

TN47 TECHNICAL NOTE

MOUNTING SEXC30RDS PLUGIN BOARD ON SIELCO TRANSMITTERS



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Revision history:

v.0.9 28/04/2016, Preliminary issuing



This Technical Note is strictly reserved to technical personnel only and not to the final customer as a reference guide only. Modification of any equipment may cause unwanted behavior or even damages which are in no way covered by the warranty. SIELCO denies any responsibility in damages either directly or indirectly consequent in doing any of the here described internal modifications.

1 SEXC30RDS RDS Generator plug-in board

The SEXC30RDS board was mainly developed as a plug-in board for the SEXC23COD2 to incorporate an RDS Generator in a self-standing Stereo Encoder like the MSE16 o MSE19.

Due to its small size and versatility it may nevertheless be added nearly to any recent SIELCO transmitter either FM or STL, to provide a simple, low cost, good performance internal RDS Generator. Being these equipment not initially designed for this option, some limitation applies:

- The SEXC30RDS board usually requires to be installed on a SEXC23COD2 Stereo-encoder board, so also this option must be included in the transmitter.
- The RDS signal is added on the Stereo multiplex signal generated by the internal Stereo-encoder, so to be effective, the internal Stereo-encoder must be switched on either in “*stereo*” or in “*mono*”. By default, the RDS signal cannot be directly added to an externally provided stereo-coded mpx signal.
- The RDS Generator cannot be directly controlled by the transmitter CPU controller because there is no interface with it. The RDS level may be seen on the transmitter display only as a small percentage signal added on the Mpx modulation, with low resolution. The RDS signal cannot be turned on/off by the Transmitter front panel control
- The RDS Generator has its own RS232-port by which it may be extensively programmed and controlled. This port is not the same of that one already provided in the transmitter and requires a convenient opening on the rear panel of the equipment to be carried out. It is uncommon that the transmitter has an auxiliary D-sub opening for this purpose on the rear panel so, in this case, the board may be preprogrammed before closing the equipment and left sealed in it after installation. Changing any RDS parameter would require opening and accessing the internal board.
Alternatively, the RDS devoid RS232-port may conveniently replace the parallel remote port connector on the rear panel which is infrequently used by most users.

2 Mounting the RDS Generator plug-in board on the Transmitter

The board is usually factory installed as an option on request on the equipment. Field installation by the customer is not suggested because any malfunction may be hardly tracked. Nevertheless its installation is not difficult for a skilled technician with proper instrumentation and knowledge of FM transmitters and RDS parameters.



Caution: SIELCO denies any responsibility for any resulting malfunction or damage in the installation of the RDS card by the User. Possible damages are not covered by the warranty. Support on installation and on RDS parameters programming may be hardly or impossible to be provided at distance from SIELCO.

2.1 Content of the RDS kit

While SIELCO strongly suggests factory installation, this one is not particularly difficult for any skilled technician who wants to do that at its own risk. In this case, SIELCO usually supply a mounting kit made by:

1. The SEXC30RDS board
2. 2 M3 threaded turrets
3. A flat cable with a 9 pin D-sub connector on one end to permit programming the board via its RS232-port, to be possibly mounted on the transmitter back-panel

A SEXC23COD2 Stereo-encoder board is presumably already fitted on the transmitter

2.2 Installing the board

To install the board on the transmitter open the transmitter upper cover to locate the Stereo-encoder board. On some apparatus this may be installed on the bottom, so you have to open also the bottom cover: refer to the equipment User Manual for details. The examples that follow is mostly taken from an EXC30GT basic transmitters but they are valid for nearly any other equipment other than for positioning details of the Stereo-encoder board.

2.2.1

Detect the position of the SEXC23COD2 Stereo-encoder board on the equipment. Remove the small flat cable that connects it to the Mainboard and also remove the two nearby M3 screws, the leftmost ones, from the board.

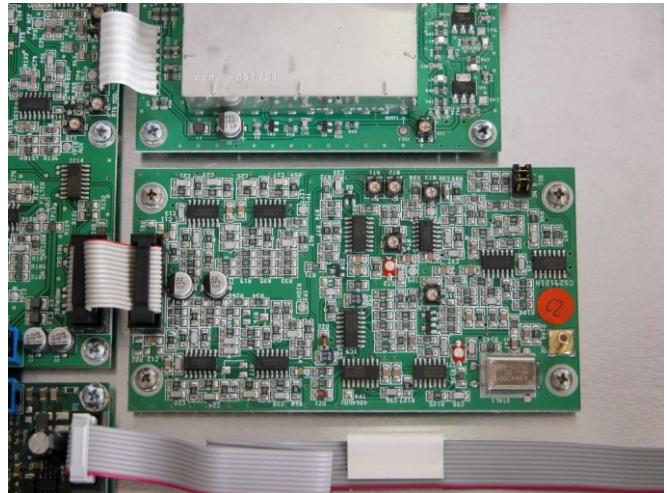


Fig.1: The SEXC23COD2 Stereo-encoder board

2.2.2

Screw 2 M3 x 10mm threaded turrets instead of the two removed screws

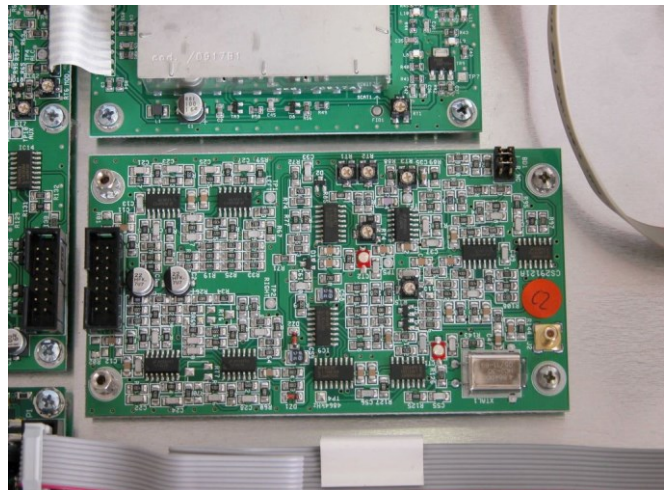


Fig.2: Two turrets mounted on the Stereo-encoder board

2.2.3

Mount the SEXC30RDS board upon the SEXC23COD2 and secure it on the turrets with the 2 M3 x 5mm screws previously removed

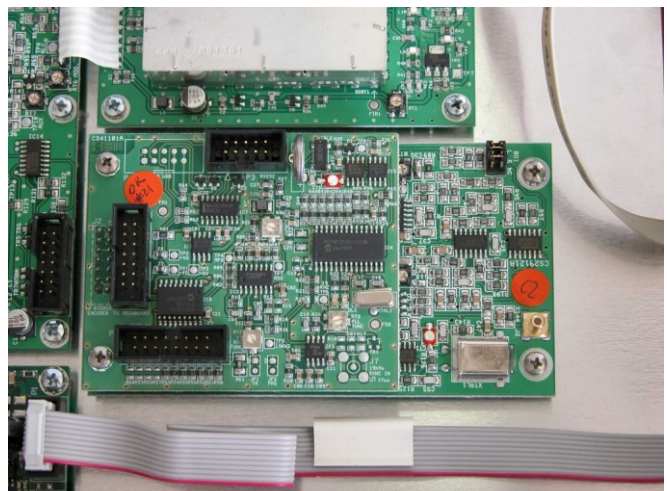


Fig.3: The RDS Generator boards fixed over the Stereo-encoder

2.2.4

Connect the RDS Generator board with the previously removed small flat-cable “1” to the mainboard. Connect the RS232 control port of the RDS board with the provided flat-cable (SIELCO cod. ASCAV10MF13 or -14) from position “2” on the board to the rear of the transmitter in position “3”. This is valid for EXC30GT which has an auxiliary D-Sub opening on the rear panel. If the equipment do not have this opening, you shall remove the flat cable “4” (remote control parallel port) and position the RDS control connector instead of that one.

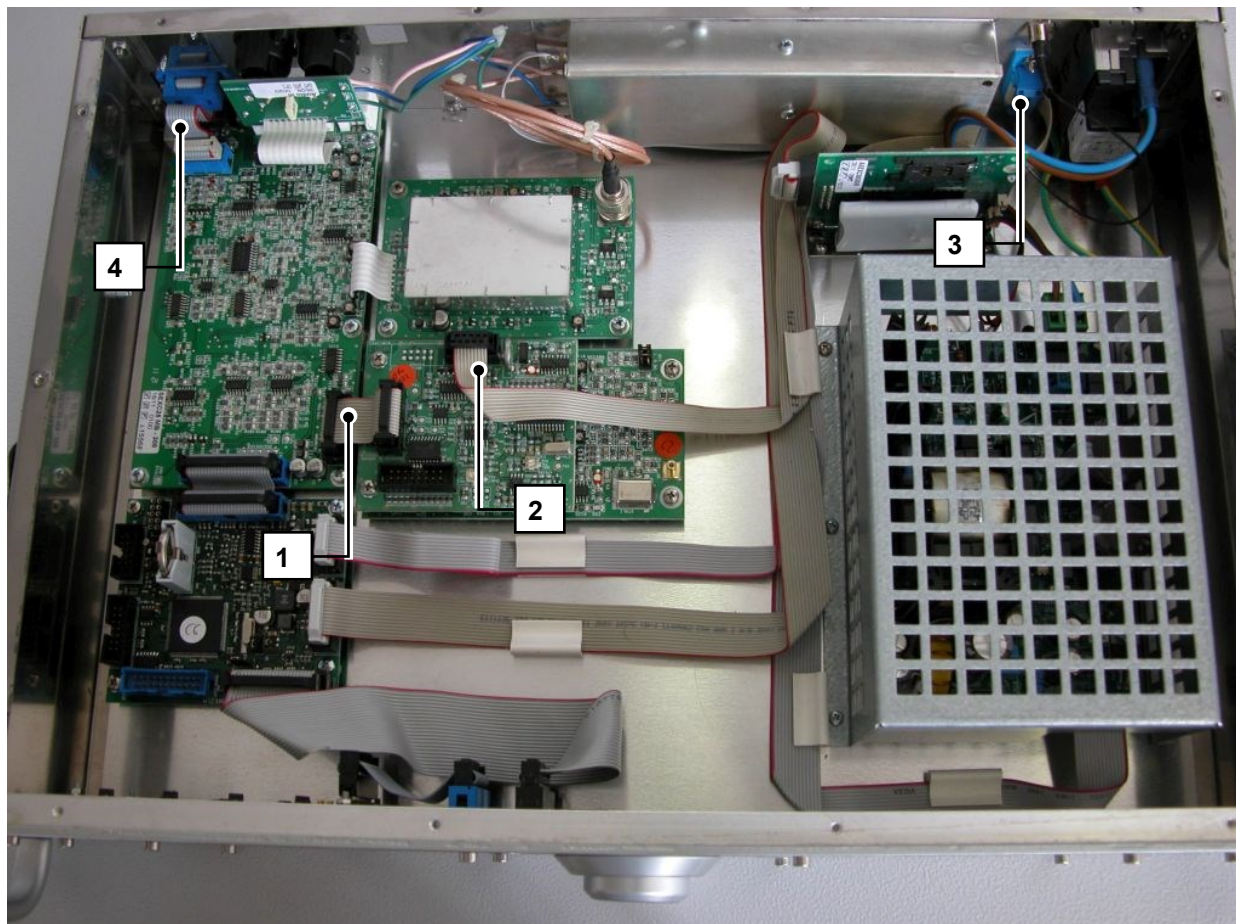


Fig.4: An EXC30GT transmitter with the RDS Generator boards fixed over the Stereo-encoder and connected to the Mainboard on the left and to the rear panel for the RS232 devoid port

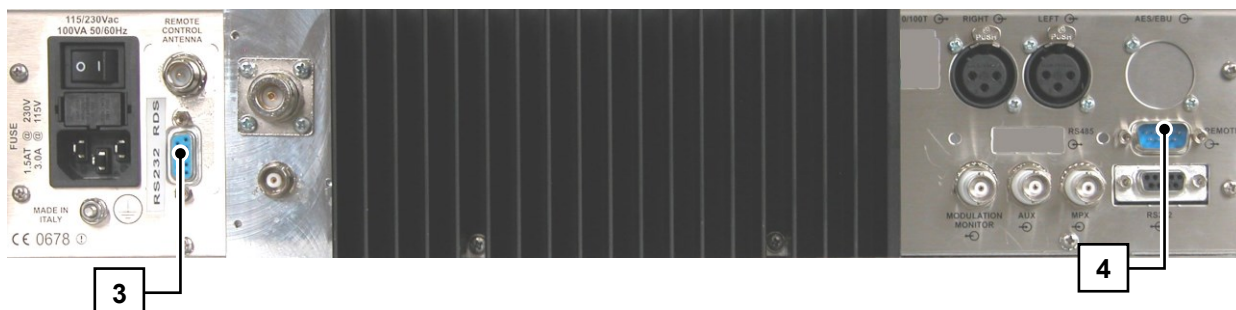


Fig.5: An EXC30GT transmitter rear panel with the alternative position of the RDS RS232 control port

3 Regulation and control of the RDS Generator

For detailed explanation of the RDS board and for schematics, drawing and management refer to the “RDE19 RDS encoder Technical Manual”

The board is usually factory preset for the RDS level which is added to the multiplex signal generated from the Stereo-encoder board to 2.5 – 3.0% injection. If a different level is required this may be varied by adjusting RT1 trimmer on the RDS board:



To use the RDS generated signal, the transmitter must be in “Stereo” or in “Mono L+R” position. No external MPX signal is allowed

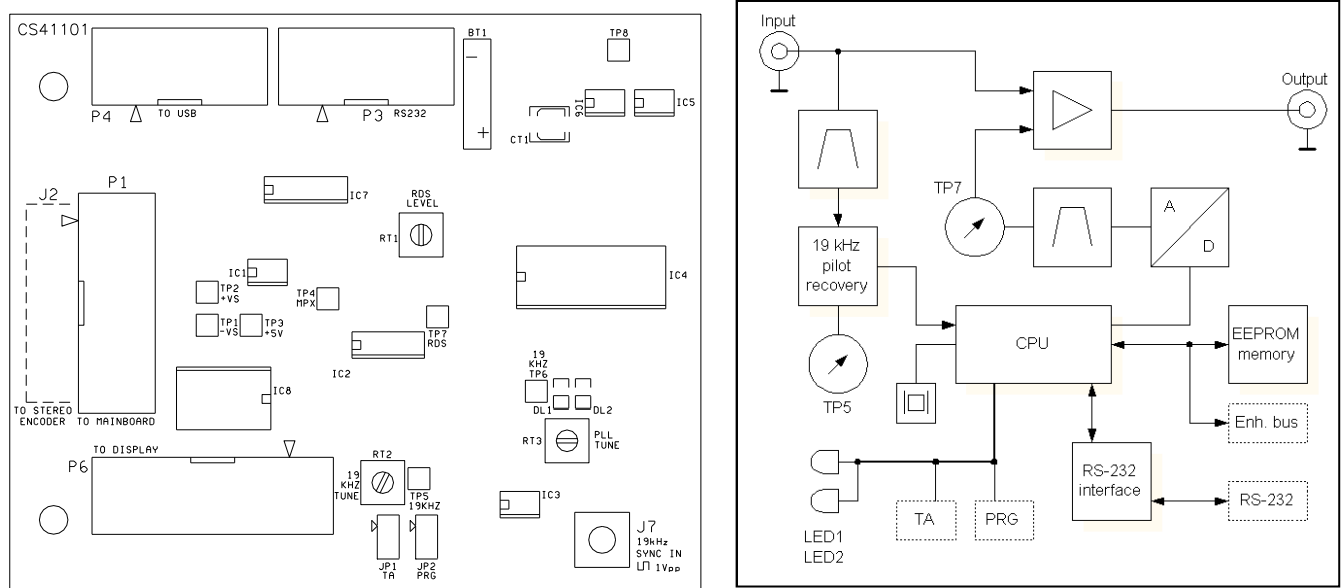


Fig.6: SEXC30RDS RDS Generator board layout and block diagram

4 Control software

Control software running on Windows-based computers is provided with the board (“MagicRDS”) or may be downloaded from www.Sielco.org. Please refer to the RDE19 RDS Technical Manual for reference. The RDS information shall be programmed directly by the user in accordance with the parameters assigned to its Radio Station and the features of its network and programme.

A skilled technician and proper knowledge of the RDS parameters is required to correctly program the RDS Generator. Some information are usually provided by the local Communication Agency, like the Station “PI”



SIELCO is not responsible for any data factory programmed by default for test purpose or as required by the customer on the board

5 Using the SEXC30RDS Generator board with externally provided Mpx

As extensively explained in the first part of this Technical Note, the SEXC30RDS board requires a companion SEXC23COD2 Stereo-encoder board to be installed and to be operative. In order the RDS Generated signal is added to the stereo multiplex, the stereo encoder must be operative: this do not permit to use an externally provided stereo-multiplex signal.

In this case SIELCO do not suggest to use this board as an internal plug-in but a separate self-standing RDS Generator like a MSE16, MSE19 or RDS19. Anyway, with some limitation and proper adjustments it is still possible to install the board on a SIELCO transmitter to function without the Stereo-encoder, with an externally supplied stereo-multiplex signal.

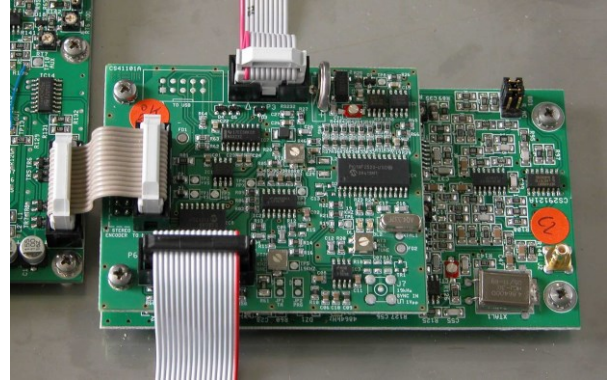


Fig.7: The Stereo Encoder and RDS Generator boards, one over the other



Following explanations are intended to skilled technicians only. SIELCO denies any responsibility for any resulting malfunction or damage in the transmitter for improper use of this information. The transmitter modified in this way is no more a standard product and performs differently. The User must be fully aware of that.



Correctly made changes are fully reversible and do not permanently impair the transmitter performance

6 Modification for pilot tone synchro and internal RDS addition to Mpx

The following few steps applies to nearly to any SIELCO FM transmitter of the EXCxxGT/GX series and also to STL transmitters like EXC18B or EXC19. The operations requires to open the equipment, take off the internal Stereo Encoder board if any, make very simple mechanical adjustments, apply a small wire bridge on the RDS Generator board, mount it again on the equipment and close the unit. No solder operation is required nor any external component other than a small 17mm long preformed piece of single conductor 0.5mm diameter electric wire (usually a ¼ axial resistor terminal or so).

1. Get access equipment internally to the Encoder board and RDS Generator board which are mounted one over the other.
2. Remove both boards and screw the turrets which were mounted between the Stereo Encoder and the RDS board directly over the bottom nuts near the Mainboard. Check that the threaded shank does not come out the bottom of the cabinet: in this case pus some washer below the turret to lift it
3. Prepare a small piece of tinned copper wire 0.5mm in diameter, 15mm long: this may conveniently be a terminal of a 1/4W axial resistor or the leg of a 5mm LED. It must be bent U-shaped with an internal distance of 5mm from the two legs. The inner side must not be straight but slightly rounded: we must use it to make a jumper on two not contiguous female terminals on the bottom connector of the RDS Generator board.

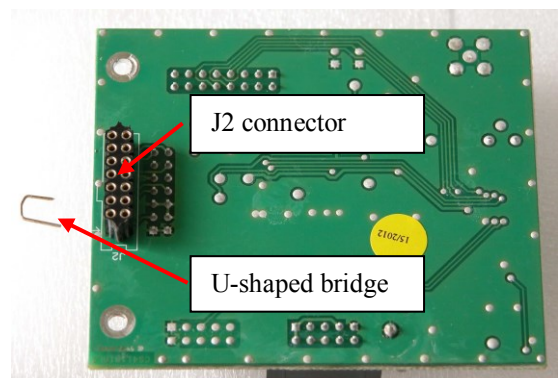


Fig.8: Rear side of the RDS Generator board and preformed U-shaped bridge

4. Insert the U-shaped bridge between terminals 7 and 11 of J2 connector on the bottom of the RDS Generator board, verifying not to short-circuit the terminal in-between.

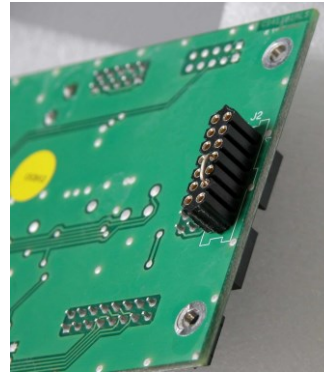


Fig.9:

The RDS Generator board with the bridge on J2

5. Mount the card thus prepared on the turrets without the supporting EXC23COD2 stereo-encoder board and restore connections.

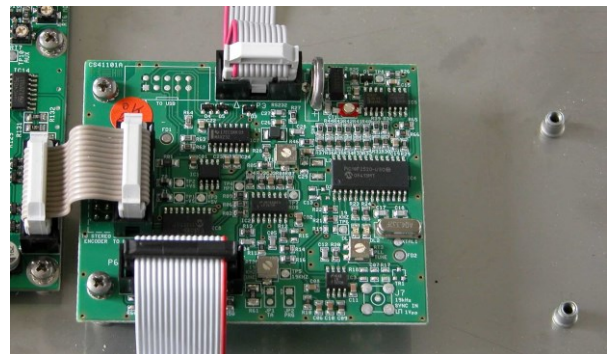


Fig.10: The RDS Generator board on site alone without the SEXC23COD2 stereo-encoder

6. Mount the RS232 control cable as described on section 2.2.4

The hardware changes are so done and the equipment may be closed and connected in the system.

7 Equipment preset and LF modulation feeding

The equipment thus modified is no more a standard equipment. The externally provided stereo-multiplex signal must no more be applied on the standard “Mpx” BNC input but on the balanced Right channel XLR connector. Being generally the Mpx signal an unbalanced one, some cares applies for the connection:

- Apply hot signal terminal on pin 2 of the XLR connector, screen to both pin 1 and pin 3 as shown on fig. 11

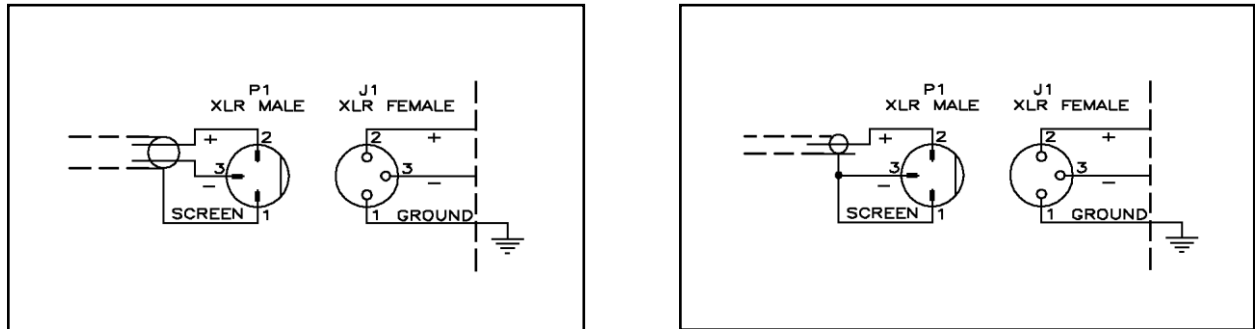


Fig.11: Feeding an XLR connector with a balanced signal (on the left) and with an unbalanced one (on the right)

- Remove the internal 600Ω impedance presetting bridge if INTERNALLY present, if you do not want such a high load on the Multiplex signal: some Stereo-Generators are able to correctly drive 600Ω or lower impedance at appropriate level but many are not.

Refer to the Stereo-encoder User Manual for information on impedance drive capability and to fig. 12 to locate the position of the JP1 Right-channel impedance bridge. For high impedance preset, JP1 bridge must be in 10kΩ position.

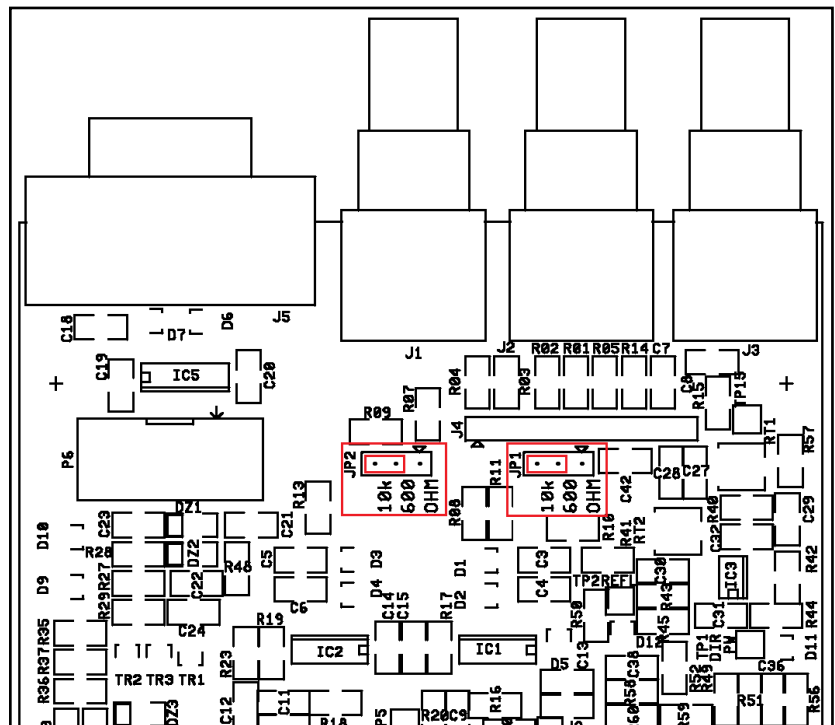


Fig.12: Position of the impedance determining jumper on the mainboard.
JP1 relates to Right and Mpx channel

Preset the transmitter this way:

- OPTION DETECT: MANUAL, STEREO ENCODER: YES, RDS GENERATOR: YES
- MODE SETUP: L+R STEREO PR= 0us
- MPX2 Nom.Input: as required to have $\approx 75\text{kHz} / +0.0\text{dB}$ on MPX modulation display. Do not consider the R channel display which shows a much higher modulation for the same level ($\approx 140\text{kHz} / +5.5\text{dB}$)

The LF input as read on the unadjusted transmitter to produce the correct 75kHz/0dB deviation on the Mpx deviation display is widely higher than 0dB, i.e. some 5.5dB higher than the nominal value. This depends from the internal interface level of the RDS Generator board and the Mainboard but do not cause noticeable problem to the apparatus other than an incorrect input reading on the Right channel level display. For this reason any level adjustment must be done referring only to the Mpx output level which is correct.

It would be possible to change two small 0805 resistor chip on the RDS board to adjust it for the new level avoiding the difference of the nominal vs. real sensitivity. In this case R03 and R04, whose standard value is 4.7k Ω must be changed to 8.2k Ω (8.87k Ω more precisely) 1%, 0805 size.

The RDS level may be adjusted acting on RT1 on the RDS Generator board: refer to figure 6 and to RDS19 User and Service Manual.



The Aux LF input and the Mpx input are still effective on the transmitter. The Mpx input may be used, provided no signal nor any other cable is contemporary applied on the Right channel XLR connector. If the transmitter is preset in “MPX MODE” by the front panel, the internally generated RDS will be not superimposed to the external multiplex signal.



If Mpx BNC input is used for modulation input, be ABSOLUTELY sure the internal impedance preset jumper JP1 is in the 10k Ω position. Refer to figure 11

8 Final notes, the Hardware way

If the “soft” accommodation is not practicable or a greater flexibility is desired in adjusting the RDS level by the front panel, a hardware method may be used to wire the RDS output from the stand-alone board to the “RDS/AUX” input. This is briefly described here:

- Install the RDS board without the stereo-encoder board as described on section 6 of this TN
- Physically connect the RDS output on the SEXC30RDS board to the “RDS/AUX” channel. A small isolated AWG24 wire is needed, positioned as close as possible to the metal chassis of the equipment, soldered on the bottom of the center pin connector of the “RDS/AUX” BNC connector input on the Mainboard. The other end must be soldered on the TP7 Test Pad on the SEXC30RDS board
- Adjust the transmitter for “MODE SETUP: EXTERNAL MPX” “PR= 0us”
- Input the externally generated multiplex signal on its devoid BNC connector as usual and regulate transmitter deviation as usual acting on the channel sensitivity and/or the input signal level
- Adjust the wanted RDS injection on the overall multiplex by the AUX channel sensitivity adjustment setup from the front panel: the display will indicate the correct deviation with good precision.



The software on the transmitter may impede to set the transmitter in “STEREO” if the stereo-encoder board is not present and if a “MANUAL OPTION DETECT” is not available on the setup menu. In this case, if a proper firmware version is not available to fix the problem, the “Hardware way” may be the only option left.