TA7982-0100-10-00 and RX6996-3001-36-xxN

TOWER TOP AMPLIFIER and
RECEIVER MULTICOUPLER / TTA CONTROLLER

Quick Start Guide

INTRODUCTION

The RFI Tower Top Amplifier (TTA) together with the Receiver Multicoupler / TTA Controller (RMC) provides a low noise, high intercept point receive system designed to amplify and distribute signals from a single tower mounted antenna to a GTR8000 ESS system. Set-up of the system is possible using either a manual interface or via the Ethernet interface using a PC. TTA and RMC power, fault and control status is given by LEDs on the RMC front and rear panels and can also be remotely monitored via the Ethernet interface. Models are available for operation over several DC voltage ranges and AC operation is provided via an external AC to DC adapter.

GENERAL

Operating Precautions

- There is no On/Off switch on the units, they become active as soon as DC power is connected or the AC plug pack is switched on at the AC outlet.
- Do not operate the unit outside the specified operating temperature range.
- Do not open the unit as there are no user serviceable parts inside. All faulty equipment should be returned to the supplier for repair.

INSTALLATION

Mounting

TTA - The TTA is designed for tower top installation. Please refer to the TTA Quick Start Guide included with the TTA for installation instructions.

RMC - The RMC must be mounted indoors only. It is designed to fit in a 1U rack space and should be mounted clear of any equipment that generates excess heat. Do not mount the unit inside small unventilated enclosures.

Cabling

- Connect the antenna cable to the ANTENNA port on the TTA.
- Connect the TTA MAIN output to the RMC RF Input with the main feeder cable. This cable should have a maximum loss of 6 dB at 824 MHz.
- Connect the TTA Test output to the RMC rear panel Test Port.

Earthing and Lightning Protection

Compliance with international electrical safety standards requires that the external Protective Earthing point on the TTA and RMC, as indicated by this symbol, be permanently hardwired to the premises protective earth system using 1.5 mm^2 (14 AWG) minimum cross-sectional area conductor. These connections provide protection from hazardous and transient voltages. It is essential to also install the recommended lightning protectors on all interconnecting cables between the two units.

RF Connector Sealing

Ensure that the RF connections to the TTA are appropriately sealed with self amalgamating tape to prevent ingress of moisture.

RMC FRONT PANEL

Ethernet Interface (LAN)

Connect to the front panel Ethernet port (LAN) using the supplied cable either locally using a PC or remotely via a TCP/IP network. To begin a session, start your web browser and type the factory default IP address - http://192.168.1.200 - into the address field. A successful connection is indicated by the display of the log in screen. Log in as a level 2 user with the default User Name, “admin” and Password, “admin”. The Ethernet interface is fully compatible with both standard and crossover Ethernet cables.

If the IP address has been changed from the factory default setting and is not known, the unit will need to be reset to factory default settings using the rear panel reset button. If the web browser is unable to open a session it may be necessary to set the IP address of your computer to an address in the same range as the RMC, e.g. 192.168.1.180.

POWER LED

The green LED is on when external power is present. If the LED is off it is possible that either the DC voltage supply is disconnected or below the specified minimum voltage, or the polarity is incorrect.

RMC FAULT LED

The red LED will light under the following circumstances.

- The internal power rails are outside the normal operating range.
- The voltage and/or current feed to the TTA is outside the normal operating range.
- The RMC internal temperature is outside the normal operating range.

GAIN LEDs

The yellow Gain LEDs indicate which gain mode is active. If the yellow Switch LED is blinking then a value outside the available values has been set on the rear panel Gain Attenuation or Configuration switches.

LAN Gain Mode

Using the Ethernet interface the system gains can be set-up and monitored either locally with a PC or remotely via a TCP/IP network.

SWITCH Gain Mode

Four rear panel rotary switches are provided for local set-up of the receive system configuration and gain. They should be adjusted as described in **SYSTEM SET-UP.**

Resetting the RMC to Switch Gain Mode

If the RMC is in LAN Gain mode but the user does not have access to a computer, the unit can be forced into Switch Gain mode by setting the two rotary Input Gain Attenuator switches to “99” and cycling the power. This does not affect any other settings.

TTA CONTROL via the RMC

TTA FAULT

The red LED will light under the following circumstances.

- The input voltage is outside the normal operating range
- The internal power rails are outside the normal operating range.
- The internal amplifier currents are outside the normal operating range.
- The internal temperature is outside the normal operating range.

AUTO LED

A green LED indicates that the TTA will automatically switch paths if the currently active path develops a fault.
When off this indicates that the user has forced path A or path B and, if a fault occurs, the TTA will not switch to the other path.

AMP A, AMP B LED

A green LED indicates that either TTA path A or B is currently in service.
If either LED is red a fault has developed in the amplifier.
Both LEDs flashing red indicates that the RMC has lost communications with the TTA.

TEST LEDs

TERM - A yellow LED indicates that the inputs of the TTA LNA's are terminated in 50 ohms. The off-air signal is disconnected from the station receivers.
BYPASS - A yellow LED indicates that the RF signal is bypassing the TTA amplifiers.
TP►RX - A yellow LED indicates that the front panel Test Port is connected to the rear panel RF Input. The off-air signal is disconnected from the station receivers.

SELECT and ENTER Switches

The two SELECT switches move the flashing LED left or right.
The ENTER pushbutton activates the selected function and the LED lights and stops flashing.

TEST PORTs

With the RMC rear panel Test Port connected to the TTA Test port via a test cable, a signal injected at the RMC front panel Test Port will appear at the TTA LNA input with a loss of 30 dB plus any test cable loss. This enables testing of system sensitivity.

RMC REAR PANEL

FILTER Ports and Switch

Two connectors are provided for the connection of an external post TTA filter. To route the RF signal through the filter a recessed push-button switch must be pressed. This switch is located between the FILTER connectors and below the FILTER LED. The LED will light to indicate the filter is included in the RF signal path.

RF INPUT

Connects to the TTA via the main feeder cable and carries the RF signal, DC power and the communications channel between the RMC and TTA.

RF OUTPUT AND RF TEST

One RF Output is available from the RMC. An RF Test Output is also available which provides a test signal equal in level to that on the RF Output. This provides a convenient point to check the signal level being sent to the GTR8000 ESS system. Best RMC performance will be achieved if a 50 ohm termination is fitted to the RF Test Output when it is not being used.

Rotary Switches

Two switches are provided to adjust the Input Gain attenuator. See **SYSTEM SET-UP** for instructions on how to adjust these switches.

ALARM Connections

A three way locking Phoenix plug is provided to connect the alarm relay to an external alarm. The contacts labeled “NC” and “COM” are closed when the RMC has power applied and there are no faults.

POWER

A two way locking Phoenix plug is provided to connect an external DC source capable of supplying the required voltage and current. The required voltage is shown on the rear panel label next to the power socket and the power consumption for the system is 26 W. e.g. a 12V system will draw a maximum of 2.2 A. The DC power input is reverse polarity protected. A green LED above the power socket indicates when power is present.

AC Power

The optional AC to DC power supply provides DC power for a 12 VDC RMC and is supplied fitted with a two way locking Phoenix plug. The power supply should be mounted safely in a convenient location and clear of any equipment or obstructions which may cause it to overheat.

RESET Switch

Two levels of reset are available.

To reset the RMC back to factory default values, including the IP address and passwords:

Remove the DC power and while pressing the reset button, re-apply the power and hold the button in for about 10 seconds until the power LED starts to flash.

To reset only the RF configuration values back to factory default values:

When the RMC is powered, press and hold the reset button in for about 10 seconds until the power LED starts to flash.

Specifications - Typical at 25^{0}C

Frequency range	RMC	698 - 960 MHz
	TTA	796 - 824 MHz
RMC Gain		-10 to -25 dB
TTA Gain		25 dB ± 1 dB
System Noise figure		< 3.5 dB
Input Gain Atten		0 - 15 dB
Input/Output return loss		>14 dB
TTA Test Port coupling		-30 dB ± 2 dB
Isolation between RF outputs		>20 dB
Maximum TTA input signal		10 dBm

Temperature range -	TTA	-22 to 140ºF (-30 to 60ºC)
	RMC	32ºF to 122ºF (0 to 50ºC)
Power supply options	DC	10 - 18 VDC*
		36 - 60 VDC*
		*floating
	AC	90 - 264 VAC
Power consumption		26 W max.
Alarm Relay contacts		1 A/60 VDC

SYSTEM SET-UP

Setting the Rotary Switches

Setting the RMC rear panel switches using the following information will result in a system with 8 dB gain. This is the recommended gain for an GTR8000 ESS system operating at 800 MHz because it provides maximum protection for the station receivers, while also obtaining good sensitivity.

INPUT GAIN ATTENUATOR (INPUT GAIN ATTEN) Switches

Measure the RF loss of the main feeder cable between the TTA and RMC or, if the length is known, calculate the loss using the manufacturer's cable data. Set the switches using Table 1.

Example: If the cable loss is 1.8 dB set the switches to 4. i.e. set the tens switch (x10) to "0" and the units switch (x1) to "4".

Post TTA Filter

If a Post TTA Filter is connected to the rear panel FILTER connectors and is switched to be in-line (Filter LED on) the insertion loss of the filter must be included in determining the Input Gain Attenuator switch setting. Simply add the post filter insertion loss to the main feeder cable loss and use the total loss together with Table 1 to determine the switch setting.

Example: If the filter insertion loss is 2.5 dB (including interconnecting cables)and the feeder loss is 2.5 dB, the sum is 5 dB. Table 1 indicates the switches should be set to "01".

Main feeder Loss*	Input Gain Atten Switch setting†
0 dB	6
1 dB	5
2 dB	4
3 dB	3
4 dB	2
5 dB	1
6 dB	0

Table 1

*or [Feeder Loss + Filter Loss] when a Post TTA filter is fitted.

†This switch setting allows for a distribution cable loss of 1 dB between the RMC03 RF Output and the Site or Cabinet RMC input.

Spectrum Analysis

The signal level at the RF Test Output should be checked with a spectrum analyzer. Set the analyzer Span to include both the Rx and Tx frequency bands, set the Resolution BW = 50 kHz, Reference Level = -20 dBm, Trace Max Hold = ON and monitor the spectrum for several minutes during a peak traffic period.
For best system performance:

- Signals in the Receive Band should be less than -35 dBm.
- Signals in the Transmit Band should be less than -55 dBm.
- All other signals should be below -75 dBm.

If any signals are above these levels (see Fig 1) the performance of the system may be compromised.

If any signal in the receive band is above -35 dBm the Input Gain Attenuator should be increased 1 dB for every 2 dB the receive signal exceeds -35 dBm. Up to 15 dB attenuation can be set but attenuation levels above those shown in Table 1 will progressively reduce system sensitivity. If higher attenuation levels are required because of interference, alternative ways of reducing the interference should be investigated so that system sensitivity can be maintained.

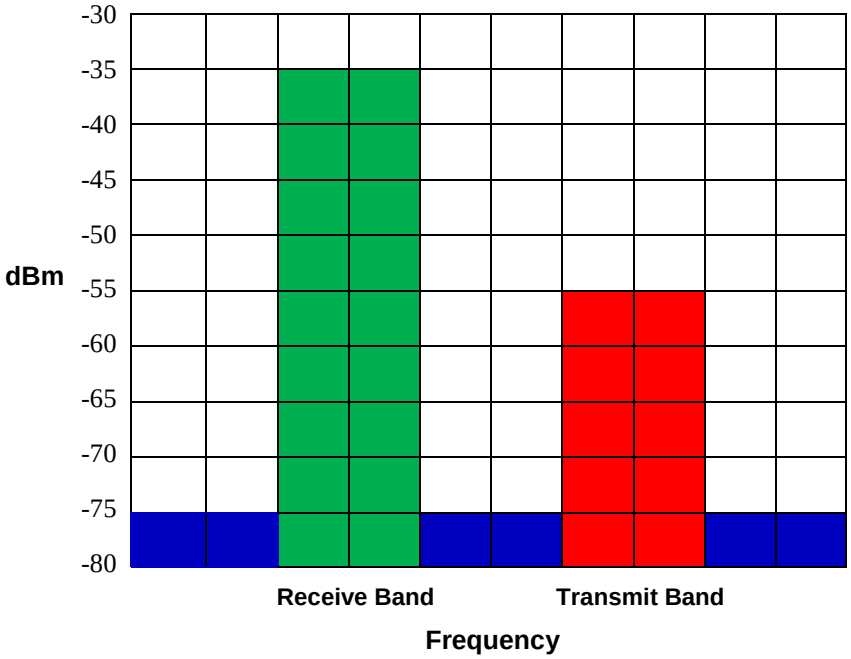

Fig 1: Maximum Signal Level Mask

GTR8000 ESS ATTENUATOR ADJUSTMENT

The GTR8000 ESS can consist of one or more cabinets. Each cabinet is fitted with a Cabinet RMC for distribution of the receive signal to a maximum of 6 stations. For systems expandable past six stations (up to 24 stations) a Site RMC will also be fitted to the system with the 4 outputs of the Site RMC connected to the inputs of the Cabinet RMC's.

The attenuation adjustments for each configuration are:

For systems with a Cabinet RMC only (no Site RMC):

- Set the Cabinet RMC attenuation to 7 dB

For systems with a Cabinet RMC and Site RMC:

- Set the Site RMC attenuation to 8 dB
- Set the Cabinet RMC attenuation to 13 dB

The attenuation value for the Site and Cabinet RMC's is determined by the position of the attenuator switches located on the RMC assembly. The first 5 attenuation switches provides 1, 2, 4, 8, or 16 dB of attenuation when the associated switch is in the ON position. The sixth switch is unused. The attenuators add, so the maximum attenuation will be 31 dB when the first five switches are ON.

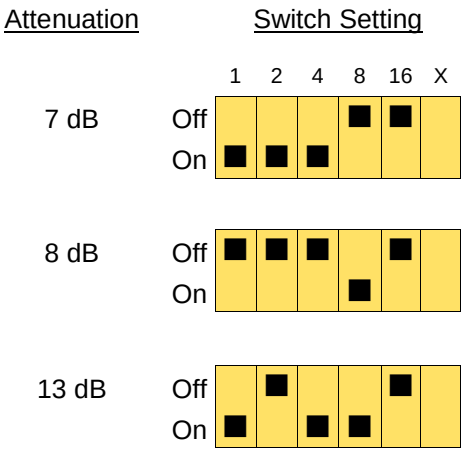

Fig 2: GTR8000 RMC Switch Settings