OPERATOR MANUAL
for
ANTENNA CONTROL SYSTEM

OPTIMIZER® RT
Version 2.0.2.2

Issue 6  March 2005

IMPORTANT: RECORD SERIAL NUMBER AGAINST ANTENNA DURING INSTALLATION.

<table>
<thead>
<tr>
<th>DEVICE SERIAL</th>
<th>ANTENNA TYPE</th>
<th>SECTOR DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When electrical storm activity is present at ACU site, DO NOT install ACU (or antennas), or operate system from site. If adjustment is required, operate from a remote location only.

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1 Introduction

The Antenna Control System (Optimizer RT) controls the electrical down tilt of variable tilt antennas from a remote location.

The system consists of multiple Antenna Control Units (ACUs) mounted onto antennas daisy chained on a control bus and controlled by a PC located remotely from the antennas.

Major system components:
- ACUs
- Cabling
- Protocol Adaptor - for connecting to a PC or modem (RFS model or customer supplied)
- PC – customer supplied.

Additional system protection devices (recommended):
- Grounding Kit (RFS model or customer supplied)
- Surge Protection Device (RFS model or customer supplied)

Table 1 Model Requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACU-E1</td>
<td>End Mounted ACU</td>
</tr>
</tbody>
</table>

1.1 System Components

1.1.1 Antennas incl. cluster mount

Most variable tilt antennas supplied by RFS can have an ACU fitted to provide full remote tilt control. Multi-band antennas can have an ACU fitted to each band separately. This provides full independent tilt control of all bands of the antenna.

Antenna clusters can be fitted with ACU’s to all antennas. The antenna cluster can also provide for the mounting of the TMA’s below the antennas while keeping the same profile.

1.1.2 ACU

The ACU provides full electrical tilt control of an antenna. The ACU can be fitted to most RFS variable tilt antennas.

1.1.3 Protocol Adaptor

The protocol adaptor provides DC power and control of the bus. It can plug straight into the any PC that has Optimizer RT software loaded.

1.1.4 Grounding kit

A grounding kit is recommended to earth communications cable at top and bottom of antenna support structure. Connection made to outer sheath of cable.

1.1.5 Surge protection device

A surge protection device is recommended between protocol adapter and PC, to protect equipment and personnel for a power surge.

1.1.6 Optimizer RT Software

The Optimizer RT control software allows configuration and control of the bus. Used in conjunction with the Protocol Adaptor, it provides a full window into the devices connected to the bus.

1.1.7 Data Files

For correct operation of ACUs, reference lookup tables are used by the Optimizer RT software. Each antenna model has a unique table, stored in a data file with extension ‘*.ret’. These files are available for download on the RFS website; www.rfsworld.com

1.1.8 Additional components

All other components such as cables required to configure the system are available from RFS.

1.2 System Block Diagrams

The flexibility of the system components allows many different system configurations.

1.2.1 ACU Control

![Figure 1 Bus Diagram – Protocol Adapter]
2 Component Details

2.1 ACU
The ACU is designed to be fitted to most RFS variable tilt antennas including multi-band antennas.

![Figure 2 ACU fitted to antenna](image)

Table 2 ACU specification

<table>
<thead>
<tr>
<th>Electrical Specifications</th>
<th>ACU-E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>24 VDC (Nominal)</td>
</tr>
<tr>
<td>Power consumption [mA]</td>
<td></td>
</tr>
<tr>
<td>standby</td>
<td>50</td>
</tr>
<tr>
<td>application for tilt</td>
<td>200</td>
</tr>
<tr>
<td>Communications Layer 1</td>
<td>RS485 (2 wire)</td>
</tr>
<tr>
<td>Communications Layer 2-7</td>
<td>MODBUS RTU</td>
</tr>
<tr>
<td>MODBUS Functions</td>
<td></td>
</tr>
<tr>
<td>Register Definitions</td>
<td></td>
</tr>
<tr>
<td>EMC IMMUNITY</td>
<td>EN50082-1 &amp; EN50081-1</td>
</tr>
<tr>
<td>Maximum Frame Length [Registers]</td>
<td>20</td>
</tr>
<tr>
<td>Support for software download</td>
<td>No</td>
</tr>
<tr>
<td>Number of user data write cycles</td>
<td>36,000 min</td>
</tr>
<tr>
<td>Baud Rate Support [bits/s]</td>
<td>9600</td>
</tr>
<tr>
<td>Accuracy</td>
<td>½ turn of shaft</td>
</tr>
<tr>
<td>Lightning protection</td>
<td>GDT, MOV’s</td>
</tr>
<tr>
<td>Earthing</td>
<td>Through Case to Antenna</td>
</tr>
<tr>
<td>Movement Time [seconds]</td>
<td>20 max</td>
</tr>
<tr>
<td>Connector: Number + Type + Location</td>
<td>2 x 5 pin M12 male</td>
</tr>
</tbody>
</table>

**Mechanical Specifications**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (H x W x D) max [mm]</td>
<td>120 x 45 x 90</td>
</tr>
<tr>
<td>Weight [Kg]</td>
<td>0.37 max</td>
</tr>
<tr>
<td>Protection</td>
<td>IP66</td>
</tr>
<tr>
<td>Body</td>
<td>Aluminium Alloy</td>
</tr>
</tbody>
</table>
2.2 Protocol Adaptor

The Protocol Adaptor allows the connection of a PC or modem to the Bus. The protocol adaptor supplies the DC power and communications on the bus.

Connection to a modem as a remote site
The switch must be in the Remote position.

2.2.2 PC Connection

The Protocol Adaptor has a DB9 pin female connection, wired Data Terminal Equipment (DTE), to provide an interface to a host computer. Pin assignments comply with standard DB9 pin RS232 pin-out schedule. This supports both hardware and software hand shaking.

Recommend connecting through surge protection device as shown in Figure 3.

2.2.1 Connections

The Protocol Adaptor has three connections.

a) PC or Modem – Female DB9 connector.

b) Power connection - 2.1mm with centre pin positive, 24VDC, 2 amps.

c) ALD Network – 12mm 5 pin connector male.

The LED on the top of the Protocol Adaptor indicates that there is power connected via the power connection.

The switch on the side of the Protocol Adaptor must be in the correct position for the application.

Connection to a PC

The switch must be in the PC position.
3 INSTALLATION

3.1 Mounting ACU to Antenna
Antennas may not be supplied with the ACUs attached. It is necessary to attach ACUs, whether this is done on the mast in an existing installation or on the ground for a new installation, the procedure is the same.

The ACU (Antenna Control Unit) is attached to the antenna as shown in Figure 4. Ensure that the hex shafts are engaged and all screws are tightened.

**IMPORTANT**
In an existing installation it is recommended that the existing tilt angles for all antennas be recorded before the installation procedure has begun.

3.1.1 Installing the ACU
Prior to installing the ACU on the antenna, it is necessary to perform the following operations.

(a) Record the existing tilt angle for all antennas that are to have ACUs fitted to them. This will allow the antennas to be returned to their past positions once the control device has been attached.

(b) Record the serial number of the antenna. The remote operator requires association between the antenna and ACU.

(c) Record the serial number of the ACU against the antenna. The serial number is located on the bottom of the ACU adjacent to the two connectors.

(d) Install the ACU / antenna interface plate as required. This is only required on some antennas. Attach the plate to the antenna using the screws provided.

(e) Engage the hex shaft of the ACU with the antenna. Rotate the ACU until the hex shaft engages.

(f) Screw the ACU to the antenna using the two captive screws attached to the ACU. Tighten the screws incrementally to ensure the ACU is not mis-aligned.

(g) Connect the cables as required (refer illustration overleaf). Cables can be connected to either port.

(h) Connect the Protocol Converter to PC.

3.1.2 Installation Recommendations
To protect equipment and for safety of personnel, the fitting of the following devices is recommended (Refer Figure 1):

1. Surge Protection Device, located between protocol adapter and PC.
2. Grounding Kit, to outer braid of cable, located at ACU installation (eg. base and top of antenna support structure).

<table>
<thead>
<tr>
<th>Description</th>
<th>RFS part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounding Kit HSE 14</td>
<td>15509658</td>
</tr>
<tr>
<td>Surge Protection Device</td>
<td>779.45746</td>
</tr>
</tbody>
</table>

3.1.3 Interface Plates
An interface plate is required for low band and multi-band antennas

Suitable flexible sealant must be used between the interface plate and the antenna and between the interface plate and the ACU.

The antennas that do not require an interface plate use the “O” ring attached to the ACU to seal to the antenna. During installation it is essential that the “O” Ring is in good condition.

When electrical storm activity is present at ACU site, DO NOT install ACU (or antennas), or operate system from site. If adjustment is required, operate from a remote location only.
### 3.1.4 Components

#### Table 3 System Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACU-E1 Antenna Control Unit</td>
<td>31042.000</td>
</tr>
<tr>
<td>2</td>
<td>PA-232/485-1 Protocol Adapter</td>
<td>31041.000</td>
</tr>
<tr>
<td>3</td>
<td>Jumper lead – 0.3m, 1m, 3m</td>
<td>31046.003 31046.010 31046.030</td>
</tr>
<tr>
<td>4a</td>
<td>Reel of cable – 2 pair + screen - twisted pair. For cables between ACUs</td>
<td>790.46001</td>
</tr>
<tr>
<td>4b</td>
<td>Reel of cable – shielded. For cable from ACUs to base of tower</td>
<td>790.46005</td>
</tr>
<tr>
<td>5-1</td>
<td>Connector – female</td>
<td>759.50002</td>
</tr>
<tr>
<td>6</td>
<td>Kit interface plate – ACU</td>
<td>31309.000</td>
</tr>
<tr>
<td>6-1</td>
<td>Interface plate</td>
<td>30825.000</td>
</tr>
<tr>
<td>6-2</td>
<td>Screw, pan XR, M4x20, SS</td>
<td></td>
</tr>
<tr>
<td>6-3</td>
<td>Washer, flat, M4, SS</td>
<td></td>
</tr>
<tr>
<td>6-4</td>
<td>Washer, spring, M4, SS</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Handbook</td>
<td>31045H000</td>
</tr>
<tr>
<td>8</td>
<td>Software – CD</td>
<td>31045.001</td>
</tr>
</tbody>
</table>

![Figure 4 Attaching ACU to Typical Antenna](image-url)

![Figure 5 Attaching ACU to Multi-band Antenna](image-url)

### 3.1.5 Additional hardware for Cluster Module

For antennas mounted in a cluster, an ACU kit is available. The kit contains all of the 3 ACUs, 3 cables, a handbook and software required to connect the ACU-E1’s to the main data cable.

The following items are contained in the Cluster Kit Part No 31163.001

#### Table 4 ACU-E1 Cluster Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>Part</th>
<th>Part Number</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACU-E1</td>
<td>31042.000</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Lead M12 RAF/RAF 0.5m (patch lead)</td>
<td>31158.005</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Lead M12 RAF/M 0.5m (Input lead)</td>
<td>31160.005</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Handbook</td>
<td>31045H000</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 5  Additional components required for a complete system.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PA-232/485-1 Protocol Adapter</td>
<td>31041.000</td>
</tr>
<tr>
<td>2</td>
<td>Jumper lead – 0.3m, 1m, 3m</td>
<td>31046.003, 31046.010, 31046.030</td>
</tr>
<tr>
<td>3</td>
<td>Reel of cable – 2 pair + screen twisted pair</td>
<td>790.46001</td>
</tr>
<tr>
<td>4</td>
<td>Connector – female</td>
<td>759.50002</td>
</tr>
</tbody>
</table>

Patch Lead
Right angle patch leads are provided to minimise the space requirements inside the cluster.

![PATCH LEAD](image)

Input Lead
An input lead with one right angle connector and a male connector is provided to connect to the main data cable.

![INPUT LEAD](image)

3.1.6  Cabling
The ACUs must be cabled in a daisy chain as shown below using 2-pair screened cable.

Preassembled cables of a variety of lengths or cable and connectors to allow other lengths to be made by the user are available.

If possible the cable route should avoid possible sources of interference such as high voltage cables, motors, switchgear and sharp edges.

Table 6  Typical Parameters

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nominal OD</td>
<td>7 mm</td>
</tr>
<tr>
<td>2</td>
<td>Weight</td>
<td>5.5 kg/100m</td>
</tr>
<tr>
<td>3</td>
<td>Max Pulling Tension</td>
<td>20.9 kg/300m</td>
</tr>
</tbody>
</table>

The cable must be supported at least every 5 metres.
Damage to the external cable sheath shall be avoided.

3.1.6.1  Recommended procedures for aerial applications

Lashing with a catenary: Cable must be lashed at least once every 5 metres for horizontal lays and once every 2 metres for vertical lays.

Maximum vertical drop and / or horizontal span is 250m.

3.1.6.2  Termination
The cable shall be terminated in the following manner.

Ensure that the centre connections have the insulation in place.

![Figure 6  M12 Connector Male (pins)](image)

<table>
<thead>
<tr>
<th>Pin Out</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shield</td>
<td>Bare</td>
</tr>
<tr>
<td>2</td>
<td>Voltage +24V</td>
<td>Pair 1 - White</td>
</tr>
<tr>
<td>3</td>
<td>Voltage 0V</td>
<td>Pair 1 - Black</td>
</tr>
<tr>
<td>4</td>
<td>Signal +</td>
<td>Pair 2 - White</td>
</tr>
<tr>
<td>5</td>
<td>Signal –</td>
<td>Pair 2 – Black</td>
</tr>
</tbody>
</table>

![Figure 7  Cable Connection Schematic](image)

The connectors are suitable to be used in all outside conditions without over wrapping. The dust caps provided with the ACUs should be over wrapped if used outside.

The cable is suitable for outdoor applications except direct burial.
4 Software configuration

The software to control the remote tilt units is a Windows based package. This software will operate through the protocol adaptor and through the CNI. In addition it configures the CNI for operation on the serial and Ethernet ports.

4.1 Installation

4.1.1 Requirements

<table>
<thead>
<tr>
<th>Table 7 Software and Hardware Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Processor</td>
</tr>
<tr>
<td>RAM</td>
</tr>
<tr>
<td>Operating System</td>
</tr>
<tr>
<td>Graphics</td>
</tr>
<tr>
<td>Ports</td>
</tr>
</tbody>
</table>

4.1.2 Installing

The installation of the software uses the standard Windows type installation routine.

1. Run setup.exe (from CD provided).
2. Enter name and company information when asked.
3. Choose the folder to install the software. Default directory provided.
4. Alter the program group as required. This is the group within the Windows start menu that the shortcut to the program will be copied to.
5. Accept settings and the program will be installed.

4.1.3 Data Files

Each antenna model has a corresponding reference lookup table, which contains positional information read by the ACU for setting the antenna downtilt angle. These tables are stored in data files (file extension *.ret), which must be copied into the same directory as the Optimizer RT software.

The data files are unique for each antenna model; in the case of multiband antennas there is a separate file for each frequency band.

The latest revision data files can be downloaded from the RFS website; www.rfsworld.com.

A sample data file is included with the software, but this does not correlate to any specific antenna, and should be used for functional checks only.

4.1.4 Running software

To run the program use the Windows start / programs. An icon will also be installed on the desktop to allow for easy starting of the software.

4.1.5 Help

Context sensitive online help is available with the software.

IMPORTANT

Prior to installing software, ensure antenna data files have been downloaded from RFS website. Refer Section 4.1.3.
4.2 Security

Three levels of security are implemented to control access to the functions within the software. For more details see the Help file.

4.2.1 Functions Available to each Level

The following table provides details as to which functions are available for each user level.

<table>
<thead>
<tr>
<th>Security User Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the user level</td>
<td>View</td>
<td>User</td>
<td>Eng.</td>
</tr>
<tr>
<td>Default Password</td>
<td>view 123</td>
<td>user 123</td>
<td>rfs 123</td>
</tr>
</tbody>
</table>

**Screens**

- Edit ✓
- Site Map ✓
- Summary ✓ ✓ ✓
- Details ✓ ✓ ✓
- Setup ✓ ✓
- Show ACU Details ✓ ✓ ✓
- History ✓ ✓ ✓
- Add New ACU ✓
- Delete ACU ✓
- Change Tilt ✓ ✓
- Calibrate ✓
- Update a device ✓ ✓
- Alter Antenna Type ✓
- Reset device ✓ ✓
- Change Bus ID ✓
- Create New Site ✓
- Save File ✓ ✓
- Upload Device software (to ACU)
- Change Passwords ✓
Connect System Hardware
(verify which PC comm port)
Tighten connections
Power ACU by Protocol Adapter / CNI

Start Program & Login: Enter Password:
Setup
- Comms Port

OPEN Existing site file (*.dat)
(to overwrite)
or, SAVE as New blank file (*.dat)

Add NEW Device
- Serial number of device

SITE SEARCH
- to find devices on network

Add / Revise ACU device details
- Description
- Sector number
- Calibrate
- Alarm reset

Change Bus ID
- to unique name
if error occurs when entering Details

Add / Revise Antenna details
- Antenna Information
- Antenna Type (Lookup Table)

Add / Revise Site details
- Sector Name

Calibrate ACU
- Full calibration (mechanical action) - Reset downtilt to 0°
- Set current Position - Finds current antenna downtilt setting

Set Point - move downtilt to designated value

SAVE file (**.dat)
END / EXIT
(file not saved)

Figure 8 Flowchart - Optimizer RT Software
5 Getting Started

After installation of the software and installation of the ACU's, the system is ready to be commissioned.

Each ACU need only be commissioned once unless it has been removed from the antenna. All information on the antenna configuration is stored in the ACU for future use.

The following steps are required to commission the system. Further definitions are provided in following sections. Refer to flowchart for overview in Figure 8.

1. Ensure that all connections made during installation are tight.
2. Ensure that the power is supplied to the Protocol adapter (an LED illuminates when power to protocol adapter).
3. Start the Optimizer RT software. The Optimizer RT software can be started by either double clicking on the RFS logo on your desktop or from the Windows Programs Menu.
4. Log on to the software. From the menu select >Security > Log On.

Enter the password for the user level required.

<table>
<thead>
<tr>
<th>User level</th>
<th>View</th>
<th>User</th>
<th>Eng.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>view123</td>
<td>user123</td>
<td>rfs123</td>
</tr>
</tbody>
</table>

5. Select the correct PC port from the tools menu.

>tools>general>

Default communications port is Port 1. If the port is in use by another device such as a mouse or a modem, when the setport button is clicked, a warning will be displayed.

6. Create a new site file to store information about the site.
Save blank file (***.dat)

7. (a) Log device(s)

>Site Settings > Site Summary

or

(b) Perform a site search

>Site Settings > Site Search

NOTE: If an ACU has not been previously commissioned (eg new site), SITE SEARCH function will not find all the devices. Each new device will require adding to the site by entering its serial number.
8. Configure operation parameters during installation to identify what, where and when device is set.

ACU details MUST be completed.

> Site Settings > Details or

![Remote Antenna Tiling System - Device Details](image)
9. Calibrate ACU at commissioning as required. This is discussed in detail later in Section 7.4.

![Calibration Diagram]

10. Set Point to designated down tilt

![Set Point Diagram]

11. Save file
6 Application – Site Files & Entry

6.1 Log On

The following password enter box will be displayed.

![Password Entry Box]

Enter the password for the user level required. (See Table 8 for default Passwords.)

See Section 8.4 for how to change passwords.

6.2 Site files

A site file is used to store the setup of the site on your PC. The file contains all of the information that will be configured about each ACU and about the site.

6.2.1 Create a New Site file

New site files can be created as required. The new site file created will be empty and will not contain any ACU.

To create a new site file choose file > new on the menu or select the

![New Icon]

Using the standard Windows file selection dialog box as shown below, select the folder and the file name for the site file.

![Site File Menu]

All site files have the extension DAT.

6.2.2 Open Existing Site File

From the menu select File > Open and choose the site file to open.
7 Application – Adding and Finding Devices

7.1 ACU Identification

A new antenna can be added to a site by using the New Device function. This will enable the ACU to be configured with all of the required information necessary for it to operate correctly on the ACU bus. This is particularly important for new ACUs that have not previously been used as they will all have identical bus ID values.

Select New Device from the Site Settings > Site Summary Screen.

The new Antenna Setup dialog box is now shown. Enter the serial number of the ACU and click OK.

![Figure 11 New Antenna Setup Dialog Box](image)

If the ACU is found on the bus then it will be given a unique bus ID and the device details screen opened.

The serial number of each unit is used by the software to determine which antenna each particular ACU controls. Should an in-field replacement be required, the failed unit is simply replaced and the new serial number is entered into the software.

7.1.1 Site Search

If the ACUs have had a Bus ID assigned then a site search can be performed. If two ACUs have the same Bus ID then communication with the ACU is not possible except by setting the ACUs Bus ID using its serial number.

A site search can be started by either:

- clicking on the site search icon on the toolbar,
- selecting Site Settings > Site Search on the menu
- Click the site search button on the summary page.

The site search facility allows a user to gain the exact configuration of the site without any prior knowledge.

Each possible ACU on the network that has been previously configured will be polled to determine its status. The ACU currently being polled is displayed in the program’s status bar.

If the ACU exists on the network it will respond to the request for information. The information found will be checked against all entries in the site file to see if it is already configured. If the ACU is not found in the site file it will be added to the listing and shown as a new ACU.

If an ACU is polled and no response is given all entries in the site file will be checked to see if the ACU is expected to be found. If the unit was expected to reply its status will be shown as “Not Found”.

As the polling continues the status of ACUs will be changed from “Not Polled” to one of the other states

7.2 Bus ID

The Bus ID is used by each device to identify itself. It will be between 0-32. Each bus must only have one of each Bus ID to ensure that each device can communicate.

The Bus ID of each device can be altered using the Change Bus ID screen. Enter the screen from the details page. Select the new Bus ID and click “OK”.

Devices with Bus ID of 0 will not communicate on the Bus except to have their Bus ID altered or reply during a site search.

![Figure 12 Change Bus ID Screen](image)
7.3 ACU Antenna Support

The Cell number can have up to 20 characters entered.

The description is a free format field of up to 200 characters.

- **a)** Using the ACU Type Drop Down Menu select the ACU Type.
  
  ACU-E1 – End Mounted ACU

- **b)** Each ACU must have an antenna type selected for correct operation, which is done using the Antenna Type drop down menu. The software then reads the corresponding data file (the file extension is *.ret) specific to the antenna selected.

Typical antennas available:

- APXV18-206516
- APXV18-206517LS
- APXV206515
- APXV15GV/15DV/15WV
- APXV15GV/15WV

The files in use can be seen on the files display &gt;**tools** &gt; Lookup tables as shown in Figure 14.

The information in the lookup tables is stored in the data files; these files must be copied into the same directory as the software. Refer to Section 4.1.3 for further information.

Each site can use as many or as few of the different files as required.

The data file contains positional information used by the ACU for setting the antenna down-tilt angle. This reduces ACU inventory requirements as individual ACUs can be customized during installation.

As new antennas are released, software updates for lookup tables will be available at the RFS web site: www.rfsworld.com

- **c)** Update the ACU with this information by clicking the Update Button.

The tilt of the antenna will be altered to show the range of the new antenna type chosen. The range of the antenna is shown on the graphical representation. (Refer Figure 13).

Figure 13 Tilt representation

If the ACU setting is outside the antenna type selected, an out of range error may be displayed. This will be corrected on calibration.

---

<table>
<thead>
<tr>
<th>Description</th>
<th>Version</th>
<th>Date</th>
<th>min</th>
<th>max</th>
<th>ACU Type</th>
<th>Antenna</th>
</tr>
</thead>
<tbody>
<tr>
<td>APXV18-206516</td>
<td>1.00</td>
<td>11/4/02</td>
<td>0</td>
<td>10</td>
<td>ACU-E1</td>
<td>106</td>
</tr>
<tr>
<td>APXV18-206517LS</td>
<td>1.00</td>
<td>11/4/02</td>
<td>0</td>
<td>10</td>
<td>ACU-E1</td>
<td>107</td>
</tr>
<tr>
<td>APXV206515</td>
<td>1.00</td>
<td>11/4/02</td>
<td>0</td>
<td>10</td>
<td>ACU-E1</td>
<td>108</td>
</tr>
</tbody>
</table>

Figure 14 Lookup Table Display
7.4 Calibration

7.4.1 Calibrate the ACU

When the ACU is first attached to the antenna, it is required to set the ACU reference position. Once this is done no further calibration is required unless the ACU is removed from the antenna.

There are two methods to calibrate the ACU.

a) Full Calibration – ACU seeks the reference position and then moves to minimum tilt.

b) Set Current Position - User enters current antenna’s down tilt.

To calibrate an ACU:

a) Open the Device details screen.
b) If the calibrate button is not enabled click the refresh button.
c) Click the Calibrate button.
d) Select the type of calibration required from the screen as shown below.
e) If set Current Position is selected enter the current position.
f) Click the calibrate button.

![Calibration Options](image)

Figure 15 Calibration Options

7.4.2 Full Calibration of ACU

Full calibration removes any possible error in the ACUs calibration due to reading of the antenna down tilt indicator. To do this it must move the ACU to an antenna physical stop position.

During Full Calibration the ACU will:

a) Move the antenna VET until it comes to a physical stop at low end of tilt range.

b) Use the position found as its calibration reference.

c) Move the antenna to the minimum down tilt position.

The time required to perform a full calibration depends on the antenna’s current position. Typically it should not take more than 30 seconds.

The software will show the current down tilt position at the minimum position.

If the ACU is not attached to an antenna then a full calibration will fail. The ACU will indicate on the Device Details page that there has been too much movement and the zero has not been set.

7.4.3 Set current position calibration for ACU

Calibration of the ACU can also be achieved by entering its current position. The current position is then used to determine the calibration reference of the ACU and is stored in the ACU.

The current position can be entered with as much accuracy as can be read on the indicator. The current position can only be entered between the lower and upper range of the ACU as determined by the antenna configuration.
7.5 Site Map

Site Map > Open

The site map can be configured to show 3 ACUs per sector to a maximum of 4 sectors. The map can be used to show cluster antenna configurations. Refer to Figure 16.

![Figure 16 Site Map](image)

7.6 History Page

Site Setting > History

A history file is generated and records ACU actions. Refer to Figure 17.

![Figure 17 History File](image)
8 Application – Screens

8.1 Device Details Screen

The Details page is used to manage each ACU.

The Details page for the antenna can be found by selecting the antenna from the site map, double-clicking a summary page ACU or selecting Site Settings>Details. (Refer Figure 18).

The Details page can:

- **Refresh** – Communicates with the ACU to check its status and tilt. Any difference between the ACU information and the site file will be displayed. Once refreshed the ACU can be moved to a new tilt.
- **Update** – Updates the site file and the ACU with any new information.

The site file is updated with any new information. The file is written to the hard disk or wherever the current site file is located.

The ACU is updated with new information such as cell number and antenna type.

- **Delete** – Deletes the ACU from the site file. No changes are made to the physical ACU.

- **Move** – Moves the antenna to the new position as indicated by the setpoint.

- **Setpoint** – This can be set to anywhere between the minimum and maximum tilts as shown. Up and down arrows are provided to adjust the tilt. Tilt resolution is 0.5 Degrees.

The move button is not enabled if the ACU has not yet been refreshed by either doing a site search or refreshing the device from the Device Details screen.

- **Antenna Type** – Select the antenna type to change the range of the antenna.

- **History** – Opens the history page showing the past movements and status of this antenna. All movements of the antenna are listed showing the time, date, cell number, description, tilt and status.

- **Calibrate** – Performs the zero function for this antenna. This function reverses the antenna until it reaches its end stop, moves away from the end and calibrates itself so this position is the minimum range.

- **Reset** – Performs a reset on the ACU electronics. Re-powering the ACU will also reset the unit. No values are altered when a reset is performed.

Figure 18 RET Device Details
8.2 Summary Screen

The summary screen provides an overview of what devices are connected to the bus. It lists sector number and description together with status and tilt.

**Site Search** - A site search can be started from the Summary screen using the button provided.

**New Device** - If the serial number of the device is known, a new device can be configured on the bus.

**Refresh** – Refresh the current screen.

8.3 Status Descriptions

The following statuses are used on the Device Summary page and the Device Details page.

**Not Polled**

Not polled is used to describe a device that has not yet been communicated to since the site file was loaded.

**OK**

If the found ACU is already configured in the site file then all information from the ACU will be checked against the site file. If all information is the same in the site file and the ACU then the ACU status will be changed to “OK”.

**Device does not match database**

If there are differences between the ACU and the site configuration (i.e. cell number different) then the ACU status will be changed to “Device does not match database”.

At the end of the site search each device will need to be refreshed from the details screen to retrieve all of the device data.

A new device is one that has been found by a site search but is not currently configured as part of the site file. The new device will display the configuration of the new ACU.

The status bar has four sections.

a) **Security Level**. This shows the current security level that is log on to the software

b) **Status**. Shows information about actions currently underway with the devices.

c) **Mode**. Shown above as checking Network ID 2 during a site search. Red and Green LED’s are also provided to indicate whether data is being sent or received.

d) **Comms**. The PC port being used for communications.

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**Figure 19** Summary Screen

**Figure 20** Status Bar
8.4 System passwords

The OPTIMIZER RT software uses passwords to determine the level of access that the user has, to be able to alter the ACU configuration. (See Table 8 for details on security levels.)

8.4.1 Where are they stored?

Users logged in as Engineers can change the passwords for all levels including Engineer.

On the menu select **Tools > Passwords**. This will open the page as shown below.

![Password Change Screen](image)

To fix this problem obtain a copy of the password file that is known to work and copy to relevant directory.

8.4.5 Where to get Help

The Optimizer RT software is installed with a full searchable help system. The help can be entered from Help on the menu.

Context sensitive help is provided. To access the help, select the item you want help on and press F1 on the keyboard.

All Optimizer RT parts are non user serviceable. If a problem is detected please return to the local representative.

8.4.2 How can they be changed?

To change a password, alter the entry shown against the security level you wish to change. Click the update button. The new passwords are now stored in the password file.

A reset to default button is also provided to change the passwords back to the original values.

Passwords must be between 4 and 10 characters.

8.4.3 How do I make all my machines use the same passwords?

To make computers use the same passwords is as simple as copying the password.pss file from the machine that contains the passwords you want to use to the other machines.

8.4.4 Cannot open password file?

If the password file is damaged or missing then you will not be able to log in to the Optimizer RT software. The file may become damaged due to it being edited externally to the Optimizer RT.

Passwords are stored in the same directory as the program file. They are contained in the file passwords.pss.
9 EMC Certification

EN 50082-1  Generic Immunity
Standard, Residential, Commercial, Light Industry. (AS/NZS4252.1)

EN50081-1  Generic Emissions (FCC Part 15 & EN55022 Class B) (AS/NZ3548)

Australian Compliance

RFS Australia
36 Garden Street
Kilsyth 3137
Victoria Australia
ABN 99 004 66 097
10 Optimizer RT - FAQ’s

1. What information is required before running the software?
The Serial Number of each ACU MUST be recorded with the Model number of the antenna that it is attached to, and the sector location that the antenna is installed at.
(Example. ACU 03140425 on APVX18-206515L on Sector Red 1-4)

2. Does it matter which order I connect the ACU’s in?
No. Any order is acceptable.

3. Do I need a separate control cable for each Sector?
No. Only one control cable is required per system (to a maximum of 30 ACU’s)

4. Are the ACU’s and Cables weather proof?
Yes. Both the ACU’s and Cables have weather seals (O-Rings) to prevent water entering.

5. What is the longest cable run I can use?
Total combined cable run from start (at Protocol adapter) to end (at last ACU in chain) should not exceed 300 meters (1000 feet). Ensure adequate protection (grounding) is used at base and top of tower.

6. Can the antenna be adjusted without the ACU?
Yes. Using a 3/16” AF (5mm) Hex head driver, observing the ‘Dip Stick’ for tilt angle.

7. What should I do to the unused connector on the last ACU?
Leave the plastic dust cap in place and secure with tape.

8. What is the maximum number of antennas that can be down tilted simultaneously?
One.

9. What is the MTBF of the ACU?
The ACU design life is 36500 operations minimum.

10. Which is more accurate, the ‘Dip-stick’ or the software?
The software is more accurate, +/- 0.1 Deg, whereas the dipstick is accurate to +/- 0.5 Deg.

11. The software does not communicate with the ACU.
Check the correct communication port is selected in Tools/Setup menu, and protocol adapter is connected to the PC and power supply.

12. The antenna model I have is not shown for selection in the ‘ANTENNA TYPE’ field.
The antenna reference data file is not in the same directory as the Optimizer software, or the software has not been restarted since the file was copied. For further information on data files refer to Section 4.1.3.