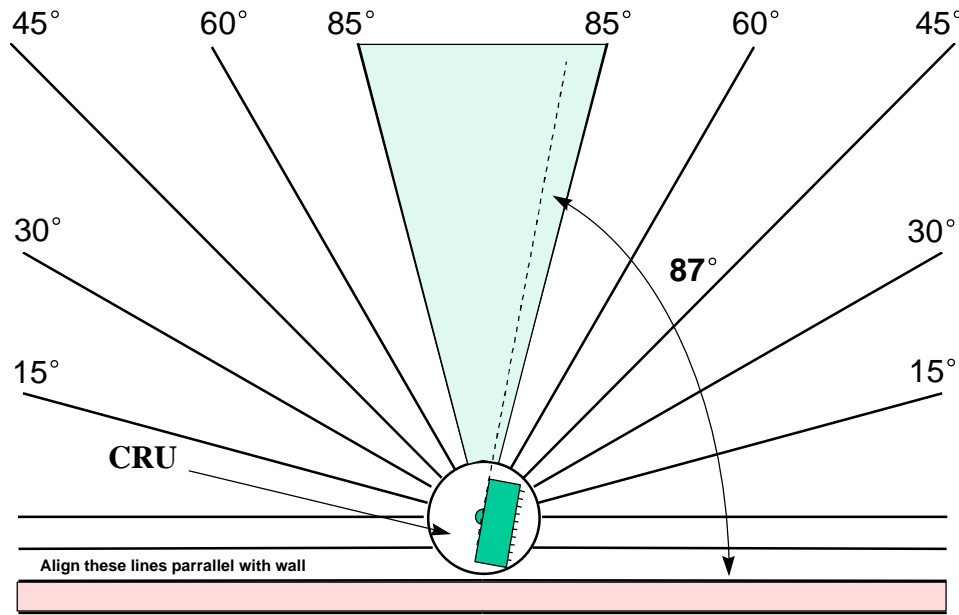
1. Photocopy the template onto a transparent media. It may also assist to mount the template on clear Perspex.
2. Stand underneath the CRU facing the house wall
3. Raise the template above the head and orientate the template such that the parallel lines align with the wall and the CRU Falls within the circle. The face of the CRU should dissect the small circle in the centre. If a rod is being used on the CRU mounting bracket then the back of the CRU should dissect the small circle in the centre.



CRU should be sighted to appear centrally in the circle.  
The angle should be measured using the sighting pole position on the scale.

4. The diagram above shows a typical view as observed through the template and that the angle of orientation is 35°. The diagram below shows a pan that does not meet the criteria for deployment. The angle is within the shaded band indicate that the wall would form an obstruction to a clear radio path. A different location should be sought.

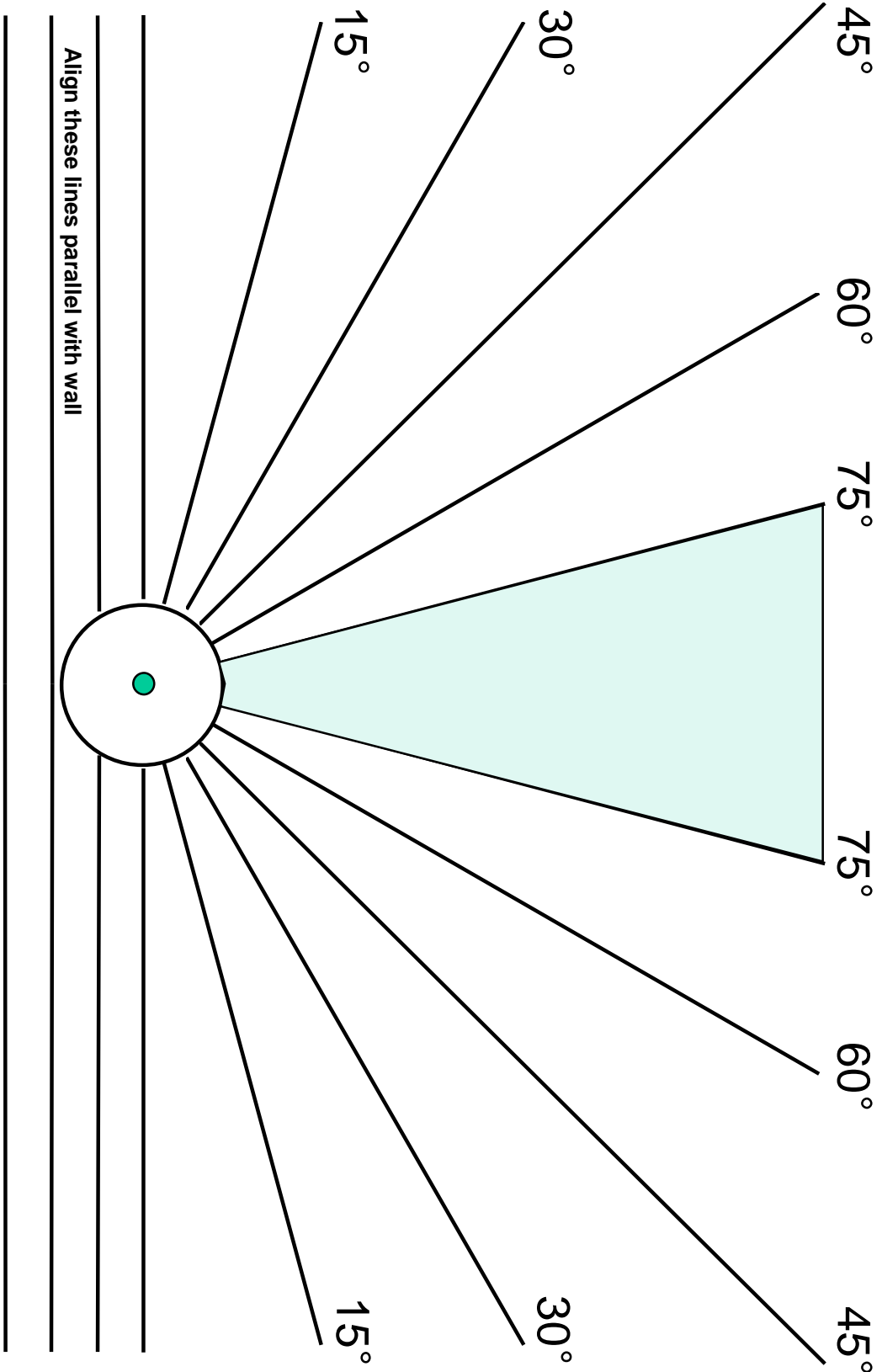
AS4000 Survey Tool	<b>Appendix C</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



CRU should be sighted to appear centrally in the circle.  
The angle should be measured using the sighting pole position on the scale.

5. Sight the angle of the CRU face and read off the template This gives the angle as seen from the underside. You may wish to attach a rod through the mounting bracket of the CRU so that the direction of the CRU is more readily readable. Mark the angle with a non-permanent marker.
6. Translate the reading onto the Survey Form. To do this place the template with the underside on a piece of paper (i.e. all text appears backwards.) The view now observed is the same as that from above the CRU. Mark the survey form with the correct panning angle and hinge orientation. Note: The sketches on the survey form show the orientation traditionally from an overhead view.

AS4000 Survey Tool	<b>Appendix C</b>
605-0000-429	
Issue 1.6. Date 1/9/99	



CRU should be sighted to appear centrally in the circle.  
 The angle should be measured using the sighting pole position on the scale.



AS4000 Survey Tool	<b>Appendix C</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Appendix D</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## SURVEY TOOL INFORMATION

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Serial Number of Test Head CRU.....(this number should be recorded on each test form)

MIF Serial Number.....

Calibration Values.....

RECIEVE SIGNAL STRENGTH /dBm	AGC DIGITAL VOLTMETER READING	TRANSMIT SIGNAL STRENGTH /dBm	PC DIGITAL VOLTMETER READING
-98	<input type="text"/>	+21	<input type="text"/>
-92	<input type="text"/>	+15	<input type="text"/>
-88	<input type="text"/>	+11	<input type="text"/>

Serial Number of Test Box .....

AS4000 Survey Tool	<b>Appendix D</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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AS4000 Survey Tool	<b>Appendix E</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## SURVEY CHECKLIST

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### Checklist

1. Set test modem in service at RLT
2. Do you have authenticated programming code?
3. Does proposed site meet site selection criteria?
4. Is site secure from safety viewpoint?
5. Ensure no obstructions (Power Cables, Over-hanging Eaves etc.)
6. Ensure Hard Hats are worn
7. Prepare tripod base
  - a) Fully lock legs ?
  - b) Engage feet retaining detents?
  - c) level tripod base
  - d) Locked feet and wheels
8. Preparation of Headload
  - a) Mount Headload securely on the mast
  - b) Attach drop cable to Headload?
  - c) Attach measuring tape to Headload?
  - d) Attach guys (if required)
9. Attachment of Headload and Mast to Tripod base
  - a) Fully inserted pin in the bush
  - b) Tighten mast mounting screw full tight?
10. Raising The Mast
  - a) . Is the air release screw closed?
  - b) Are mast sections locked?
  - c) When raised are all section screws tight?
  - e) is Mast correctly guyed?
11. Connecting Test Box
  - a) Is TX switch set to Disabled
  - b) Are telephone and drop cable attached to the Test Box
  - c) Is Test box switched on
  - d) Program CRU if not already programmed
12. Panning CRU
  - a) Is AGC panned to maximum
  - b) Enable TX switch
  - c) are Fade Margins within Limits If not do secondary pan.
13. Record Test Results  
Take Polaroid picture for test results.
14. Dismantling Survey Tool
  - a) Disable TX
  - b) Switch off Test Box, disconnect and remove
  - c) Lower mast
  - d) Remove guys if fitted
  - e) Remove Mast

AS4000 Survey Tool	<b>Appendix E</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

- f) Disconnect Drop Cable and measuring Tape
- g) Remove Headload
- h) Fold Tripod Base
- I) Remove safety barriers and debris



AS4000 Survey Tool	<b>Appendix F</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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## RF PROGRAMMING CODES

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This procedure should be used if programming the system using a test telephone and **can only be applied to Voice STs.**

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.

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 <sup>o</sup> . 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.

AS4000 Survey Tool	<b>Appendix F</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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	<b>1 00</b>	01	2029.75	2204.75
2.0 – 2.3GHz	<b>1 01</b>	02	2033.25	2208.25
2.0 – 2.3GHz	<b>1 02</b>	03	2036.75	2211.75
2.0 – 2.3GHz	<b>1 03</b>	04	2040.25	2215.25
2.0 – 2.3GHz	<b>1 04</b>	05	2043.75	2218.75
2.0 – 2.3GHz	<b>1 05</b>	06	2047.25	2222.25
2.0 – 2.3GHz	<b>1 06</b>	07	2050.75	2225.75
2.0 – 2.3GHz	<b>1 07</b>	08	2054.25	2229.25
2.0 – 2.3GHz	<b>1 08</b>	09	2057.75	2232.75
2.0 – 2.3GHz	<b>1 09</b>	10	2061.25	2236.25
2.0 – 2.3GHz	<b>1 10</b>	11	2064.75	2239.75
2.0 – 2.3GHz	<b>1 11</b>	12	2068.25	2243.25
2.0 – 2.3GHz	<b>1 12</b>	13	2071.75	2246.75
2.0 – 2.3GHz	<b>1 13</b>	14	2075.25	2250.25
2.0 – 2.3GHz	<b>1 14</b>	15	2078.75	2253.75
2.0 – 2.3GHz	<b>1 15</b>	16	2082.25	2257.25
2.0 – 2.3GHz	<b>1 16</b>	17	2085.75	2260.75
2.0 – 2.3GHz	<b>1 17</b>	18	2089.25	2264.25
2.0 – 2.3GHz	<b>1 18</b>	19	2092.75	2267.75
2.0 – 2.3GHz	<b>1 19</b>	20	2096.25	2271.25
2.0 – 2.3GHz	<b>1 20</b>	21	2099.75	2274.75
2.0 – 2.3GHz	<b>1 21</b>	22	2103.25	2278.25
2.0 – 2.3GHz	<b>1 22</b>	23	2106.75	2281.75
Unused		24		
Unused		25		
Unused		26		
Unused		27		
Unused		28		
Unused		29		
2.3 – 2.5GHz	<b>2 00</b>	30	2308.00	2402.00
2.3 – 2.5GHz	<b>2 01</b>	31	2312.00	2406.00
2.3 – 2.5GHz	<b>2 02</b>	32	2316.00	2410.00
2.3 – 2.5GHz	<b>2 03</b>	33	2320.00	2414.00
2.3 – 2.5GHz	<b>2 04</b>	34	2324.00	2418.00
2.3 – 2.5GHz	<b>2 05</b>	35	2328.00	2422.00
2.3 – 2.5GHz	<b>2 06</b>	36	2332.00	2426.00
2.3 – 2.5GHz	<b>2 07</b>	37	2336.00	2430.00
2.3 – 2.5GHz	<b>2 08</b>	38	2340.00	2434.00
2.3 – 2.5GHz	<b>2 09</b>	39	2344.00	2438.00
2.3 – 2.5GHz	<b>2 10</b>	40	2348.00	2442.00
2.3 – 2.5GHz	<b>2 11</b>	41	2352.00	2446.00
2.3 – 2.5GHz	<b>2 12</b>	42	2356.00	2450.00

AS4000 Survey Tool	<b>Appendix F</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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	<b>2 13</b>	43	2360.00	2454.00
2.3 – 2.5GHz	<b>2 14</b>	44	2364.00	2458.00
2.3 – 2.5GHz	<b>2 15</b>	45	2368.00	2462.00
2.3 – 2.5GHz	<b>2 16</b>	46	2372.00	2466.00
2.3 – 2.5GHz	<b>2 17</b>	47	2376.00	2470.00
2.3 – 2.5GHz	<b>2 18</b>	48	2380.00	2474.00
2.3 – 2.5GHz	<b>2 19</b>	49	2384.00	2478.00
Unused		50		
Unused		51		
Unused		52		
Unused		53		
3.4 – 3.6GHz	<b>4 00</b>	54	3411.75	3511.75
3.4 – 3.6GHz	<b>4 01</b>	55	3415.25	3515.25
3.4 – 3.6GHz	<b>4 02</b>	56	3418.75	3518.75
3.4 – 3.6GHz	<b>4 03</b>	57	3422.25	3522.25
3.4 – 3.6GHz	<b>4 04</b>	58	3425.75	3525.75
3.4 – 3.6GHz	<b>4 05</b>	59	3429.25	3529.25
3.4 – 3.6GHz	<b>4 06</b>	60	3432.75	3532.75
3.4 – 3.6GHz	<b>4 07</b>	61	3436.25	3536.25
3.4 – 3.6GHz	<b>4 08</b>	62	3439.75	3539.75
3.4 – 3.6GHz	<b>4 09</b>	63	3443.25	3543.25
3.4 – 3.6GHz	<b>4 10</b>	64	3446.75	3546.75
3.4 – 3.6GHz	<b>4 11</b>	65	3450.25	3550.25
3.4 – 3.6GHz	<b>4 12</b>	66	3453.75	3553.75
3.4 – 3.6GHz	<b>4 13</b>	67	3457.25	3557.25
3.4 – 3.6GHz	<b>4 14</b>	68	3460.75	3560.75
3.4 – 3.6GHz	<b>4 15</b>	69	3464.25	3564.25
3.4 – 3.6GHz	<b>4 16</b>	70	3467.75	3567.75
3.4 – 3.6GHz	<b>4 17</b>	71	3471.25	3571.25
3.4 – 3.6GHz	<b>4 18</b>	72	3474.75	3574.75
3.4 – 3.6GHz	<b>4 19</b>	73	3478.25	3578.25
3.4 – 3.6GHz	<b>4 20</b>	74	3481.75	3581.75
3.4 – 3.6GHz	<b>4 21</b>	75	3485.25	3585.25
3.4 – 3.6GHz	<b>4 22</b>	76	3488.75	3588.75
3.4 – 3.6GHz	<b>4 23</b>	77	3492.25	3592.25
3.4 – 3.6GHz	<b>4 24</b>	78	3495.75	3595.75
Unused		79		
Unused		80		
Unused		81		
Unused		82		
1.8-1.9GHz	<b>0 00</b>	-	1851.25	1931.25
1.8-1.9GHz	<b>0 01</b>		1853.75	1933.75
1.8-1.9GHz	<b>0 02</b>		1856.25	1936.25



AS4000 Survey Tool	<b>Appendix F</b>
605-0000-429	
Issue 1.6. Date 1/9/99	

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 )
1.8-1.9GHz	<b>0 03</b>		1858.75	1938.75
1.8-1.9GHz	<b>0 04</b>		1861.25	1941.25
1.8-1.9GHz	<b>0 05</b>		1863.75	1943.75
1.8-1.9GHz	<b>0 06</b>		1866.25	1946.25
1.8-1.9GHz	<b>0 07</b>		1868.75	1948.75
1.8-1.9GHz	<b>0 08</b>		1871.25	1951.25
1.8-1.9GHz	<b>0 09</b>		1873.75	1953.75
1.8-1.9GHz	<b>0 10</b>		1876.25	1956.25
1.8-1.9GHz	<b>0 11</b>		1878.75	1958.75
1.8-1.9GHz	<b>0 12</b>		1881.25	1961.25
1.8-1.9GHz	<b>0 13</b>		1883.75	1963.75
1.8-1.9GHz	<b>0 14</b>		1886.25	1966.25
1.8-1.9GHz	<b>0 15</b>		1888.75	1968.75
1.8-1.9GHz	<b>0 16</b>		1891.25	1971.25
1.8-1.9GHz	<b>0 17</b>		1893.75	1973.75
1.8-1.9GHz	<b>0 18</b>		1896.25	1976.25
1.8-1.9GHz	<b>0 19</b>		1898.75	1978.75
1.8-1.9GHz	<b>0 20</b>		1901.25	1981.25
1.8-1.9GHz	<b>0 21</b>		1903.75	1983.75
1.8-1.9GHz	<b>0 22</b>		1906.25	1986.25
1.8-1.9GHz	<b>0 23</b>		1908.75	1988.75

**STOP. THIS PROCEDURE HAS BEEN COMPLETED.**