ProDAB-1 Plus & ProDAB-2 Dual
User Guide

Audio & Design

Rev 4.6

Firmware 228/230

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Audio & Design
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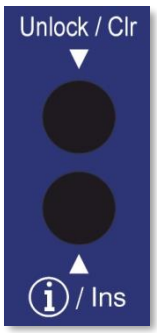
1. Initial Configuration

1.1 Getting Started

ProDAB takes approximately 35 seconds to boot up, during this time the power LED will flash.

Press to select:
DAB/DAB+
MP3
Web (Internet Radio)
FM

When the OLED display is not in screen saver mode (Pressing any of the "Nav" keys will bring the unit out of screen saver)
DAB Mode: ◀▶ display the available DAB services **OK**, will select the currently displayed service.
MP3 Mode: ◀▶ display the MP3 files available **OK**, will play the currently displayed file.
Web Mode: ◀▶ display available web links **OK**, will select the currently displayed link.
FM Mode: ◀▶ tune FM receiver in 100KHz steps **OK**, will tune to the currently displayed frequency.

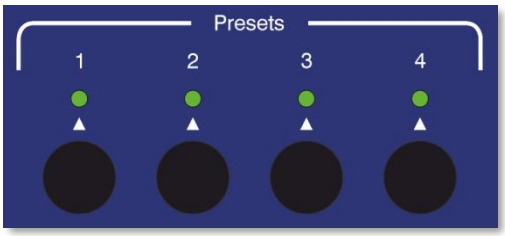


Unlocked

Locked

To Unlock front panel press and hold Unlock button until padlock symbol changes to Unlocked. This button will also jump out of Screen Saver or Main Menu to service display.
When displaying currently selected service, station or track press ⓘ to change displayed information.

When ProDAB is shipped from the factory it will require a "DAB Scan" to find your local multiplexers. You will see a message "No Stream Selected – Press OK for Menu" Press the **OK** button then select DAB Scan use the ▲ ▼ button to select the type of scan you require and ▶ to start scanning. ProDAB will then select the first service alphabetically that it finds. Press ◀▶ to view all other found services & **OK** to select.



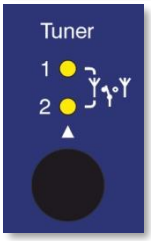
Press and hold Preset button to save currently selected service, station, MP3 track or Web link.

Pressing ◀▶ whilst the preset directory is shown will cycle through the available presets, including those not available by direct access buttons – i.e. Presets 5 to 15

Presets also store mode, so can be used as a quick way to switch between DAB, FM, MP3 & Web.

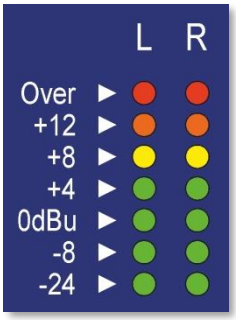
Mono/Stereo selection will change the audio output in all modes, including IP stream output.

The headphone output is suitable to drive headphones with a minimum impedance of 16Ω



Tuner selection button selects which output is currently being monitored by the headphone output and controlled by the front panel buttons

Press and hold Tuner button to change unit mode between Diversity or Independent modes



LED Meters - Over = 1dB below fsd.
0dBu = -18dB below fsd.

1.2 OLED DAB Display screens

Press Info button to cycle through available display screens

Basic screen with Service Name, program information, bit rate & mode

Information about selected MUX, audio algorithm, CID & SID, allocated Consumers Units

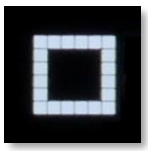
Technical information for both tuners

Oscilloscope display to help with setting change over parameters

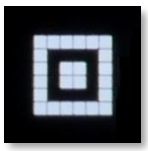
See Change Over section for more details

1.3 Other OLED display ICONs

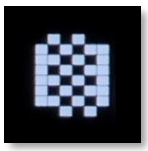
Change Over Disabled



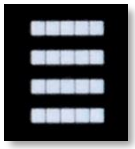
Change Over Enabled



Change Over Active



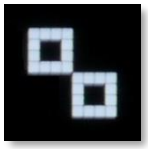
Change Over Mode Changing



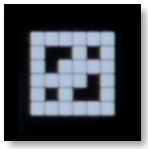
Streaming port 5000 active

Carousel Mode Enabled

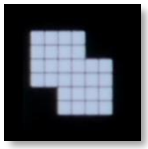
LAN Connected



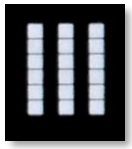
LAN Disconnected



LAN & Streaming Connected



LAN & Streaming Web Radio Mode



AES67 or Multicast active

2. Network set-up

Press **OK** then select SYSTEM with ▲▼ then ▶. Set IP address mask & default gateway.

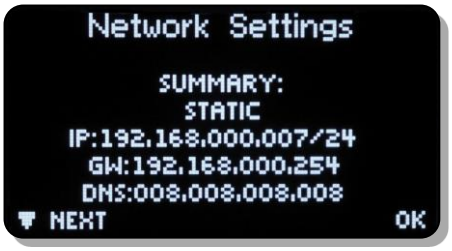
Select NETWORK MENU with ▲ or ▼ then ▶

Choose between Static & DHCP using ◀▶ **keys**

If Static press ▶ to edit IP address/net mask. Then use ◀▶ to select & ▲▼ to change items then **OK** to save
Note: net mask of 255.255.255.0 is shown as /24 i.e. 24 bits

To edit use ◀▶ to select & ▲▼ to change items then **OK** to save

To edit use ◀▶ to select & ▲▼ to change items then **OK** to save



Note: The embedded web server can be accessed via the set IP address port 80.

▶ To save STATIC settings

Or if DHCP has been selected ▶ to save

Then ▶ to reboot unit

Units are shipped with the network set to STATIC:
IP address - 192.168.0.7
Net Mask – 255.255.255.0
Default Gateway – 192.168.0.254
DNS – 8.8.8.8 (Google)

To upload MP3 files use a SFTP client such as Filezilla, but, note that we use non-standard port for SSH & SFTP of 43222 See MP3 Menu section below on how to upload files using a USB stick.

2.1 Login details for MP3 upload:

Username - mp3
Password - 2033740

Filezilla download - https://filezilla-project.org/

When displaying menus pressing ▲ or ▼ takes you to the next or previous menu item. **OK** is for selecting/accepting the desired action or parameter. ▶ Will take you into sub-menu or editing function.

3. DAB Scan

Press **OK** then select DAB Scan with ▲▼ then ▶

Choose between Tuner 1 & 2 using ◀▶ keys Then ▼ to go to next menu option

Choose between NEW SCAN which will clear current station list or RE-SCAN to append to current list using ◀▶ Then ▼ to go to next menu option

NORMAL SCAN or SLOW SCAN

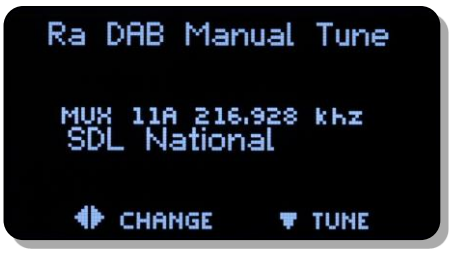
Press **OK** to start Scan or ◀▶ to change scan starting MUX or ▲▼ to change scan ending MUX.

4. Manual DAB Tune

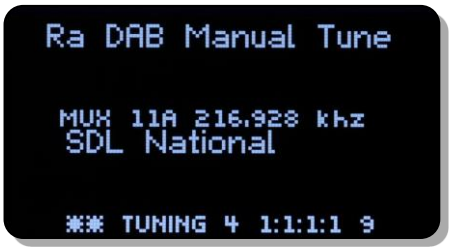
Press **OK** then select Manual DAB Tune with ▲▼ then ▶

Choose between Radio section A or B using ◀▶ keys
Then ▼ to go to next menu option

Choose between KEEP STATION LIST or CLEAR LIST FIRST which will clear current station list ◀▶ Then ▼ to go to next menu option



Select MUX with ◀▶ and ▼ to tune to selected MUX



The unit will attempt to tune to selected MUX.
1:1:1:1 are discovery flags for:
Acquired : Ensemble : Service List : Service Audio

Select service with ◀▶ and **OK** to jump out of menu

If the unit has been used in a different location then it's recommended that you CLEAR LIST FIRST.
This will ensure that there are no conflicts with previously tuned services SID & CID

5. System Menu

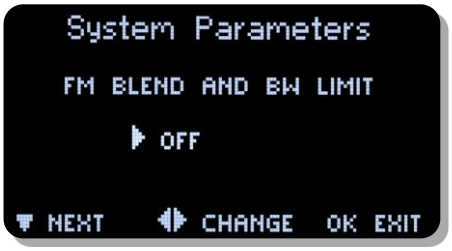
▶ Then▼ to go to next menu option

▶ to access, option time before unit will automatically lockout front panel keys. Press and hold Unlock/Clr key to unlock.

▶ to access sub-menu, this sets the MUX range for DAB Scan options:
UK Range 10B to 13A
EU Range 05A to 13F

▶ to access sub-menu, this sets Tuner 1 & 2 as fully independent or diversity mode.

▶ to access sub-menu
options:
100KHZ
50KHZ



▶ to access sub-menu
options:
OFF
AUTO BLEND – Audio will automatically be mixed to Mono as RSSI decreases.

▶ to access sub-menu
options:
DISABLED
ENABLED

▶ to access sub-menu
options:
DISABLED
ENABLED

▶ to access sub-menu
options:
NONE (Disabled) Unit will return to previous setting when powered up
Select Preset which should be used on power up.

▶ to access sub-menu

▶ to access sub-menu

◀▶ to edit

◀▶ to edit

▶ to access Engineering sub-menu

▶ to access Network sub-menu, see Network setup section on previous pages

▶ to access sub-menu

▶ to access sub-menu, manage copy/delete stored MP3 files

6. Change Over

ProDAB can automatically play out a stored MP3 or switch to Internet radio when audio silence is detected or when RF signal level drops below a set threshold. From version 160/160 Change Over is implemented as a separate software module that is “hard coded” to use Preset 1 as the main program selected and Preset 2 as the “fail over” preset. Once “Armed” front panel controls are locked out. To disable Change Over mode, press and hold the Unlock/Clr front panel button. On ProDAB Dual only Tuner 1 can be set to Change Over mode, Tuner 2 still functions but cannot be changed. Also, from version 160/160 Change Over can be “Armed” and parameters changed via the web GUI.

Change Over modes

	Preset 1	Preset 2
✓	DAB	MP3 or Web
✓	FM	MP3 or Web
✓	Web	DAB or FM
⚠	* Web	MP3
✗	FM	DAB
✗	DAB	FM

*Due to hardware restrictions when returning from Preset 2 to Preset 1 audio from both Web and MP3 are played simultaneously during changeover period.

Press **OK** then select SYSTEM with ▲▼ then ▶

Then select CH/MENU with ▲▼ then ▶

Change over options are: Disabled, ON AF THRESHOLD (Audio level) or ON RSSI THRESHOLD (Received Signal Strength)

Change over parameters can be optimized for audio threshold/rf RSSI along with delay, attack and decay times. Other options – SMOOTH MUSIC, POP MUSIC, SPEECH, CLASSIC MUSIC & RSSI LEVEL

Change Over, Disabled or detection on audio silence or low RSSI

MP3 Repeat options:
STOP AT END – Play once then stop
REPEAT SAME – Play single selected MP3 then repeat.
NEXT IN LIST – Play all MP3 once, then stop

Oscilloscope display, see notes below for how to use this tool.

AF is the instant L+R (mixed) volume level for the selected source (i.e channel 1 as "C1") This is shown as a number (0..255) and also as a time plot.

PK is the peak value of the above, and modified by the attack and decay constants settable by the change over menu, "pk" is shown as a number (0..255) and as a time plot.

GT is the raw gate logic level generated by the value **PK** threshold by constant value **TH** which is also settable from the changeover menu and displayed as a number (0..255)

EG Is the extended (smoothed) gate version of **GT** by adding extra lead and lag times to avoid glitches.
Lead and lag are settable from the changeover menu. The **EG** gate is the one that defines the changeover state.

The general procedure is to set the **GT** threshold, attack and decay so that it more or less follows the audio, then adjust the lead and lag times for **EG** so that short glitches are minimised or removed.

SI is the silence gate for the same source, (obtained by a different calculation) and shown here for comparison.

7. Carousel Mode

When enabled ProDAB can cycle through a range of Presets monitoring each one for a set sampling window. If a failure is detected then a SNMP trap is generated for that Preset. The range of Presets is from 1 to 14 and can be set to monitor any range of Presets within these limits. Thresholds for various parameters can be set as detailed below:
Carousel mode is enable through the System | Engineering | Carousel Menu

Press **OK** then select SYSTEM with ▲▼ then ▶

Then select Carousel Menu with ▲▼ then ▶

◀ **or** ▶ to Enable

This icon shows on the main OLED screen when Carousel mode is enabled.

Carousel mode supports Presets 1 through to 14. The first Preset in the range is set here. Note: ProDAB will skip over any Presets in the defined range that have not been defined.

Last Preset in Carousel scan range is set here.
Use ◀ **or** ▶ to change

This is the “sampling window” for each Preset.
Range: Disabled, 10 to 60 seconds to 10 second steps.
Use ◀ **or** ▶ to change.

Use ◀ **or** ▶ to change. Options Tuner 1, Tuner 2 (ProDAB-2 Dual)

FIB (Fast Information Block) errors in each sampling window.
Range: Disabled, 10 to 250 in steps of 10.
Use ◀ **or** ▶ to change.

Signal to Noise detector.
Range: Disabled, 1 to 20 in steps of 1dB.
Use ◀ **or** ▶ to change.

Receiver Signal Strength detector.
Range: Disabled, 1 to 60 in steps of 1dB.
Use ◀ **or** ▶ to change.

Audio silence detector.
Range: Disabled, 1 to 255 in steps of 1.
Use ◀ **or** ▶ to change.

Use ◀ **or** ▶ to enable/disable

Sets how often an SNMP Trap is sent once the set threshold FIB | SNR |RSS or Audio silence is triggered
Range: Disabled, 1 to 15 seconds in 1 second steps
Use ◀ **or** ▶ to change.

Front panel indication of the current Preset that is being sampled is shown by the LED/LEDs above the 4 front panel Preset buttons flashing.

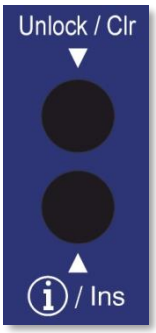
Note: As there are only 4 front panel presets the indication of which Preset is currently being sampled is shown as a “binary” count on the front panel LEDs.

Preset	Presets 1	2	3	4
1	●	○	○	○
2	○	●	○	○
3	●	●	○	○
4	○	○	●	○
5	●	○	●	○
6	○	●	●	○
7	●	●	●	○
8	○	○	○	●
9	●	○	○	●
10	○	●	○	●
11	●	●	○	●
12	○	○	●	●
13	●	○	●	●
14	○	●	●	●

8. MP3 menu

ProDAB can store internally up to 12GB of MP3 files. To upload MP3 files to the unit, copy your files to the root of a USB stick formatted as FAT32 and insert in to any of the USB sockets on the rear of the unit.

File names for MP3 files **MUST NOT** contain spaces.
If you are in MP3 mode whilst uploading files, then you need to change mode and back to MP3 in order to update the file list.



Delete files

With MP3 file operations press info/Ins key to upload files and Unlock/Clr key to delete files

Upload files

MP3 file can be selected on your local PC and uploaded via the web interface.

First option in MP3 menu allows you to copy or Delete files on the USB stick. Choose file using ◀▶ keys press **Ins** key to upload to ProDAB or **Unlock** key to delete. ▼ key takes you to next menu ▶

MP3 files on the ProDAB are stored in /home/mp3 this menu allows you select (◀▶) and delete stored files.

MP3 playback options press ◀▶ to change: Repeat current track

9. Engineering menu

▶ key takes you to next menu level

▶ key takes you to next menu level

▶ key takes you to simplified Tone Generator menu options
▼ key takes you to next menu

▶ key takes you to Tone Generator menu options
▼ key takes you to next menu

▶ key takes you to AES3 menu options
▼ key takes you to next menu

Set AES 3 parameters such as sampling frequency.

Press ◀▶ to edit, then ▲▼ to change
▼ key takes you to next menu

Press ◀▶ to edit, then ▲▼ to change
▼ key takes you to next menu

Press ◀▶ to edit, then ▲▼ to change
▼ key takes you to next menu

Warning ▶ key will reboot system

Full or partial spectrum scan of FM band

▶ key takes you to FM Scan menu options
▼ key takes you to next menu

Full or partial spectrum scan of DAB MUX/Services

▶ key takes you to DAB Quick Scan menu options
▼ key takes you to next menu

Application software and FPGA versions

▼ key takes you to next menu

DAB (and FM, select FM mode first) chipset firmware versions
DAB - 6.04
FM - 4.0C
▼ key takes you to next menu

Select source for Icecast compatible IP stream output. Either follows the selected “Tuner” (Front panel or web GUI), or fixed to the output of Tuner 1

◀▶ keys selects menu options
▼ key takes you to next menu

Allows additional calibration of DAB RSSI level
Press ◀▶ to edit, then ▲▼ to change
▼ key takes you to next menu

Allows additional calibration of FM RSSI level
Press ◀▶ to edit, then ▲▼ to change
▼ key takes you to next menu

Default map settings for GPIO Outputs.
(compatible with ProDAB-1)
▶ key takes you to next menu options
▼ key takes you to next menu

Default map settings for GPIO Inputs.
(compatible with ProDAB-1)
▶ key takes you to menu options
▼ key takes you to next menu

▶ key takes you to SNMP menu options
▼ key takes you to next menu

▶ key takes you to AES67 menu options
▼ key takes you to next menu

9.1 GPIO Outputs

◀▶ & ▲▼ to change
Press Mono button to toggle
active High (+)
or active Low (-)

Default GPIO Output mapping and pin out

GPO-0 (pin 23) Low = In changeover to MP3, Tuner 1
GPO-1 (pin 22) Low = RDS TA Traffic Flag active, Tuner 1
GPO-2 (pin 21) Low = Mono, Tuner 1
GPO-3 (pin 20) Low = Audio silence detect, Tuner 1
GPO-4 (pin 19) Low = RSSI below threshold, Tuner 1
GPO-5 (pin 10) Low = Audio silence detect, Tuner 2
GPO-6 (pin 9) Low= Network Fail

9.2 GPIO Output options available

OLED Display	
Changeover	Changeover Active
Power detect wav	Output toggles at 1.5Hz
Power detect '1'	Output low whilst unit is operational
Carousel Trap	Carousel Trap Active
Stream Active	Streaming output has active connection/s
Ra AF Silence	Silence detected on Tuner 1 (internal)
CPU AF Silence	Silence detected on Streaming Output (internal)
SNR Low Ra	Signal to Noise low on Tuner 1
Diversity	Unit in Diversity mode
Mono Flag on DACb	Output 2 set to mono (DAB, FM, MP3 or Web)
Network Fail	No network connection
Silence on DACb	Silence detected on Output 2 (internal)
RSS Low Ra	Received Signal Strength Low Tuner 1
Silence on DACa	Silence detected on Output 1 (internal)
Mono Flag on DACa	Output 1 set to mono (DAB, FM, MP3 or Web)
FM TA Flag	FM TA Flag active Tuner 1

Default GPIO allocation version 1.72/1.75 firmware onwards

9.3 GPIO Output Pin out:

GPO-0 (pin 23) Low = In changeover to MP3, Tuner 1
GPO-1 (pin 22) Low = RDS TA Traffic Flag active, Tuner 1
GPO-2 (pin 21) Low = Mono, Tuner 1
GPO-3 (pin 20) Low = Audio silence detect, Tuner 1
GPO-4 (pin 19) Low = RSSI below threshold, Tuner 1
GPO-5 (pin 10) Low = Audio silence detect, Tuner 2
GPO-6 (pin 9) Low = Network Fail
GPO-7 (pin 8) Low = Not Defined

Common Grounds: pins 2, 3, 4, 11, 12 & 13
+5V Current Limited: pins 24 & 25

9.4 GPIO Inputs

◀▶ & ▲▼ to change

9.5 GPIO Inputs options available

Option	Activate (Closing contact to GND)	Release (Open)
0	No action	No action
1	Preset 1 Tuner 1	No Action
2	Preset 2 Tuner 1	No Action
3	Preset 3 Tuner 1	No Action
4	Preset 4 Tuner 1	No Action
5	Preset 1 Tuner 2	No Action
6	Preset 2 Tuner 2	No Action
7	Preset 3 Tuner 2	No Action
8	Preset 4 Tuner 2	No Action
9	Preset 2 Tuner 1	Return to Preset 1 Tuner 1
10	Preset 3 Tuner 1	Return to Preset 1 Tuner 1
11	Preset 4 Tuner 1	Return to Preset 1 Tuner 1
12	Preset 1 Tuner 1	Return to Silence
13	Preset 2 Tuner 1	Return to Silence
14	Preset 3 Tuner 1	Return to Silence
15	Preset 4 Tuner 1	Return to Silence

Default GPIO allocation version 1.30 firmware onwards

9.6 GPIO Input Pin out:

GPIO-0	(pin 18)	Gnd to select preset 1, Tuner 1
GPIO-1	(pin 17)	Gnd to select preset 2, Tuner 1
GPIO-2	(pin 16)	Gnd to select preset 3, Tuner 1
GPIO-3	(pin 15)	Gnd to select preset 4, Tuner 1
GPIO-4	(pin 14)	Gnd to select preset 1, Tuner 2
GPIO-5	(pin 1)	Gnd to select preset 2, Tuner 2

Common Grounds: pins 2, 3, 4, 11, 12 & 13
+5V Current Limited: pins 24 & 25

9.7 SNMP Configuration:

▶ key takes you to SNMP menu options
▼ key takes you to next menu

◀▶ & ▲▼ to change
▼ key takes you to next menu

◀▶ & ▲▼ to change
▼ key takes you to next menu

◀▶ & ▲▼ to change
▼ key takes you to next menu

◀▶ & ▲▼ to change
▼ key takes you to next menu

◀▶ to change, 0 to Disable
▼ key takes you to next menu

◀▶ to change
Full list of options below:

SNMP Traps:

Trap	Description	Typical Octet String
FM TA	FM Traffic Flag	Ra FM TA flag ON 97000KHz Rb FM TA flag ON 92500KHz
RSS	Received Signal strength	Ra RSS Dropped low Ra RSS Recovered Hi Rb RSS Dropped low Rb RSS Recovered Hi
DAC	Audio silence detect at audio outputs	Da Silence Started Da Silence Ends Db Silence Started Db Silence Ends
RA	Audio silence detect at DAB/FM chip set outputs	Ra Silence Started Ra Silence Ends Rb Silence Started Rb Silence Ends
Chover	Change Over state	Change over Started ON Change over Ended OFF
Carousel		Carousel(trap) preset:2 <BBC Radio 4 > rss:0(<10)
Summary	Use for Debugging only	Da sil:00 DAB <BBC Radio 2 > rs:38 sn:04

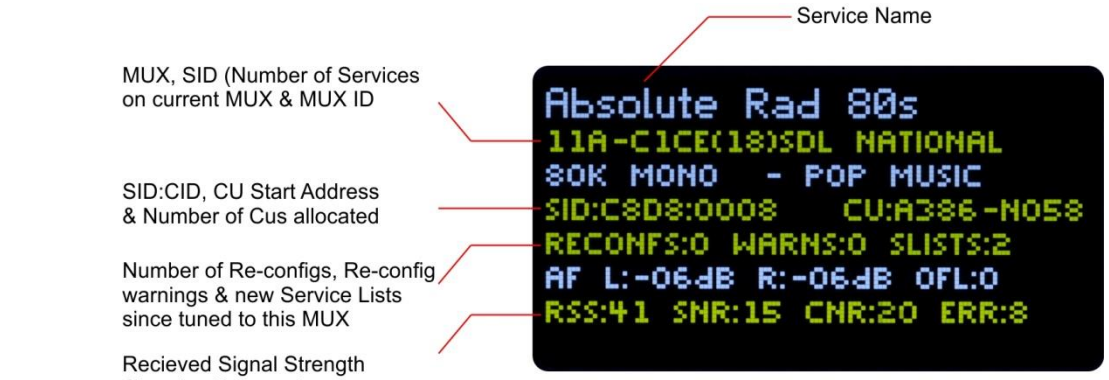
Note: Ra/Da = Tuner 1, Rb/Db = Tuner2

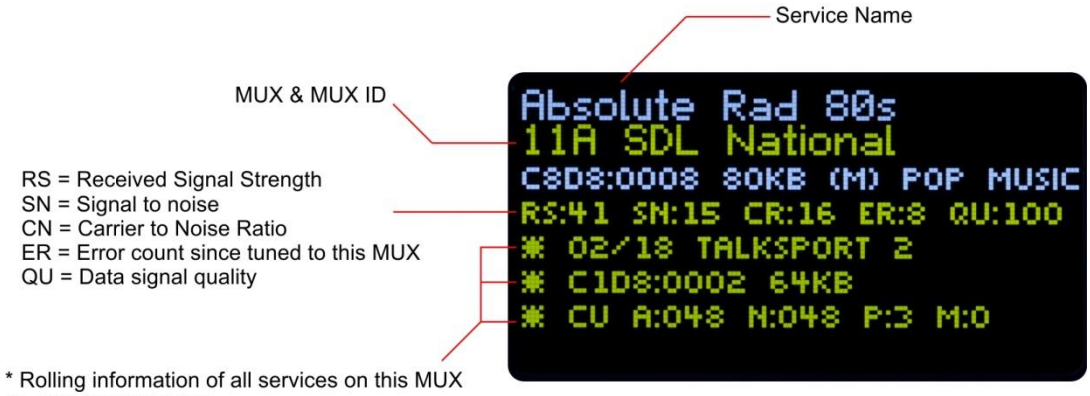
10. Signal Quality troubleshooting

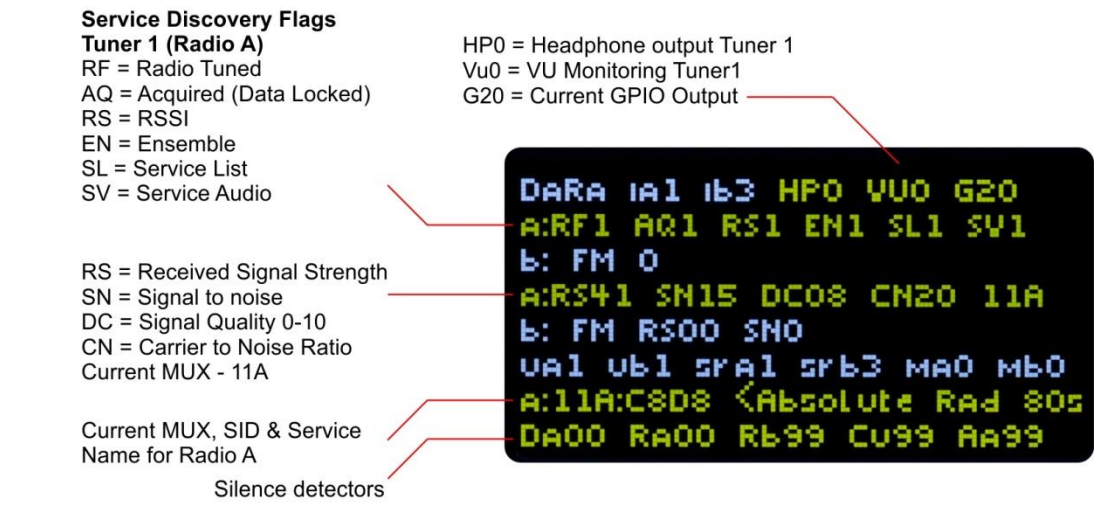
10.1 OLED Technical Information Screens

Press 

to cycle through screens







10.2 How ProDAB Tunes to a DAB signal

When tuned to a new RF DAB channel (as shown by the RF flag), ProDAB will first attempt to obtain low level data sync with the received digital stream. The AQ (acquisition) flag will be set when this is stable. At this point, a rough measure of signal level is also recorded (RSSI level). ProDAB will then attempt to obtain ensemble information (EN flag), and then wait for, and download, the service list (SL flag), which contains the list of services with their SID and CID numbers. Finally, ProDAB will lock onto the desired audio service (SV flag) and audio enabled.

If no multiplexer is present, or the signal too low or bad, the AQ flag will not be set, even though RSS may show some positive value (background noise or other carriers) With a good clean DAB signal (i.e. RSS greater than 30), the AQ flag should be set within 2-3 seconds. The Ensemble flag (EN) should follow within a second or so, and the Service list (SL) after a few more seconds. If the "wanted" SID/CID services are not present in the service list, the audio will not be enabled. Note that ProDAB will accept a CID value of FFFF as a wildcard, and will lock to the first SID, whatever its CID value present in the service list.

The above tuning status flags are shown on the LDC display in the fourth information display page in real time form (second line from top). (enter (I) four times) This can be used to show how ProDAB is tuning and how long it is taking to sync to the various data blocks.

The seventh line of the second information display page (enter (I) once) shows the current RSSI, SNR (Signal to noise ratio) CNR (carrier to noise ratio) and the accumulated number of block errors to date. Observing the latter over a short period (e.g. a minute) can give a good indication on how good the received stream is.

The flags are also shown when in DAB manual tune mode (bottom row) the message format being:
("nn" and "mm" are count up timers)
** TUNING nn RF:AQ:RS:EN:SL mm **

To help visualise the number of DAB multiplexers in the band, a "quick DAB scan" function is available under the engineering menu (/SYSTEM/ENGINEERING/QUICK DAB SCAN) This shows a continuous scan of the relevant band together with their RSSI and SNR levels. This can be left running continuously to visualise a snapshot of all multiplexers present.

Note: See page 9 for more information about how to manually DAB tune.

10.3 DAB scan

▶ key takes you to next menu level

Press ◀▶ to change
Options:
Radio A
Radio B
▼ key takes you to next menu

Press ◀▶ to change
Options:
RESCAN (Keep Station List)
NEW SCAN (Clear List
▼ key takes you to next menu

Press ◀▶ to change
Options:
THOROUGH SCAN (Takes Longer)
NORMAL SCAN (Faster)
▼ key takes you to next menu

Press **OK** to start scan

The unit will scan all DAB MUX frequencies and display any MUXes it finds along with RSSI & SNR. This will run continuously until stopped by pressing the **OK** button

11. AES67 Support

From firmware version 171/170 ProDAB supports basic AES67 connectivity with audio algorithms for G.711 & PCM 24bit as well as multicast streaming output.

Select Main Menu | SYSTEM | Engineering Menu | AES67 Menu ▶

This is the Public IP address, set this if you are using NAT or Public IP address is different from LAN IP Address
To edit IP address use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

To edit Port use ◀▶ to select & ▲▼ to change items then **OK** to save. Note traditional SIP port is 5060
Press ▼ Next Menu

Leave as 000.000.000.000 if you wish SIP to negotiate Remote IP address otherwise, to edit IP address use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

Leave as 00000 if you wish SIP to negotiate Remote Port address otherwise, to edit Port use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

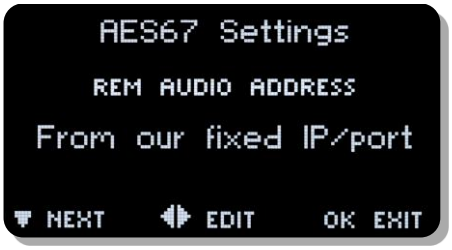
With Timeout set to zero, ProDAB will continuously send UDP audio packets until it receives a “BYE” command via SIP.
To change Timeout use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

By default ProDAB will answer any calls made to SIP:xxx@ProDAB.IP.Address. Calling SIP:255@ProDAB.IP.Address will access built-in 1kHz tone generator.
To edit number use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

ProDAB supports G.711 & PCM24bit (48,000 kHz Stereo) audio modes. To edit mode use ◀▶ to select & ▲▼ to change items then **OK** to save.
Press ▼ Next Menu

ProDAB can determine the IP address of units trying to connect using the following methods:

- From UDP source address (default)
- From Contact Field
- From fixed IP/port – set in earlier menus.
- Multicast



When Multicast is selected ProDAB will immediately start sending Multicast packets.
Typical values for Axia X-node using multicast
IP Address 239.192.x.x
Port 5004

Multicast Address of unit

Multicast Port

Not needed for multicast

To set ProDAB for multicast transmit:

- Go to AES67 menu
- Enter multicast address under "rem audio ip addr e.g. 239.192.006.001
- Enter multicast port under "rem audio port" e.g. 5004
- Enter multicast protocol (96) under "audio protocol"
- Enter "000" under "audio timeout" (unless time limited multicast is wanted)
- Select multicast under "rem audio address"

This will start multicast immediately on the given port

To turn off multicast (from AES67 menu):

- Select other than multicast under "rem audio address"

To select MULTICAST reception on an Axia xNode:

- Log into the axia web interface
- Select "destinations"
- Under line # enter "239.192.6.1:5004" then apply

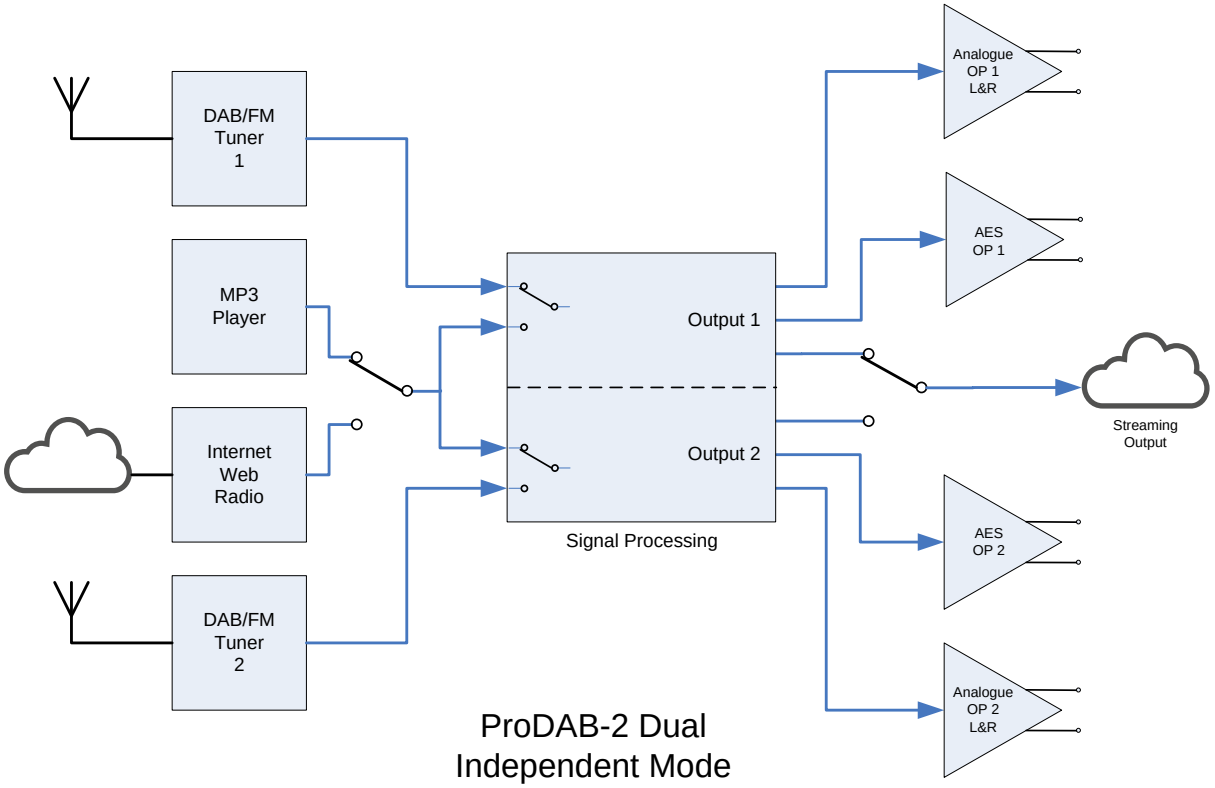
xNode will start receiving immediately, note the displayed entry may change

Note: Axia xNode supports multicast addresses by default in the range 239.192.x.x

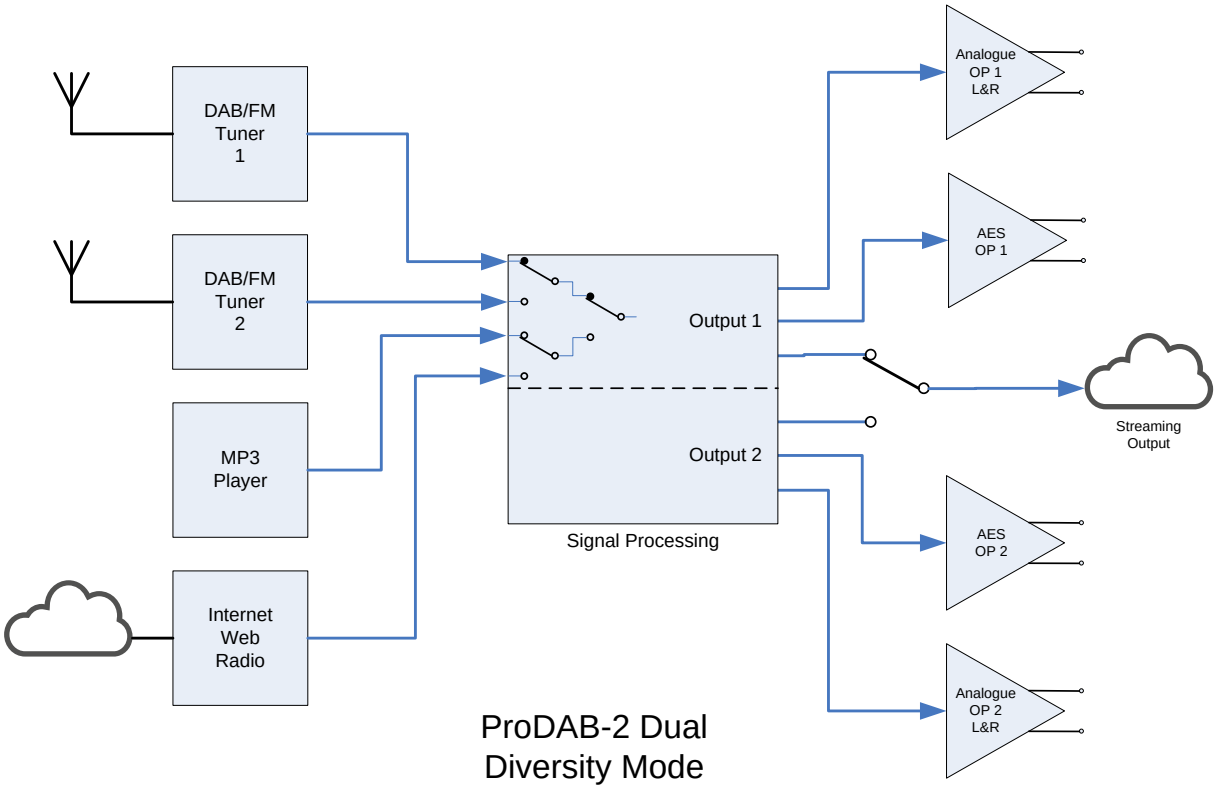
To select UNICAST reception on the xNode:

- Log into the xNode web interface
- Select "destinations"
- Under line # enter "sip:1@239.192.6.1:5004" then apply

12. System Block Diagrams



ProDAB-2 Dual
Independent Mode



ProDAB-2 Dual
Diversity Mode

13. Rear Panel

Analogue balanced audio outputs, gain adjustable from 0dBU to +20dBU.

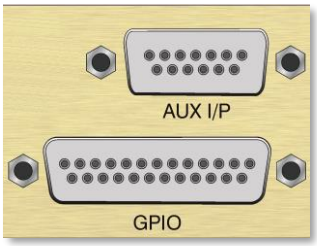
Pin 1 = GND
Pin 2 = + output
Pin 3 = - output

AES3 digital output, sampling rate adjustable via menu to 48Kbps or 96Kbps

Pin 1 = GND
Pin 2 = + output
Pin 3 = - output

Antenna input for DAB & FM

F-Type female connector fitted to unit.



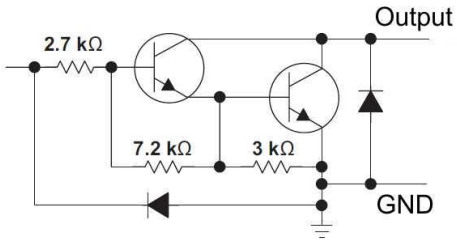
Default GPIO allocation version 1.30 firmware onwards

13.1 Inputs:

GPIO-0 (pin 18)	Gnd to select preset 1, Tuner 1
GPIO-1 (pin 17)	Gnd to select preset 2, Tuner 1
GPIO-2 (pin 16)	Gnd to select preset 3, Tuner 1
GPIO-3 (pin 15)	Gnd to select preset 4, Tuner 1
GPIO-4 (pin 14)	Gnd to select preset 1, Tuner 2
GPIO-5 (pin 1)	Gnd to select preset 2, Tuner 2

13.2 Outputs:

Darlington (Open Collector) Output



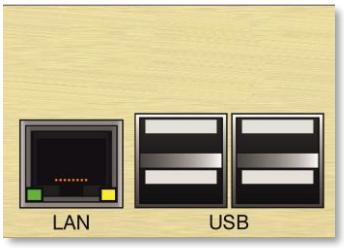
GPO-0 (pin 23)	Low = In changeover to MP3, Tuner 1
GPO-1 (pin 22)	Low = RDS TA Traffic Flag active, Tuner 1
GPO-2 (pin 21)	Low = Mono, Tuner 1
GPO-3 (pin 20)	Low = Audio silence detect, Tuner 1
GPO-4 (pin 19)	Low = RSSI below threshold, Tuner 1
GPO-5 (pin 10)	Low = Audio silence detect, Tuner 2
GPO-6 (pin 9)	Low = Network Fail
GPO-7 (pin 8)	Low = Not Defined

13.3 Common Grounds: pins 2, 3, 4, 11, 12 & 13

13.4 +5V Current Limited supply: pins 24 & 25

RS232 I/O – ProDAB Production units allows access to operating system console at 115k baud.

Pin 2 = Tx data
Pin 3 = Rx data
Pin 5 = GND



RJ45 LAN connector 10/100 auto negotiation MDX

USB Can be used for additional MP3 storage.

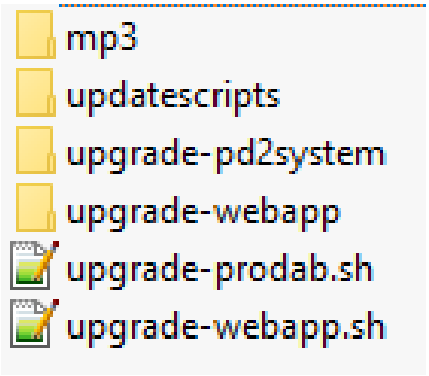
IEC Mains inlet – Fuse T3.15A 90/240VAC

Provision for IEC retaining clip and M4 Earth tag

14. Firmware Upgrade

Firmware upgrades will be supplied as a package of files in ZIP format.

This can either applied directly from the web GUI (Version xxx onwards) by browsing to the ZIP file or by unzipping files to the root of a USB flash drive formatted FAT32



Root of USB flash drive should look like above.
Insert the flash drive into one of the USB sockets on the rear on the unit.
After a few minutes the ProDAB will re-start using the new firmware.

From version 160/160 there is new DAB front-end firmware available (version 6.0.4) please contact sales@adrl.co.uk if you wish to apply this upgrade.

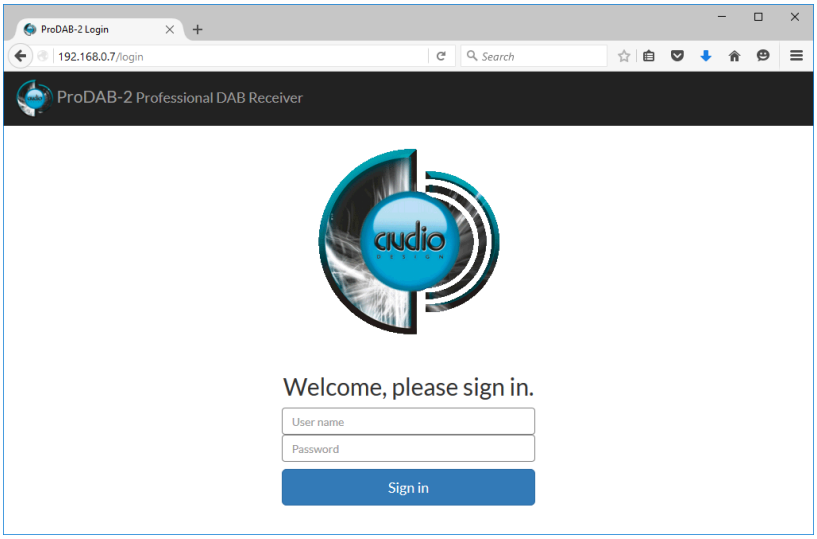
15. Web Interface

Using a web browser navigate to the IP address of the ProDAB (default 192.168.0.7)

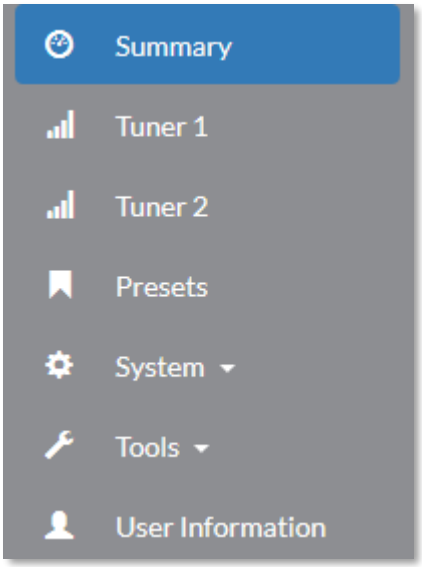
15.1 Default Username & Password:

Sign in as:

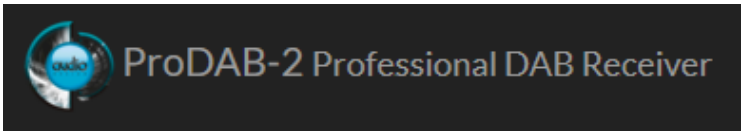
Username – admin
Password – 1234



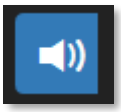
Note that the web interface has been tested with the following browsers: Firefox, Chrome & Internet Explorer version 10 onwards



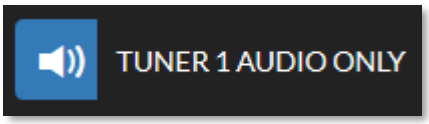
System information & User Information is only available when you sign In as Admin. Users can only be added or changed when you sign in as Admin.



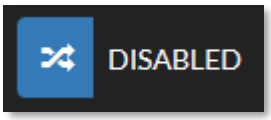
Info Bar ICONs



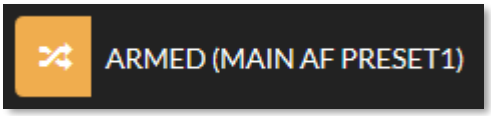
Click here to play audio for currently selected tuner. Note: that when option “STREAMER SOURCE” is set to “Tuner 1 Only” in Engineering menu you can only listen to Tuner 1.



Click here to turn off audio monitor stream.

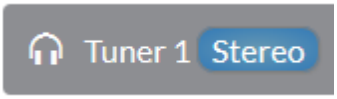


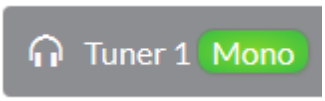
Change Over mode disabled



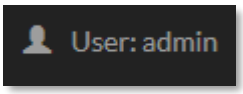
Change Over “Armed” Set to AF Threshold mode, Preset 1 currently selected

Change Over “Active” Set to AF Threshold mode, Preset 2 currently selected

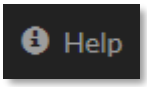




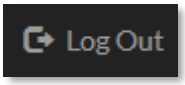
Click on Mono or Stereo indicator to change hardware output mode of ProDAB. This is independent of received service or station. Tuner 1 or 2 can be set separately.



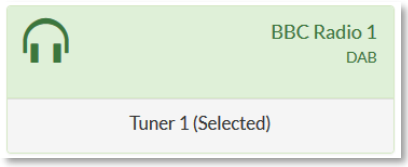
This is the user you are currently signed in as.



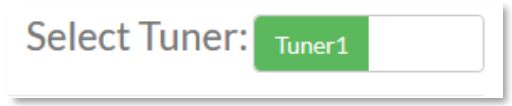
Click here to access or download an “embedded” copy of the User Guide as a PDF.



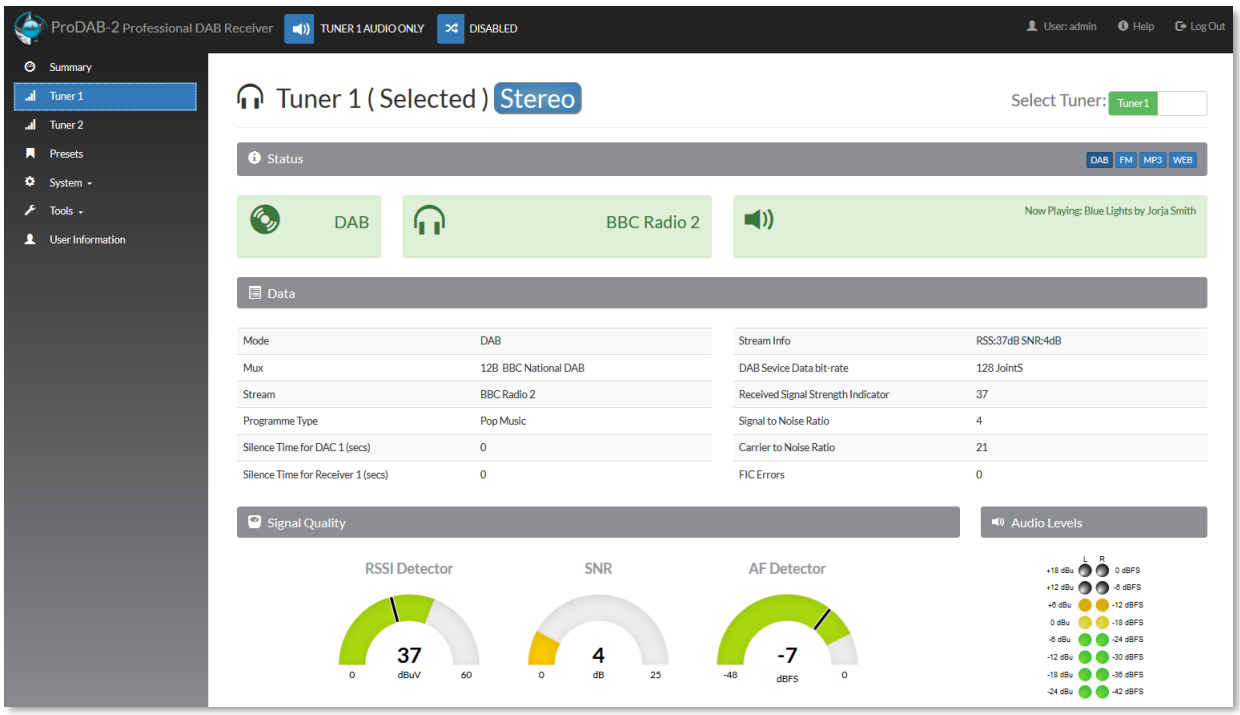
Click here to Sign Out.

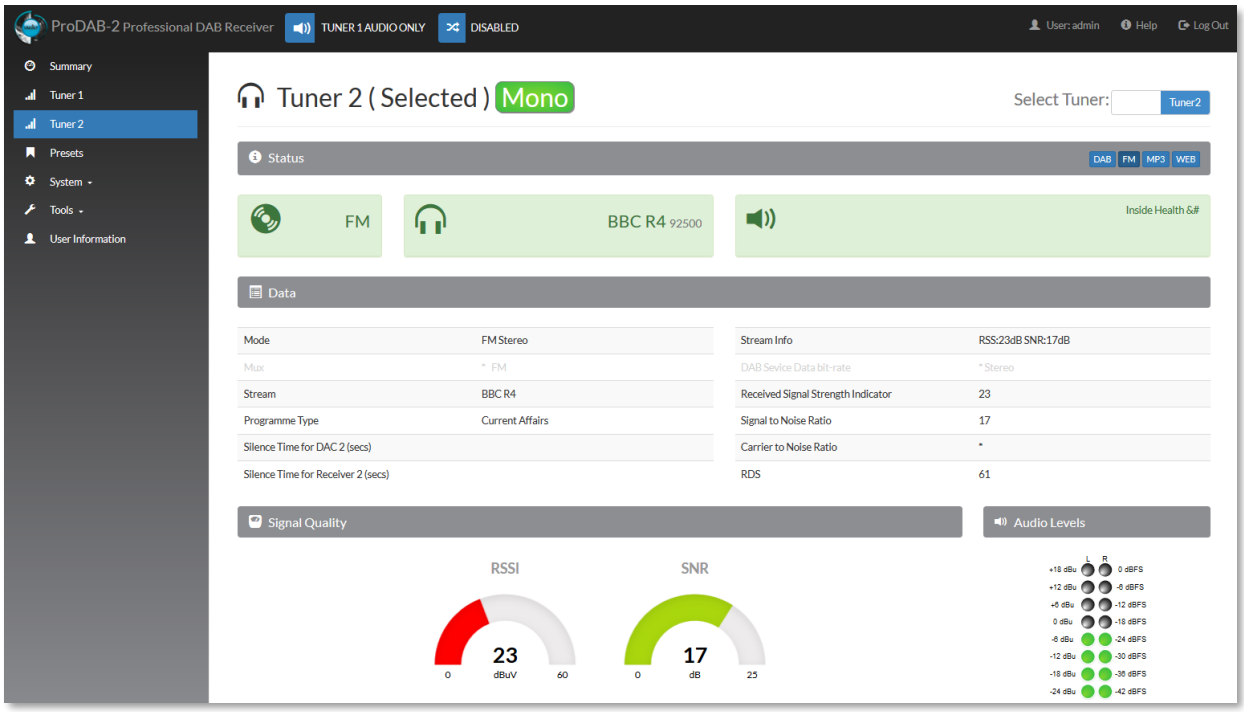


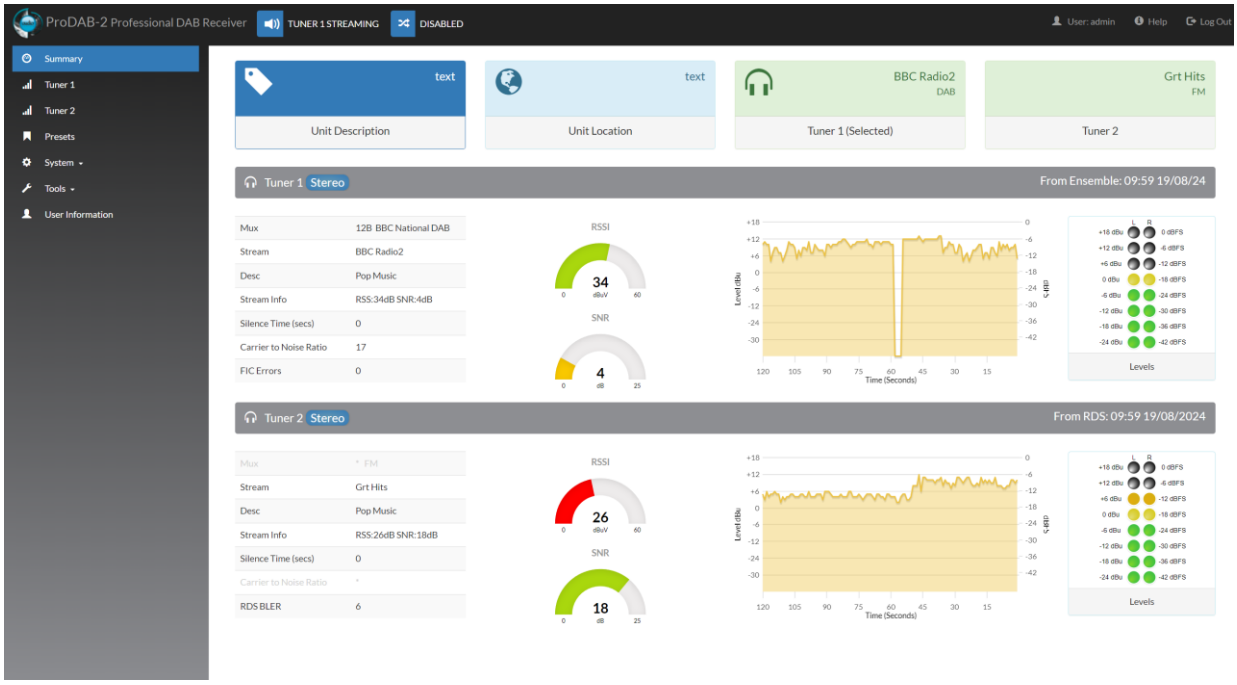
In order to control a Tuner using the web interface, it has to be selected in the individual Tuner Info page.



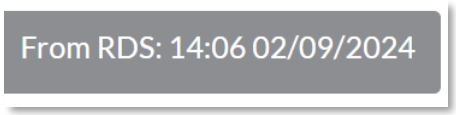
Select here

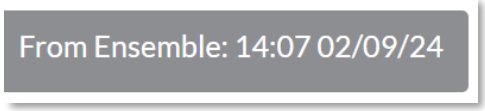






FM **DAB**

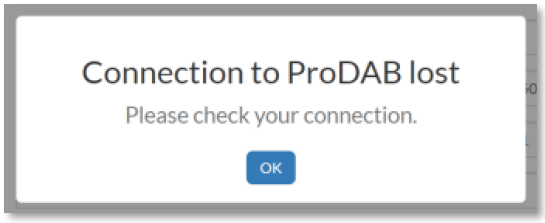




The Summary screen shows information about both tuners on Dual units and Tuner 1 on ProDAB-1 Plus. Also includes time derived from either DAB MUX or FM RDS.

Traffic Announcement flag now indicated on GUI when active.

If the GUI loses network IP contact with the ProDAB unit then this message will be displayed:



DAB Mode Info

Mux	BBC National DAB
Stream	BBC Radio 1
Desc	Pop Music
Stream Quality Info	RSS:42dB SNR:4dB
Signal Credibility	8
AF Peak	AF pk:92
Silence Time (secs)	*

MP3 Mode Info

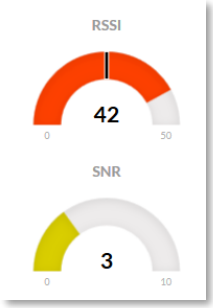
Mux	MP3
Stream	GLITS_tone_192.mp3
Desc	MP3
Stream Quality Info	199 of 480 kB
Signal Credibility	0
AF Peak	AF pk:118
Silence Time (secs)	*

FM Mode Info

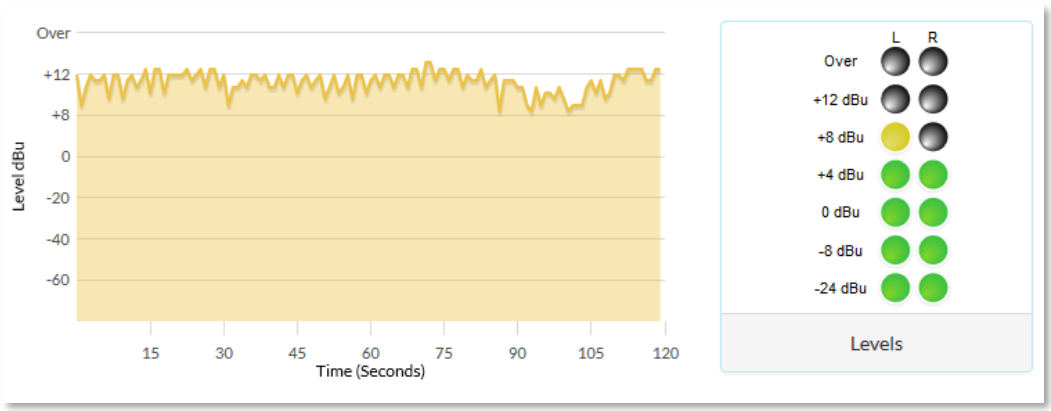
Mux	FM
Stream	BBC R3&#
Desc	Classical Music
Stream Quality Info	RSS:38dB SNR:12dB
Signal Credibility	*
AF Peak	AF pk:44
Silence Time (secs)	*

Web Radio Mode Info

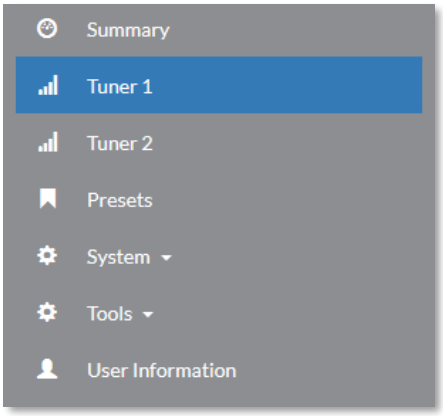
Mux	WEB
Stream	ADR-ProDAB-Test-2
Desc	http://92.27.244.13:5000
Stream Quality Info	222 kb total
Signal Credibility	0
AF Peak	AF pk:26
Silence Time (secs)	*



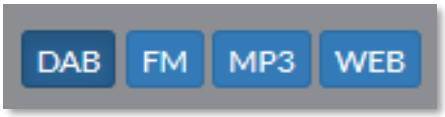
RSSI (Received Signal Strength Indicator) and SNR (Signal to Noise Ratio) for DAB reception. Note: Black bar on RSSI gauge is the threshold for change over set in the Change Over menu.



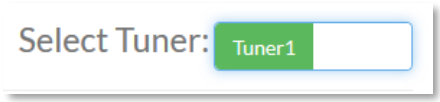
Real time audio level indicators. LED meter 0dBu audio output is factory set to 18dB below FSD (Full Scale Digits)



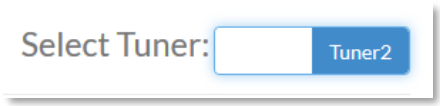
Select for more detailed information to be displayed.

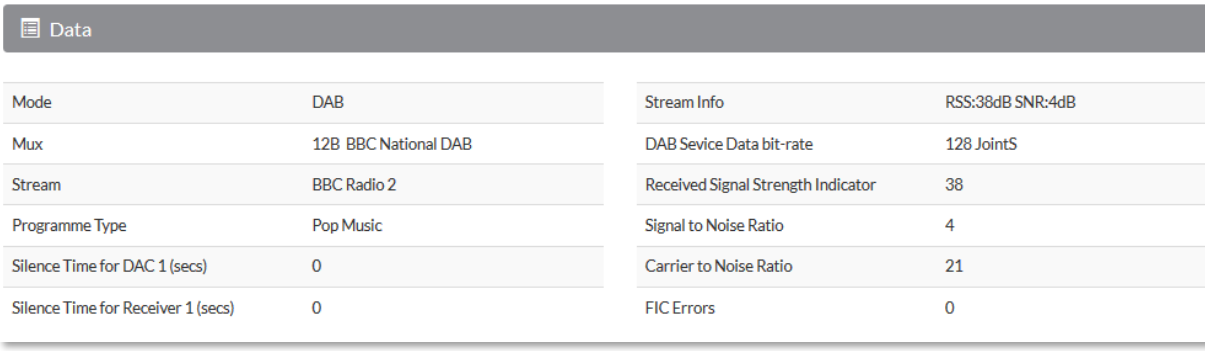


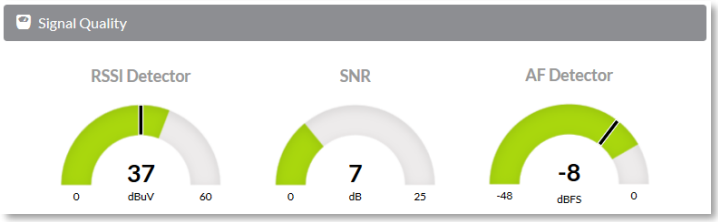
Current mode selected. Note: only one tuner at a time can be set to Web or MP3 mode.



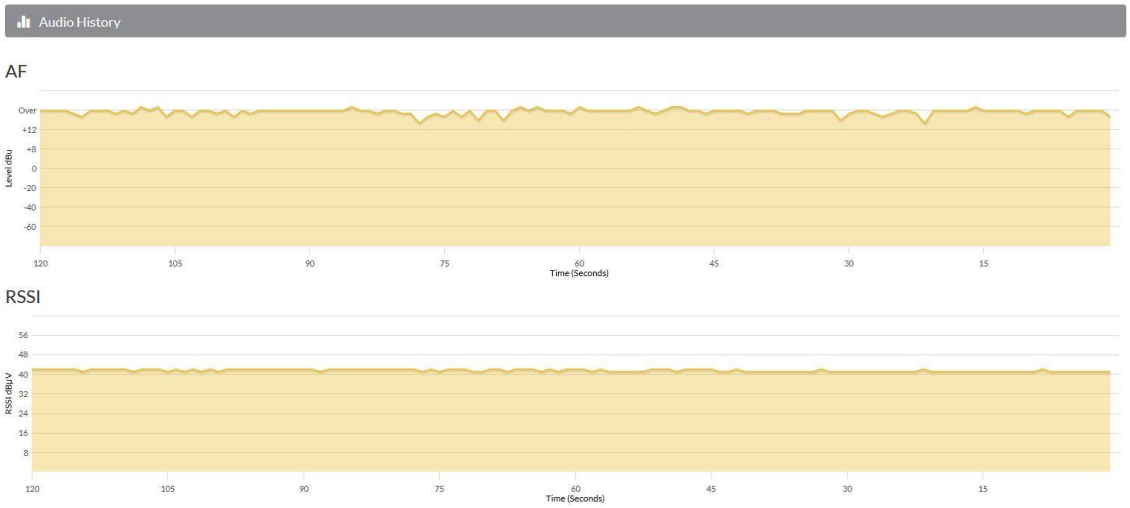
Click here to take control of a tuner.



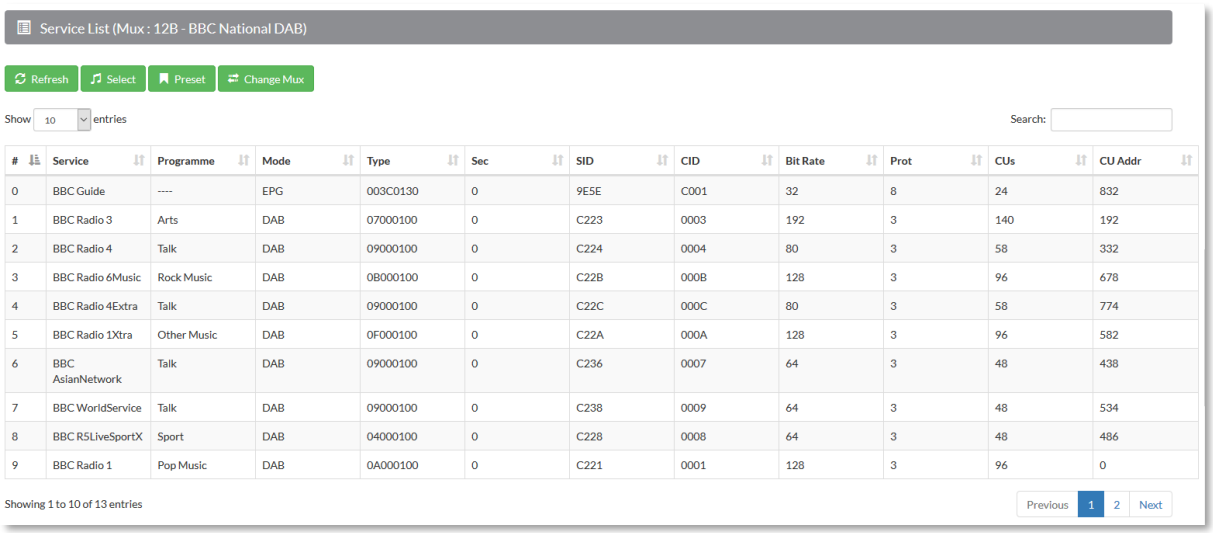




Black markers indicate set threshold for change over for either RSSI or Audio level (silence) set in Change Over menu.



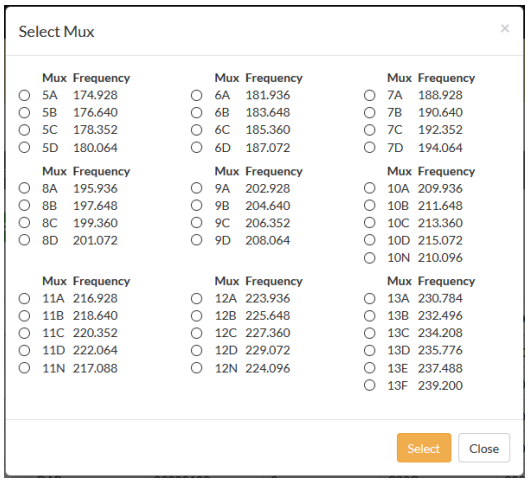
Real time history display of Audio level and RSSI

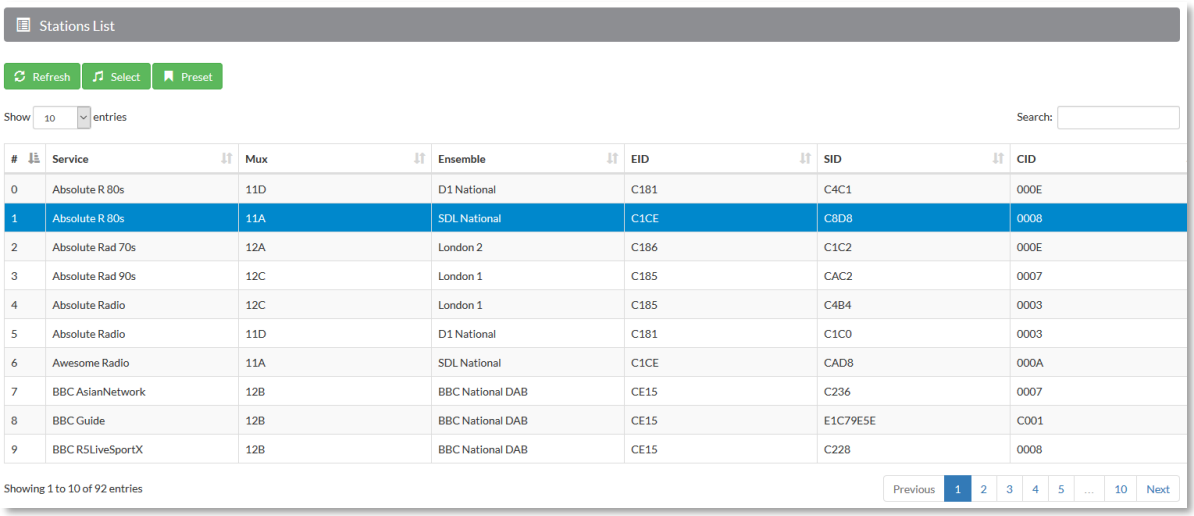


#	Service	Programme	Mode	Type	Sec	SID	CID	Bit Rate	Prot	CUs	CU Addr
0	BBC Guide	----	EPG	003C0130	0	9E5E	C001	32	8	24	832
1	BBC Radio 3	Arts	DAB	07000100	0	C223	0003	192	3	140	192
2	BBC Radio 4	Talk	DAB	09000100	0	C224	0004	80	3	58	332
3	BBC Radio 6Music	Rock Music	DAB	0B000100	0	C22B	000B	128	3	96	678
4	BBC Radio 4Extra	Talk	DAB	09000100	0	C22C	000C	80	3	58	774
5	BBC Radio 1Xtra	Other Music	DAB	0F000100	0	C22A	000A	128	3	96	582
6	BBC AsianNetwork	Talk	DAB	09000100	0	C236	0007	64	3	48	438
7	BBC WorldService	Talk	DAB	09000100	0	C238	0009	64	3	48	534
8	BBC R5LiveSportX	Sport	DAB	04000100	0	C228	0008	64	3	48	486
9	BBC Radio 1	Pop Music	DAB	0A000100	0	C221	0001	128	3	96	0

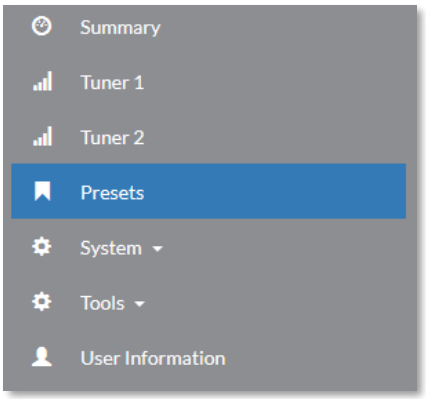
Service list for MUX that tuner is currently tuned to.
The table columns can be sorted by clicking in the heading cell of each column.

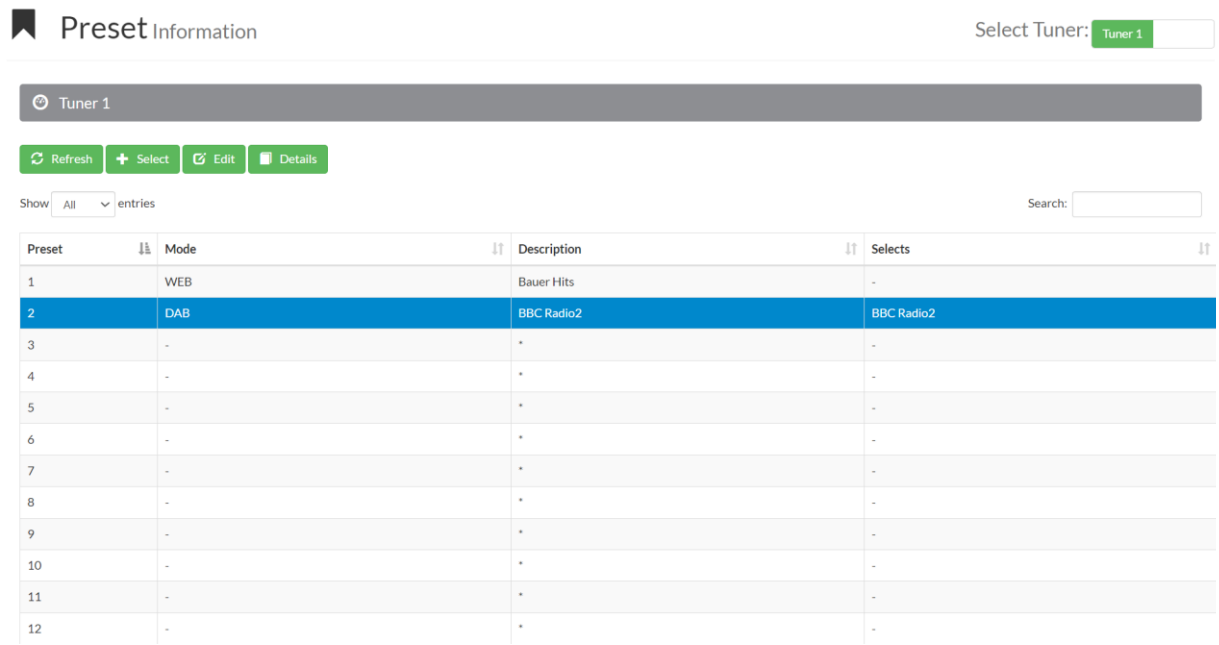
Using “Change Mux” button you can select a specific MUX from the dispalyed table. ProDAB will attempt to turn to the selected MUX and if it is available will then display the Service List. Note that Services will then also be added to the Station list.



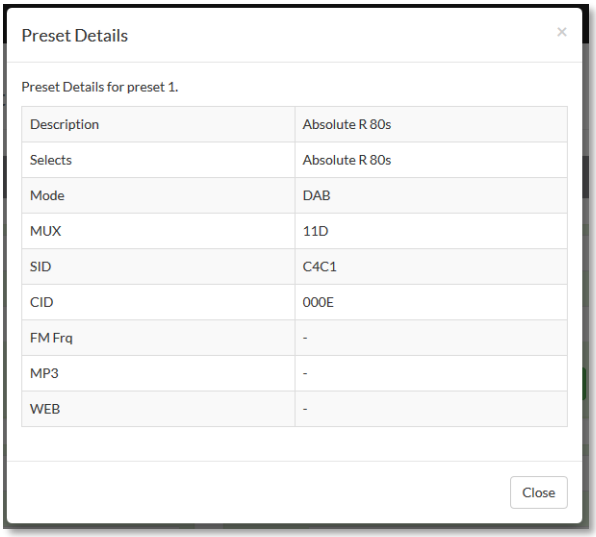


Stored Stations list obtained by DAB SCAN or added via “Change MUX” button.



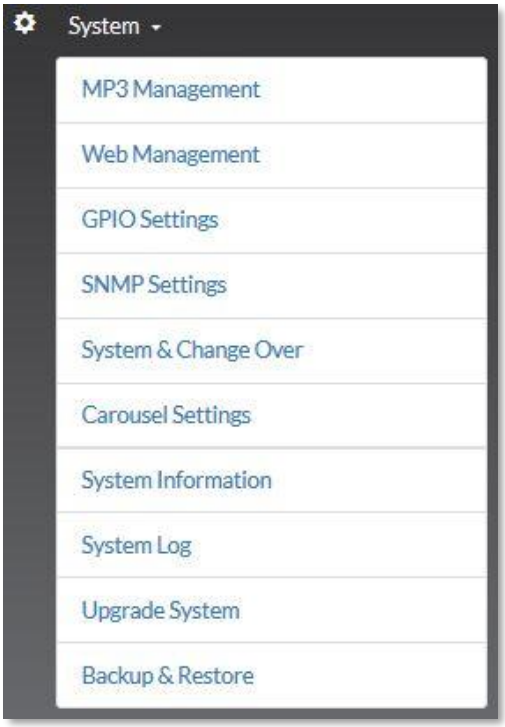


Click to highlight then Edit or Select presets.
Presets can be any combination of DAB, FM, MP3 or Web.
Up to 63 presets can be defined.

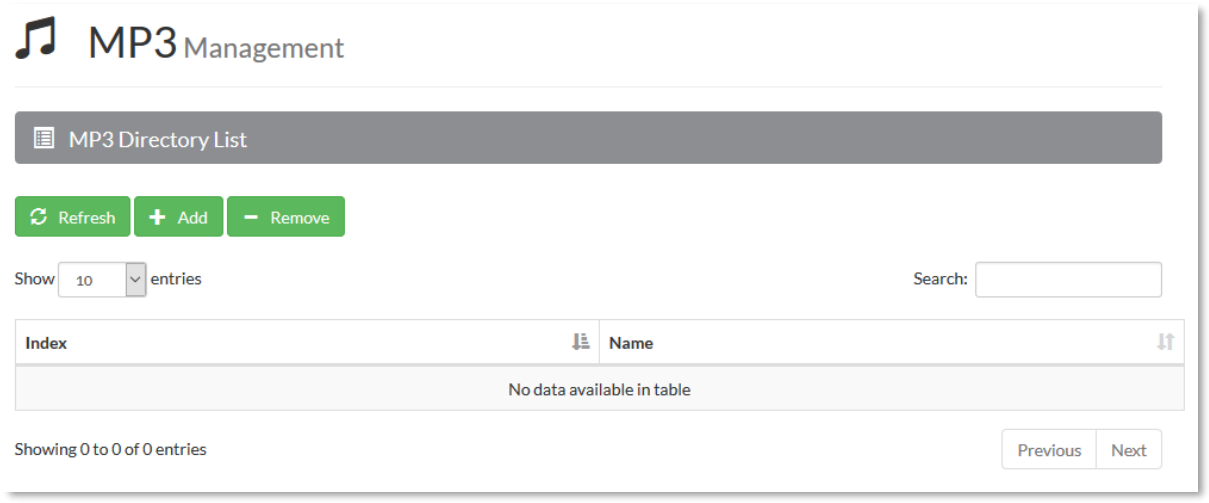


Preset Details

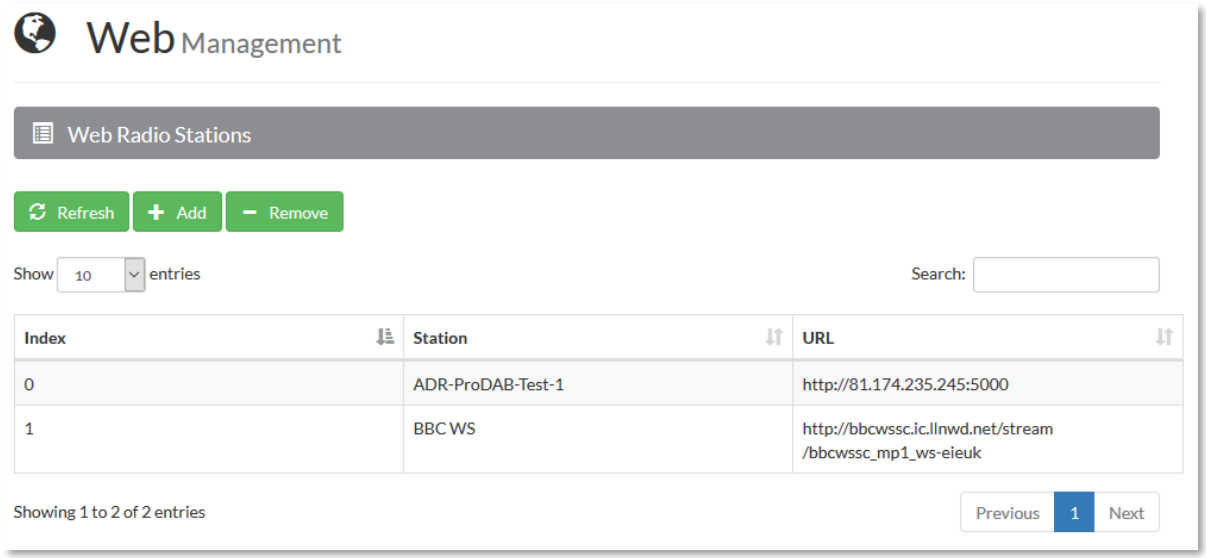
Preset Edit Screen

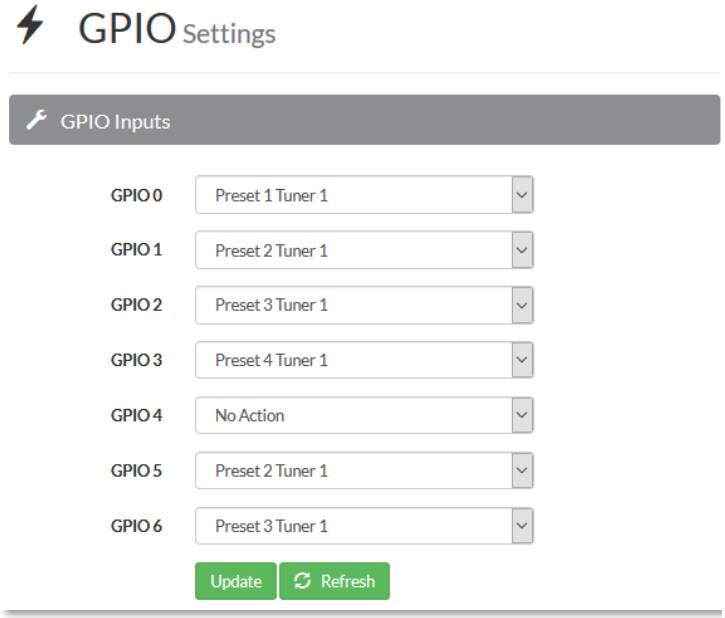


System information is only available when you sign In as Admin.

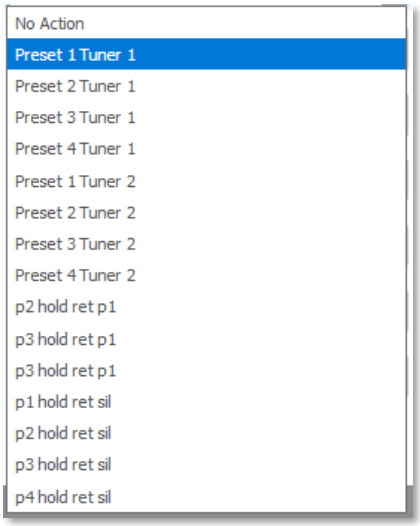


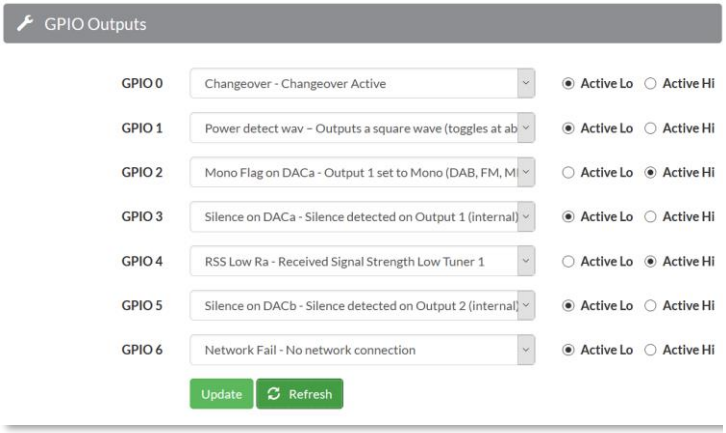
Note: Maximum file size for upload via Web GUI is 110MB

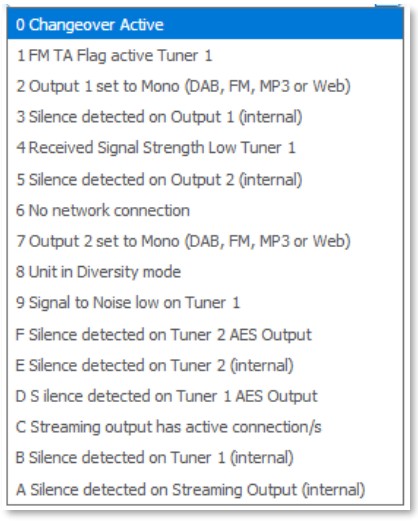


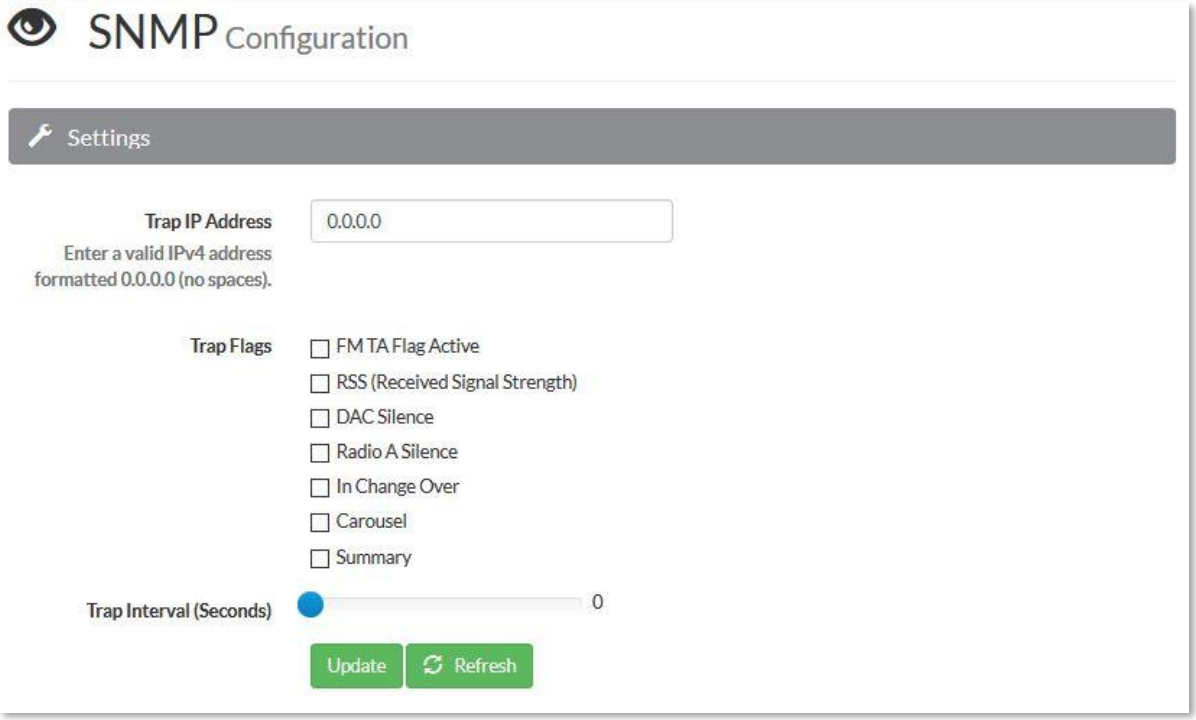


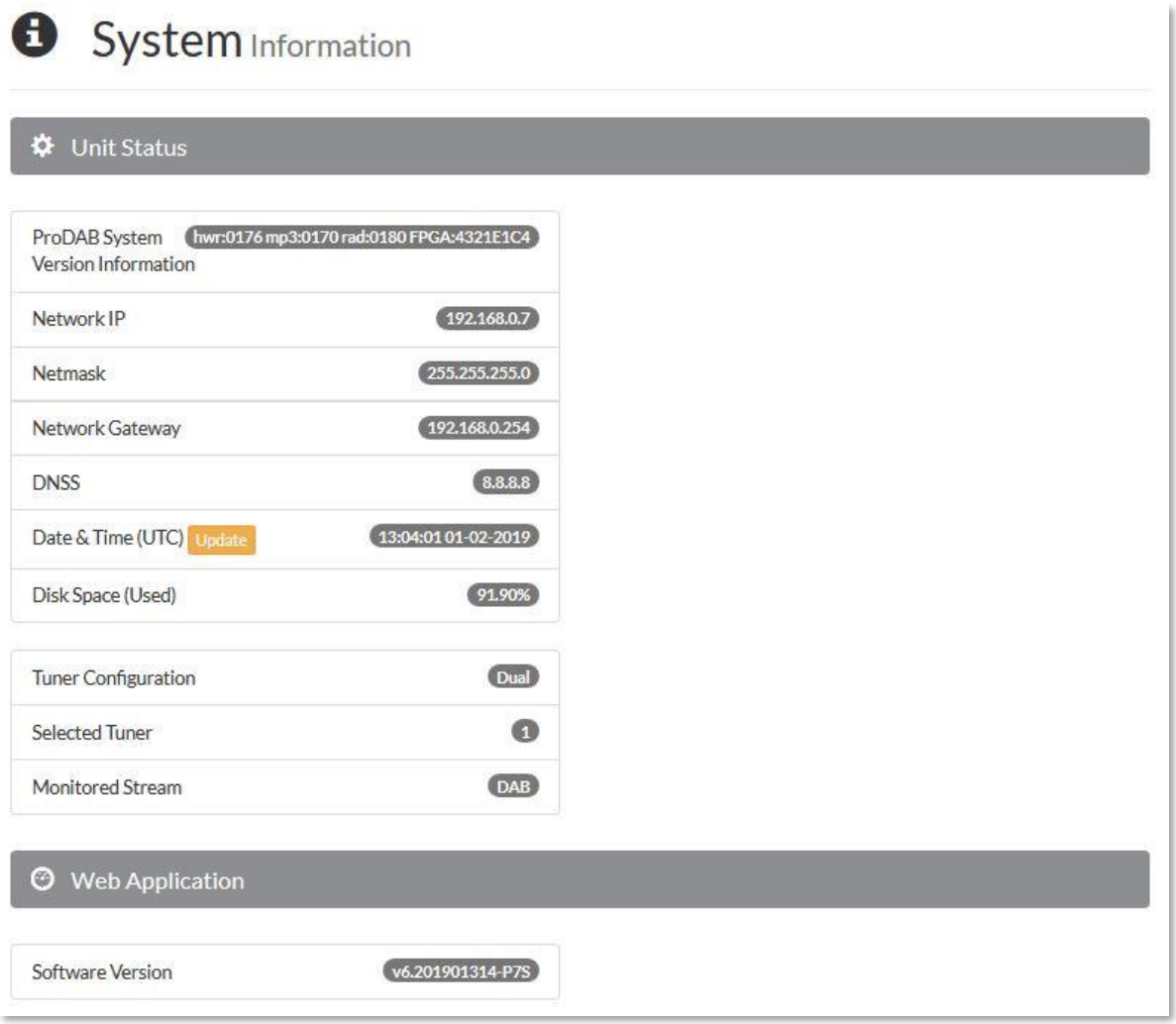
GPIO Options available

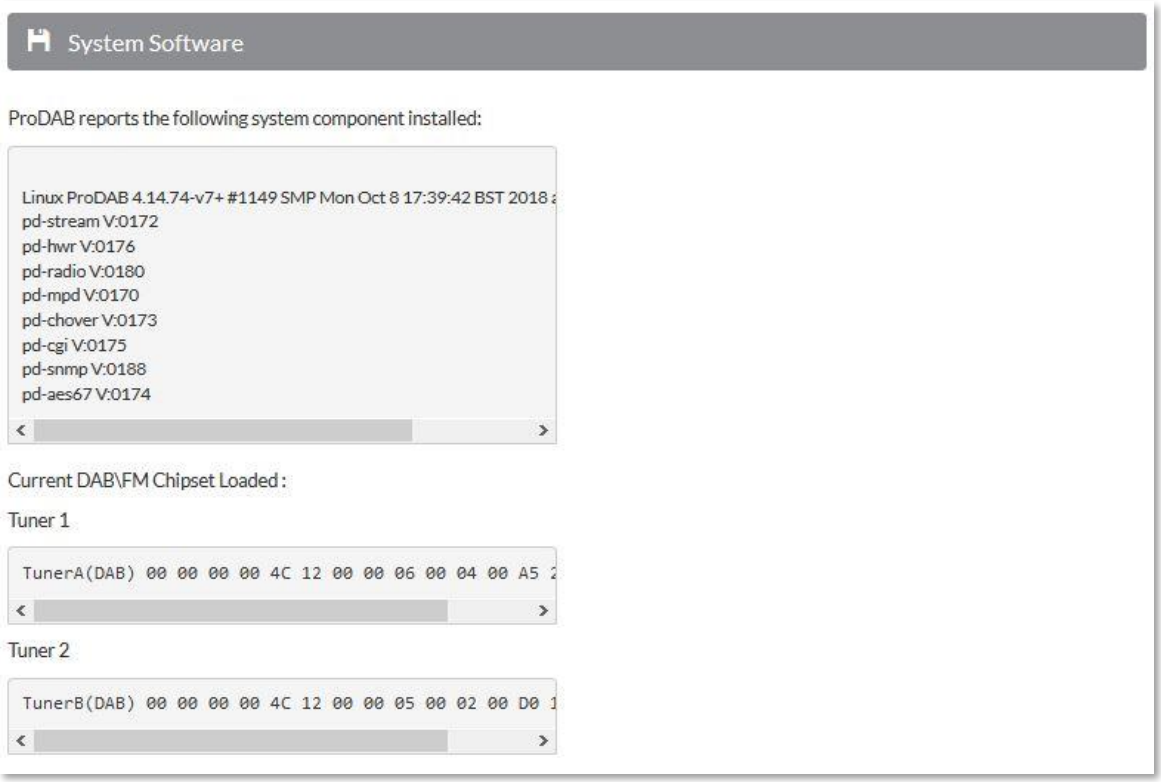


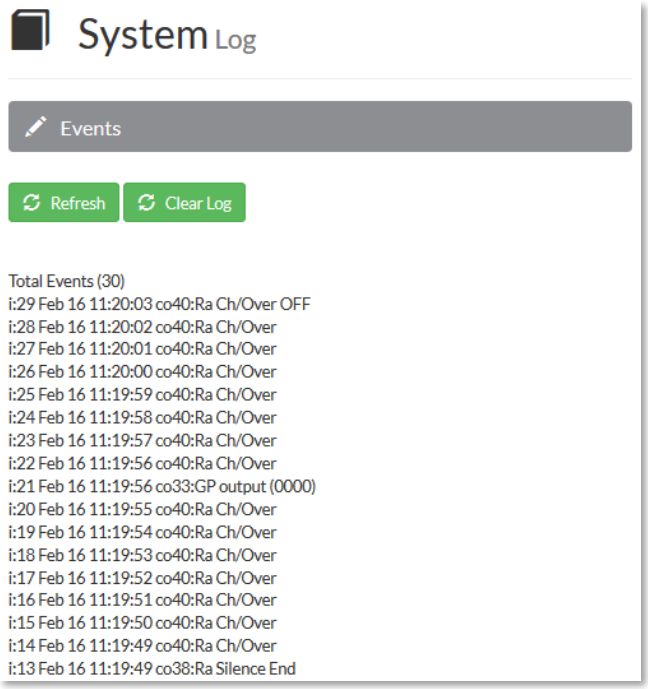


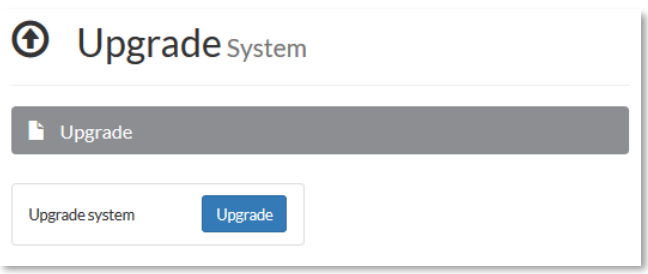



SNMP Configuration
Settings
Trap IP Address
Enter a valid IPv4 address formatted 0.0.0.0 (no spaces).
0.0.0.0
Trap Flags
FM TA Flag Active
RSS (Received Signal Strength)
DAC Silence
Radio A Silence
In Change Over
Carousel
Summary
Trap Interval (Seconds)
0
Update
Refresh


System Information
Unit Status
ProDAB System Version Information
hwr:0176 mp3:0170 rad:0180 FPGA:4321E1C4
Network IP
192.168.0.7
Netmask
255.255.255.0
Network Gateway
192.168.0.254
DNSS
8.8.8.8
Date & Time (UTC)
Update
13:04:01 01-02-2019
Disk Space (Used)
91.90%
Tuner Configuration
Dual
Selected Tuner
1
Monitored Stream
DAB
Web Application
Software Version
v6.201901314-P7S

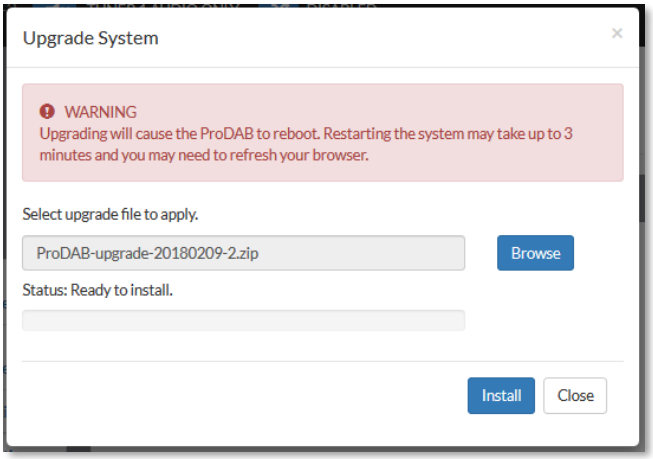


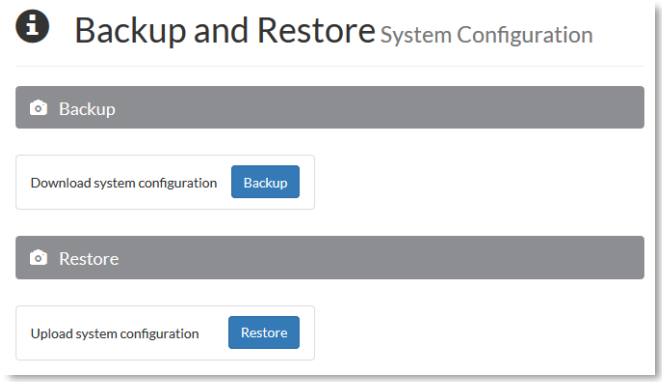




Press “Upgrade” then browse to upgrade file, the “Install” – The upgrade process takes about 3 minutes and you will need to refresh the browse page.

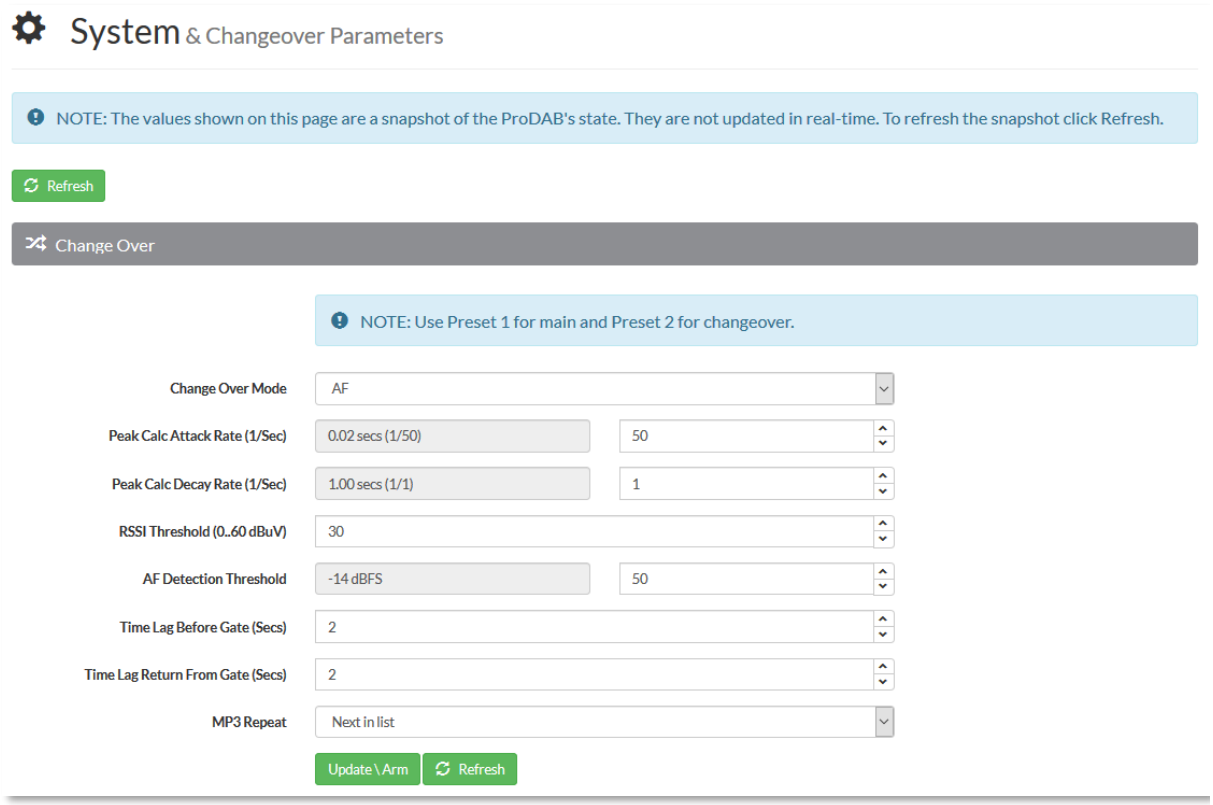
Note: System configuration files and USB upload script are downloaded as a single zip file.

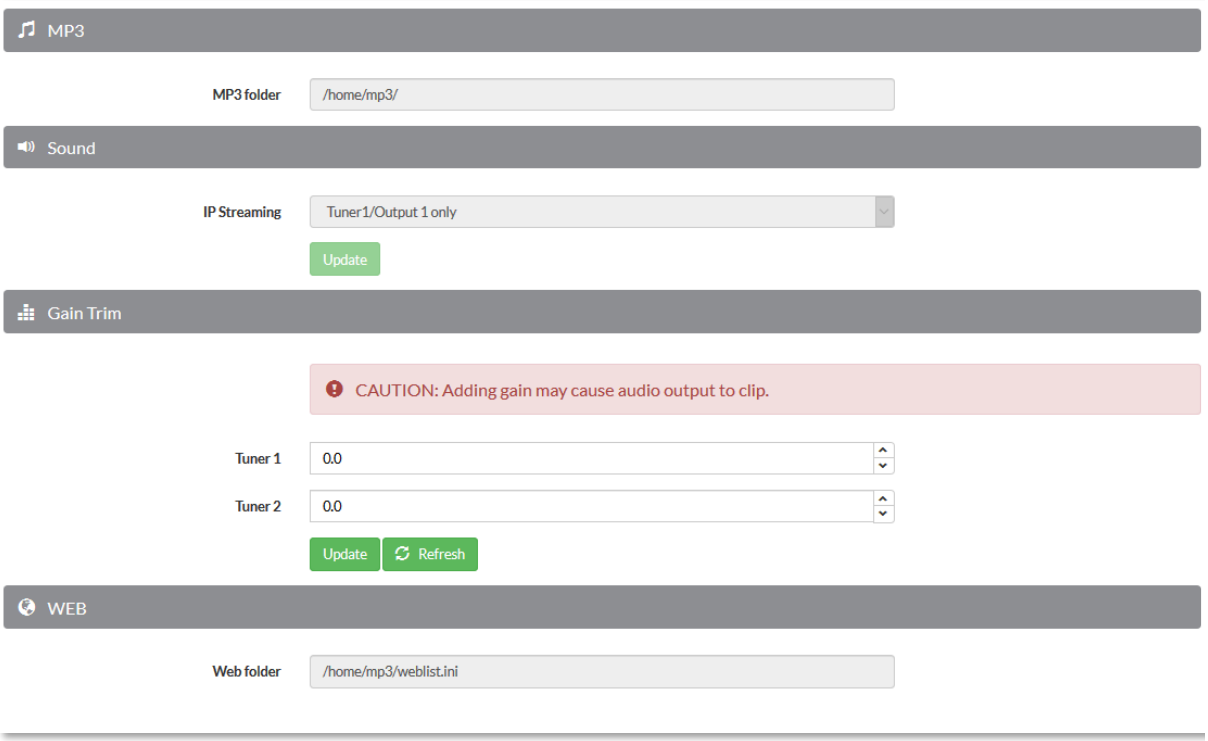




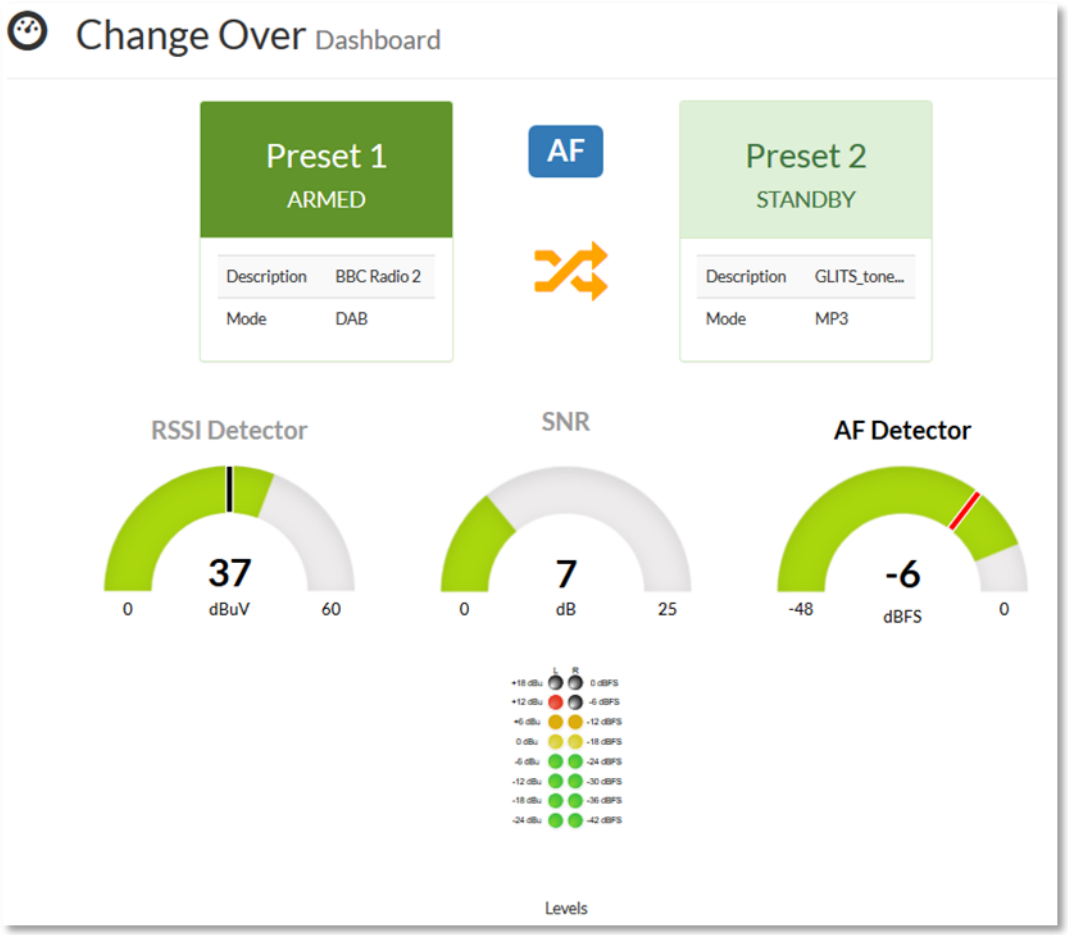
To restore, either unzip all files to the root of a blank USB stick formatted FAT32 or Upload via the “Restore” button using the web application.

System & Changeover

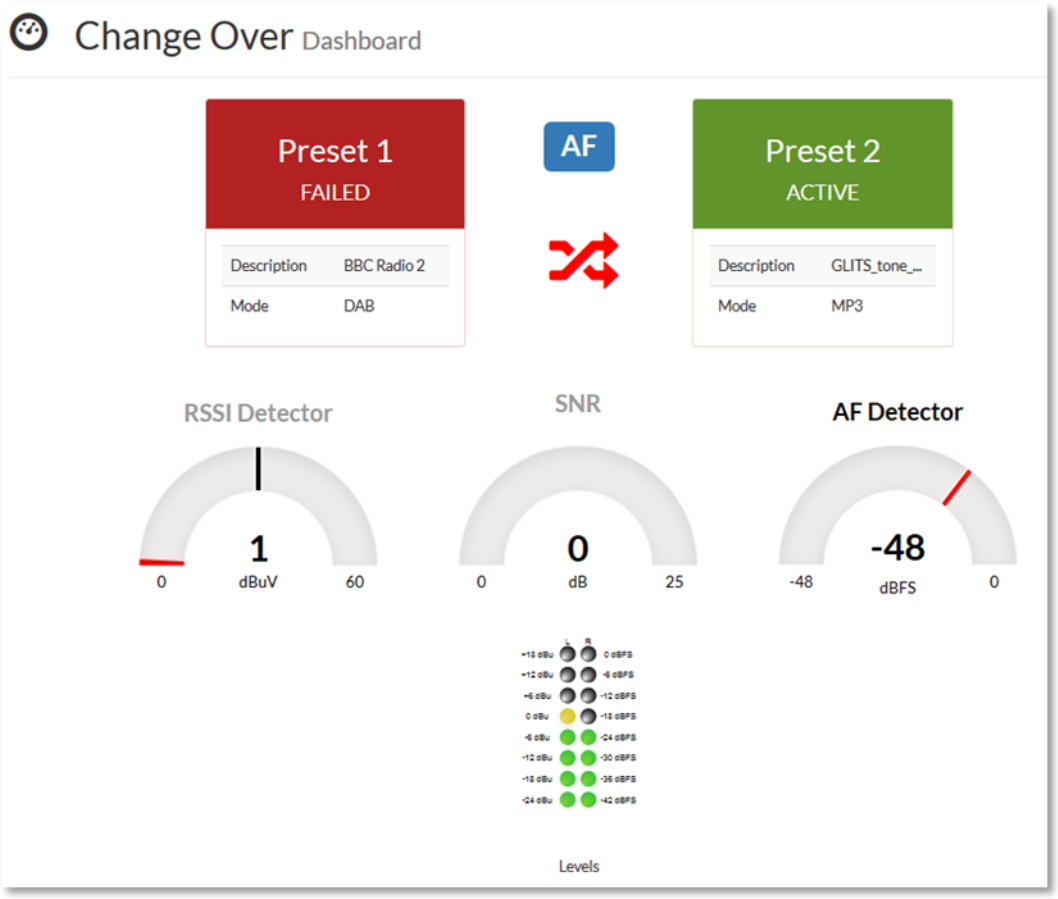




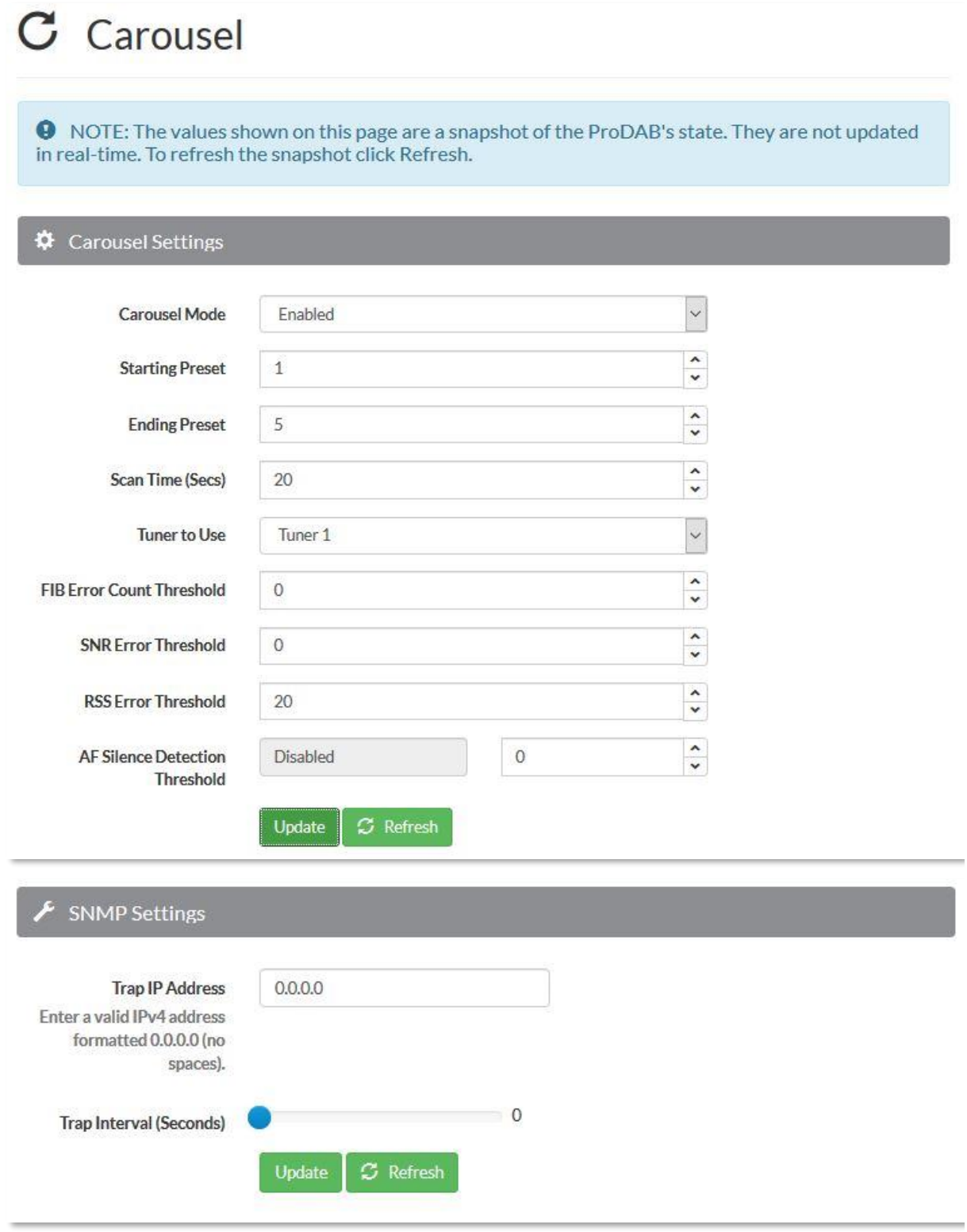
Change Over Armed:

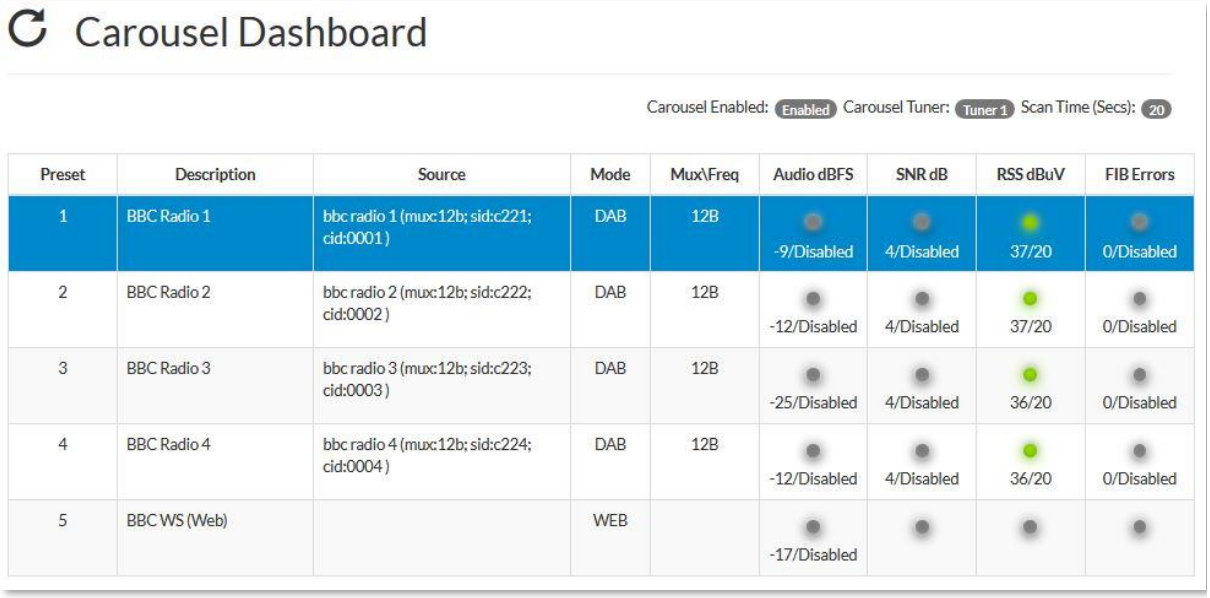


Change Over Active:

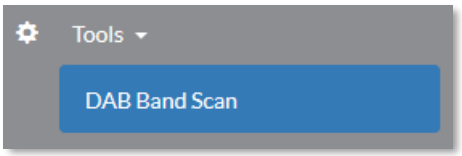


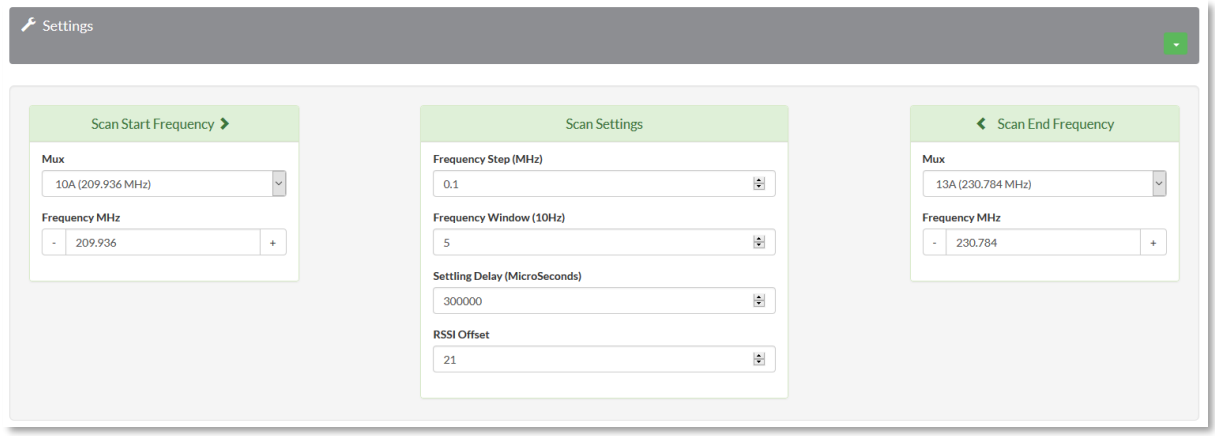
Carousel Mode



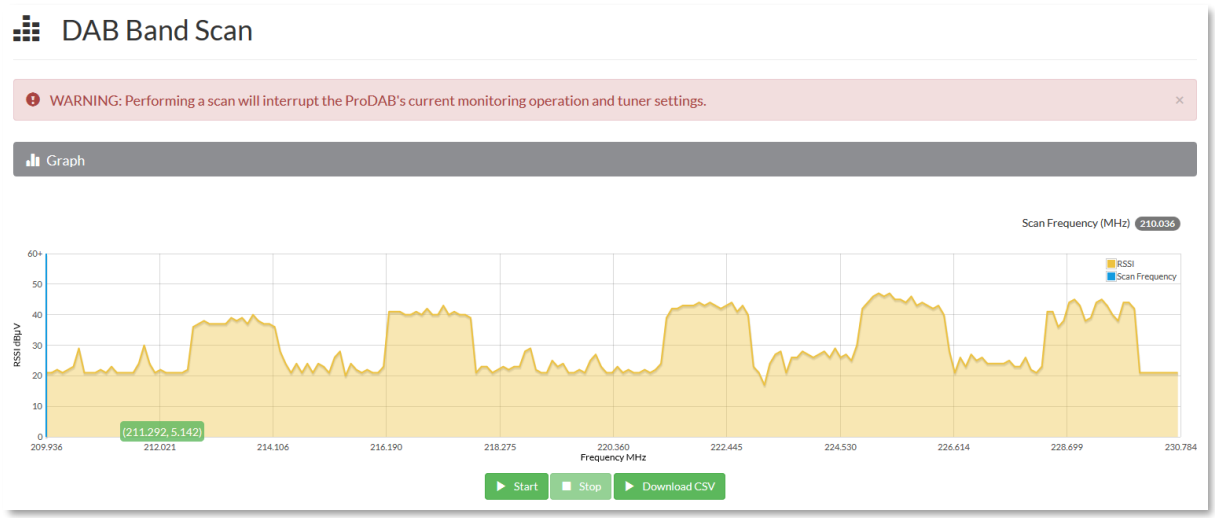


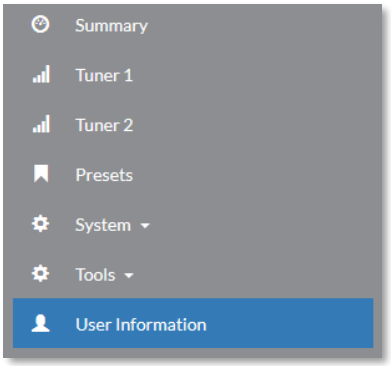
Blue bar shows the Preset being scanned

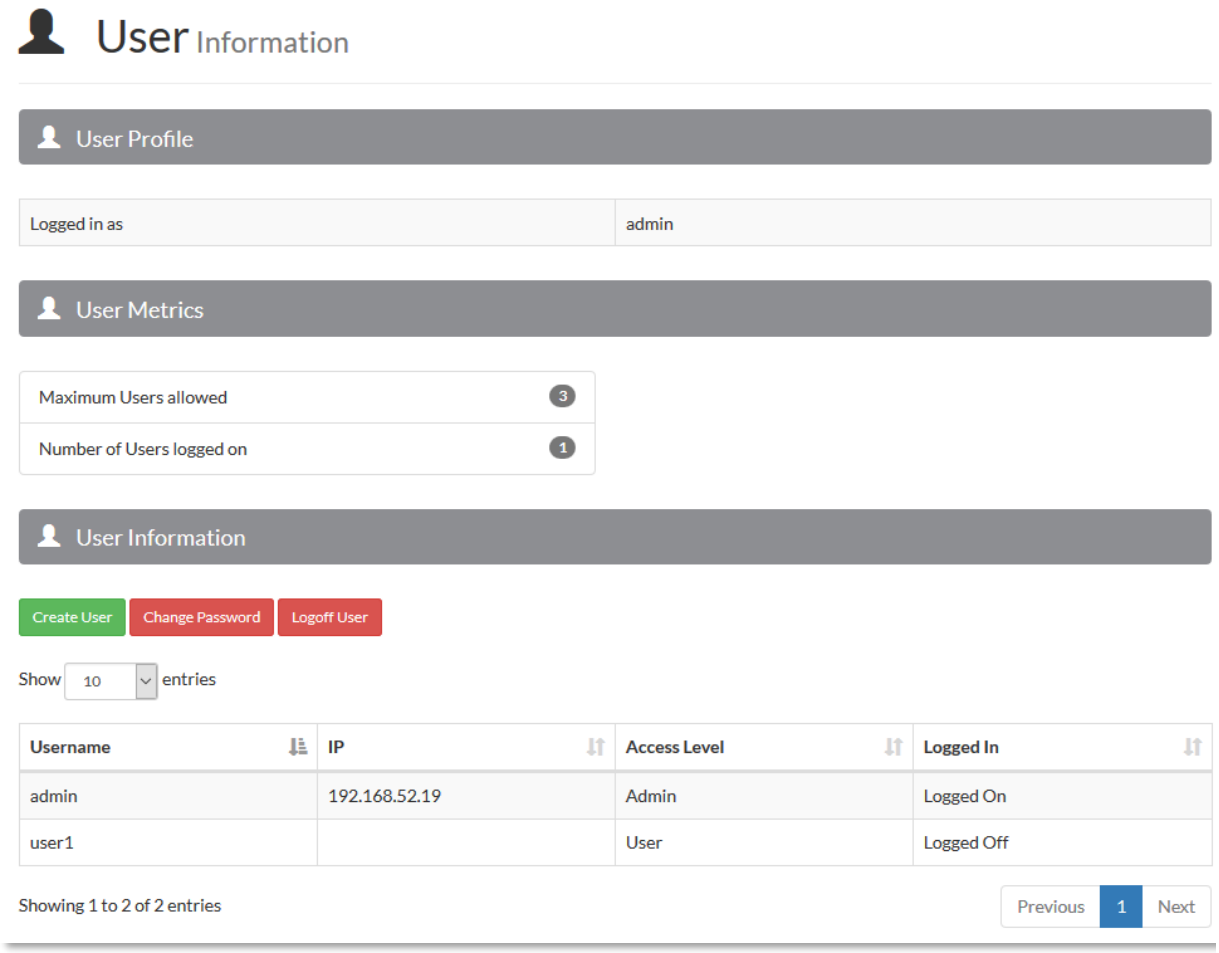




DAB Band Scan, Select Start & End Frequency either by MUX or frequency. Scan setting have been optimised for the ProDAB but can be changed if needed.




Summary
Tuner 1
Tuner 2
Presets
System
Tools
User Information


User Information
User Profile
Logged in as
admin
User Metrics
Maximum Users allowed
3
Number of Users logged on
1
User Information
Create User
Change Password
Logoff User
Show
10
entries
Username
IP
Access Level
Logged In
admin
192.168.52.19
Admin
Logged On
user1
User
Logged Off
Showing 1 to 2 of 2 entries
Previous
1
Next

16. Spectrum Analyser Utility (Front Panel Menu)

The ProDAB has a built-in simple spectrum analyser, which can be accessed as detailed below. All scans are run using the FM mode of the chip set (DAB mode only “looks” for multiplexers). Typical setting as below:

Note: That when in this mode the current tuner is dedicated to this function.

Press **OK** then select SYSTEM with ▲▼ then ▶

Use ▲▼ to navigate to ENGINEERING MENU then ▶

Use ▲▼ to navigate to FM SCAN MENU then ▶

Select Tuner with ◀▶ then ▼ to go to next option

Select either DAB or FM band with ◀▶ then ▼ to go to next option

▼ to go to next option, or change with ◀▶

▼ to go to next option, or change with ◀▶

▼ to go to next option, or change with ◀▶

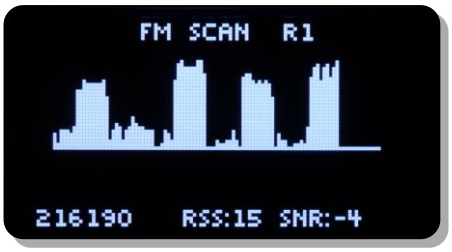
Set frequency step, either 50kHz or 100kHz with ◀▶ then ▼ to go to next option

Set settling delay (time system waits after frequency has been set) with ◀▶ then ▼ to go to next option

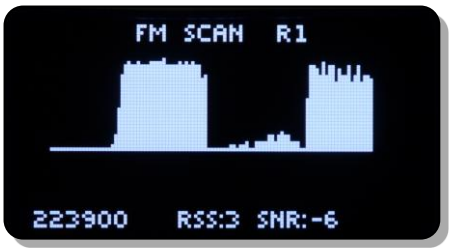
Set display “gain” in order to optimize display with ◀▶ then ▼ to go to next option

Test type:
FM Scan (also covers DAB frequency band)
DAB Scan for Muxes
Set with ◀▶ then ▼ to go to next option

▶ To continuously run scan, Unlock/Clr to stop



Example “zooming” in to a specific MUX



Mux 12A very low level between 11D & 12B

11D – RSSI = 42dBuV
12A – RSSI = 22dBuV
12B – RSSI = 41dBuV

Audio & Design Reading Ltd. Hereby confirm that the ProDAB-2 conforms to the requirements of EN50081-1 & EN60950 provided it is used as described in this manual and in the sections below:

To comply with the EMC Directive EN50081-1 (generic), it is recommended that all-digital input and output cabling be of Belden type 1696A or its exact equivalent. All input/output connectors must be of good quality and be constructed with RF protected covers. All interconnections via cables must carry a full earth shield, which should be connected to the RF shielded covers at all times. Input/output cables must be terminated to comply with the AES/EBU and IEC958 digital audio standards protocol.

This unit is wired so that a technical earth is connected to the chassis via the mains input socket. It is recommended that this connection be made to the mains earth system at all times to minimise the effects of radiated and conducted RF emissions.

Low Voltage Directive EN60950:
There are no serviceable parts within the unit. All repair work must be referred to a qualified electronic engineer or returned to the factory. In the case where the unit contains plug in modules, always switch off the unit before removing or replacing any module.

Audio & Design Reading Ltd does not accept responsibility for non-compliance if the above criteria are not met in full.

WARRANTY:
All Audio & Design products are of the highest quality and designed to give long, trouble free service. Nevertheless they are fully guaranteed for one year from the date of purchase. Provided any faulty equipment is returned, post paid, to Audio & Design or its established Agent by the original purchaser during the relevant period we will repair, or at our opinion replace, entirely free of charge all breakdowns due to faulty workmanship or materials. In keeping with normal practice, breakdowns due to fair wear and tear, misuse, neglect or faulty adjustment by the user, are outside the scope of this warranty.

Warning: Warranty repairs are subject to serial number checking. We reserve the right not to service any equipment whose serial number has in any way, been defaced or altered.

WEEE Directive: The end user must excise due care when disposing of this product at the time it is deemed as waste material.

RoHS: The current status of Audio & Design products can be obtained from www.adrl.co.uk/Rohs.htm

Audio & Design Reading Ltd practices lead-free manufacturing processes. Lead free solder is used on the surface-mount PCB manufacturing processes and for hand soldering. Printed circuit boards used are immersion tin plated, and as such use no lead.
The manufacturing processes include the assembly of purchased components from various sources. Our products are offered as RoHS compliant, or lead free, only after sufficient evidence is received from the component manufacturers that their components are RoHS compliant. Audio & Design Reading Ltd relies solely on the distributor, or manufacturer of the components for identification of RoHS compliance. Whilst every effort is made to ensure compliance, Audio & Design Reading Ltd makes no warranty, or certification, or declaration of compliance concerning said components.
Audio & Design Reading Ltd defines “Lead Free” as pertaining to any product, which has been manufactured by Audio & Design Reading Ltd using components which have been declared by the manufacturers as “Lead Free”. All statements by Audio & Design Reading Ltd of RoHS compliance are based on component manufacturer documentation

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