

## ECOS-D Digital Simulcast Technology Radio Base Station Guide

Installation, configuration and maintenance



REVISION TABLE		
Date	Revision	Comment
21/01/2010	1	First issue

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## 1. Scope

This manual provides experienced technicians familiar with similar types of equipment with information which permit the installation and maintenance of the described product, whose characteristics are described in the Technical specification Section.

This document does not contain information of the maintenance and configuration software that are provided with the software itself.

Information contained in this document are valid only for the described RBS of the ECOS-D Family of products, optional cards and ancillaries included. The technicians must use only the part of information related to the RBS really shipped.

## 2. First aid for electrical shock and safety rules

### 2.1 First aid for electrical shock

Do not touch the patient with bare hands until the circuit has been opened. Open the circuit by switching off the line switches. If that is not possible protect yourself with dry material and free the patient from the conductor.

#### 2.1.1 Artificial respiration





It is important to start mouth resuscitation at once and to call a doctor immediately. Suggested procedure for mouth to mouth resuscitation method is described in Table 1.

#### 2.1.2 Treatment of burns

This treatment should be used after the patient has regained consciousness. It can also be employed while artificial respiration is being applied (in this case there should be at least two persons present).

Warning

- Do not attempt to remove clothing from burnt sections
- Apply dry gauze on the burns
- Do not apply ointments or other oily substances.

Step	Description	Figure
1	Lay the patient on his back with his arms parallel to the body. If the patient is laying on an inclined plane, make sure that his stomach is slightly lower than his chest. Open the patients mouth and check that there is no foreign matter in mouth (dentures, chewing gum, etc.).	
2	Kneel beside the patient level with his head. Put an hand under the patient's head and one under his neck. <b>Lift the patient's head and let it recline backwards as far as possible.</b>	
3	Shift the hand from the patient's neck to his chin and his mouth, the index along his jawbone, and keep the other fingers closed together. While performing these operations take a good supply of oxygen by taking deep breaths with your mouth open.	
4	With your thumb between the patient's chin and mouth keep his lips together and blow into his nasal cavities	
5	While performing these operations observe if the patient's chest rises. If not it is possible that his nose is blocked: in that case open the patient's mouth as much as possible by pressing on his chin with your hand, place your lips around his mouth and blow into his oral cavity. Observe if the patient's chest heaves. This second method can be used instead of the first even when the patient's nose is not obstructed, provided his nose is kept closed by pressing the nostrils together using the hand you were holding his head with. The patient's head must be kept sloping backwards as much as possible.	
6	Start with ten rapid expirations, hence continue at a rate of twelve/ fifteen expirations per minute. Go on like this until the patient has regained consciousness, or until a doctor has ascertained his death.	

**Table 1 First aid**

## 2.2 Product Safety and RF Exposure Compliance

### 2.2.1 RF Exposure Compliance

The described product is intended for use in occupational/controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This RBS is NOT authorized for any other use.

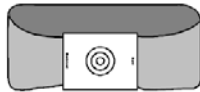
### 2.2.2 Electrostatic protection

When the equipment units are provided with the plate, shown in Figure 1 it means that they contain components electrostatic charge sensitive.

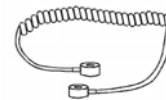


**Figure 1 Electrostatic sensitive equipment**

In order to prevent the units from being damaged while handling, it is advisable to wear an elasticised band (Figure 2) around the wrist ground connected through coiled cord (Figure 3) to the appropriate point on the RBS (Figure 4)



**Figure 2 Antistatic band**



**Figure 3 Coiled Cord**



**Antistatic  
contact point**

**Figure 4 Antistatic contact point**

### 3. Technical/Environmental Specification

The main characteristic of the device are:

#### Radio Frequency:

Frequency range	145 – 174 MHz (subject to limitation to 150 – 174 in U.S.)
Channel Spacing	12,5 – 20 – 25 kHz
Channel step	5 kHz – 6,25 kHz
RF Power	2 – 25 Watt (step 0,1 dB)
Modulation type	Analog FM/PM
CTCSS	67 – 254.1 Hz (step 0,1 Hz)
Antenna connector	50 Ohm
Emission mode	Duplex/Simplex
Receiver sensitivity	Analog FM (12,5 kHz): $\leq -112$ dBm @ 20 dB SINAD psofo Digital 4FSK: $\leq -118$ dBm @ BER = $5 \times 10^{-2}$

#### Power supply:

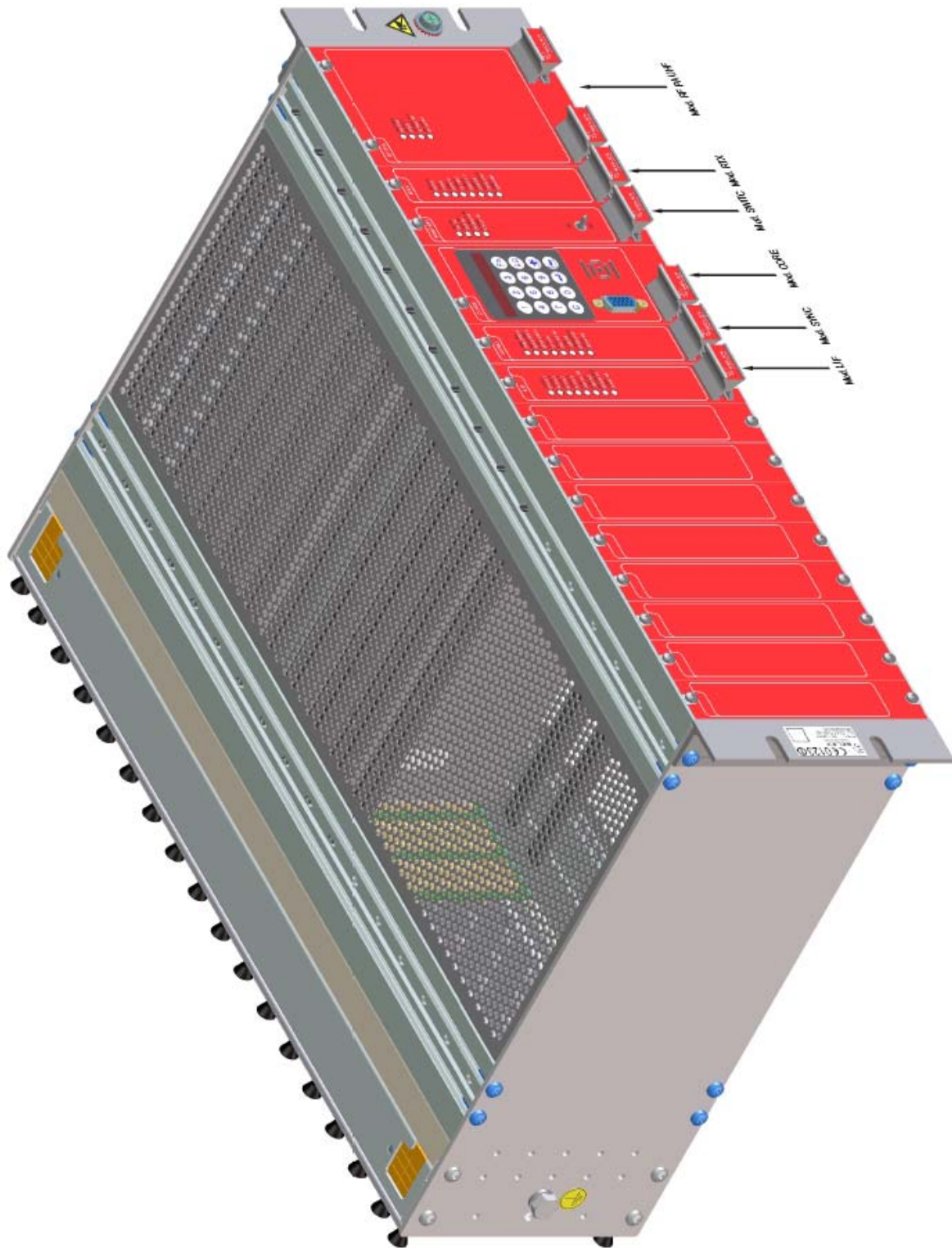
Input voltage	13.2 Vdc (10.8 ÷ 15.6 Vdc - negative grounded)
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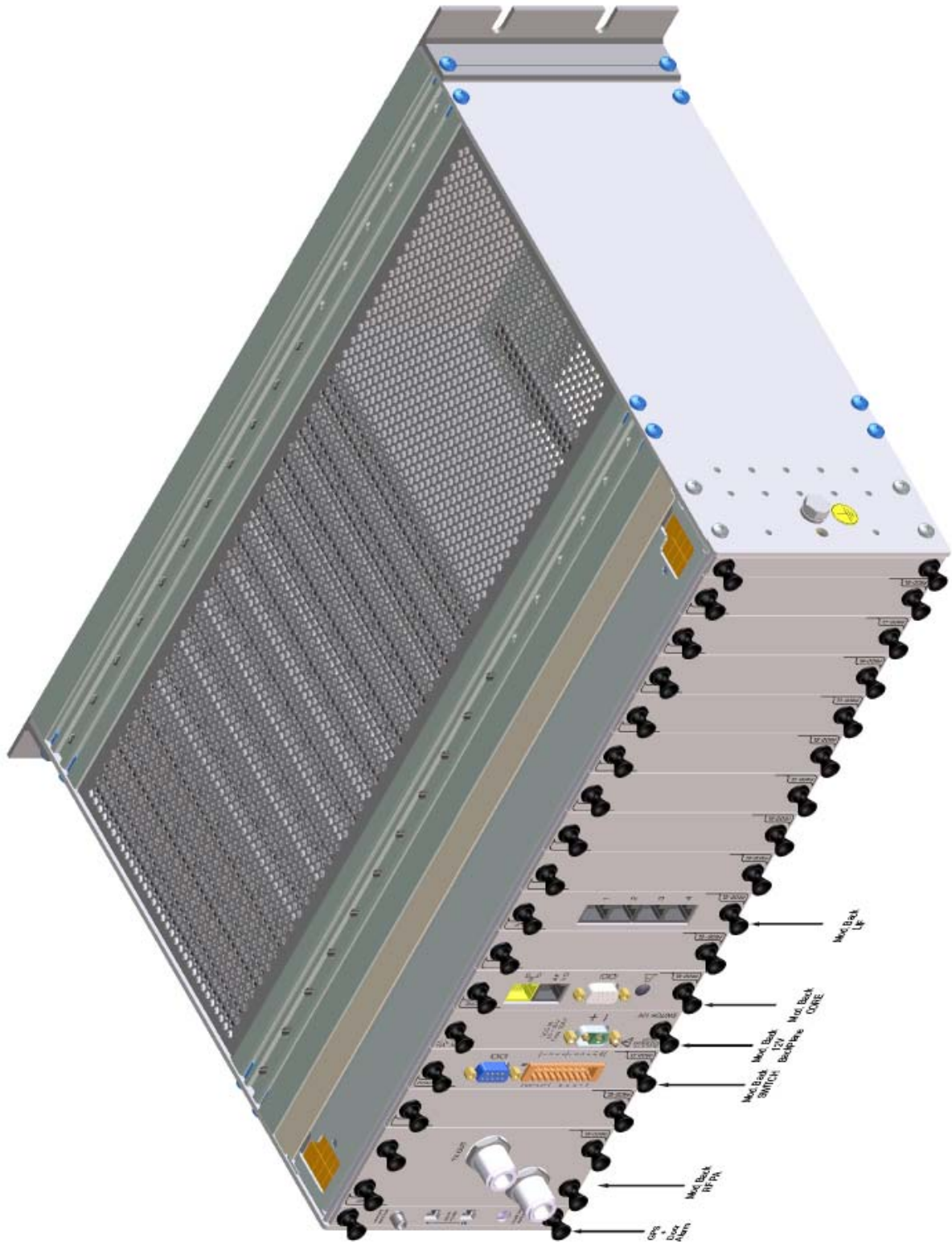
#### Environmental condition:

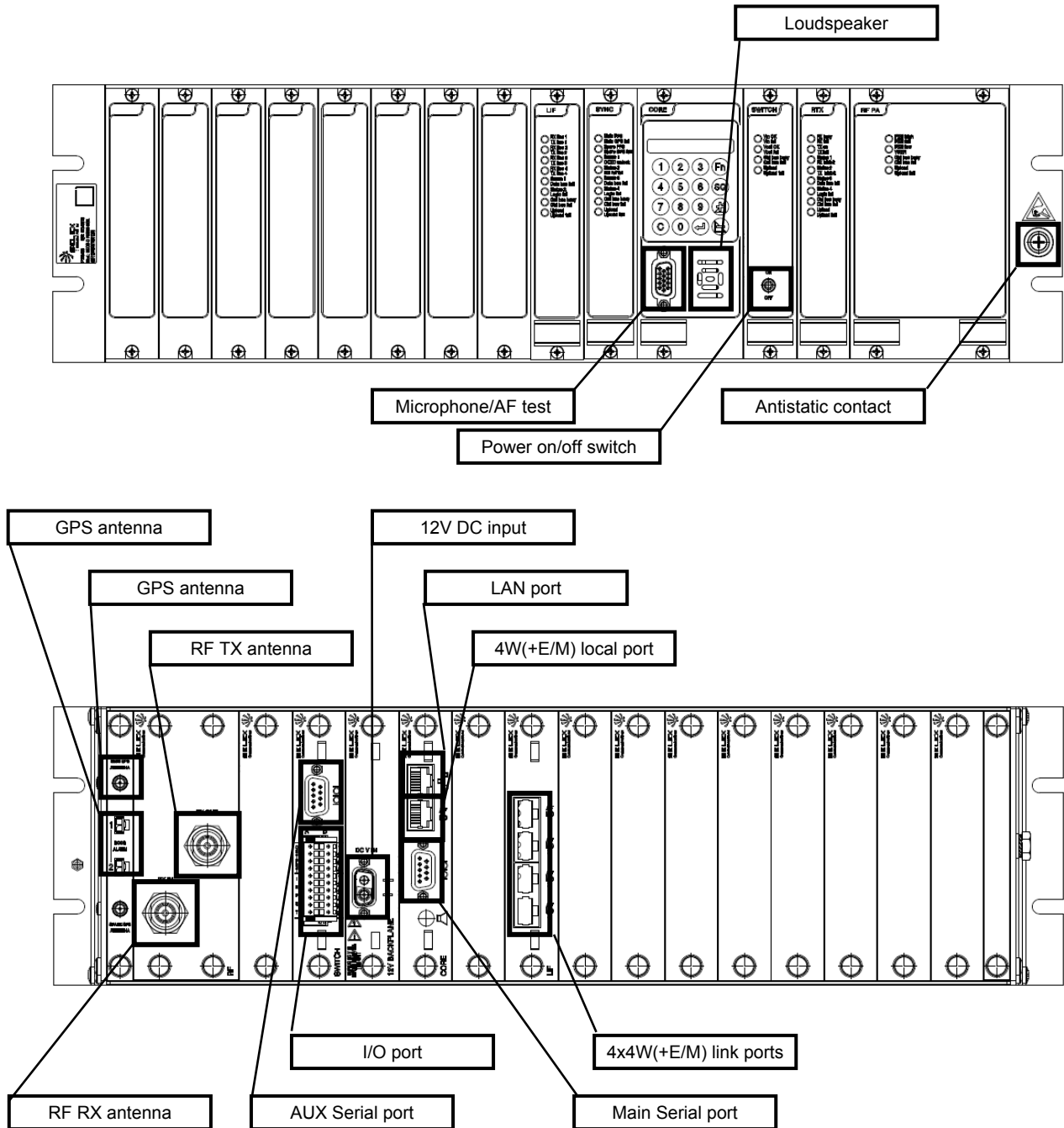
Operating temperature	-30 - +60 °C (-22 - +140 °F)  This is the temperature measured in close proximity to the device. If the device is mounted in a cabinet, the temperature within the cabinet is measured.
Humidity	should not exceed 90% relative humidity @ 50°C (122°F) non condensating
Air Quality	no particular requirements due to the fact there is not any rotating/mobile part in the equipment
Equipment Ventilation	a minimum of ½ RU (4,4 cm – 0,8 inches) must be left among devices installed in the same cabinet



#### 4. Device Assembly and composition







## 5. Installation

### 5.1 Overview

The Unit is not shipped preinstalled in a cabinet. After unpacking, mechanical installation takes place, followed by electrical connections as described in this document. The device may be installed in any location suitable for electronic communications equipment, provided that the environmental conditions do not exceed the equipment specifications for temperature, humidity, and air quality.

#### 5.1.1 Installation Pre-requisites

To ensure the best possible performance and reliability of the described equipment pre-installation planning is required. This includes considering the mounting location of the repeater in relation to input power and antennas. Also to be considered are site environment conditions, the particular mounting method and required tools and equipment.

To plan the installation, please pay particular attention to environmental condition at the site, ventilation requirements, and grounding and lightning protection as described in this manual.

After that, following the instruction given in this manual:

- Unpack and inspect the equipment.
- Mechanical install the equipment at the site.
- Make necessary electrical wiring:
  - Unit Grounding
  - DC input cabling
  - Coaxial cables to transmit and receive antennas
- Perform a post-installation function checkout test of the equipment to verify proper installation.
- Proceed to customize the repeater parameters per customer specifications (e.g. operating frequency, PL, codes, color code, etc.)

#### 5.1.2 Unpack

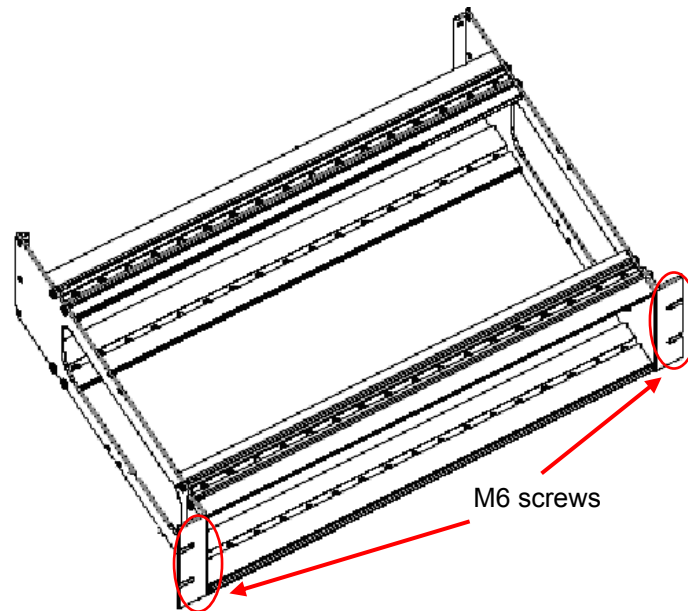
Inspect the equipment for damage immediately after unpacking and make a report of the extent of any damage to the transportation company and to SELEX Communications S.p.A.

The following items are packed together:

- ECOS-D A2T Radio Base Station
- DC power cable
- This manual

### 5.1.3 Mechanical installation

The device is shipped in a box. Upon delivery, the equipment must be removed from the container (see Unpack section) and transferred to a rack or cabinet.



Customer-supplied cabinets and racks must have mounting rail and hole spacing compatible with EIA Universal 48.3 cm (19 inches) specifications. Cabinets must provide adequate ventilation and must meet the following criteria:

- 45.0 cm (17.71 inches) deep
- 48.3 cm (19 inches) wide
- 13.4 cm (5.25 inches) high
- Two mounting rails 5 cm (2 inches) from front cabinet with front mounting holes 5.7 cm (2.25 inches) apart (center to center).

The front of the device is provided with four holes for M6 screws. This permits to fasten the device to a 19" rack by means of 4 M6 screws.

If several devices are installed in a single cabinet, be sure equipment have to be spaced at least by 1/2 RU (2,2 cm, 0,8 inches).to allow for adequate cooling.

Cabinets must have a least 15 cm (6 inches) of open space between the air vents and any wall or other cabinets. This allows adequate air flow.

When multiple cabinets (each equipped with several repeaters) are installed in an enclosed

area, ensure appropriate ventilation and consider air conditioning or other climate control equipment to satisfy the temperature requirements.

**5.1.4 Electrical wiring**

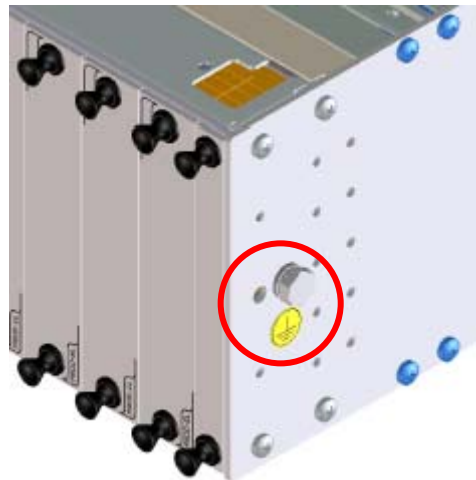
The electrical wiring must be done using appropriate cables thus assuring the equipment responds to the electromagnetic compatibility standards.

The cable terminates to flying connectors which have to be connected to the corresponding connectors on the equipment front.

Position and pin-out of the equipment connectors are available in the appropriate section in the following of this document.

**5.1.5 Unit grounding**

The device is equipped with a ground nut located on the rear panel of the device. This nut is used to connect the device to the site grounding. All antenna cables and DC power cabling, should be properly grounded and lightning protected by following. Failure to provide proper lightning protection may result in permanent damage to the radio equipment.



**Ground connector**

**Figure 5 Ground connector**

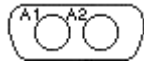
Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
Ground	M6 nut	Section area $\geq 6$ sq. mm

### 5.1.6 DC input

Use the connector marked in red to connect RBS to the output of the 12 VDC power supply. Each level must be connected separately to the 12 VDC power supply. The SRB must be negative grounded.



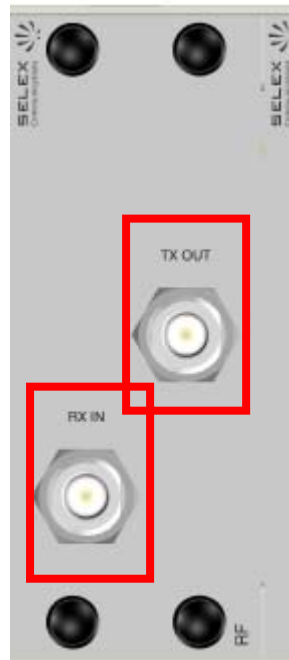
Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
Power supply 12 Vdc	Polarised SUB-D 2W2 female connector	Section of each wire $\geq$ 4 sq.mm. (for length < 6 m)

D-SUB 2W2 female pinout	
<b>PIN</b>	
A1	Ground
A2	+ 12 Volt
 (soldering side view)	

## 5.2 Radio Interfaces

### 5.2.1 Dual N type connector

In RBS without branching and using duplex mode of operation connect the transmitter cable to the “TX OUT” connector and the receiver cable to the “RX IN” connector as shown in the following figure.



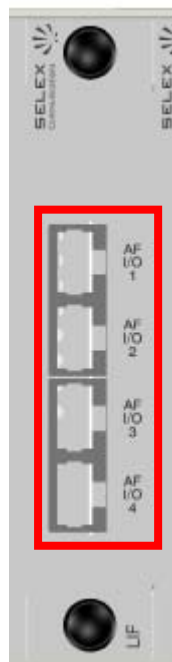
Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
Antenna	N male connector	50 ohm coaxial cable with double shield



### 5.3 Line interfaces

#### 5.3.1 4W and 4W+E/M Link

If the RBS is equipped with a LIF module on the rear panel 4 4W+E/M connectors are present. The following figure shows the rear panel of the LIF module. Configuration of the feature of this four links is out of the scope of this manual. The electrical interface is described in this section. Usually these AF links are used to establish RBS to RBS links or RBS to RNFE links.



4x 4W or 4W(+E/M)

Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
4W or 4W+E/M Link port	RJ45 male connector	AWG 24 Category 5

4W+E/M line RJ45 female pinout	
<b>PIN</b>	
1	Mouth (M+)
2	Mouth (M-)
3	Ear (E+)
4	AF_OUT (-)
5	AF_OUT (+)
6	Ear (E-)
7	AF_IN (-)
8	AF_IN (+)

4W+E/M and 4W line usage			
PIN		4W+E/M	4W
1	M (+)	Mouth signal +	not connected
2	M (-)	Mouth signal -	not connected
3	E (+)	Ear Signal +	not connected
4	AF_OUT (-)	600 Ohm Balanced OUT AF	600 Ohm Balanced OUT AF
5	AF_OUT (+)	600 Ohm Balanced OUT AF	600 Ohm Balanced OUT AF
6	E (-)	Ear Signal -	not connected
7	AF_IN (-)	600 Ohm Balanced IN AF	600 Ohm Balanced IN AF
8	AF_IN (+)	600 Ohm Balanced IN AF	600 Ohm Balanced IN AF

E/M pin usage			
PIN		Balanced	Unbalanced
1	M (+)	Mouth signal +	Mouth signal
2	M (-)	Mouth signal -	not connected
3	E (+)	Ear Signal +	Ear Signal
6	E (-)	Ear Signal -	not connected

4W cabling example: link between RBS A and RBS B

RJ-45, RBS A side		
M (+)	1	Not connected
M (-)	2	Not connected
E (+)	3	Not connected
AF_OUT (-)	4	White-blue
AF_OUT (+)	5	Blue
E (-)	6	Not connected
AF_IN (-)	7	White-orange
AF_IN (+)	8	Orange

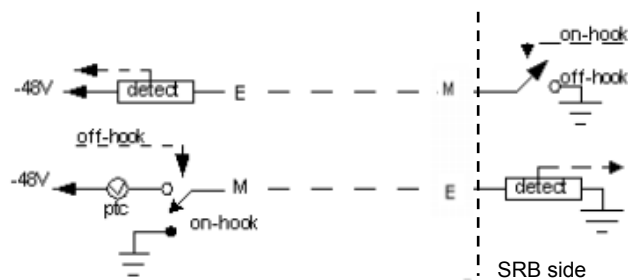
RJ-45, RBS B side		
Not connected	1	M (+)
Not connected	2	M (-)
Not connected	3	E (+)
White-orange	4	AF_OUT (-)
Orange	5	AF_OUT (+)
Not connected	6	E (-)
White-blue	7	AF_IN (-)
Blue	8	AF_IN (+)

**E/M Hardware Line settings**

All the E/M signals share a common voltage reference. The four Mouth signals may be hardware configured independently. The four Ear signals share the same hardware configuration in couple of lines. For unbalanced settings connect the two communicating entities to the same ground.

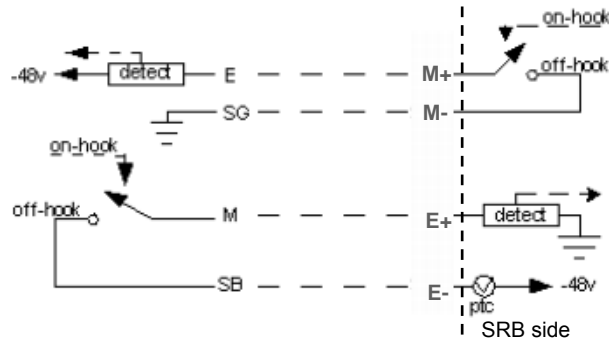
**E/M Type I Interface Model**

E/M Type I is the original E/M lead signaling arrangement and it is the most common interface type in North America. The following diagram displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expects to see active conditions on the E-lead and signal active to the remote device on M-lead.



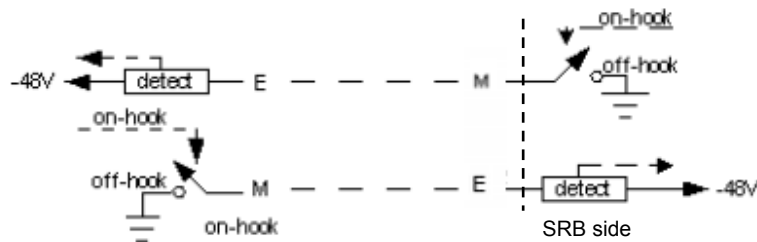
**E/M Type II Interface Model**

E/M Type II provides a four-wire fully-looped arrangement that provides full isolation between the trunks and signaling units. The following table displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expects to see active conditions on the E-lead and signal active to the remote device on M-lead.



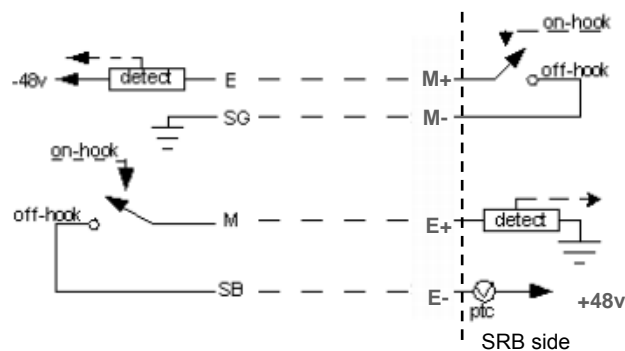
**E/M Type V Interface Model**

E/M Type V interface is a symmetrical two-wire lead arrangement that signals in both directions by means of open for not active and ground for active signalling. The following table displays the sent signal states for active/not active signalling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expects to see active conditions on the E-lead and signal active to the remote device on M-lead.



**E/M Proprietary Type Interface Model**

E/M Proprietary Type provides a four-wire fully-looped arrangement that provides full isolation between the trunks and signaling units. The following table displays the sent signal states for active/not active signalling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expects to see active conditions on the E-lead and signal active to the remote device on M-lead.



E/M Hardware settings						
		Type I (Unbalanced)	Type II (Balanced)	Type V (Unbalanced)	proprietary (Balanced)	
IP1	1	voltage reference	ON	OFF	OFF	ON
	2		ON	OFF	OFF	ON
IP2	1		OFF	ON	ON	OFF
	2		OFF	ON	ON	OFF
IP3	1	E line 3&4	ON	OFF	ON	OFF
	2	E line 1&2	ON	OFF	ON	OFF
IP6	1	M line 2	ON	OFF	ON	OFF
	2	M line 1	ON	OFF	ON	OFF
IP7	1	M line 4	ON	OFF	ON	OFF
	2	M line 3	ON	OFF	ON	OFF



Back card deep switch positioning

Where, in the equipment described in this document, a 4 wires interface towards a common communication network is used, it is mandatory to use 4 (four) different copper pairs: two of them are

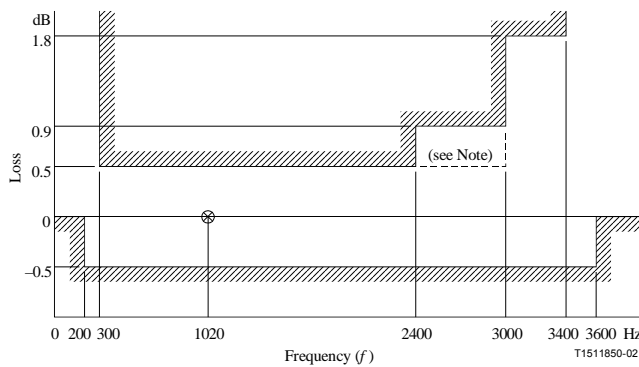
used to transfer from one to the other RBS the user payload and two of them are optionally used to transfer E and M criteria.

All the signals are exchanged using a balanced type of connection, avoiding any ground reference. For the two copper pairs used for exchanging the user payload, the impedance of the interface is 600 Ohm.

The characteristics of the pairs must be as follows:

**Amplitude:**

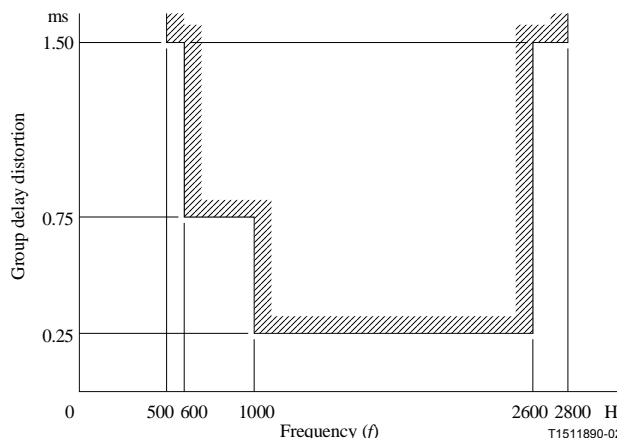
Amplitude characteristic of the media must comply with FIGURE 2/G.712 (ITU-T Rec.G.712 page 8). The mask is shown below. Anyway in the audio band from 300 Hz to 3400 Hz the response must be +/- 1,5 dB with respect to the nominal level of -10 dBm.



NOTE – In some applications in which several PCM channels may be connected in tandem, it may be necessary to extend the +0.5 dB limit from 2400 Hz to 3000 Hz.

**Group delay:**

Group delay characteristic of the media must comply with FIGURE 6/G.712 (ITU-T Rec.G.712 page 10). The mask is shown below.



**Insertion loss:**

The insertion loss must be 0dB +/- 3 dB. This must be true also with regard to the aging of the media physically used.

**Noise:**

The characteristic of the media must comply with prescriptions contained in chapter 9 (noise) of book III.4-Rec.G.792 page 4 and following.

**Diaphony:**

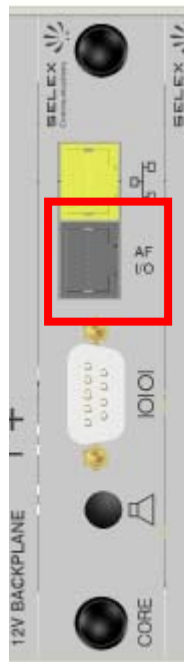
The pairs of the media used to transport the user payload must have a diaphony attenuation greater than 40 dB.

**E/M time response:**

The response time of E/M criteria must be less than 100 msec.

**5.3.2 AF in/out**

If the RBS is equipped with a CORE back card module a 4W+E/M link if available. The following figure shows the rear panel of the CORE module. Configuration of this AF link is out of the scope of this manual. Usually it is used to provide an AF signal to a third party audio device.



Link to external AF

Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
4W or 4W+E/M Link	RJ45 male connector	AWG 24 Category 5

AF 4W+E/M line RJ45 female pinout	
<b>PIN</b>	
1	Mouth (M+)
2	Mouth (M-)
3	Ear (E+)
4	AF_OUT (-)
5	AF_OUT (+)
6	Ear (E-)
7	AF_IN (-)
8	AF_IN (+)



4W+E/M line usage		
PIN		4W+E/M
1	M (+)	Mouth signal +
2	M (-)	Mouth signal -
3	E (+)	Ear Signal +
4	AF_OUT (-)	600 Ohm Balanced OUT AF
5	AF_OUT (+)	600 Ohm Balanced OUT AF
6	E (-)	Ear Signal -
7	AF_IN (-)	600 Ohm Balanced IN AF
8	AF_IN (+)	600 Ohm Balanced IN AF

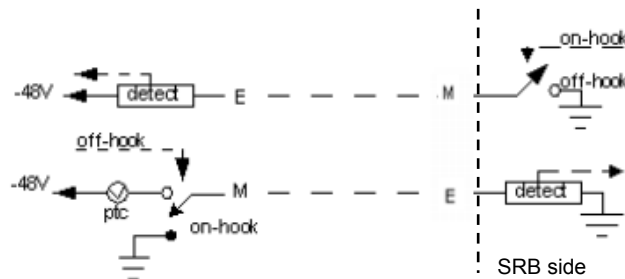
E/M pin usage			
PIN		Balanced	Unbalanced
1	M (+)	Mouth signal +	Mouth signal
2	M (-)	Mouth signal -	not connected
3	E (+)	Ear Signal +	Ear Signal
6	E (-)	Ear Signal -	not connected

### E/M Hardware Line settings

The four Mouth signals share the same hardware configuration. The four Ear signals share the same hardware configuration. For unbalanced settings connect the two communicating entities to the same ground.

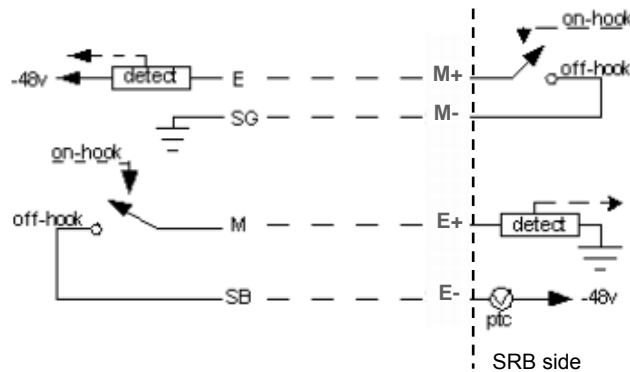
### E/M Type I Interface Model

E/M Type I is the original E/M lead signaling arrangement and it is the most common interface type in North America. The following diagram displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expect to see active conditions on the E-lead and signal active to the remote device on M-lead.



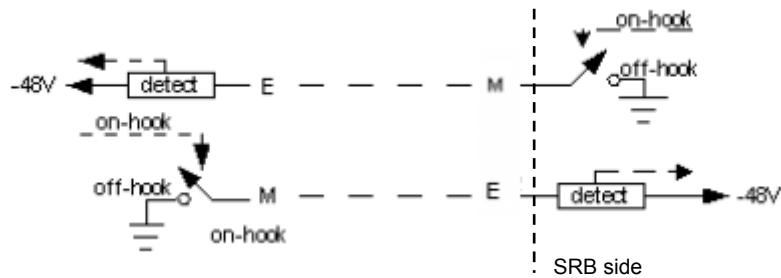
### E/M Type II Interface Model

E/M Type II provides a four-wire fully-looped arrangement that provides full isolation between the trunks and signaling units. The following table displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expect to see active conditions on the E-lead and signal active to the remote device on M-lead.



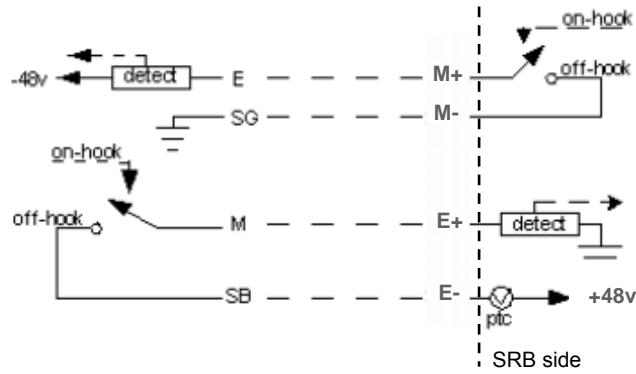
**E/M Type V Interface Model**

E/M Type V interface is a symmetrical two-wire lead arrangement that signals in both directions by means of open for not active and ground for active signalling. The following table displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expect to see active conditions on the E-lead and signal active to the remote device on M-lead.



**E/M Proprietary Type Interface Model**

E/M Proprietary Type provides a four-wire fully-looped arrangement that provides full isolation between the trunks and signaling units. The following table displays the sent signal states for active/not active signaling. The RBS grounds its M-lead to signal a seizure. The other device applies battery to its M-lead to signal a seizure. Prod-EI SRB expect to see active conditions on the E-lead and signal active to the remote device on M-lead.



E/M Hardware settings					
		Type I (Unbalanced)	Type II (Balanced)	Type V (Unbalanced)	proprietary (Balanced)
IP1	1	ON	OFF	OFF	ON
	2	ON	OFF	OFF	ON
IP2	1	OFF	ON	ON	OFF
	2	OFF	ON	ON	OFF
IP3	1	OFF	OFF	OFF	OFF
	2	ON	OFF	ON	OFF

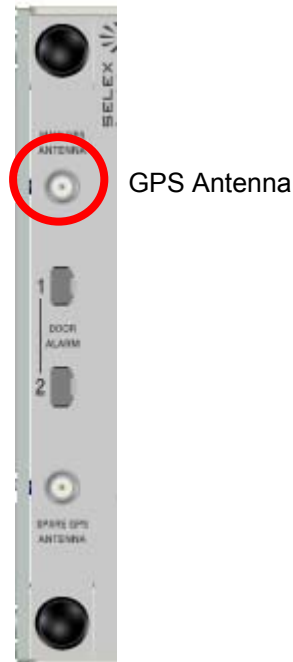


Back card deep switch positioning

## 5.4 Synchronization Interfaces

### 5.4.1 Main GPS Interface

In order to connect the Main GPS antenna to the RBS, connect the GPS antenna to the SMA-BNC "Main GPS" connector shown in the following figure.

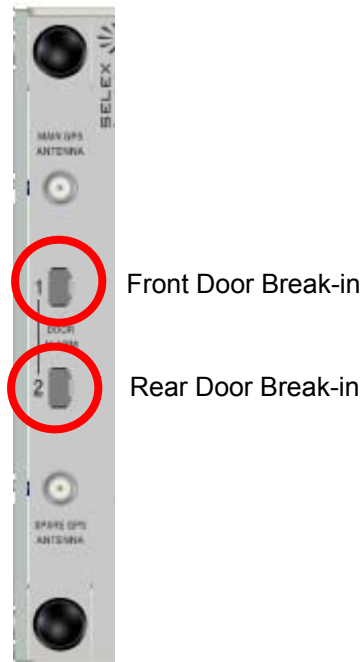


Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
GPS	SMA female connector	50 ohm coaxial cable with double shield

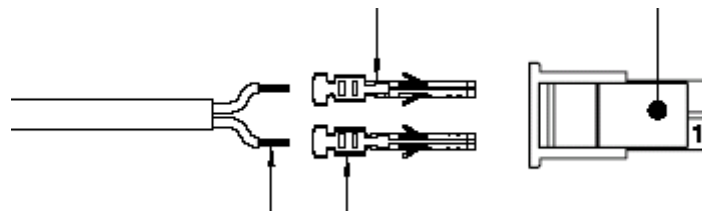
## 5.5 Other Interfaces

### 5.5.1 Door break-in

Insert the connector in the front or rear door break-in connector shown in the following figure.



Connect the three devices to the cable coming from the door as shown in the following figure.



**5.5.2 LAN Interface**

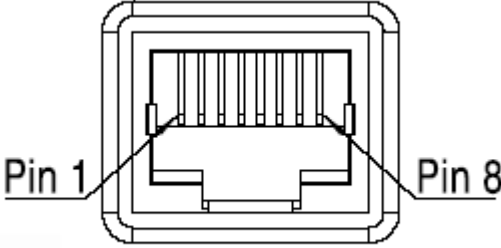
The LAN Interface is a 10BASE-T 100BASE-TX autosensing Ethernet interface with a standard RJ45 connector. Connect it to a hub/switch to provide LAN access to the feature of the RBS. Available features depend on the settings of the RBS.



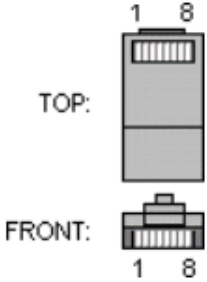
LAN port

Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
LAN	RJ45 male connector	AWG 24 Category 5

LAN RJ45 female pinout		
PIN		
1	RX+	Receive Data +
2	RX-	Receive Data -
3	TX+	Transmit Data +
4		not used
5		not used
6	TX-	Transmit Data -
7		not used
8		not used



LAN RJ45 male cabling			
PIN		EIA/TIA 568A	EIA/TIA 568B
1	TX+	White/Green	White/Orange
2	TX-	Green	Orange
3	RX+	White/Orange	White/Green
4		Blue	Blue
5		White/Blue	White/Blue
6	RX-	Orange	Green
7		White/Brown	White/Brown
8		Brown	Brown



To connect the RBS to an Ethernet hub/switch use a straight cable (EIA/TIA 568A or EIA/TIA 568B on both ends).

To connect the RBS directly to an Ethernet host use a cross cable (EIA/TIA 568A on one end and EIA/TIA 568B on the other end).

### 5.5.3 Serial Interface

The Serial Interface is an RS232 interface with a standard female type D DCE connector. Connect it to a DTE to provide serial access to the RBS. Available features depend on the settings of the RBS.



Serial Interface

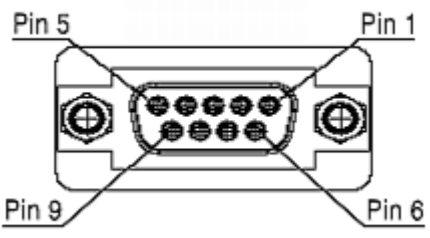
Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
RS232	Female type D connector with 9 pins and shielded holder	9 conductor cable with double brass sheath type interconductor



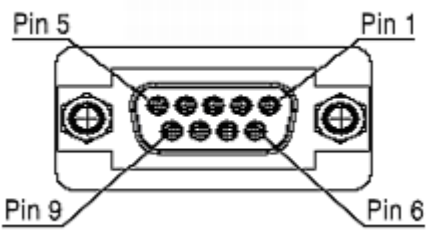
**RS232**

RS232 standards are defined by EIA/TIA (Electronic Industries Alliance /Telecommunications Industry Association). RS232 defines both the physical and electrical characteristics of the interface. RS232 is an Active LOW voltage driven interface and operates at +12V to -12V. RS232 is a serial interface for the transmission of point to point digital data. Description of the connector's pins is from DTE to DCE. The RBS acts as a DCE.

RS232 female pinout		
PIN		Mean
1		not used
2	RX	Data from DCE to DTE
3	TX	Data from DTE to DCE
4		not used
5	GND	Ground
6		not used
7	RTS	Ready To Send (from DTE)
8	CTS	Clear To Send (to DTE)
9		not used



Complete RS232 female pinout (only on request)		
PIN		Mean
1		not used
2	RX	Data from DCE to DTE
3	TX	Data from DTE to DCE
4	DTR	Data Terminal Ready (from DTE)
5	GND	Ground
6	DSR	Data Set Ready (to DTE)
7	RTS	Ready To Send (from DTE)
8	CTS	Clear To Send (to DTE)
9		not used



#### 5.5.4 Auxiliary Serial Interface

The Auxiliary Serial Interface is an optional RS232, RS422 or RS485 interface with a standard female type D DCE connector. Connect it to a DTE to provide serial access to the RBS. Available features depend on the settings of the RBS.



AUX Serial Interface

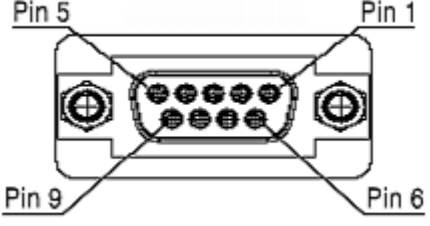
Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
RS232 RS422 RS485	Female type D connector with 9 pins and shielded holder	9 conductor cable with double brass sheath type interconductor

Pinout of the three types of serial interface are described below.

**RS232**

RS232 standards are defined by EIA/TIA (Electronic Industries Alliance /Telecommunications Industry Association). RS232 defines both the physical and electrical characteristics of the interface. RS232 is an Active LOW voltage driven interface and operates at +12V to -12V. RS232 is a serial interface for the transmission of point to point digital data. Description of the connector's pins is from DTE to DCE. The RBS acts as a DCE.

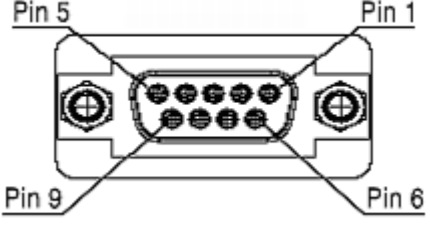
RS232 female pinout		
PIN		Mean
1		not used
2	RX	Data from DCE to DTE
3	TX	Data from DTE to DCE
4		not used
5	GND	Ground
6		not used
7	RTS	Ready To Send (from DTE)
8	CTS	Clear To Send (to DTE)
9		not used



**RS422**

RS422 is a balanced serial interface for the transmission of point to point digital data. The advantage of a balanced signal is the greater immunity to noise. The EIA describes RS422 as a DTE to DCE interface for point-to-point connections. Description of the connector's pins is from DTE to DCE. The RBS acts as a DCE.

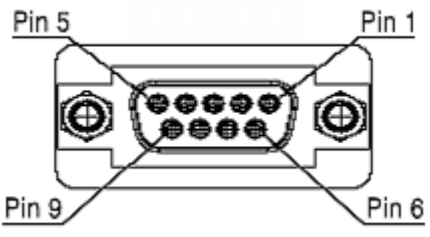
RS422 female pinout (only on request)		
PIN		Mean
1	GND	Ground
2	TX +	Data from DTE to DCE
3		not used
4	RX +	Data from DCE to DTE
5	GND	Ground
6		not used
7	TX -	Data from DTE to DCE
8		not used
9	RX -	Data from DCE to DTE



**RS485**

RS485 is a balanced serial interface for the transmission of digital data. The advantage of a balanced signal is the greater immunity to noise. Point to point or multi-point behaviour of this serial interface is software dependent and is out of the scope of this manual. Description of the connector's pins is from DTE to DCE. The RBS acts as a DCE.

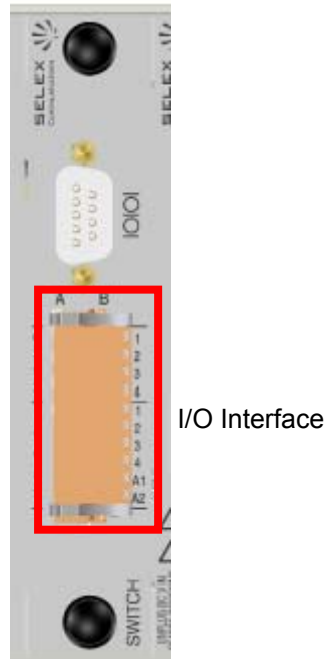
RS485 female pinout (only on request)		
PIN		Mean
1		not used
2	RTX +	Data
3		not used
4		not used
5	GND	Ground
6		not used
7	RTX -	Data
8		not used
9		not used



The diagram shows a top-down view of a 9-pin D-sub connector. The pins are arranged in a 3x3 grid. Pin 1 is at the top right, Pin 5 is at the top left, Pin 6 is at the bottom right, and Pin 9 is at the bottom left. The center pins (2, 3, 4, 7, 8) are not individually labeled in the diagram.

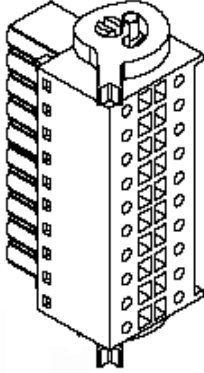
### 5.5.5 Digital Input/Output Interface

The RBS manages 4 digital outputs. The connector is located on the rear of the RBS and is shown in red in the following figure.



Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
User I/O	Socket block B2L 3.5/20LH	Section of each wire $\leq 1$ sq.mm. (AWG 18)

I/O Socket block B2L male pinout		
type	contact	
out	1	power supply alarm (*)
out	2	temperature alarm (*)
out	3	synchronization alarm (*)
out	4	RF power alarm (*)
in	1	not used
in	2	not used
in	3	not used
in	4	not used
in	A1	not used
in	A2	not used



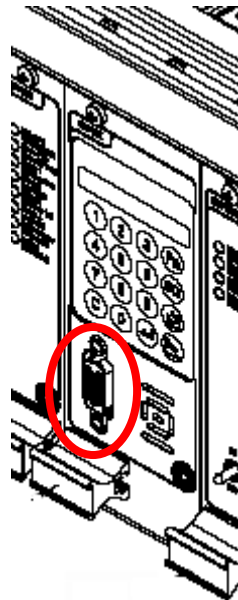
(\*) The meaning of the digital outputs depends on the firmware release of the RBS.

In the shown example the meaning is as follows:

- ✓ Output 1: power supply alarm. When the RBS is supplied from battery the output is closed.
- ✓ Output 2: RBS temperature alarm. When the temperature is over a defined maximum value the output is closed.
- ✓ Output 3: RBS synchronization alarm. When the RBS loses synchronisation the output is closed.
- ✓ Output 4: RF power alarm. When the PA transmitting power is 3 dB below the right power level the output is closed.

### 5.5.6 Local Microphone Interface

The local microphone interface permits to connect a microphone to the RBS. Features related with PTT press and the AF of the microphone are out of the scope of this manual.



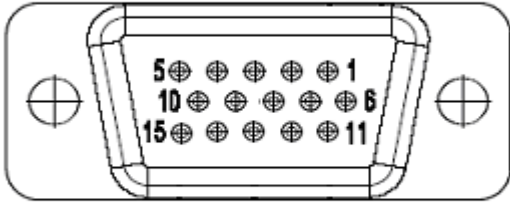
Local Microphone Interface

Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
Microphone	Male type D high density connector with 15 pins	Section of each wire $\leq 1$ sq.mm. (AWG 18)



Microphone

<b>D-SUB HD 15 male pinout</b>		
<b>PIN</b>		<b>Mean</b>
1	GND	Ground
2		not used
3		not used
4		not used
5		not used
6	AF in	Audio Frequency input to RBS
7		not used
8		not used
9		not used
10		not used
11	PTT	Push To Talk input to RBS
12		not used
13	DGND	Digital Ground
14		not used
15	VDD	



(soldering side view)



## 6. Configuration

The hardware configuration, where applicable, is described in the installation section of this manual. Hardware configuration is limited only to hardware related characteristics such as electrical interfaces.

A parameter configuration must be done to adjust each device to the user need. This procedure is described in the manual of the configuration software. Please refer to it for more information.

A list of values for each parameter for each device is provided in a separate document on demand. Please refer to it to set the proper value for each parameter.

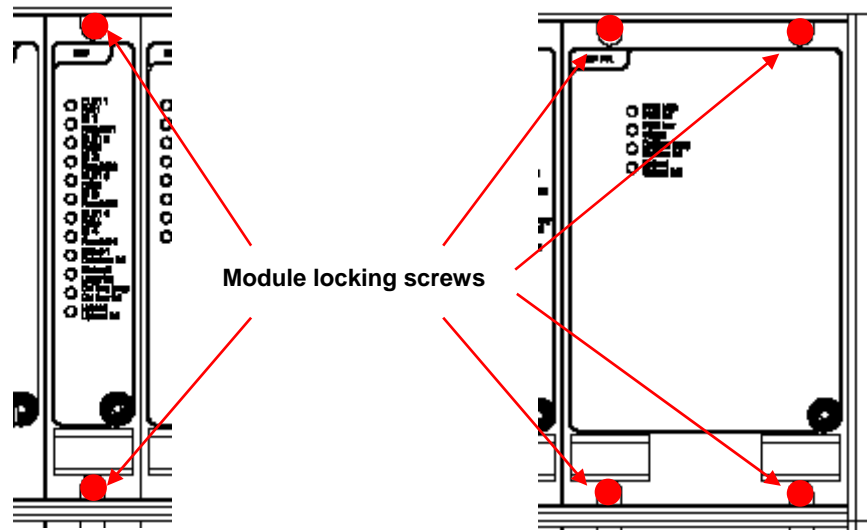
To connect the PC with the configuration software to the RBS follow the procedure described in the Local Maintenance Interface section.

## 7. Maintenance

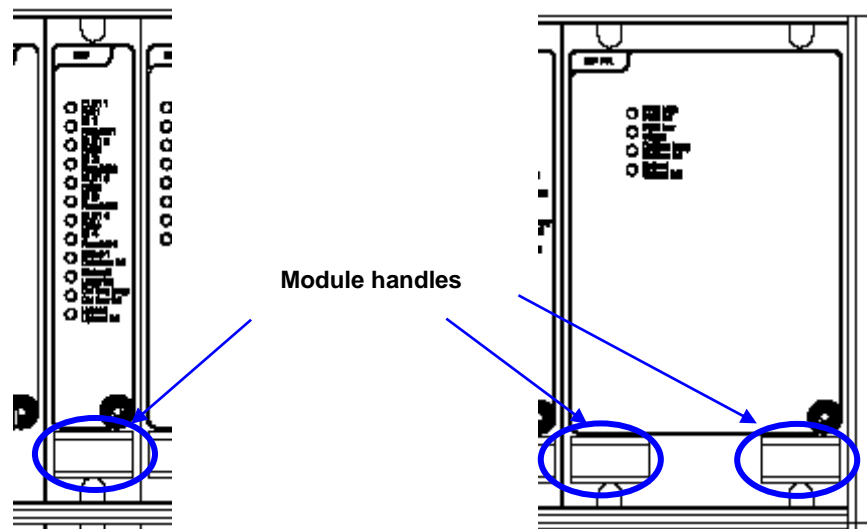
### 7.1 Module removal

To remove a module from the RBS follows the procedure described below.

- 1 – Unscrew the two (or four) screws marked in red on the front panel of the module



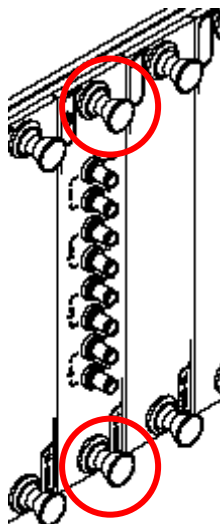
- 2 – From the front side of the RBS using the handle marked in blue pull the module out.



## 7.2 Back card removal

To remove a back card from the RBS follows the procedure described below.

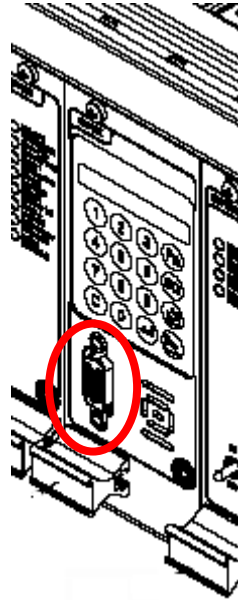
1 – Unlock the two (or four) knobs marked in red on the panel of the back card



2 – From the rear side of the RBS using the same knobs pull the back card out.

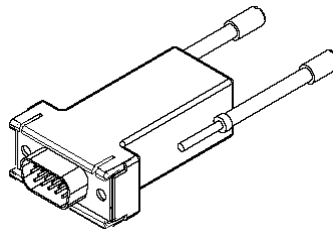
### 7.3 Local Maintenance Interface

The local maintenance interface is located on the front panel of the RBS on the CORE module.



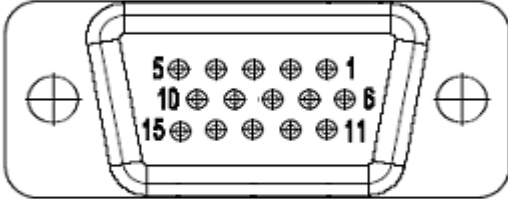
Local Maintenance Interface

To perform local Maintenance and local configuration of the RBS, connect a PC to this connector using the appropriate LAN adapter.



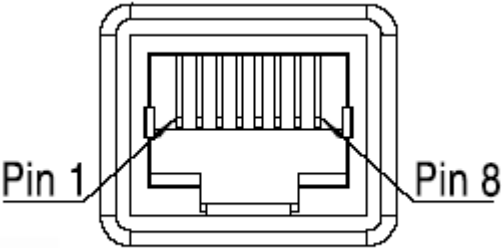
Maintenance LAN Adapter

D-SUB HD 15 male pinout		
PIN		Mean
1		not used
2		not used
3		not used
4		not used
5	TX-	Transmit Data -
6		not used
7	RX-	Receive Data -
8		not used
9	TX+	Transmit Data +
10		not used
11		not used
12	RX+	Receive Data +
13	DGND	Digital Ground
14	FLP	Front LAN Presence
15		not used



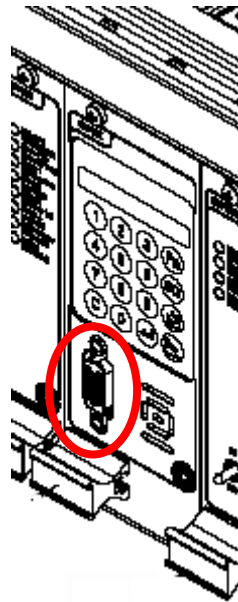
(soldering side view)

LAN RJ45 female pinout		
PIN		
1	RX+	Receive Data +
2	RX-	Receive Data -
3	TX+	Transmit Data +
4		not used
5		not used
6	TX-	Transmit Data -
7		not used
8		not used



### 7.4 Local Test AF Interface

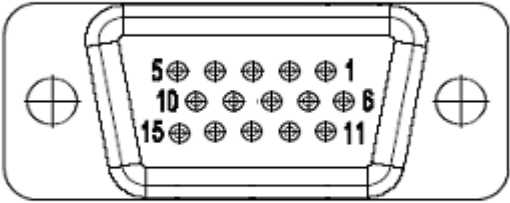
The local Audio Frequency interface is located on the front panel of the RBS on the CORE module. Use this interface to test the AF performance of the RBS.



Local Maintenance Interface

Interconnecting points	Type of connector terminating the cable	Type of cable/conductor
Microphone	Male type D high density connector with 15 pins	Section of each wire $\leq 1$ sq.mm. (AWG 18)

D-SUB HD 15 male pinout		
PIN		Mean
1	GND	Ground
2	AF FO	Audio Frequency Output (no volume)
3		not used
4	AF out -	Audio Frequency output from RBS
5		not used
6	AF in	Audio Frequency input to RBS
7		not used
8		not used
9		not used
10	AF out +	Audio Frequency output from RBS
11	PTT	Push To Talk input to RBS
12		not used
13	DGND	Digital Ground
14		not used
15	VDD	



(soldering side view)

## 7.5 Remote Maintenance Interface

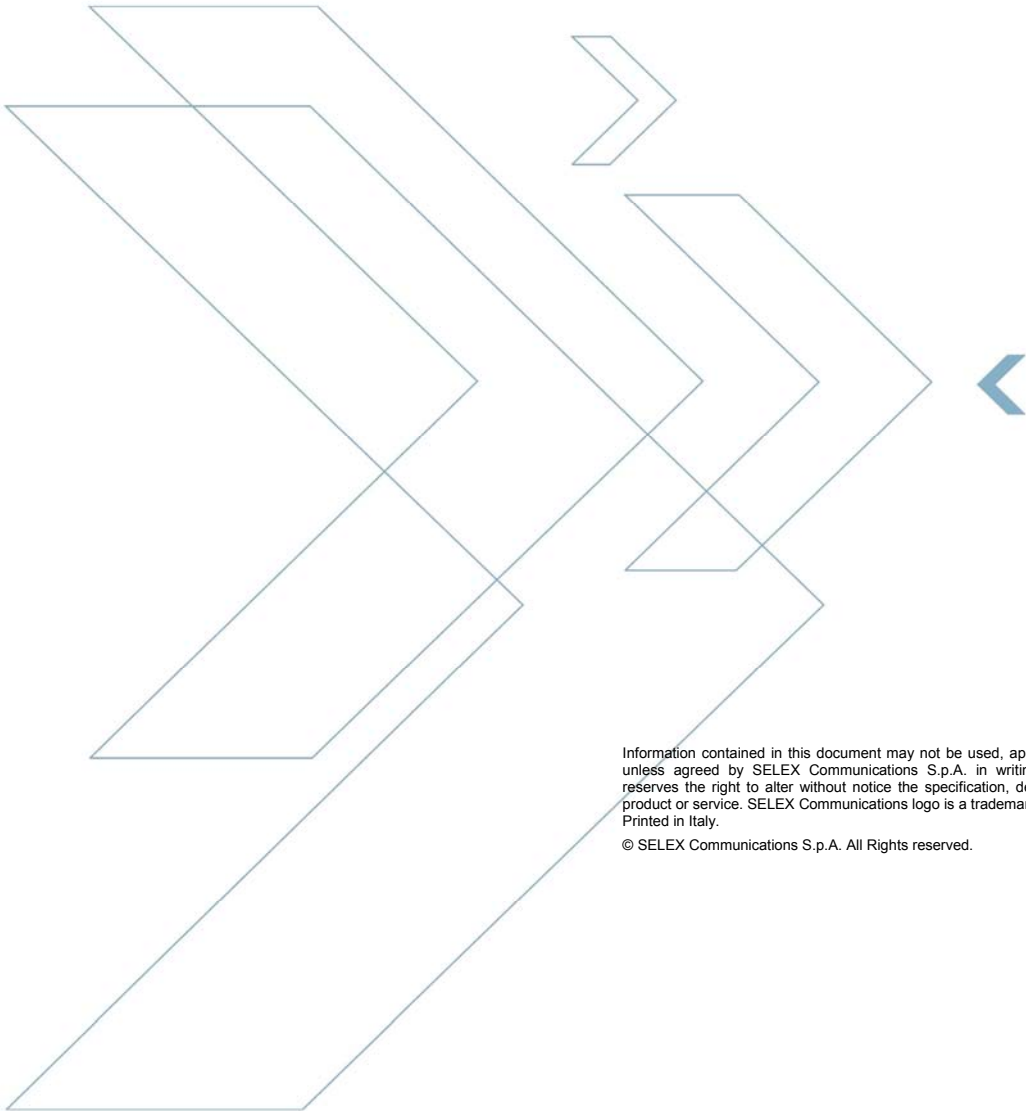
The Remote maintenance interface may be accessible directly or not on each RBS depending on the configuration of the system.

If the RBS is configured to be remotely controlled via the LAN interface, see the LAN interface section to correctly connect the RBS.

For more information about the remote maintenance procedure see the Network Management System (NMS) Manual, where supplied.



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