

COBALT



CH-1 Fully Featured 1+1 Changeover unit Installation Guide and User Manual

Creating the Most Exciting and Engaging FM Broadcast experience possible...

We're grateful that you have chosen an Aqua Broadcast CH-1 Changeover unit. We hope that you enjoy your Aqua Broadcast product for many years to come.

Everyone here at Aqua Broadcast is passionate about developing new and innovative products. By shaping the future of FM Broadcast by delivering innovative, intuitive solutions that inspire our customers to create the most exciting and engaging content possible.

From everyone at Aqua Broadcast, thanks for your purchase.

ABOUT THE CH-1

The Aqua Broadcast Changeover is a platform ready to implement a variety of redundant 1+1 systems. It supports Aqua transmitters, exciters and amplifiers but also other brands and we'll keep adding/expanding the systems that can be implemented. The CH-1 will be pre-set to the type of relay you will use.

Depending on the specific transmitters and system, there will be more or less signals to manage. Also some signals will be analogue and some digital. In order to enhance the compatibility with other brands we allow some options on some of the signals.

The changeover includes dedicated interlock inputs which are necessary to deal with systems that require more advanced capabilities like antenna patch panels, antenna monitors, dummy loads, etc. The dedicated interlock I/O can also be routed to the transmitter remote connectors for convenience and simplify wiring.

There are provisions to be able to route the analogue telemetry between the remote connectors and that, together with the ability to route interlock I/O, makes the changeover ready to implement modular systems consisting of exciters and amplifiers. Some of these systems require to close external AGC loops or require different interlock logic or routing, for example some amplifiers may have an interlock output that has to go to an exciter. A couple of examples are dual exciter configurations, with one exciter per amp or a double exciter with two exciters switched into a single amplifier.

At the moment the system works with 1+1 systems with only exciters or only transmitters but is ready for much more. So, if you have a different application, talk to us and explain your requirements.

The COBALT CH-1 has the following standard features,

- ~ Built-in DPDT RF relay switch (latching), 100W max
- ~ Built in RF power measurement for internal RF relay inputs
- ~ Built in automatic fail-over logic with RF power detectors
- ~ Automatic and Manual switching modes
- ~ Dummy load connection for exciter testing
- ~ Dedicated interlocks outputs (relay) and interlock inputs
- ~ Linux OS
- ~ RGB screen and LED synoptic
- ~ Ethernet Control & SNMP
- ~ +48VDC power input

USER WARNINGS AND CAUTIONS	5
SAFETY INFORMATION	6
OPERATING ENVIRONMENT	6
INSTALLATION	6
OPERATION	7
REPAIR AND SERVICE	7
DETAILED SAFETY INSTRUCTIONS	8
PRODUCT DISPOSAL AND HAZARDS	9
WARRANTY	10
1. HARDWARE	
1.1 FRONT AND REAR PANELS	11
1.2 DUAL SUPPLY	11
1.3 RF CONNECTORS AND PROBES	11
1.4 REMOTE CONNECTORS PINOUT	12
1.4.1 EXCITERS REMOTE CONTROL CONNECTOR PINOUT	13
1.4.2 AMPLIFIERS REMOTE CONTROL CONNECTOR PINOUT	13
1.4.3 EXTERNAL RELAY REMOTE CONTROL CONNECTOR PINOUT	13
1.4.4 INTERLOCK INPUTS AND GPIO CONNECTOR	13
1.5 INTERLOCK OUTPUTS	15
1.5.1 DEDICATED INTERLOCK OUTPUTS (RELAY OUTPUT)	15
1.5.2 DIGITAL INTERLOCK OUTPUTS IN REMOTE CONNECTORS (OPEN COLLECTOR)	15
1.6 INTERLOCK INPUTS	16
1.6.1 DEDICATED INTERLOCK OUTPUTS (RELAY OUTPUT)	17
1.6.2 DIGITAL INTERLOCK OUTPUTS IN REMOTE CONNECTORS (OPEN COLLECTOR)	17
1.7 SYNOPTICS AND SIGNALLING	18
1.7.1 TRANSMITTERS STATUS	18
1.7.2 RELAYS	19
1.7.3 LOAD	19
1.7.4 ANTENNA	20
2. WEB INTERFACE	
2.1 DASHBOARD	22
2.1.1 OVERVIEW	22
2.1.2 STATUS AND INFORMATION	23
2.1.3 CONTROLS	23
2.1.4 SWITCHOVER OPERATION MODES	24

2.1.4.1 OFF MODE	24
2.1.4.2 MANUAL MODE	24
2.1.4.3 AUTOMATIC MODE	24
2.1.5 RF PROBES	25
2.2 CHANGEOVER CONFIGURATION	25
2.2.1 SYSTEM AND SIGNALS	26
2.2.1.1 OVERVIEW	26
2.2.1.2 SYSTEM PANEL	26
2.2.1.3 SIGNALS PANEL AND STATUS TABLE	27-28
2.3 FAULT DETECTION TIMERS	29
2.4 SWITCHOVER TIMERS	29
2.5 AUTOMATIC MODE OPERATIONS	30
3.1 CONFIGURATIONS	31
3.2 SAVING AND LOADING A CONFIG	32
3.3 UNIT	32
3.3.1 FRONT PANEL	32
3.3.2 DATE AND TIME	32
3.3.3 FACTORY RESET	32
3.3.4 NETWORK	32
3.3.5 LOGS	33
3.3.6 DIAGNOSTICS	33
4.1 SPECIFICATIONS	

The installation and service instructions in this manual are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Refer all servicing to qualified personnel

This product has an auto-ranging line voltage input. Ensure the power voltage is within the specified range stated on the rear of the unit.

CAUTION: HAZARDOUS VOLTAGES

This paragraph concerns safety instruction related to all Aqua Broadcast products in general.

Aqua Broadcast makes every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system.

Aqua Broadcast products are compliant with safety rules for broadcasting transmitter as defined by IEC / EN 60215 and its amendment. According to this standard only skilled person are allowed to operate on Aqua Broadcast devices IEC / EN 60215 and its amendment defines the minimum requirements for skilled electrical personnel.

The compliance with this standard is a pre-condition for operating with Radio Broadcasting equipment. The operator or the operator's authorized representative is responsible for ensuring compliance with these guidelines. They are also responsible to achieve necessary authorization by site owner or according to local laws to operate hereunder. They must also ensure that the operating personnel meets the applicable country-specific training requirements. These requirements also may include any periodic training that is necessary.

The products described here have been designed, manufactured and tested according the relevant standards and directive, see EC/ EU declaration of conformity attached to this manual. The products described here have left the manufacturers facilities fully compliant with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. For any clarification on it, for any doubt or any suggestion please directly contact Aqua Broadcast at support@aquabroadcast.co.uk

Furthermore it is your responsibility to operate the device in an appropriate manner. This product is designed to work in telecommunications centres only, except when expressly authorized, and must not be used in any way that may cause injury to persons or goods. In case the product is used for any intention other than its designated purpose or in disregard of its instructions you, the operator, are the sole responsible for any damage that this un-proper operation may cause.

The product is used properly when it is used in accordance with its instructions and under its operating conditions and its performance limits (refer to product manual, modules, manuals and products or modules datasheets). This condition may only be assumed by a skilled person with a basic knowledge of English (since all symbols, labels and message displayed are referred to in this language).

Skilled people also have to check if particular requirements or special equipment or tools are required depending on the product or the environment and to follow all instructions to use any additional special equipment.

The Product manual, and in particular safety instructions should be kept near the product in a safe place, in order to be available for all skilled personnel who operate the device. Observing the safety instructions will help prevent personal injury or damage to goods caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation or that are given on the operating site.



CHECK ALL ELECTRICAL CONNECTIONS ARE CORRECT AND SAFE BEFORE POWERING ON THE CH-1

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without any obstruction in product's ventilation. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all cases. Unless otherwise specified, the following environmental requirements apply to Aqua Broadcast products: Use only indoors, the maximum operating altitude 3000 m above sea level, maximum transport altitude 6000 m above sea level. A tolerance of $\pm 15\%$ shall apply to the nominal voltage and $\pm 5\%$ to the nominal frequency. Do not place the product on surfaces, cabinets, or tables that for reasons of weight or stability are unsuitable for this purpose.

Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or death. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or death. Do not install, operate, maintain the device if you are physically or mentally stressed.

INSTALLATION

If the information on electrical safety is not observed there is a possibility that electric shock, fire and/or serious personal injury or death may occur.

Prior to switching on the product, always ensure that the product nominal voltage setting matches with the nominal voltage of the AC supply network. If there is a mismatch do not connect the product to the power network until the mismatch is resolved. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.

In the case of products of safety Class 1 with a removable power cord and connector, operation is permitted only on sockets with an earth contact and protective earth connection.

Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

If the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable must be considered as the disconnecting device. In this case, always ensure that the power plug is always easily reachable and accessible. Ensure also that the plug-in connection is secure, bad connections may cause damage to the equipment and may be unsafe. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, a disconnecting device must be provided at the system level is site main electrical switchboard.

Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. Check the power cable is suitable for the power ratings of the device by taking appropriate safety measures and carefully laying the power cable, you must ensure that the cable will not be damaged and that no one can be hurt by. Tripping over the cable or suffering an electric shock.

The product may be operated only from TN/TT supply networks.

Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks could result in fire and/or injuries may occur.

For measurements in circuits with voltages $V_{rms} > 30\text{ V}$, suitable precautions (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.

Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, electrical shock, fire, or damage to the product.

Aqua Broadcast products are designed to be permanently installed, so the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made.

Permanently installed equipment must have either built-in fuses, circuit breakers or similar protective devices, moreover the supply circuit must be fused in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.

Use suitable over-voltage protection to ensure that no over-voltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock. Products are normally designed to operate in an indoor environment (IP 20 typically) no liquid protection is therefore given, the equipment must be protected from all liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.

Never use the product under conditions in which condensation has formed or can form in or on the product, e.g., if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.

Prior to cleaning the product, disconnect it completely from the power supply (e.g., AC supply network or battery). Use a soft, non-lining cloth to clean the product. Never use chemical aggressive cleaning agents such as alcohol, acid, acetone, or diluents for cellulose lacquers.

OPERATION

Operating the equipment requires trained and skilled personnel. It requires also intense concentration. Make sure that people who operates is physically, intellectually, and mentally fit to do so. Physical or mental stress may cause a fall in concentration, and this may cause injury or material damage.

Before you install, connect, operate, disconnect, or dismount the equipment, read the relative safety instructions. In case of fire, some hazardous substances may be released by the unit, such as gas or fluids. This can cause health problems. So, in this case necessary measures must be taken, such as protective masks, gloves, clothing and so on should be used.

REPAIR AND SERVICE

Special training is required to open and repair Aqua Broadcast devices. Before removing the lid and before opening it, the AC mains must be switched off and disconnected and then wait at least 30 seconds for the discharge of energy of any capacitors. Otherwise, there could be a risk of electrical shock.

It is strongly recommended to send faulty devices / modules to the factory for repair, if feasible. Otherwise only when authorized by Aqua Broadcast, trained personnel may perform repairs. All repairs require only original spare parts to be used. After repair a safety test is recommended (visual inspection, electrical test, insulation test, ground continuity test, leakage current measurement, functional test and so on) This helps to assure the continued safety of the device.

If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

All the safety and operation instructions should be read before the unit is operated.

Retain Instructions:	The safety and operating instructions should be retained for future reference.
Follow instructions:	All warnings on the unit and in the operating instructions should be adhered to.
Water and Moisture:	All operation and user instructions should be followed. The unit should not be used near water. The unit should not be exposed to dripping or splashing and objects filled with liquids should not be placed on or within close proximity of the Transmitter.
Ventilation:	The unit should be situated so that its location or position does not interfere with its proper ventilation. For example, the unit should not be situated on a surface that may block the ventilation openings, or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
Grounding or Polarisation:	Precautions should be taken so that the grounding or polarisation method of the unit is not defeated or compromised.
Power-Cord Protection:	Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles and the point where they exit from the unit.
Cleaning:	The unit should be cleaned only as recommended by the manufacturer. Wash your hands after any cleaning.
Non-use Periods:	The power cord of the unit should be unplugged from the outlet when left unused for a long period of time.
Object and Liquid Entry:	Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
Damage Requiring Service:	The unit should be checked and serviced by qualified service personnel when: The power supply cord or the plug has been damaged Objects have fallen, or liquid has been spilled into the appliance The appliance has been exposed to rain The appliance does not appear to operate normally or exhibits a marked change in performance The appliance has been dropped, or the enclosure damaged

During product disposal the following directives must be adhered to:

- 2002/96/EC on waste electrical and electronic equipment (WEEE),
- 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



Once a product is at the end of its lifetime, the product must not be disposed of in standard domestic civil refuse. Even disposal of on municipal collection points for waste electrical electronic device is not allowed. It has to be treated as electronic waste.

Hazards due to Beryllium Oxide / Beryllium Copper (BeO)

In case the apparatus contains components are using Beryllium Oxide / Beryllium Copper, these shall be labelled with special symbols.

- **DANGER!** Beryllium Oxide / Beryllium Copper is dangerous when inhaled, ingested or in contact with the skin, especially if cut or scratched. After handling products containing Beryllium Oxide / Beryllium Copper, wash your hands immediately.
- If handled correctly, parts or components containing Beryllium Oxide / Beryllium Copper are not hazardous to health. If used improperly, however, Beryllium Oxide / Beryllium Copper dust may be released. Beryllium Oxide / Beryllium Copper dust causes chronic disease (berylliosis); inhaling large amounts over an extended period of time is toxic, causing respiratory paralysis and death.

Rules for Handling Beryllium Oxide / Beryllium Copper:

- Parts or components containing Beryllium Oxide / Beryllium Copper ceramics must not be opened, mechanically processed, or destroyed.
- Above all, these parts or components must not be scratched, broken, ground, tempered and sandblasted, not even under exhaust hoods.
- In the transmitter, all components containing parts made from Beryllium Oxide / Beryllium Copper are marked with a warning symbols and a labels.



DANGER! Beryllium Oxide / Beryllium Copper

Please ensure the warranty registration process is completed upon receipt of this product.

To do so, go to www.aquabroadcast.co.uk/support with your product's serial number to hand. Aqua Broadcast warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of up to Two years from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified limited warranty period that are not due to normal wear and tear and/or improper handling by the user, Aqua Broadcast shall, at its sole discretion, either repair or replace the product. If the warranty claim proves to be justified, the product will be returned to the user. The return freight for any Warranty repair or claim will be paid by Aqua Broadcast during the 2-year Warranty, thereafter freight will be the responsibility of the customer. Warranty claims other than those indicated above are expressly excluded.

NOTE: The warranty registration process must be carried out as described above to enable warranty cover.

Return authorisation number: To obtain warranty service, the buyer (or his authorised dealer) must contact Aqua Broadcast during normal business hours BEFORE returning the product. All inquiries must be accompanied by a description of the problem. Aqua Broadcast will then issue a return authorisation number. Subsequently, the product must be returned in its original shipping carton, together with the return authorisation number to the address indicated by Aqua Broadcast.

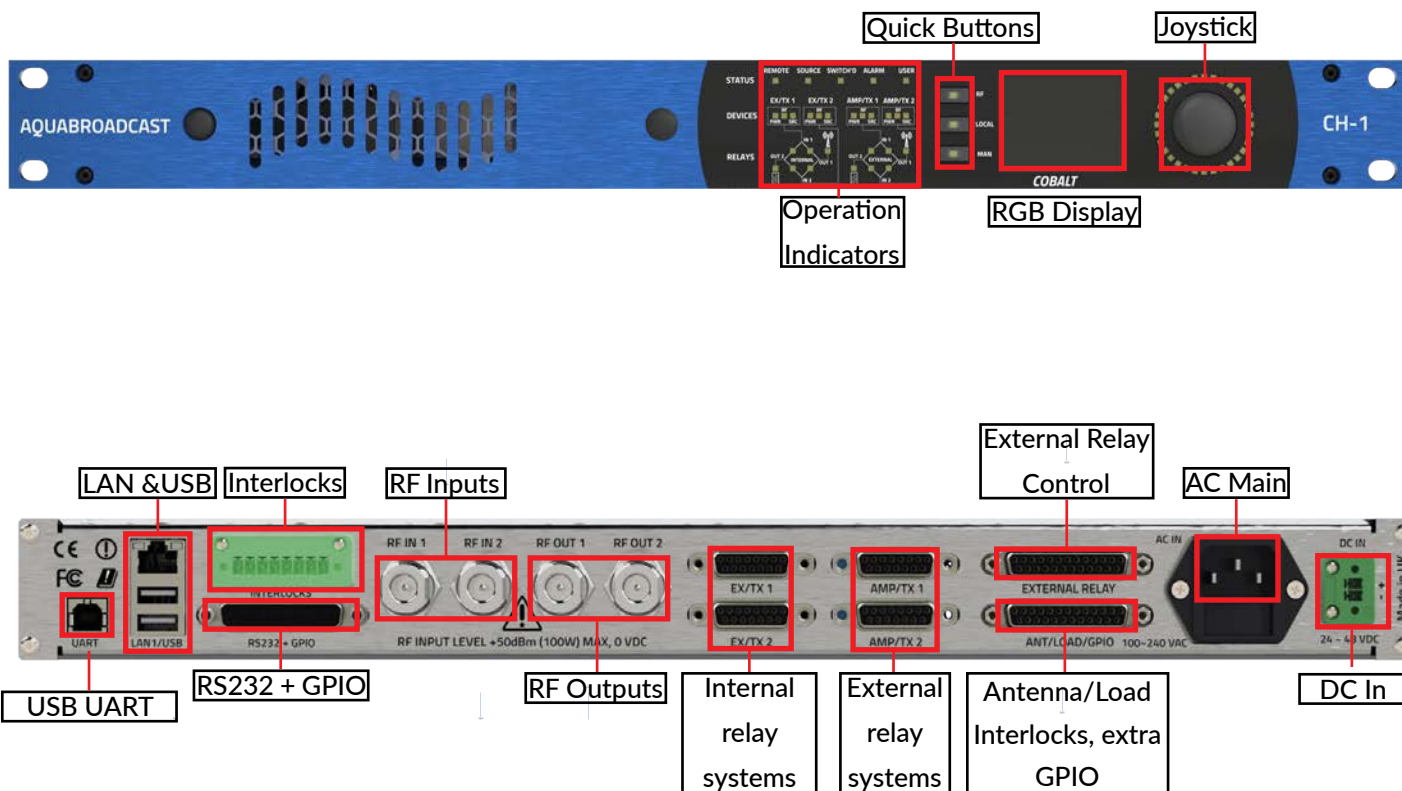
Warranty regulations: Any product deemed eligible for repair or replacement by Aqua Broadcast under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at Aqua Broadcast. If the product needs to be modified or adapted to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, Aqua Broadcast shall not be held responsible for any cost resulting from such a modification/adaptation. Free inspections and maintenance/repair work are expressly excluded from this warranty if caused by improper handling of the product by the user. This also applies to defects caused by normal wear and tear of potentiometers, keys/buttons, and similar parts. Damages/defects caused by the following conditions are not covered by this warranty: Misuse, neglect, or failure to operate the unit in compliance with the instructions given in Aqua Broadcast user or service manuals. Connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used. Damages/defects caused by force majeure or any other condition that is beyond the control of Aqua Broadcast. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty. If an inspection of the product by Aqua Broadcast shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer. Products that do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. Aqua Broadcast will inform the buyer of any such circumstance.

Warranty transferability: This warranty is extended exclusively to the original buyer (customer of the retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promises on behalf of Aqua Broadcast.

Claims for damages: Failure of Aqua Broadcast to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of Aqua Broadcast exceed the invoiced value of the product.

Other warranty rights and national law: This warranty does not exclude or limit the buyer's statutory rights provided by national law any such rights against the seller that arise from a legally effective purchase contract. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

1.1 FRONT AND REAR PANELS



1.2 DUAL SUPPLY



The unit has dual power supply inputs: AC and 48V DC. It's recommended to connect each of them to a different mains phase for extra redundancy.

1.3 RF CONNECTORS AND PROBES



The RF inputs are connected to an internal latching relay which is very convenient for 1+1 applications when using exciters or low power transmitters.

The RF inputs are also connected internally to some RF probes for power metering which are rated to up to 100W.

If you want, it would also be possible to use the RF metering capabilities with external relay applications but bear in mind the noise floor is somewhere around 11dBm so you may need amplification if you are using a very small signal source (like an RF monitoring output or some output RF taps at the transmitters outputs). We would recommend you to use the analogue telemetry instead as it's simpler.

The internal wiring is fixed and it's as follows:

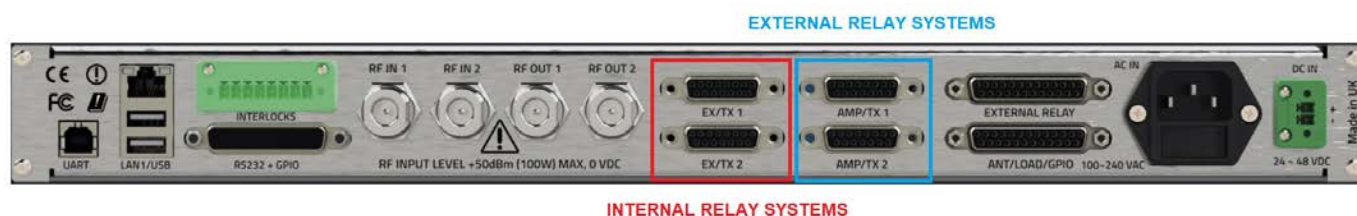
- RF IN 1: EXC 1 (main)
- RF IN 2: EXC 2 (backup)
- RF OUT 1: Antenna
- RF OUT 2: Load

1.4 REMOTE CONNECTORS PINOUT

The I/O pins in the connectors EXC1, EXC2, TX1, TX2, External relay and ANT/LOAD/GPIO share these characteristics:

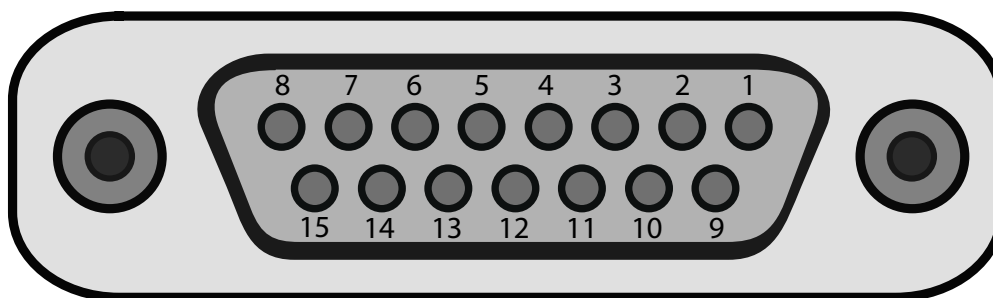
- All digital inputs and outputs are optically isolated and current limited.
- Analogue inputs are protected with diodes for overvoltage and surges and analogue outputs have current limiting resistors. The range is 0 to 6V.
- The 12V supply voltage available in the remote connectors is rated for 750mA.

The connectors to be used for the remote control of the transmitters depends on whether you use the internal relay or the external relay



1.4.1 EXCITER REMOTE CONNECTORS PINOUT

DB15 FEMALE CONNECTOR

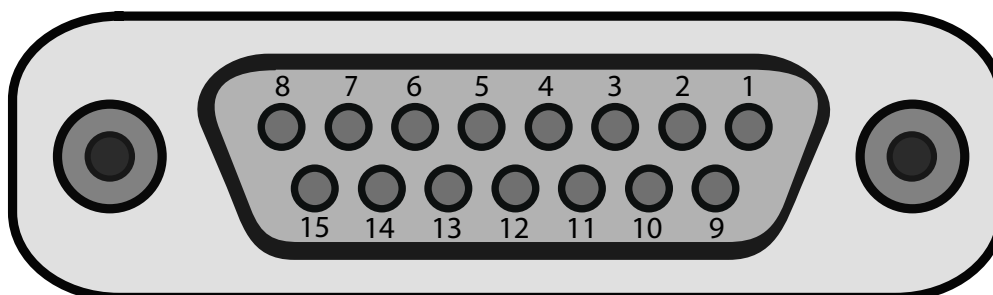


<u>PIN</u>	<u>SIGNAL</u>	<u>ALTERNATIVE</u>	<u>PIN NUMBER</u>	<u>SIGNAL</u>	<u>ALTERNATIVE</u>
1	Digital IN 1	Analogue IN 1(*)	9	Digital IN 2	Analogue IN 2
2	Digital IN 3		10	Digital IN 4	
3	Digital IN 5		11	Digital IN 6	
4	GND		12	Digital OUT 1	
5	Digital OUT 2		13	Digital OUT 3	
6	Digital OUT 4		14	Digital OUT 5	Analogue OUT 1
7	Digital OUT 6	Analogue OUT 2	15	GND	
8	12V @0.75A				

(*) PIN 1 is set as Analogue input from the factory

1.4.2 AMPLIFIERS REMOTE CONNECTORS PINOUT

DB15 FEMALE CONNECTOR



<u>PIN</u>	<u>SIGNAL</u>	<u>ALTERNATIVE</u>	<u>PIN NUMBER</u>	<u>SIGNAL</u>	<u>ALTERNATIVE</u>
1	Digital IN 1	Analogue IN 1 (*)	9	Digital IN 2	Analogue IN 2
2	Digital IN 3		10	Digital IN 4	
3	Digital IN 5		11	Digital IN 6	
4	GND		12	Digital OUT 1	
5	Digital OUT 2		13	Digital OUT 3	
6	Digital OUT 4		14	Digital OUT 5	
7	Digital OUT 6		15	GND	
8	12V @0.75A				

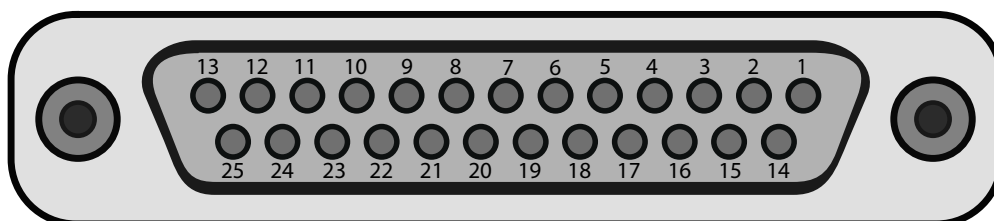
(*) PIN 1 is set as Analogue input from the factory

1.4.3 EXTERNAL RELAY REMOTE CONNECTOR PINOUT

If you are intending to use an external relay, consult with us so we can set the HW for you. The external relay connector includes 24V in case the relay needs to be supplied.

1.4.4 INTERLOCK INPUTS AND GPIO CONNECTOR

DB25 FEMALE CONNECTOR



<u>PIN</u>	<u>SIGNAL</u>	<u>ALTERNATIVE</u>	<u>PIN NUMBER</u>	<u>SIGNAL</u>
1	Digital IN 1	Interlock IN 1(*)	14	GND
2	Digital IN 2	Interlock IN 2 (*)	15	GND
3	Digital IN 3	Interlock IN 3 (*)	16	GND
4	Digital IN 4	Interlock IN 4 (*)	17	GND
5	Digital OUT 1		18	GND
6	Digital OUT 2		19	GND
7	Digital OUT 3		20	GND
8	Digital OUT 4		21	GND
9	Analogue IN 1		22	GND
10	Analogue IN 2		23	GND
11	12V @0.75A		24	GND
12	12V @0.75A		25	GND
13	12V @0.75A			

(*) Pin 1,2,3 and 4 are set as Interlock inputs from factory

1.5 INTERLOCK OUTPUTS

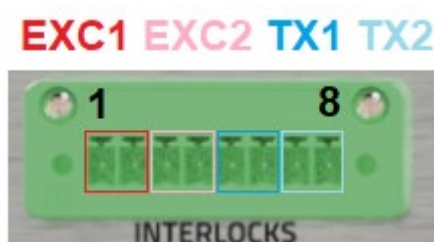
When turned on, exciters and transmitters will produce output power unless their interlock is open so the interlock outputs will be used both for transmitters power control and to route any interlock inputs from other devices in the system. By convention, an open interlock will disable the power output of transmitters.

The CH1 has dedicated normally closed relay interlock outputs but can also route the interlock output signal to any digital pin of the remote connectors (open collector).

Connect just one type of interlock output

1.5.1 DEDICATED INTERLOCK OUTPUTS (RELAY OUTPUT)

This connector has normally closed (NC) relay outputs by default.

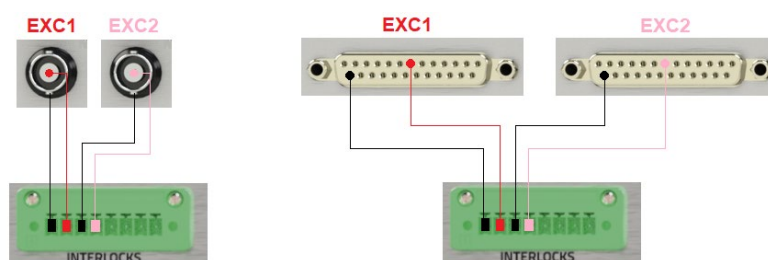


This connector has normally closed (NC) relay outputs by default.

The interlock positions are fixed and go in pairs as follows:

- 1-2: Exciter 1
- 3-4: Exciter 2
- 5-6: Amp 1
- 6-7: Amp 2

CONNECTION



If the transmitter has dedicated interlock inputs (two contacts) just connect the pair of contacts from the changeover to the transmitter, like in the left hand side of the image.

>> We recommend you twist the interlock wires together and maybe loop the cable pair around a ferrite core for best rejection of any common mode interference.

If there are no dedicated interlock inputs to your transmitter, connect the changeover interlock outputs to the ground and RF mute/Interlock input pins of your transmitter, as per the right hand side image.

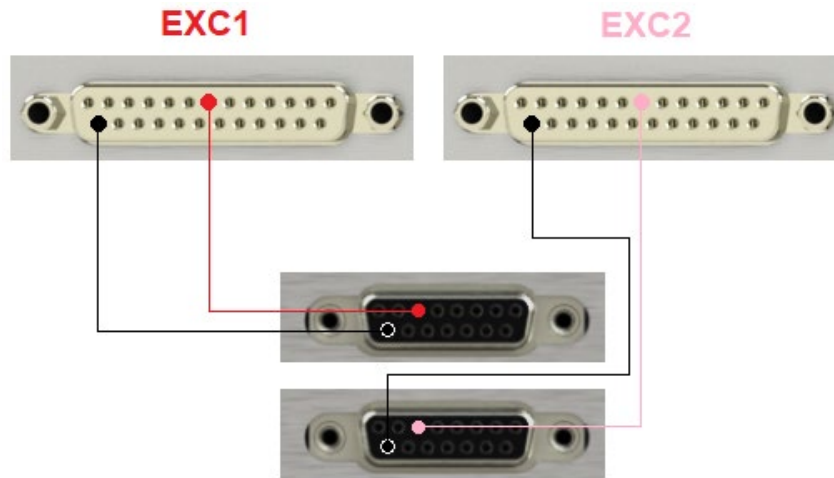
POLARITY

It is always recommended to use the relay outputs as normally closed. The HW comes configured in this way from the factory so make sure your transmitter's interlock inputs polarity matches. Although It is possible to change the relays to normally open this is strongly not recommended.

1.5.2 DIGITAL INTERLOCK OUTPUTS IN REMOTE CONNECTORS (OPEN COLLECTOR)

To simplify your wiring, it's possible to route the interlock outputs to any of the digital output pins (open collector) available in the remote connectors for exciters, transmitters and amps.

CONNECTION:



Simply wire your cables so both grounds are connected and select any of the digital outputs in the changeover as per the changeover pinout tables. We'd recommend you to use shielded cables.

POLARITY:

Using the changeover interlock outputs available in the remote connectors can be very convenient for wiring but they'll be left in high impedance (interlock open) should the changeover lose power. If this scenario worries you, we recommend you to either:

- if your transmitter allows, change its interlock input polarity or,
- use the normally closed relays in the dedicated connectors

1.6 INTERLOCK INPUTS

If your system includes elements with interlock outputs like loads, antenna monitors, patch panels, etc... you have to connect them to any of the four interlock inputs in the ANTENNA/LOAD/GPIO connector. You'll assign and enable them in SW later.

The load interlock will disable the reserve transmitter and the antenna interlock will disable the main transmitter.

CONNECTION:

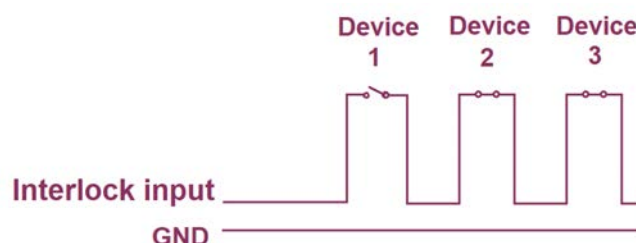
The digital input pins go to the cathode of an optoisolator, so you need to connect your device's interlock output between the changeover interlock input pin and ground.

The wires should be twisted and it's recommended to loop the cable around a ferrite for EMI protection, especially if the cables are not shielded

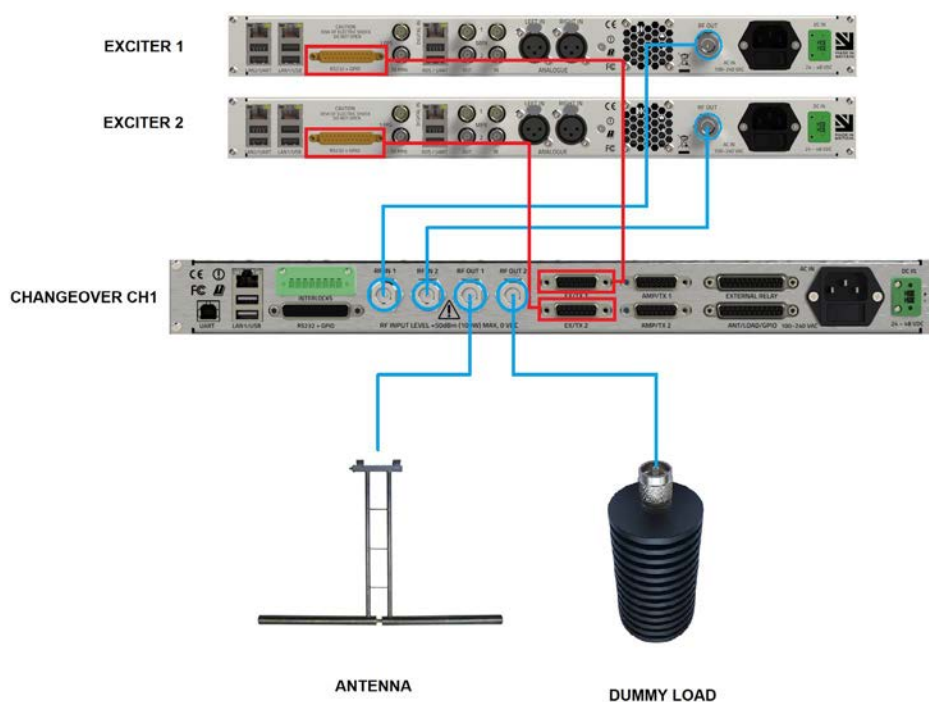
POLARITY:

You must use the normally close interlock outputs of your device so the interlock presence is detected and any disconnection is immediately spotted.

The NC connections also allows for expanding the loops by connecting the interlocks of several devices in series.

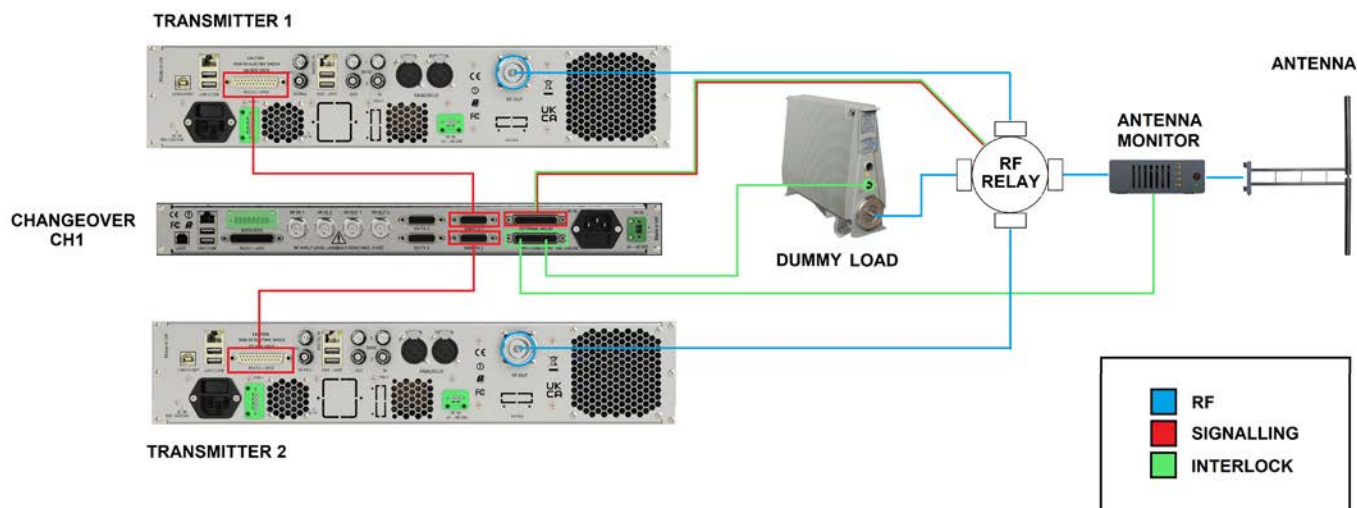


1.6.1 INTERNAL RELAY SYSTEMS: 1+1 OF EXCITERS



Note: the interlock signals to the transmitters have not been shown for simplicity. Please refer to the interlock connection section.

1.6.2 EXTERNAL RELAY SYSTEMS: 1+1 OF TRANSMITTERS

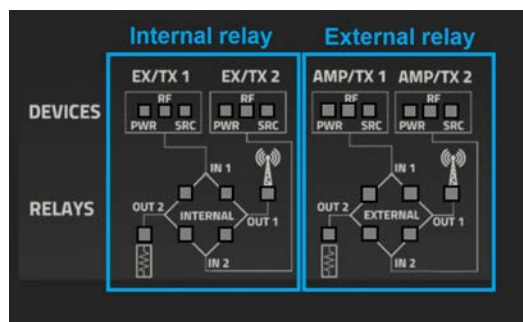


Note: the interlock signals to the transmitters have not been shown for simplicity. Please Refer to the interlock connection section.

1.7 SYNOPTIC AND SIGNALLING

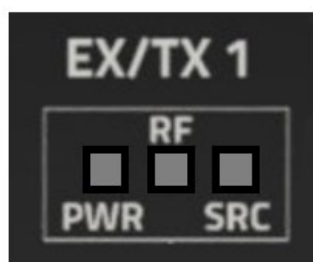
The synoptic is a schematic depiction of the system containing combined information about the system configuration and system state.

In the future, there will be support for systems that may use both synoptics. For now, the left synoptic is used for 1+1 systems (exciters or transmitters < 100W) using the internal relay while the right one is reserved for systems using an external relay (power > 100W)



1.7.1 TRANSMITTERS STATUS

The active devices (exciters, transmitters and amplifiers) show a combination of the readings from their pins and the changeover fault detection.

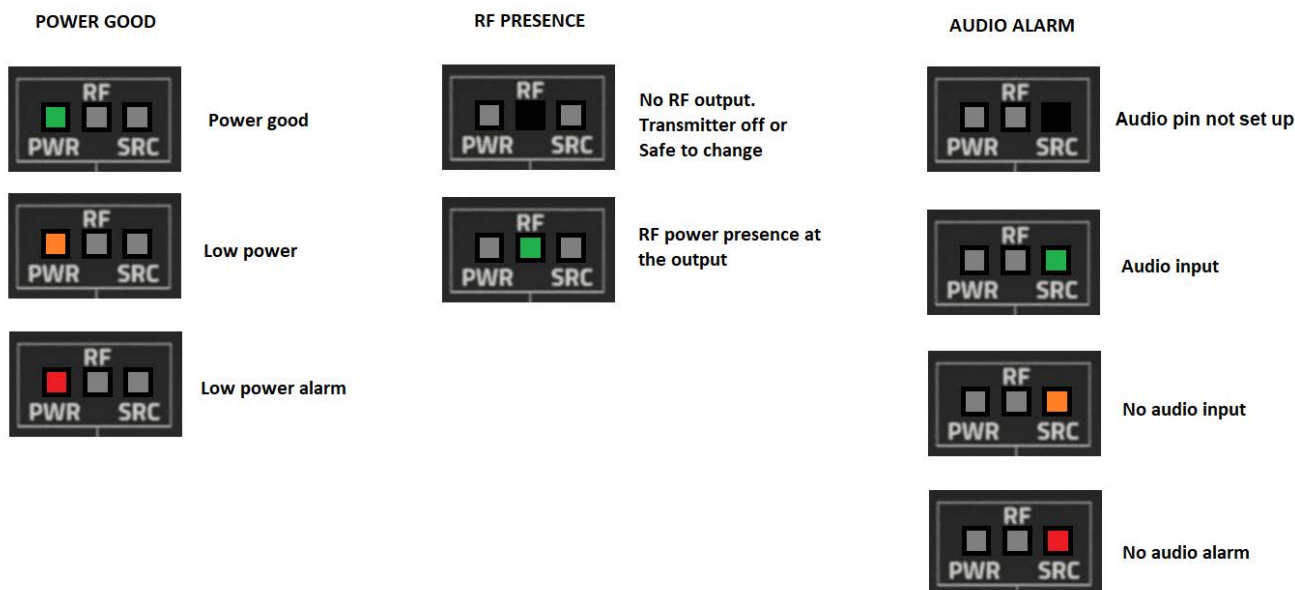


The active devices (exciters, transmitters and amplifiers) show a combination of the readings from their pins and the changeover fault detection.

- **RF** shows if there is RF power at the device output (**green**) or not (**black**), as read from the changeover RF probes or from analogue telemetry, as configured.
- **Power Good** shows if the RF output power is above (**green**) or below the expected output power (**orange**), as indicated by the transmitter itself. If the pin has persisted in the alarm state for longer than the low power detection time the led will become red to show that the changeover has acknowledged the fault condition.
- **The audio alarm** shows the state of the audio source as indicated by the transmitter. It will be **green** if it is OK and **orange** if the transmitter shows there is no audio source present. If the audio alarm is enabled in the changeover, and the pin has persisted in the alarm state for longer than the low power detection time the LED will become **red** to show that the changeover has acknowledged the fault condition.

NOTE

If the Audio/Source pin is not defined (set as "None") in the signal definition section of the configuration page, the LED will be shown in black.

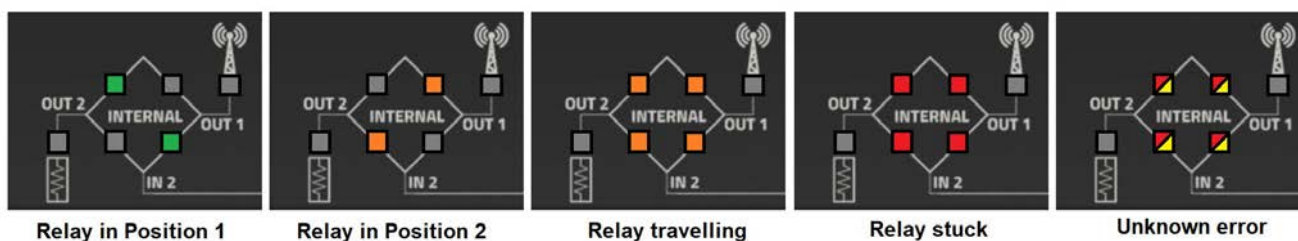


1.7.2 RELAYS

The relay LEDs will be shown in **green** when in position 1 and **orange** in position 2 since if everything is OK it should remain in position 1.

While it travels between positions, it will be shown blinking in **orange** (probably you won't see it as it's commonly rather quick)

If the relay spends too much time travelling (greater than 10 seconds) the system will assume it's stuck and the LEDs will become **red** to signal it.



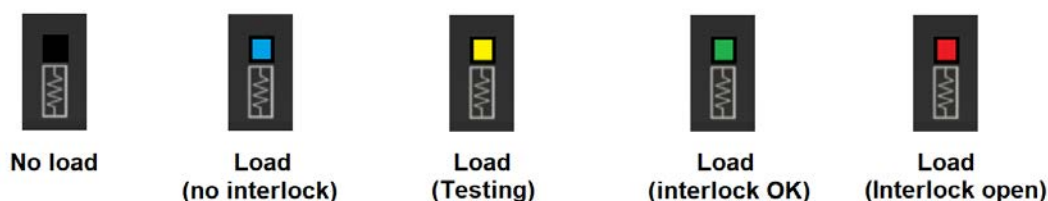
1.7.3 LOAD

The user must set in the configuration whether he is using a dummy load or not and if the load has an interlock output.

If no load is defined in the system configuration, its led will stay **black**. If there is a load but it has no interlock, the synoptic will reflect this by illuminating the led in **blue**.

During tests of the backup transmitter the load will blink **yellow** to show power is being delivered to the load.

If the load has an interlock output, it must be connected to one of the changeover's interlock inputs so it can stop the reserve transmitter immediately to avoid overheating hazards. The system will show the state of the interlock. **Green** means the interlock is closed and red means the interlock is **open** and it's not ready to receive.



1.7.4 ANTENNA

Normally antennas don't have interlocks so the antenna will be shown in **blue** by default.

You may have the antenna connected to a device with interlock outputs like a patch panel or an antenna monitoring system. In this case the interlock status will be shown by changing the LED to **green** or **red** if the interlock opens



Antena w/o interlock



Antenna Interlock OK



Antenna interlock open

The CH-1 features a user-friendly Interface that is accessible from any web browser.

Please use the network screen on the front of the unit to determine or set the IP address and any other Network Parameters of the Cobalt CH-1.

On any web browser, please enter the IP address of the unit, and press enter/search on the Browser bar.

You will then see the following screen, allowing you to enter in the default user credentials.

AQUABROADCAST

Username

Password

☐ Remember me

Sign in

Please enter the username and password, and sign in.

LOGIN DETAILS

THE DEFAULT USER LOGIN
CREDENTIALS FOR ALL COBALT CH-1
PRODUCTS IS

USERNAME - admin

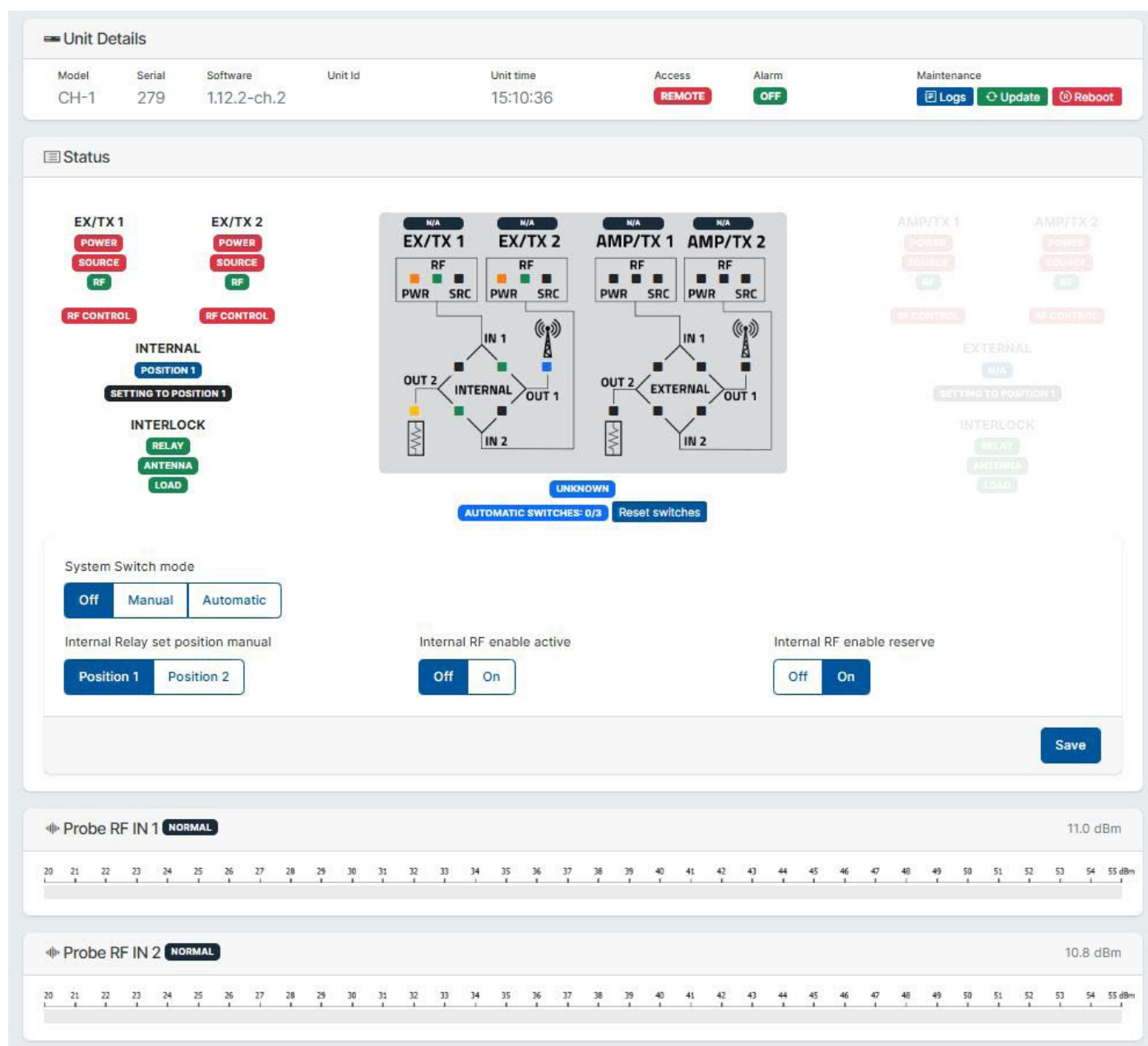
PASSWORD - pass

This is the main page where you can see an overview of the system and control it but before you can use the changeover you need to configure all the other sections first.

- **Configuration:** System configuration signal definition and pinout.
- **Fault detection:** thresholds for analogue signals and fault filtering timers
- **Timers:** Set up the timing characteristics for the switch-over process (both manual and auto)
- **Switching:** Automatic mode settings

As you configure the settings in the different sections, you should come back to this page to check they are correct.

2.1.1 OVERVIEW

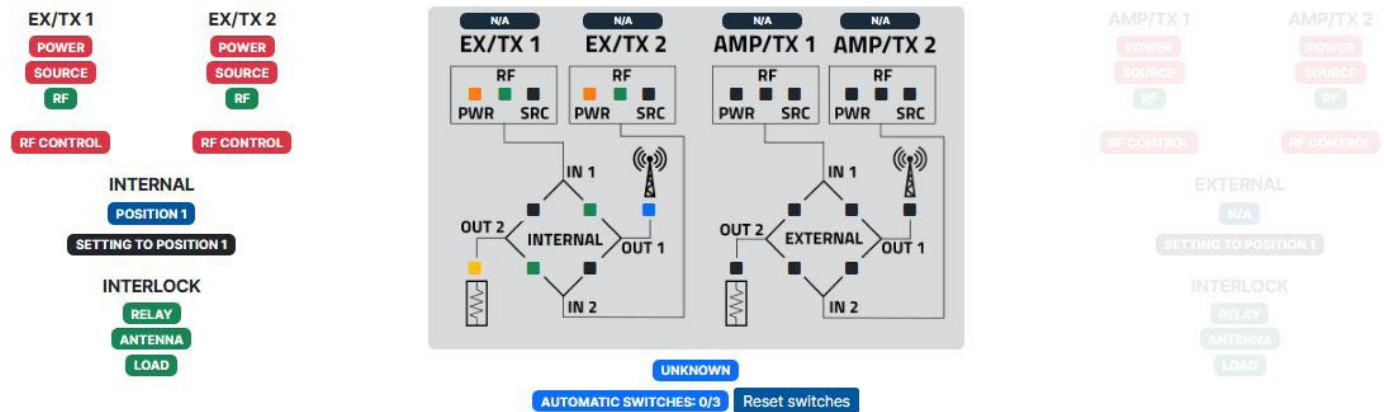


There are three main sections:

- The top section displays some general unit info and controls: model name, serial number, software release, custom name and time, plus some tags and buttons to access the logs page, the software upgrade page and a reboot button to use only in case of general malfunction.
- The central section shows a summary of the system status, the signals values readings and the changeover user controls.
- The bottom section consists of the RF probes meters.

2.1.2 STATUS AND INFORMATION

Synoptic and system signals



On the centre you can find a replica of the synoptics shown in the front panel. The left synoptic is reserved for the internal relay applications while the right one is used for external relay applications. For clarity, some tags on top of the transmitters' status show which transmitter is the active, the one connected to the antenna and the reserve one.

On the sides, some tags display the real time logic value at the I/O pins while the synoptic shows the changeover's interpretation that includes the state of the fault detection.

Right below the synoptic some messages will clarify what actions are currently being carried out which will be useful in debugging problems in the configuration or in the system. Immediately below the info messages you will find the number of automatic switchovers left and a button to reset them to their maximum as set in the switching menu.

2.1.3 CONTROLS

Switchover operation mode

System Switch mode

Off
Manual
Automatic

This switch changes the switchover operation modes:

- **Off:** stops the system and keeps the interlocks open.
- **Manual and Automatic:** The changeover is enabled. The main difference is the switchover trigger: the user or detected faults.

The particulars of each mode will be explained below, in its own section.

Relay Position

Internal Relay set position manual

Position 1
Position 2

This switch selects the relay position.

Position 1 switches the relay so TX1 is connected to the antenna and TX2 to the load.
Position 2 switches them over.

This control is only enabled in the manual mode.

Power controls: Main and reserve transmitter

Internal RF enable active

Off
On

Internal RF enable reserve

Off
On

The power controls are relative to the transmitter's function which depends on the relay position. The transmitter tagged as active is the one connected to the antenna while the other is the reserve one.



Since the power controls are relative you can just switch the relay positions without having to worry about switching transmitters off and on before and after a relay switch. The changeover will do this automatically for you, respecting the switchover procedure timings defined in the “Switching” menu page.

Reserve power on/off

For safety, you won't be able to turn on the reserve transmitter if you don't have a dummy load (as defined in the config).

Internal RF enable active



Internal RF enable reserve



2.1.4 SWITCHOVER OPERATION MODES

2.1.4.1 OFF MODE

This mode keeps all the transmitter interlocks open. You can use it to turn all devices off at once, maybe in an emergency or for maintenance. The RF button in the front panel works in a similar way.

The changeover will start on this mode the first time it boots. To avoid erratic behaviour you have to complete the system configuration before changing to manual or automatic mode.

Relay position and power controls won't work in this mode.

2.1.4.2 MANUAL MODE

In the manual mode the switchovers are triggered by the user and can also manually turn on and off any device.

The unit will take care of the power to keep the transmitters in the same state they were previous to the switching relative to their connection to the antenna and load. The switchover will be completed according to the timers defined in the “Switching” menu section.

This mode is useful, when testing the settings, during maintenance or if human supervision is preferred.

The changeover will default to this mode if all the automatic switchovers are consumed. The user will have to reset the number of switchovers before returning the system to the automatic mode.

2.1.4.3 AUTOMATIC MODE

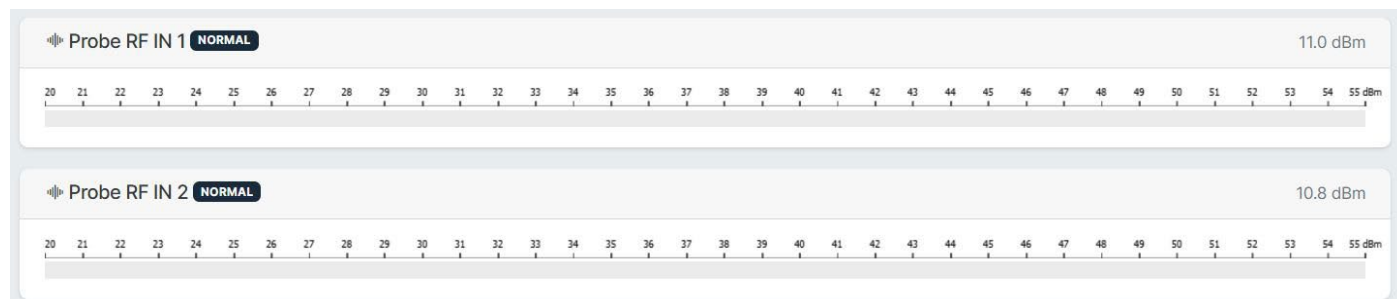
When in automatic mode, the unit will switch the transmitters on its own upon detection of a power fault. It is also possible to enable switchovers on audio faults.

In this mode it is not possible to switch the relay position. If you need to do so, you can change momentarily to the manual mode, switch the relay position and change the mode back to automatic.

You can turn on/off the reserve transmitter if you have a test load but you won't be able to turn off the main transmitter as that would immediately trigger a changeover.

If the switchovers are consumed, the mode will change to manual mode. You will have to reset the number of switchovers and change the mode back to automatic.

2.1.5 RF PROBES



The RF probes display the real time power readings from the probes connected to the RF inputs going to the internal relay.

They should be used for applications that use the internal relay only. If you still want to use them with external applications you need to make sure that the level is well over the noise floor which is around 11dBm (you may need to use gain blocks) but we'd recommend you to use the analogue telemetry coming from the transmitters instead.

2.2 CHANGEOVER CONFIGURATION

The CH1 changeover is a highly configurable platform to implement numerous 1+1 systems supporting different relay configurations, devices, brands and models. This requires different signal types and polarities, detectors which need to be set up first.

If you give us the details when you order, we'll configure the HW and the SW specifically for you so the process is as easy as possible. We'll provide you with a pinout and you'll just need to make the cables and configure your transmitters.



NOTE

If you give us the details when you order, we'll configure the HW and the SW specifically for you so the process is as easy as possible. We'll provide you with a pinout and you'll just need to make the cables and configure your transmitters.

The amount of systems and brands supported now is limited but it will grow with time. Should you require a different application than currently supported, please contact us and we'll help you.

We'll provide you with settings that work but should you want to change any of the preconfigured values or your application varies, please check the instructions in the next sections.

2.2.1.1 SYSTEMS AND SIGNALS OVERVIEW

System

System relay: **Internal** External

External Relay connected: **No** Yes

Internal Relay antenna interlock pin: None

Internal Relay load interlock pin: None

Internal Relay load present: **No** Yes

External Relay antenna interlock pin: None

External Relay load interlock pin: None

External Relay load present: **No** Yes

Save

Signal definition Configure devices separately

RF presence detector: **RF Probes** ADC

RF ADC pin: ADC 1 / Pin 1 **Configure thresholds**

Power good pin: In 3 / Pin 2

Power good polarity: **Negative** Positive

Audio/Source pin: In 2 / Pin 9

Audio/Source polarity: **Negative** Positive

RF Control pin: Out 3 / Pin 13

RF Control polarity: **Negative** Positive

Interlock replication pin: None

Save

Signal status

EX/TX 1

Probe: 11.0 dBm Probe threshold: 20.0 dBm

ADC 1: 0.80 V ADC 2: 0.80 V ADC threshold: 0.40 V

RF CONTROL: **OUT1** **OUT2** **OUT3** **OUT4** **OUT5** **OUT6**

EX/TX 2

Probe: 11.0 dBm Probe threshold: 20.0 dBm

ADC 1: 0.80 V ADC 2: 0.80 V ADC threshold: 0.40 V

RF CONTROL: **OUT1** **OUT2** **OUT3** **OUT4** **OUT5** **OUT6**

There are three sections on this screen:

- In the top section you describe your system: the relay type and if you are using a dummy load, and the interlock inputs and their pins.
- In the middle section you state the exact cable pinout you have decided for the status and control signals and their polarity.
- The bottom sections show the real time status of the I/O pins to the system and their values taking into account the selected polarity.

2.2.1.2 SYSTEM PANEL

Relay type:

Defines what relay is used. The remote control cables for your transmitters are different depending on this setting, as explained in the HW section.

External Relay:

Enables/Disables the external relay control.

Load present:

If you are using a dummy load, set it to yes or the relay will be treated as if it was an SPDT one and the power controls for the reserve transmitter will be disabled.

Interlock inputs:

If you are using elements with interlock outputs, select the pin they are connected to or select None if you want to ignore that interlock.

You must use the NC output from these devices:

- The load interlock will disable the reserve transmitter if it's open.
- The antenna interlock will disable the reserve transmitter if it's open.

2.2.1.3 SIGNAL PANEL AND STATUS TABLE

The signals are described in the same order they must be set up.

RF Control/Interlock: Mute pin to mute the transmitters to manually turn them off or to disable their RF output in dangerous situations for devices like the relay, load or antenna.

RF presence detector: It detects if there is any power at the transmitter's output, to speed up the switchover process and detect other faults. There are two detectors:

- **RF probes:** Read internally from the RF input connectors. Recommended for internal relay applications.
- **ADC inputs:** To be connected to the forward power analogue telemetry of the transmitters. Recommended for external relay applications

The readings from this detector are used to display the real time output power in the dashboard and front panel display.



Thresholds: Push the button to be taken to the page where the thresholds are set. They must be set as low as possible but over the noise floor of the analogue detectors. The default values are generally OK but if your transmitter is off and the RF tag shows it's on, increase the relevant threshold, a small bit at a time until the RF tag shows it's off.

If you can't make it to work, your internal alternative pin HW switch may be incorrectly set up. If that's the case, please contact us.

	RELAY			THRESHOLD
Internal	RF presence detector	RF ADC pin		RF presence - RF Probe detector threshold [dBm]
	RF Probes ADC	ADC 1 / Pin 1		20.0
External	RF presence detector	RF ADC pin		RF presence - ADC detector threshold [V]
	RF Probes ADC	ADC 1 / Pin 1		0.40

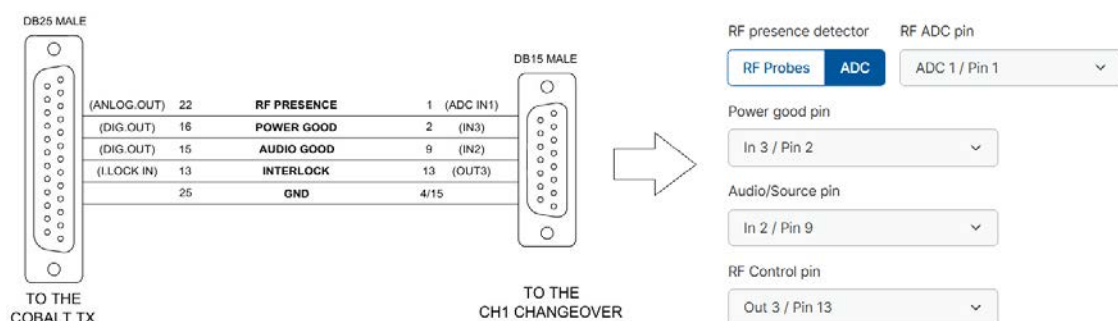
The RF signal tag will change its colour when over or under the presence threshold, like in the example below. The readings are shown in real time to help you set the thresholds and the set thresholds are shown as a reminder.

RF presence detector	RF presence - RF Probe detector threshold [dBm]	
RF Probes ADC	20.0	Probe: 11.0 dBm < Probe threshold: 20.0 dBm → RF
RF presence detector	RF presence - ADC detector threshold [V]	
RF Probes ADC	0.40	ADC 1: 8.60 V > ADC threshold: 0.40 V → RF

Power good pin: Alarm signal coming from the transmitter to warn when its output RF power is lesser than the set power.

Audio/Source pin: Alarm signal coming from the transmitter to warn when the audio source is absent.

Pin selection: Assign the changeover pins for each signal as per your cable. Example:



POLARITY

In the Signal Status table you can see the state of all I/O pins at once, which is useful for debugging cables and settings. In the following example there is nothing connected to the changeover.



DIGITAL INPUTS

The digital inputs are connected internally to the cathode of an optoisolator. With the connector disconnected, all inputs look **red** (off = open circuit).

The changeover unit will interpret the status signals associated with those pins as active or inactive depending on the set polarity:

Power good pin In 3 / Pin 2	Power good polarity Negative Positive	IN3 POWER
Audio/Source pin In 2 / Pin 9	Audio/Source polarity Negative Positive	IN2 SOURCE

DIGITAL OUTPUTS

The output pins are connected to a transistor open collector and the polarity will work similarly.

RF Control pin Out 3 / Pin 13	RF Control polarity Negative Positive	RF CONTROL OUT3
RF Control pin Out 3 / Pin 13	RF Control polarity Negative Positive	RF CONTROL OUT3

CONFIGURE DEVICES SEPARATELY

The settings introduced in the signals panel are used for both connectors associated with the set relay type.

If you switch the switch shown in **red** in the image the settings panel expands to show all 4 connectors and you'll be able to configure them separately which is useful if your transmitters are from different brands or models or they require different settings.

Do not use this option if the transmitters are identical, to avoid any mistakes when introducing values.

Signal definition

Configure devices separately

RF presence detector

RF ADC pin

Configure thresholds

Power good pin

Power good polarity

Audio/Source pin

Audio/Source polarity

RF Control pin

RF Control polarity

Interlock replication pin

Signal definition

Configure devices separately

EX/TX 1 RF presence detector

EX/TX 1 RF ADC pin

Configure thresholds

EX/TX 1 Power good pin

EX/TX 1 Power good polarity

EX/TX 1 Audio/Source pin

EX/TX 1 Audio/Source polarity

EX/TX 1 RF Control pin

EX/TX 1 RF Control polarity

EX/TX 1 Interlock replication pin

AMP/TX 1 RF presence detector

AMP/TX 1 RF ADC pin

Configure thresholds

AMP/TX 1 Power good pin

AMP/TX 1 Power good polarity

AMP/TX 1 Audio/Source pin

AMP/TX 1 Audio/Source polarity

AMP/TX 1 RF Control pin

AMP/TX 1 RF Control polarity

AMP/TX 1 Interlock replication pin

EX/TX 2 RF presence detector

EX/TX 2 RF ADC pin

Configure thresholds

EX/TX 2 Power good pin

EX/TX 2 Power good polarity

EX/TX 2 Audio/Source pin

EX/TX 2 Audio/Source polarity

EX/TX 2 RF Control pin

EX/TX 2 RF Control polarity

EX/TX 2 Interlock replication pin

AMP/TX 2 RF presence detector

AMP/TX 2 RF ADC pin

Configure thresholds

AMP/TX 2 Power good pin

AMP/TX 2 Power good polarity

AMP/TX 2 Audio/Source pin

AMP/TX 2 Audio/Source polarity

AMP/TX 2 RF Control pin

AMP/TX 2 RF Control polarity

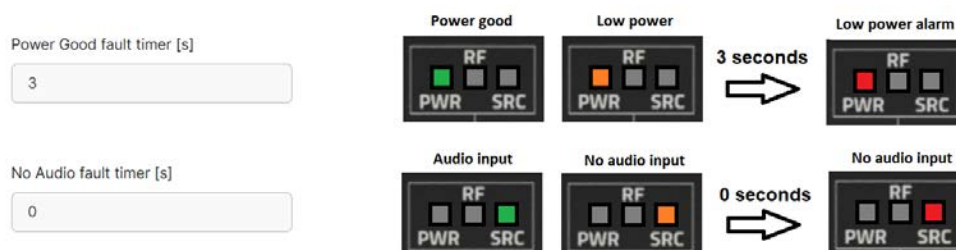
AMP/TX 2 Interlock replication pin

In the expanded panel, the top settings are for the exciters (internal relay applications) and the bottom ones for the transmitters (external relay applications)

2.3 FAULT DETECTION TIMES

The changeover is constantly monitoring the transmitter alarm pins. You can see the current state of the power and audio alarm pins in the synoptic. The relevant LED will change from **green** to **orange** when the transmitter detects a fault.

When the LED changes to **orange** a timer is initiated. If the alarm persists when the timer count finishes, the changeover will confirm the fault by changing the LED colour to **red**. In the automatic mode, all confirmed power faults will trigger a changeover while the audio faults will do it only if they are enabled in the automatic mode options.



The timers are used to filter out any transients and false alarms. You need to decide on the compromise between transient filtering and gaps in the broadcast.

With regards to the audio fault detection timer, you should take into account that some transmitters will introduce a delay between detecting they have no modulation source and presenting the alarm in its remote connector. This is done to account for any audio failovers switching times. If this is the case, set the audio fault timer to zero so you don't add any unnecessary delays.

If you need, you can set different settings for each transmitter by enabling the “Configure devices separately” option.

2.4 SWITCHOVER TIMERS

Timers

Power ramp up time [s]

10

Delay before switch [s]

1

Delay after switch [s]

1

POWER RAMP UP TIME

After releasing the interlock for a transmitter, the changeover will wait for the time you set in this box before checking any alarm pins. This is to give time to reach the set power and stabilize and to avoid spurious switchovers.

The safest option is setting this timer a bit longer than the time your transmitter takes to reach its maximum power.

DELAY BEFORE SWITCH

The changeover waits until the RF presence detector determines the transmitter is off, according to its set threshold. After this, the changeover will wait for the time specified in this box before commanding the relay to switch positions. This ensures there is no power at the relay inputs and no arcing, sparking or power reflections are produced.

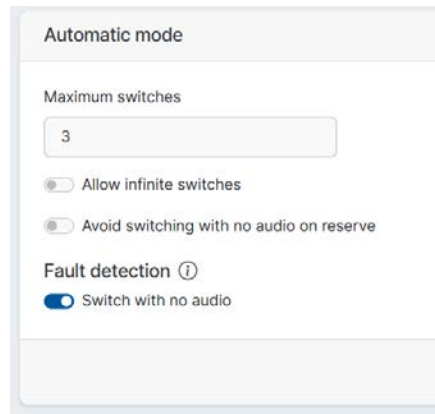
DELAY AFTER SWITCH

After the relay is in position, the changeover waits for this timer to expire before releasing the transmitter interlock.

In most cases it can be set to 0 to speed up the process.

2.5 AUTOMATIC MODE OPTIONS

This section defines the behaviour of the automatic switching mode.



The screenshot shows a configuration panel titled "Automatic mode". It contains the following settings:

- Maximum switches:** A numeric input field with the value "3".
- Allow infinite switches:** A toggle switch that is currently turned off.
- Avoid switching with no audio on reserve:** A toggle switch that is currently turned off.
- Fault detection ⓘ:** A section header with an information icon.
- Switch with no audio:** A toggle switch that is currently turned on.

MAXIMUM SWITCHES

This setting limits the number of permitted switchovers before changing to manual mode.

The user will have to reset the number of switches and put it back to manual (in the dashboard page)

ALLOW INFINITE SWITCHES

Use this option if you don't want to limit the number of switchovers.

FAULT DETECTION - SWITCH WITH NO AUDIO ALARMS

Power faults always trigger an automatic switchover. If you want the changeover to also switch transmitters on audio faults, turn on this option.

Switching on audio faults makes sense when the modulation source into each transmitter comes from a different link. One example would be if you have two tuner receivers with one antenna each.

We don't recommend using this option when the modulation sources are distributed by splitting since losing the input to the splitter will leave both transmitters without input. In these cases, only a fault affecting the path to one transmitter would be remedied by switching the transmitters over.

AVOID SWITCHING WITH NO AUDIO

As mentioned above, when there are audio link problems the issue will affect both transmitters. Check first if your transmitter keeps showing audio alarms correctly while held off by the interlock.

CONFIGURE DEVICES SEPARATELY

Turn on the switch "Configure devices separately" to configure finer adjustments as required.

You can also save configurations and reuse them on other CH-1 products, and they are useful as back-ups in case you need them in the future.

To make a new Configuration is easy!

The screenshot displays a web interface for managing configurations. At the top, under the 'Actions' header, there are six buttons: 'Activate' (yellow), 'Save' (blue), 'New' (green), 'Remove' (red), 'Import' (dark grey), and 'Export' (dark grey). Below this is the 'Selected config' section, which lists two configurations. The first is '2 Cobalt 1+1 Setting WITH Audio Fault' with a blue header and a description: 'Setting for 2 Cobalt units with audio fault active. Customer must set the power good level in the Cob...'. The second is '2 Cobalt 1+1 Setting NO Audio' with a white header and a description: 'Setting for 2 Cobalt units without audio fault active. Customer must set the power good level in the C...'. To the right of the 'Selected config' list is a form for editing a configuration. It has a 'Name' field containing '2 Cobalt 1+1 Setting WITH Audio Fault', a 'Description' field containing 'Setting for 2 Cobalt units with audio fault active. Customer must set the power good level in the Cobalt and the Ramp Up time', and a 'Used sections' list with checkboxes for: Configuration, Fault detection, Timers, Switching - Automatic, Switching - Mode, Switching - Relay control, and Switching - Power control. All checkboxes are checked.

1. Setup all the CH-1 settings you need.
2. Click New.
3. Give it a name of your choice.
4. We advise adding a description, especially if you have multiple configs.
5. Select the used sections
6. Once you have selected all you need for the config, click SAVE

You can save the settings from the sections you choose to create a configuration file to keep it as a backup or to load it in a different machine.

If you are deploying several systems with the same settings or if you want to change the settings of several stations it's much better to do it only once and copy it to the other machines.

If you have problems setting up the system we can do it for you if you tell us the information and we could send you a configuration file. We may ask you to share your configuration to provide you better support.

3.2 SAVING AND LOADING A CONFIG

Once you have saved a config, or even multiple ones - you can save them locally to your computer or to any other location or storage device.

Select the config you want to save, then click "Export" and save the file to your PC with a fitting name.

To load a config from a saved file, click "Import" and locate the file and follow the on-screen instructions. You may then use the imported config.

3.3 UNIT

3.3.1 FRONT PANEL

Brightness - adjust the Front panel Display and LED brightness to your choosing.

Local mode timeout - set the delay you want the screensaver to come on when using the front panel controls.

Screensaver level - Choose what you want to enter into a screensaver mode

OFF - No screensaver is enabled

Display only - The OLED will turn off, but the meters and LED will still be shown.

Display & LED's - all will turn OFF.

Screensaver timeout - set how long you want the delay to enable screensaver to come on.

3.3.2 DATE AND TIME

NTP For automatic time and date settings you can connect to an NTP time server. Select your timezone for the correct area you are in. You can also click "Fill browser values" to automatically fill in your timezone.

You can also override these settings if you have your own NTP server that you prefer to use. Just unlock the padlock on the NTP override section and enter your own server details, then press save.

The screenshot shows two side-by-side configuration panels. The 'Front Panel' panel on the left has fields for 'Brightness [%]' (set to 80), 'Local mode timeout [min]' (set to 5), 'Screensaver level' (a dropdown menu currently showing 'Display & LEDs'), and 'Screensaver timeout [min]' (set to 5). The 'Date and time' panel on the right has a green 'NTP synchronized' status bar, a toggle for 'Use NTP to obtain current date and time' (which is turned on), a 'Timezone' dropdown menu (set to 'Europe/London'), an 'NTP server override' field with a green padlock icon, and a 'Fill browser values' button. Both panels have a 'Save' button at the bottom right.

3.3.3 FACTORY RESET

There are two ways to reset the unit back to factory setting.

Do Factory reset - Clicking this will restore the unit back to factory settings.

Do factory reset (keep network settings) - This will restore all values of the unit back to factory settings **EXCEPT** the network settings, so you can still access the unit even remotely.

The screenshot shows a 'Factory reset' section with a heading and a descriptive text: 'Factory reset wipes all user configuration and brings the unit into a clean state.' Below the text are two blue buttons: 'Do factory reset' and 'Do factory reset (keep network settings)'.

The front panel can be locked out to eliminate unauthorised access. This is done using the joystick as a means of setting the lockout.

There are 6 values you need to set, and can be any combination of movements.

The example below shows the combination of, Enter, Left, Right, Up, Down, Enter

You can choose your own combination.

If you forget the combination, you can easily choose a new one in the web interface.

Once you have set the combination, remember to click "enable" and click Save.

The screenshot shows a 'Lock screen' configuration interface. At the top right is a red 'Enable' toggle switch. Below it are six joystick movement diagrams, each consisting of a central square with four surrounding squares. The first diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'R' (Right) in the surrounding squares. The second diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'A' (Enter) in the surrounding squares. The third diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'R' (Right) in the surrounding squares. The fourth diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'A' (Enter) in the surrounding squares. The fifth diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'R' (Right) in the surrounding squares. The sixth diagram has 'U' (Up), 'D' (Down), 'L' (Left), and 'A' (Enter) in the surrounding squares. A 'Save' button is at the bottom right.

3.3.4 NETWORK

You can adjust these parameters to suit your own network requirements, this can also be done from the front panel controls.

Network setting

MAC address: 8c:1f:64:eb:20:01

☐ DHCP

IP address
Netmask prefix length

192.168.1.100
24

Gateway

192.168.1.1

DNS 1
DNS 2

192.168.1.1
1.1.1.1

Save

3.3.5 LOGS

System logs can be accessed from here. They are also accessible at all times from any page at the top right corner.

Each relevant log will be sorted by the most recent timestamp.

Clicking “SHOW” will open up further information showing the log including any errors.

You can also download the log and save to your Computer for further reference, archiving, or to share the log with our support department.

DATE	ACTIONS
05.11.2024	Show Download
04.11.2024	Show Download
01.11.2024	Show Download
31.10.2024	Show Download
29.10.2024	Show Download
24.10.2024	Show Download
23.10.2024	Show Download
22.10.2024	Show Download
20.09.2020	Show Download



NOTICE

The logs Timestamp will only be accurate when the Cobalt CH-1 is connected to a network with access to NTP Time servers on the Internet.

3.3.6 DIAGNOSTICS

The Diagnostics page gives you a quick and easy view of all relevant systems and statuses.

These are useful if you need to check systems locally or remotely.

Diagnostics

Front Panel MCU ✓ 0.1.0	FPGA ✓ 0.1	Audio Clock ✓	Network ✓
----------------------------	---------------	------------------	--------------

GENERAL

Input ACV @ 50/60Hz	100-240 (277 North America only)
Input DCV	+48V
Power Connector	IEC 13A filtered
Power consumption	<70W @ max power
Dimensions WxDxH [inch]	19 x 15 x 1RU (1.75")
Dimensions WxDxH [cm]	48.3 x 38 x 4.45
Weight	3.4 Kg / 7.5lb

RF INTERFACE

RF Input	2 x N-Type female (up to 100W)
RF Output	2 x N-Type female (up to 100W)

RF RELAY INTERFACE

Connector type	D-Sub25 female
External Supply Voltage	24V DC @1.1A
Relay compatibility	Spinner and Delta Meccanica
Relay selection	Internal DIP switches

EXCITER / TRANSMITTER INTERFACE

Connector type	D-Sub15 female
External Supply Voltage	12V DC @0.75A
Digital Input	6x (optical isolated)
Digital Output	6x (optical isolated)
Analogue Input (optional)	2 x, 0-6V range
Analogue Output (optional)	2 x, 0-6V range

AMPLIFIER CONTROL INTERFACE

Connector type	D-Sub15 female
External Supply Voltage	12V DC @0.75A
Digital Input	6x (optical isolated)
Digital Output	6x (optical isolated)
Analogue Input (optional)	2x, 0-6V range

INTERLOCK INTERFACE

Connector type	Pluggable Terminal Block 8 Pos 3.81mm pitch
Output configuration	4x (Relay or Open collector optical isolated type)
Relay configuration	NC or NO
Output type selection and configuration	Internal DIP switches

CONTROL INTERFACE

Connector type	Pluggable Terminal Block 8 Pos 3.81mm pitch
Output configuration	4x (Relay or Open collector optical isolated type)
Relay configuration	NC or NO
Output type selection and configuration	Internal DIP switches

ENVIRONMENTAL

Altitude	15,000 ft / 4,420m AMSL
Temperature range	0 to +45°C, working, -10 to +50°C, storage
Humidity	95% @ 35°C, non-condensing

EU DECLARATION OF CONFORMITY



Aqua Broadcast Ltd declare under our sole responsibility that the radio equipment below,

Type: FM Transmitters

Models: Cobalt C-10, Cobalt C-30, Cobalt C-50, Cobalt C-100, Cobalt C-300, Cobalt C-600, Cobalt C-1000

Intended use: Broadcast Transmitter

are in conformity with the essential requirements of the Directive 2014/53/EU (RED) and of the Directive 2011/65/EU (RoHS).

The models mentioned have been tested against the following standards or technical specifications:

1. Essential requirements for the protection of the health and safety of people, pets and goods, Article 3.1a) of Directive 2014/53/UE:
 - IEC/EN 60215(1998)+A1(1992)+A2(1994)
2. Essential requirements on electromagnetic compatibility levels, Article 3.1b) of Directive 2014/53/UE:
 - ETSI EN 301 489-53 V1.1.1 (2019-04)
 - ETSI EN 301 489-01 V2.2.3 (2019-11)
3. Essential requirements for the effective use of radio spectrum, Article 3.2 of Directive 2014/53/UE:
 - ETSI EN 302 018 V2.1.1 (2017-04)
4. Requirements in the Article 4 of Directive 2011/65/EU, towards the maximum tolerated concentrations of the substances listed in Annex II as modified by directive 2015/863/UE:
 - EN IEC 63000:2018

If you need and advice or support, we are always on hand to help you as fast as we can.

We have various ways that you can contact us, and we always recommend any additional information is sent to us so we can quickly assist you.

Aqua Broadcast Limited

Unit 7, First Quarter

Blenheim Road

Epsom

KT19 9QN

United Kingdom

+44 203 411 0387

info@aquabroadcast.co.uk

Firmware updates

Please visit <https://www.aquabroadcast.co.uk/support> then simply click on the Downloads tab and select the latest firmware version available.

Alternatively, please scan the QR code below to link directly to the downloads section.



FIRMWARE

You will find the latest firmware version
of your COBALT FM CH-1 on our
website.

<https://www.aquabroadcast.co.uk/support>

