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PRORXB Broadcast Receiver

User Guide

Software v2.0

Cobham Tactical Communications and Surveillance

UNCLASSIFIED

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0. Preface

0.1 About this Document

This document contains relevant details required for the Operation and Administration of the equipment or system.

Since the available functions are licensed and depend on the specific implementation, not all the functions and or applications contained in this document may be relevant or applicable to the system you will be working with.

Actual screen presentation may differ from those in this document due to software changes or your browser configuration.

0.2 Who Should Read this Book

This document is meant for anyone interested in how the system can best be used, but it is of most benefit to:

- **Operators** who are in charge of the daily operation of the equipment.
- **Installers** who are responsible for the pre-installation, on-site installation and configuration of the system in the end-user environment.
- **Maintainers** who are responsible for maintaining the equipment or system.

0.3 Assumed Knowledge

Throughout this book it is assumed that the reader has a thorough knowledge of:

- Basic Personal Computer Operations.
- Basic Radio Frequency (RF) Principles.

0.4 Notice about Specifications

While Cobham makes every attempt to maintain the accuracy of the information contained in its product manuals, the information is subject to change without notice. Performance specifications included in this manual are design-centre specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

0.5 Notice about this Guide

The product described in this manual is subject to continuous development and improvement. All particulars of the product and its use (including the information and particulars in this guide) are given by Cobham in good faith. However, it is acknowledged that there may be errors or omissions in this guide.

0.6 Typographic Conventions

This document uses these typographic conventions to identify text that has a special meaning:

Typographic Convention	Example
TEXT in small capitals represents a specific key press on the console **keyboard** or hardware **panel**.	ESC, F1, SHIFT
The + sign means "hold down the first key while pressing the second key".	Press CTRL+C to abort
<Text> Serves as a placeholder for variable text that you will replace as appropriate to its context.	Use the filename <systemname>.sys for…
Text in **bold** emphasises a new word or term of significance.	We call this a **protocol** and its function is…
[-a] Text in these brackets indicates an optional component that can be left out.	Ls [-a]
NN This indicates a value entered on a **numeric keypad**.	45 on the numeric keypad
Successive menu selections are shown using **arrows** to indicate a sub-menu. In this example this would mean: Select the **Insert** menu, then select **picture**, then select **from file**.	**Insert** > **picture** > **from file**

0.7 Symbols

This document uses these symbols to highlight important information:

WARNING: A written notice given to a reader when a situation might result in personal injury or loss of life.

CAUTION: A written notice given when a situation might result in damage to or destruction of equipment or systems.

Note: A written notice given to draw the reader's attention to something or to supply additional information.

0.8 Trademarks

All trademarks or registered trademarks that appear in this document are the property of their respective owners.

0.9 Related Documents

You may also need to read:

Document	Source
Solo Concept Guide	Cobham Tactical Communications and Surveillance
IP Concept Guide	Cobham Tactical Communications and Surveillance

0.10 Document History

This document was written and produced by the Cobham Technical Publications Team.

This is a change controlled document. Each main page of this document displays a revision number and date at the bottom left corner of the page. The revision is also indicated in the table below.

Changes to any page will raise the revision status of the whole document.

Revision	Date	Authors	Summary of Changes
Draft 1	2011-04-11	R Cogswell	Initial Draft
Revision 1.0	2011-12-23	R Cogswell	First Release
Revision 1.1	2013-01-30	R Cogswell	Added Remote Commands.
Revision 1.2	2013-05-02	R Cogswell	FEC Correction
Revision 1.3	2013-07-25	R Cogswell	Updates to Streaming, HDMI connector and remove CA0511 cable.
Revision 1.3.1	2013-07-22	R Cogswell	Fixed TOC.

Contents

1. Systems Description

The subject equipment of this User Guide is:

Equipment Title	Part Number
Broadcast Receiver	PRORXB-

Figure 1-1 – PRORXB Broadcast Receiver

1.1 What is the PRORXB Broadcast Receiver?

The PRORXB is a feature rich multi-way diversity COFDM receiver designed to work with the next generation of H.264 wireless camera systems.

Designed specifically for the demanding broadcast market, it is supplied in a 1/2 19" 2U high rack receiver chassis, where two units can be mounted together to occupy a 19" slot and uses standard broadcast connectors for signal interfaces.

It is available with 2-way, 4-way, 6-way and class leading 8-way maximum ratio combining RF inputs, ensuring video is recovered free from the distortions typically associated with fading and multipath. All DVB-T 6/7/8MHz modes are supported, plus optional Cobham Narrowband, enabling broadcast quality SD signals to be transmitted in only 2.5MHz bandwidth. Designed to work with external Cobham down-converters, the receiver can be located up to 100m from the antennas using standard 75Ω co-axial cables.

The PRORXB incorporates an extremely flexible decoding platform, with low-delay SD and HD H.264 decoding capability plus an SD MPEG2 decoder for compatibility with existing systems. Multiple video output formats are offered with composite and SDI outputs in SD mode and HD-SDI and in HD mode. SDI/HD-SDI both feature embedded audio and a HDMI output is provided for use with domestic TVs. Please note HDMI is enabled as a cost option.

A full Genlock facility is available in both SD and HD modes. When in HD mode, an optional downconverted SD composite video monitoring output is also offered. When enabled, the downconverted SD is also available on the SDI2 output.

The PRORXB can be controlled through its OLED front panel display, as well as on its RS232 or IP Ethernet browser control interfaces.

For customers wanting to distribute received video to remote locations, the PRORXB is supplied with ASI and optional IP streaming outputs.

A comprehensive On-Screen Graphical display is available for monitoring and diagnostics, which can be enabled or disabled separately on the composite and SDI outputs.

1.2 What are the Features and Benefits of PRORXB?

It can be very useful to understand how the features of the unit yield tangible benefits to you. This table summarises these features and, more importantly, the benefits.

1.2.1 Features and Benefits Table

Key Features	Key Benefits
Digital COFDM Modulation	Excellent performance - Resistant to multipath interference, delivers high quality video and audio, even when mobile or in built-up areas like urban environments.
Receivers with 2, 4, 6 or 8-way COFDM maximum ratio combining antenna diversity.	Excellent performance and reliability - Enables fade and multipath elimination delivering reliable reception.
Compliant DVB-T Modulator and comprehensive demodulation at 8, 7, and 6MHz,	True multi-mode operation - Simple integration with your current equipment.
Proprietary narrowband. 2.5, 1.25 MHz and 625 kHz option. BPSK and 8PSK. CIF and QCIF.	Spectrally efficient transmission modes.
H.264 SD & HD decoding.	Highly flexible – Configure the unit to suit your current operation.

Key Features	Key Benefits
Low Delay, high quality and fully MPEG-2 compliant SD decoding	High reliability - Use a radio system just like it was a line.
HD-SDI/SDI with embedded audio out	Simple connection to your current equipment.
Composite video output (with optional HD down-conversion)	Low cost of ownership - Easy integration with Composite systems.
HDMI Output (Cost Option)	Industry standard linking.
ASI input and output	Low cost of ownership - Easy connection to your current devices
IP control and optional IP streaming video	Easy to use - Operations staff can make quick changes to reconfigure the receiver. More flexibility – IP streaming enables internet based broadcast systems to be supplied.
Genlock input	Easy synchronisation with your current systems.
Comprehensive On-Screen display (OSD)	Software Driven - Simple and fast to deploy and operate – saves you time and cost with diagnostics for link analysis, including spectrum analyser.
External Downconverters provide choice of L, S or C band solutions	Improved operational efficiency - Efficient use of limited radio spectrum. Choose the frequency that suits your operations. Select licence free bands for some operations. Avoid cluttered parts of the radio spectrum. Also enables convenient antenna placement.
Integral Encryption at AES128 or AES256 (Optional).	Secure - Preserve your security of transmission with powerful, simple to operate encryption.
Facility for generating log files of receiver status information. (Available in future release of software).	Makes receiver management easy and simple.

Table 1-1 – Features and Benefits of PRORXB

1.3 Getting an Overview of the PRORXB

Diagram: PRORXB Main System

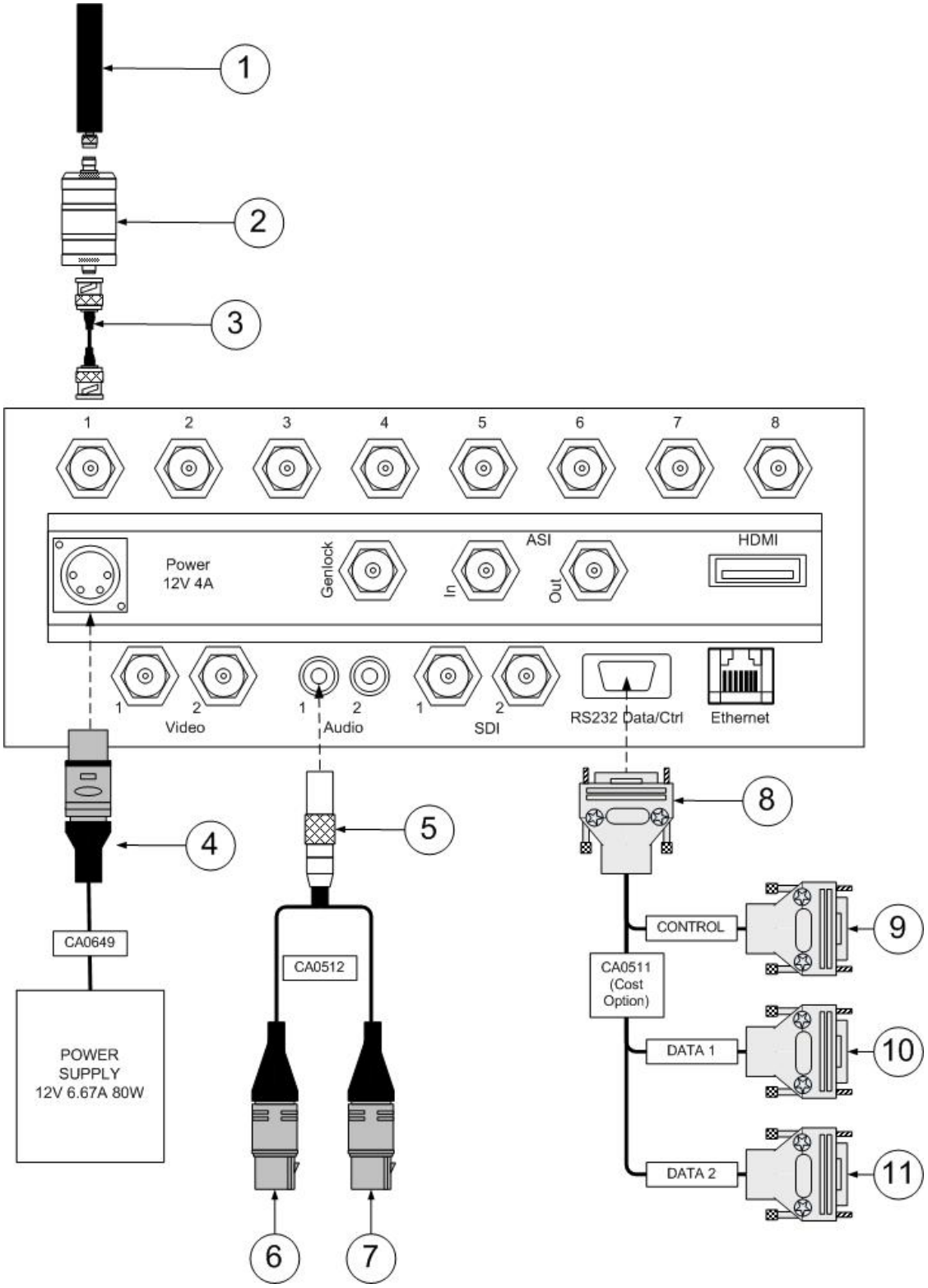


Figure 1-2 Main System Diagram

No	Item	Function
1	Antenna.	Matched to band of the downconverter. Do not over tighten – hand tight only.
2	Downconverter.	Enables the PRORXB to be used in various RF bands.
3	IF cable, TNC 2-way plug, (pins) to BNC 2-way plug, (pins).	Downconverter to PRORXB connection. IF – Intermediate Frequency.
4	XLR 4-way plug (sockets).	Power connection to the PRORXB from the CA649 power supply unit.
5	Lemo OB 5-way plug (pins) twin key.	For Audio output. CA512 PRORXB External XLR Audio Cable Assembly 2 Metres.
6	XLR 3-way plug (pins)	For left audio output.
7	XLR 3-way plug (pins)	For right audio output.
8	D-Type 9-way plug, sockets.	For RS232 control and data output.
9	D-Type 9-way plug, sockets.	For PC control.
10	D-Type 9-way plug, sockets	For Data 1 output.
11	D-Type 9-way plug, sockets	For Data 2 output.

Table 1-2 – Main System Diagram Legend

2. Getting Started

2.1 Identifying your Device

There is only one type of PRORXB Receiver described in this User Guide.

This is a **PRORXB Receiver.**

Its type designation is: **PRORXB-**

Size: 358mm (L) x 220mm (W) x 87.5 (H).

Weight: 2.8kg.

Operating Temperature: -20 deg C to +60 deg C.

DC Input 9 to 16VDC Reverse Polarity Protected

Power Consumption:

27W (Two Way Diversity Inc. D/C)
35W (Four Way Diversity Inc. D/C)
43W (Six Way Diversity Inc. D/C)
51W (Eight Way Diversity Inc. D/C)

Figure 2-1 – PRORXB Receiver

2.2 Unpacking your PRORXB

Carefully open the packaging and remove the device. Verify that all the components have been included in the package as shown in the packing list. Inspect the unit for shipping damage.

Retain the packing list and all the packing materials for storage.

The codes on the picture mean:

- CA – Cable Assembly
- SA – Sub Assembly
- AP – Assembly Part.

The codes are useful to you if you need to order a new cable sometime.

Diagram: Unpacking your PRORXB

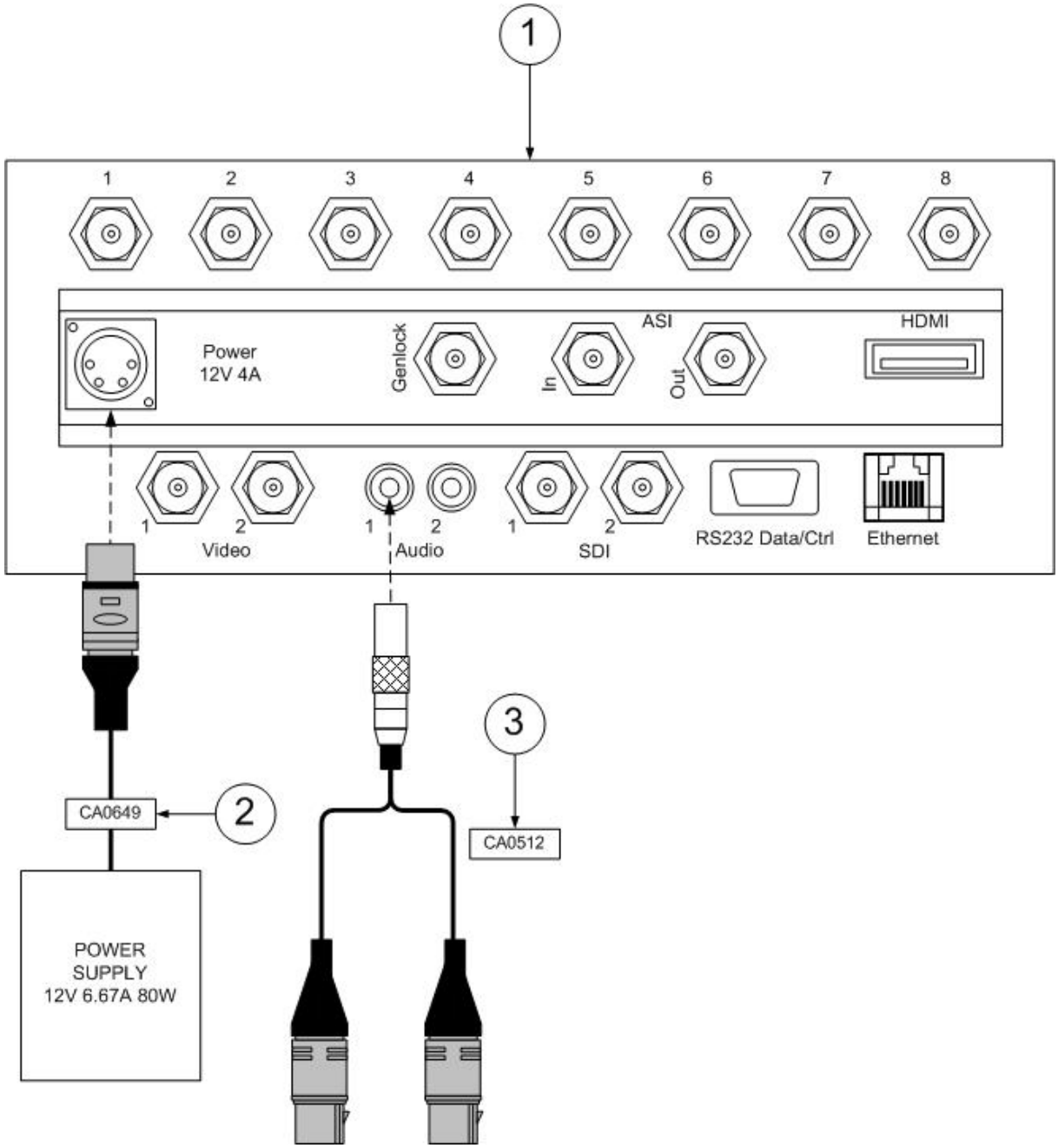


Figure 2-2 – PRORXB Packing Diagram

No	Item	Notes
1	Main Unit.	PRORXB-2 for example, 2-way diversity, DVBT demodulation, includes MPEG2 and H.264 SD decoder, Composite and SDI out, Genlock, Web-browser interface, with BNC connectors, excludes antennas and down converters.
2	Pro-RXB External 12V 6.67A 80W Desktop Power Supply Unit Assembly 1.165 Metres.	CA0649 Power Cable Assembly (3 metres) PSU Block to XLR 4-way plug (sockets) 12VDC.
3	Pro-RXB External XLR Audio Cable Assembly 2 Metres.	CA0512 Lemo OB 5-way plug (pins) to XLR 3-way plug, sockets (left audio) XLR 3-way plug, sockets (right audio).

Table 2-1 – Parts in the PRORXB Package

Troubleshooting

☹ I don't have all the parts you described!

☺ Call your Cobham contact right away and we'll get this solved for you.

The Cobham Centre – Solent Fusion 2 1100 Parkway, Solent Business Park Whiteley, Hampshire PO15 7AB, England	+44 (0)1489 566 750

2.3 About the Label on your PRORXB

Which model do I have? What is its Serial Number?

This topic contains information covering placards, labels, markings, etc., showing the part number, legend and location of each placard, label, or marking required for safety or maintenance significant information.

Diagram: PRORXB Label

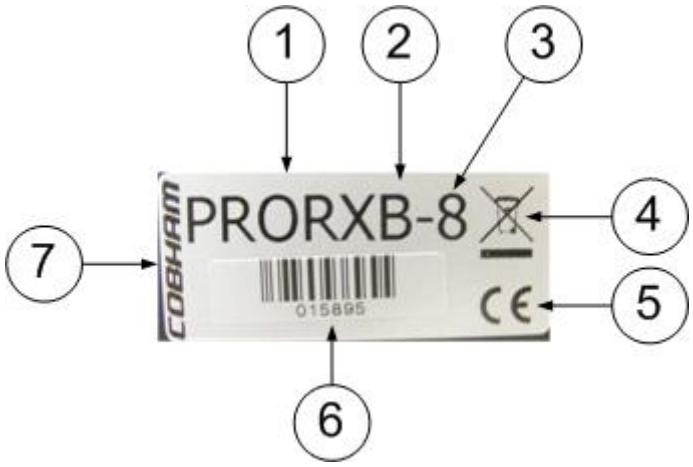


Figure 2-3 – PRORXB Label

No	Item
1	Professional Receiver Group.
2	Broadcast variant with HD Decoder.
3	Number of ways of diversity (eight in my example).
4	Disposal mark.
5	The **CE marking** (also known as **CE mark**) is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA). The **CE marking** certifies that a product has met EU consumer safety, health or environmental requirements.
6	Barcode with six digit serial number. We'll nearly always ask you for this number during a support call.
7	Manufacturer.

Table 2-2 – PRORXB Label Key

2.4 Planning the Hardware Installation

During the design and layout of the system, you should give careful consideration of the location of this and all other associated modules. Some of the items to consider include:

- Space - Leave at least 100mm clearance left and right to allow for cable bending.
- Proximity to other devices (for example, source equipment).
- Length of cable runs.
- Environmental conditions (temperature, humidity, etc.)
- Access for service repair.
- Compliance with local regulations.

2.5 Identifying the Variants of PRORXB

Step 1: Identify the Variants

Equipment Title	Part Number
2-way diversity, DVBT demodulation, includes MPEG2 and H.264 SD decoder, Composite and SDI out, Genlock, Web-browser interface, with BNC connectors, excludes antennas and down converters.	PRORXB-2 and PRORXB-2NA
4-way diversity, DVBT demodulation, includes MPEG2 and H.264 SD decoder, Composite and SDI out, Genlock, Web-browser interface, with BNC connectors, excludes antennas and down converters.	PRORXB-4 and PRORXB-4NA
6-way diversity, DVBT demodulation, includes MPEG2 and H.264 SD decoder, Composite and SDI out, Genlock, Web-browser interface, with BNC connectors, excludes antennas and down converters.	PRORXB-6 and PRORXB-6NA
8-way diversity, DVBT demodulation, includes MPEG2 and H.264 SD decoder, Composite and SDI out, Genlock, Web-browser interface, with BNC connectors, excludes antennas and down converters.	PRORXB-8 and PRORXB-8NA

2.6 Identifying the Options on PRORXB

The PRORXB has **two** types of options:

- Accessory Options
- Licensing Options

Step 1: Identify the Accessory Options

Equipment Title	Part Number
Professional Receiver Broadcast 42HP Single Rack Front Panel.	PRORXBSRFP
Upgrade with extra 2-way diversity including additional licensing.	PRORXB-UP
Professional Receiver Coupler Kit.	PRORXCPLKT
Enable HDMI output on PRORXB receiver	PRORXB-HDMIUP

Step 2: Identify the Licensing Options

Equipment Title	Part Number
License for Receiver Streaming Upgrade (Professional Receiver Broadcast).	NETPRORXBIPUP

2.7 About the Software with your PRORXB

The PRORXB has **two** software elements:

- **Firmware** that runs inside the device on the boards.
- **Control Pages** that you access using your web browser on your Windows PC.

About the Firmware

Although much of the unit is built up of hardware components, many of the sophisticated features are implemented in firmware running on a Field Programmable Gate Array (FPGA) inside the device.

When you need to perform an internal software upgrade we provide an installer pack which contains all the code you'll need to do this easily.

About the Control Pages

The software tools provide users a convenient access to the most common features and functions of the device. All software tools are implemented as a web interface. The advantage of a web interface is that it is independent from the user's operating system and doesn't require any specific software on the host PC.

The Control Panel on the front of the unit gives access to many of the features of the radio but for more sophisticated operations and configuration tasks you'll connect up a PC running a web browser to access the Control Pages on your PRORXB.

The Control Pages enables you to set up sixteen presets in the radio and have control over many parameters of the unit.

Here's what one of the PRORXB Control Pages look like:

Screenshot: PRORXB Control Page

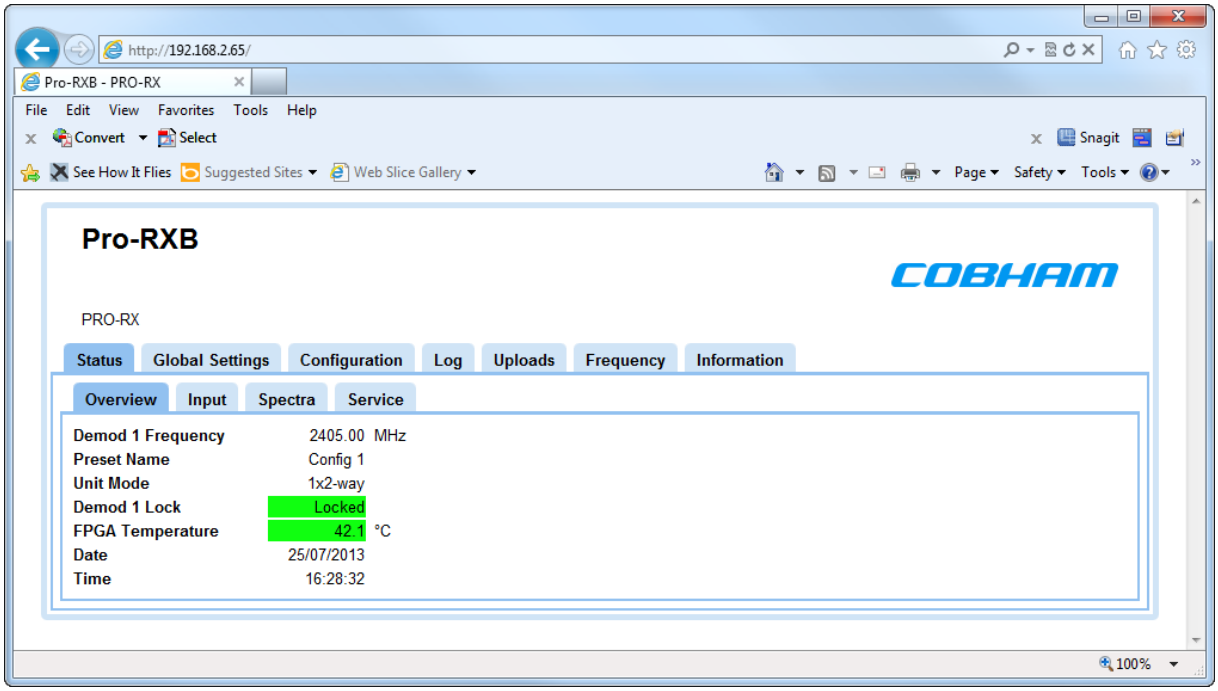


Figure 2-4 – PRORXB Control Page

3. Controls, Connections and Indicators

3.1 About Controls, Connections and Indicators

You'll need to be able to find all the **controls** and **connections** on the unit. You'll also need to be able to identify and interpret any **alarms** or **indicators**. The following topics will help you identify all these features.

Each PRORX has **front** and **rear** panels which contain all the interface connections for the units and the controls and indicators. There is an operational control panel on the front of the unit.

3.2 Exploring the Front Panel

Diagram: Front Panel

Figure 3-1 PRORXB Front Panel

No	Item	Used for...
1	Rack Mounting Ears.	Removable metalwork to enable the PRORXB to be fitted in a half of a 19" rack. Two PRORXBs can be joined together to fit a full 19" rack space using the Professional Receiver Coupler Kit, part code PRORXCPLKT.
2	Display Screen.	This two line OLED display screen forms part of the Control Panel where you can quickly set up many of the features of the PRORXB.

No	Item	Used for...
3	Cancel / Back Button.	Press to cancel action or go back one level.
4	Joystick / Confirm Button	Move the joystick for UP, DOWN, LEFT and RIGHT. Press the joystick for ENTER.
5	Power Button.	Toggles the power on or off.
6	USB Jack.	Supplies USB Power.
7	BNC Jack.	For video output.

Table 3-1 – PRORX Front Panel Key

3.3 Exploring the Rear Panel

Diagram: Rear Panel

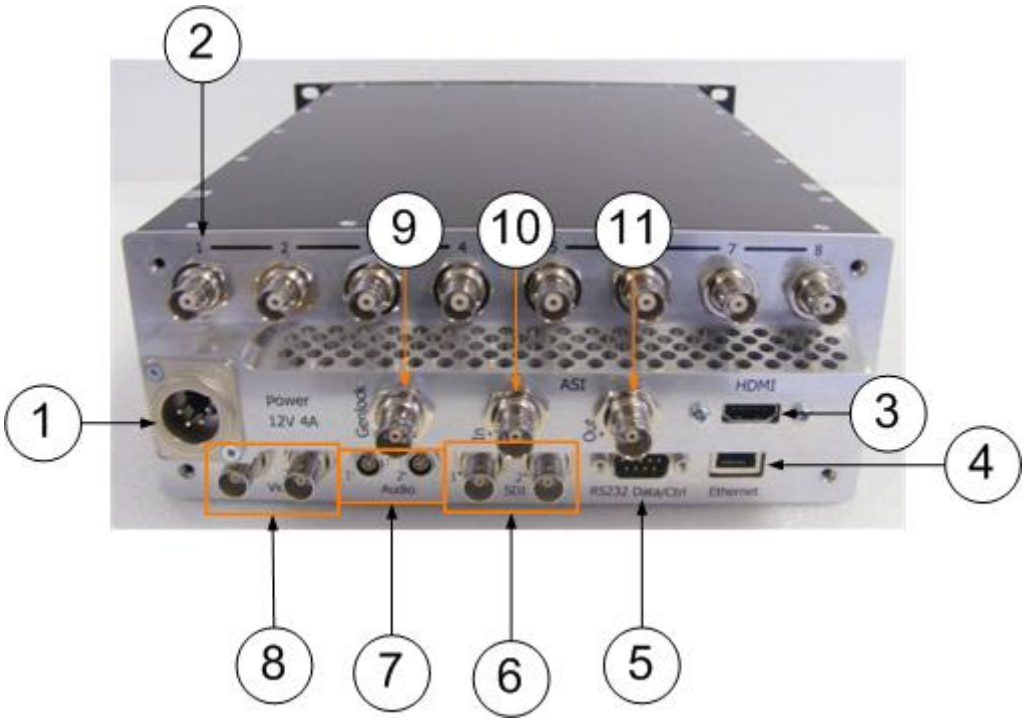


Figure 3-2 PRORXB Rear Panel

No	Item	Used for…
1	XLR 4-way jack, (pins) marked POWER 12V 4A.	Power input to the PRORXB.
2	BNC 2-way jack (sockets) x 8 marked 1 to 8.	Connect your IF cables from the downconverter / antenna assembly here. Do not over tighten. Hand-tight only.
3	HDMI Type-A 19-way jack, sockets.	HDMI (High Definition Multimedia Interface) output. **Note**: Not connected. Can be enabled as a factory fit cost option.
4	RJ45 8-way jack, (sockets) marked ETHERNET.	Ethernet input / output. You'll use this port to control your PRORXB using a web browser on your PC. It is also used for streaming video if your unit is licenced for that.
5	D-Type 9-way jack, (pins) marked RS232 Data/Ctrl.	RS232 Data/Control port. Data output and enables you to control the PRORX serially if required.
6	BNC 2-way jacks, (sockets) marked SDI 1 and SDI 2.	SDI video outputs, decoder 1 and 2.
7	Lemo OB 5-way jacks, (sockets) marked AUDIO 1 and AUDIO 2.	Audio outputs, decoder 1 and 2.
8	BNC 2-way jacks, (sockets) marked VIDEO 1 and VIDEO 2.	Composite video outputs, decoder 1 and 2.

Table 3-2 – Rear Panel Key

4. Setting up your PRORXB

4.1 Connecting the Antennas

This topic describes connecting systems designed mainly for transporting the RF signals. Of all the variables affecting single-channel radio communications, the one factor that an operator has the most control over is the antenna. With the right antenna, an operator can change a marginal net into a reliable net.

There are **eight** antenna interfaces located on the rear panel of the PRORXB receiver.

Note: If you have four-way diversity PRORXB then you **must** connect **four** antennas to achieve best performance from the four-way diversity receiver system.

If you have six-way diversity PRORXB then you **must** connect **six** antennas to achieve best performance from the six-way diversity receiver system.

If you have eight-way diversity PRORXB then you **must** connect **eight** antennas to achieve best performance from the eight-way diversity receiver system.

Before you Begin

You'll need:

- 2, 4, 6 or 8 downconverters that match the frequency range you want to receive.
- 2, 4, 6 or 8 antennas that match the frequency range of your downconverters.

Step 1: Select your Downconverters

All PRORXB receivers use downconverters to lower the frequency from microwave (L, S and C-Band) to an Intermediate Frequency (IF) between 51 and 858MHz that the on-board tuners in the receivers can use.

It is important to select the correct downconverter for the microwave transmission frequency you are planning to receive. Downconverters have a label to help you select the correct unit.

If you are using long cable runs from the base of the downconverter to the rear panel of the PRORXB, you may need to select a high gain version of the downconverter to deal with the RF losses in the long cable.

Step 2: Attach the Antennas to the Downconverters

1. Connect each antenna directly to the TNC jack on the top panel of each downconverter.
2. Do not over tighten the antenna – hand tight only!

Step 3: Set Antenna Polarization

1. COFDM links are very robust and are tolerant to changes in antenna position, however, it is important to try and keep the antennas in the **same plane** if possible.
2. The antennas used with the COFDM links are normally **linearly** polarized.

Step 4: Attach IF Cable to the Downconverter

1. Connect the TNC plug on the IF Cable to the TNC jack on the bottom panel of each downconverter.
2. Do not over tighten the TNC connector – hand tight only!

Step 5: Attach IF Cable to the PRORXB

Connect the BNC plug on the IF Cable to the BNC jack on the rear panel of the PRORXB.

Next Steps

Connect AC Power.

4.2 Connecting AC Power

Before you Begin

You'll need:

- A CA0649 Pro-RXB External 12V 6.67A 80W Desktop Power Supply
- PRORXB.

Step 1: Connect the AC Power

1. Connect the **XLR 4-way plug** (sockets) from the AC adaptor to the **XLR 4-way jack** (pins) on the PRORXB Receiver which is located on the left side of the rear panel.
2. Now connect the **IEC mains 3-way plug** (sockets) to the **IEC mains 3-way jack** (pins) on the AC adaptor.
3. Connect IEC mains plug to your **local AC supply** and switch on.

5. Basic Operation

5.1 Starting and Stopping the PRORXB

PRORXB units have a power switch on the right side of the front panel.

Before you Begin

You'll need:

- A PRORXB connected to a source of power.

Step 1: Powering Up

1. Press the Power Switch on the front panel.
2. You'll see the Splash display appear.
3. Let the unit Initialise.

Step 2: Shutting Down

It is important to shut down the system carefully. This ensures that all processes are terminated correctly and no data or settings are lost.

1. Press the Power Switch on the front panel.
2. The display will go blank.
3. The system is shut down safely.

Next Steps

Explore the Control Panel.

5.2 Exploring the Control Panel

When you have powered up the PRORXB you'll see the control panel located on the front panel.

Before you Begin

You'll need:

- A fully powered PRORXB

Diagram: Control Panel

Figure 5-1 PRORXB Control Panel

No	Item	Used for...
1	Display Screen.	This two line OLED display screen forms part of the Control Panel where you can quickly set up many of the features of the PRORXB.
2	Cancel / Back Button.	Press to cancel action or go back one level.
	Joystick / Confirm Button	Move the joystick for UP, DOWN, LEFT and RIGHT. Press the joystick for ENTER.

Table 5-1 – Control Panel Key

Next Steps

Navigate the Menu Pages.

5.3 Navigating the Menu Pages on the Control Panel

The PRORXB has a Control Panel which uses a system of **menu pages** which enable you to change **modes**, **configurations** and to control the **RF** settings.

Those menu pages are:

- Status
- Config

Before you Begin

You'll need:

- A fully powered PRORXB.

Step 1: Select the Status or Configuration Menu

1. On the front panel, press the **Cancel/Back** Button.
2. You'll see PRO-RX, **Status** on the display screen.
3. Pull the **Joystick/Confirm** Button down.
4. You'll see PRO RX, **Config** on the display screen.
5. You can cycle between **Status** and **Config** by moving the **Joystick/Confirm** button up and down.
6. Choose **Status**.
7. **Press** the centre of the **Joystick/Confirm** button to **select** the **Status** Menu.
8. **Press** the **Cancel/Back** button to **go back up a menu level.**

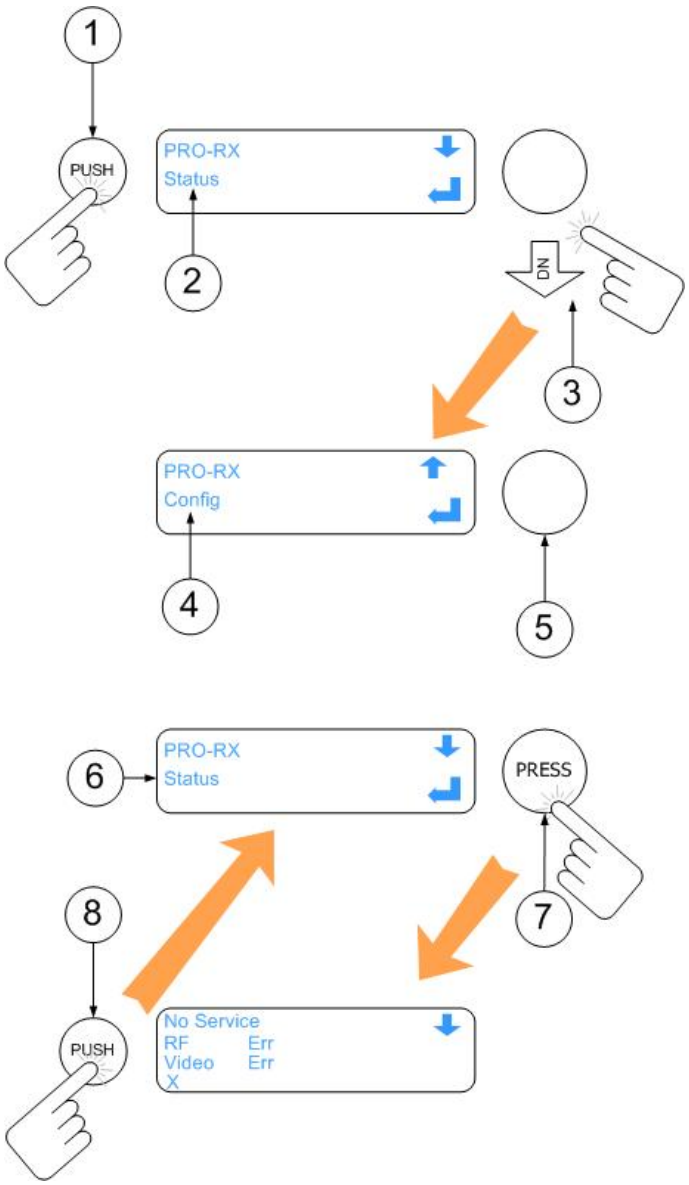


Figure 5-2 Select the Status or Configuration Menu

Next Steps

Explore the Status Menu.

5.4 Exploring the Status Menu

Before you Begin

You'll need:

- A fully powered PRORXB

Step 1: Select Status Menu

1. From the menu, choose **Status**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Status** menu.
3. Use the **Joystick/Confirm** button to move up and down the status menu

Menu	Sub-Menu	Notes
Status	No Service or Unit 1 RF Err or OK Video Err or OK	The Service status The RF lock status The Video lock status
	Config 1 Freq 2415.00 LO 1880.00 Low	The configuration in use The frequency in this configuration Local oscillator **frequency** and **side**
	BW 8MHz Const 16QAM FEC 1/2	The bandwidth in use Constellation in use FEC rate in use
	Input A to H No Lock SNR 0.0 Level -83.3	Input A to H Lock status The signal to noise ratio The received signal strength
	192.168.2.65 255.255.255.0 192.168.2.254	The IP Address of the unit The Subnet Mask of the unit The Gateway of the unit
	Software Version 2.0 HD Dec 1.3	Software versions: Firmware in the unit itself Firmware for the HD decoder in the unit
	Clock 26/07/2013 15:40:57	Date / Time: Date Time

Menu	Sub-Menu	Notes
	Tx Status Video Lock: ___ Battery: ____	If the transmitter has been configured to send its status information then it will be displayed here. Video lock status – reports if the input to the transmitter has a video lock. Battery status – Reports the voltage of the transmitters battery

Table 5-2 – Status Menu

Note: Don't worry if you accidentally press the **Joystick/Confirm** button when you are moving about the status menu. It really just shows you the current settings and will not allow you to change them.

Next Steps

Explore the Config Menu.

5.5 Exploring the Config Menu

Before you Begin

You'll need:

- A fully powered PRORXB

Step 1: Select Config Menu

1. From the menu, choose **Config**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Config** menu.
3. Use the **Joystick/Confirm** button to move up and down the Config menu

Menu	First Sub-Menu	Second Sub-Menu	Notes
Config	**Global Setup**	Preset Config 1	
		DHCP Disabled	

Menu	First Sub-Menu	Second Sub-Menu	Notes
		IP Address 192.168.2.65	
		IP Netmask 255.255.255.0	
		IP Gateway 192.168.2.254	
		Rest. Defaults Off	
	RF Setup	RF Frequency 2405.00	
		LO Preset DCBGS-200250	
		LO Frequency 1880.00	
		LO Side Low	
		Receiver Mode DVB-T	
		Bandwidth 8 MHz	
		Guard Interval 1/32	
		Polarity Normal	
		LNB Power On	
	Decoder Setup	Decoder Input Demod 1	

Menu	First Sub-Menu	Second Sub-Menu	Notes
		Service Mode Defaults	
		Prog. List (0) No Service	
		Default Service Unit 1	
		Default ID 1	
		Man. Video PID1 0300	
		Man. Audio PID1 0200	
		Man. PCR PID1 8190	
		Man. Data PID1 100	
	Video Setup	OSD Mode Off	
		OSD Eng. Mode Spectra	
		OSD Spectrum Input A	
		Genlock Mode Off	
		Lines Offset 0	
		Pixels Offset 0	

Menu	First Sub-Menu	Second Sub-Menu	Notes
		Freeze Frame Off	

Table 5-3 – Config Menu

5.6 Changing Numbers in the Config Menu

Sometimes you'll need to change numbers in the Config menu, like frequencies for example. This technique will apply to all numbers you change in the Config menu.

Before you Begin

You'll need:

- A fully powered PRORXB

Step 1: Select Config Menu

1. From the menu, choose **Config**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Config** menu.

Step 2: Select Config Sub-Menu

3. Use the **Joystick/Confirm** button to move up and down the Config menu and choose **RF Setup** (a sub-menu) from the choices: **Global Setup**, **RF Setup**, **Decoder Setup** or **Video Setup**.
4. **Press** the centre of the **Joystick/Confirm** button to **select** the **RF Setup** sub-menu.

Step 3: Select Config you want to Change

5. Use the **Joystick/Confirm** button to move up and down the RF Setup sub-menu.
6. When you find a config with numbers you want to change, **press** the **Joystick/Confirm** button to select that config for editing. (try RF Frequency as an example).

Step 4: Change the Numbers in the Config

7. Move the **Joystick/Confirm** button left and right to move the **cursor** underneath each digit.
8. Move the **Joystick/Confirm** button up and down to increase and decrease the value of the digit.
9. Press the **Joystick/Confirm** button to **save** the new setting.
10. Press the **Joystick/Confirm** button again to **confirm** the new setting.
11. When done, press the **Cancel/Back** button to return to the top menu.

Note: If you do not understand any of the parameters mentioned above, they are all fully covered in the chapter about the control pages.

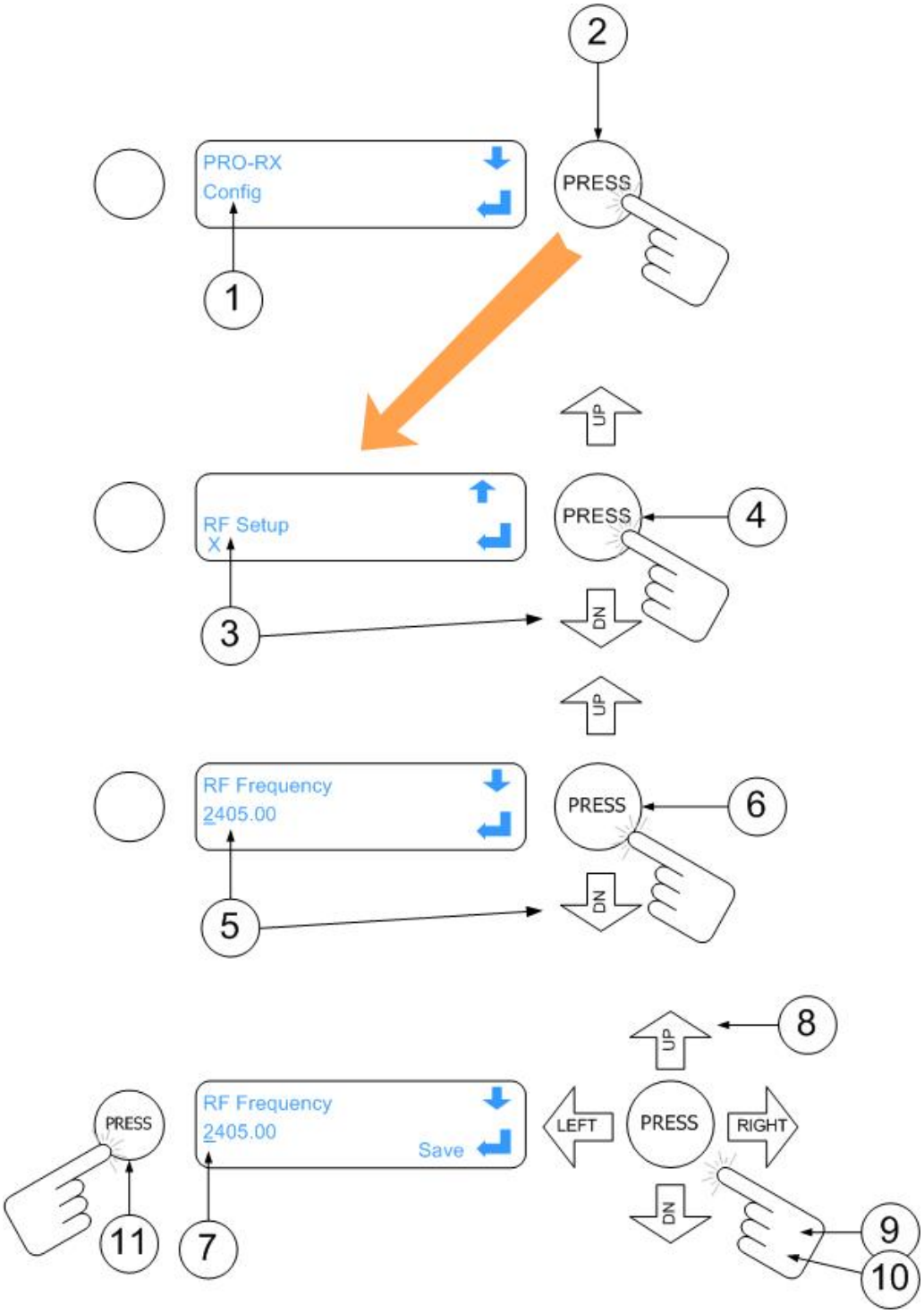


Figure 5-3 Changing Numbers in the Configuration Menu

5.7 Toggling DHCP On or Off

When shipped, the PRORXB is set to be given an IP address by an external DHCP server.

You may need to switch this DHCP facility off.

Before you Begin

You'll need:

- A fully powered PRORXB

Step 1: Select Config Menu

1. From the menu, choose **Config**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Config** menu.

Step 2: Select Global Setup Sub-Menu

1. Use the **Joystick/Confirm** button to move up and down the Config menu and choose **Global Setup**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Global Setup** sub-menu.

Step 3: Select DHCP

1. Use the **Joystick/Confirm** button to move up and down the Global Setup sub-menu.
2. When you find **DHCP**, press the **Joystick/Confirm** button to select it for editing.

Step 4: Change the DHCP Mode

1. Move the **Joystick/Confirm** button up and down to toggle between enabled and disabled.
2. Press the **Joystick/Confirm** button to **save** the new setting.
3. Press the **Joystick/Confirm** button again to **confirm** the new setting.
4. When done, press the **Cancel/Back** button to return to the top menu.

5.8 Setting a Fixed IP Address

One of the very early things you'll want to do is be able to set up your fixed IP address on the unit.

Before you Begin

You'll need:

- A fully powered PRORXB.
- Ensure you have disabled DHCP.

Step 1: Select Config Menu

1. From the menu, choose **Config**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Config** menu.

Step 2: Select Global Setup Sub-Menu

1. Use the **Joystick/Confirm** button to move up and down the Config menu and choose **Global Setup**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Global Setup** sub-menu.

Step 3: Select IP Address

1. Use the **Joystick/Confirm** button to move up and down the Global Setup sub-menu.
2. When you find **IP Address**, press the **Joystick/Confirm** button to select it for editing.

Step 4: Change the IP Address

1. Move the **Joystick/Confirm** button left and right to move the **cursor** underneath each digit.
2. Move the **Joystick/Confirm** button up and down to increase and decrease the value of the digit.
3. Press the **Joystick/Confirm** button to **save** the new setting.
4. Press the **Joystick/Confirm** button again to **confirm** the new setting.
5. When done, press the **Cancel/Back** button to return to the top menu.

Note: You can also use this procedure to configure the **IP Netmask** and **IP Gateway** settings.

5.9 Setting the Receiver Configuration

A common operational requirement is to be able to change preset configurations quickly.

Before you Begin

You'll need:

- A fully powered PRORXB

Step 1: Select Config Menu

1. From the menu, choose **Config**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Config** menu.

Step 2: Select Global Setup Sub-Menu

1. Use the **Joystick/Confirm** button to move up and down the Config menu and choose **Global Setup**.
2. **Press** the centre of the **Joystick/Confirm** button to **select** the **Global Setup** sub-menu.

Step 3: Select Preset

1. Use the **Joystick/Confirm** button to move up and down the Global Setup sub-menu.
2. When you find **Preset**, press the **Joystick/Confirm** button to select it for editing.

Step 4: Change the Preset

1. Move the **Joystick/Confirm** button up and down to increase and decrease the value of the digit.
2. Press the **Joystick/Confirm** button to **save** the new setting.
3. Press the **Joystick/Confirm** button again to **confirm** the new setting.
4. When done, press the **Cancel/Back** button to return to the top menu.

6. Advanced Operation

6.1 About Encryption

The target is focused on intercepting your radio signal. To do this, all that they need is a radio receiver that operates in the same mode and on the same frequency you are using to transmit. The mere fact that you are operating gives them valuable information. It tells them that you are in the area and by the number of stations operating on the same frequency they can estimate the size of the operation against them. If your radio net is operating in the clear, the target specialists can see or hear exactly what is being transmitted for even more information. When analysing the traffic patterns, the target can work out which station is the net control station and identify the headquarters.

6.2 Setting up Encryption

If the AES scrambling option has been purchased for the SOLO system in use, then it is possible to encrypt the link. Both AES128 and AES256 are licence-controlled features. You'll need to encrypt the traffic leaving the transmitter and set up the receiver for decrypt.

Note: The word **Encryption** applies to the whole process of encryption and decryption. We'll just use the word encryption for this receiver manual even though what is actually going on here is a decryption process.

Before you Begin

You'll need:

- A fully powered PRORXB.
- The correct license loaded on the PRORXB for Encryption.
- A laptop connected to the PRORXB configured to browse the Control Pages.

Step 1: Select the Encryption Mode

1. Click on the **Configuration** tab.
2. In the **Descrambling Mode** drop-down box click the drop-down arrow and select an encryption type. (AES128 in my example).
3. Click the **Apply** button.
4. The **Configured Successfully** message box opens.
5. Click the **OK** button.

Screenshot: Select the Encryption Mode

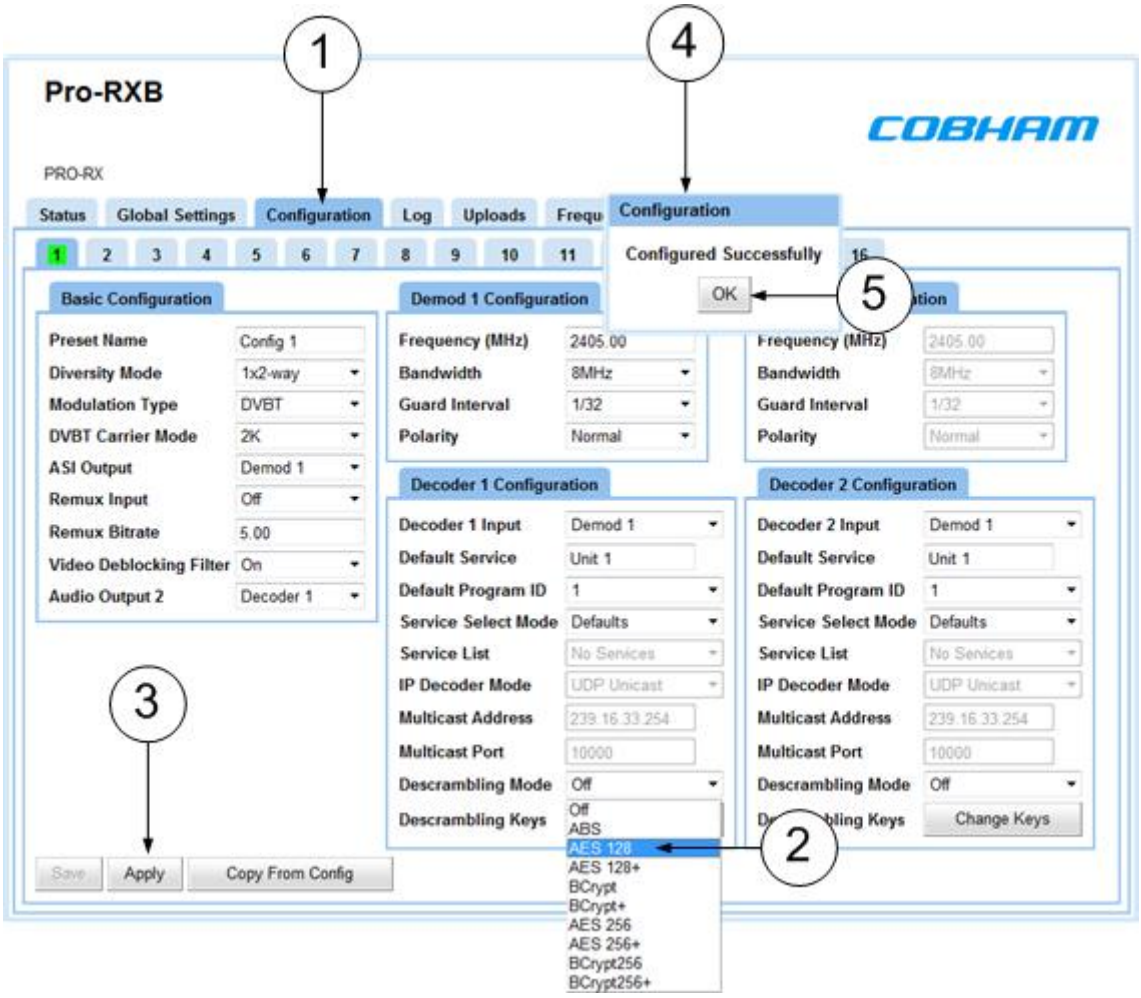


Figure 6-1 Select the Encryption Mode

Step 2: Change the Descrambling Keys

The **encryption key** is a 128bit value for AES128 and a 256bit value for AES256, and is entered as 32 or 64 ASCII hexadecimal characters (0..9, A..F).

1. Click on the **Configuration** tab.
2. Click the **Change Keys** button.
3. The **Enter Scrambling Key** dialog box opens.
4. In the **Key Type** drop-down box click the drop-down arrow and select the key type you are trying to write. (Should match the key type you chose in *Select the Encryption Mode* above).
5. In the **AES128 key** text box, type the encryption key you want to use.
6. Click the **OK** button.
7. The **Scrambling Key Set** box opens.
8. Click the **OK** button.

Screenshot: Change the Encryption Key

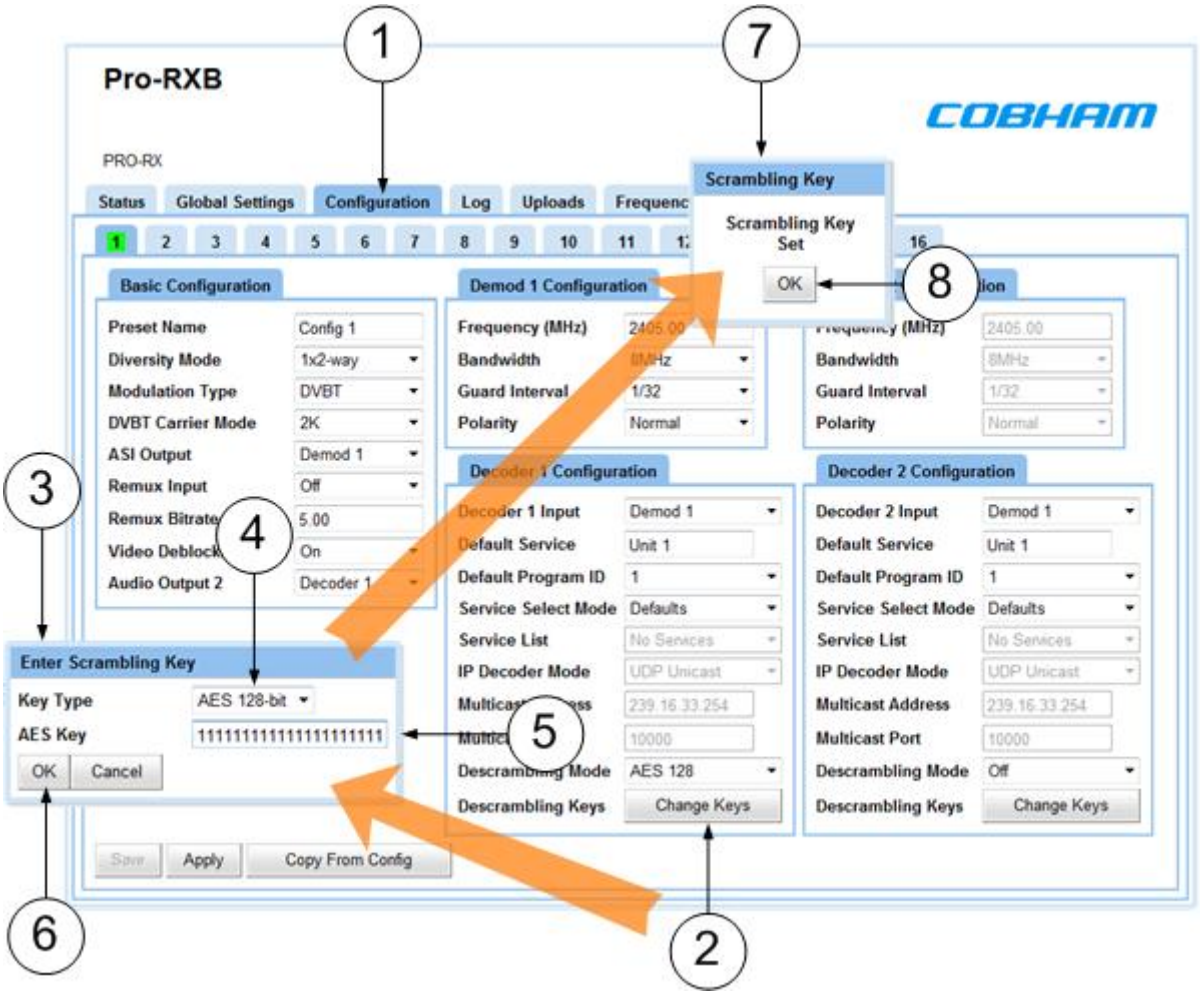


Figure 6-2 Change the Encryption Key

6.1 About the Encryption Key Characters Required

In our example above we used AES128 encryption. This needed a key of 32 characters. If we had chosen AES256 it would need a 64 character key which we spread over two fields like this:

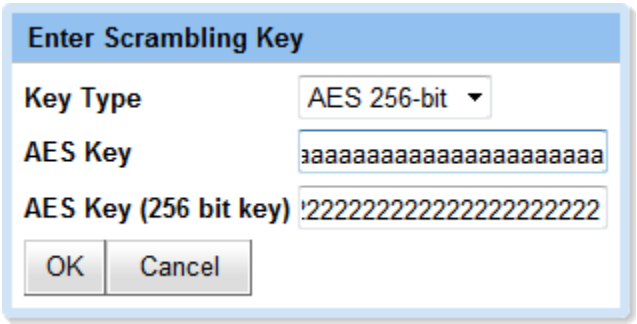


Figure 6-3 Encryption Key for AES256

Key Type	Number of Characters Needed
ABS	8
AES128	32
AES256	64 (32 in each field)

Table 6-1 – Encryption Key Characters Required

6.1 About Streaming Over IP

Note: This section is relevant only to customers that have the Streaming licence loaded onto their PRORXB unit.

Streaming is the transmission of digital audio or video or the listening and viewing of such data without first storing it.

The PRORXB supports:

- Raw Multicast streaming
- RTSP/RTP streaming.

6.2 Configuring UDP Multicast Streaming

When you have got a Video or Audio service into the PRORXB, you may want to stream that information down a fixed IP link.

For multicast streaming the transport stream video data is transmitted over the Ethernet network by means of multicasting i.e. continuous real-time streaming of packets accessible to any PC connected to the network.

It is therefore possible for more than one connected PC to view the streamed data simultaneously.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.
- The PRORXB must have a Streaming licence installed.
- Have a video transmission being received on Demod 1 of your PRORXB.

Step 1: Open the Global Settings Tab

1. Click on the **Global Settings** tab.
2. Find the **Streaming Settings** Pane.

Step 2: Configure the IP Settings Pane - Gateway

For multicast operations it is very important that you configure the **gateway** in the IP settings pane even though we might not have a gateway in our network.

1. You must use an IP address in the same network range as the PRORXB and for simplicity; we recommend you use the actual PRORXB IP Address for your Gateway too.

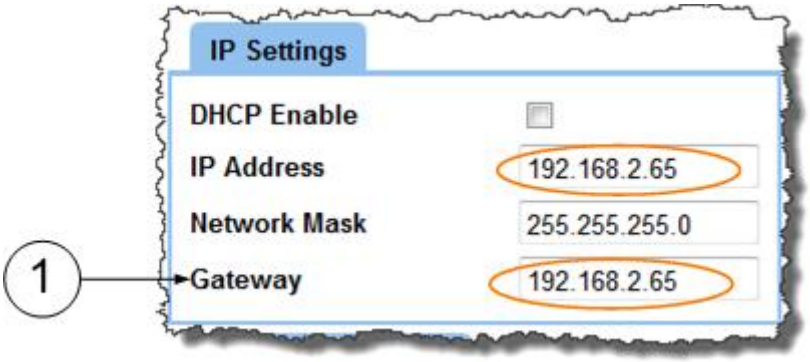


Figure 6-4 Configure the Gateway in the IP Settings Pane

Step 3: Configure the Streaming Settings

1. Check the **Streaming Enable** checkbox.
2. In the **Streaming Mode** box select **UDP Multicast**.
3. In the **Streamer Select** box choose the source you want to stream (**Demod 1** in my example).
4. In the **Multicast Address** box set **239.16.33.254**.
5. In the **Multicast TTL** box set 10.
6. In the **Multicast Port** box set 10000.
7. In the **Multicast Service Name** box set 10000.
8. In the **Multicast ToS** box set Routine (0).
9. Click the **Apply** button.
10. The **Configured Successfully** message opens.
11. Click the **OK** button.

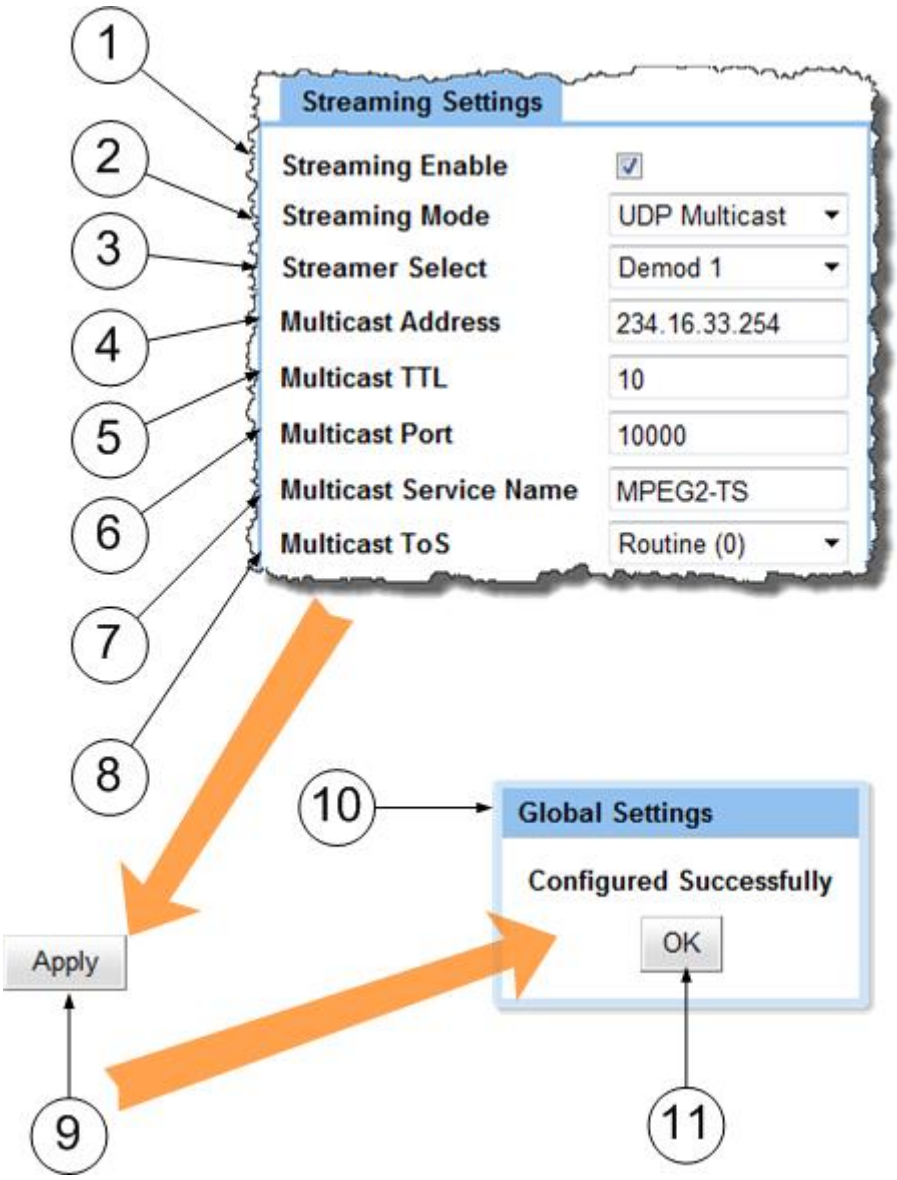


Figure 6-5 Configure the Streaming Settings Pane

6.3 Recovering a UDP Multicast Stream - VLC

Now you have configured your multicast stream at the PRORXB, you'll want to recover that stream on you PC. We'll use VLC Media Player for this example as it is free to download from the internet.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.
- The PRORXB must have a UDP Multicast Stream Configured.

- Your PC must have VLC loaded.

Step 1: Open VLC

1. On your desktop, double-click the **VLC Media Player** Icon.
2. The **VLC Media Player** window opens.

Step 2: Configure the Playback

3. From the **Media** menu, select **Open Network Stream**.
4. The **Open Media** window opens.
5. Type the Network URL in this format: udp://@234.16.33.254:10000
6. Click the **Play** button.
7. Your **stream** will start playing in a new window.

Screenshot: Recovering a UDP Multicast Stream

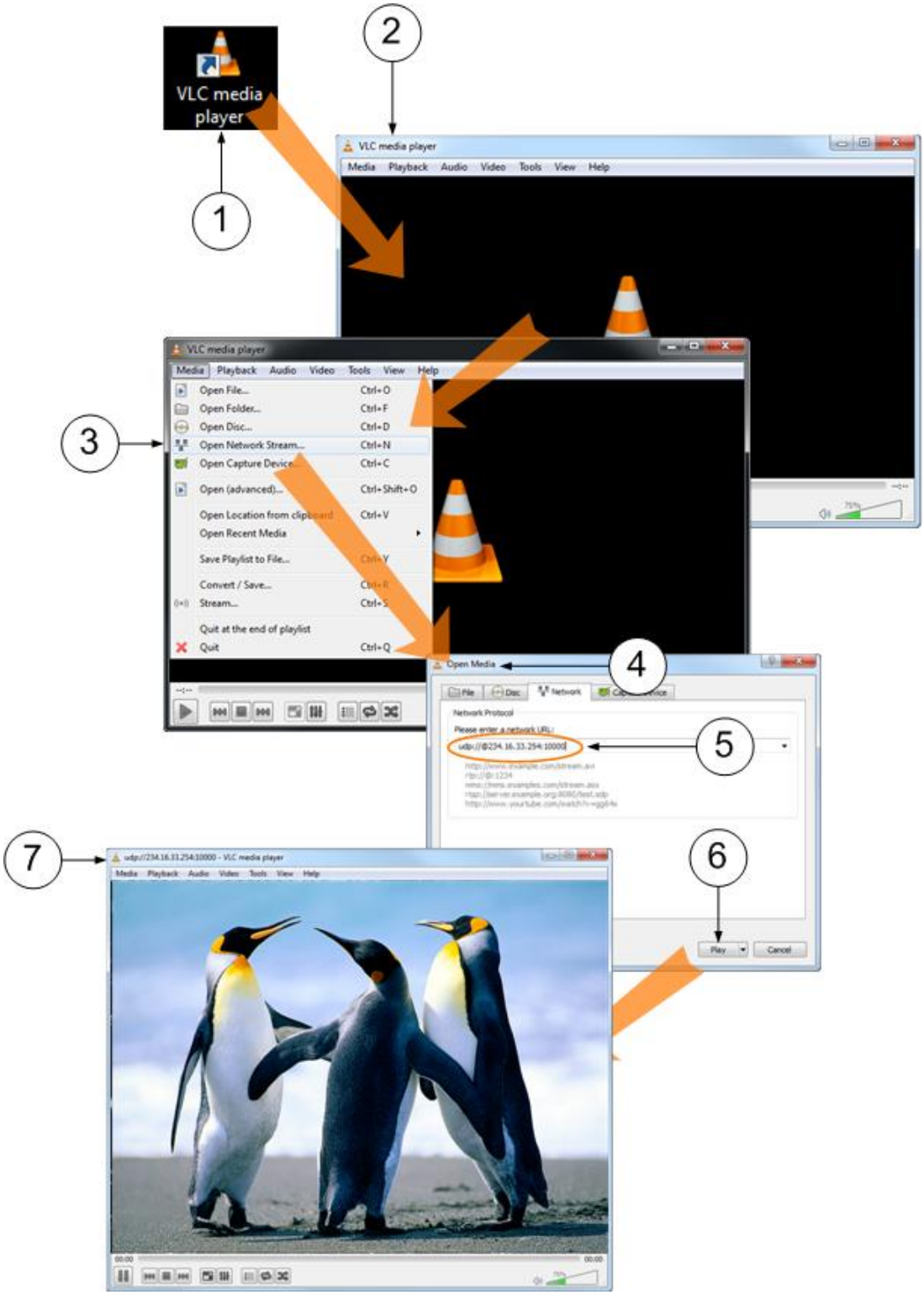


Figure 6-6 Recovering a UDP Multicast Stream - VLC

6.4 Recovering a UDP Multicast Stream – Mission Commander

Now you have configured your multicast stream at the PRORXB, you'll want to recover that stream on you PC. We'll use Mission Commander for this example.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.
- The PRORXB must have a UDP Multicast Stream Configured.
- Your PC must have Mission Commander loaded.

Step 1: Open Mission Commander

1. On your desktop **double-click** the **Mission Commander Icon**.
2. The **Mission Commander** window opens.

Step 2: Open the Video Player

3. From the **Tree pane**, select **Devices**.
4. From the **Details pane**, select **Video Player**.
5. Click the **Add Device** button.
6. The Details pane switches to **Video Player**.

Step 3: Configure the Video Player

7. In the **Source** drop-down box select **Manual**.
8. Type the **URL** in the format: udp://@234.16.33.254:10000
9. You don't need a **Service Name**.
10. Leave **Encryption** to **None** for this exercise.
11. Set the **Interface** box to be the Local Area Connection you are using to connect the PC to the PRORXB.
12. Ensure the **Video Window** checkbox is **checked**.
13. Click the **Connect** button.
14. Your **stream** will start playing in the **Video Player** window.

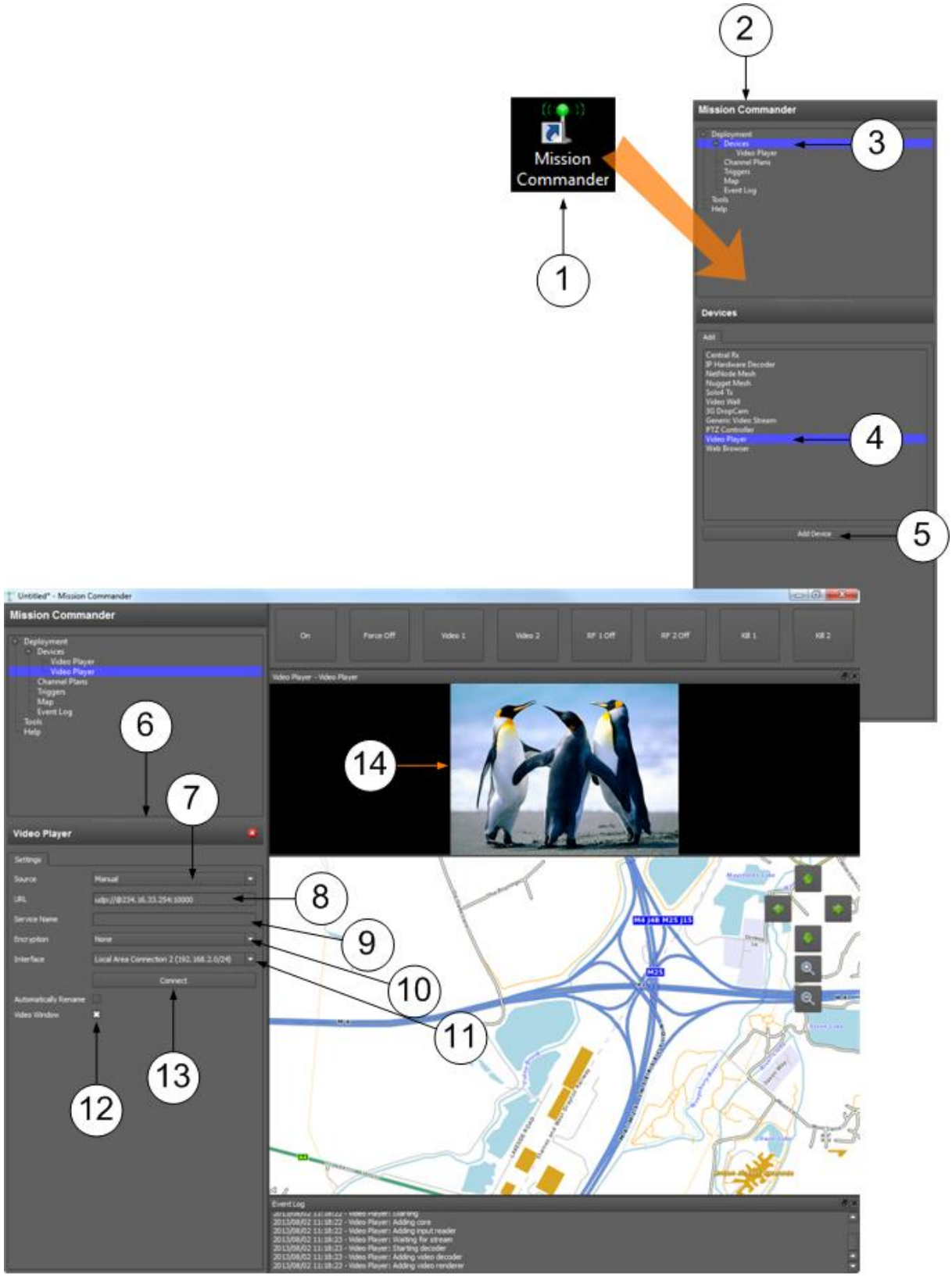


Figure 6-7 Recovering a UDP Multicast Stream – Mission Commander

6.5 About RTSP Multicast and Unicast

If you set the streaming mode on the PRORXB to be RTSP Multicast or RTSP Unicast then the Network URL you'll need in VLC or Mission Commander will be:

rtsp://192.168.2.65/stream1.sdp

The IP address here is that of the PRORXB you are streaming from.

If you were using the second streamer on the PRORXB then the last part of the URL would be stream2.sdp.

7. Advanced Setup

7.1 About Advanced Setup

To get the most from your radio system you must customise the programming for your operations and area.

CAUTION: Before you start programming your radio make sure the batteries are fresh and fully charged. If the radio loses power while you program it, its memory might be corrupted which will require you to reset defaults. All information programmed in the radio might be lost. Alternatively, you could use an AC adapter to power your radio.

The **Control Application** or **Control Pages** enable you to control the communication system, to keep it functioning in proper and stable order. It enables you to change many of the settings of the unit like frequency or bandwidth.

The control system may be in the form of a **Control Application** that runs on your PC connected to the device using Serial communications.

Alternatively, it may be in the form of **Control Pages** that are viewed on your PC browser when connected to the device using IP communications.

The PRORXB Receiver uses **Control Pages** accessed from your web browser which enables you to perform many configuration tasks quickly and easily. These next topics tell you how to connect your PC to the receiver and then use your browser to configure the unit.

7.2 Installing the Browser Application on your PC

Note: Most PCs will have a browser already installed. You'll only need this topic if you want to switch to a different browser.

Before you Begin

You'll need:

- A PC running Windows XP or better.
- The PC to have a network card configured for a fixed IP Address.
- A copy of the Browser Application you want to use. (Internet Explorer or Firefox for example).

Step 1: Install the Browser Application on your PC

1. Install Browser on your desktop or other convenient location on your PC.
2. Ensure you have a Browser start-up icon on your desktop to start the program.

Next Steps

Connect the PRORXB to your PC using IP.

7.3 Connecting your PC to the PRORXB using IP

You'll want to configure your PRORXB to do useful work right away.

The PRORXB has **Control Pages** accessed from your web browser which enables you to perform many configuration tasks quickly and easily.

Before you Begin

You'll need:

- A PC with a web browser.
- An Ethernet cable.
- A powered PRORXB unit.
- The IP Address of the PRORXB unit.

Step 1 - Install the Web Browser Application on your PC

Ensure you have installed a **browser** (Internet Explorer, Firefox or Chrome for example) onto your Personal Computer (PC).

Step 2: Establish an IP Connection between PRORXB and the PC

1. Connect the RJ45 8-way plug (pins) on the Ethernet Cable to the RJ45 8-way jack (sockets) on the PRORXB receiver.
2. Connect the RJ45 8-way plug (pins) on the Ethernet Cable to the RJ45 8-way jack (sockets) of your Personal Computer.

Diagram: PRORXB IP Connection

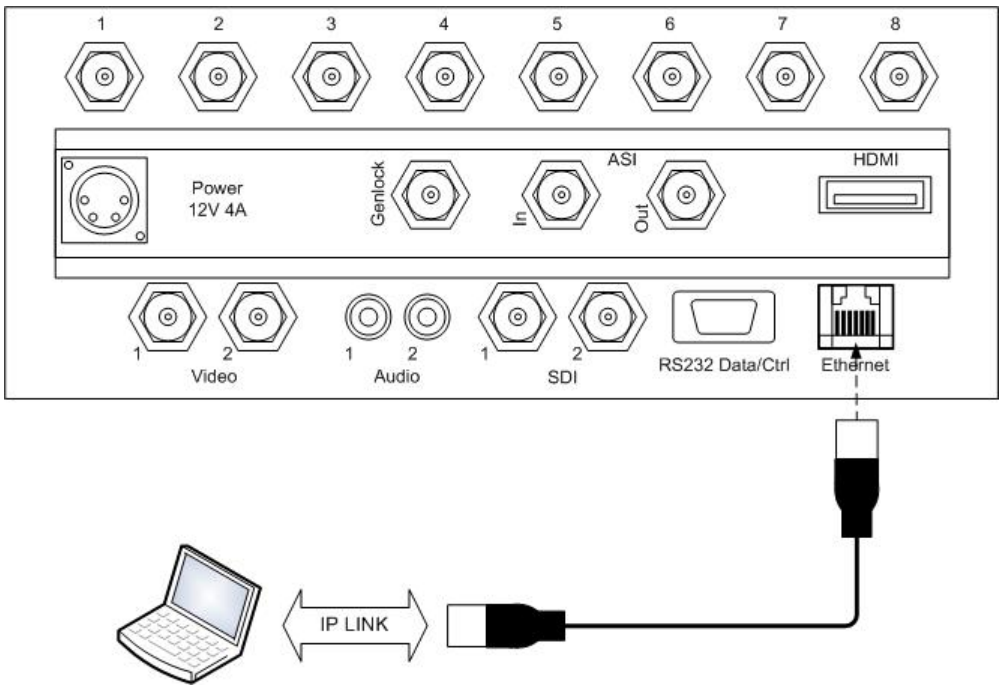


Figure 7-1 PRORXB IP Connection

Step 3 - Open your Web Browser and Log on

1. On your PC, double-click your **Internet Browser** icon.
2. The Web browser **Home Page** window **opens**.
3. In the **Address bar**, type the **IP Address** of the PRORXB you want to configure like this example: http://192.168.2.65/
4. Your PRORXB **Control Page** opens in your Web Browser.

Screenshot: Open Web Browser and Log on

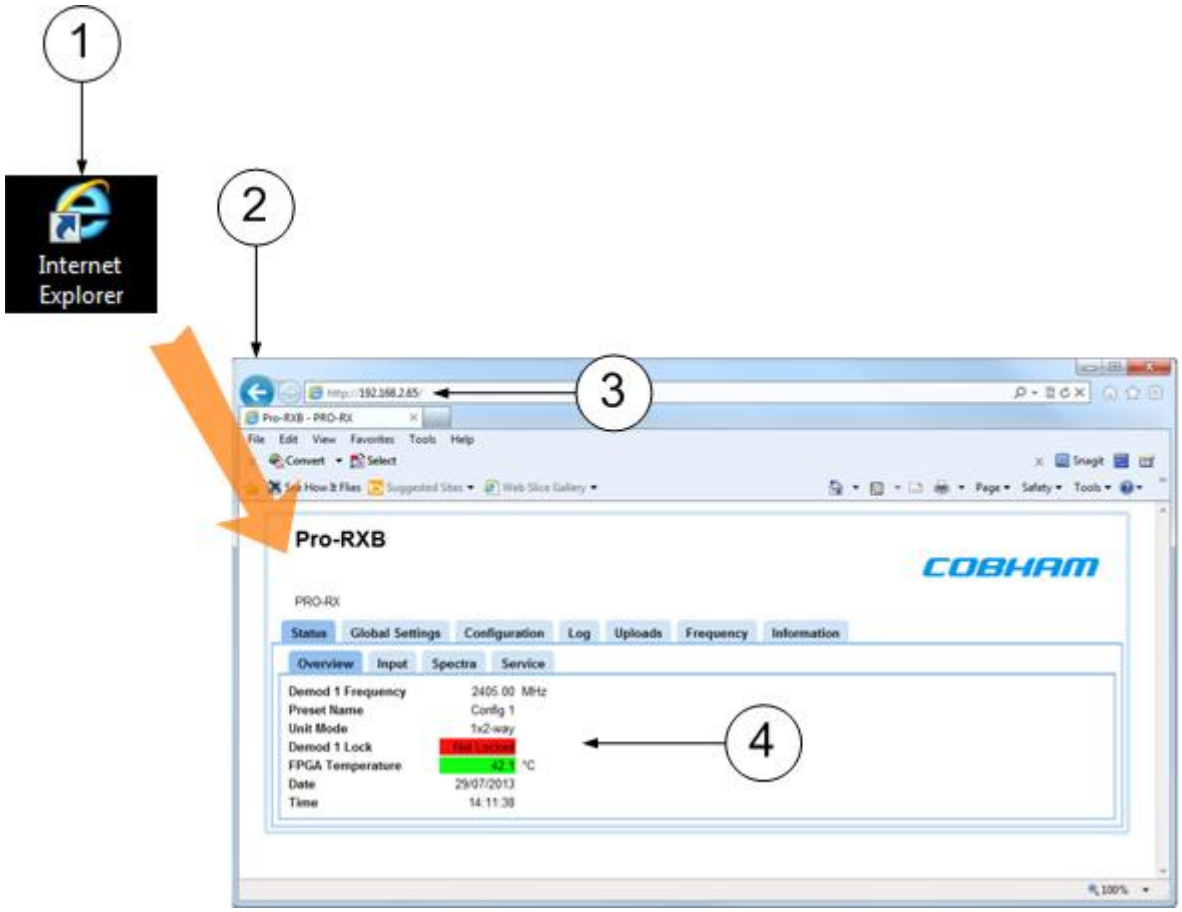


Figure 7-2 Open Web Browser and Log on

Troubleshooting

☹ I don't know the IP address of the unit.

☺ You'll find the IP Address on the front panel **Config**>**Global Setup**>**IP Address** page.

☹ I just got the unit out of the box and it's in DHCP mode.

☺ You can toggle DHCP to OFF on the front panel **Config**>**Global Setup**>**DHCP** page

Next Steps

Explore the Main Window.

7.4 Exploring the Main Window

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Screenshot: Explore the Control Pages

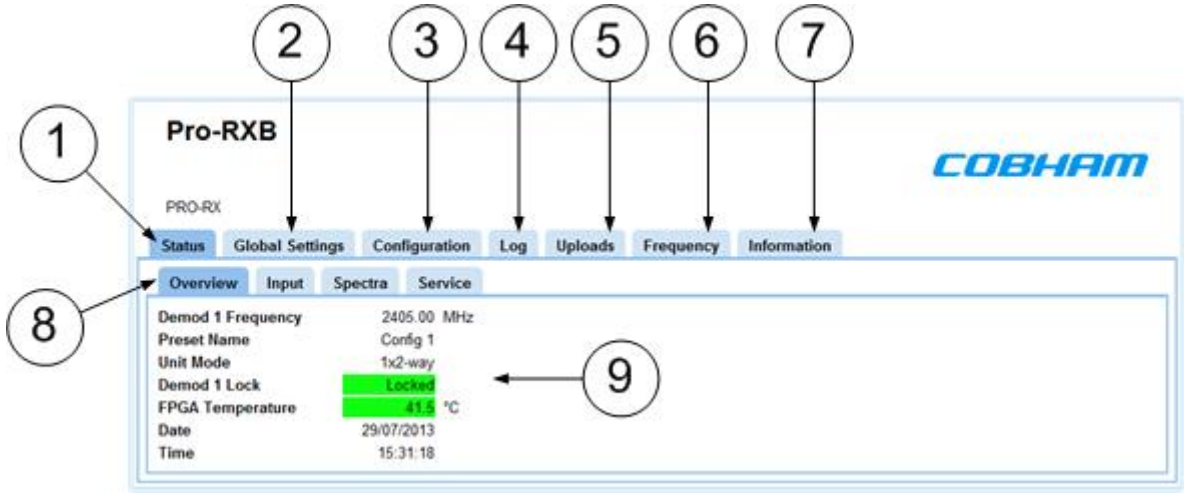


Figure 7-3 Explore the Control Pages

No	Name	Notes
1	Status tab	Divided into Overview, Input, Spectra and Service sub-tabs. This displays detailed status information of received signal quality and decoded video and audio services.
2	Global Settings tab	Divided into General Settings, Downconverter Settings, IP Settings, Streaming Settings, OSD Settings and Genlock Settings panes.
3	Configuration tab	Divided into Basic Configuration, Demod 1 Configuration, Decoder 1 Configuration, Demod 2 Configuration and Decoder 2 Configuration panes. The Configuration tab contains the list of 16 presets. Each preset the user can specify demodulation parameters, decoding modes, and descrambling configuration.
4	Log tab	The PRORXB receiver has the facility for generating log files of receiver status information.

No	Name	Notes
5	Uploads tab	Enables you to upload a license file to enable licensable features, and send software upgrade files to the PRORXB.
6	Frequency tab	The PRORXB is able to scan frequencies and find active channels for you for quick tuning.
7	Information tab	Contains information including software versions and unit specific data. You'll need this information during a support call for example.
8	Overview sub-tab	Some of the tabs have sub-tabs to further divide the information or they will use panes to divide information.
9	Information Fields	The sub-tabs or panes are divided into fields of information that you'll work with.

Table 7-1 – Control Pages Key

Next Steps

Configure the Basic Settings.

7.5 Configuring the Basic Settings

When shipped, the PRORXB is set to be given an IP address by an external DHCP server.

In managed networks which use DHCP address allocation this option should be selected. In networks that are manually managed (or do not feature a DHCP server), users may prefer to assign an IP address manually.

When you start-up the PRORXB for the first time you'll need to set up a couple of things.

- You need to turn off DHCP
- You need to set a fixed IP address

Before you Begin

You'll need:

- A fully powered PRORXB.

Step 1: Switch DHCP to OFF

Use the topic: **Toggling DHCP On or Off** in *Basic Operation*.

Step 2: Set a Fixed IP Address

Use the topic: **Setting a Fixed IP Address** in *Basic Operation*.

7.6 Working with the Status Tab

The **Status Tab** displays detailed status information of received signal quality and decoded video and audio services.

The Status Tab is divided into four sub-tabs:

- Overview
- Input
- Spectra
- Service

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Overview Sub-Tab

Click on **Status** > **Overview** tab.

Screenshot: Overview Sub-Tab

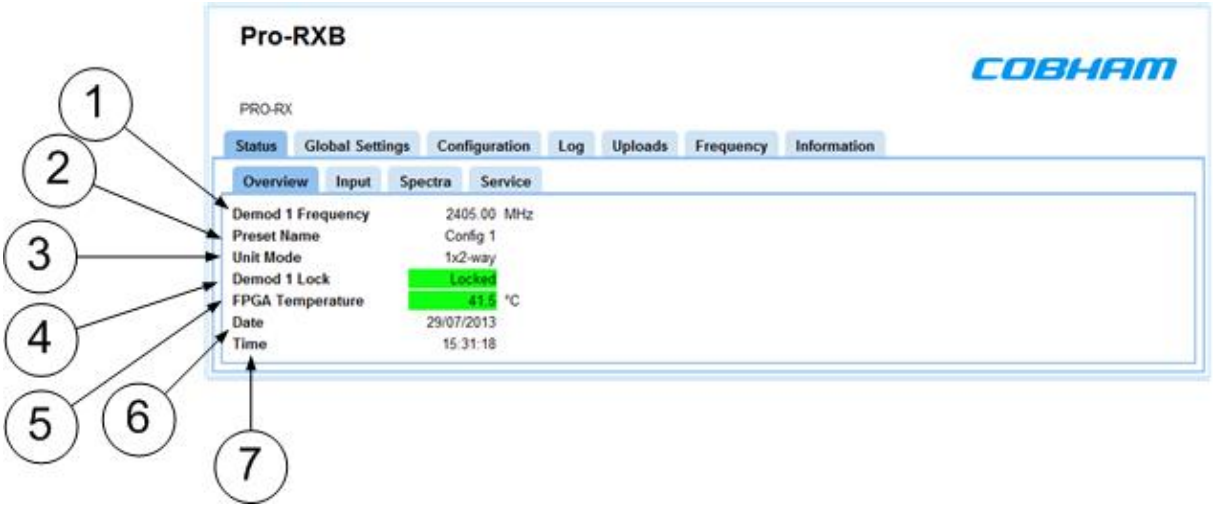


Figure 7-4 Status Tab showing Overview Sub-Tab

Step 2: Interpret the Overview Sub-Tab

No	Name	Options	Notes
1	Input frequency (MHz)	L, S and C Bands	The **frequency** in megahertz (MHz) to which the receiver is tuned.

No	Name	Options	Notes
2	Preset Name	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	This is the configuration you are currently working on. Only 1 to 16.
3	Unit Mode	1x2-way 1x4-way 2x4-way etc	The configuration of the diversity and channel arrangement of the receiver.
4	Demod 1 Lock Status	Locked or Not Locked	Tells you if the unit has successfully demodulated the incoming RF.
5	FPGA Temperature	Any temperature on a green or red field background.	This field reports the current temperature of the FPGA in degrees Celsius. If the field background is green, the temperature is within limits. If the background shows red, then the FPGA is overheating and the unit should be switched off immediately. It should be in the region of 50 to 80 degrees Celsius.
6	Date	Any valid date.	
7	Time	Any valid time.	

Table 7-2 – Overview Sub-Tab Key

Step 3: Open the Input Sub-Tab

Click on, **Status** > **Input** tab.

Screenshot: Input Sub-Tab

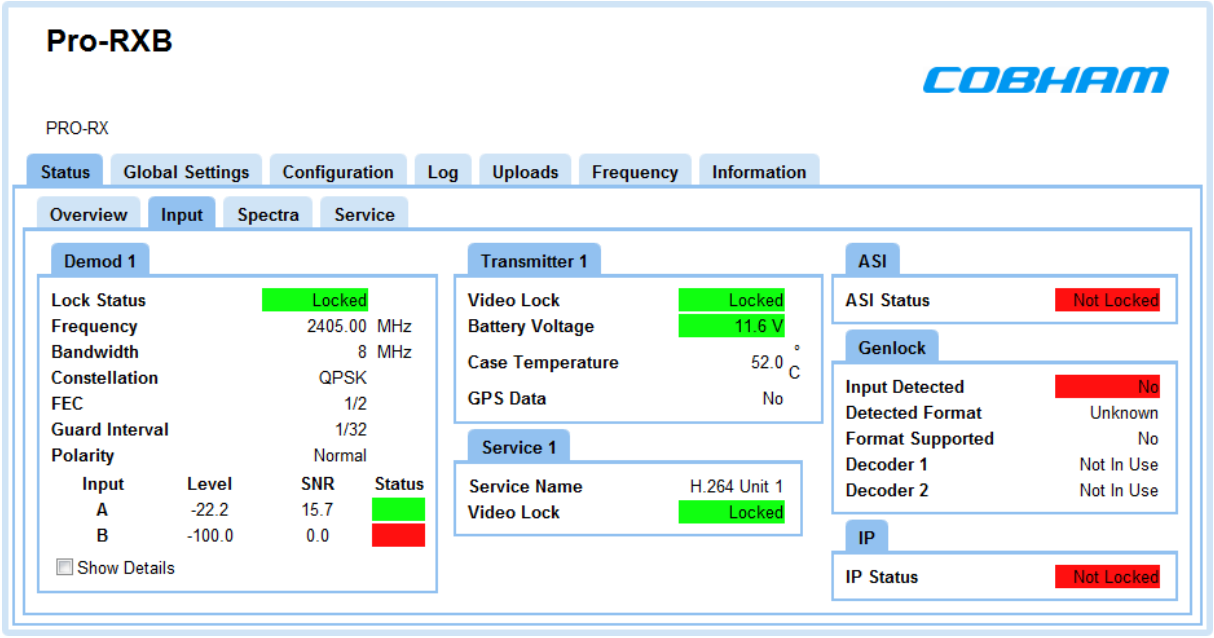


Figure 7-5 Status Tab showing Input Sub-Tab

Step 4: Interpret the Demod 1 Pane

Screenshot: Demod 1 Pane

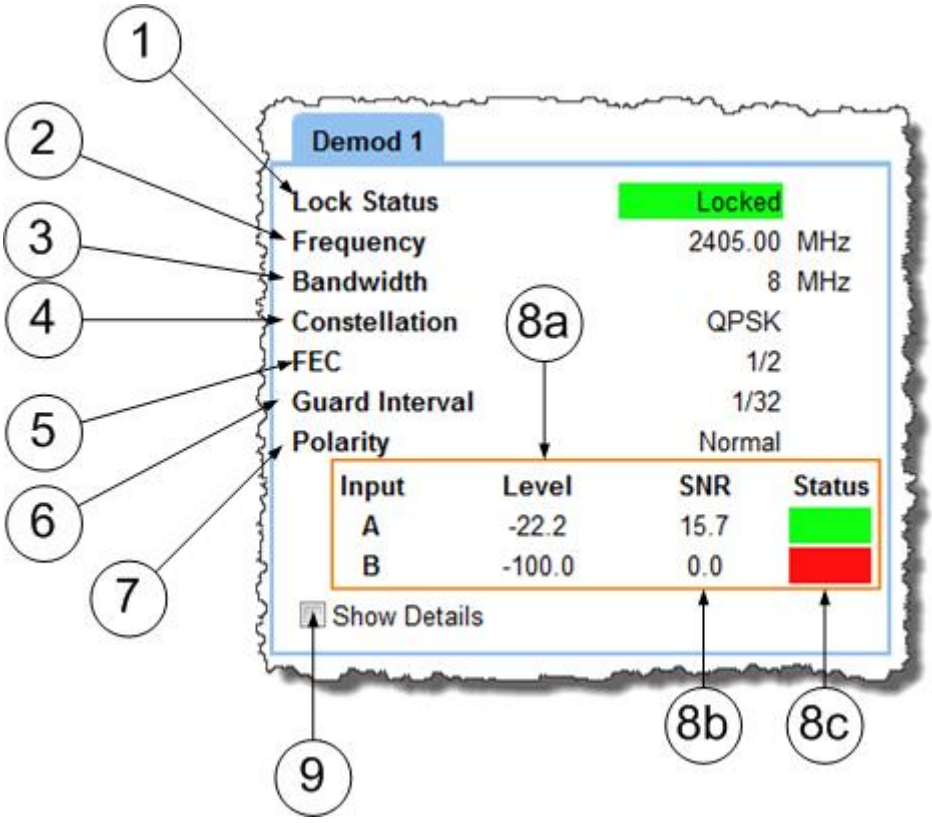


Figure 7-6 Input Sub-Tab showing Demod 1 Pane

No	Name	Options	Notes
1	Lock Status	Locked (steady green background) or Not Locked (steady red background.	Tells you if the unit has successfully locked to the incoming bit stream.
2	Frequency (MHz)	L, S and C Bands	The frequency in megahertz (MHz) to which the receiver is tuned.
3	Bandwidth	DVBT/UMVL: 6, 7 and 8MHz Narrowband: 2.5MHz 1.25MHz and 625kHz	DVB-T / UMVL bandwidths (normally used for broadcast). Cobham narrowband (normally surveillance use). Cobham Ultra-narrowband (this is a licensable feature, normally surveillance use).
4	Constellation	DVBT: QPSK, 16QAM, 64QAM Narrowband/UMVL: BPSK, 8PSK, QPSK, 16QAM	This field indicates the OFDM constellation being received. QPSK-less user data, more robust, more range. 16QAM-more user data, less robust, less range. The mode is automatically detected and is simply displayed here. You can't change it other than at the transmitter.
5	FEC	DVBT: 1/2, 2/3, 3/4, 5/6, 7/8 Narrowband/UMVL: 1/3 or 2/3	This field indicates the forward error correction (FEC) rate which is being applied. Think 'data bits/all bits' 1/3 means 1 bit out of 3 bits is data and therefore 2 bits are used for error correction. Little user data means less picture quality, but more error correction means a more robust signal and therefore more range. 2/3 means 2 bits out of 3 bits are data and therefore 1 bit is used for error correction. More user data means better picture quality, but less error correction means less robust signal and therefore less range. The mode is automatically detected and is simply displayed here. You can't change it other than at the transmitter.

No	Name	Options	Notes
6	Guard interval	DVBT: 1/32, 1/16, 1/8, 1/4 Narrowband/UMVL: 1/16 or 1/8	The guard interval which is being applied to the narrowband mode in use. The guard interval is a deliberate extension of the RF symbol period to give immunity to reflections. 1/16, short extension, deals with fast reflections, more data, less range. 1/8, long extension, deals with slower reflections, less data, more range.
7	Polarity	Normal or Inverted	All Cobham equipment should use normal mode. The receivers can be used with other manufacturer's products and sometimes this requires us to change the polarity to inverted to match this third party equipment.
8a	Input Level A		The level in dBm of the signal being received on antenna A There are readings for both antennas.
8b	Input A SNR	Could be any number.	The signal to noise ratio of the signal being received on antenna A. There are readings for both antennas.
8c	Status	Green or Red	A visual indication of signal strength.
9	Show Detail Check Box	Checked or Unchecked	When checked, the extra details about the error corrector on this page are displayed.

Table 7-3 – Demod 1 Pane Key

Step 5: Check the Show Details Checkbox

When checked, the extra details about the error corrector on this page are displayed.

Screenshot: Demod 1 Pane, Show Details Checked

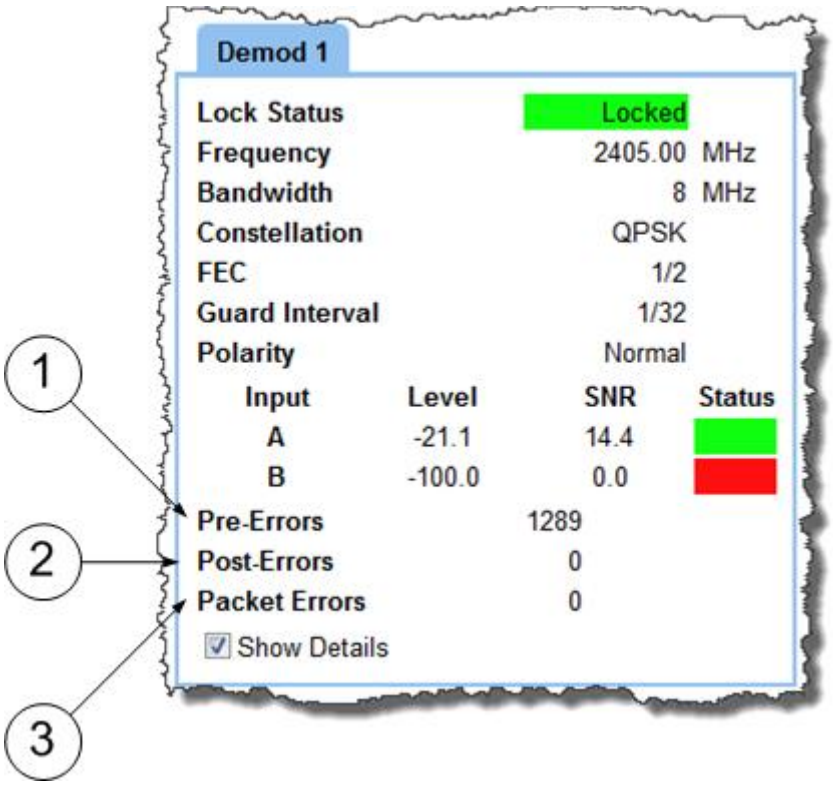


Figure 7-7 Demod 1 Pane with Show Details Checked

No	Name	Options	Notes
1	Pre-Errors	0 is ideal. Could be any number.	The bit error rate for pre-errors.
2	Post-Errors	0 is ideal. Could be any number.	The bit error rate for post-errors.
3	Packet Errors	0 is ideal. Could be any number.	The number of packet errors coming out of the error correction system. Any error here will corrupt the video, audio or data signals coming through the receiver.

Table 7-4 – Demod 1 Pane with Show Details Key

Step 6: Interpret the Transmitter 1 Pane

Some Cobham transmitters are capable of sending metadata in with the RF signal. This metadata has to be switched on at the transmitter and then provides useful information at the receiver.

Screenshot: Transmitter 1 Pane

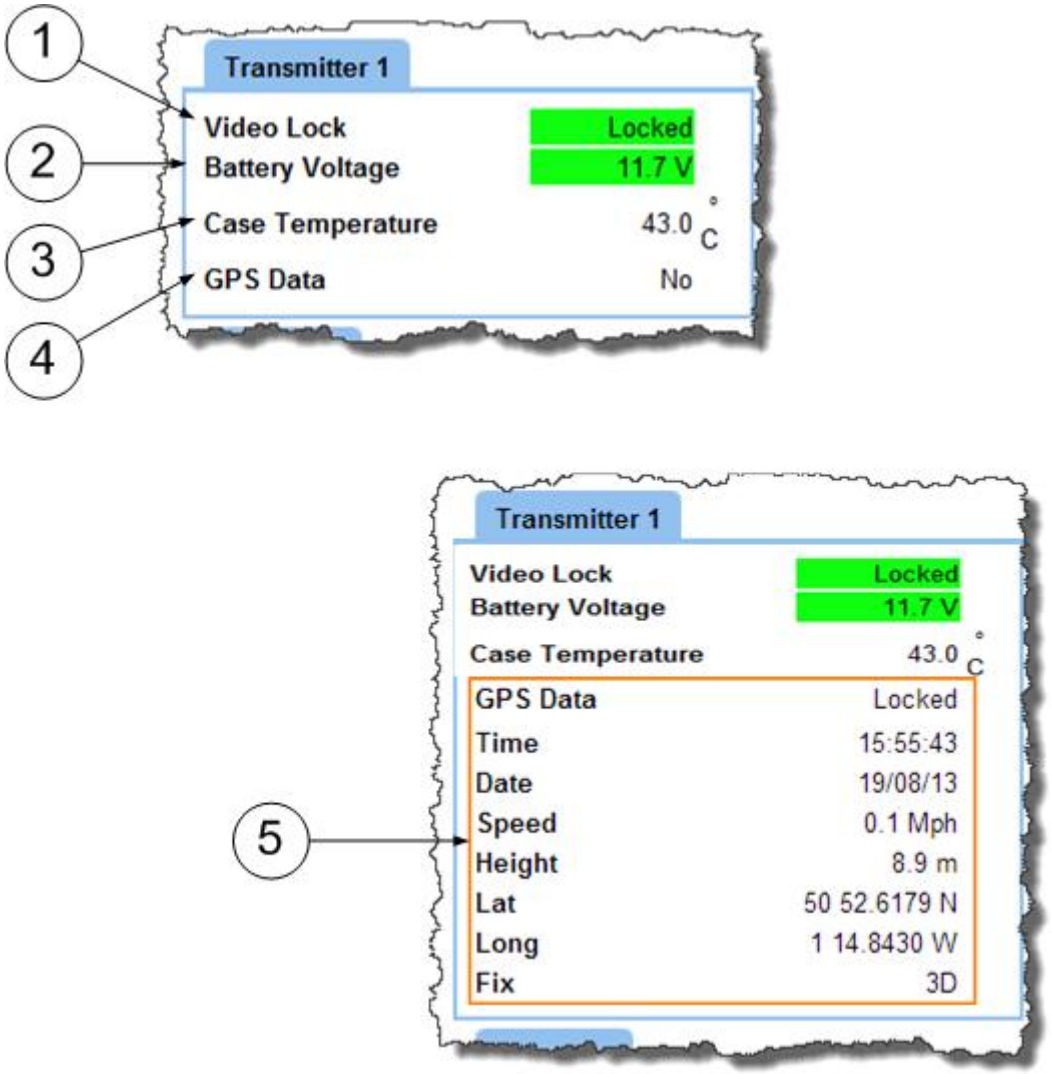


Figure 7-8 Input Sub-Tab showing Transmitter 1 Pane

No	Name	Options	Notes
1	Video Lock	Locked (steady green background) or Not Locked (steady red background.	Tells you if the transmitter has successfully locked to its incoming video signal.

No	Name	Options	Notes
2	Battery Voltage	Any voltage on a green or red field background.	This field reports the current voltage of the transmitter's battery in VDC. If the field background is green, the voltage is greater than the Tx Battery Alarm voltage parameter specified in the Global Settings pane. If the background shows red, then the voltage is below the alarm limit, too low and the unit will fail to operate correctly.
3	Case Temperature	Any temperature on a green or red field background.	This field reports the current temperature of the transmitter's case in degrees Celsius.
4	GPS Data	Locked or No	Indicates if GPS Data is being sent from the transmitter. If GPS NMEA data is present, the receiver will extract and display it.
5	GPS Data	Locked in this case	This shows the Transmitter 1 Pane with GPS data being received.

Table 7-5 – Transmitter 1 Pane Key

Step 7: Interpret the Service 1 Pane

Screenshot: Service 1 Pane

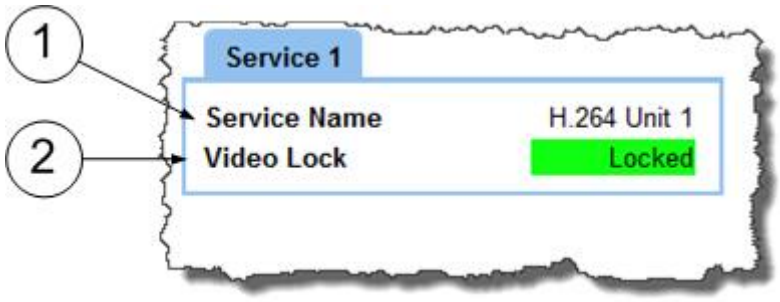


Figure 7-9 Input Sub-Tab showing Service 1 Pane

No	Name	Options	Notes
1	Service Name	H.264 Unit 1 is default but could be anything.	This text box lets you name the multicast stream as delivered in the SAP/SDP packets from the unit. Default is **H.264 Unit 1.** The Service Name on the receiver should match the transmitter's service name.

No	Name	Options	Notes
2	Video Lock	Locked (steady green background) or Not Locked (steady red background.	Tells you if the unit has successfully locked to the incoming video signal.

Table 7-6 – Service 1 Pane Key

Step 8: Interpret the ASI Pane

Screenshot: ASI Pane

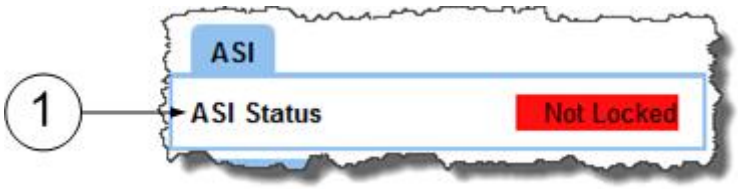


Figure 7-10 Input Sub-Tab showing ASI Pane

No	Name	Options	Notes
1	ASI Status	Locked (steady green background) or Not Locked (steady red background.	Tells you if the unit has successfully locked to the incoming ASI signal.

Table 7-7 – ASI Pane Key

Step 9: Interpret the Genlock Pane

Screenshot: Genlock Pane

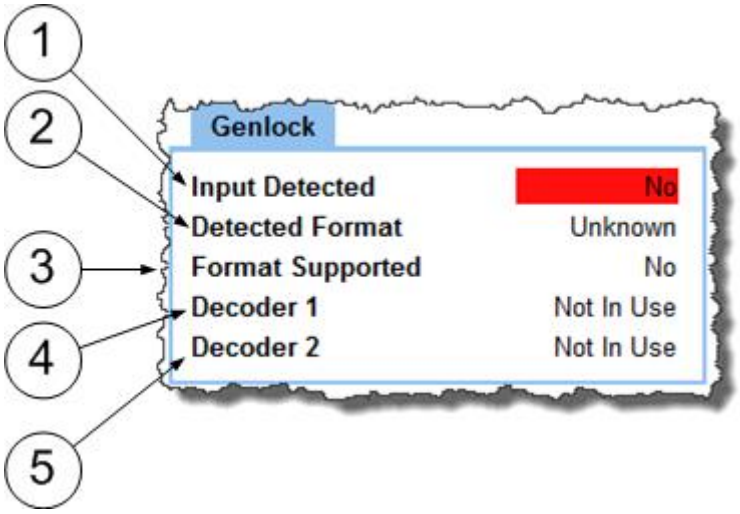


Figure 7-11 Input Sub-Tab showing Genlock Pane

No	Name	Options	Notes
1	Input Detected	Yes (steady green background) or No (steady red background.	Tells you if the unit has successfully discovered an incoming Genlock signal.
2	Detected Format	Unknown PALNTSC HD standards	Reports the format of the Genlock signal. If the unit features the tri-level sync upgrade, HD standards are also detected.
3	Format Supported	Yes or No.	Informs you if the currently received Genlock format is suitable for use with this receiver.
4	Decoder 1	Not in Use Using	External Genlock has been selected and is supported. Not in use – External Genlock not selected or not supported.
5	Decoder 2	Not in Use Using	External Genlock has been selected and is supported. Not in use – External Genlock not selected or not supported.

Table 7-8 – Genlock Pane Key

Step 10: Interpret the IP Pane

Screenshot: IP Pane

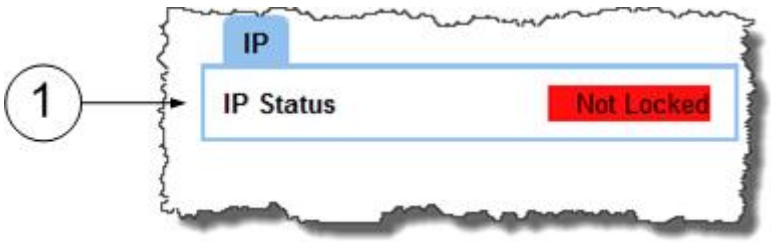


Figure 7-12 Input Sub-Tab showing IP Pane

No	Name	Options	Notes
1	IP Status	Locked (steady green background) or Not Locked (steady red background.	Tells you if the unit has successfully locked an IP signal. Not Locked – IP Input not selected or not being received.

Table 7-9 – IP Pane Key

Step 11: Open the Spectra Sub-Tab

Click on, **Status** > **Spectra** tab.

Screenshot: Spectra Sub-Tab

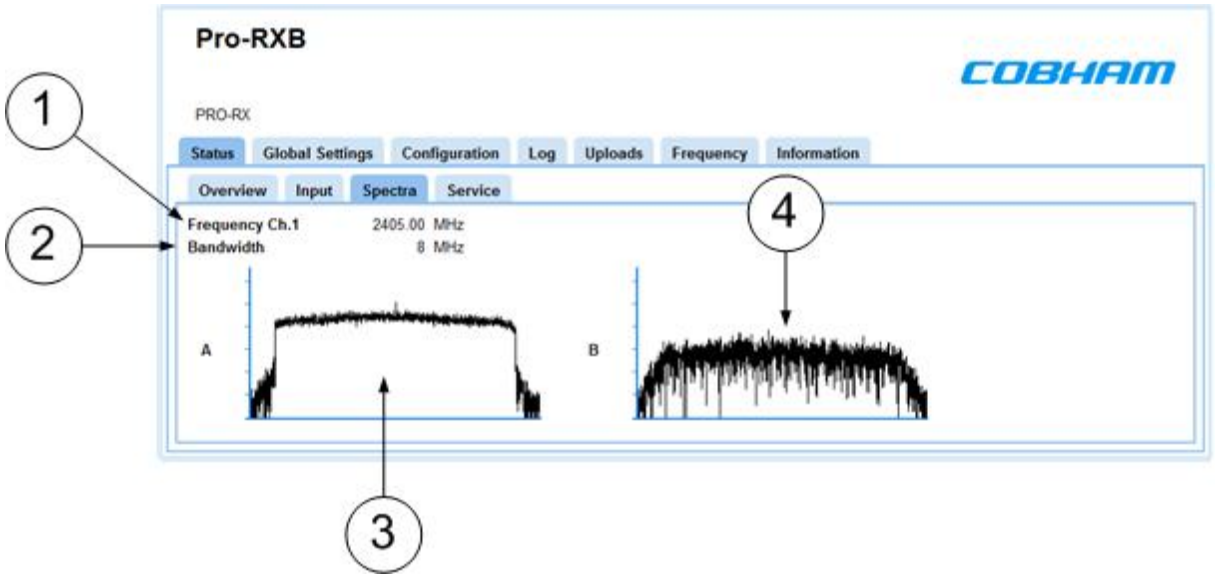


Figure 7-13 Status Tab showing Spectra Sub-Tab

No	Name	Options	Notes
1	Frequency (MHz).	L, S and C Bands	The frequency in megahertz (MHz) to which the receiver is currently tuned.
2	Bandwidth.	DVBT/UMVL: 6, 7 and 8MHz Narrowband: 2.5MHz 1.25MHz and 625kHz	The bandwidth which is currently in use. DVB-T bandwidths (normally used for broadcast). Cobham narrowband (normally surveillance use). Cobham Ultra-narrowband (this is a licensable feature, normally surveillance use).
3	Spectrum Display for channel A.	Displays for the A and B antennas are shown in my example, but there may be up to eight displays here, A to H.	When tuned in correctly you'll expect to see the classic 'top hat' display of a COFDM waveform as in this example.
4	Spectrum for channel B.		Channel B has been disconnected here to show you what a noisy channel looks like. Compare this to the COFDM waveform in channel A.

Table 7-10 – Spectra Sub-tab Key

Step 12: Open the Service Sub-Tab

Click on, **Status** > **Service** tab.

Screenshot: Service Sub-Tab

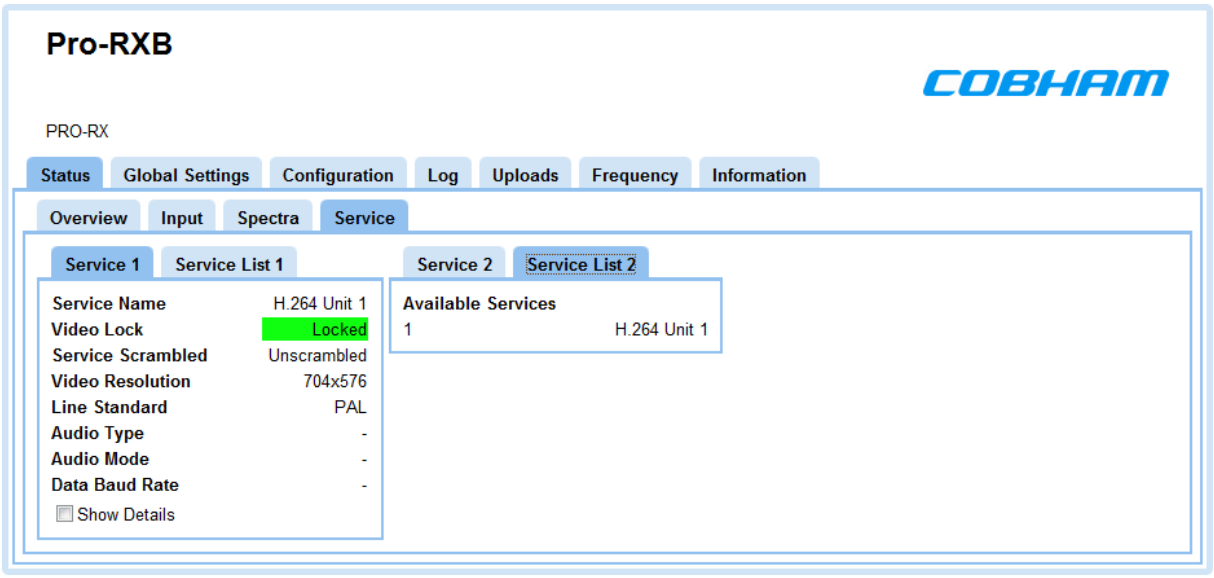


Figure 7-14 Status Tab showing Service Sub-Tab

Step 13: Interpret the Service 1 Pane

Screenshot: Service 1 Pane

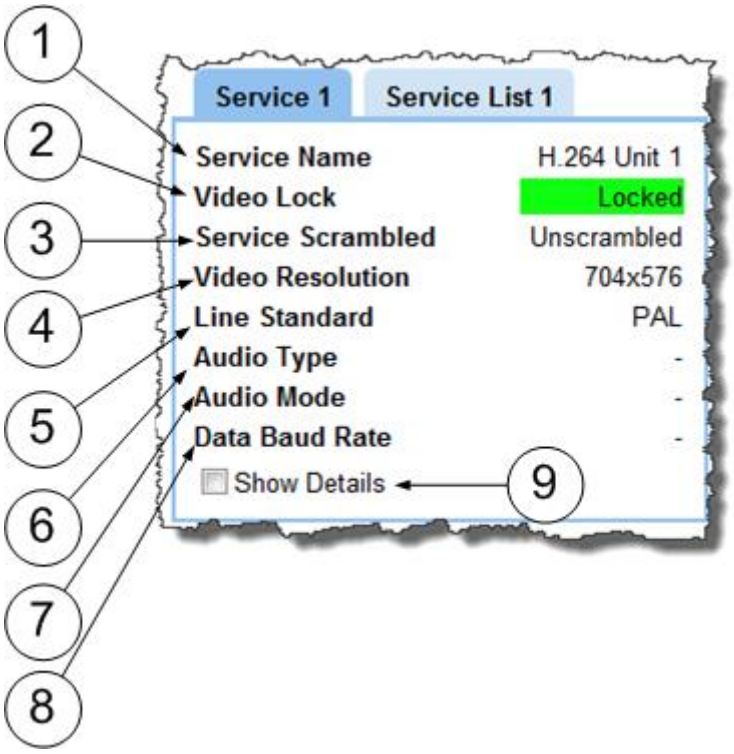


Figure 7-15 Service Sub-Tab showing Service 1 Pane

No	Name	Options	Notes
1	Service Name	H.264 Unit 1 is default but could be anything.	Displays the currently received and decoded service name from the incoming service.
2	Video Lock	Locked (steady green background) or Not Locked (steady red background.	Tells you if the unit is successfully decoding the incoming video signal.
3	Service Scrambled	Scrambled or Unscrambled	Reports the encryption status of the incoming signal.
4	Video Resolution	704x576 or any valid resolution.	Reports the resolution of the video that was set at the transmitter.
5	Line Standard	SD: PAL or NTSC HD: 720p50, 720p59, 720p60, 1080i50, 1080i59, 1080i60, 1080p23, 1080p24, 1080p25, 1080p29, 1080p30, 1080psf23, 1080psf24, 1080psf25, 1080psf29, 1080psf30	Reports the line standard of the video that was set at the transmitter.
6	Audio Type	MPEG Layer 1, MPEG Layer 2 or Solo Nicam	Reports the type of the audio that was set at the transmitter.
7	Audio Mode	Stereo or Mono	Reports the mode of the audio that was set at the transmitter.
8	Data Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	Reports the baud rate of the date that was set at the transmitter.
9	Show Details Checkbox	Checked or Unchecked.	When checked, you'll see a lot more detail in the Service 1 Pane. You may want to leave this unchecked to reduce clutter on the screen.

Table 7-11 – Service 1 Sub-tab Key

Step 14: Check the Show Details Checkbox

When checked, the extra details about the Service 1 Pane on this page are displayed.

Screenshot: Service 1 Pane, Show Details Checked

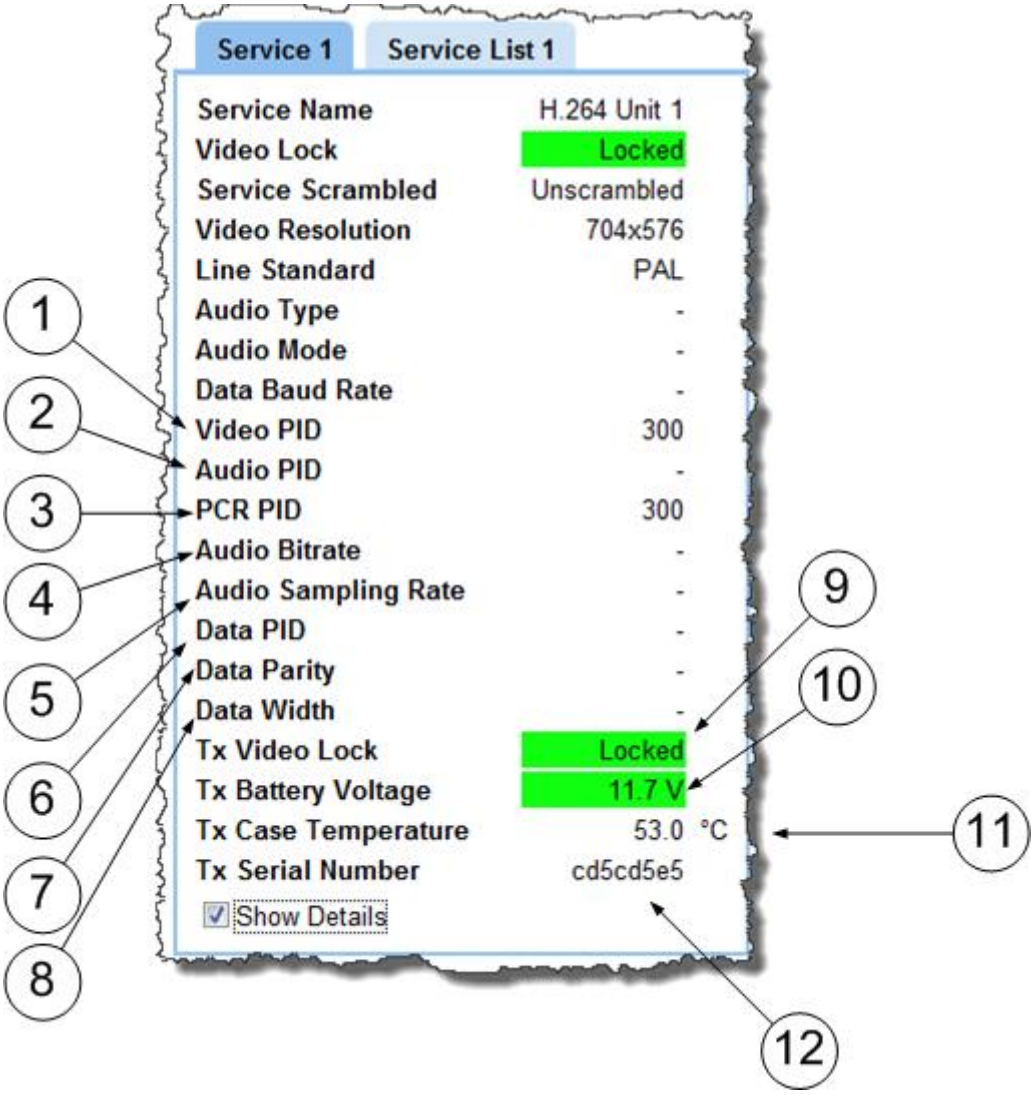


Figure 7-16 Service 1 Pane with Show Details Checked

No	Name	Options	Notes
1	Video PID	Default or 0x0020 to 0x1FFE	Each table or elementary stream in a transport stream is identified by a 13-bit packet ID (PID). This is set at the transmitter.
2	Audio PID	Default or 0x0020 to 0x1FFE	Each table or elementary stream in a transport stream is identified by a 13-bit packet ID (PID). This is set at the transmitter.

No	Name	Options	Notes
3	PCR PID PCR=Program Clock Reference	Default or 0x0020 to 0x1FFE	Each table or elementary stream in a transport stream is identified by a 13-bit packet ID (PID). This is set at the transmitter. Used to sync the audio and video. The PCR keeps the system clock synced. If the clock starts to drift, it is rectified using the PCR value.
4	Audio Bitrate	64, 96, 128, 160, 192, 224, 256, 288, 320, 352, 384, 416 and 448kbits/s are examples of MPEG L1 bit-rates.	Reports the audio bitrate that has been set at the transmitter. This is the MPEG audio encoding bit-rate. Generally the higher the number the better the quality.
5	Audio Sampling Rate	44.1kHz, 48kHz or 32kHz	Reports the audio sampling rate that has been set at the transmitter.
6	Data PID	Default or 0x0020 to 0x1FFE	Each table or elementary stream in a transport stream is identified by a 13-bit packet ID (PID). This is set at the transmitter.
7	Data Parity	None, Even, Odd	This is the parity of serial data running through the unit. This normally must match the data device you are planning to use. Reports the Data parity that has been set at the transmitter.
8	Data Width	7 or 8 bit	8 bit is Cobham standard and 7 bit is available to allow interoperability with third party equipment. Reports the Data Width that has been set at the transmitter.
9	TX Video Lock	Locked (steady green background) or Not Locked (steady red background.	Tells you if the **transmitter** has successfully locked to an incoming video signal. This does not mean this receiver necessarily has video lock.

No	Name	Options	Notes
10	Battery Voltage	Any voltage on a green or red field background.	This field reports the current voltage of the **transmitter's** battery in VDC. If the field background is green, the voltage is within limits. If the background shows red, then the voltage is too low and the unit will fail to operate correctly. The voltage alarm threshold is set in **Global Settings**>**General Settings**>**Tx Battery Alarm(v)**
11	TX Case Temperature	Any temperature	This field reports the current temperature of the **transmitter** case in degrees Celsius.
12	TX Serial Number	Any valid electronic serial number (ESN).	The ESN is used for licencing and we may ask you for this number during a support call for example.

Table 7-12 – Service 1 Pane with Show Details Key

Step 15: Configure the Service List 1 Pane

Screenshot: Service List 1 Pane

Figure 7-17 Service Sub-Tab showing Service List 1 Pane

No	Name	Options	Notes
1	Available Services	Any Valid Service	Provides a list of services which have been recovered from the transport stream and are available for you view.

Table 7-13 – Service List 1 Pane Key

Note: Service 2 and Service List 2 work in exactly the same way as Service 1 and Service List 1.

7.7 Working with the Global Settings Tab

The Global Settings tab contains parameters that control global unit features common to all presets, including downconverter settings, IP settings, streamer settings and OSD configuration for example.

The Global Settings tab is divided into six panes:

- General Settings
- Downconverter Settings
- IP Settings
- Streaming Settings
- OSD Settings
- Genlock Settings

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Global Settings Tab

Click on the **Global Settings** tab.

Screenshot: Global Settings Tab

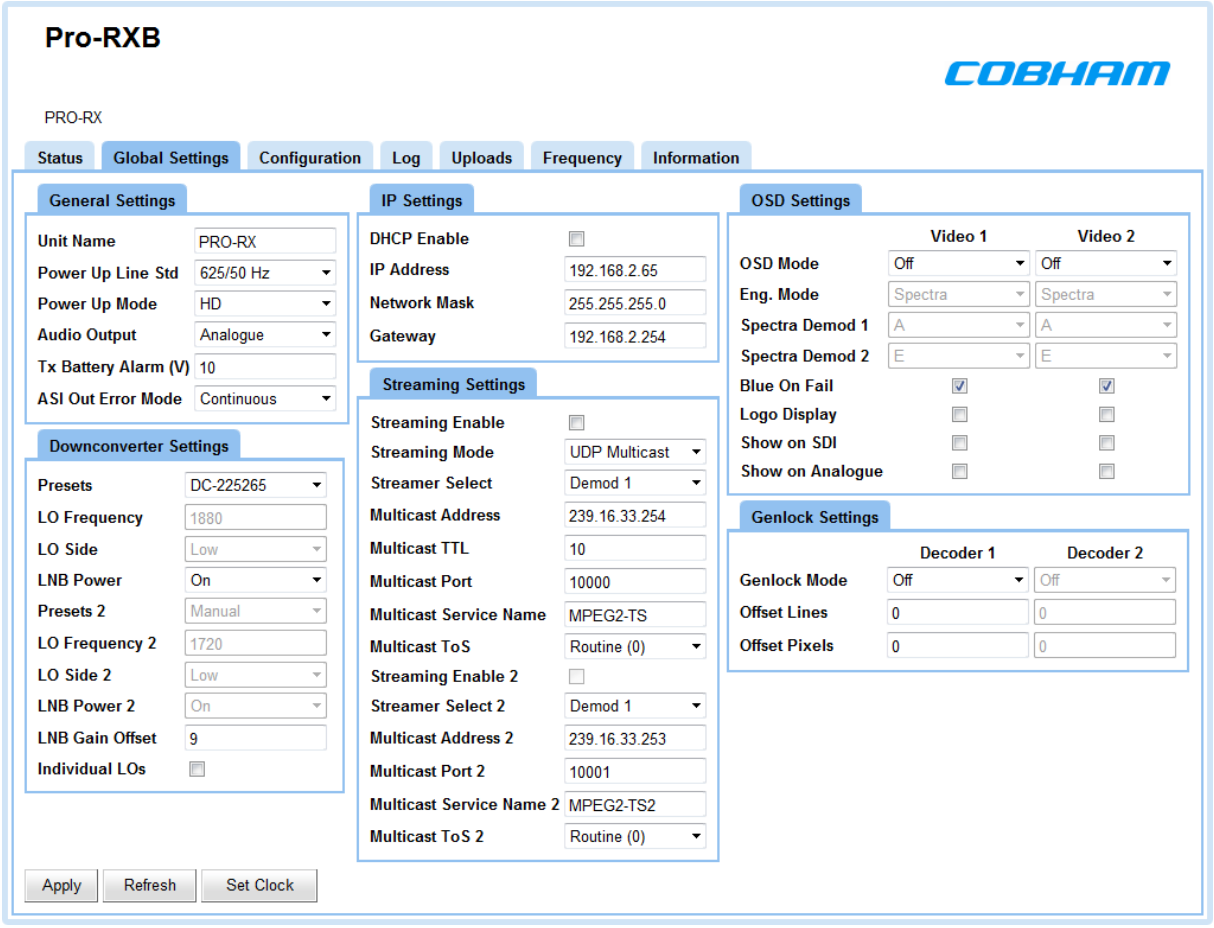


Figure 7-18 Global Settings Tab

Step 2: Configure the General Settings Pane

Screenshot: General Settings Pane

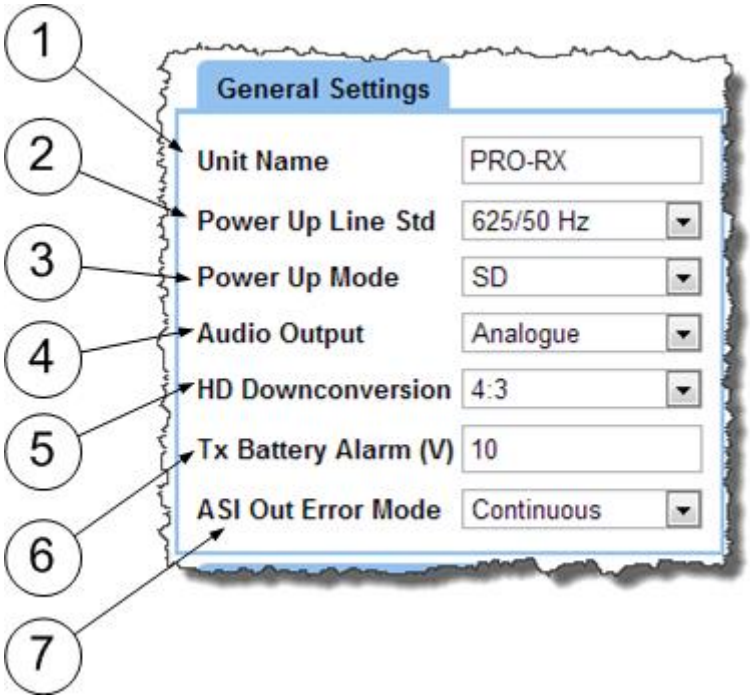


Figure 7-19 General Settings Pane

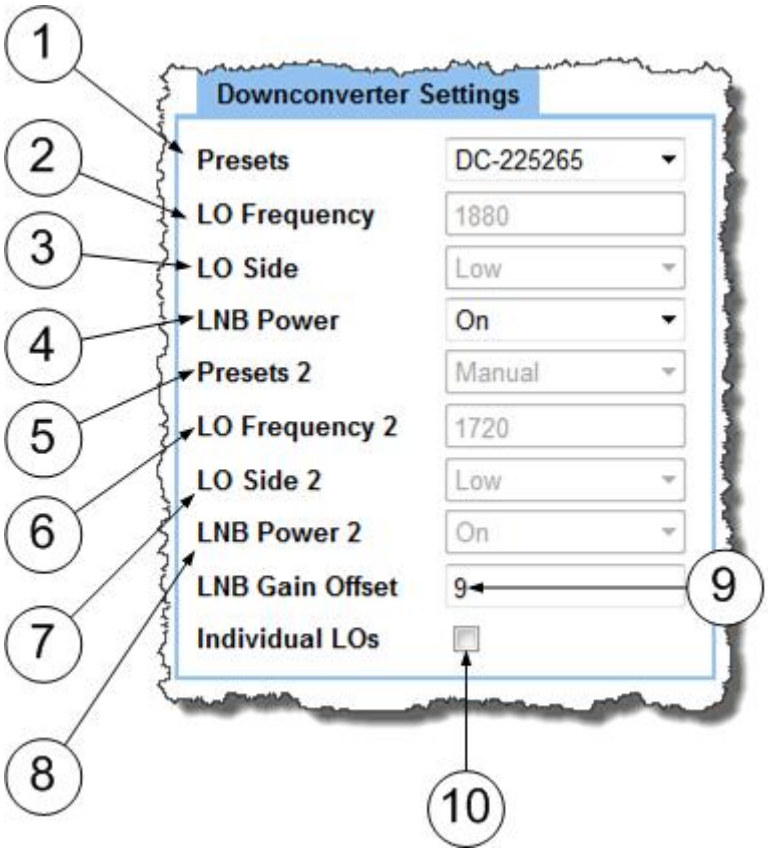
No	Name	Options	Notes
1	Unit Name	PRO-RX or ant combination of characters.	The name for the receiver. Used when the PRORXB is streaming to identify the source.
2	Power Up Line Std.	625/50 Hz or 525/59 Hz.	The television line standard that the receiver will start up with when first powered on. 625/50 Hz is PAL. 525/59 Hz is NTSC.
3	Power Up Mode	HD or SD.	The mode that the receiver will start up with when first powered on. HD is High Definition. SD is Standard Definition.
4	Audio Output	Analogue or Digital	Select the audio mode to suit your operation.

No	Name	Options	Notes
5	HD Down Conversion	Off, 4:3 or 16:9	When licensed for HD down conversion, offers the option to enable and select the video output aspect ratio.
6	TX Battery Alarm (V)	Any value from 0 to 20V.	This number is the voltage at which the TX Battery Voltage caption turns red.
7	ASI Out Error Mode.	Continuous or Gapped.	Continuous – ASI data is always passed but if in error it is flagged. Gapped – ASI output only passes valid data.

Table 7-14 – General Settings Pane Key

Step 2: Configure the Downconverter Settings Pane

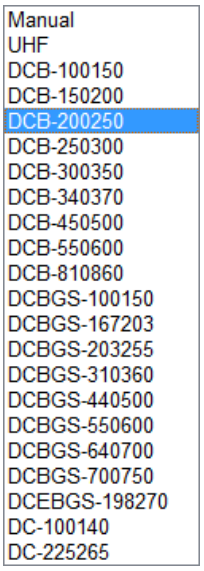
Screenshot: Downconverter Settings Pane



MUST RE-GRAB DOWNCONVERTER SETTINGS WITH LATEST S/W

Figure 7-20 Downconverter Settings Pane

No	Name	Options	Notes

No	Name	Options	Notes
1+6	Presets		If you select **Manual** it means you will have to type in the LO Frequency and LO Side in the next two fields yourself. You might do this for an unusual frequency that requires an odd downconverter. If you select **UHF** it means you don't really need a downconverter because the receiver is UHF anyway. There may still be an amplifier up near the antenna though. The easiest thing to do is select your downconverter from the list. Then the LO Frequency and LO Side will be filled in for you. Check the label on your downconverter to see which model you have.
2+7	LO Frequency (MHz)	1880 or any valid downconverter frequency.	All our receiver units use **downconverters** to lower the frequency from microwave (L, S and C-Band) to an Intermediate Frequency (IF) between 51 and 858MHz that the on-board tuners in the receivers can use. We get this information from the downconverter frequency and side table in Appendix D – Reference Material.
3+8	LO Side	Low or High	We need to set which side (of the expected incoming frequency) the LO frequency will be. In my example the incoming frequency I want to receive is in S-Band, 2.25GHz to 2.65 GHz. I've selected a DC-225265 downconverter whose LO Frequency is 1880MHz. Now, 1880MHz is *lower* than 2.25GHz, so I set the LO side to be **Low**. We get this information from the downconverter frequency and side table in Appendix D – Reference Material.

No	Name	Options	Notes
4+9	LNB Power	On or Off	The downconverters up on the mast need power. We send this up the IF line. We call it LNB power and here is where you turn it on. LNB=Low Noise Block. You may want to turn LNB power off if you are using a third party downconverter that has its own power supply for example.
5+10	LNB Voltage	9V or 12V	When unit is fitted with latest tuner PCBs, the LNB voltage is selectable.
11	LNB Gain Offset	9 typically, but any value to suit the downconverter you are using.	Most downconverters introduce gain to the RF path. A DCB-200250 for example introduces 9dB in its standard gain version and 19dB in the high gain version. To make sense of the signal strength numbers you need to apply this correction.
12	Individual LOs	Checked or Unchecked	When unchecked the LO Frequency and LO Side apply globally to all downconverters attached to the receiver. When checked, new fields open up to enable you to set individual LO Frequencies and LO Sides for each downconverter. This means you could have one half of the antennas set up for S-Band and the others, L-Band.

Table 7-15 – Downconverter Settings Pane Key

Step 3: Check the Individual LOs Checkbox

When checked, the extra fields which enable individual LO Frequencies are displayed. In addition, you'll find a checkbox which enables you to invert the COFDM spectrum.

Screenshot: Downconverter Settings Pane, Individual LOs Checked

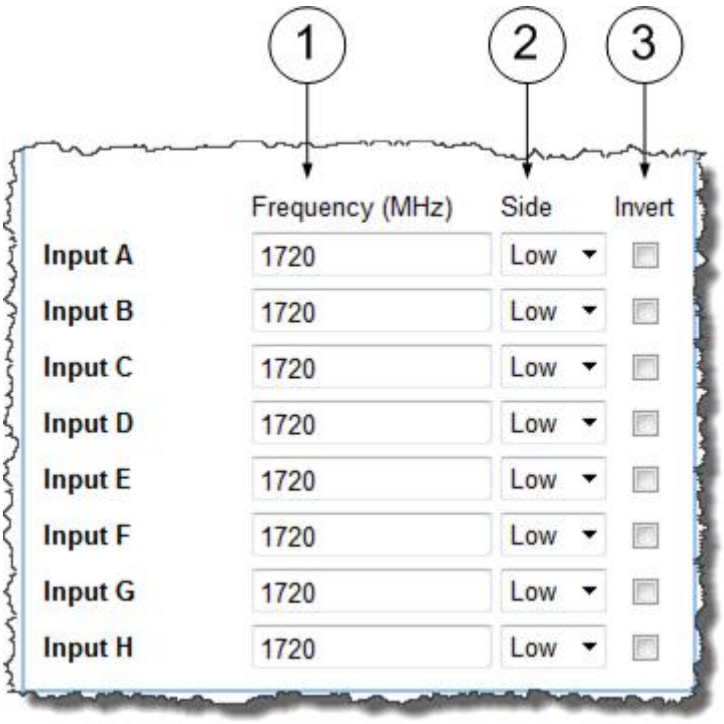


Figure 7-21 Downconverter Settings Pane with Individual LOs Checked

No	Name	Options	Notes
1	LO Frequency (MHz)	1720 or any valid downconverter frequency.	All our receiver units use **downconverters** to lower the frequency from microwave (L, S and C-Band) to an Intermediate Frequency (IF) between 51 and 858MHz that the on-board tuners in the receivers can use. We get this information from the downconverter frequency and side table in Appendix D – Reference Material.
2	LO Side	Low or High	We need to set which side (of the expected incoming frequency) the LO frequency will be. We get this information from the downconverter frequency and side table in Appendix D – Reference Material.

No	Name	Options	Notes
3	Invert	Checked or Unchecked	Checked=Inverted Unchecked=Normal All Cobham equipment should use normal mode. The receivers can be used with other manufacturer's products and sometimes this requires us to change the polarity to inverted to match this third party equipment.

Table 7-16 – Individual LO Settings Key

Step 4: Configure the IP Settings Pane

Screenshot: IP Settings Pane

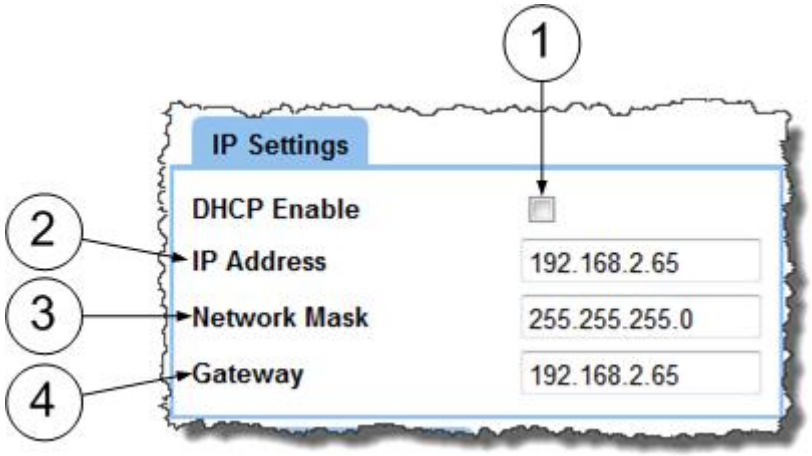


Figure 7-22 IP Settings Pane

No	Name	Options	Notes
1	DHCP Enable (Dynamic host configuration protocol)	Checked or Unchecked	When checked the PRORXB is given an IP address by an external DHCP server. In managed networks which use DHCP address allocation this option should be selected. In networks that are manually managed (or do not feature a DHCP server), users may prefer to assign an IP address manually.

No	Name	Options	Notes
	IP Address	Example: 192.168.2.65	If the PRORXB is not automatically acquiring its IP address via a DHCP server then a fixed IP address needs to be assigned to the unit Enter an **IP address** for this PRORXB in the IP address text box. It can be any class of network you choose.
	Network Mask	Example: 255.255.255.0	The network mask allows a network administrator to break a network into smaller more efficient subnets to prevent excessive numbers of IP packets being routed through the network. This is normally defined by the network administrator Enter a **subnet mask** in the Network mask text box.
	Gateway	Example: 192.168.2.254	A default gateway is used by a host when an IP packet's destination address belongs to someplace outside the local subnet. The default gateway address is usually an interface belonging to the LAN's border router. We recommend you leave the gateway at the same setting as the IP Address. Note, for correct streaming operation, a valid Gateway address within the IP subnet range must be set, either manually or via DHCP.

Table 7-17 – IP Settings Pane Key

Step 5: Configure the Streaming Settings Pane

Screenshot: Streaming Settings Pane

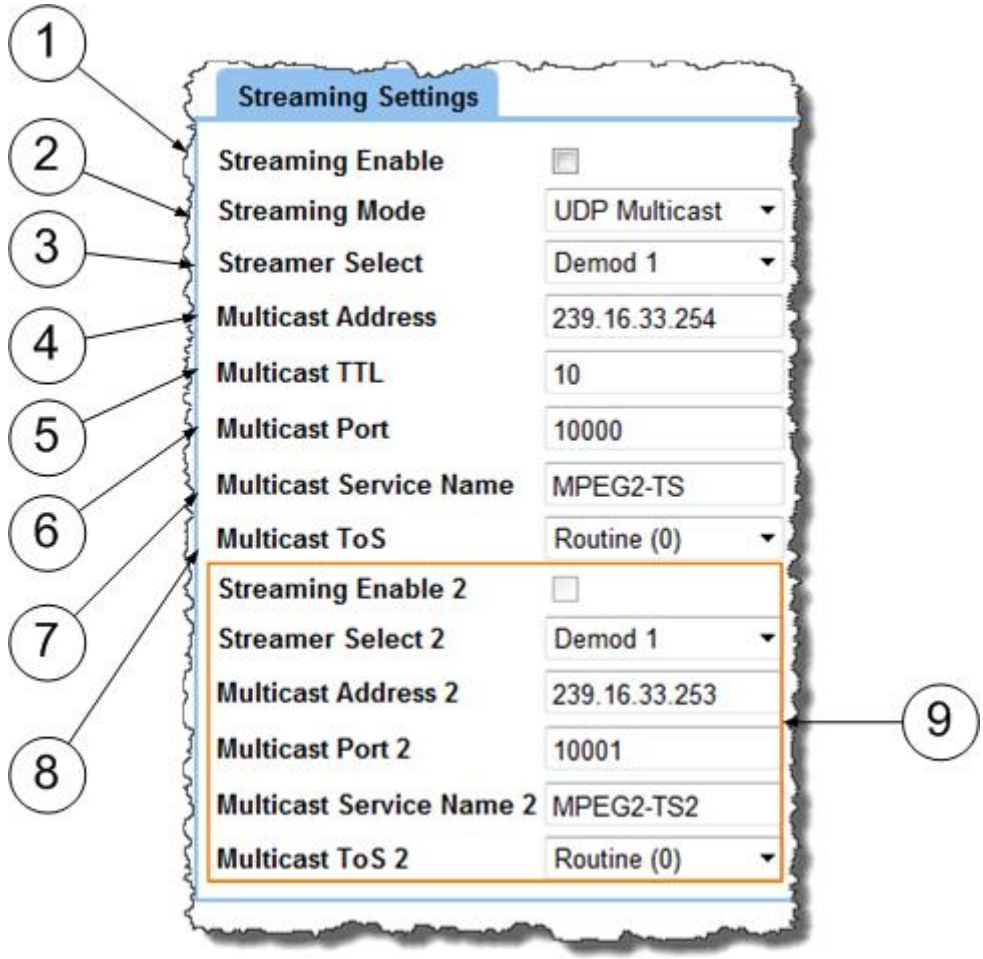


Figure 7-23 Streaming Settings Pane

No	Name	Options	Notes
1	Streaming Enable	Checked or Unchecked	Switches the streaming feature on or off. **Note**: The PRORXB must be licensed for Streaming. If it is not, you won't be able to enable Streaming. In addition, for correct streaming operation, a valid Gateway address within the IP subnet range must be set, either manually or via DHCP.
2	Stream Mode	UDP Multicast or RTSP Multicast or RTSP Unicast	Select the streaming mode you want to use.

No	Name	Options	Notes
3	Streamer Select	Demod 1 ASI Input Descrambler 1 Remux Remux Decrypted	You choose the source that will provide the stream from this box. Demod 1 for example means the stream will come from the first receiver channel.
4	Multicast Address	239.16.33.254	This text box enables you to change the multicast address used by the unit. The default value is 239.16.33.254. It is also possible to Unicast by specifying a valid destination IP address within the local subnet range.
5	Multicast TTL	1 to 255 Default is 10	This is the multicast time to live value. Default 127.
6	Multicast Port	10000 Range available is 1-65535	Protocols like TCP or UDP use port numbers in the header to direct traffic around the network. Low port numbers are used by computer systems for predefined tasks. For example SMPT (for your email service) uses port 25. A good rule is to use numbers above 10,000 to avoid conflict with existing services. When you set up a port number on several computers on a network they will all listen for packets directed to that port. The default values are 10000 and 10001.
7	Multicast Service Name	Up to 20 ASCII characters.	The defaults are MPEG2-TS and MPEG2-TS2. This is an identifier for the service.
8	Multicast ToS	Routine (0) Priority (1) Immediate (2) Flash (3) Flash Override (4) Critical (5) Internetwork Control (6) Network Control (7)	The priority for the Multicast can be set here.

No	Name	Options	Notes
9	Channel 2		All the controls are exactly the same for the second channel.

Table 7-18 – Streaming Settings Pane Key

Step 6: Configure the OSD Settings Pane

Screenshot: OSD Settings Pane

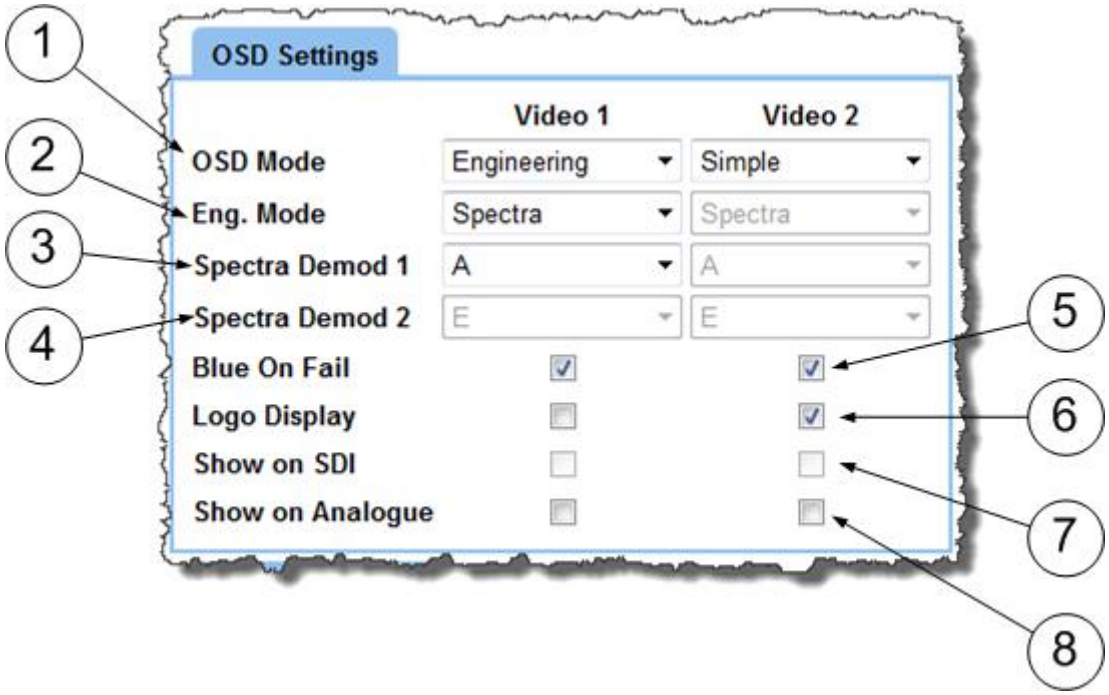


Figure 7-24 OSD Settings Pane

No	Name	Options	Notes
1	Mode	Off Simple Detailed Engineering	You can choose how much detail is displayed on the On Screen Display (OSD). You can also switch the OSD off.

No	Name	Options	Notes
2	Eng. Mode	Spectra Scan GPS/Tx Data	If you selected **Engineering** in **Mode** earlier, these fields become active. Spectra – Displays a graph on the OSD of the spectra being received for the antenna selected. Scan – Displays the frequency scanner on the OSD similar to the display under the frequency tab. GPS/Tx Data – Displays metadata and GPS data from the transmitter on the OSD. The TX must be configured to send metadata and data must be in valid NMEA format.
3	Spectra Demod 1	A to H	The Demodulator 1 OSD Spectrum display can be set to show antenna A to H.
4	Spectra Demod 2	A to H	The Demodulator 2 OSD Spectrum display can be set to show antenna A to H.
5	Blue On Fail	Checked or Unchecked	If the link is lost, a blue screen appears to alert you. Some broadcasters prefer not to have blue on fail set.
6	Logo Display	Checked or Unchecked	When checked, the Cobham Logo will be displayed in the OSD.
7	Show on SDI	Checked or Unchecked	When checked the OSD is displayed on the SDI output. You may want to turn this off if you are transmitting from this port. The OSD is only available if an SD video service is decoded. If the video is HD, the OSD can only be displayed on SDI Output 2 and HD Downconversion is enabled and selected.
8	Show on Analogue	Checked or Unchecked	When checked the OSD is displayed on the Analogue output. You may want to turn this off if you are transmitting from this port.

Table 7-19 – OSD Settings Pane Key

Step 7: Configure the Genlock Settings Pane

Screenshot: Genlock Settings Pane

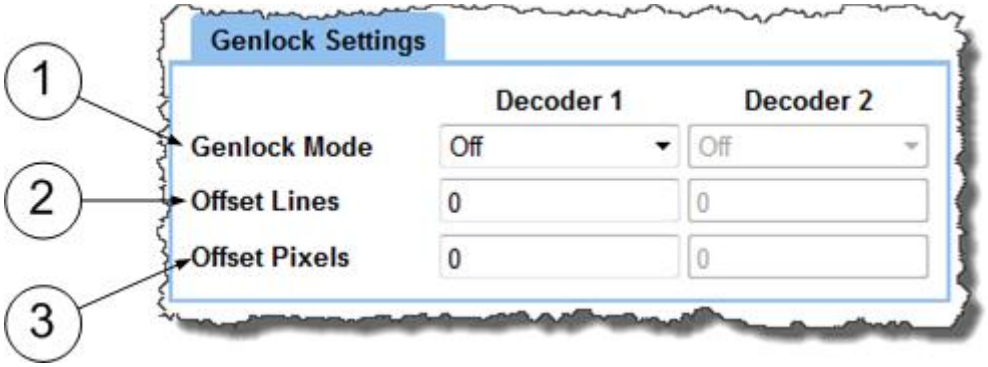


Figure 7-25 Genlock Settings Pane

No	Name	Options	Notes
1	Genlock Mode	Off External Internal	Off=Genlock switched off and systems is not locked. External=Using the Genlock source connected to the external port on the back of the receiver. This is normally your station SPG. Internal=Using the receiver's own Genlock source built into the unit.
2	Offset Lines	0	Standard dependant. Enables you to apply delay adjustment.
3	Offset Pixels	0	Standard dependant. Enables you to apply delay adjustment.

Table 7-20 – Genlock Settings Pane Key

Step 8: Use the Apply Button Consistently

Each time you change any parameter on the Control Application it is **very important** to click the **Apply** button and wait for a moment for the changes to be sent to the device.

Many times people change a parameter and then wonder why the device has not changed behaviour. **Always** click the **Apply** button.

Step 9 – About the Refresh Button

The browser software will check with the device every few seconds so it can update the Control Pages with the latest changes.
To force a refresh of the control pages you'll need to click the **Refresh Button.**

7.8 Setting the Clock

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Global Settings Tab

Click on the **Global Settings** tab.

Step 2: Set the Clock

1. Click the **Set Clock** button.
2. The **Set Clock** dialog opens.
3. Click the **Date** box.
4. The **Calendar** opens.
5. Select the date you require.
6. In the **Time** box, enter the current time.
7. Ensure you use the correct time format! (hh:mm:ss).
8. In the **Time Zone** drop-down box, select the time zone you require.
9. In the Daylight Saving drop-down box, select the setting you require.(Off, 1 hour or 2 hours).
10. Click the **Set** button.
11. The **Clock Set Successfully** message opens.
12. Click the **OK** button.

Screenshot: Set the Clock

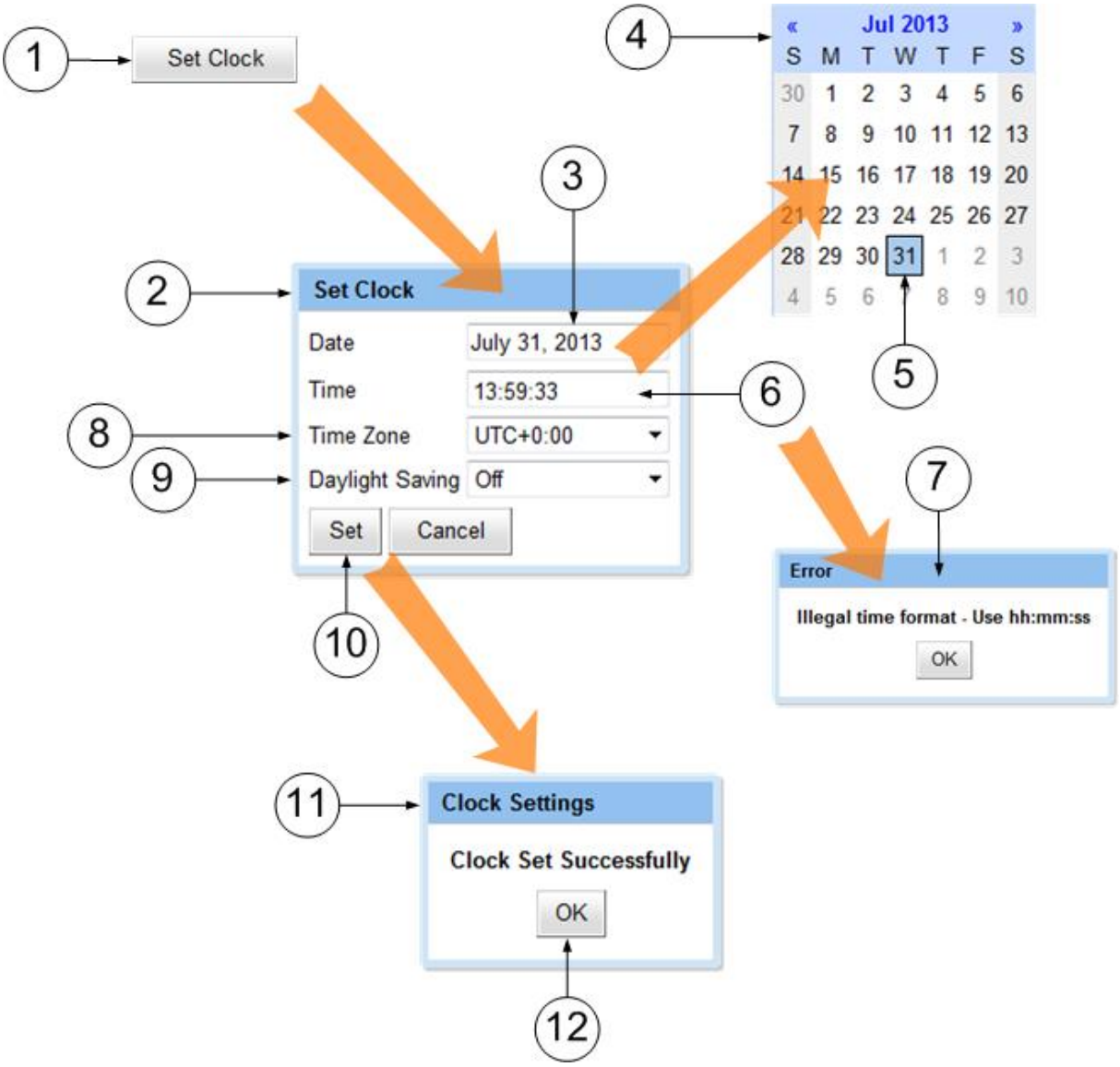


Figure 7-26 Set the Clock

7.9 Working with the Configuration Tab

The Configuration tab contains the list of 16 presets. Each preset enables you to specify demodulation parameters, decoding modes, and descrambling configuration.

You can easily load a different preset by selecting one of the 16 configuration tabs and clicking the **Apply** button.

The **Live** preset is indicated by a **green box** around the preset number.

Changes to the live preset are automatically applied with the **Apply** button. Changes made to all other non-live presets can be saved by clicking on **Save**.

The Configuration tab is divided into five panes:

- Basic Configuration
- Demod 1 Configuration
- Decoder 1 Configuration
- Demod 2 Configuration
- Decoder 2 Configuration

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Configuration Tab

Click on the **Configuration** tab.

Screenshot: Configuration Tab

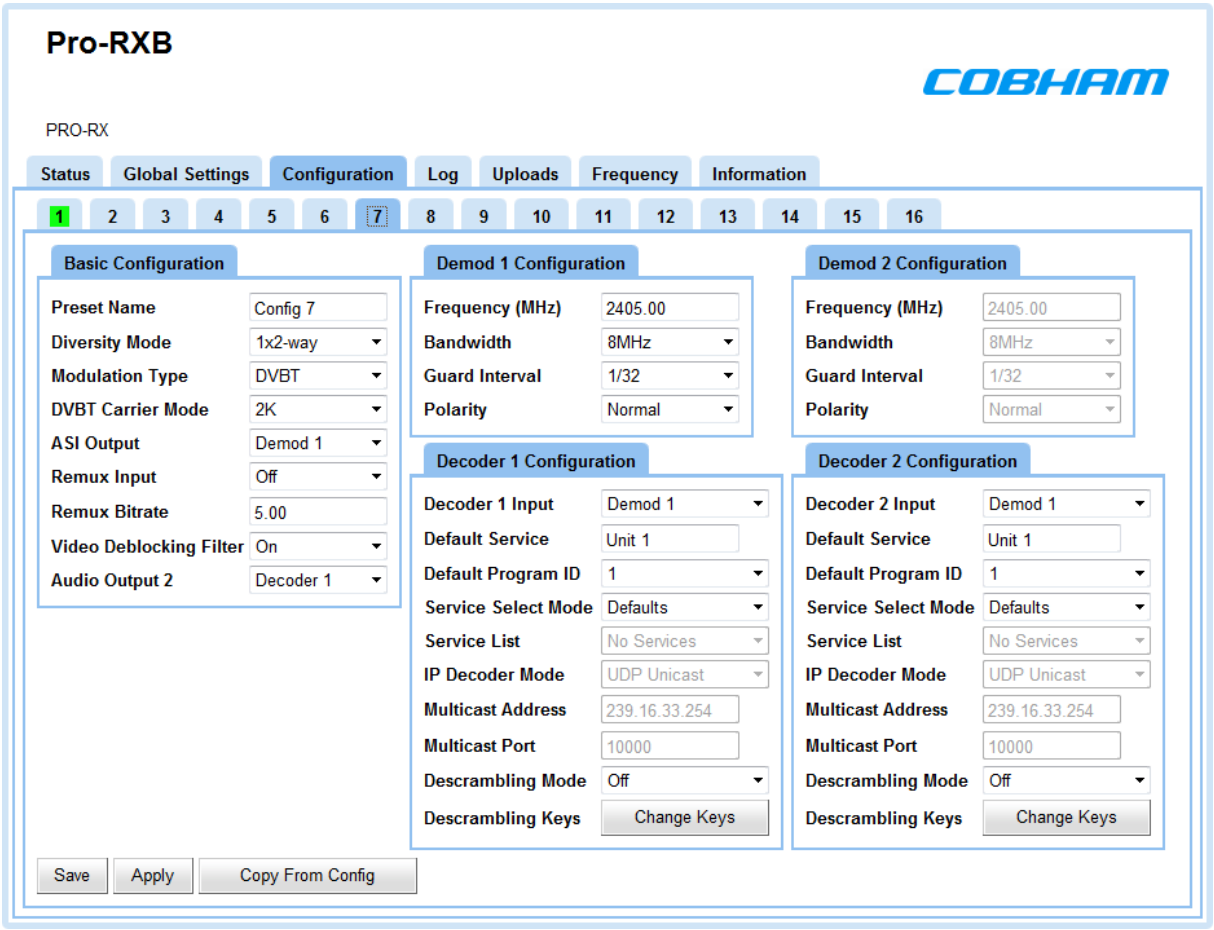


Figure 7-27 Configuration Tab

Step 2: Understand the Preset Tab Colours

1. The **green box** shows which preset is currently **active** in the receiver.
2. The **light blue** tab shows presets available for you to use (There are 16).
3. The **dark blue** tab shows the preset you are currently **editing**.

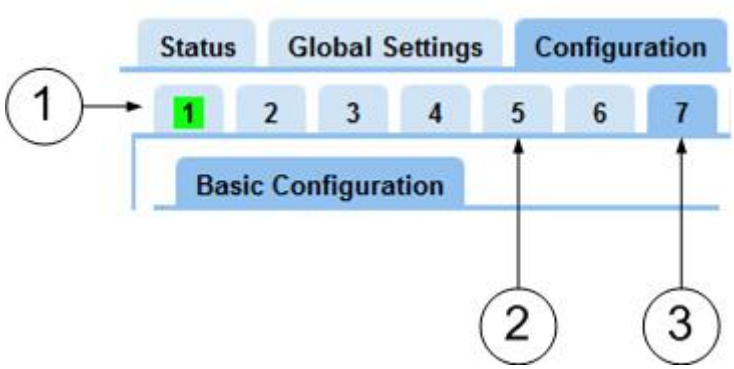


Figure 7-28 Preset Tab Colours

Step 3: Make a Different Preset Available for Editing

1. Click on any **light blue** tab
2. The tab turns **dark blue** and you are now **editing** that preset

Step 4: Make a Different Preset Active on the Receiver

1. Click on **any tab** other than the green one.
2. Click the **Apply** button
3. The tab turns **green** and that preset is now **active** on the receiver.

Step 5: Configure the Basic Configuration Pane

Screenshot: Basic Configuration Pane

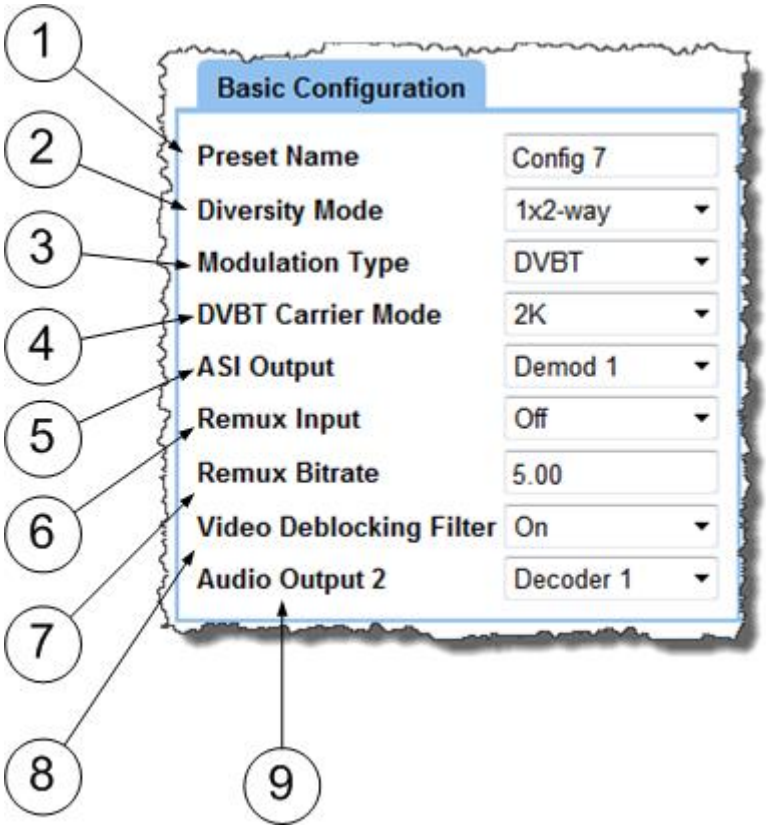
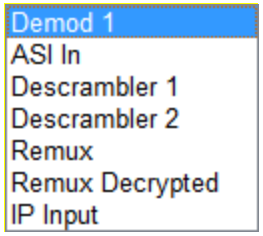
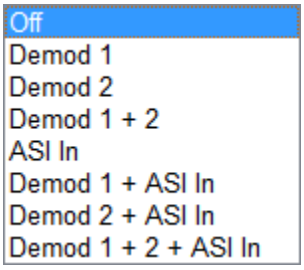


Figure 7-29 Basic Configuration Pane

No	Name	Options	Notes
1	Preset Name	Config 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	This is where you **set** the current configuration.
2	Diversity Mode	1x2-way 1x4-way 1x6-way 1x8-way 2x2-way 2x4-way	The configuration of the diversity and channel arrangement of the receiver.

No	Name	Options	Notes
3	Modulation type	Narrowband DVBT UMVL	Choose the modulation bandwidth you want to use. UMVL- Ultra Mobile Video Link – licence dependant bandwidths. UMVL is a mix of technologies between DVBT and Narrowband. It is optimised for use in high speed mobile environments (like car racing for example). UMVL is also excellent when you are using high frequency (4 GHz and above) transmissions.
4	DVBT Carrier Mode	2K or 4K	If you selected DVBT as your Modulation Type earlier, you can now select how many carriers will be used. 2K=About 2000 4K=About 4000 (dual pedestal mode)
5	ASI Output		The source for the ASI output is selected here. For example if you choose Demod 1, then this will provide an ASI signal to the ASI Out port. If you choose Remux, the ASI Output will be made up of whatever you configure in the next field, Remux Input.
6	Remux Input		This field enables you to select what you want to go into the Remux. You can combine sources to be remuxed into a single ASI stream. For example, **Demod 1+ASI** in would enable you to have received pictures being combined with a signal from the ASI input port, all being sent to the ASI Output port. For correct operation all PIDs present in the input streams must be unique.

No	Name	Options	Notes
7	Remux Bitrate	5.00	If you have selected **Remux** in **ASI Output** (item 5 in this table) earlier, then this field will become active and will enable you to set the bitrate for the Remux stream leaving the ASI Output port. You may have remuxed two video signals together which you are then planning to transmit forwards. You could configure the Remux Bitrate to suit your transmitter bandwidth then ensure the two signal you are going to Remux will fit into that space. For correct operation, the bitrate must be equal or higher than the combined bitrate of all input streams.
8	Video De-blocking Filter	Off or On.	MPEG ASP mode only. Filter which by default is on, helps provide a softening effect on sharp edged boundaries.
9	Audio Output 2	Decoder 2 or Decoder 1	Mapping the second audio physical output to an audio stream source. Also selects which audio service is embedded on SDI channels 3 and 4. If service contains two audio streams, select Decoder 1.

Table 7-21 – Basic Configuration Pane Key

Step 6: Configure the Demod 1 Configuration Pane

Screenshot: Demod 1 Configuration Pane in each Possible Configuration

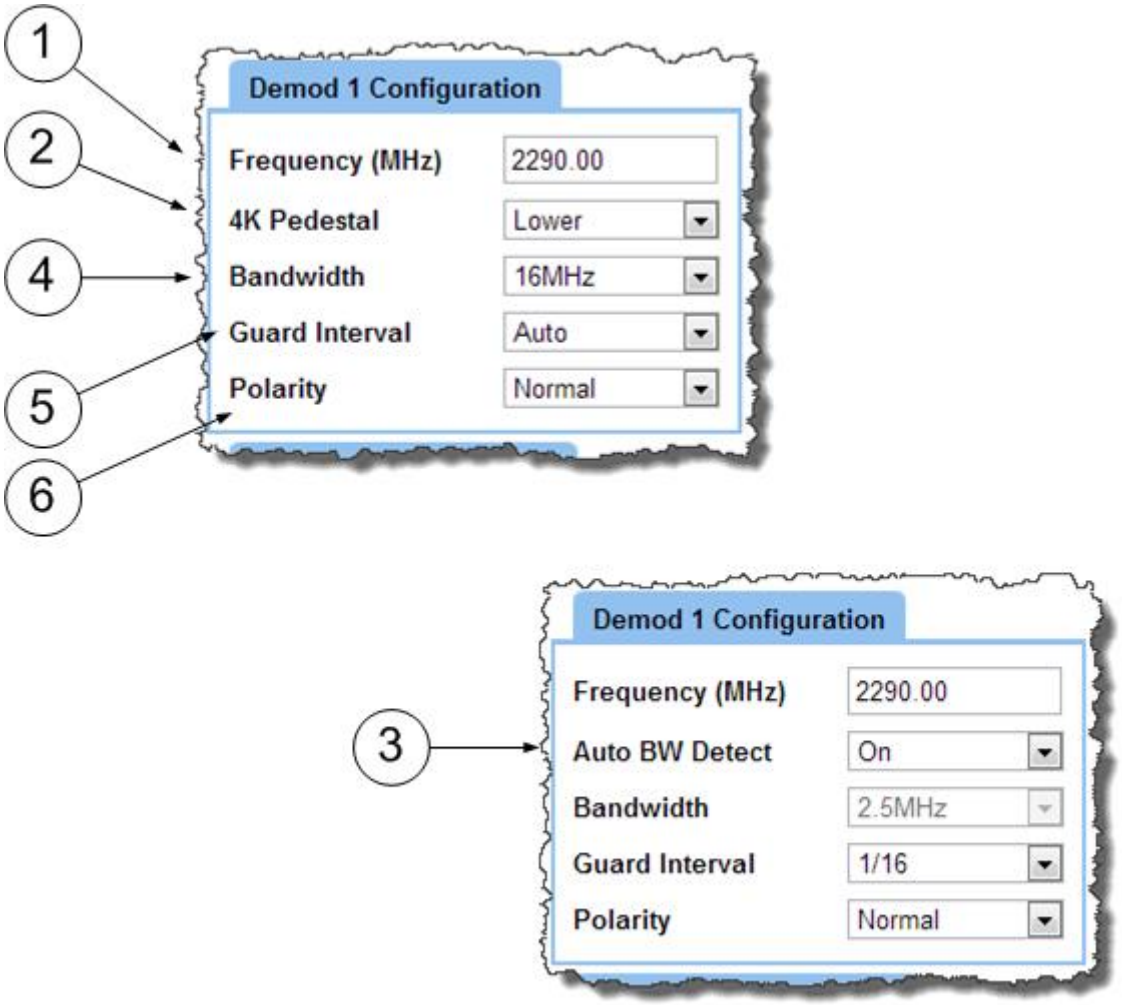


Figure 7-30 Demod 1 Configuration Panes

No	Name	Options	Notes
1	Frequency (MHz)	L, S and C Bands	The frequency in megahertz (MHz) that you want to use for this preset. If you try to input a frequency that is out of range, the radio will tune the nearest available frequency automatically.
2	4K Pedestal	Lower or Upper	DVBT only and if licensed for dual pedestal mode. Selects which pedestal is demodulated wrt the centre frequency.

No	Name	Options	Notes
3	Auto BW Detect	Off or On	Narrowband only. When on, the receiver will attempt to automatically detect the bandwidth.
4	Bandwidth	DVBT:6, 7 & 8MHz Narrowband: 2.5MHz 1.25MHz 625kHz	DVB-T bandwidths (normally used for broadcast) Cobham narrowband (normally surveillance use) Cobham Ultra-narrowband (this is a licensable feature, normally surveillance use).
5	Guard Interval	Narrowband: 1/16 or 1/8 DVBT: 1/32, 1/16, 1/8, 1/4	The guard interval which is being applied to the narrowband mode in use. The guard interval is a deliberate extension of the RF symbol period to give immunity to reflections. 1/16, short extension, deals with fast reflections, more data, less range. 1/8, long extension, deals with slower reflections, less data, more range.
6	Polarity	Normal Inverted Auto	All Cobham equipment should use normal mode. The receivers can be used with other manufacturer's products and sometimes this requires us to change the polarity to inverted to match this third party equipment. If you select Auto the receiver will attempt to automatically select the correct format for you.

Table 7-22 – Demod 1 Configuration Pane Key

Step 7: Configure the Decoder 1 Configuration Pane

Screenshot: Decoder 1 Configuration Pane

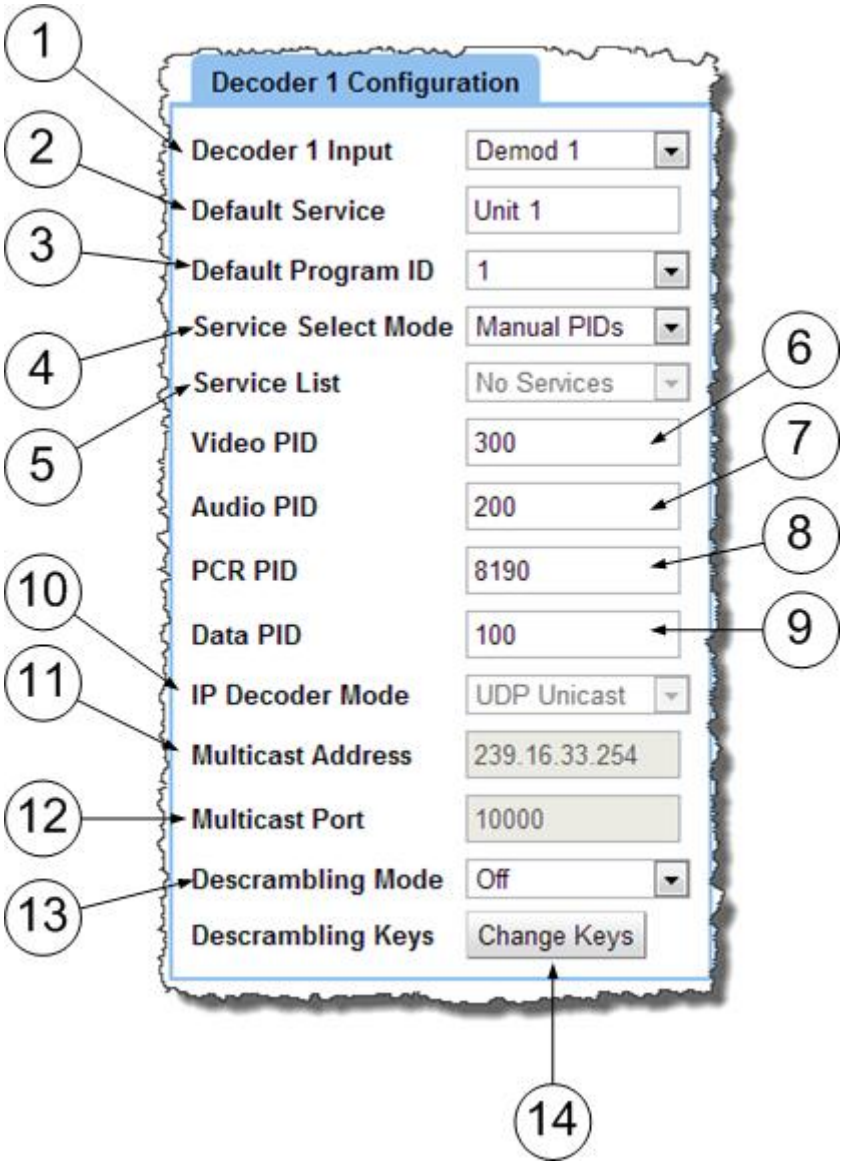


Figure 7-31 Decoder 1 Configuration Pane

No	Name	Options	Notes
1	Decoder 1 Input	Demod 1 Demod 2 ASI In IP In	Source feeding the decoder. Licence dependant.

No	Name	Options	Notes
2	Default Service	Up to 20 ASCII characters.	The default is Unit 1. If the received stream contains multiple services, this service name will be checked for a match and used as preference.
3	Default Program ID	1 to 10	This sets which program number in the transport stream will be used on initial power up. If the received stream contains multiple services, this program ID will be checked for a match and used in preference.
4	Service Select Mode	Defaults List Manual PIDs	This selects how services in the transport stream will be selected. Defaults – Uses Default Service name and Program ID as set earlier. List – Will show a list of available services in **Status** > **Service** > **Service List 1** or **2**. Manual PIDs - Enables you to select particular elements from the transport stream like alternate language audio.
5	Service List	H.264 Unit 1 for example.	If you have selected List in Service Select Mode earlier then this field will show a list of available services on the current Transport stream. The selected service from the list will be decoded.
6	Video PID	0x0020 to 0x1FFE	Set the manual Video service PID for decoding
7	Audio PID	0x0020 to 0x1FFE	Set the manual Audio service PID for decoding
8	PCR PID	0x0020 to 0x1FFE	Set the manual PCR PID for clock reference
9	Data PID	0x0020 to 0x1FFE	Set the manual Data service PID for decoding
10	IP Decoder Mode	UDP Unicast UDP Multicast	Only available if you have selected IP In under Decoder 1 input.

No	Name	Options	Notes
11	Multicast Address	239.16.33.254	This text box enables you to change the multicast address to be received by the unit. The default value is 239.16.33.254.
12	Multicast Port	10000 Range available is 1024-65535	Protocols like TCP or UDP use port numbers in the header to direct traffic around the network. Low port numbers are used by computer systems for predefined tasks. For example SMPT (for your email service) uses port 25. A good rule is to use numbers above 10,000 to avoid conflict with existing services. When you set up a port number on several computers on a network they will all listen for packets directed to that port. The default value is 10333.
13	Descrambling Mode	Off ABS AES 128 AES 128+ BCrypt BCrypt+ AES 256 AES 256+ BCrypt256 BCrypt256+	If you want to use descrambling you'll select your mode here. You may not have all the modes shown here as they are licensable features.
14	Descrambling Keys	Change Keys Button.	After selecting a Descrambling Mode, press this button to open the Enter Scrambling Key dialog where you can set the key. See *Advanced Operation, Setting up Encryption.*

Table 7-23 – Decoder 1 Configuration Pane Key

Note: Demod 2 and Decoder 2 Configuration are set up exactly the same as Demod 1 and Decoder 1.

7.10 Working with the Copy from Config Button

Sometimes you want to create a new configuration from one that already exists. For example, you may have a complex configuration you like to use but just need to change the frequency. The **Copy from Configuration** button makes this very simple.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Configuration Tab

1. Click on the **Configuration** tab.
2. The Configuration Page opens

Step 2: Select the Preset you want to Setup

3. Click on a **Config** tab. I've chosen config 3 in my example. It turns **dark blue** which means you are **editing** that config.

Step 3: Open the Choose Options to Copy Window

4. Click the **Copy from Config** button.
5. The **Choose Options to Copy** window opens.
6. Choose a **Config** to copy options **from**. I've chosen Config 1 in my example.
7. **Check** any items you want to be copied **to** your new preset.
8. Click the **OK** button.
9. You'll see the **Saved Successfully** message box.
10. Click the **OK** button.
11. All the configs you selected from Config 1 are now pasted into config 3.

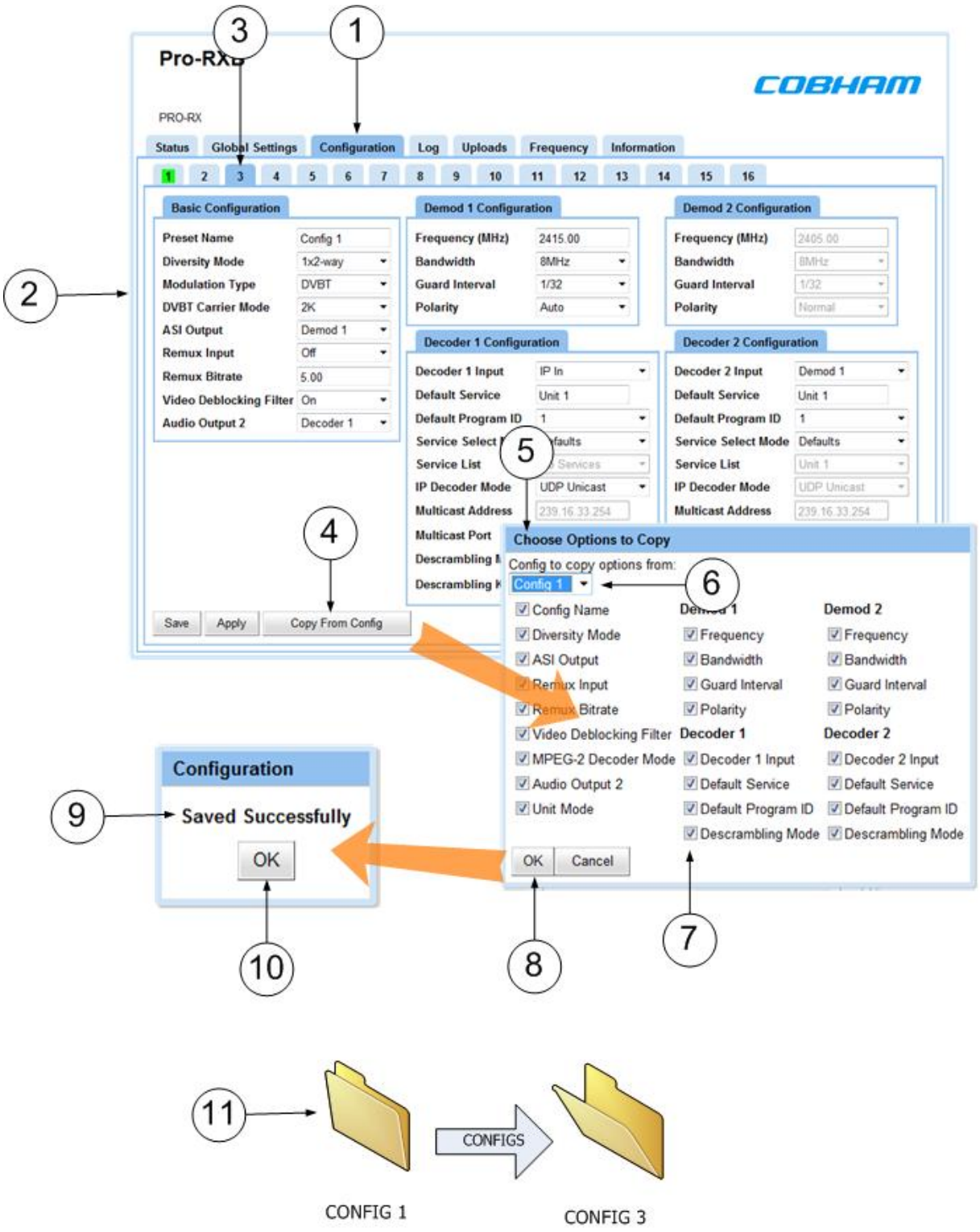


Figure 7-32 Working with the Copy from Config Button

7.11 Working with the Log Tab

The PRORXB receiver has the facility for generating log files of receiver status information.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Log Tab

Click on **Log** tab.

Screenshot: Log Tab

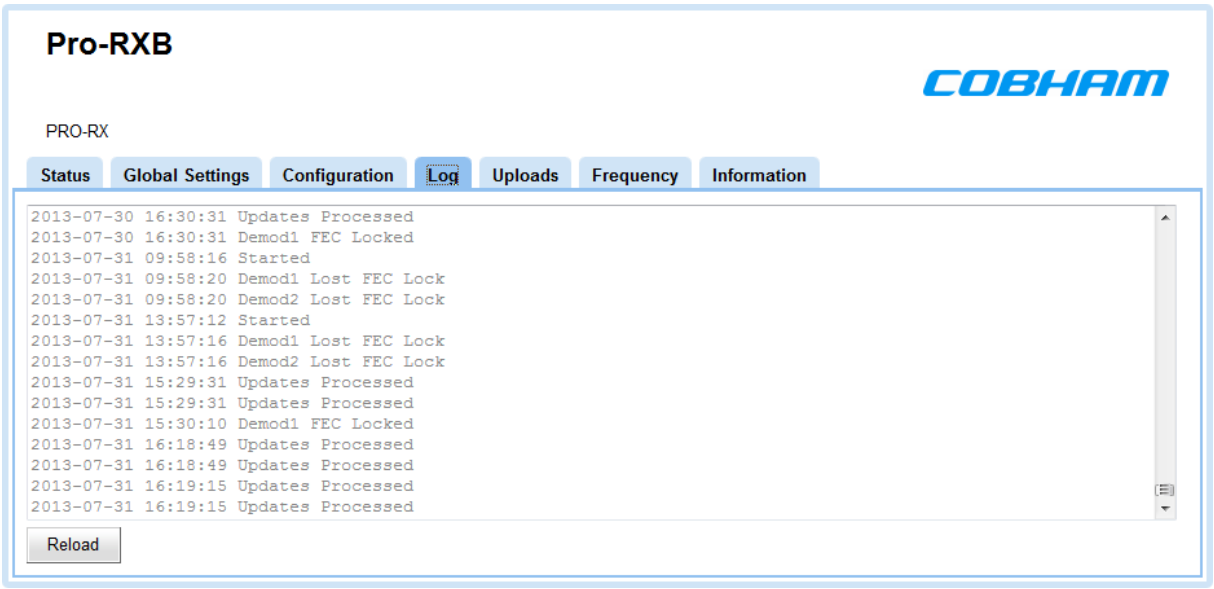


Figure 7-33 Log Tab

Step 2: Interpret the Information Presented in the Log Tab

The log tab gives you a textual display of events with time information. The events logged include stream errors and software updates processed.

Step 3: Reload Button

Click the **Reload** button to force a reload of the page data.

7.12 Working with the Upload Tab

This page enables you to upload a license file, enable licensable features, or send software upgrade files to the PRORXB.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Uploads Tab

Click on **Uploads** tab.

Screenshot: Uploads Tab

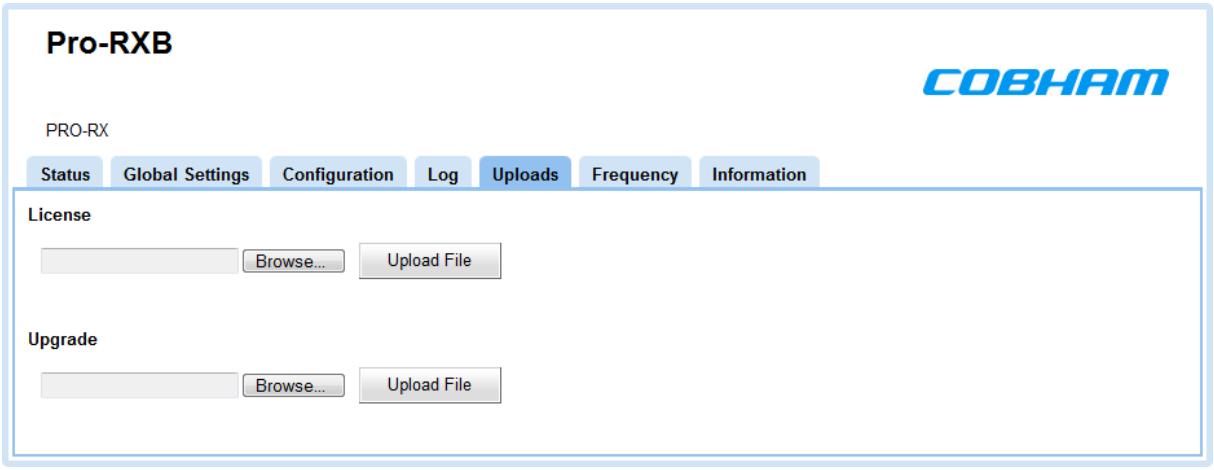


Figure 7-34 Uploads Tab

Step 2: Upload a New License File

If a new licensable feature is purchased for a unit then a new license code has to be programmed into the PRORXB to enable the function.

Cobham will generate a new license file (with the file extension .lic) which we'll send to you.

1. Open the **Uploads** Tab
2. Click the **Browse** button next to the **Licence** text box
3. The **Choose File to Upload** window opens
4. Navigate to the .lic file we sent you
5. Click **Open**
6. Check the **correct file** is shown in the **Licence** text box
7. Click **Upload File**
8. The licence is written to the unit, you'll see a **message**
9. After rebooting the unit, the new features will be enabled

Step 3: Upgrade your PRORXB

When a new software release is available for the PRORXB, Cobham can supply customers with a software upgrade.

Cobham can generate a new upgrade file (with the file extension .upg) which we'll send to you.

1. Open the **Uploads** Tab
2. Click the **Browse** button next to the **Upgrade** text box
3. The **Choose File to Upload** window opens
4. Navigate to the .upg file we sent you
5. Click **Open**
6. Click **Upload File –** it will take about five minutes.
7. The upgrade is applied to the unit, you'll see a **message**.
8. After rebooting the unit, the new features will be enabled.

7.1 Working with the Frequency Tab

The **Frequency** tab enables you to scan the spectrum around you within a **bandwidth** and **resolution** of your choice.

You can use the **Find** function which will tag the strongest signals and report their frequencies to you.

You can use the **Cycle** button to select found frequencies in turn and if you wish you can press the **Select** button which will make that frequency currently active in your PRORXB.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Frequency Tab

Click on **Frequency** tab.

Screenshot: Frequency Tab

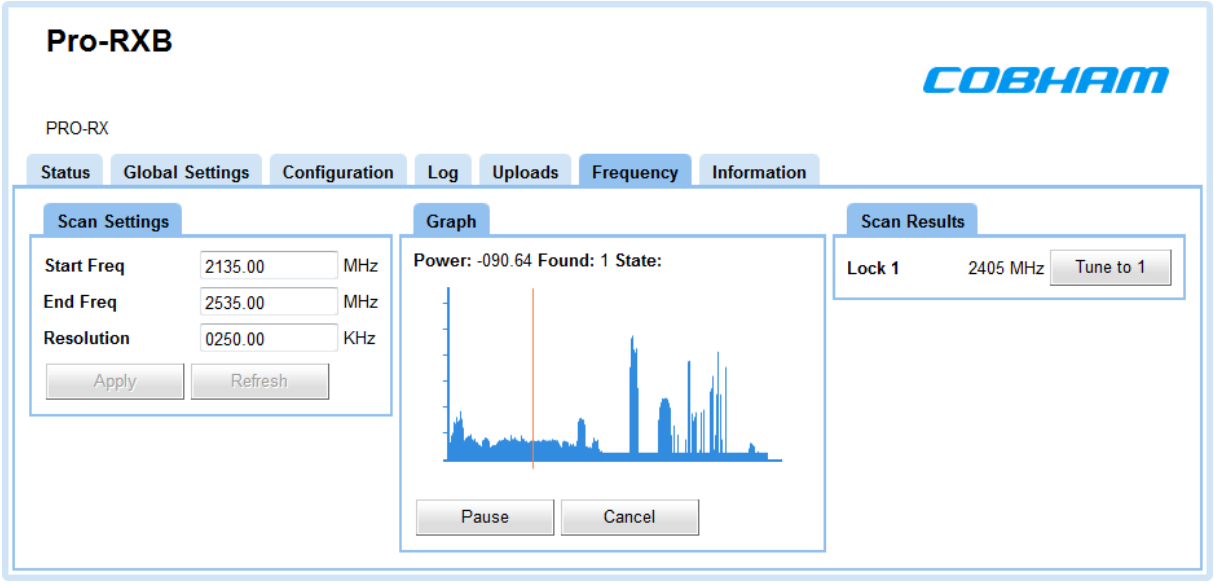


Figure 7-35 Frequency Tab

Step 2: Configure the Scan Settings Pane

1. Click the **Refresh** button – this resets any previous scans in the frequency scanner.
2. Type in the **Start** frequency in MHz you want to use for your Frequency scan. If you enter a frequency that is too low the Start frequency will set itself to the lowest frequency this PRORXB can perform.
3. Type in the **End** frequency in MHz you want to use for your Frequency scan. If you enter a frequency that is too high the End frequency will set itself to the highest frequency this PRORXB can perform.

Note: The wider the band you want to scan using the Start and Stop setting, the longer the scan will take.

4. Type in the **Resolution** frequency in MHz you want to use for your Frequency scan. If you enter a very small resolution like 0.5 MHz the scan will find many more discrete frequencies but the scan will take longer. Using a larger resolution will speed up the scan but may miss very fine frequency steps.
5. Click the **Apply** button.
6. The **Scan Settings** message window opens.
7. Click the **OK** button.

Screenshot: Scan Settings Pane

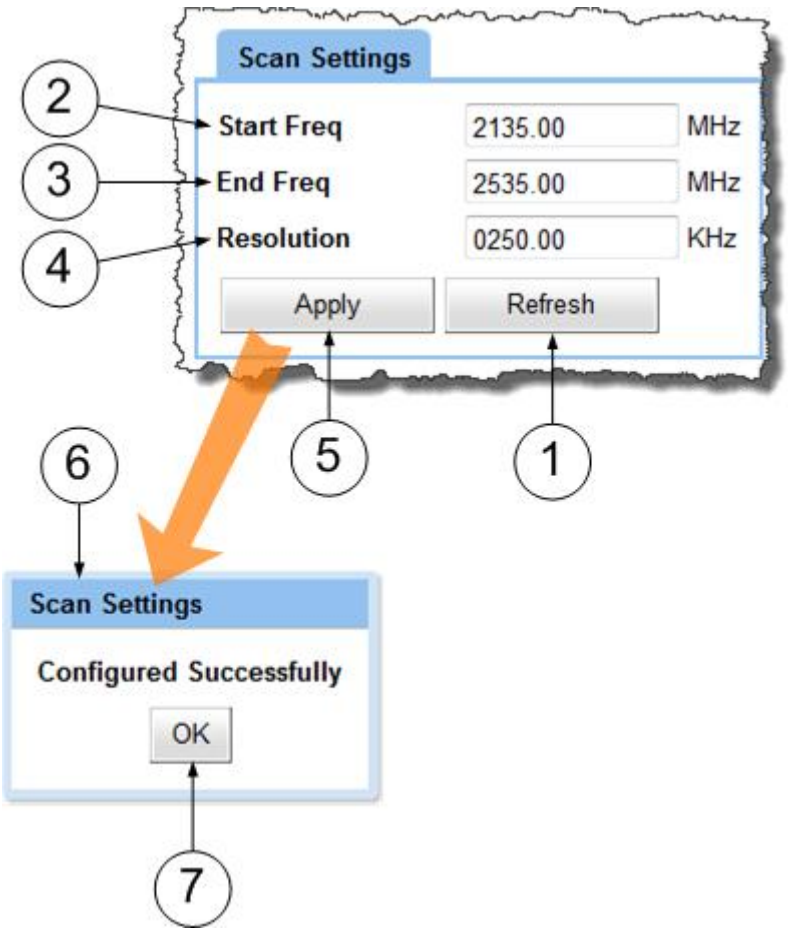


Figure 7-36 Scan Settings Pane

Step 3: Start the Scan

1. Click the **Start** button.
2. The **Confirm Scan** message window opens. This reminds you normal operations will stop.

CAUTION: This means the receiver will drop any channel it is receiving. Don't run a scan if the receiver is on air!

3. Click the **OK** button.
4. Observe the **graphical display** of the scan. The orange line will track across the graph drawing a graph of RF power levels. The state indicator shows **scanning**.
5. You can click the **Pause** button at any time. Click **Continue** button to carry on with the scan.
6. After the scan, there is a **testing** phase – please wait until this is complete.

Screenshot: Graph Pane

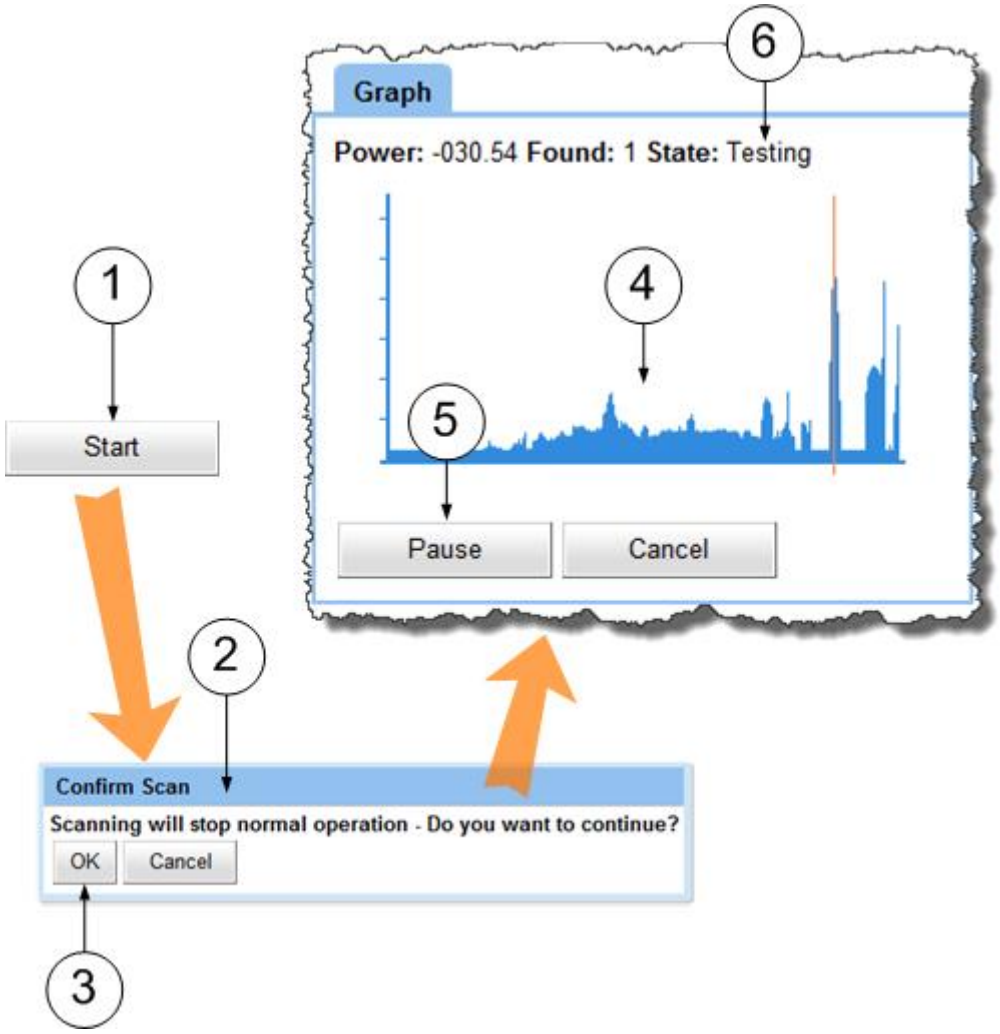


Figure 7-37 Graph Pane

Step 4: Check the Scan Results

1. Look at the **Scan Results** pane – It will list any frequencies it has found that it is able to tune for you.
2. Click the **Tune to** button for your required channel.
3. The **Channel Details** window opens. It tells you some things about the channel like its frequency and bandwidth for example.
4. If you want the PRORXB to tune to this channel, press the **Yes** button. This will save the channel configuration parameters on the currently active configuration preset.
5. If you want the PRORXB to remain on its current channel, then press the **No** button.

Screenshot: Scan Results Pane

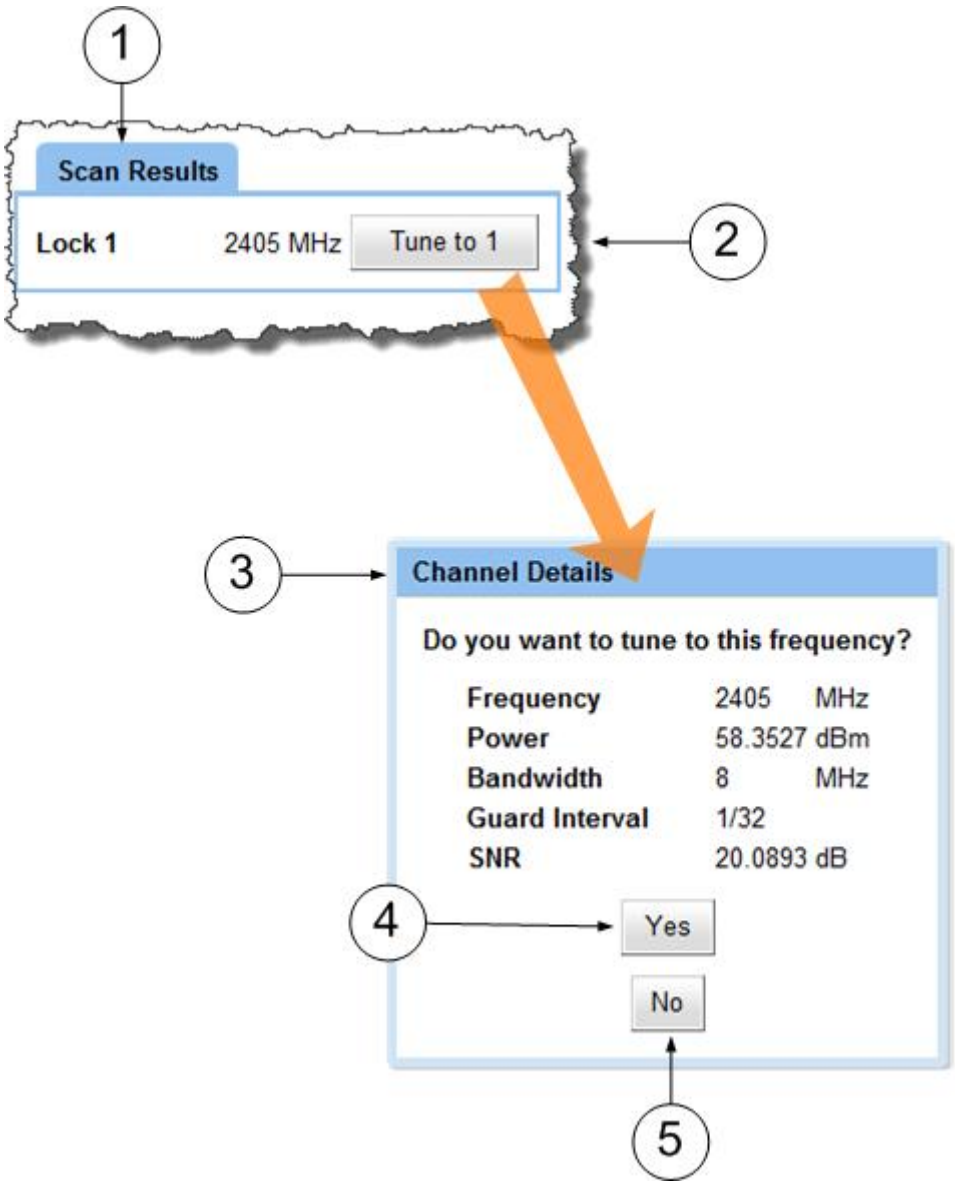


Figure 7-38 Scan Results Pane

7.2 Working with the Information Tab

The Information tab contains generic information including software versions and unit specific data. You may need this information during a support call for example.

Before you Begin

You'll need:

- To have connected your PC to the PRORXB using IP.
- To be logged on to the PRORXB unit.

Step 1: Open the Information Tab

Click on **Information** tab.

Screenshot: Information Tab

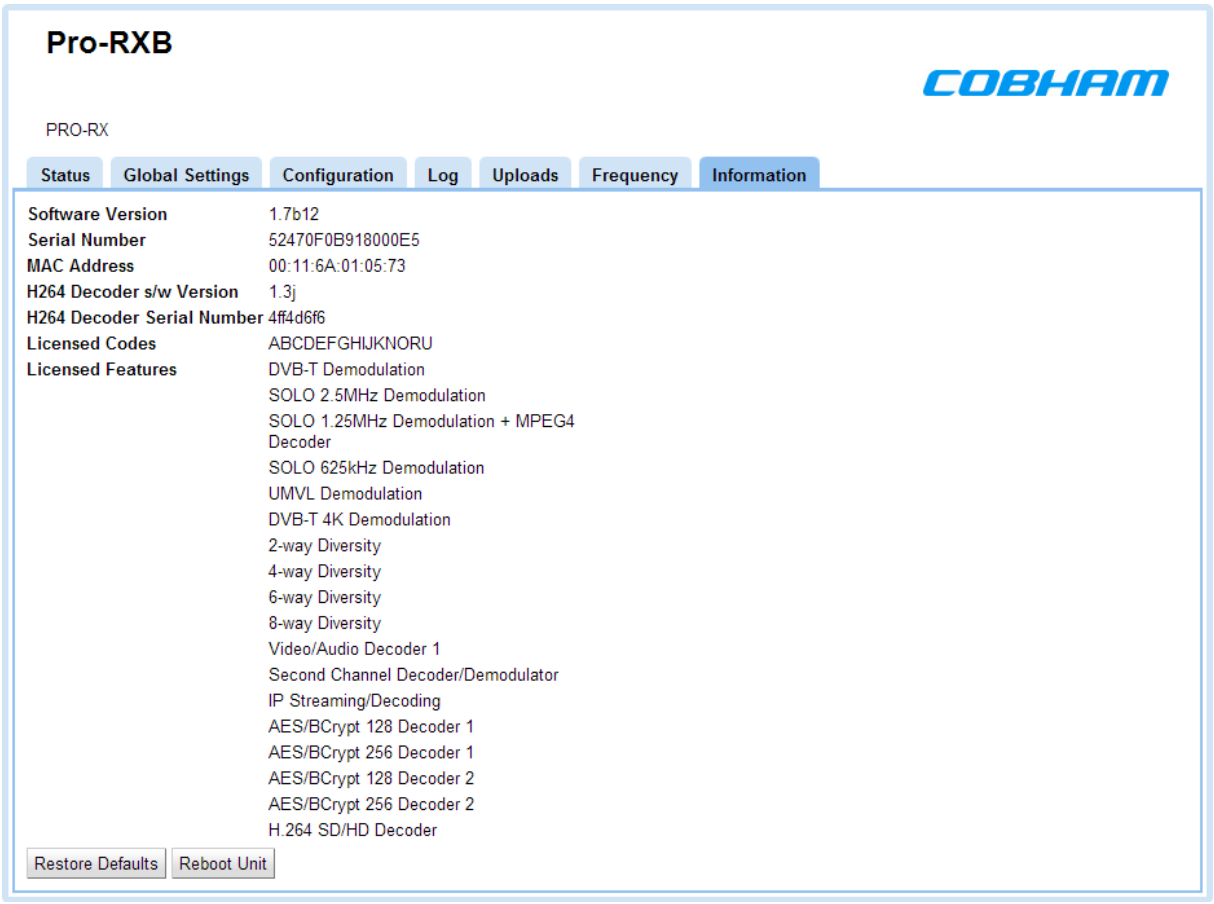


Figure 7-39 Information Tab

Step 2: Check the Software Version

This field returns the current version of software loaded onto the PRORXB unit. When you do an upgrade, you'll probably want to check here to see that the upgrade went well.

Step 3: Check the Serial Number

During a support call we'll often ask you for the Serial Number of your PRORXB. This is where you find it.

Step 4: Check the MAC Address

Media Access Control Address (MAC) is reported by this field. You may need this if you are involved in network operations with your PRORXB.

Step 5: Check the H264 Decoder Software Version

This field returns the current version of software loaded onto the H264 Decoder unit. When you do an upgrade, you'll probably want to check here to see that the upgrade went well.

Step 6: Check the H264 Decoder Serial Number

During a support call we'll often ask you for the Serial Number of your H264 Decoder unit. This is where you find it.

Step 7: Check the Licenced Codes

Cobham products use licence codes to switch features on and off in your product. Each feature has a letter and your licence is made up of several of these letters.

Step 5: Check the Licensed Features

The **Licensed Features Pane** is a list of all the licensed features on this device.

8. Appendix A – Cautions and Warnings

8.1 Cautions and Warnings

Serial	Area	Note
1	Enclosures	Do not remove any factory installed screws or fastenings. Damage to the units may result and void any warranties. Only authorised, trained personnel should open the product. There are no functions that required the user to gain access to the interior of the product. There are no user serviceable parts inside.
2	Maintenance	Other than cleaning, no scheduled maintenance is required to ensure proper function of the unit.
3	Environment	The equipment should not be used in hazardous or corrosive atmospheres. Users are reminded of the necessity of complying with restrictions regarding the use of radio devices in fuel depots, chemical plants and locations where explosives are stored and/or used.
4	Power Supply	Ensure that the power supply arrangements are adequate to meet the stated requirements of each product. Observe all electrical safety precautions.
5	Electro Static Discharge (ESD) Precautions	ESD guidelines must be followed for this electrostatic sensitive device.
6	Lightning Strike	There is a risk of lightning strike to antennas. The equipment should not be assembled in an area at the time of lightning activity. Antennas should be adequately protected from lightning strikes.
7	Working at Height	Observe caution when locating the device at height, for example on a mast. Ensure the unit is well secured to prevent it falling and injuring personnel.
8	Risk of Eye Injury	Care should be taken to avoid eye contact with the antennas.
9	Cables	Connecting cables should not be positioned where they are likely to become damaged or where they may present a trip hazard.

Serial	Area	Note
10	Thermal Control System	Any powered device will always produce heat as a by product of its operation. If you operate this device in an enclosed space you must ensure it has adequate airflow to keep it cool. Also, if worn close to the body, care must be taken to protect the operator from excessive temperatures.
11	RF Emission System	When using this device please ensure a distance of 20cm is maintained between your device and your body while the device is transmitting.
12	Aircraft Safety	Use of this equipment on board aircraft is strictly forbidden. Use of radio transmitter equipment in an aircraft can endanger navigation and other systems.

8.2 EMC / Safety and Radio Approvals

The equipment has been designed to meet and has been tested against the following harmonized EMC and safety standards:

EN 301 489-1 & EN 301 489-5

EN 61000-3-2:2000

EN 61000-3-3:1995

EN 55022:1998, Class A

EN 61000-4-2:1995

EN 61000-4-3:1996

EN 61000-4-4:1995

EN 61000-4-5:1995

EN 61000-4-6:1996

EN 61000-4-11:1994

EN 60950:2006, Class A

8.3 CE Marking

The CE mark is affixed to all Broadcast Transmitter products, and the CE Declaration of Conformity, as well as the technical file is available on request.

9. Appendix B - Care and Maintenance

9.1 Caring for your Equipment

- Do not subject the radio to physical abuse, excessive shock or vibration
- Do not drop, jar or throw the radio
- Do not carry the radio by the antenna
- Avoid exposure to excessive moisture or liquids
- Do not submerse the radio unless it is designed to be submersible
- Do not expose the radio to corrosives, solvents, cleaners or mineral spirits
- Avoid exposure to excessive cold and heat
- Avoid prolonged exposure to direct sunlight
- Do not place or leave radios on surfaces that are unstable
- Always turn the radio off before installing optional accessories
- Only use accessories intended for the specific make and model of your radio, especially batteries, chargers and power adapters

9.2 Charging

- Use approved batteries, chargers and adapters designed specifically for your make and model radio
- Do not attempt to charge a wet radio or battery pack
- Do not charge the radio or battery pack near anything flammable
- Stabilize the battery pack to room temperature (72 degrees F) before charging
- Do not charge radios and/or battery packs on wet or unstable surfaces
- Do not leave radios and/or batteries in chargers for excessive periods

9.3 Working with Lithium Batteries

- Charge only with the approved charging cable
- Batteries are to be used only for the specified purpose. Incorrect use will invalidate the warranty and may make the battery become dangerous.
- Charge in a clean, dry environment, ideally at 10 degrees Celsius. (0 to 45 degrees Celsius is permissible).
- Do not store or operate in direct sunlight for extended periods. Battery can be damaged by over-heating, for example if placed on the rear parcel shelf of a motor vehicle.
- Store in a cool dry environment. Storage at elevated temperatures can cause permanent loss of capacity.
- For short term (less than six months) storage, store in a fully charged state.

- For extended periods of storage (more than one year) charge before storage and recharge every six to nine months.
- Always fully recharge the battery after any storage period greater than one month before use.
- Do not store the battery with the charge depleted as this can cause failure of the battery and invalidate warranty.
- Do not short circuit
- Do not immerse in water
- Do not incinerate. Cells are likely to explode if placed in a fire
- Dispose of batteries in accordance with the regulations in place for the Country of use. Batteries are normally considered 'separate waste' and should not be allowed to enter the normal waste stream. Either return to the seller, or deliver to an approved re-cycling facility.

9.4 Cleaning

- Turn off the radio and remove batteries (if applicable) before maintenance
- Use a clean, soft, damp cloth to clean the radio. A microfiber cloth is recommended
- Do not use alcohol or cleaning solutions to clean the radio
- Do not immerse the radio in water to clean it
- If the radio becomes wet, immediately dry it with a microfiber or other lint-free cloth.

9.5 Storage

- Turn off the radio and remove batteries before storage
- Store radios and battery packs in a cool, dry area at room temperature (72 degrees F).
- Do not store radios and/or batteries in active chargers

9.6 Repairs

Do not attempt any repair. The radio contains no user serviceable parts. Contact the Cobham Customer Service Centre or take it to a qualified repair technician.

9.7 Getting Technical Support

Step 1 – Contact Client Services

Technical support enquiries should be sent to the Client Services team.

Post: The Cobham Centre-Solent, Fusion 2, 1100 Parkway, Solent Business Park, Whiteley, Hampshire, PO15 7AB, England.

Phone: +44 1489 566 750 then press 1 for support. Office hours: 0900-1700 UK time excluding holidays.

Email: tcs.whiteley.support@cobham.com (no restricted content).

For technical support we undertake to get a first response to you in less than one working day and a progress update at least every two weeks.

9.8 Using the Cobham RMA Service

You have a problem and all troubleshooting steps have been unsuccessful. You need to contact Cobham for Return Material Authorisation (RMA) Service.

Step 1 – Email Cobham

To return something to Solent please Email tcs.whiteley.rma@cobham.com. We will then send you an RMA request form to complete and return. We'll then send you an RMA number and shipping instructions.

Step 2 – Save your Personal Kit

Remove all personal kit or media from the device.

Step 3 – Pack the Unit

Use the original shipping container and packing materials if possible.

If the original packing materials are not available, wrap the equipment with soft material (e.g. PU/PE form) then put the wrapped equipment into a hard cardboard shipping box.

Step 4 – Prepare an Information Sheet

Include a sheet with the following information.

Note: Please keep a copy of this sheet for your records.

- Name
- Address
- Unit Serial Number
- Date of Purchase or the original invoice number
- Date of failure
- A detailed description of the problems you have encountered
- A list of the hardware / software configuration if applicable

Step 5 - Put the RMA Number on the Box

Clearly mark the outside of the shipping box with the RMA number. If an RMA number is not present on the shipping box, receiving will be unable to identify it and it might be returned.

Step 6 – Send the Box to Cobham

Send the box using your normal shipping process.

10. Appendix C-Glossary

10.1 Glossary

0-9	Means...
16QAM	16-state Quadrature Amplitude Modulation.
64QAM	64-state Quadrature Amplitude Modulation.

A	Means...
AC	**Alternating Current.** Current that is continually changing in magnitude and periodically in direction from a zero reference level.
A/V	Audio/Video.
AES	In cryptography, the **Advanced Encryption Standard** (**AES**) is an encryption standard adopted by the U.S. government. The standard comprises three block ciphers, AES-128, AES-192 and AES-256, adopted from a larger collection originally published as **Rijndael.** Each AES cipher has a 128-bit block size, with key sizes of 128, 192 and 256 bits, respectively.
ASI	**Asynchronous Serial Interface**. A streaming data interface which often carries an MPEG Transport Stream. An ASI signal can carry one or multiple SD, HD or audio programs that are already compressed, not like an uncompressed SD-SDI (270Mbs) or HD-SDI (1.45Gbs). An ASI signal can carry varying amounts of data but is always padded to run at a fixed line rate of 270 Mb/s.
Amplification	The process of increasing the strength (current, voltage or power) of a signal.
Amplitude	The level of an audio or other signal in voltage or current. The magnitude of variation in a changing quantity from its zero value.
Amplitude Modulation	Modulation in which the amplitude of the carrier wave is varied above and below its normal value in accordance with the intelligence of the signal being transmitted. Also called AM.

A	Means...
Analogue	**Analog transmission** is a transmission method of conveying voice, data, image, signal or video information using a continuous signal which varies in amplitude, phase, or some other property in proportion to that of a variable.
Antenna	An **antenna** (or **aerial**) is a transducer designed to radiate or receive electromagnetic energy (generally RF).
Antenna Bandwidth	The frequency range over which a given antenna will accept signals.
Antenna Gain	The effectiveness of a directional antenna as compared to a standard non-directional antenna. It is usually expressed as the ratio in decibels of standard antenna input power to directional antenna input power that will produce the same field strength in the desired direction. For a receiving antenna, the ratio of signal power values produced at the receiver input terminals is used. The more directional an antenna is, the higher is its gain.
Attenuation	Power loss resulting from conductor resistance and dielectric loss within the insulating material used to separate the conductors.

B	Means...
BNC	**Bayonet Neill-Concelman –** A very common type of RF connector used for terminating coaxial cable.
Bandwidth	The width of a band of frequencies used for a particular purpose.

C	Means...
COFDM	**Coded Orthogonal Frequency Division Multiplexing** is a frequency-division multiplexing (FDM) scheme utilized as a digital multi-carrier modulation method. A large number of closely-spaced orthogonal sub-carriers are used to carry data.

D	Means...
D/C	Downconverter. A device which converts microwave frequencies to UHF frequencies for use in Cobham receivers.
Digital	A **digital signal** is a discontinuous signal that changes from one state to another in discrete steps.
Decibel	The standard unit used to express transmission gain or loss and relative power levels. Also written as dB.

D	Means...
Decoder	Processor in a video receiver that converts digital video data to analogue signals for replay on analogue monitors; or in certain cases a software decoder, a program that decodes digital data for replay on the PC (decompression etc).
Demodulate	To recover the information originally impressed on the radio wave.

E	Means...
Electromagnetic field	The field of force that an electrical current produces around the conductor through which it flows.
Electromagnetic Waves	A wave propagating as a periodic disturbance of the electric and magnetic fields and having frequency in the electromagnetic spectrum; the means by which energy is transmitted from one place to another.
Elementary Stream (ES)	Elementary streams: These streams contain only one MPEG-2 video channel and no audio. Elementary streams are required if you intend to use **Milestone** or any player that cannot operate with Transport streams. You must be in RTSP mode to use Elementary streams.
Encoder	A processor in a video transmitter which converts analogue video from a camera to digital data.

F	Means...
FEC	**Forward Error Correction** is a system of error control for data transmission, whereby the sender adds redundant data to its messages, also known as an **error-correction code**. This allows the receiver to detect and correct errors (within some bound) without the need to ask the sender for additional data. The advantage of forward error correction is that a back-channel is not required, or that retransmission of data can often be avoided, at the cost of higher bandwidth requirements on average. FEC is therefore applied in situations where retransmissions are relatively costly or impossible.
Firmware	Software which is installed directly on a device and is intended specifically for that device and is used to control it.
FOV	**Field of View -** The field of view (also field of vision) is the angular extent of the observable world that is seen at any given moment.

F	Means...
Fading	A periodic decrease in received signal strength
Frequency	The rate at which a process repeats itself. In radio communications, frequency is expressed in cycles per second. Signals also have a property called wavelength, which is inversely proportional to the frequency.
Frequency Modulation	The process of varying the frequency of a carrier wave, usually with an audio frequency, in order to convey intelligence. Also called **FM**.
FPGA	**Field-Programmable Gate Array -** an integrated circuit designed to be configured by the customer or designer after manufacturing, hence "field-programmable".

G	Means...
GUI	**Graphical User Interface.**
GHz	**Gigahertz** - One gigahertz is equal to 1,000 megahertz (MHz) or 1,000,000,000 Hz.
Gain	The increase in signal strength that is produced by an amplifier.

H	Means...
Hertz	One cycle per second.

I	Means...
IP Address	**Internet Protocol Address** – A unique numeric ID for a device within a network.
IR	**Infra Red** - Infrared (IR) radiation is electromagnetic radiation whose wavelength is longer than that of visible light.
Impedance	The total opposition offered by a circuit or component to the flow of alternating current.

L	Means...
LOS and NLOS	**Line-of-sight** propagation refers to electro-magnetic radiation including light emissions travelling in a straight line. The rays or waves are diffracted, refracted, reflected, or absorbed by atmosphere and obstructions with material and generally cannot travel over the horizon or behind obstacles. NLOS is Non Line-of-sight.
Load	A device that consumes electrical power.
Lux	The **lux** (symbol: **lx**) is the SI unit of illuminance and luminous emittance. It is used in photometry as a measure of the *apparent* intensity of light hitting or passing through a surface.

M	Means...
MHz	**Megahertz** is equal to 1,000,000 Hz
mW	**Milliwatt** - The milliwatt (symbol: mW) is equal to one thousandth (10^{-3}) of a watt.
MPEG	Moving Pictures Experts Group.
Modulation	To change the output of a transmitter in amplitude, phase or frequency in accordance with the information to be transmitted. Data is superimposed on a carrier current or wave by means of a process called modulation. Signal modulation can be done in either of two main ways: analogue and digital. In recent years, digital modulation has been getting more common, while analogue modulation methods have been used less and less. There are still plenty of analogue signals around, however, and they will probably never become totally extinct.
Multicast	Multicasting is sending data from a sender to multiple receivers where each receiver signals that they *want* to receive the data.

N	Means...
nm	A **nanometre** (American spelling: **nanometer**; symbol **nm**) is a unit of length in the metric system, equal to one billionth of a metre (i.e., 10^{-9} m or one millionth of a millimetre).

N	Means…
NMEA 0183	**NMEA 0183** is a combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonar, anemometer, gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the U.S.-based National Marine Electronics Association.
NTSC	National Television Systems Committee.
Noise	Random pulses of electromagnetic energy generated by lightening or electrical equipment.

O	Means…
Omni directional antenna	An antenna whose radiation pattern shows equal radiation in all horizontal directions.
Oscillation	A periodic, repetitive motion or set of values (voltage, current, velocity).

P	Means…
PAL	Phase Alternate Line.
PIR	**Passive Infra Red** sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view.
PTZ	**Pan, Tilt and Zoom** – PTZ is a common way of referring to controllable cameras.
Propagation	A phenomenon by which any wave moves from one point to another; the travel of electromagnetic waves through space or along a transmission line.

Q	Means…
QPSK	Quadrature Phase Shift Keying.

R	Means…
RF	**Radio Frequency.**

R	Means...
RTSP	**Real Time Streaming Protocol** (RTSP) is a network control protocol designed for use in entertainment and communications systems to control streaming media servers. The protocol is used for establishing and controlling media sessions between end points. Clients of media servers issue VCR-like commands, such as play and pause, to facilitate real-time control of playback of media files from the server.
Rx	**Receiver**, an electronic device that changes a radio signal from a transmitter into useful information.
Radiate	To transmit RF energy.
Radio Frequency	Any frequency of electrical energy capable of propagation into space (usually above 20kHz). Also called RF.

S	Means...
SNR	**Signal to Noise Ratio** is an electrical engineering measurement defined as the ratio of a signal power to the noise power corrupting the signal. Signal-to-noise ratio compares the level of a desired signal (such as music) to the level of background noise. The higher the ratio, the less obtrusive the background noise is.
Shannon Limit	The **Shannon limit** or **Shannon capacity** of a communications channel is the theoretical maximum information transfer rate of the channel, for a particular noise level.
Signal	In electronics, a signal is an electric current or electromagnetic field used to convey data from one place to another. The simplest form of signal is a direct current (DC) that is switched on and off; this is the principle by which the early telegraph worked. More complex signals consist of an alternating-current (AC) or electromagnetic carrier that contains one or more data streams.
Streaming	**Streaming** is the transmission of digital audio or video or the listening and viewing of such data without first storing it.

T	Means...
Tx	A **transmitter** is an electronic device which, usually with the aid of an antenna, propagates an electromagnetic signal such as radio, television, or other telecommunications.

T	Means…
TNC	The **TNC (threaded Neill-Concelman) connector** is a threaded version of the BNC connector. The connector has a 50 Ω impedance and operates best in the 0–11 GHz frequency spectrum.
Transport Stream (TS)	Transport streams: These streams can contain several MPEG-2 content channels and associated audio. All the channels are multiplexed together, allowing the receiver to choose which to play back.

U	Means…
UDP	**User Datagram Protocol** (UDP) Sometimes called fire and forget because there is no dialog between the sender and receiver. If the receiver does not get a packet, the sender will never know. However, UDP is very efficient when there is little chance of errors (like in your LAN), or when TCP would provide "too late" delivery.
USB	Universal Serial Bus
Unicast	Unicast is simply sending packets from one source to one destination. For example, from one web server to one (or each) person viewing a page on a web browser.

V	Means…
VHF	**Very High Frequency** – 30 MHz to 300 MHz
V	Volt.
Viterbi Decoder	A Viterbi decoder uses the Viterbi algorithm for decoding a bit stream that has been encoded using forward error correction based on a Convolutional code.

W	Means…
Watt	The **watt** (symbol: **W**) is a derived unit of power in the International System of Units (SI). It measures rate of energy conversion. One watt is equivalent to 1 joule (J) of energy per second.
Waveform	Signal shape.

W	Means…
Waveguide	A specially form hollow metal tube, usually rectangular in shape in cross section, used to connect a High Power amplifier to the antenna.

R1.3

11. Appendix D - Downconverter Data

11.1 About Downconverters, Square

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DC-100140	1700MHz	High	9dB	19dB
DC-168185	1050MHz	Low	9dB	19dB
DC-225265	1880MHz	Low	9dB	19dB

11.2 About Downconverters, Barrel

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DCB-100150	1800MHz	High	9dB	19dB
DCB-150200	2300MHz	High	9dB	19dB
DCB-200250	1700MHz	Low	9dB	19dB
DCB-250300	2200MHz	Low	9dB	19dB
DCB-300350	2700MHz	Low	9dB	19dB
DCB-450500	4200MHz	Low	9dB	19dB
DCB-550600	5200MHz	Low	9dB	19dB

11.3 About Downconverters, Barrel, Gain Selectable, TNC-TNC

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DCBGS-100150	1800MHz	High	10dB	30dB
DCBGS-167203	2350MHz	High	10dB	30dB
DCBGS-203255	1720MHz	Low	10dB	30dB

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DCBGS-310360	2750MHz	Low	10dB	30dB
DCBGS-440500	4150MHz	Low	10dB	30dB
DCBGS-550600	5200 MHz	Low	10dB	30dB

11.4 About Downconverters, Barrel, Gain Selectable, Broadcast, N Type to BNC

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DCBGSB-167203	2350 MHz	High	10dB	30dB
DCBGSB-203255	1720 MHz	Low	10dB	30dB
DCBGSB-310360	2750 MHz	Low	10dB	30dB
DCBGSB-440500	4150 MHz	Low	10dB	30dB
DCBGSB-550600	5200 MHz	Low	10dB	30dB
DCBGSB-640700	6150 MHz	Low	10dB	30dB
DCBGSB-700750	6650 MHz	Low	10dB	30dB

11.5 About Downconverters, Extended Barrel, Gain Selectable, Broadcast (N Type to BNC)

Product	LO Frequency	LO Side	Gain (Standard)	Gain (High Gain)
DCEBGSB-198270	1850MHz	Low	10dB	30dB

12. Appendix E-Remote Control Guide

This section describes the control protocol used on the RS232 interface for controlling the Pro-Rx.

12.1 About the RS232 Control General Principles

The physical interface is RS232 but this can be converted to RS485 with an external adapter where multiple units are controlled over one RS485 bus.

Normal operation involves sending a packet from the control device (normally a PC) to the device being controlled. If the packet satisfies an address integrity check, then the controlled device will action the command and send a reply.

For compatibility with modems an ASCII style protocol is used.

Ports are set for 115200 baud, 8 bits, No parity, 1 stop.

12.2 About the Command Packet Structure

ASCII	Value	Notes
STX	02h	Start byte
0-9	30h-39h	4 byte unit address. In range 0-9999
R	20h-7Eh	1 byte command type. **r** read, **w** write
ABCD	20h-7Eh	Command –four byte mnemonic
;	3Bh	Separator
PQR	20h-7Eh	Data –Optional, variable length
;	3Bh	Separator
X	20h-7Eh	Sum Check
ETX	03h	End byte

12.3 About the Reply Packet Structure

ASCII	Value	Notes
STX	02h	Start byte
0-9	30h-39h	4 byte unit address. In range 0-9999
R	20h-7Eh	1 byte command type. **r** read, **w** write
STX	02h	Start byte

ASCII	Value	Notes
0-9	30h-39h	4 byte unit address. In range 0-9999
Z	20h-7Eh	Status BYTE
PQR	20h-7Eh	Data –Optional, variable length
;	3Bh	Separator
X	20h-7Eh	Sum Check
ETX	03h	End byte

The Sum check byte is the summation of all bytes in the packet, not including the start and end bytes. Higher order bytes are ignored and the final byte result is modified to prevent ASCII control characters being sent. Bit 7 (highest) is forced high.

The Status byte will indicate if the command was performed OK, or will indicate an error.

ASCII	Meaning
1	All OK
E	General error, command could not be actioned.

Typically E will be returned if the message is formatted incorrectly (separators in wrong place) or if commands are in upper case, or if commands do not match against the allowed list of commands, or if the checksum is wrong.

Addresses in the range 0001 to 9998 are for general use. Address 0000 is reserved and 9999 is a broadcast address. i.e. any device will reply to this address. Its reply will contain its own specific address.

All data in the transmitter and receiver is stored as one of 5 data types, Double, String, List, Integer or HexInteger. The data type dictates the contents of the data section of the reply.

- List – 1 byte for sending. Value is hexadecimal coded as ASCII. 2 byte reply. Reply represents index into original choice list. e.g. Reply 02 indicates entry 2 in original list.
- Float - variable length. Reply always contains decimal point and 4 decimal places. Can have 1 to 3 digits before decimal.
- Integer - 6byte reply. integer value with stuffed with preceding zeros. e.g. GOP reply 000012 = GOP length 12
- String - Variable length. Reply is string excluding null terminator
- HexInteger – 8byte Hex reply.

12.4 About the Programming Model

The control commands work on four sets of parameters:

6. Global parameters which apply to all configs
7. Config parameters which apply to one specific config
8. Status Parameters which are read-only
9. Specials which have unique actions.

To make changes to the settings on the board for Global and Config parameters, they have to be loaded into a "scratch" area. Once in the scratch area changes can be made to the parameters. To make the changes permanent the scratch area has to be saved.

To edit a config you have to load it into scratch by specifying the config number you want to edit. A simple example or changing input frequency is shown below: (<C> represents the checksum)

<STX>0001wload;1;<C><ETX> "Load config 1 into scratch area"

<STX>0001wdipf;2360.00;<C><ETX> "Change input frequency to 2360"

<STX>0001wsave;1;<C><ETX> "Save scratch to config 1"

The config you edit can be different from the currently active config. This means you could edit config 8 in the scratch area and then save it back while config 1 was active. If you edit the active config in scratch, when you save it back it will automatically action any changes. To find the config number currently being edited in scratch, perform an rload command.

The same process applies to Global Settings except that no config number needs to be supplied and the commands change to "wloau" and "wsavu". When editing globals if the changes are saved they are actioned immediately.

Please note that when issuing read and write commands to Global and Config parameters they always read and write to the scratch area.

The load and loau commands can also be used like a reset if any changes need to be cancelled, i.e. If the user backs out of an edit menu before saving.

Status parameters are always current and not affected by loads and saves.

Specials are actioned immediately.

12.5 Commands

Command	Description	Access	Setting Type	Default	Type	Possible Values
gadd	ControlAddress	RW	Global	1	Integer	1 to 9998
unam	Unit Name	RW	Global	PRO-RX	String	Max Length = 20
ccon	Current Active Config Number	RW	Global	1	Integer	1 to 8
cnam	Config Name	RW	Config	Config <x>	String	Max Length = 20
gfpg	FPGA Version Number	R	Status	N/A	hex string	
gver	Application version	R	Status	N/A	String	

Command	Description	Access	Setting Type	Default	Type	Possible Values
gser	Serial Number (64 bit)	R	Status	N/A	Hex String (16 hex char)	
gmac	MAC address	R	Status	N/A	String	
gbty	Board Type	R	Status	D320	String	D320
glnf	LNB Fault	R	Status	N/A	integer	0=OK, 1=FAULT
rdef	Restore Unit Defaults	W	Global	N/A	Integer	Any
vstd	Power-up Video Output Standard	RW	Global	0	Integer	0=PAL, 1=NTSC, 2=NTSC no pedestal
lnbg	LNB gain offset	RW	Global	9	Float	"-30 to 30"
spec	OSD Spectrum Select	RW	Global	0	Integer	0=A, 1=B, ..., 5=F
umod	Unit Mode	RW	Config	1	Integer	0=Narrowband, 1=DVBT
dvdm	DVBT Decoder Mode	RW	Config	0	Integer	0=Compliant, 1=Low Delay
divm	Diversity Mode	RW	Config	0	Integer	0=2-way, 1=4-way, 2=6-way, 3=8-way, 4=2x2-way, 5=2x4-way
ddcf	Downconverter LO frequency (MHz) Demod 1	RW	Global	1880	Float	0 - 10000
dlos	Downconverter LO side Demod 1	RW	Global	0	Integer	0=low side, 1=high side
glnb	LNB Phantom Power Enable Demod 1	RW	Global	1	Integer	0=off, 1=on
dipf	Input Frequency Demodulator 1 (MHz)	RW	Config	2405	Float	50.000MHz -> 850MHz offset from LO
dwid	OFDM bandwidth Demodulator 1	RW	Config	0	Integer	0=8MHz, 1=7MHz, 2=6MHz, 3=2.5MHz,4=1.25MHz
dgua	OFDM Guard Interval Demodulator 1	RW	Config	0	integer	0=1/32, 1=1/16, 2=1/8, 3=1/4, 4=AUTO
dpol	OFDM Polarity Demodulator 1	RW	Config	0	integer	0=Normal, 1=Inverted
ddc2	Downconverter LO frequency (MHz) Demod 2	RW	Global	1880	Float	0 - 10000

Command	Description	Access	Setting Type	Default	Type	Possible Values
dlo2	Downconverter LO side Demod 2	RW	Global	0	Integer	0=low side, 1=high side
gln2	LNB Phantom Power Enable Demod 2	RW	Global	1	Integer	0=off, 1=on
dif2	Input Frequency Demodulator 2 (MHz)	RW	Config	2405	Float	50.000MHz -> 850MHz offset from LO
dwd2	OFDM bandwidth Demodulator 2	RW	Config	0	Integer	0=8MHz, 1=7MHz, 2=6MHz
dgu2	OFDM Guard Interval Demodulator 2	RW	Config	0	integer	0=1/32, 1=1/16, 2=1/8, 3=1/4, 4=AUTO
dpo2	OFDM Polarity Demodulator 2	RW	Config	0	integer	0=Normal, 1=Inverted
sgua	Detected OFDM Guard Interval (Useful in AUTO mode) Demodulator 1	R	Status	0	integer	0=1/32, 1=1/16, 2=1/8, 3=1/4
dmod	Constellation Demod 1	R	Status	N/A	Integer	0=QPSK, 1=16QAM, 2=64QAM
dfec	FEC rate Demod 1	R	Status	N/A	Integer	0=1/2, 1=2/3, 2=3/4, 3=5/6, 4=7/8
snra	Input SNR A Demod 1	R	Status		float	
snrb	Input SNR B Demod 1	R	Status		float	
snrc	Input SNR C Demod 1	R	Status		float	
snrd	Input SNR D Demod 1	R	Status		float	
snre	Input SNR E Demod 1 / 2	R	Status		float	
snrf	Input SNR F Demod 1 / 2	R	Status		float	
snrf	Input SNR G Demod 1 / 2	R	Status		float	
snrf	Input SNR H Demod 1 / 2	R	Status		float	
dina	Input Level A Demod 1	R	Status		float	input level in dBm
dinb	Input Level B Demod 1	R	Status		float	input level in dBm
dinc	Input Level C Demod 1	R	Status		float	input level in dBm
dind	Input Level D Demod 1	R	Status		float	input level in dBm
dine	Input Level E Demod 1 / 2	R	Status		float	input level in dBm

Command	Description	Access	Setting Type	Default	Type	Possible Values
dinf	Input Level F Demod 1 / 2	R	Status		float	input level in dBm
ding	Input Level G Demod 1 / 2	R	Status		float	input level in dBm
dinh	Input Level H Demod 1 / 2	R	Status		float	input level in dBm
dpre	BER Pre-Viterbi Demod 1	R	Status		integer	Pre Viterbi x 10^-6
dpos	BER Post-Viterbi Demod 1	R	Status		integer	Post Viterbi x 10^-6
dpkt	Packet errors Demod 1	R	Status		integer	
dloc	Lock Status Demod 1	R	Status		integer	0=Not Locked, 1=Locked
sgu2	Detected OFDM Guard Interval (Useful in AUTO mode) Demodulator 2	R	Status	0	integer	0=1/32, 1=1/16, 2=1/8, 3=1/4
dmo2	Constellation Demod 2	R	Status	N/A	Integer	0=QPSK, 1=16QAM, 2=64QAM
dfe2	FEC rate Demod 2	R	Status	N/A	Integer	0=1/2, 1=2/3, 2=3/4, 3=5/6, 4=7/8
dpr2	BER Pre-Viterbi Demod 2	R	Status		integer	Pre Viterbi x 10^-6
dpv2	BER Post-Viterbi Demod 2	R	Status		integer	Post Viterbi x 10^-6
dpk2	Packet errors Demod 2	R	Status		integer	
dlo2	Lock Status Demod 2	R	Status		integer	0=Not Locked, 1=Locked
dsl1	Decoder 1 Input Select	RW	Config	0	Integer	0=Demodulator1, 1=Demodulator2, 2=ASI Input
dsr1	Default Service Name Decoder 1	RW	Config	Unit 1	String	Max Length = 20 characters
dpr1	Default Program ID Decoder 1	RW	Config	1	Integer	Range = 1 - 10
srv1	Service Name Decoder 1	R	Status		String	
vlk1	Video Lock Status Decoder 1	R	Status		integer	0=Not Locked, 1=Locked
vpd1	Video PID Decoder 1	R	Status		integer	
apd1	Audio PID Decoder 1	R	Status		integer	

Command	Description	Access	Setting Type	Default	Type	Possible Values
dpd1	Data PID Decoder 1	R	Status		integer	
ppd1	PCR PID Decoder 1	R	Status		integer	
dbr1	Data baudrate Decoder 1	R	Status	3	integer	0=1200, 1=2400, 2=4800, 3=9600, 4=19200, 5=38400, 6=57600, 7=115200
dpa1	Data parity mode Decoder 1	R	Status	0	integer	0=no parity, 1=odd, 2=even
dty1	Data type Decoder 1	R	Status	0	integer	
dwi1	Data width Decoder 1	R	Status	0	integer	
eli1	Video Line Standard Decoder 1	R	Status		integer	0=PAL(625), 1=NTSC (525), 2=NTSC no pedestal
vrs1	Video Resolution Decoder 1	R	Status		integer	
scr1	Encrypted Service Status Decoder 1	R	Status		integer	0=Clear service, 1=Encrypted service
dsl2	Decoder 2 Input Select	RW	Config	0	Integer	0=Demodulator1, 1=Demodulator2, 2=ASI Input
dsr2	Default Service Name Decoder 2	RW	Config	Unit 1	String	Max Length = 20 characters
dpr2	Default Program ID Decoder 2	RW	Config	1	Integer	Range = 1 - 10
srv2	Service Name Decoder 2	R	Status		String	
vlk2	Video Lock Status Decoder 2	R	Status		integer	0=Not Locked, 1=Locked
vpd2	Video PID Decoder 2	R	Status		integer	
apd2	Audio PID Decoder 2	R	Status		integer	
dpd2	Data PID Decoder 2	R	Status		integer	
ppd2	PCR PID Decoder 2	R	Status		integer	
dbr2	Data baudrate Decoder 2	R	Status	3	integer	0=1200, 1=2400, 2=4800, 3=9600, 4=19200, 5=38400, 6=57600, 7=115200
dpa2	Data parity mode Decoder 2	R	Status	0	integer	0=no parity, 1=odd, 2=even
dty2	Data type Decoder 2	R	Status	0	integer	

Command	Description	Access	Setting Type	Default	Type	Possible Values
dwi2	Data width Decoder 2	R	Status	0	integer	
eli2	Video Line Standard Decoder 2	R	Status		integer	0=PAL(625), 1=NTSC (525), 2=NTSC no pedestal
vrs2	Video Resolution Decoder 2	R	Status		integer	
scr2	Encrypted Service Status Decoder 2	R	Status		integer	
asil	ASI Input Lock Status	R	Status		integer	0=Not Locked, 1=Locked
asos	ASI Output Source	RW	Config	0		0=Demodulator1, 1=Demodulator2, 2=ASI Input, 3=Descrambler1, 4=Descrambler2
vdbf	MPEG-4 Video De-blocking Filter	RW	Config	1	Integer	0=Off, 1=On
asas	Second Audio Channel Source	RW	Config	0	Integer	0 = Audio service 1 from decoder 2 1= Audio service 2 from decoder 1
dena	Data input enable	RW	Config	0	integer	0=off, 1=on
dndi	Diversity Setting (num ways licensed for)	R	Status		Integer	0, 2, 4, 6, 8
smin	Receive Spectrum (minimum points)	R	Status		String	string length is 160 bytes. The lower 7 bits of each byte is a spectrum point value. Valid number range 0 to 127. Top bit always set to stop control characters being sent
smax	Receive Spectrum (maximum points)	R	Status		String	string length is 160 bytes. The lower 7 bits of each byte is a spectrum point value. Valid number range 0 to 127. Top bit always set to stop control characters being sent
aout	Audio Output Format	RW	Global	0	Integer	0=Analogue, 1=Digital
icom	IP settings	RW	Special	192.168.0.1, 255.255.255.0, 192.168.0.254	String	comma separated list of <IP address>,<SubnetMask>,<Default Gateway>
idhc	DHCP enable	RW	Special	1	integer	0=off, 1=on
ipac	Active IP address and Subnet mask	R	Special	N/A	integer	comma separated list of <IP address>,<SubnetMask>
sten	Streaming Enable	RW	Global	0	Integer	0=off, 1=on
strs	Streaming Source	RW	Global	0	Integer	0=Demodulator1, 1=Demodulator2, 2=ASI Input, 3=Descrambler1, 4=Descrambler2

Command	Description	Access	Setting Type	Default	Type	Possible Values
stad	Streaming Multicast Address	RW	Global	239.16.33.254	String	IP address format in multicast range
stsa	Streaming SAP Address	RW	Global	224.2.127.254	String	IP address format in SAP range
sttl	Streaming Multicast TTL	RW	Global	127	Integer	Range 1 - 255
stpo	Streaming Multicast Port number	RW	Global	10000	Integer	Range 1 - 65535
stsn	Streaming Multicast Service Name	RW	Global	MPEG2-TS	Integer	Max Length 20 characters
osd1	OSD Mode Decoder 1	RW	Global	0	Integer	0=Off, 1=Simple, 2=Detailed, 3=Engineering
osc1	OSD Enable on Composite Output 1	RW	Global	0	Integer	0=Off, 1=On
oss1	OSD Enable on SDI Output 1	RW	Global	0	Integer	0=Off, 1=On
osl1	OSD Enable Logo on Outputs 1	RW	Global	0	Integer	0=Off, 1=On
osd2	OSD Mode Decoder 2	RW	Global	0	Integer	0=Off, 1=Simple, 2=Detailed, 3=Engineering
osc2	OSD Enable on Composite Output 2	RW	Global	0	Integer	0=Off, 1=On
oss2	OSD Enable on SDI Output 2	RW	Global	0	Integer	0=Off, 1=On
osl2	OSD Enable Logo on Outputs 2	RW	Global	0	Integer	0=Off, 1=On
ss11	OSD Spectral Display Demod 1 Output 1	RW	Global	0	Integer	0 -7 = RF inputs A – H
ss12	OSD Spectral Display Demod 2 Output 1	RW	Global	0	Integer	4 -7 = RF inputs E – H
ss21	OSD Spectral Display Demod 1 Output 2	RW	Global	0	Integer	0 -7 = RF inputs A – H
ss22	OSD Spectral Display Demod 2 Output 2	RW	Global	0	Integer	4 -7 = RF inputs E – H
sce1	OSD Engineering Mode Output 1	RW	Global	0	Integer	0 = Spectra, 1 = Frequency Scan
sce2	OSD Engineering Mode Output 2	RW	Global	0	Integer	0 = Spectra, 1 = Frequency Scan

Command	Description	Access	Setting Type	Default	Type	Possible Values
desm	Decoder 1 Descrambling Mode	RW	Config		Integer	0=Off, 1=ABS, 4=AES, 5=AES+, 6=AES256, 7=AES256+, 8=BCRYPT, 9=BCRYPT, 10=BCRYPT256, 11=BCRYPT256+
ebsk	Decoder 1 ABS Descrambling Key	W	Config	N/A	Hex String	8 Hexadecimal characters
aesk	Decoder 1 AES Descrambling Key/ AES256 lower 128 bits	W	Config	N/A	Hex String	32 Hexadecimal characters
ae2k	Decoder 1 AES256 Descrambling Key (upper 128 bits)	W	Config	N/A	Hex String	32 Hexadecimal characters
des2	Decoder 2 Descrambling Mode	RW	Config		Integer	0=Off, 1=ABS, 4=AES, 5=AES+, 6=AES256, 7=AES256+, 8=BCRYPT, 9=BCRYPT, 10=BCRYPT256, 11=BCRYPT256+
ebs2	Decoder 2 ABS Descrambling Key	W	Config	N/A	Hex String	8 Hexadecimal characters
aes2	Decoder 2 AES Descrambling Key/ AES256 lower 128 bits	W	Config	N/A	Hex String	32 Hexadecimal characters
a2k2	Decoder 2 AES256 Descrambling Key (upper 128 bits)	W	Config	N/A	Hex String	32 Hexadecimal characters
load	Load config to scratch (on read gives config number in scratch)	RW	Special	1	Integer	1 to 16
save	Save config in scratch to config number given	W	Special	N/A	Integer	1 to 16
loau	Load Global Settings to scratch	W	Special	N/A	N/A	No data field required
savu	Save Global Settings	W	Special	N/A	N/A	No data field required
date	Date and Time	RW	Special	N/A	Integer String	Date can be set and read using the following format: HHmmssDDMMYYYY - All dates and times are UTC no daylight savings.