

## RA-xxx tune up information

Versione 1v0



**Radio Activity S.r.l.**

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## 1 TUNE UP INFORMATION

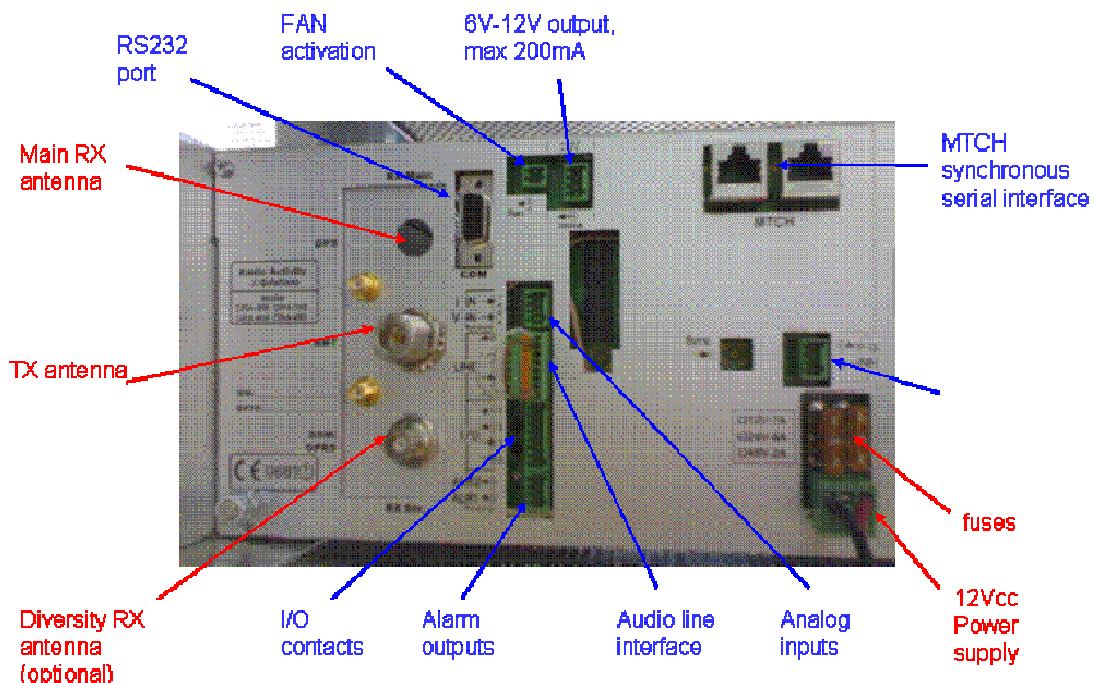
Tune up process of RA-xxx equipments is very simple and can be made through a PC with installed DMR\_manager application. Every setting of the transceiver can be changed by SW application only.

### 1.1 QUICK INSTALLATION AND POWER ON

The base station is equipped with a discrete set of HW connectors on the rear side, but only few of them are essential for working; the following connections are needed:

- ∞ Power supply: by 12V battery with negative to ground; nominal power supply voltage is 13,8Vdc, minimum is 10.8V and maximum is 15.4V, with electronic protection from overvoltage and undervoltage. Current absorption is 1A@1W, 5A@25W, max 7A.
- ∞ Main RX / TX antenna; for laboratory test, it is better to connect a 20dB RF attenuator between radio equipment and the antenna;
- ∞ Ethernet: TCP/IP connection to the same LAN as for the PC for remote control.

The following picture shows the basic connections in red colour and optional ones in blu.



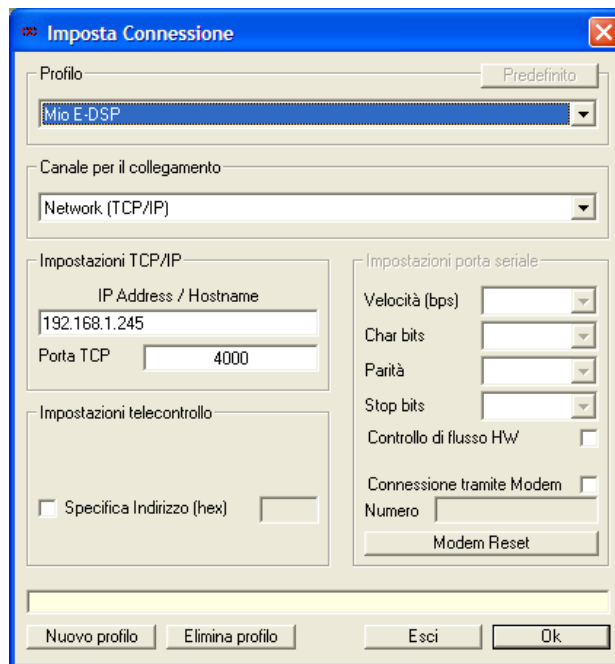
When the equipment is powered on, it automatically performs the following actions:

- ∞ Linux booting, during which LEDs of DSP module are yellow;
- ∞ download of software applications to DSP, clock generator and eventually to microcontrollers of peripheral modules which LEDs are flashing yellow and green;
- ∞ self calibration test, with the aim to tune the parameters of modulator and of demodulator and to test the overall performances. It takes about 1 minute, during which LEDs are flashing green and red.

At the end of this process, only the following LEDs will remain on (see User Manual for further information):

- ∞ on PSM module, both leds will be green, monitoring the correct supply;
- ∞ on DSP module "LINK" led is green if equipment is connected to ethernet LAN, "ACT" led is flashing yellow if LAN communication is present;

Now the equipment is ready to be tuned through a PC connected to the same LAN. The Ethernet interface of RA-xxx transceiver is auto-sensing: both straight and crossed cables are allowed. On a PC the application "DMR\_Manager.exe" shall be installed (see User Manual for further information) and launched. The equipment can be accessed at a specific IP address, as indicated on a side of the equipment itself.



## 1.2 TUNE UP PARAMETERS

RA-xxx equipments can work in dual mode, that is, they can recognize if the incoming signal from a terminal equipment is analog or digital and configure itself as analog or DMR. The remote control SW is very powerful and complex, but few mask are enough to set and to monitor the basic analog and DMR parameters.

From the main mask of DMR\_Manager, open RA-DMR→Controls→Radio control. This mask allows the following actions:

- ∞ to change power of RF transmitter from 1W to 25W;
- ∞ to change frequency of RX and TX, or to change the current channel;
- ∞ to change TCS/DPL ;
- ∞ to check the main analog measures which are automatically performed.

The screenshot shows the 'Radio Control - TRX RPT VHF' interface. Key sections include:

- Radio control and status:** Power Supply (Main voltage: 12.2V), AF Generator (Freq: 1000 Hz), Signallings (MTCH, DIG/TS, INT, Super, GPS, DSP Sync, I/O 1, I/O 2), Calibrations (RX, TX, Loop Test, Blanking lines), Squelch (Speed: Medium, Threshold: 20.0 dB, Hysteresis: 6.0 dB).
- TX:** TX Enabled (DSP, HW), Power (1W), On Air status (On Air, Idle, St.by), PLL Vtune (3294 mV), Temp (28.2 °C), Current (52 mA), Direct Pwr (N/A), Refl. Pwr (N/A), SWR (N/A), Dev (0 Hz), Limiter (0.0 dB).
- RXs:** Primary (M/D), Secondary, Tertiary channels with Enabling (DSP) and Measures (1° LO, 45 MHz, 10.7 MHz, Carrier δf, Audio dev, SINADp, TCS freq, TCS dev, RSSI M, RSSI D).
- Frequencies:** RXs (Primary: 157000,000 kHz, PLL: 6,250), Tx (161600,000 kHz, PLL: 6,250), TCS/DCS (TCS freq: 123.5 Hz, DCS code: oct), Current channel (0).

A green 'TRX OPERATIVE' indicator is visible at the bottom left, and 'Refresh' and 'Close' buttons are at the bottom right.

Eventual modifications of parameters will not be saved into internal flash: in order to permanently change parameters, channel table must be edited (by the mask RA-DMR→Radio Configuration→Channel table).

If frequencies are significantly changed (some MHz), it is suggested to make the transceiver perform a new self-calibration process. In order to do this, the last channel (the 201<sup>st</sup>) of the channel table contains self-calibration frequencies parameters: you should change the frequencies of both working and self-calibration channel. Specifically in detail, the TX and RX frequency of calibration channel must be the same, they must be multiple of 100KHz and must be as nearest as possible to the TX frequency of working channel. In order to make the modification active and to perform a new self-calibration, the application on the equipment can be restarted by the command RA-DMR→Restart...→Main.

**Channels Table - TRX RPT VHF**

	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Em
Channel Name	CH0	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Em
Channel present	Yes	No	No	No	No	No	
Channel enabled	Yes	No	No	No	No	No	
TRX mode	ANA+ETSI+MOTO						
Channels spacing [kHz]	12,5	12,5	12,5	12,5	12,5	12,5	
TX Frequency [kHz]	161600,000	0,000	0,000	0,000	0,000	0,000	
Primary RX Frequency [kHz]	157000,000	0,000	0,000	0,000	0,000	0,000	
Secondary RX Frequency [kHz]	0,000	0,000	0,000	0,000	0,000	0,000	
Tertiary RX Frequency [kHz]	0,000	0,000	0,000	0,000	0,000	0,000	
Simplex Frequency Shift	No	No	No	No	No	No	
TX Power [W]	1	0	0	0	0	0	
Maximum continous transm. time [s]	0	0	0	0	0	0	
Transm. closure delay [ms]	500	500	500	500	500	500	
TX DCS Code [oct]	--	--	--	--	--	--	
RX DCS Code [oct]	--	--	--	--	--	--	
TX TCS Frequency [Hz]	123,5	123,5	123,5	123,5	123,5	123,5	
RX TCS Frequency [Hz]	123,5	123,5	123,5	123,5	123,5	123,5	
RX Emergency TCS Frequency [Hz]	0,0	0,0	0,0	0,0	0,0	0,0	
RX TCS hold time [ms]	500	500	500	500	500	500	
Subtone tone deviation [Hz]	250	250	250	250	250	250	
Supertone Frequency [Hz]	0	0	0	0	0	0	
RX Squelch level [dB]	20,0	20,0	20,0	20,0	20,0	20,0	
RX Squelch Hysteresis [dB]	6,0	6,0	6,0	6,0	6,0	6,0	
RX DMR Colour Code (main)	1	1	1	1	1	1	
TX DMR Colour Code (main)	1	1	1	1	1	1	
RX DMR Colour Code (aux)	0	0	0	0	0	0	
TX DMR Colour Code (aux)	0	0	0	0	0	0	

Buttons: Write on File, Read from File, Edit data, Write on TRX, Read from TRX, Imposta come predefinito, Close

The main parameters of DMR mode can be set by the mask RA-DMR→Radio Configuration→DMR Layer configuration. In the lower part of this mask main, DMR measures which are automatically performed, can be seen.

**DMR Layer Configuration - TRX MASTER VHF TEST**

**DMR Parameters**

- Enable modem 4FSK:
- Receiving as terminal:
- Transmission as Base Station:
- Enabling DMR repeater:
- Enabling Half Trunking:
- PCM Audio Mode: Flat / **μ-Law**
- Current UTC Minute: 255
- Current UTC Second: 255
- Current Second Correction: 0
- Current timeslot Correction: 0
- Fine Timing Correction (ticks): 0
- Received packets advance [ts]: 0
- RC packets advance [ts]: 0
- Distance advance timing [km]: 0

Color Codes:

- RX DMR Colour Code (main): 10
- TX DMR Colour Code (main): 10
- RX DMR Colour Code (aux): 0
- TX DMR Colour Code (aux): 0
- Network Delay [ts]: 4
- Timeslot validity [ts]: 32
- Hang Time [ts]: 100
- Hold Time [ts]: 24

**Signalings**

Status: DMR Mode enabled █

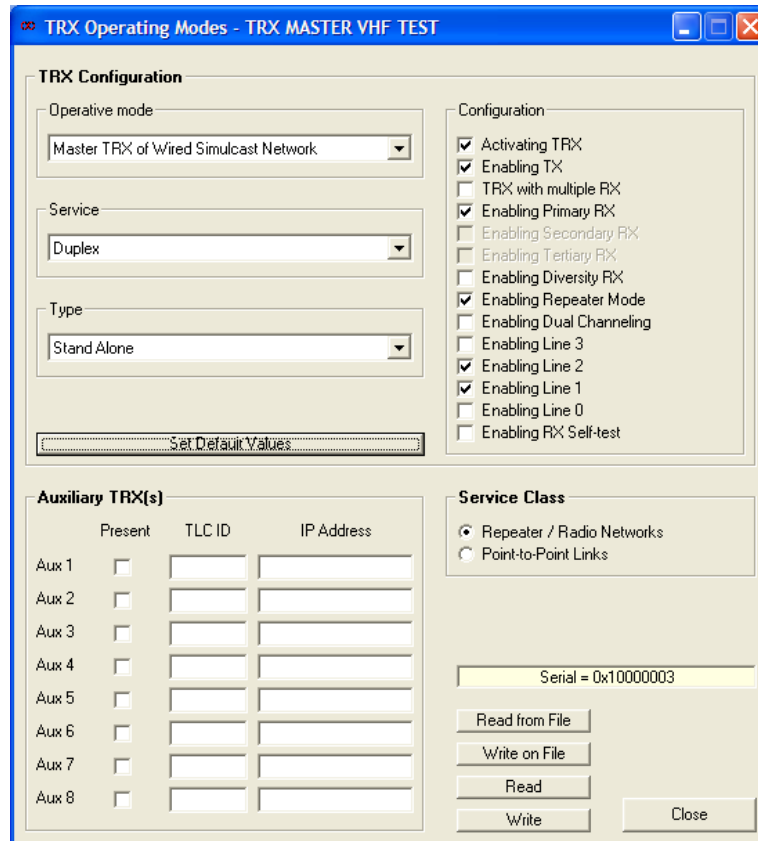
Current Second/Timeslot: 8/76  
Current Timeslot\_300: 276

	TS 1	TS 2
Last received timeslot	40	0
Frequency offset rx [Hz]	-12	0
Time offset rx [ms]	18,851	0,000
Error Vector	405	0
Colour Codes received	10	0

Access: **READ** **WRITE** | Reading:   Repeat Reading |

The transmission can be enabled by different commands to get different effects:

- ∞ if the “**repeater mode** is enabled” the equipment will transmit the same received signal. This function can be enabled in DMR mode by the mask RA-DMR→Radio Configuration→DMR Layer configuration by checking the box “Enabling DMR repeater” and in analog mode by the mask RA-DMR→Radio Configuration→TRX operating modes by checking the box “Enabling repeater mode”;



- ∞ if an **external analog signal** is applied to the input of the “audio line interface” connector and its input contact is closed, the TX will go “on air” with the modulated carrier by the external signal in FM mode;
- ∞ the TX can also transmit a modulated carrier by an **internally generated analog signal**: by the mask RA-DMR→Controls→Radio control an audio frequency (AF) generator can be programmed to generate a “sinusoidal test” signal at a specified frequency (between 300 and 3400Hz) and by checking “Activate transmission” the TX will go “on air” with the modulated carrier by the internal signal in FM mode;
- ∞ a **DMR test signal** can be **internally generated** and transmitted. To this aim, by the mask RA-DMR→Radio Configuration→Test AF, in the box “test mode settings”, the encoder can be set to “BER test with DMR HIDL E packs” to transmit standard DMR hidle packets.

BF Test - TRX MASTER VHF TEST

**Configurazione Test BF**

 Abilitazione modulo Sw BF Gen  
 Abilitazione analizzatore audio  
 Criterio di PTT se iniezione BF  
 Inserimento filtro psfometrico

**Impostazione generatore**

Frequenza di test (Hz)

Freq. minima sweep (Hz)

Freq. massima sweep (Hz)

Freq. step sweep (Hz)

Tempo di sweep (Hz)

T(on) onda quadra (ms)

T(off) onda quadra (ms)

 Passa-alto (Hz) 
 Passa-basso (Hz) 

Predefiniti    Imposta

**Stato del Modulo BF**

■ Passaggio parametri abilitato  
■ Generatore abilitato  
■ Analizzatore audio abilitato

**Impostazione modo di Test**

Encoder off

- DTMF
- Sel Call CCIR
- Sel Call ZVEI-1
- Sel Call ZVEI-2
- Sel Call EIA
- Sel Call EEA
- BER test with 1200 Hz AF
- BER test with DMR HIDLE pack

0000   0000   0000   0000

DTMF

0000   0000   0000   0000

**Impostazione invio DTMF**

Numero da inviare:

Durata del tono dei singoli digit (ms):

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
70	70	70	70	70	0	70	70	70	70	70	70	70	70	70	70

**Impostazione sequenza test modem**

	1	2	3	4	5	6	7	8
Parole per bit-sequence (hex):	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>
	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>	<input type="text" value="0000"/>
	9	10	11	12	13	14	15	16

Accesso

Letture

Lettura Continua