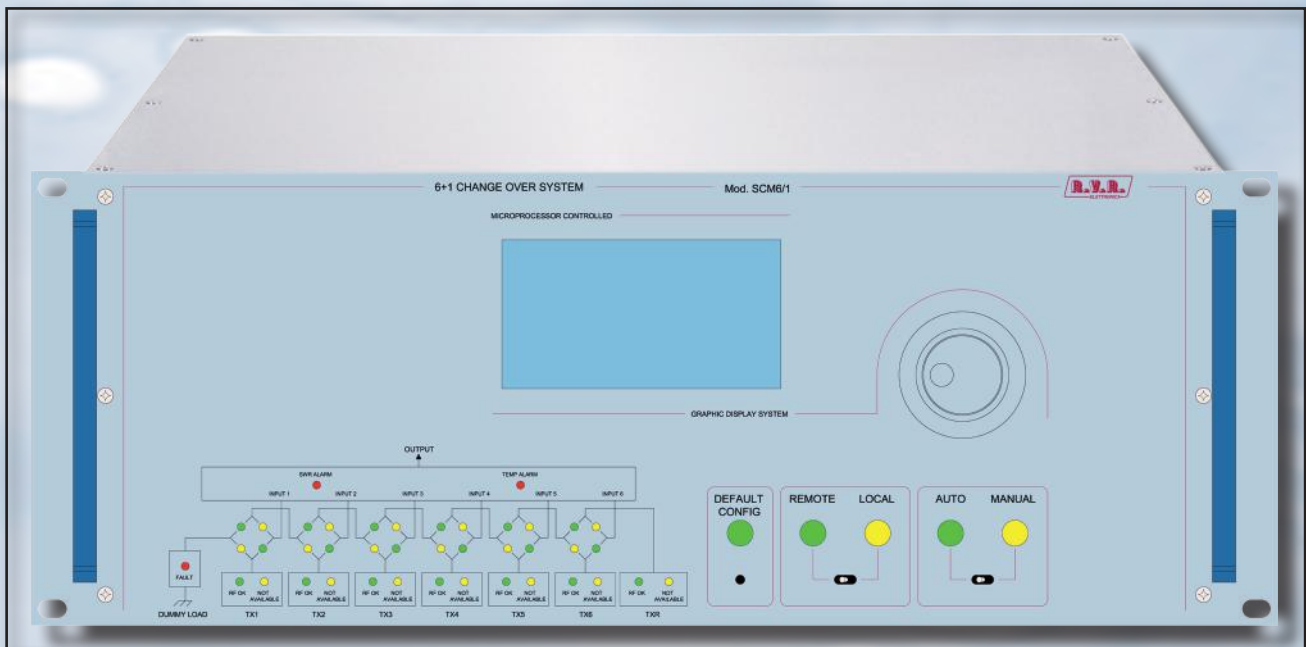




# SCM6/1

USER MANUAL  
VOLUME 1



**File Name:** SCM6\_1\_ENG\_2.0.indb

**Version:** 2.0

**Date:** 06/07/2020

### Revision History

Date	Version	Reason	Editor
28/10/2022	2.0	Second Version	J. H. Berti

SCM6/1 - User Manual  
Version 2.0

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#### **Notification of intended purpose and limitations of product use**

This product is a FM transmitter intended for FM audio broadcasting. It utilizes operating frequencies not harmonised in the intended countries of use. The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with. Limitations of use can apply in respect of operating frequency, transmitter power and/or channel spacing.

#### **Declaration of Conformity**

Hereby, R.V.R. Elettronica, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.



# Technical Specifications

		<b>SCM6/1</b>		
Parameters		U.M.	Value	Notes
<b>GENERALS</b>				
Working temperature		°C	-10 to +50	
Working Humidity		%	95 (Without condensing)	
Working Altitude		mt	3000	With adequate air evacuation system in site
<b>POWER REQUIREMENTS</b>				
AC Power Input	AC Supply Voltage	VAC	115 -125 - 230 - 250 ±15% (*)	(*) Internal switch (**) monophase (***) Threephases Y
	AC Apparent Power Consumption	VA		
	Active Power Consumption	W	50	
	Power Factor			
	Overall Efficiency	%		
DC Power Input	Connector		VDE IEC Standard	
	DC Supply Voltage	VDC	24	
	DC Current	ADC	< 2	
<b>MECHANICAL DIMENSIONS</b>				
Physical Dimensions	Front panel width	mm	483 (19")	19" EIA rack
	Front panel height	mm	176 (69") 4HE	convertire in pollici
	Overall depth	mm	334	
	Chassis depth	mm		escluso il pannello, esclusi i connettori, convertire in pollici
Weight		kg	about 4	
<b>VARIOUS</b>				
Cooling			Forced, with internal fan	
Acoustic Noise		dBA	< 58	
<b>INPUTS</b>				
Digital				Specific RVR connectors, optocoupler isolated
<b>OUTPUTS</b>				
Relay				Specific RVR connectors
<b>FUSES</b>				
On Mains			1 External fuse F 1 A - 5X20 mm	
<b>HUMAN INTERFACES</b>				
User			Graphical LCD - 240 x 128 with Encoder	
Signalling LEDs / Synoptical			Yes	
TC/TS			Yes	



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### IMPORTANT



The symbol of lightning inside a triangle placed on the product, evidences the operations for which is necessary gave it full attention to avoid risk of electric shocks.




The symbol of exclamation mark inside a triangle placed on the product, informs the user about the presence of instructions inside the manual that accompanies the equipment, important for the efficacy and the maintenance (repairs).


## 1. Preliminary Instructions

### • General Warnings


This equipment should only be operated, installed and maintained by "trained" or "qualified" personnel who are familiar with risks involved in working on electric and electronic circuits. "Trained" means personnel who have technical knowledge of equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment. "Qualified" means personnel who are trained in and experienced with equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment.

 **WARNING: Residual voltage may be present inside the equipment even when the ON/OFF switch is set to Off. Before servicing the equipment, disconnect the power cord or switch off the main power panel and make sure the safety earth connection is connected. Some service situations may require inspecting the equipment with live circuits. Only trained and qualified personnel may work on the equipment live and shall be assisted by a trained person who shall keep ready to disconnect power supply at need.**


R.V.R. Elettronica shall not be liable for injury to persons or damage to property resulting from improper use or operation by trained/untrained and qualified/unqualified persons.


 **WARNING: The equipment is not water resistant. Any water entering the enclosure might impair proper operation. To prevent the risk of electrical shock or fire, do not expose this equipment to rain, dripping or moisture.**

Please observe local codes and fire prevention rules when installing and operating this equipment.

 **WARNING: This equipment contains exposed live parts involving an electrical shock hazard. Always disconnect power supply before removing any covers or other parts of the equipment.**

Ventilation slits and holes are provided to ensure reliable operation and prevent overheating; do not block or cover these slits. Do not block the ventilation slits under any circumstances. The product must not be incorporated in a rack unless adequate ventilation is provided or the manufacturer's instructions are followed closely.

 **WARNING: This equipment can radiate radiofrequency energy and, if not installed in compliance with manual instructions and applicable regulations, may cause interference with radio communications.**

 **WARNING: This equipment is fitted with earth connections both in the power cord and for the chassis.**

### Make sure both are properly connected.

Operation of this equipment in a residential area may cause radio interference, in which case the user may be required to take adequate measures.

The specifications and data contained herein are provided for information only and are subject to changes without prior notice. **R.V.R. Elettronica** disclaims all warranties, express or implied. While **R.V.R. Elettronica** attempts to provide accurate information, it cannot accept responsibility or liability for any errors or inaccuracies in this manual, including the products and the software described herein. **R.V.R. Elettronica** reserves the right to make changes to equipment design and/or specifications and to this manual at any time without prior notice.

### • Notice concerning product intended purpose and use limitations.

This product is a radio transmitter suitable for frequency-modulation audio radio broadcasting. Its operating frequencies are not harmonised in designated user countries. Before operating this equipment, user must obtain a licence to use radio spectrum from the competent authority in the designated user country. Operating frequency, transmitter power and other characteristics of the transmission system are subject to restrictions as specified in the licence.

## 2. Warranty

La **R.V.R. Elettronica** warrants this product to be free from defects in workmanship and its proper operation subject to the limitations set forth in the supplied Terms and Conditions. Please read the Terms and Conditions carefully, as purchase of the product or acceptance of the order acknowledgement imply acceptance of the Terms and Conditions. For the latest updated terms and conditions, please visit our web site at [WWW.RVR.IT](http://WWW.RVR.IT). The web site may be modified, removed or updated for any reason whatsoever without prior notice. The warranty will become null and void in the event the product enclosure is opened, the product is physically damaged, is repaired by unauthorised persons or is used for purposes other than its intended use, as well as in the event of improper use, unauthorised changes or neglect. In the event a defect is found, follow this procedure:

- 1 Contact the seller or distributor who sold the equipment; provide a description of the problem or malfunction for the event a quick fix is available.

Sellers and Distributors can provide the necessary information to troubleshoot the most frequently encountered problems. Normally, Sellers and Distributors can offer a faster repair service than the Manufacturer would. Please note that Sellers can pinpoint problems due to wrong installation.

- 2 If your Seller cannot help you, contact **R.V.R. Elettronica**. and describe the problem; if our staff deems it appropriate, you will receive an authorisation to return the equipment along with suitable instructions;

- 3 When you have received the authorisation, you may return the unit. Pack the unit carefully before shipment; use the original packaging whenever possible and seal the package perfectly. The customer bears all risks of loss (i.e., **R.V.R.** shall not be liable for loss or damage) until the package reaches the **R.V.R.** factory. For this reason, we recommend insuring the goods for their full value. Returns must be sent on a C.I.F. basis (PREPAID)

to the address stated on the authorisation as specified by the R.V.R. Service Manager.



Units returned without a return authorisation may be rejected and sent back to the sender.

- 4 Be sure to include a detailed report mentioning all problems you have found and copy of your original invoice (to show when the warranty period began) with the shipment.

Please send spare and warranty replacement parts orders to the address provided below. Make sure to specify equipment model and serial number, as well as part description and quantity.



R.V.R. Elettronica  
Via del Fonditore, 2/2c  
40138 BOLOGNA ITALY  
Tel. +39 051 6010506

### 3. First Aid

All personnel engaged in equipment installation, operation and maintenance must be familiar with first aid procedures and routines.

#### 3.1 Electric shock treatment

##### 3.1.1 If the victim is unconscious

Follow the first aid procedures outlined below.

- Lay the victim down on his/her back on a firm surface.
- the neck and tilt the head backwards to free the airway system (**Figure 1**).

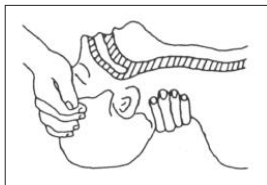


Figure 1

- If needed, open the victim's mouth and check for breathing.
- If there is no breathing, start artificial respiration without delay (**Figure 2**) as follows: tilt the head backwards, pinch the nostrils, seal your mouth around the victim's mouth and give four fast rescue breaths.



Figure 2

- Check for heartbeat (**Figure 3**); if there is no heartbeat, begin chest compressions immediately (**Figure 4**) placing your hands in the centre of the victim's chest (**Figure 5**).

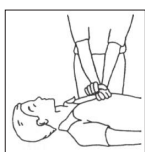
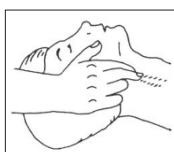


Figure 3

Figure 4

Figure 5

- One rescuer: give 2 quick rescue breaths after each 15 compressions.

- Two rescuers: one rescue breath after each 5 compressions.
- Do not stop chest compressions while giving artificial breathing.
- Call for medical help as soon as possible.

##### 3.1.2 If the victim is conscious

- Cover victim with a blanket.
- Try to reassure the victim.
- Loosen the victim's clothing and have him/her lie down.
- Call for medical help as soon as possible.

#### 3.2 Treatment of electric burns

##### 3.2.1 Large burns and broken skin

- Cover affected area with a clean cloth or linen.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.

If medical help is not available within an hour, the victim is conscious and is not retching, administer a solution of table salt and baking soda (one teaspoon of table salt to half teaspoon of baking soda every 250 ml of water).

Have the victim slowly drink half a glass of solution for four times during a period of 15 minutes.

Stop at the first sign of retching.

Do not administer alcoholic beverages.

##### 3.2.2 Minor burns

- Apply cold (not ice cold) strips of gauze or dress wound with clean cloth.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- If needed, have the victim change into clean, dry clothing.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.



## 4. General Description

### 4.1 Unpacking

The package contains:

- 1 **SCM6/1**
- 1 User Manual
- 1 Mains power cables

The following accessories are also available from Your R.V.R. Dealer:

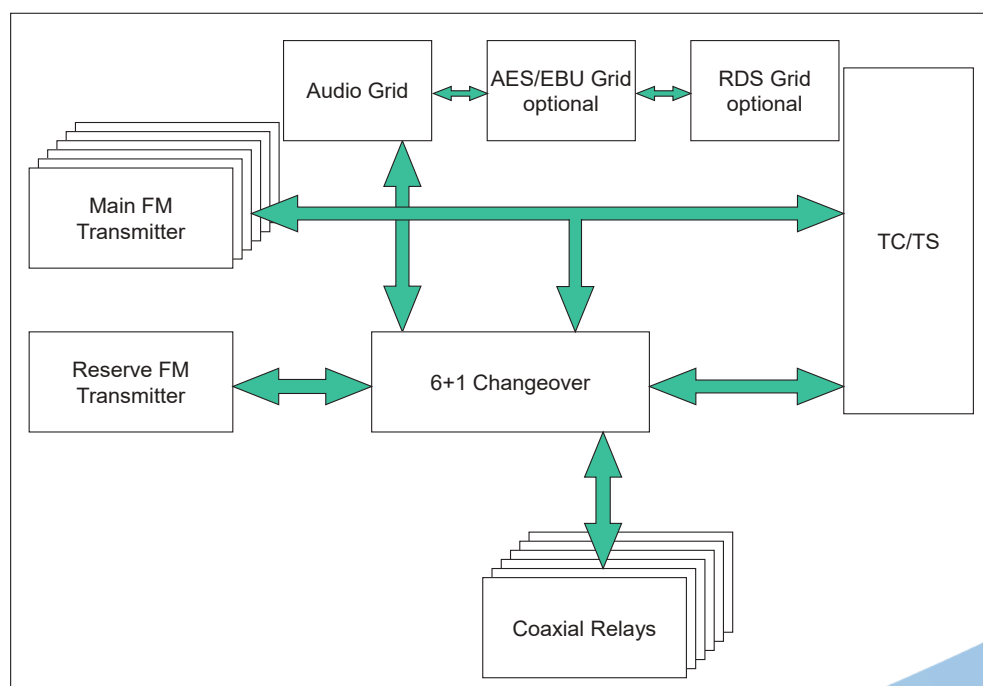
- **Options for the machine**
- **Spare parts**
- **Cables**

### 4.2 Features

The automatic N+1 changeover system RVR is composed of two devices:

- **SCM6/1** Changeover device
- **AUD6/1** Audio selection device
- **RDS6/1** RDS selection device (optional)
- **AES6/1** AES/EBU selection device (optional)

It's aimed to be incorporated in a transmission system including N (maximum 6) main transmitters and a reserve transmitter, plus the coaxial relays to perform the permutation between the transmitters and the combiner for the RF output of the transmitters.



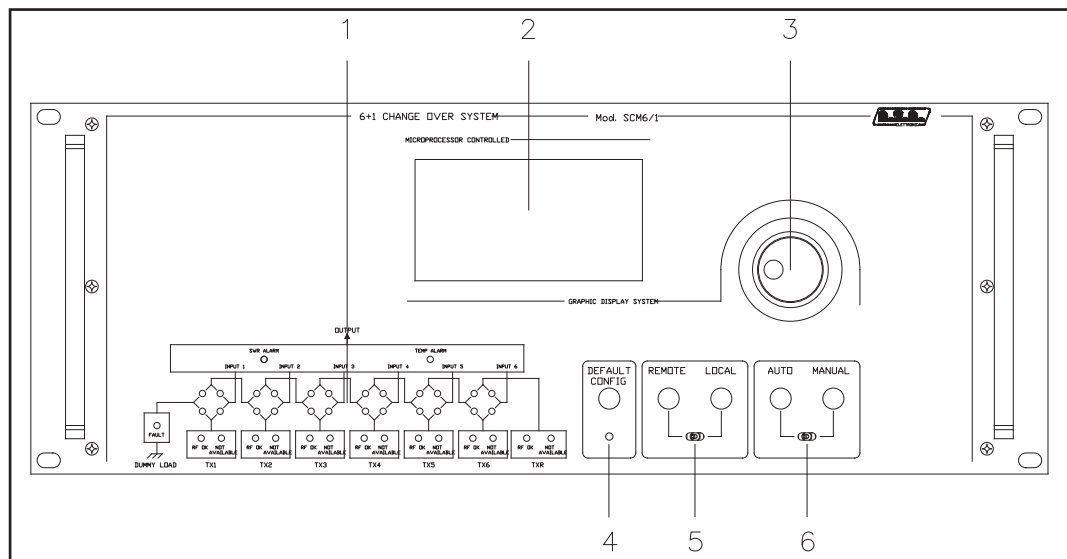
The heart of the system is the SCM6/1, while the audio, RDS and AES/EBU grids are just actuators of its commands.

The functions performed by the SCM6/1 are:

- Acquisition of the transmitters' status
- Control of the transmitters
- Control of the coaxial relays
- Control of the audio grid
- Control of the RDS grid
- Control of the AES/EBU grid
- Automatic changeover policy implementation with transmitter priority support, configurable intervention delays to take into account start-up, recycle or temporary RF power faults
- Visualization of the status of the components of the system
- Setting of the parameters related to the automatic changeover policy
- TC/TS electromechanical interface

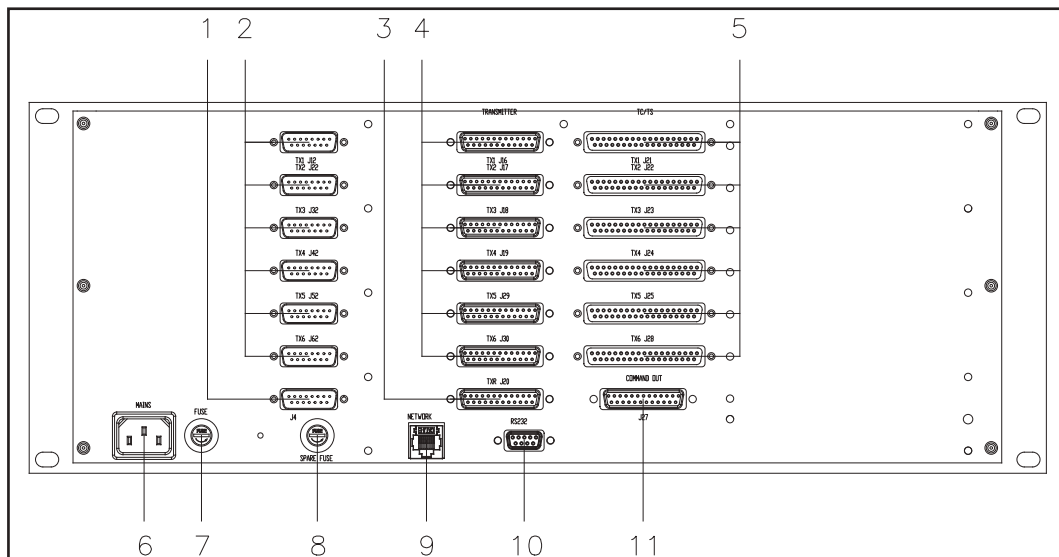
The user interface of the SCM6/1 is constituted by a LCD graphic display and a knob (the "encoder"). There are also two switches to select the working mode of the system, a button to force the system to work in "Nominal" mode and a series of LEDs.

### 4.3 Frontal Panel Description



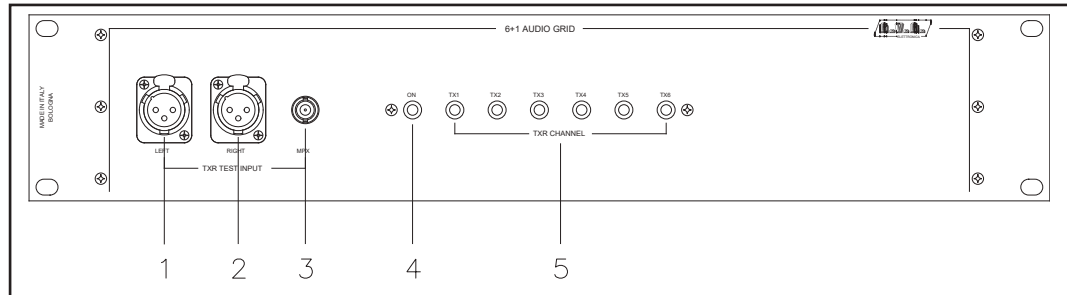
- [1] SYNOPTIC                      Representation of the system status.
- [2] DISPLAY                        Liquid crystals display.
- [3] ENCODER                       Software control knob and button.
- [4] DEFAULT CONFIG              Working status indication (LED) and force button.
- [5] REMOTE/LOCAL               Indicators (LEDs) and switch.
- [6] AUTO/MANUAL                Indicators (LEDs) and switch.

## 4.4 Rear Panel Description



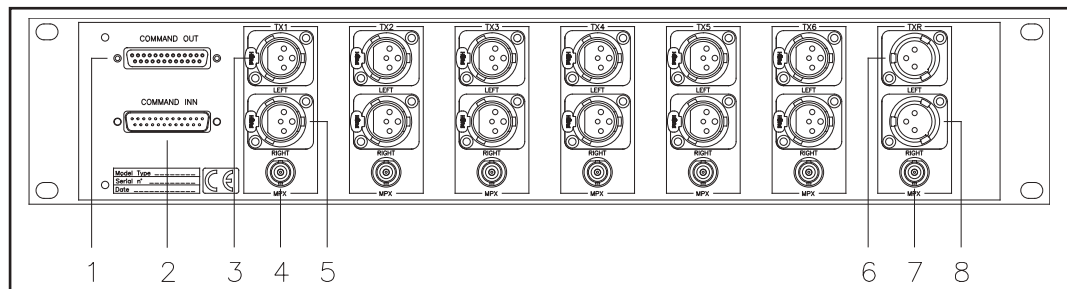
- |                      |   |
|----------------------|---|
| [1] J4               | Control connector for combiner/load.                        |
| [2] TX1/6 J12/62     | Control connectors for relays 1-6 (from top to bottom)      |
| [3] TXR J20          | Control connector for the reserve transmitter.              |
| [4] TX1/6 J16/30     | Control connector for transmitters 1-6 (top to bottom).     |
| [5] TX1/6 J21/28     | Connectors to the TC/TS - transmitters 1-6 (top to bottom). |
| [6] MAINS            | Mains power plug.   |
| [7] FUSE             | Mains fuse.   |
| [8] SPARE FUSE       | Spare fuse.   |
| [9] NETWORK          | RJ45 connector for TCP/IP communication.                    |
| [10] RS232           | DB9 connector for direct serial communication.              |
| [11] COMMAND OUT J27 | Control connector for Audio and RDS Grid.                   |

## 4.5 Frontal Panel Description Audio Grid



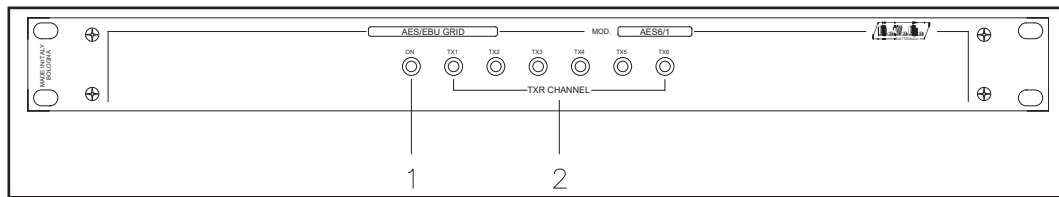
- |                 |  |
|-----------------|--|
| [1] LEFT        | Auxiliary input connector XLR (Left channel to reserve TX).                                    |
| [2] RIGHT       | Auxiliary input connector XLR (Right channel to reserve TX).                                   |
| [3] MPX         | Auxiliary input connector BNC (MPX to reserve TX).   |
| [4] ON          | Green led, lit when the device is ON.  |
| [5] TXR CHANNEL | Six Yellow leds, lit when the corresponding audio channel is routed to the reserve transmitter |

## 4.6 Rear Panel Description Audio Grid



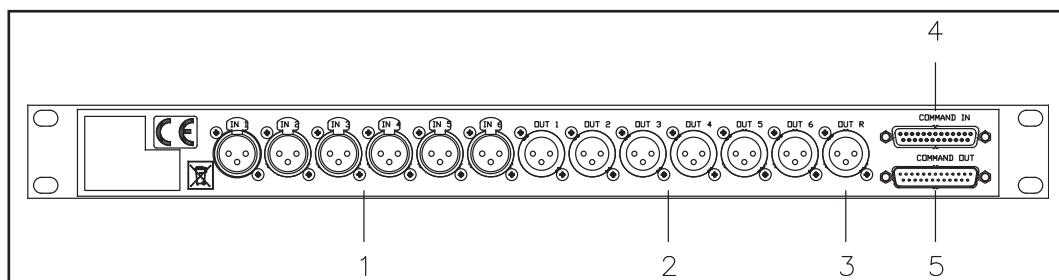
- |                 |  |
|-----------------|--|
| [1] COMMAND OUT | DB25 connector from SCM6/1.                                |
| [2] COMMAND IN  | DB25 connector to RDS Grid.                                |
| [3] TX1/6 LEFT  | XLR female left channel input TX1-6 (from left to right).  |
| [4] TX1/6 MPX   | BNC MPX input TX1-6 (from left to right).                  |
| [5] TX1/6 RIGHT | XLR female right channel input TX1-6 (from left to right). |
| [6] TXR LEFT    | XLR male left channel output to TXR.                       |
| [7] TXR MPX     | BNC MPX output to TXR.                                     |
| [8] TXR RIGHT   | XLR male right channel output to TXR.                      |

## 4.7 Frontal Panel Description AES/EBU Grid



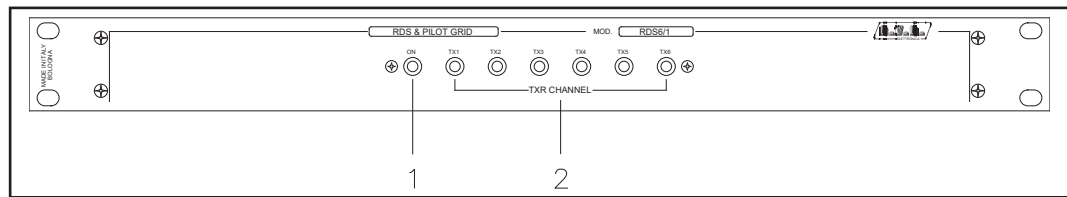
- [1] ON Green led, lit when the device is ON.  
 [2] TXR CHANNEL Six Yellow leds, lit when the corresponding AES/EBU channels are routed to the reserve transmitter.

## 4.8 Rear Panel Description AES/EBU Grid



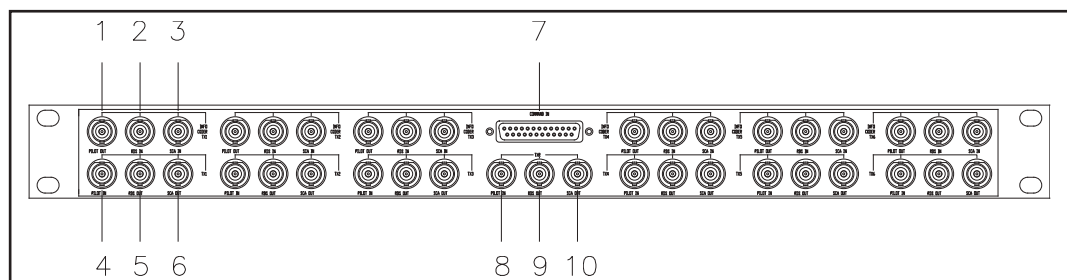
- [1] IN 1/6 Balanced XLR female AES/EBU channel input TX1-6 (from left to right).  
 [2] OUT 1/6 Balanced XLR male AES/EBU channel output TX1-6 (from left to right).  
 [3] OUT R Balanced XLR male AES/EBU channel output TXR.  
 [4] COMMAND IN DB25 connector to RDS Grid.  
 [5] COMMAND OUT DB25 connector from Audio Grid.

## 4.9 Frontal Panel Description RDS Grid



- |                 |   |
|-----------------|---|
| [1] ON          | Green led, lit when the device is ON.   |
| [2] TXR CHANNEL | Six Yellow leds, lit when the corresponding RDS channels are routed to the reserve transmitter. |

## 4.10 Rear Panel Description RDS Grid



- |                     |  |
|---------------------|--|
| [1] PILOT OUT TX1/6 | BNC Pilot tone to RDS encoder 1-6 (from left to right).    |
| [2] RDS IN TX1/6    | BNC RDS signal from RDS encoder 1-6 (from left to right).  |
| [3] SCA IN TX1/6    | BNC SCA1 signal form RDS encoder 1-6 (from left to right). |
| [4] PILOT IN TX1/6  | BNC Pilot tone from TX1-6 (from left to right).            |
| [5] RDS OUT TX1/6   | BNC RDS signal to TX1-6 (from left to right).              |
| [6] SCA OUT TX1/6   | BNC SCA1 signal to TX1-6 (from left to right).             |
| [7] COMMAND IN      | DB25 control connector from Audio Grid or AES/EBU grid.    |
| [8] PILOT IN TXR    | BNC Pilot tone from TXR.                                   |
| [9] RDS OUT TXR     | BNC RDS signal to TXR.                                     |
| [10] SCA OUT TXR    | BNC SCA1 signal to TXR.                                    |

## 5. Quick guide for installation and use

This section provides a step-by-step description of equipment installation and configuration procedure. Follow these procedures closely upon first power-on and each time any change is made to general configuration, such as when a new transmission station is added or the equipment is replaced.

Once the desired configuration has been set up, no more settings are required for normal operation; at each power-up (even after an accidental shutdown), the equipment defaults to the parameters set during the initial configuration procedure.

The topics covered in this section are discussed at greater length in the next sections, with detailed descriptions of all hardware and firmware features and capabilities. Please see the relevant sections for additional details.



**IMPORTANT:** When configuring and testing the transmitter in which the equipment is integrated, be sure to have the Final Test Table supplied with the equipment ready at hand throughout the whole procedure; the Final Test Table lists all operating parameters as set and tested at the factory.

### 5.1 Using the encoder

The interaction between the user and the exciter's control software is performed using the encoder (fig. 5.1).

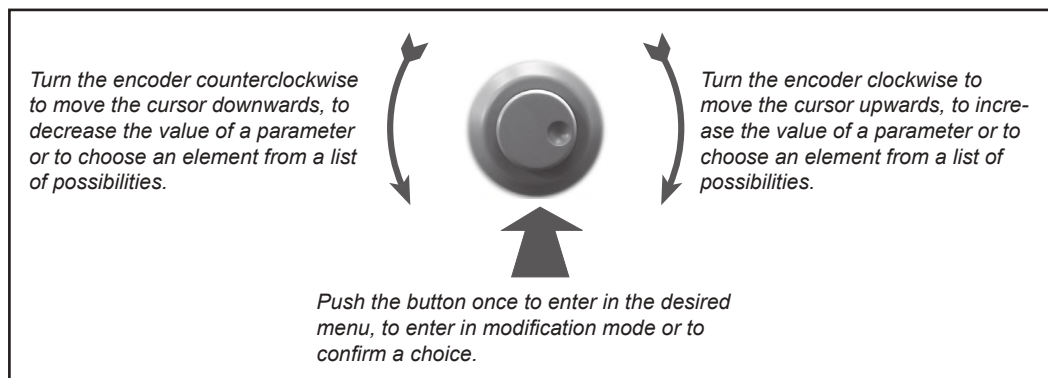


Figure 5.1

The operations that can be performed on the encoder are:

- **rotation:** moves the cursor shown on the display; if you turn the encoder to the left (counterclockwise), the cursor moves downwards, if you turn it right the cursor moves upwards; it also permits to increase or diminish the parameters (turning the encoder left diminishes the parameter, turning it right increases it) or to select an item from a list of options.
- **pression:** push the button once when the cursor is on the name of a menu to enter in that menu, push it when the cursor is on the name of a parameter to enter in modification mod (the cursor starts blinking); after the modification of a parameter, push the button to save the new value.



After having modified the value of a parameter, the cursor goes on blinking for approximately 30 seconds, waiting for confirmation from the user. If the user doesn't confirm the new value (i.e., the button is not pressed), the device emits a sound to indicate that no modification has been saved; the cursor stops blinking and remains on the selected parameter.

## 5.2 Modes of Operation

The SCM6/1 can operate in different modes, depending on the combination of the position of the switches on the front panel.

Switch REMOTE/LOCAL (5 figure 4-3)

- LOCAL The parameters can be set locally using the encoder, telecontrol of the transmitters from the Frontal is disabled
- REMOTE No parameter can be set locally using the encoder, telecontrol of the transmitters from the Frontal is enabled

Switch AUTO/MANUAL (6 figure 4-3)

- AUTO The automatism is enabled (the effective intervention of the system depends on the configuration of the machine). Manual intervention is still possible
- MANUAL The automatism is disabled

## 5.3 Display

The display is organized in two sections.

The upper part of the display contains one line for each of the 6+1 transmitters of the system, on which the main parameters related to the control of each of them can be read and/or set.

The lower part contains different menus for the control of special functions supported by the system.


The two parts are separated by a "status bar" that is used, depending on the situation, to:

- request for confirmation from the user (Are you sure? [Yes] [No])
- Indicate the status of the automatism of the system ("Auto Switch Allowed" or "Auto Switch Disabled")
- indicate the fact that the system is waiting for some condition (e.g. "Wait for TX1 switch")



Name                      Name assigned to the transmitter.

To enable the configuration of the transmitters, the SCM6/1 has to be set in Maintenance or in Configuration mode (see below the Mode menu).

With the encoder, select the line of the transmitter to be configured and push the encoder. The order number of the transmitter is substituted by the icon , signalling that the configuration of the transmitter is in progress.

At this point, rotating the encoder will select the different parameters, that can then be changed pushing the encoder.

To change the name assigned to the transmitter, select it with the encoder and push it. The name can be changed letter by letter rotating the encoder to select the desired character, and each time the encoder is pushed the editing passes to the following letter. When finished with the editing of the name, push the encoder and keep it pressed until a long beep signals that the new name has been stored in memory.

The line related to the reserve transmitter is analogous to the ones of the main transmitters, with the following differences:

- No priority is present
- The position of the switch is not settable manually (in fact, there is no switch dedicated to the reserve transmitter, and the indication is the consequence of the positions of the main transmitters switches)
- The status Enabled/Disabled is not settable
- The “Name” shown reflects the status of the of the reserve transmitter: if it signals to the SCM6/1 that it is configured for frequency “i”, than the name of transmitter “i” will be shown. If the reserve transmitter doesn’t signal any configuration, no name will be shown.
- When the SCM6/1 is in local mode and the reserve transmitter is on load, it is possible to configure it for one of the different transmitter frequencies. With the encoder, highlight the “Name” field and push it. Rotating the encoder the different names will be selected in turn. Once the desired name is shown, push the encoder to send the configured telecontrol to the transmitter. To exit from this frequency-selection mode, keep the encoder pushed until you hear a long beep.

### 5.3.2 Mode Menu

When the SCM6/1 is in local mode, this menu allows the user to select one out of three operating modes:

**EXPLOITATION** The user can only read the parameters without changing them.

**MAINTENANCE** The user is allowed to change the parameters, they are taken into account immediately but they are not stored in non volatile memory. This means that if the changeover unit is forced to the NOMINAL status or if it's reset, the previous saved configuration is restored.

**CONFIGURATION** The user is allowed to change the parameters, they are taken into account immediately and stored in non volatile memory as the "Nominal" configuration.

### 5.3.3 Wait menu

Using this menu one can configure the waiting times that are connected with each transmitter.

	InhBit	Before	After	Mode
	sec.	sec.	sec.	Wait
TTXX	00000000	00000000	00000000	Info
TTXX	00000000	00000000	00000000	Back
TTXX	00000000	00000000	00000000	Alarm
TTXX	00000000	00000000	00000000	Set

Each line contains the value in seconds for the following intervals:

- InhBit** When switched ON, the transmitter is allowed to keep the Inhibit signal active for a time as long as the one configure in this field. The SCM6/1 will start checking the Power Good status only at the end of this interval or when the Inhibit signal is deactivated.
- Before** Time to wait before considering a Powerfail alarm valid. If the PowerGood signal comes back before this interval is expired, no switching is performed
- After** This is the time allowed after a switchover before assuming a fault in the coaxial relay

### 5.3.4 Info menu

This information menu gives the details of the Firmware (the basic I/O evaluation software) and of the Software (the I/O table) releases used in each of the I/O boards.

	InhBit	Before	After	Mode
	sec.	sec.	sec.	Wait
TTXX	00000000	00000000	00000000	Info
TTXX	00000000	00000000	00000000	Back
TTXX	00000000	00000000	00000000	Alarm
TTXX	00000000	00000000	00000000	Set

If any of the boards is not installed, the corresponding line will be empty.

### 5.3.5 Ack. menu

The “Acknowledge” menu is useful for diagnostics purpose, since it gives the status of the transmitters as they are seen by the SCM6/1.

	Auto	Switch	Allowed					
	ON	HT	RF	SWC	MTX	InH		
TX1	XX	XX	XX	---	---	X		Mode
TX2	XX	XX	XX	---	---	---		Wait
TX3	XX	XX	XX	---	---	---		Info
TX4	XX	XX	XX	---	---	---		Ack.
TX5	XX	XX	XX	---	---	---		Alarm
TX6	XX	XX	XX	---	---	---		GSet
TXR	MA	---	---	---	---	3		

- ON A “X” in this column indicates the presence of the ON signal, a “-” indicates its alnterlockence
- HT A “X” in this column indicates the presence of the HT signal, a “-” indicates its alnterlockence
- RF A “X” in this column indicates the presence of the RF signal, a “-” indicates its alnterlockence
- SWC “A” means Mode 1 (Antenna), “L” means Mode 2 (Load)
- MTX A “X” in this column indicates the presence of the MTX signal, a “-” indicates its alnterlockence
- InH A “X” in this column indicates the presence of the InH signal, a “-” indicates its alnterlockence

For the reserve transmitter line “TXR”, the five fields have a different meaning:

- 1 MA On
- 2 AR Off
- 3 DE Fault
- 4 LOC Local
- 5 --3--- (example) The reserve transmitter is set to sulnterlocktitute the transmitter 3

### 5.3.6 Alarm menu

This menu contains the history of the alarms that possibly occurred.

Auto	Switch	Disabled						
Alarm	01	07						Mode
12/02/2001	17:37							Wait
TX1: Power fault								Info
								Ack.
								Alarm
								GSet
TX1: X	-	-	A	-	-	-		

With the first line of the menu the user can select one of the alarm that occurred (the inverted “01” in the example above) out of the set of alarms that are kept in the memory (the number “07” in the example).

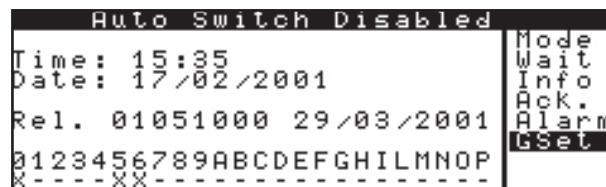
The rest of the screen gives the date and time of the alarm, the kind of alarm and the status of the acknowledges of the transmitter (see 3.3.5) at the moment the alarm was generated.

The alarm codes that are handled by the SCM6/1 are the following:

SCM6 Restart	Restart of the SCM
Transmitter Fault	Validated power good fault (-> a changeover is started)
Load Fault	Fault on the dummy load
Sw.Coax Fault	During a changeover, the switch didn't confirm reaching the required position
No I2C Comunic	No I2C communication with a transmitter control board
Fault +24V TX	Alinterlockence of the power supply of the TC of a TX
Fault OFF TX	The power from a transmitter that was switched off (for example to perform a manual changeover) has not been cut
No TXR Config Ack	Alinterlockence of the acknowledge of the configuration from the reserve transmitter

### 5.3.7 GSet menu

The General Settings menu is used to set the date and time of the SCM6/1, that is used only for diagnostic purposes (see Alarm menu).

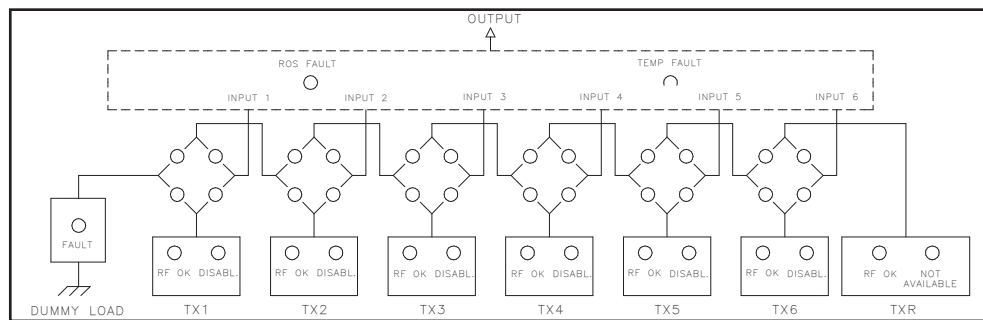


To set the current date and time, enter in the menu screen pushing the encoder on the indication GSet in the navigation bar. Then rotate the encoder to highlight the parameter that you want to change and push the encoder again. Rotate the encoder to show the value to be set and than push the encoder to store the value. You can than use the encoder to change another parameter or to exit from the menu.

The third and fourth lines give respectively the release number and date of the management software and the configuration of the jumpers on the panel board.

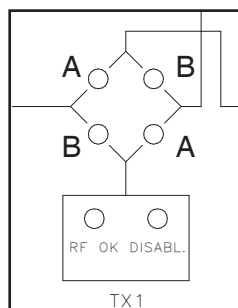
## 5.4 The Synoptic

In the front panel of the SCM6/1 there is a synoptic diagram that indicates at once the status of the controlled transmission system using a set of leds.



The meaning of the leds is the following:

For each transmitter, the synoptic includes a diagram of the respective coaxial relay with 4 LEDs. The green LEDs “A” when lit indicate the setting of the relay on way 1 (normal), while the yellow LEDs “B” are used to signal the status of the relay on way 2 (reserve). One green denotes the “power good” status of the transmitter, while a yellow on indicates disabled, that is the setting in the configuration of the SCM6/1 or the “Local” status of the transmitter.



If a transmitter is not included in the system, the corresponding leds are off.

There are also three red leds related to the TSs of the combiner and of the dummy load:

- fault of the dummy load
- excessive SWR at the combiner
- excessive temperature at the combiner

## 5.5 The Nominal status

The SCM6/1 implements the concept of “Nominal” status.

It considers itself in “Nominal” status and signals it switching on the relative LED on the front panel if:

- the switch LOCAL/REMOTE is on REMOTE
- the switch AUTO/MANUAL is on AUTO
- the reserve transmitter is on load
- the current configuration of the system (enabled/disabled, Priority) coincides with the configuration stored in memory using the “CONFIGURATION” mode.

The SCM6/1 includes a protected button to force the system in Nominal mode.

If the user pushes the “Nominal” button, the management software first asks for confirmation on the status bar. Upon confirmation, the SCM6/1 checks whether the actual status of the transmission system coincides with the one stored in memory as “nominal”, and then it performs the necessary steps to go back to the nominal status, that is:

- it performs the necessary permutations to bring all the transmitter back in the normal position (i.e. Position 1)
- it sets the priority level of the transmitters as in the nominal configuration
- it restores the Enab./Disab. setting of each transmitter as it was in the nominal configuration

When all the steps are completed and confirmed by the relevant TSs, the “nominal” LED will be lit indicating that the system is configured as required.



## 6. Operation

This chapter describes the basics of the operation of a generic N+1 system and the different modes of operation of the SCM6/1.

### 6.1 Telecontrol, Telesignaling

The SCM6/1 is designed to make available it to receive telesignalling (TS) and to transmit telecontrols (TC). TS are signals of permanent type, while TC are impulse type signals of approx. 700 ms duration.

If the switch REMOTE/LOCAL (5 Fig 4-3) is on the position LOCAL, the TC are ignored. In this case, the TS “Local (N+1)” is present.

When the switch is on the position REMOTE, TC are enabled.

The very minimum set of information interchange required to control a transmitter in a changeover system is composed by the “Power Good” signal from the transmitter and by the Interlock (Figure 6-1):



Figure 6-1

In a typical installation two more signals are used to send to the transmitter the TCs On and Off (Figure 6-2).

When the SCM6/1 activates a transmitter, the basic operations performed are:

- the Interlock is closed
- the TC On is sent

When a transmitter is manually switched off,

- the Interlock is opened
- the TC Off is sent

When a transmitter has to be switched off by the automatism implemented by the SCM6/1 to perform a permutation, the TC Off is not sent, and only the Interlock is opened. This behaviour is intended to avoid the need for the pre-heating cycle.

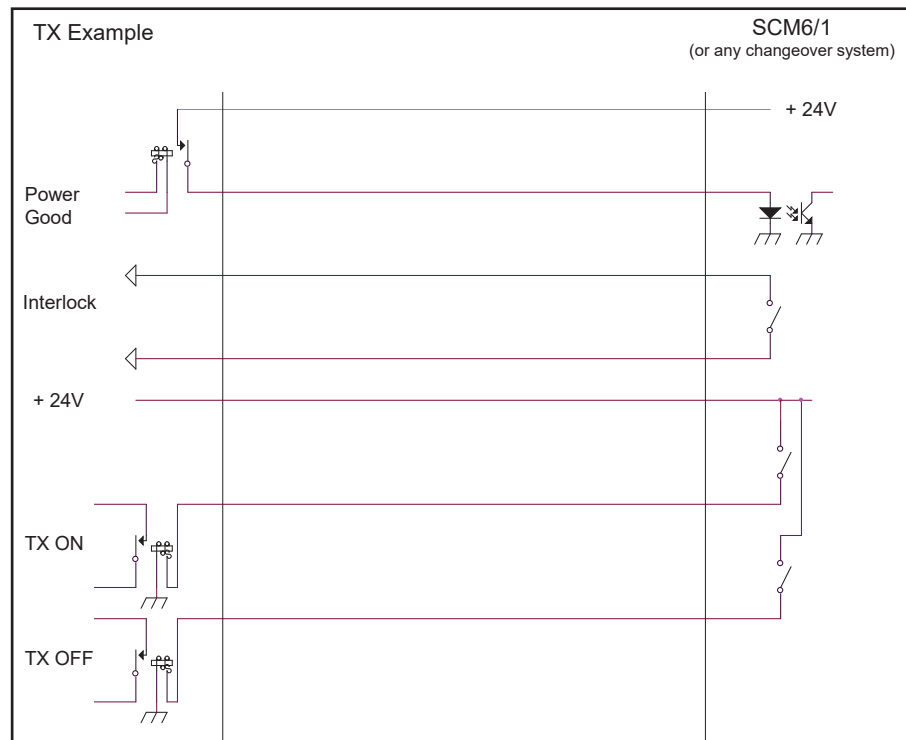


Figure 6-2

In a real installation, TCs and TSs are exchanged between the SCM6/1 and all the other devices in the transmission system (see the details in the following paragraphs). In general, TSs and TCs are constituted by dry contacts that are closed or opened by the generator of the information, and that are energized by the user of the information.

An example of the set of TCs and TSs exchanged between the SCM6/1 and a transmitter is given in figure 4-3.

## 6.1.1 Links with the main transmitters

### 6.1.1.1 Signalizations to N+1

- 1 Transmitted power fault: when the fault occurs the Interlock is open,
- 2 Local mode: when the transmitter is in local mode the Interlock is closed,
- 3 On transmitter: when the transmitter is in On the Interlock is closed, These Interlocks are polarized for the + 24 of the N+1 (pin 16)

### 6.1.1.2 Telecontrols

- 1 Transmitter power on: On command of the main transmitter (TX 1 to TX6)
- 2 Transmitter shutdown: Off command of the main transmitter (TX 1 to TX 6)

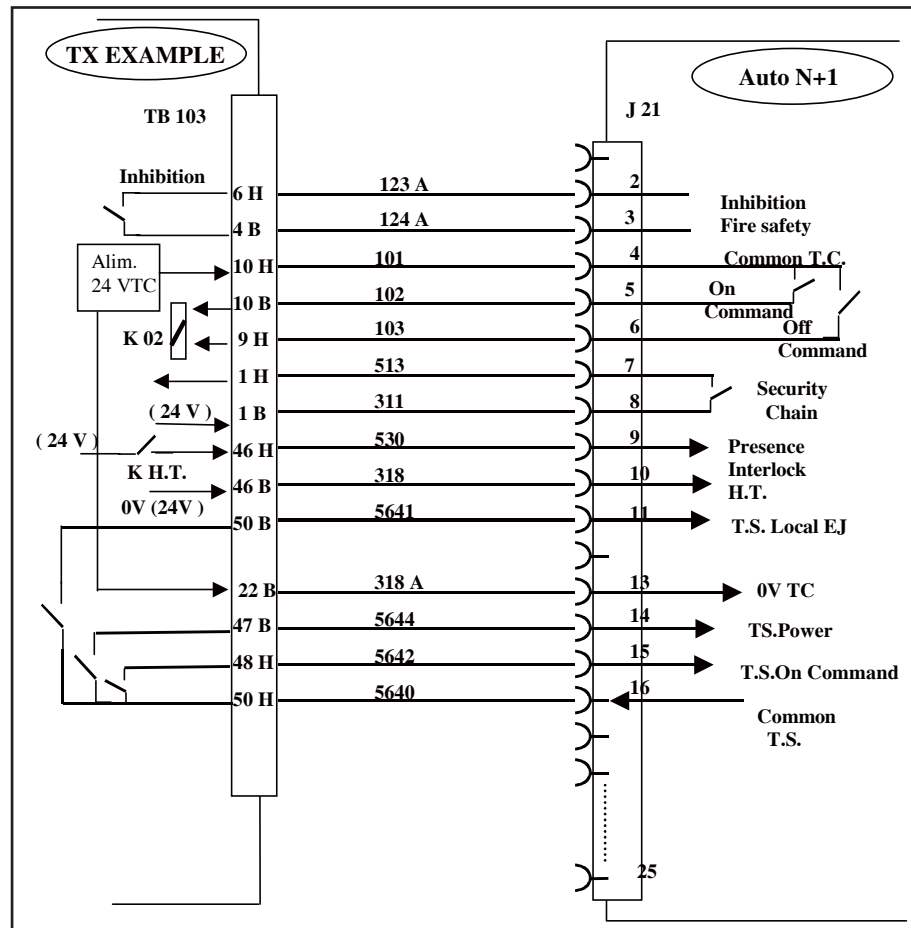


Figure 6-3

These telecontrols are made by closing Interlock by the RVR system, from the TC common (+24 volt) supplied by the THOMSON transmitter. They are in parallel with the front end SYSTEMEX (see appendices 2 &3).

The existing mono/stereo TC on the Thomson system is not included in the RVR system.

### 6.1.1.3 Others

1 HT presence : when HT is present, a potential of 24 v is present between pins 9 and 10 of the connector.

lors de la présence HT un potentiel de 24 v est present entre les pins 9 et 10 du connecteur.

2 Inhibition: Boucle sèche ouverte entre pins 2 et 3 quand inhibition terminée

3 Chaine sécurité: Boucle seche entre pins 7 et 8. L'ouverture de dette boucle sèche provoque la suppression de l'alimentation HT des émetteurs

## 6.1.2 Connections with emergency transmitter

### 6.1.2.1 Telesignalizations

- 1 Off : closing the interlock means that the transmitter is actually stopped,
- 2 On : closing the interlock means that the transmitter is actually On,
- 3 Transmitter fault: the closing of the interlock means that the transmitter is either in power alarm, or stopped on fault
- 4 Local Mode : closing the interlock means that the transmitter is in local mode
- 5 Transmitter Configuration (TX 1 to TX 6): closing one of the interlocks signals enable the configuration of the transmitter.

These telesignalizations are obtained by permanent interlocks opening/closing via a TS Common polarized by the SCM6/1.

### 6.1.2.2 Telecontrols

- 1 On transmitter,
- 2 Off transmitter,
- 3 Transmitter Configuration (TX 1 to TX 6)

These telecontrols are obtained by closing a dry interlock by the RVR system, from the TC common supplied by the reserve transmitter.

### 6.1.2.3 Others

- 1 The interlock is connected (2 points: open = fault)

## 6.1.3 TC/TS Signals

### 6.1.3.1 Telesignalizations

- 1 On Position 2: copy of the TC On acknowledgment on R&S Transmitter,
- 2 Local Position 2: active when R&S transmitter is in local mode,
- 3 Mode 1: copy of the TC Mode 1 acknowledgment (normal)
- 4 Mode reserve: copy of the TC Mode 2 acknowledgment (emergency)
- 5 Fault N+1: active when fault self-diagnosis,
- 6 Manual N+1: active when automation N+1 is disengaged,

These telesignalizations, in up to 6 copies, are generated by the RVR system and are maintained (permanent).

### 6.1.3.2 Telecontrols

- 1 On
- 2 Off
- 3 Mode 1,
- 4 Mode 2 (reserve)

The existing TC stereo on the Thomson system is not included in the RVR system. TC Mono N+1 is also not managed in the RVR system.

These telecontrols supplied, in up to 6 copies, by the front end are fleeting (approximately 700 ms).

### 6.1.3.3 Others

The interlock is connected (2 points : open = fault)

## 6.1.4 Connections with coaxial switches

### 6.1.4.1 Power supply on Socapex connector

- 1 Phase 1 position 1,
- 2 Phase 2 position 2,

### 6.1.4.2 Copy status

- 1 Switch in position 1,
- 2 Switch in position 2,

## 6.1.5 Links with baseband grid

The TS and TC are identical for the audio drawer and for the broadcast info drawer

### 6.1.5.1 Telesignalizations

Program 1 to 6 positioned on reserve.

These 6 remote signals are managed by the RVR system.

### 6.1.5.2 Telecontrols

Program 1 to 6 to position on reserve.

## 6.2 Operation in automatic mode

The control software of the SCM6/1 continuously checks the operating conditions of the transmitters of the system.

The current status of the SCM6/1 is a consequence of the configuration, of the history of previous events, and of the current telesignals from the controlled devices. A fault event detected by the SCM6/1 will thus be treated differently depending on the status of the system.

The basic aim of the SCM6/1 is to cyclically check the RF Power of the transmitters and to substitute a faulty principal transmitter using the reserve transmitter. This is performed by a software routine of which the overall flow-chart is given in figure 6-3.

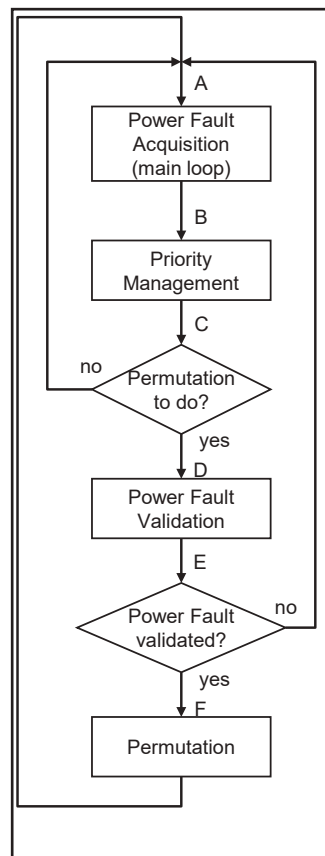


Figure 6-4: Automatism routine

The management software of the SCM6/1 loops in this cycle when the following conditions are met:

- SCM6/1 is in automatic mode
- TXR is not in Local mode
- No fatal error has occurred in the SCM6/1

The automatism cycle can be subdivided for clarity in the following subprocesses:

- Acquisition of the power fault: this process is run indefinitely while no fault event is detected.
- Priority management: the software determines whether the detected fault requires the implementation of the priority policy
- Power Fault validation: this process is intended to validate the necessity for a permutation with respect to the different delays and conditions intended to avoid taking into account temporary fault conditions
- Permutation: implementation of the permutation of the relevant relay and realization of the possible necessary fault management actions

### 6.2.1 Power fault acquisition

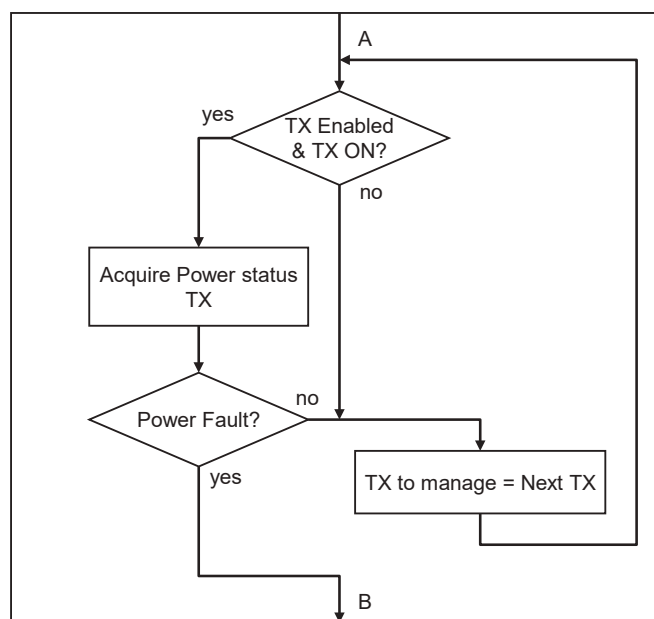


Figure 6-5: Power fault acquisition

This process consists in cyclically checking the TS “RF presence” from the transmitters of the system, until a fault is detected. The next transmitter to be checked can also be set externally from the process “Permutation” (see below).

### 6.2.2 Priority management

This function is aimed to take into account the status of the system with respect to possible permutations that have been performed before.

If the reserve transmitter TXr is currently switched towards the dummy load (i.e. it’s free to be used), no priority management has to be performed, and the result of the function is just the validation of the fact that the permutation to be done consists in putting TXr on air in the place of the current transmitter.

If the reserve transmitter is instead currently used to substitute another transmitter, the priority of that transmitter has to be checked against the one of the

current transmitter. If it's higher or equal, no permutation will be done, while if it's lower the permutation that will be operated by the system will be the reverse one (i.e. Position 2 to Position 1) of the formerly substituted transmitter.

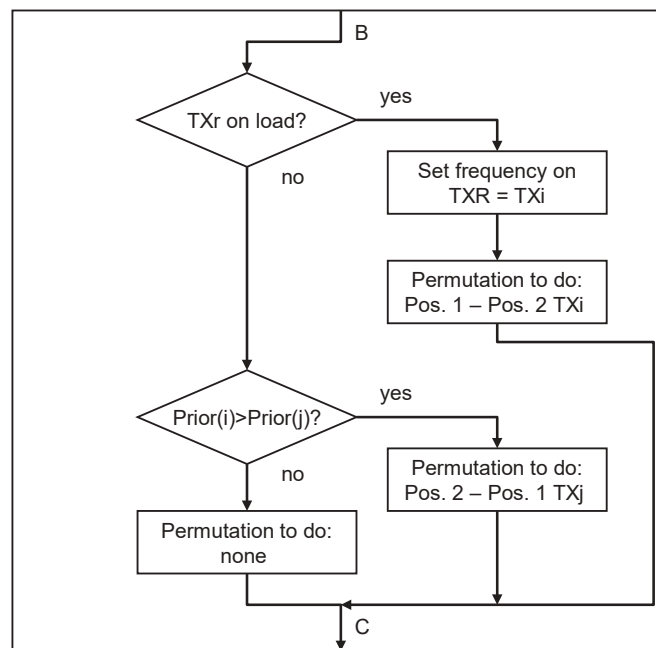


Figure 6-6: Priority management

### 6.2.3 Power Fault Validation

The role of this function is to avoid executing a permutation if the fault condition was only temporary. To reach this goal, different delays (timer) and conditions to be checked are foreseen in the SCM6/1.

The first checked condition is the presence of the TS Inhibit of the current transmitter, with the annexed delay interval that is configurable for each transmitter. This condition takes the precedence on the other, that is if the Inhibit TS is raised while the software is waiting for another timer to expire, the Inhibit timer is immediately started and the former timer is discarded.

This condition is connected with the start-up of a transmitter, in which typically a longer time is allowed before declaring that a power fault has to be taken into account. The start-up condition is in fact signalled by the transmitter using the Inhibit TS (not used, always OK).

The second condition, checked if the TS Inhibit is not present, is the status of the HT TS. The interlocking of both RF power and HT is used to signal that the transmitter is performing a Rearmement sequence. In this case, a fixed 20" delay is introduced by the control software. Steps are taken to avoid the recycling delay to be inserted more than once consecutively for a given transmitter.

The last delay used by the SCM6/1 is the "before" timer, configurable for each transmitter.



If during any of the above mentioned delays, the RF power of the current transmitter comes back, the process exits with the value "Power fault not validated".

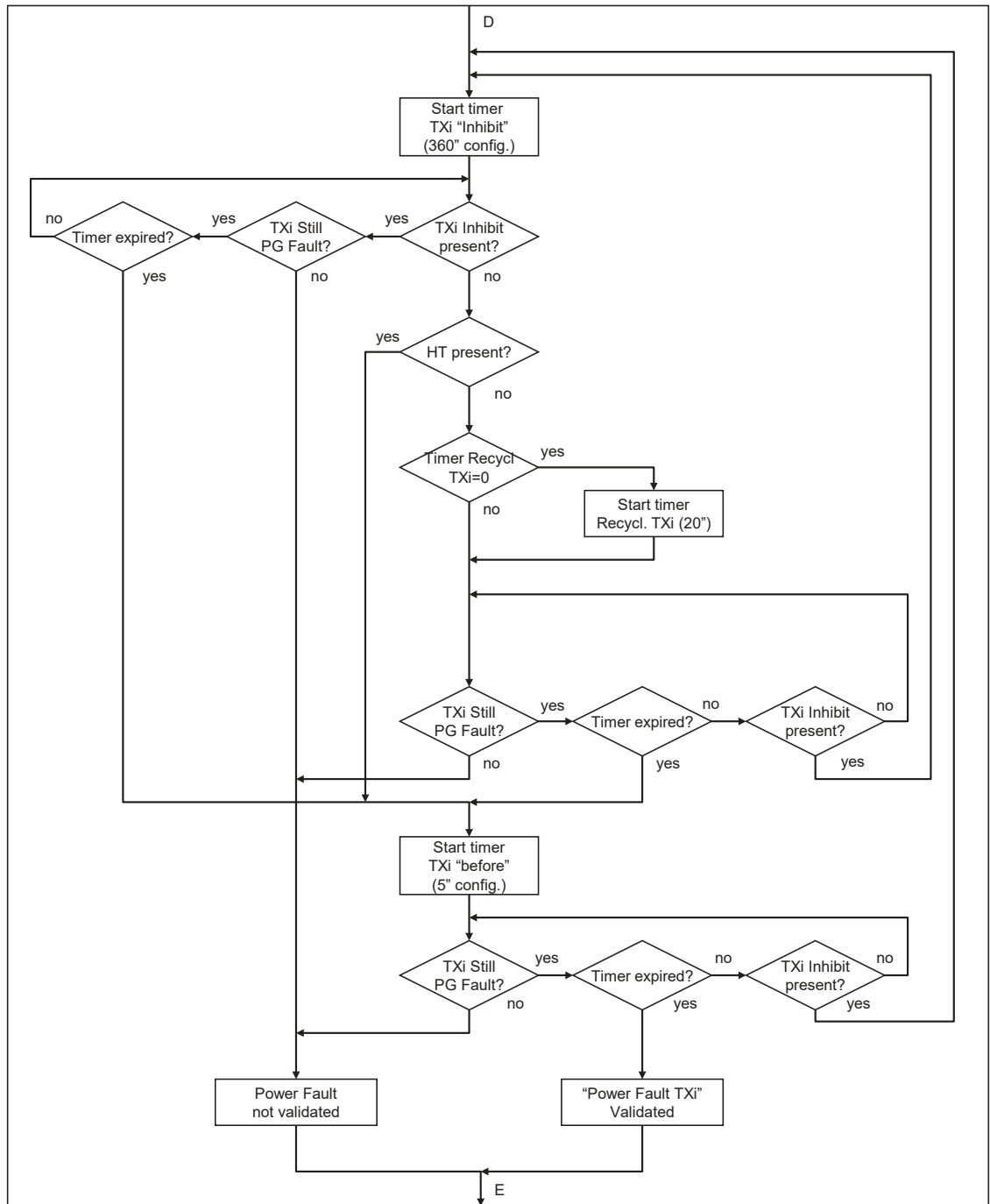


Figure 6-7: Power fault validation

### 6.2.4 Permutation

The permutation process (Figure 4-8 )can actually assume two forms, depending on the kind of permutation to be done, that is Position 1 to Position 2 or vice versa, as determined by the "priority management" process.

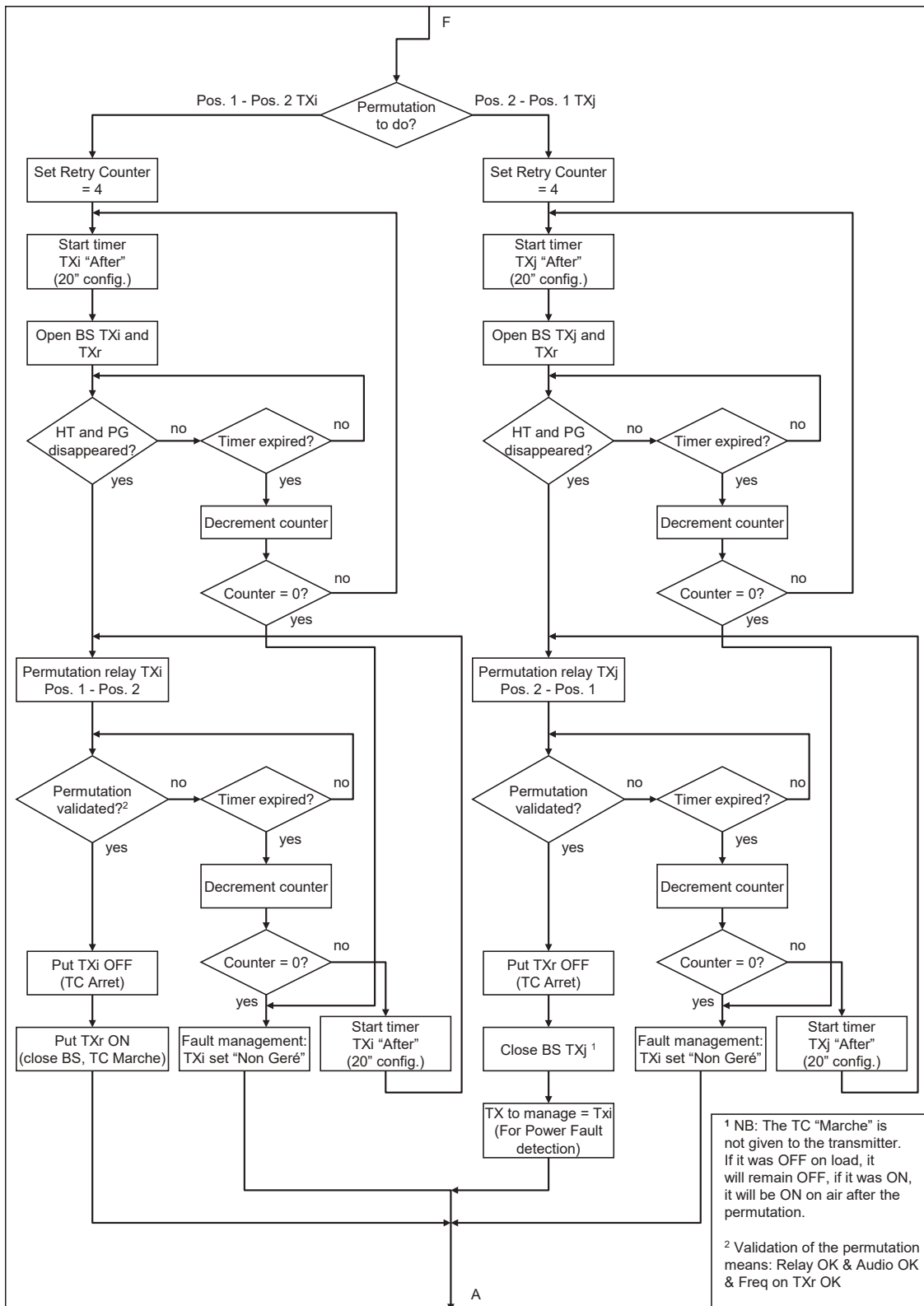


Figure 6-8:Permutation

The first step of this process is to disable the power output of the transmitters involved in the permutation. This is done giving the OFF TS on both transmitters and waiting for the relevant TS to have the required values (HT and RF Power have to disappear).

When it's safe to move the coaxial relay, SCM6/1 sends the corresponding TC and waits for the acknowledge of the fact that the relay reached the wanted position.

To allow for possible delays or misfunctionments in the actuation of the preceding two steps, a wait-retry mechanism is foreseen including 4 attempts separated by a configurable delay (this timer is called "after" in the wait menu).

If everything went as requested, at the end of the permutation the transmitter that has been put on load is switched using the relevant Telecontrol.

In case of "reverse" permutation, the software will then pass to the "Power Fault detection" process for transmitter TX<sub>i</sub>, that is the one that caused the reverse permutation for transmitter TX<sub>j</sub> (with lower priority) that was on load.

If the commands given by the SCM6/1 don't have the required effect (the power of a transmitter is not cut, or the relays doesn't switch to the requested position), the system implements a mechanism of fault management consisting in locally setting the involved transmitter as disabled. This is intended to avoid hanging in trying to serve a transmitter that is not controllable anymore, and living to the automatism the possibility to manage possible faults of other transmitters. It's the case to remember that in such case the system will not be in "Nominal" status anymore, and such condition will be denoted by the "Nominal" led on the front panel being off.

### 6.3 Operation in manual mode

When the SCM6/1 is set in manual mode with the switch on the front panel, the automatism in the machine is disabled.

The manual status is remotely signalled to the frontal with the TS "N+1 Local".

When in this mode, it is possible send TC, receive TS or configure the system being shure that the SCM6/1 will not interfere with the operations performed.

The SCM6/1 assists the operator also in manual mode, giving to the devices of the system the suitable commands to obtain the desired results.

In particular, if the user requests a permutation (from the transmitters configuration menu, item "Air/Load"), the SCM6/1 acts exactly as described in the "Permutation" process in the automatic mode.

As noted in chapter 4.2.4, when the permutation is direct (Position 1 to Position 2), TX<sub>r</sub> is switched ON, while TX<sub>i</sub> is switched OFF. For a reverse permutation (Position 2 to Position 1), TX<sub>r</sub> is switched OFF, while TX<sub>i</sub> is put on air, but the On TC is not given, so it's left in the status it was before the permutation. If it was OFF, it is thus necessary to explicitly turn it ON from the configuration menu.

## 7. Internal Description

### 7.1 SCM6/1

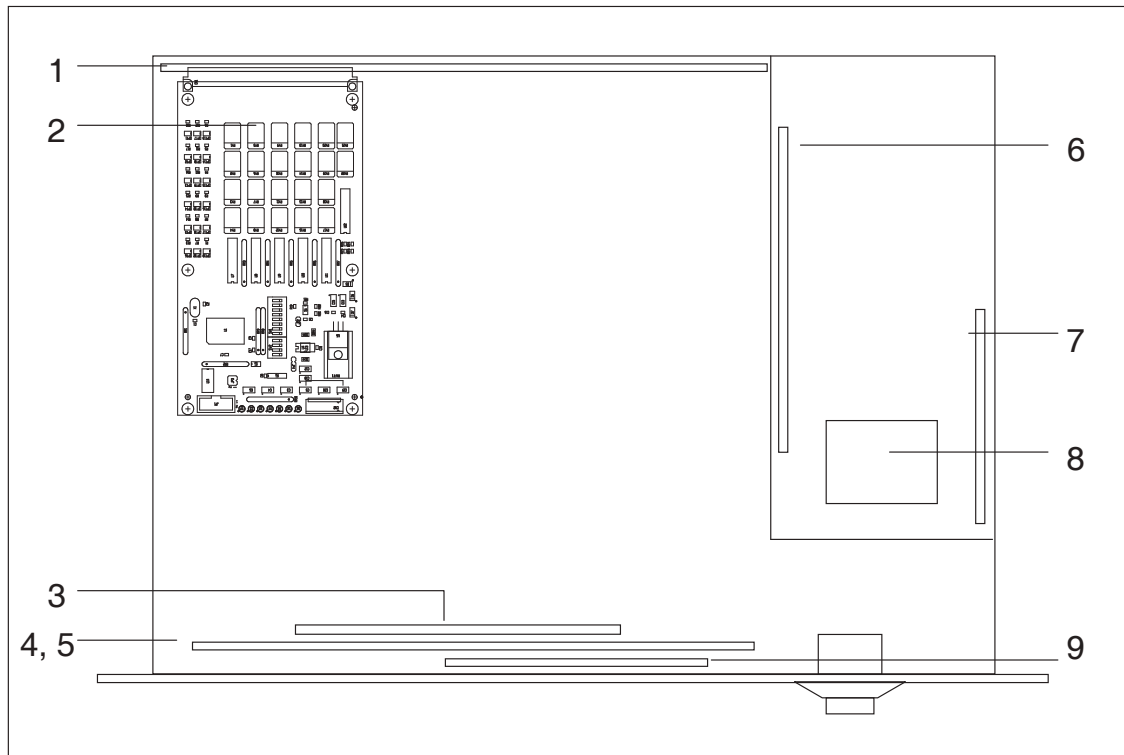


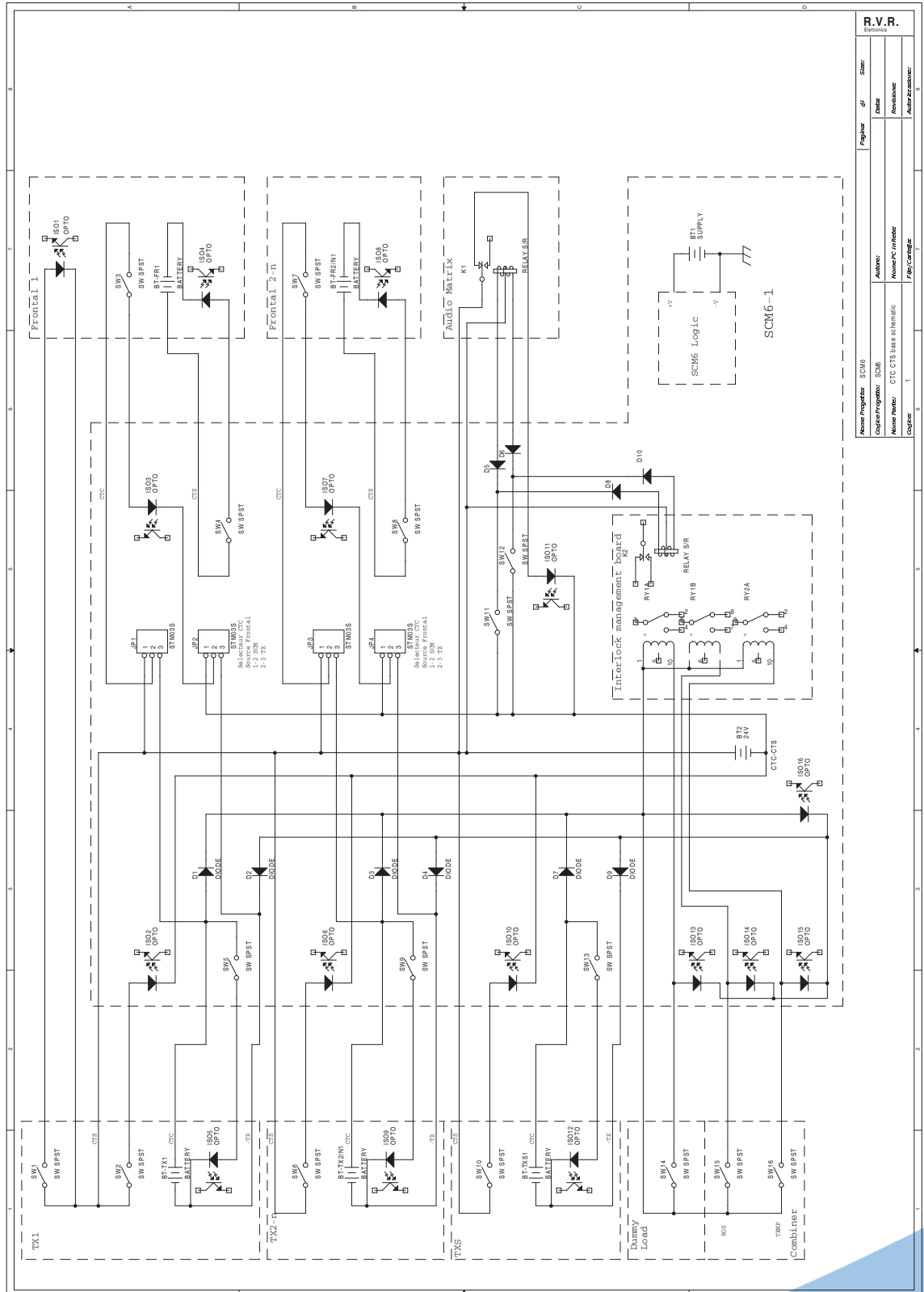
Figure 7-1: Top view of the SCM6/1

- 1 System Interconnection board
- 2 Transmitters control boards (up to 7 units)
- 3 CPU board
- 4 Panel board (top)
- 5 Synoptic board (bottom)
- 6 Relay interconnection board
- 7 Switching power supply
- 8 Rectifiers board
- 9 Display

The different board composing the device are described in the following paragraphs.

## 7.1.1 Supply of TCs and TSs

An important point in the interconnection of different devices exchanging telecontrols and telesignalling is the way the related signals are supplied. Figure 5-2 gives a schematic overview of the different power sources for the signals involved in a complete N+1 system.

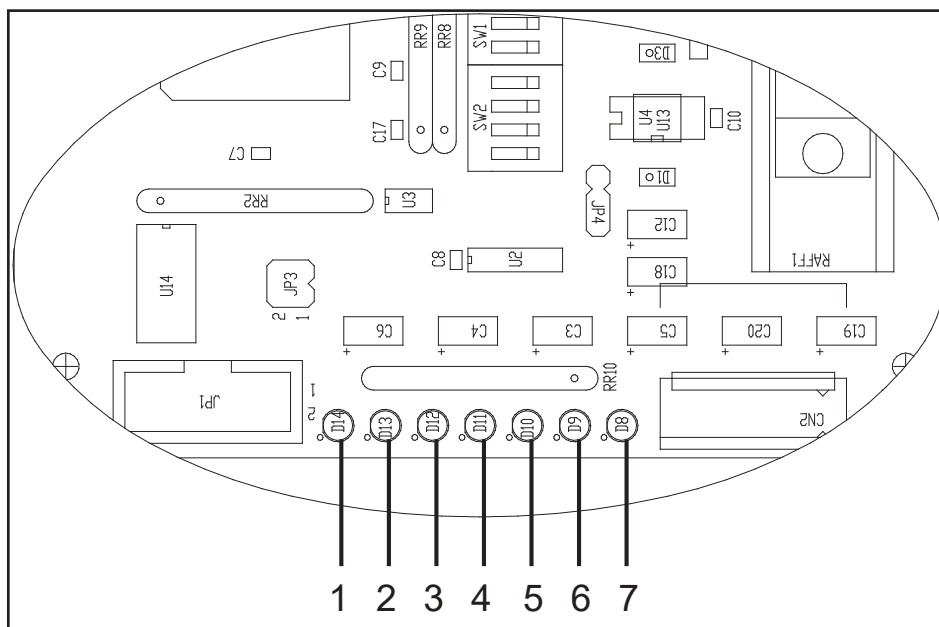


## 7.1.2 Transmitter control boards

The SCM6/1 includes one transmitter control board for each of the transmitters in the system. These boards are based on a Fujitsu MB90F543 microprocessor for the implementation of the I/O logic, they have 18 digital inputs and 26 digital outputs. They communicate with the CPU board using the IIC bus protocol, and snap into the system interconnection board with a standard DIN 41612 96 pins connector.

The boards contain seven green LEDs indicating:

- 1 Working
- 2,3 RS232 communication (during programming of the board)
- 4,5 CAN communication (not used in SCM6/1 system)
- 6,7 IIC communication

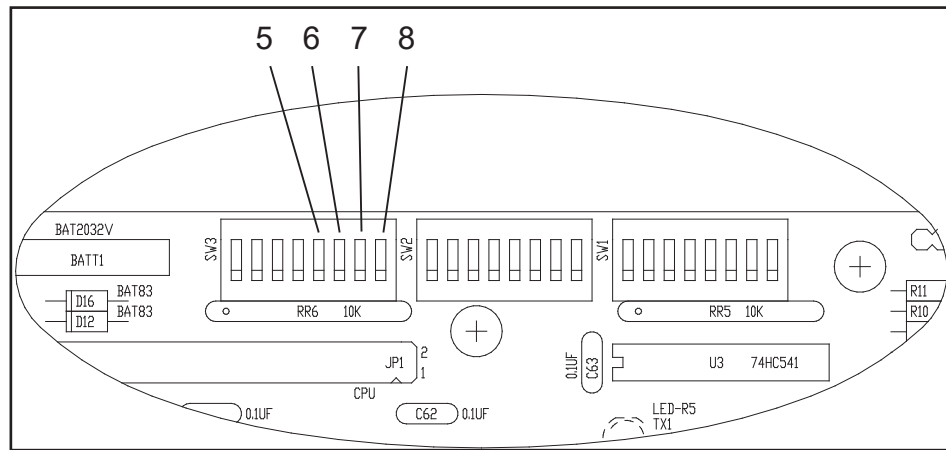


## 7.1.3 CPU board

The CPU board, based on a 80C522 microcontroller, realizes all the logic of the system, based on the input received via IIC bus from the transmitter control boards. It also implements all the other auxiliary function like display management or encoder input. Nine red leds on this board are used to signal communication on the data lines.

## 7.1.4 Panel board

The main role of the panel board is to interface the components of the device. It includes a series of DIP switches that permit to the mainainer of a site to select the number os transmitters in the N+1 system:



Switch number	5	6	7	8	Number of Transmitters
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	0	1	0	0	6

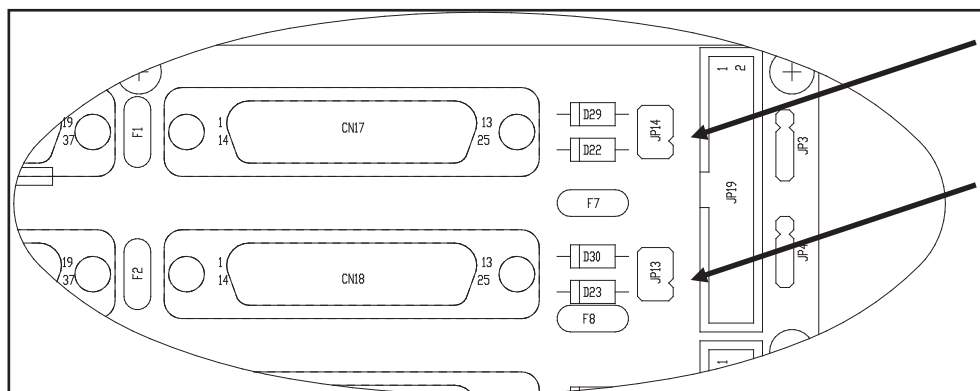
Other combinations: for future use


### 7.1.5 System interconnection board


This PCB basically hosts the connections between the different components of the device and (through the external connectors) the external elements of the transmission system (transmitters, relay etc.).

On the board there are seven LEDs (one for each transmitter control board) that are visible from outside the machine on the rear panel. When lit, these LEDs indicate correct working of the transmitter control board.

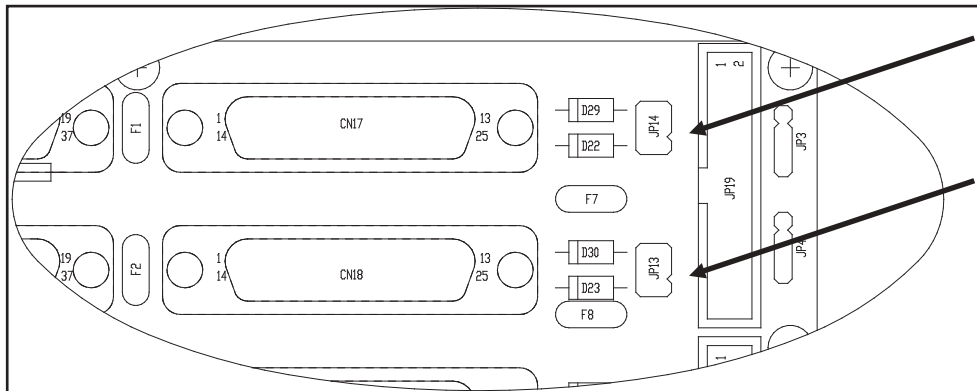
On the the right of each DB25 control connector for the transmitters, there is a strip line (3 x 2 pins) by means of which it is possible to select the power supply used for the TC from the Frontal to the transmitters.



 1-3, 2-4: The power supply for the TC for the frontal comes from the corresponding transmitter

 3-5, 4-6: The power supply for the TC for the frontal is generated by the SCM6/1 (common voltage)

On the right side of the three connectors of the flat cables that join the board to the relay board, there are six 4-pin strip lines. These jumpers are used to force the Interlock circuit closed if the coaxial relay (or the connection to the relay) do not provide the “out of position” contact.



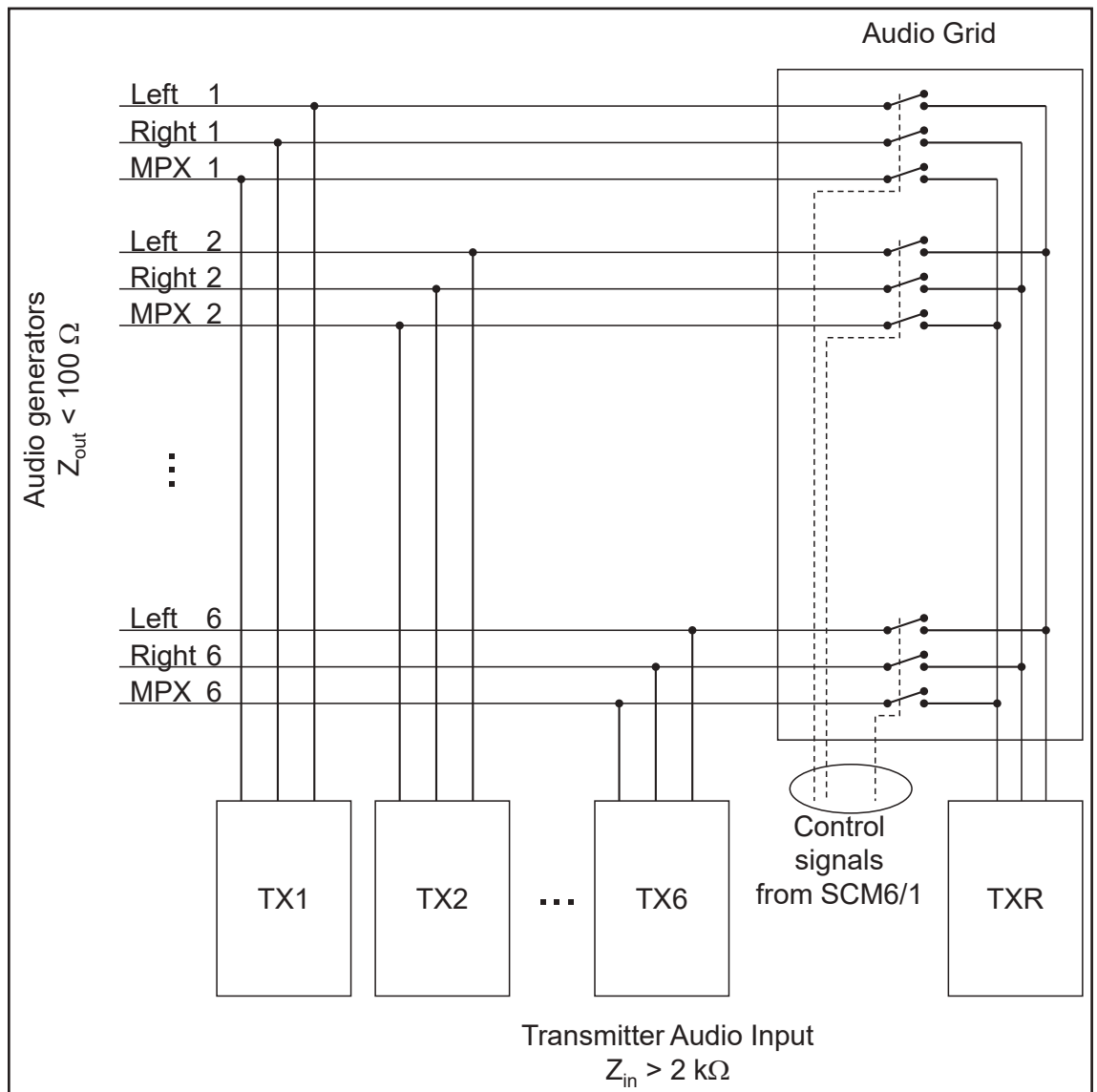
The jumper identification is: JP3 for the coaxial relay of transmitter 1, JP4 for transmitter 2 and so on.

The security loop is forced closed when 1-2 and 3-4 are shorted.



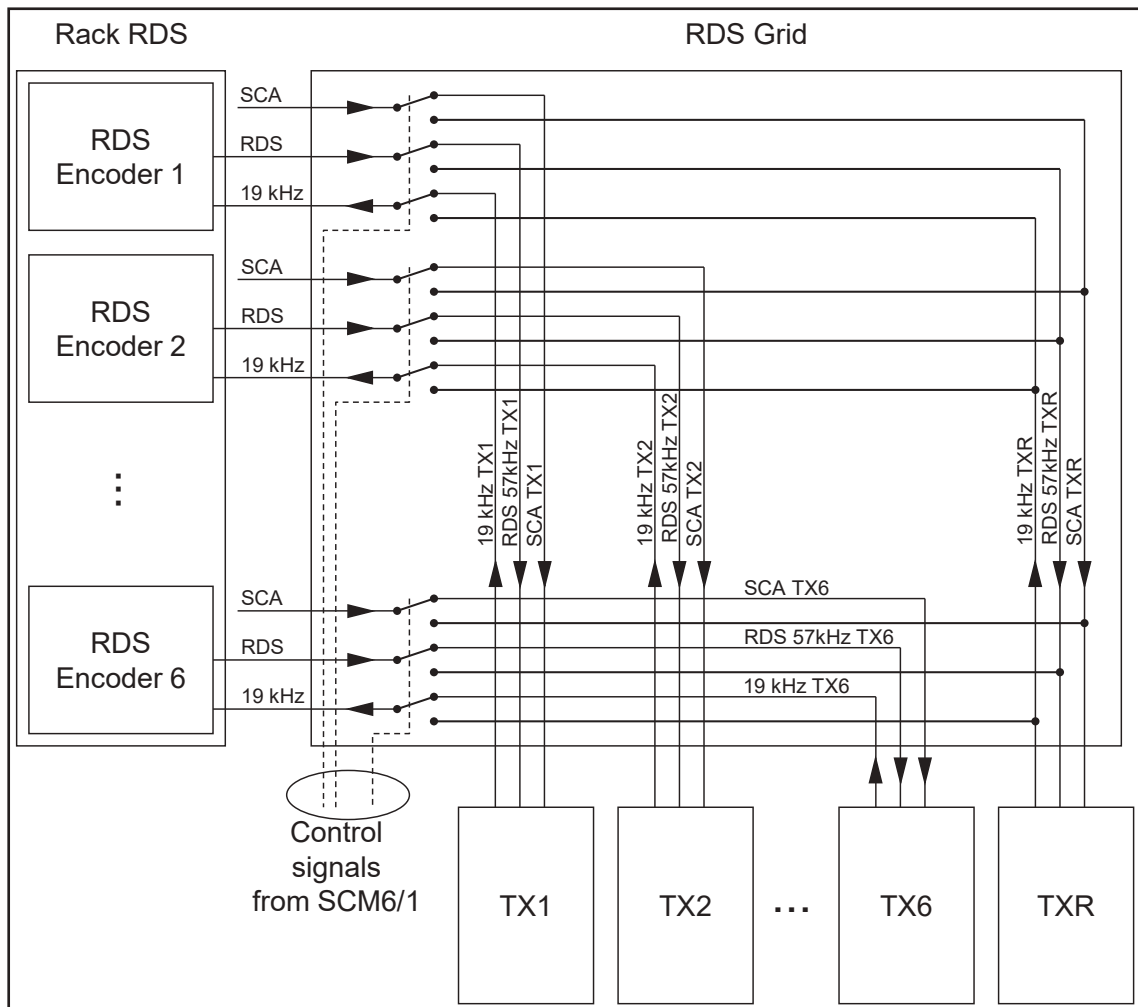
## 7.2 Audio Grid

The following figure describes the structure of the Audio Grid.



This device is basically constituted by a series of switches that are controlled by the SCM6/1. In case of changeover the switches are configured to route the audio signal of the substituted main transmitter to the reserve transmitter. A panel of LEDs indicates the channel that is fed to TXr.

### 7.3 RDS Grid



As for the audio grid, this device is basically constituted by a series of switches that are controlled by the SCM6/1. In case of changeover the switches are configured to route the RDS signal of the substituted main transmitter to the reserve transmitter. A panel of LEDs indicates the channel that is fed to TXr. Since the RDS coders have to be synchronized with the pilot tone of the corresponding stereo coder, this device also provides the connections and switches to route the pilot tone of the stereo coder of TXr to the RDS coder related to the substituted transmitter.

## 8. Maintenance

### 8.1 Preventive Maintenance

The components of the SCM6/1 that require substitution as a means of preventive maintenance are the following:

- Fan 3 years
- Electrolytic capacitors in the switching power supply 5 years
- Battery of the real time clock (BATT1 on the panel board) 6 years Please note that the up-to-dateness of the RTC is needed only for the correct indication of the timestamp of the alarms in the “Alarm” menu. The functionality of the system is unaffected by the RTC.

### 8.2 Corrective Maintenance

#### 8.2.1 Configuration of a SCM6/1

This section summarizes the steps for a from-scratch configuration of the SCM6/1, both hardware and software.

- Put the transmitters in Local or manual mode
- Use the dip switch to set the number of transmitters in the system (5.1.3)
- Set the jumpers for the power supply of the TC of the frontal (5.1.5)
- Select the priority of the transmitters
- Select for each transmitter the configuration Gere / Non gere
- Input the name of each transmitter
- Modified as appropriated the wait timers (before, after and Inhibit)
- Reset the alarm indications
- Adjust date and time
- Check if all the relays are configured for Position 1 (Air on the line of the corresponding transmitter) and if needed change the configuration
- Put the transmitters in Remote mode
- From the configuration menu, give the commands On or Off to the transmitters as required

#### 8.2.2 Substitution of a transmitter control board

The SCM6/1 includes diagnostics features to detect possible defects on the transmitter control boards. If the symbol on the line related to a transmitter on the display is not present, this means that the board is not communicating with the

CPU. Furthermore, for each board a green led on the rear panel of the device indicates that the software on the control board is correctly working.

If a board has to be substituted, follow these steps:

- Disconnect the mains plug from the SCM6/1. The current status of the transmission system will not be affected, since the machine uses bistable relays.
- Put the transmitter connected to the board to be changed in “Local” mode.
- Remove the top cover of the SCM6/1
- Remove the screws that fasten the front panel of the SCM6/1 to the rest of the box and lower the panel to leave sufficient room to remove the card. Remove the metal bar that secure the control cards set.
- Remove the defective card. It may be necessary to use e.g. a screwdriver as a lever on the card to make it snap out from its connector.
- Insert the new card
- Reconnect the mains plug.



**WARNING:** please apply all the safety precautions while working on the device under voltage with the cover removed. Avoid touching any internal component, even more in the power supply section.

- Check on the display the presence of the indication .
- Set the transmitter back in remote mode
- Reassemble the metal bar, the front panel and the top cover

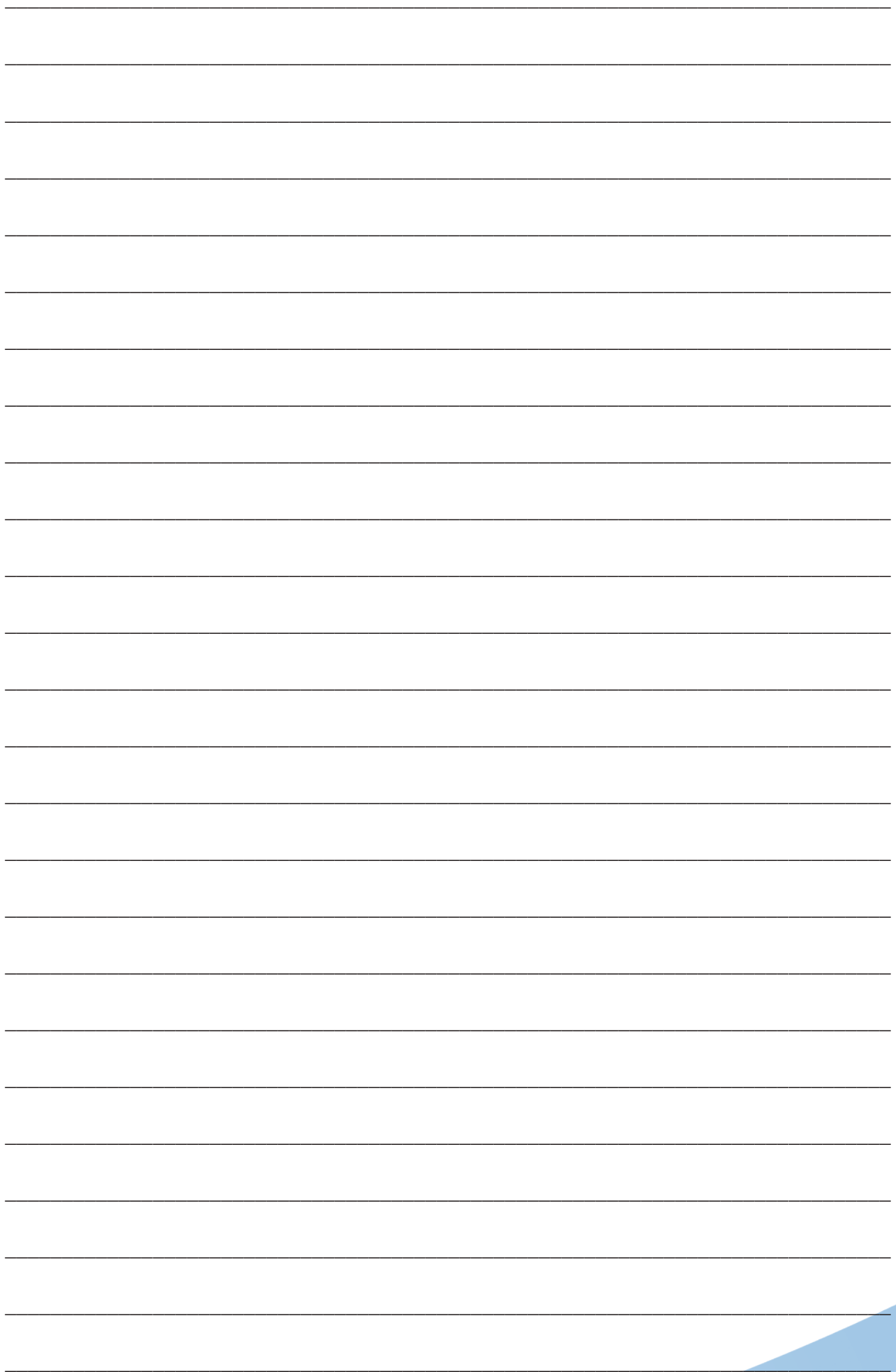
### 8.2.3 Substitution of the SCM6/1

If there is the necessity to replace the SCM6/1, execute the following steps:

- Put the transmitters (N main and the reserve) in local mode
- Disconnect the mains plug from the SCM6/1.
- Disconnect all the connectors from the back of the SCM6/1 (control of the relays, connection with the frontal and with the audio and RDS grids).
- Remove the SCM6/1 and put in place the new unit.
- Connect the mains plug to the SCM6/1
- Configure the SCM6/1 as required by the controlled system as described in chapter 6.2.1
- Remove the mains plug from the SCM6/1
- Reestablish the control connections with the frontal, with the relays and the audio and RDS grids
- Reconnect the mains plug.

- Wait for the system to boot and check on the display the correctness of all the telesignals generated by the devices connected to the SCM6/1.
- If everything is correct, put the transmitter in remote mode and configure the SCM6/1 in auto mode if required.

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