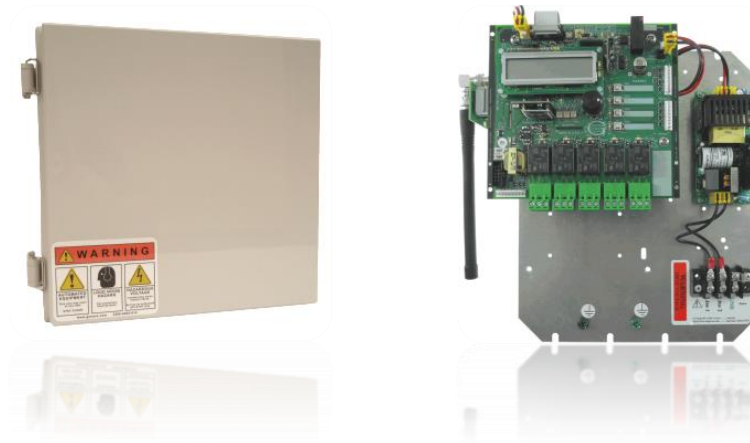




# RXC-3000<sup>TM</sup>

USB / Twist-n-Touch<sup>TM</sup>

## Receiver Decoder Controller Hardware Manual



Genave / NRC, Inc.

[www.genave.com](http://www.genave.com)

[support@genave.com](mailto:support@genave.com)

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## **Warning**



**If incorrectly used, this equipment can cause severe injury. Those who use and maintain the equipment should be trained in its proper use, warned of its dangers, and should read the manuals before attempting to set up, operate, adjust or service the equipment. Keep this manual for future reference.**

# **Important Safety Information**

## **System Planning**

**Proper planning is the cornerstone to an effective warning system. The Federal Emergency Management Agency (FEMA) publishes the “Outdoor Warning Guide” CPG 1-17, which should be used in planning your system. In addition, you should recognize and understand the following items:**

- Outdoor warnings sirens and equipment are not intended to be heard indoors. Conversely indoor devices are not intended to cover outdoor environments. All devices have specific purposes and distances that they can be considered effective. Proper placement and selection of the correct equipment is necessary to cover a desired area. Refer to the FEMA guide for placement guidelines.**
- Training is necessary to ensure those responsible can correctly activate the system. It is also necessary that everyone understand the purpose of the warning system and the protective actions they need to take when the system is activated. Periodic tests can serve to accomplish the training for the operators, in addition to demonstrating the various signals to the public.**
- All warning systems must have contingency plans in case equipment problems or operator errors interfere with its performance. Just as with the primary warning system, the contingency plans should be periodically tested to make sure those responsible know how to implement them and the necessary response from the public is achieved.**

# Important Safety Information

## Installation & Service Precautions



• **Electrocution, severe personal injury and damage to equipment can occur during installation or servicing this equipment. All electrical work should be performed by, or under the supervision of an experienced electrician and in accordance with all applicable electrical, fire, building and safety codes.**



• **This equipment can start at any time from local controls, automatic timers, radio remote, commands from a computer and many other sources. The sound output can cause hearing damage, while other attached equipment can cause personal injury when they engage. Whenever working in or around the equipment you must assume it could activate at any moment, and take appropriate precautions to protect yourself and others. You should completely disable the equipment before working on or in close proximity to any part of it.**

• **You must test the system and equipment to insure it is operating correctly after the installation, as well as after any work has been performed.**

## System Operation

• **Training is necessary to ensure those responsible can correctly activate the system. It is also necessary that everyone understand the purpose of the siren and the protective actions they need to take when the system is activated. Periodic tests can serve to accomplish the training for the operators, in addition to demonstrating the various signals to the public.**

• **You must carefully read and completely understand all the information about the system including its abilities and its limitations. Since no warning system is infallible, you must have contingency plans for warning, in the event the primary systems do not perform as expected, for any reason.**

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## **RXC-3000™ Hardware**

Phone 651-460-6616

Fax 651-460-6686

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# RXC-3000 Receiver Decoder Controller

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## Specifications

### General Specifications

#### General

V <sub>SUPPLY</sub> :	90 to 250 VAC, 47 to 63 Hz
I <sub>SUPPLY</sub> :	1 Amps Maximum
Weight:	16 lbs.
Enclosure Size:	11.73 in x 11.73 in x 7.25 in
Enclosure Rating:	NEMA 4X, Polycarbonate
Power Connector:	#6 Cage Clamp
Temperature: Run	-30 ° to +80 °C
Temperature: LCD	-10 ° to +50 °C

#### Inputs

Number:	8, Logic level active low,
Vin:	Internal pull-up, 5vdc max
Debounce:	150 msec
t <sub>SCAN</sub> :	< 2 msec

#### Relay Outputs

Number:	Up to 5
V max:	230 vac
I max:	7 amps
Type:	1 Form C

#### LCD

Width:	1 to 16 char.
Lines:	2
Font:	5 x 7

#### RF Transceiver

Model:	Maxon SD-161/171/164/174
Freq Range:	148 MHz to 174MHz 450 MHz to 490MHz
Specs:	See Maxon manual for more details

#### Communication

Format	USB 2.0
--------	---------

Software	Use Genave ComstarG4™ software
----------	--------------------------------

#### DTMF Decode

Mark <sub>MIN</sub> :	20 msec
Space <sub>MIN</sub> :	20 msec
Sensitivity:	200 mv p-p, min 3 Vp-p, max
Twist <sub>MAX</sub> :	+/- 8 dB
Interword:	0 to 25.5 sec
Length:	32 char. max

#### Tone Decode (optional)

Accuracy:	> 0.2%
Selectivity, adj.:	0 to 3000 Hz
Range:	210 – 3000 Hz
S/N Ratio:	0 dB or better
Detect <sub>MIN</sub> :	400 msec
Detect <sub>MAX</sub> :	25.5 seconds
Intertone <sub>MAX</sub> :	300 msec

#### Number of Two Tone seq. A/B tones decoded

20



## Overview

The RXC-3000 is a standalone Receiver – Decoder – Controller (RXC) device that is fully programmable from either a computer or via the new Genave Twist-n-Touch™ rotary input switch. The unit is equipped with a transceiver, signal decoders, programmable logic controller, power supply, up to 5 relay outputs, optional LCD screen, board mounted activation switches and USB computer interface, all contained in a NEMA 4 weatherproof enclosure.

The RXC-3000 is programmable, and not dependent upon any manufacturers' particular tone code scheme. It can, of course, detect and generate Motorola, GE, Bramco, RCA and many other standard codes. But it can just as easily be programmed to use custom tone codes already in use, or to develop your own code schemes for a particular application.

## *How It Works*

The RXC-3000 monitors audio from its radio receiver for either DTMF or Two Tone Sequential signals. When the unit receives signals that it has been programmed to act upon, it starts the associated pre-programmed script from its memory. The script controls which outputs are activated and how long they are to operate, if a sound, song or voice message is played from the ADPCM player, if the audio from the player is sent to its Public Address (PA) port, etc...

### **How the History Memory works**

The RXC-3000 remembers each signal it has been programmed to decode and logs it into its memory. If the unit is equipped with the optional Real Time Clock (RTC) then each history entry will also have the time and date of the received signal.

### **How the Real Time Clock works**

The Real Time Clock (RTC) enables the RXC-3000 to start a script at a certain time and date. It can also disable scripts from running, aka "Lockouts" (e.g. keep siren from operating at night) at certain times of the day or on a particular day of the week such as Saturday or Sunday. The RTC has a battery that keeps the time current in the event power is lost.

### **How the Radio works**

When the RXC-3000 is equipped with a Maxon transceiver, many of the settings for the Maxon can be made directly through the RXC-3000. No special programs or cables are required to make standard changes to the radio's settings. Alternatively, the RXC-3000 can be connected to any audio source or radio receiver chosen by the installer. The radio receives signals on a single narrow or wide band signal and sends the audio to the RXC-3000 decoder circuitry. The radio's audio can also be sent to the PA audio port by the RXC-3000.

### **How the Audio Player works**

If the RXC-3000 is equipped with the optional ADPCM player, the unit can play songs, sound or voice messages that are stored in its TransFlash (TF) card. The audio is sent to the PA port and 600 Ohm port. The RXC-3000 can play up to 98 different audio files that are stored on the TF card.

### **How the Inputs work**

In addition to the Twist-n-Touch switch, the RXC-3000 has 4 switches on the main board that can be programmed to start or stop any script in the unit's memory. Additional inputs are available for installers to connect to their own external switches.

**How the Outputs work**

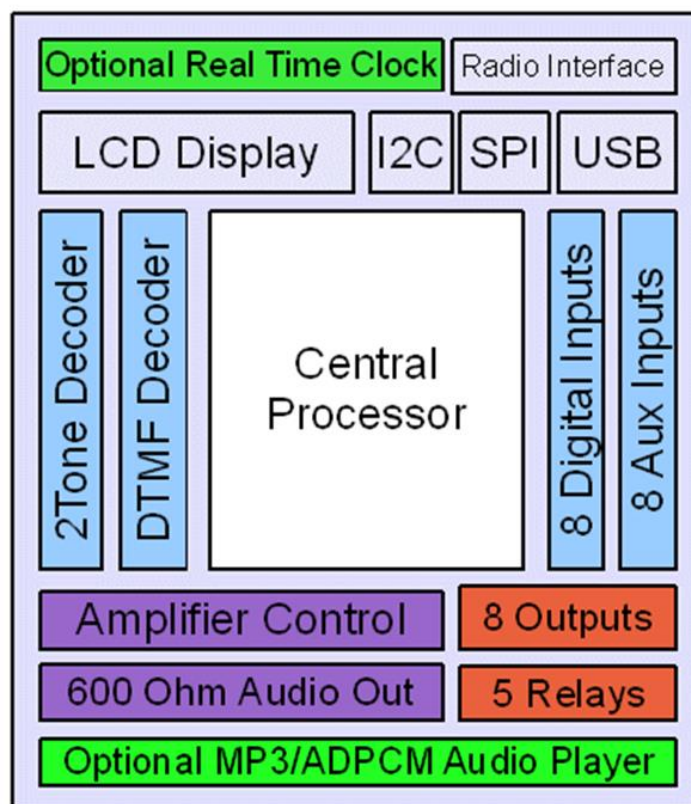
The RXC-3000 comes equipped with 5 Single Pole Single Throw (SPST) high power relays. Additionally, the RXC-3000 has an output header where the installer can tap into the transistors that control the relays as well as 3 additional transistors that are open for special use. During the running of a script, a command in the script will tell an output to turn on and/or off. Scripts can have timers embedded in them which allow relays to cycle on and off continuously for a predetermined amount of time (e.g. wail signal for 3 minutes).

**How the Audio Port works**

The RXC-3000 can control an external amplifier. Not only does it send audio out this port, but it has control points in the port to power up and enable several different types of amplifiers. Two pins in the port are connected to the 600 ohm transformer which allows audio from the ADPCM or radio to be sent to the amplifiers.

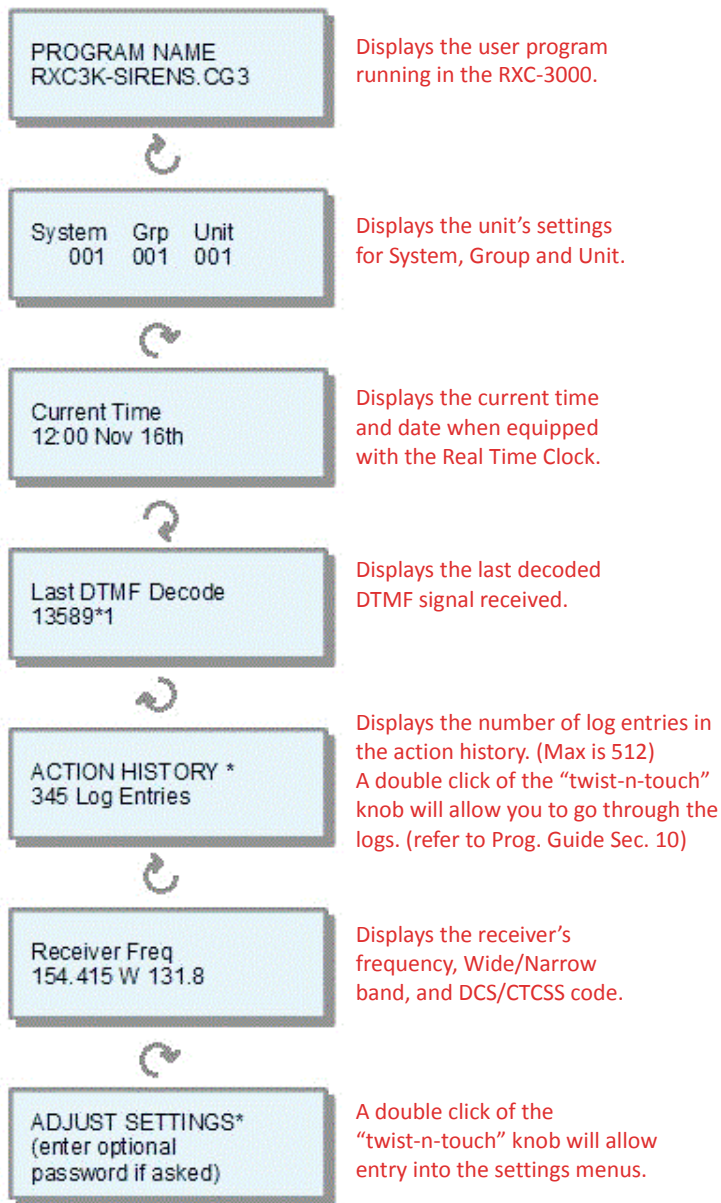
**How the 600 Ohm port works**

The RXC-3000 can send radio or ADPCM audio through a balanced 600 Ohm audio transformer for use by installers when they need to interface the RXC-3000 to an external PA system.

*Building Blocks*

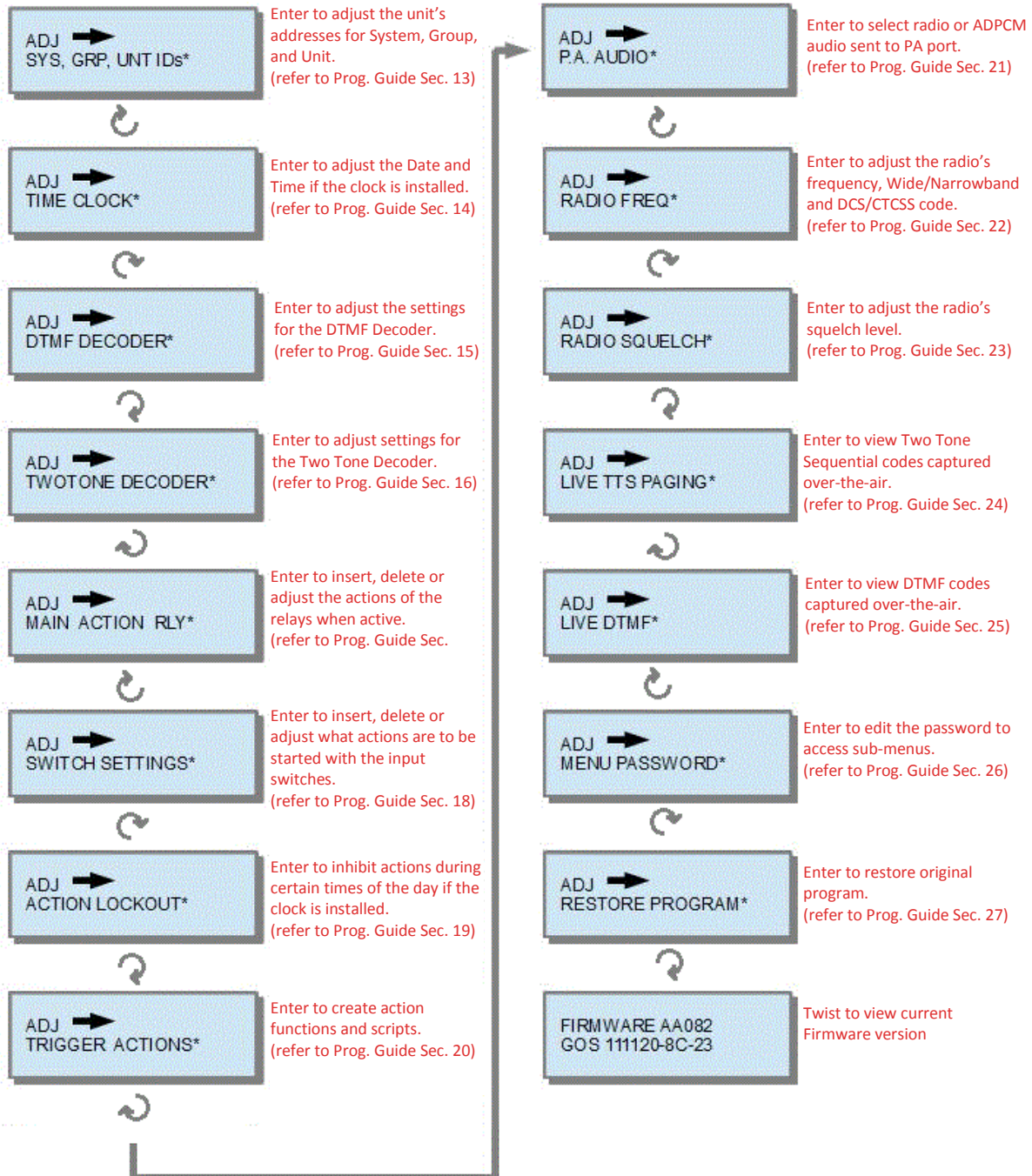
## Menus And What They Mean

### RXC-3000 Main Screens



Note: Sub-menu screen will time out in 3 minutes and return the RXC-3000 to normal operation without Twist-n-Touch knob movement.  
Live DTMF\* and LIVE TTS PAGING\* do not time out.

## “Adjust Settings” Screens



## Installing

### *Mounting the RXC-3000*

The enclosure is made of polycarbonate and has a NEMA 4X rating when shipped from the factory. Four mounting inserts are provided on the back of the enclosure for mounting the box to a wall. The inserts are threaded for metric M5 bolts. Mounting feet are available for the enclosure (Genave P/N 7050-0000-019). The feet allow front-on mounting of the enclosure to a wall and can be mounted vertically, 45 degrees, or horizontally. If you are mounting the equipment to a pole it is important to keep the enclosure flat and not allow the box to twist. The door gasket will not completely seal if there is a twist to the box. If you need design assistance please contact Genave®. We have several options available for pole mounting.

When making connections to the enclosure, do not drill through the top or sides of the box. Make all connections through the bottom of the enclosure to maintain at least a **NEMA 3R** rating.

The internal equipment is mounted to a metal backplane. The backplane is secured to the enclosure with screws that are specifically designed for plastics. Do not use any other type of screw to secure the backplane to the enclosure, as it will damage the standoff.

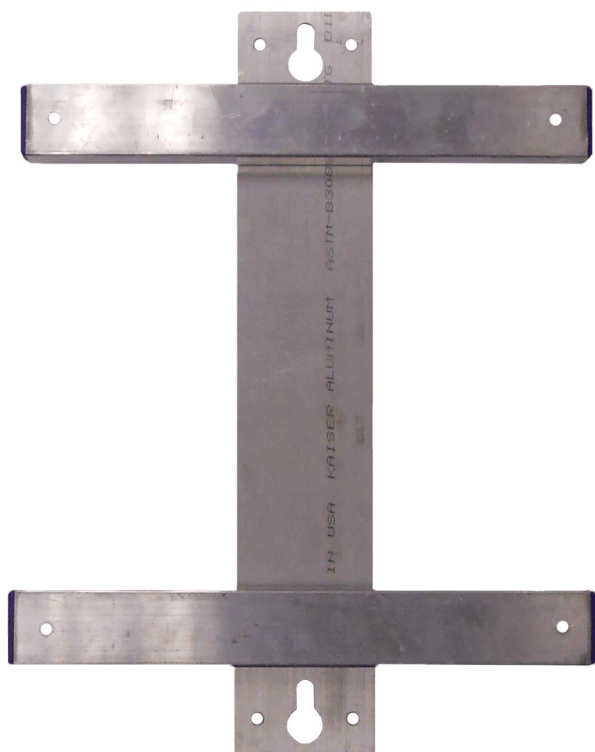


### *Attachment To A Pole*

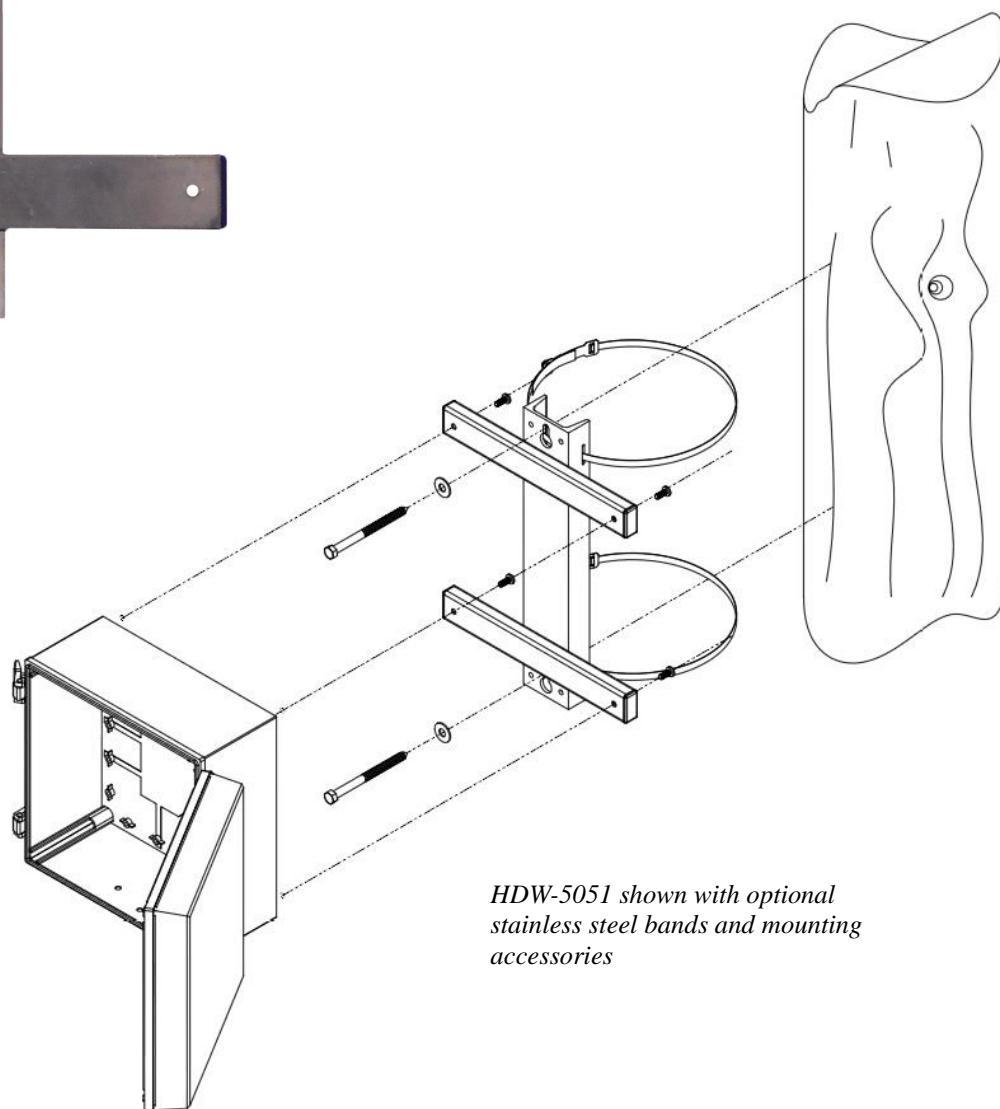
Genave offers a pole mounting kit (HDW-5051) for the RXC-3000. The kit can be used to attach the RXC-3000 to a wood pole with screws or lags, customer supplied, or it can be attached to a steel pole with the optional stainless steel banding.



## Pole Mounting



HDW-5051



*HDW-5051 shown with optional stainless steel bands and mounting accessories*

## AC Wiring



### Power Connection

The RXC-3000 requires 90 to 250 volts AC power to operate. The unit is supplied with a 3 position barrier terminal block. The terminal screw size is #6 screw and will accept a forked terminal with a maximum width of .320". Terminal #3 is grounded to the backplane. This terminal should be bonded/grounded to earth ground. Maximum wire size is #12 AWG.

## AC Connections:

### 110 Volt :

Connect Hot wire to "Line 1"  
Connect Neutral wire to "Line 2"  
Connect Earth Ground wire to "GND"

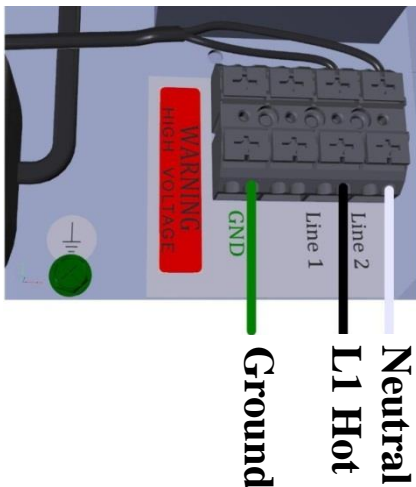
### 208 / 240 Volt:

Connect Hot Line 1 to "Line 1"  
Connect Hot Line 2 to "Line 2"  
Connect Earth Ground wire to "GND"

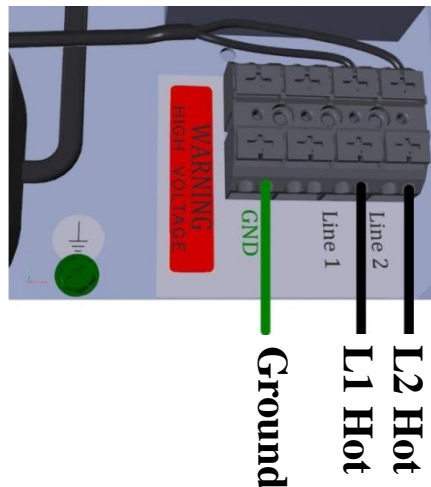
### 220 Volt:

Connect Line 1 to "Line 1"  
Connect Line 2 to "Line 2"  
Connect Earth Ground wire to "GND"

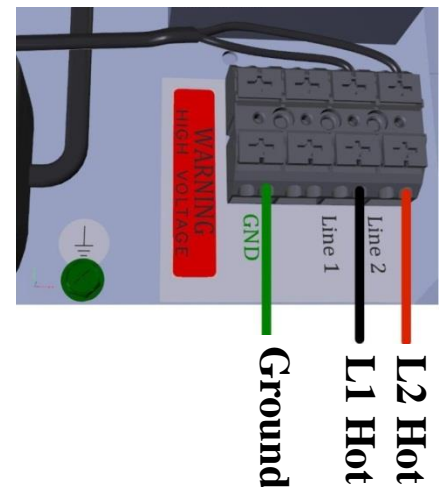
### 110 Volt



### 220 Volt



### 208 / 240 Volt



### *DC Wiring*

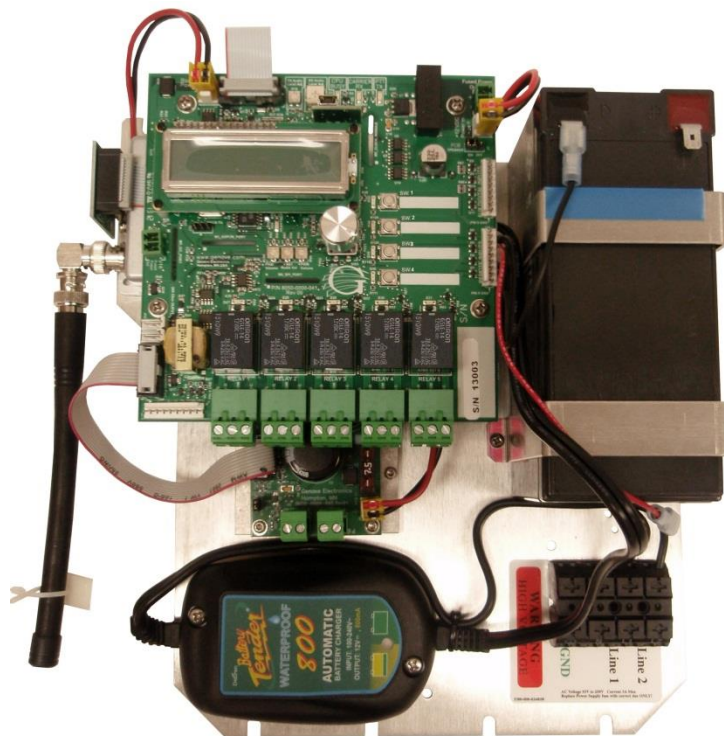
The installer can choose to power the RXC-3000 from a +12 Volts DC power source that can supply a minimum of 3 amps. The connector type is a Tyco 3-640427-2 IDC connector. It has a pin spacing of 0.156 inches and is made for 20 AWG wire. A special tool is required to make connections. Alternatively, Genave can make a custom length cable for installation.



**Warning:** Make certain that the polarity of the wires is correct. Even though the unit has diode protection for reverse voltages, damage to the RXC-3000 may occur if the polarity is reversed.

### *Battery Backup*

The battery backup consists of a seven amp hour sealed lead acid battery along with a universal input battery charger. Input voltage for the charger can range between 100 – 240 Volts AC.





## Programming

### *Installing ComstarG4*

The RXC-3000 can be programmed with a computer running the optional ComStarG4 program. To install the program on a computer, follow these instructions:

#### **Thumbdrive Installation to Computer Disk drive.**

- 1) Insert the thumbdrive into your computer. The computer should automatically find the drive and install it as a removable disk drive.
- 2) If the program does not automatically install, you may need to use Windows Explorer to select the drive and manually start the installation program: **setup.exe**

The program will create and install to the directory **C:\Program Files\Genave**

The program will also install all of the files you need into the Genave directory.

The program will also ask if you want a desktop icon.

The first time you install ComStarG4 on your computer, select the option to install the USB Drivers.

- 3) Attach your USB cable to the RXC unit and run **ComStarG4.EXE**.

For Windows 7 users it may be necessary to open Windows Explorer, locate ComStarG4.exe then right click on the file name and select "Run as administrator".

- 4) The first time your run ComstarG4, click **Edit->Preferences** and select the USB drive.

The file that holds all of the configuration data for your Genave product will automatically load when you start the ComstarG4 program. If you make changes to the file, use "SAVE AS" and save the new file to the hard drive. It is best if you also save the file to the thumbdrive. This will be your backup copy of the changes.

**KEEP YOUR THUMBDRIVE SAFE.** If you need to return your Genave product for service, you will need to send us the thumbdrive along with the unit if you have made changes to the data files in the field. This will be our only way of knowing what the unit has been programmed to do.

### *USB Port, Connector And Cable*

The RXC-3000 communicates with a computer over a USB 2.0 port. The port's connection is a mini type B 5 pin USB receptacle. The maximum USB cable length is 16 feet.

**Belkin cable F3U138-0 “6 foot USB Type A to mini 5 pin Type B”.**



### *Passwords*

The 5 character password locks out access to the sub menus.

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *Restoring RXC-3000 to Default Programming*

If during changes or setup, you need to return the RXC-3000 to a previous program, the RXC-3000 holds the last program downloaded to the unit through the USB in its memory.

**Warning!!! Restoring the running program to its original program sent with the unit will delete all previous changes to the running program.**

*Please refer to the Programming Guide 9000-0000-041 for more information*

## Inputs

### Input Header Characteristics (J14 and J15)

The inputs for the RXC-3000 are ALWAYS pulled low to pin 9 of J14 or J15. You can connect these inputs to switches or opto-couplers. We recommend that they are not connected directly to a digital level source unless there is protection between the two circuits.

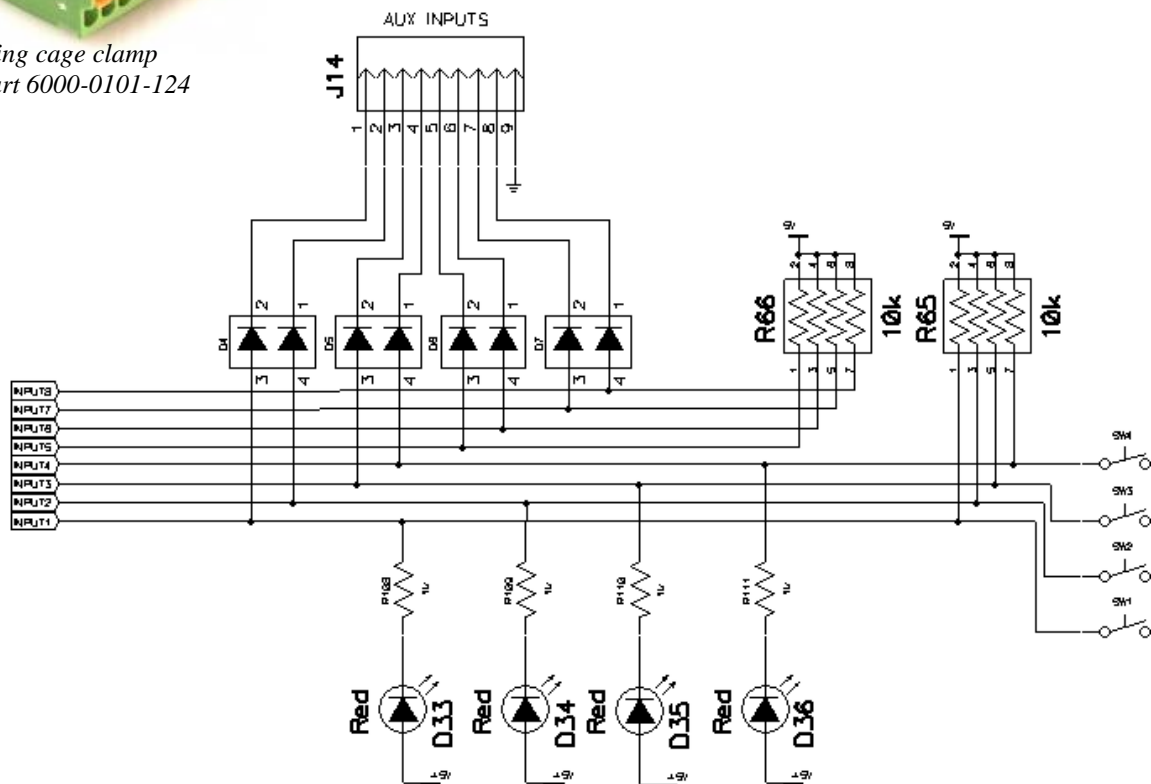
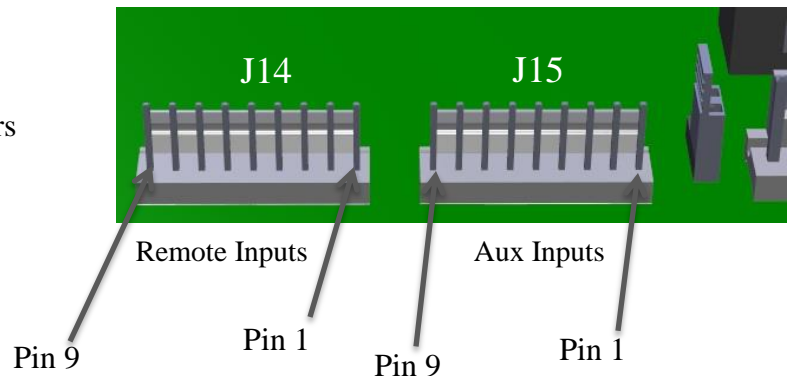
Never supply voltage to these inputs. Even though they are protected with diodes in case a voltage above +5VDC is applied to them, they may become damaged. Each input has a pull up resistor.

Input header J14 is used to add additional remote switches to the RXC-3000.

Input header J15 is for future use with sensors designed for the RXC-3000.



Optional spring cage clamp  
connector Part 6000-0101-124



### *Triggering RXC-3000 From an Input*

The following items describe input triggering:

- (1) Each of the 8 inputs can start an action script, but only one script per switch.
- (2) The action scripts need to be setup before a switch can be attached to them.
- (3) The name of the action script will appear on the screen as you make your selections.
- (4) The action script begins upon the closure of the switch. If the switch is still closed when the action is complete, it will not trigger again until the switch is opened and then closed again.
- (5) Each input has a 150 millisecond debounce. If the switch closure is faster than the debounce, no actions will start.

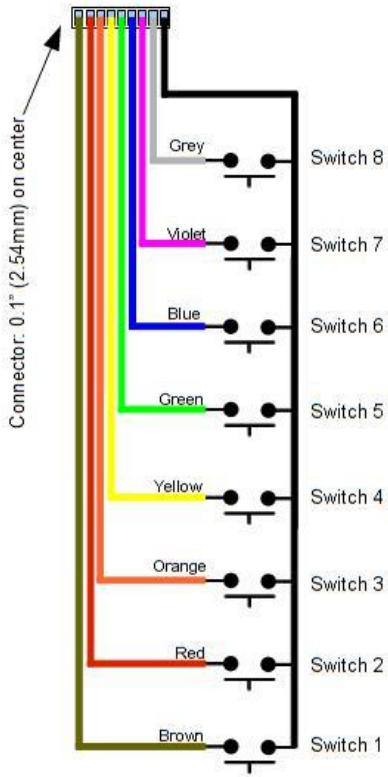
*Please refer to the Programming Guide 9000-0000-041 for more information*



**Example wiring method from input header to user switches with the RXC-3000**

RXC-3000

Turn off ALL power before working on any electrical equipment. Follow all applicable electrical and safety rules and regulations. This is only an example. Your contactor and wiring may differ. Electrical work should only be performed by licensed and qualified personnel.



In this example, remote switches are used to control the RXC-3000. The switches shown are momentary contact (press and release).

Notes:

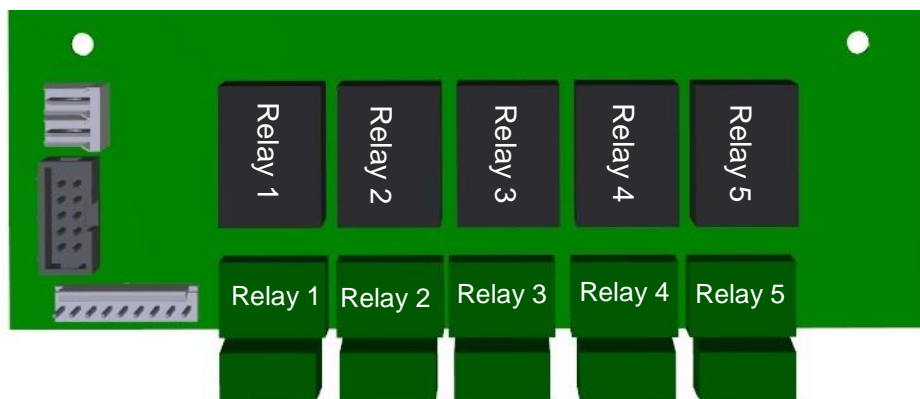
- (1) Use dry contact closure switches or opto-isolated switches only.
- (2) Use the ground reference (PIN 9) from the RXC-3000 as the common for the switches. **NEVER CONNECT THE SWITCHES TO ANY OTHER VOLTAGE OR GROUND SOURCE OTHER THAN PIN 9 OF THE INPUT HEADER. YOU MIGHT DAMAGE THE RXC-3000.**

- (3) Keep the wires as short as possible.

## Outputs

### Relay Characteristics

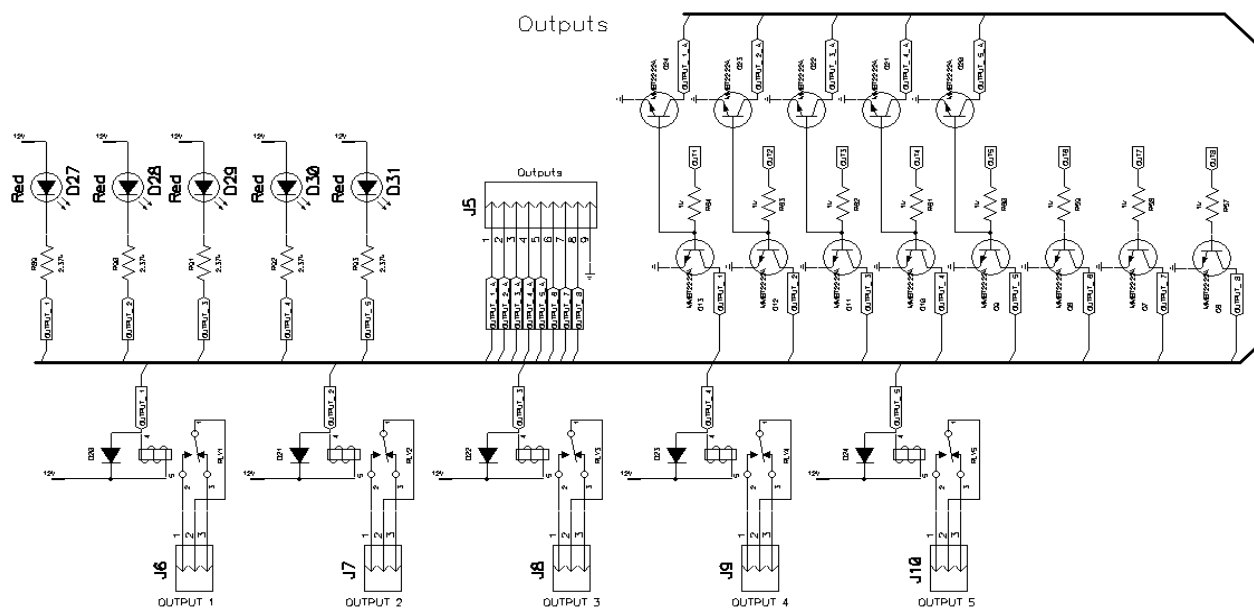
The RXC-3000 has 5 high power relays available for use. Each relay can handle 240VAC at 7 Amps. Each relay's outputs are directly connected to a 3 position header (J6 to J10) that can accept wires up to 12 AWG diameter.



Each output connector is a “1 FormC” output (A single switch with normally open, common and normally closed connections).

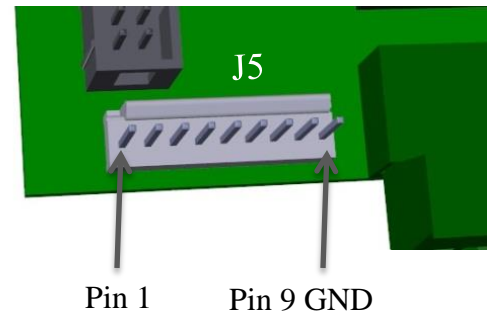
The relay is supplied on one side of its coil with +12VDC and the other side of the coil controlled by a transistor that, when active, pulls the relay's coil to ground and activates the relay.

The transistors that control the relays are also connected to the output header along with 3 uncommitted transistors. (see below).



### *Output Header Pinout (Aux Output)(J5)*

The first 5 pins of the Aux output header are connected to the 5 on board relays. When they are off, the outputs will be +12VDC. When the transistors are on, the output will be 0 VDC. Do not connect these pins to any voltage higher than +12VDC since the voltage will go through the relays and into the RXC-3000's power supply.



Pin 1 - Relay #1

Pin 2 - Relay #2

Pin 3 - Relay #3

Pin 4 - Relay #4

Pin 5 - Relay #5

Pin 6 - Uncommitted Transistor

Pin 7 - Uncommitted Transistor

Pin 8 - Uncommitted Transistor

Pin 9 - Ground

### *Output Header Transistor Characteristics*

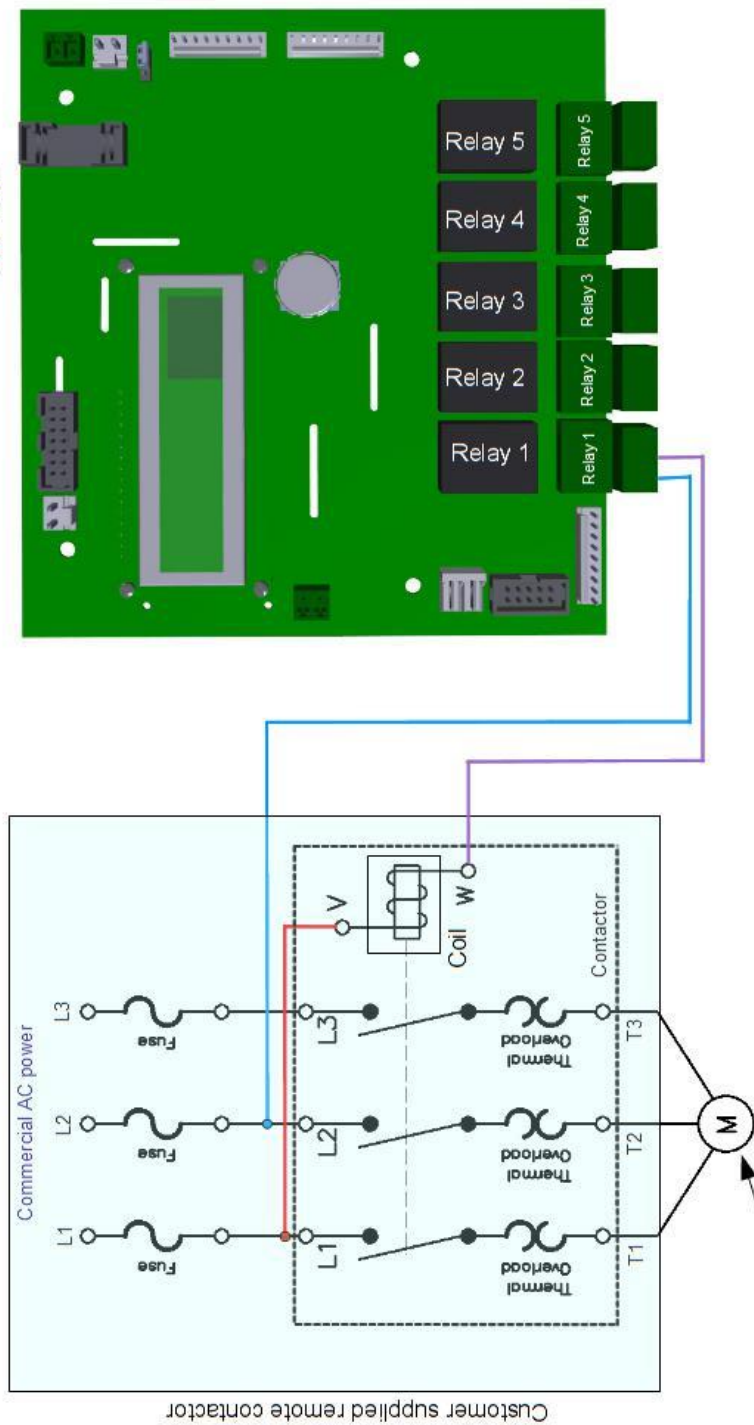
Pins 6,7,8 are connected to the collectors of 3 uncommitted transistors. Each transistor can handle a maximum of 30VDC and 150mA. When activated, the transistors pull the pins to ground (pin 9).





RXC-3000

Example wiring method to control heavy loads with the RXC-3000



In this example, when relay #1 on the RXC processes the radio command to engage, it completes the coil circuit of the contactor. The contactor then turns on and lets the voltage flow to the customer's device.

Turn off ALL power before working on any electrical equipment. Follow all applicable electrical and safety rules and regulations. This is only an example. Your contactor and wiring may differ. Electrical work should only be performed by licensed and qualified personnel.

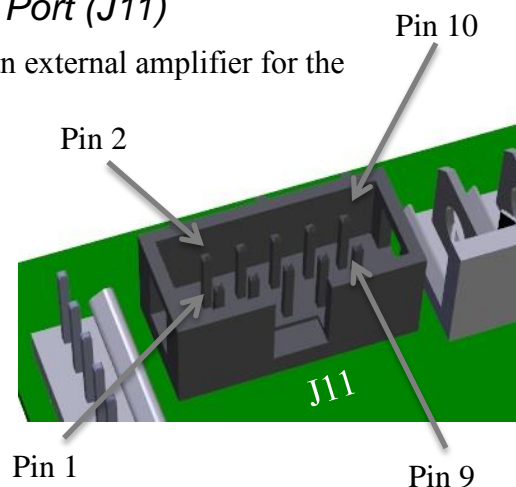


## PA Audio Port

### *Pinout And Characteristics Of External Amplifier Control Port (J11)*

The amplifier control port “PA Port” is specifically designed to control an external amplifier for the audio that comes out of the RXC-3000. The pinout of the connector is:

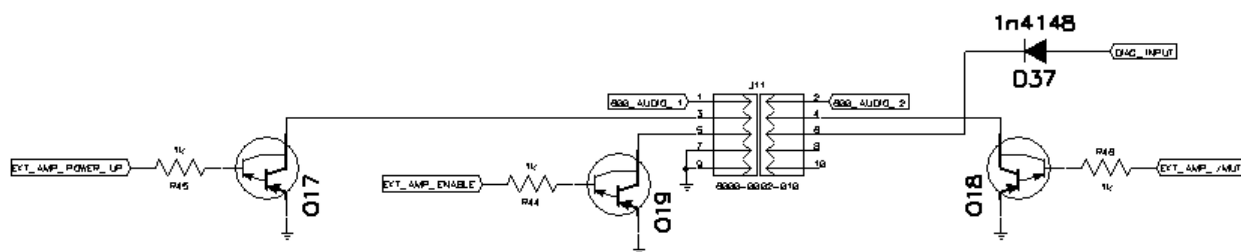
Pin 1	600 Ohm Audio 1	Pin 6	Amp Diagnostics Input
Pin 2	600 Ohm Audio 2	Pin 7	Ground
Pin 3	External Amp Power Up	Pin 8	Not Used
Pin 4	External Amp Mute	Pin 9	Ground
Pin 5	External Amp Enable	Pin 10	Not Used



The control pins (Power up and Mute) are connected to the collectors of transistors that can handle 40VDC at 1 amp.

The Diagnostics pin is diode protected so that voltages above +5VDC are blocked from damaging the RXC-3000. The diagnostic input serves to tell the RXC-3000 that the amplifier is working properly. A low voltage on this pin indicates that the amplifier is ok. A high voltage on this pin indicates that the amplifier either has a problem or is not connected.

### External Amplifier Interface



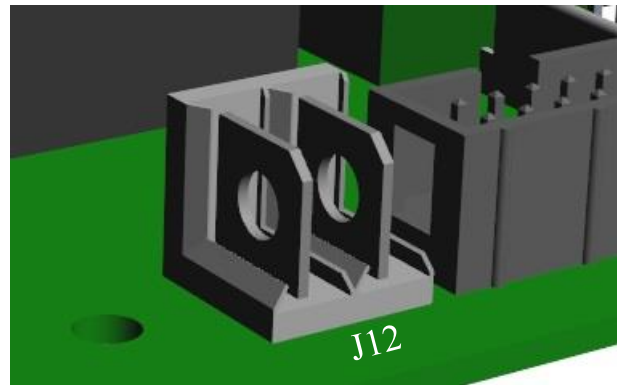
The Audio pins are connected to the 600 Ohm audio transformer. The transformer passes AC voltages but blocks DC voltages from exiting the RXC-3000. This to help remove “Hum” from the audio lines if the RXC-3000 is not connected to the same power supply as the amplifier.

### *Pinout And Characteristics Of 600 Ohm Audio Port (J12)*

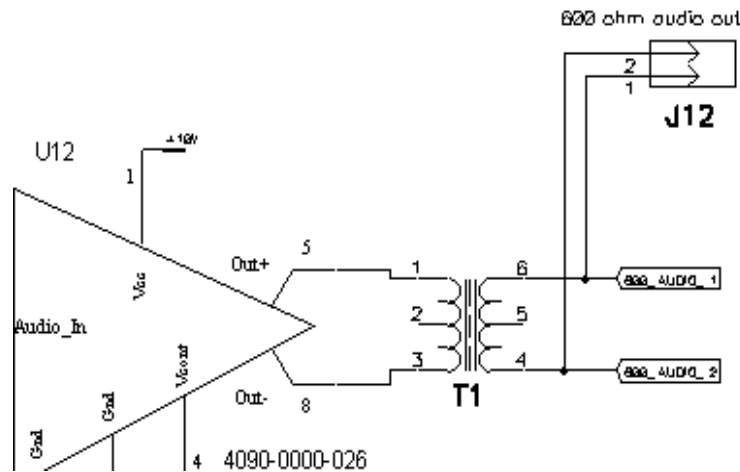
The 600 Ohm audio port is used to connect the audio from the RXC-3000 to a PA system such as the type used in a school, fire station or office building. Most of these systems have audio inputs that are rated as 600 Ohms of balanced audio (600 ohms between the audio wires and no ground reference).

The transformer passes AC voltages but blocks DC voltages from exiting the RXC-3000. This is to help remove “Hum” from the audio lines if the RXC-3000 is not connected to the same power supply as the amplifier. Additionally, the current sent through the transformer is a push-pull type which allows it to go further without interference from other sources of AC power. Please note that you should use either twisted wires or shielded wires between the RXC-3000 and the PA amplifier. This helps remove unwanted AC signals which cause hum and distortion. Also, do not run the audio wires near fluorescent light fixtures since they can produce a large amount of AC noise.

The connector J12 can accept wires up to **16 AWG**.

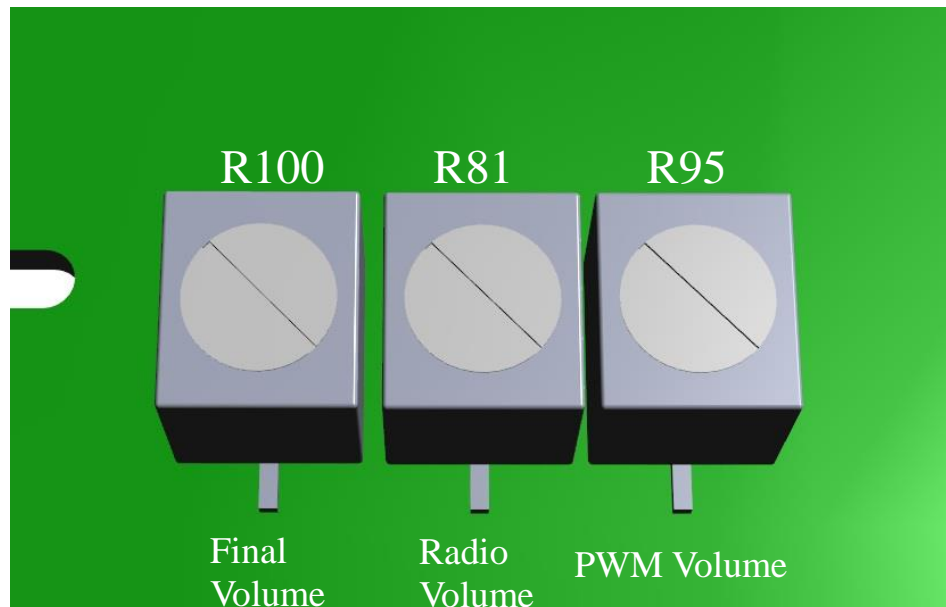


Note: If you connect the 600 Ohm port to a PA system, you cannot use the External Amplifier Control Port since the 600 Ohm transformer is also connected to 2 of the pins in this connector.



### Setting PA Port Levels

There are 3 voltage controlled amplifiers on the RXC-3000 that boost the audio from the radio and main IC (PWM) and then a final boost into the 600 Ohm transformer. These amplifiers are controlled by R81, R95 and R100 respectively. To set the levels, rotate R100 to half volume then adjust R81 and/or R95 for the desired volume levels individually. If you are using the ADPCM module, you need to set the volume with the potentiometer on the module. Once all of the levels are set, use R100 as the main volume adjustment for setting audio out of the RXC-3000.

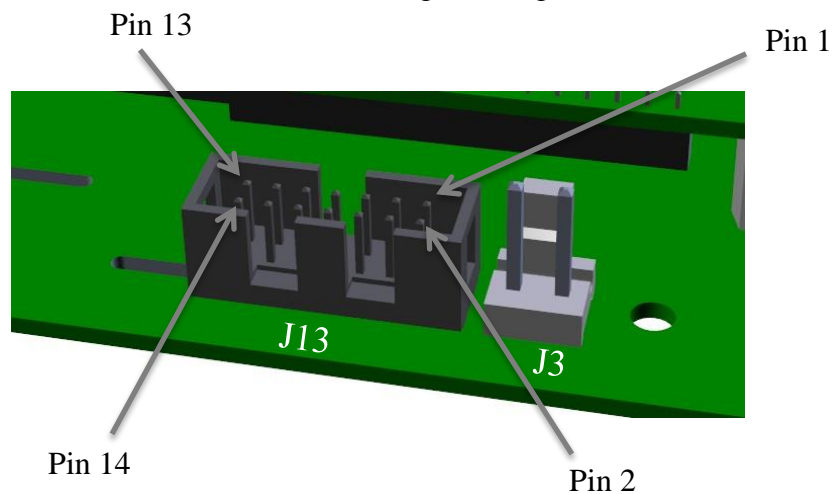


## Radio Port

### *Radio Port Pinout (J13)*

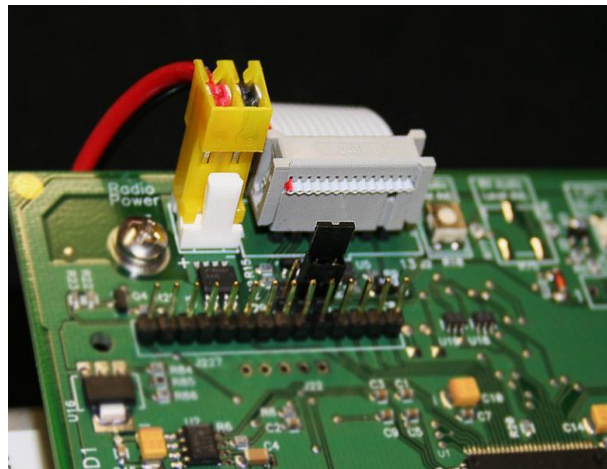
The Radio Interface Port is optimized for use with the Maxon SD series of radios. However, this port can be used to connect the RXC-3000 to any radio or audio source. Here is the pinout of the port:

Pin 1	Do Not Use	Pin 8	Push To Talk (/PTT)
Pin 2	Do Not Use	Pin 9	Not Connected
Pin 3	Ground	Pin 10	Rx Audio From Radio To Decoders
Pin 4	+12 VDC (Fused)	Pin 11	Carrier Detect (/CD)
Pin 5	Speaker Audio from Radio	Pin 12	Tx Audio To Radio and Radio Program Pin
Pin 6	Ground	Pin 13	Programming Data From Radio
Pin 7	Not Connected	Pin 14	Programming Data To Radio



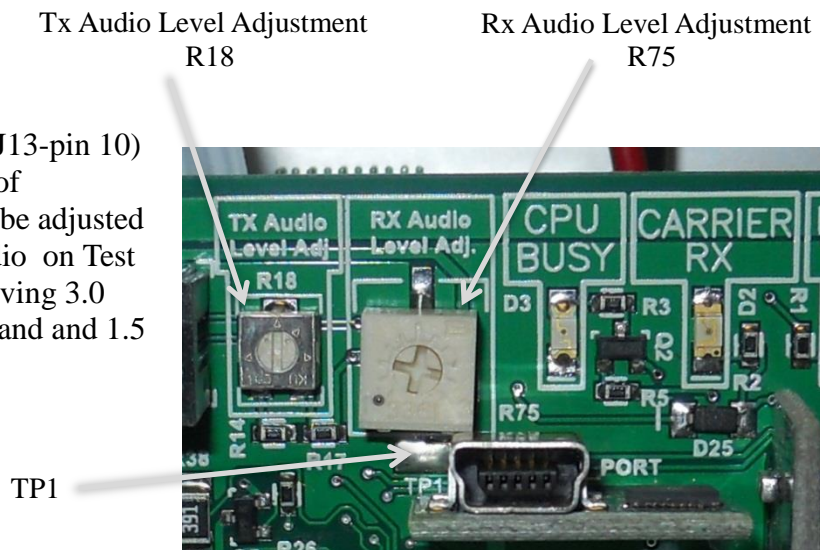
### *Radio Power Port*

The Radio Power Port (J3) is used to supply power for Maxon SD series radios only. Do not use this port for other types of radios.



## Setting Rx Audio Levels

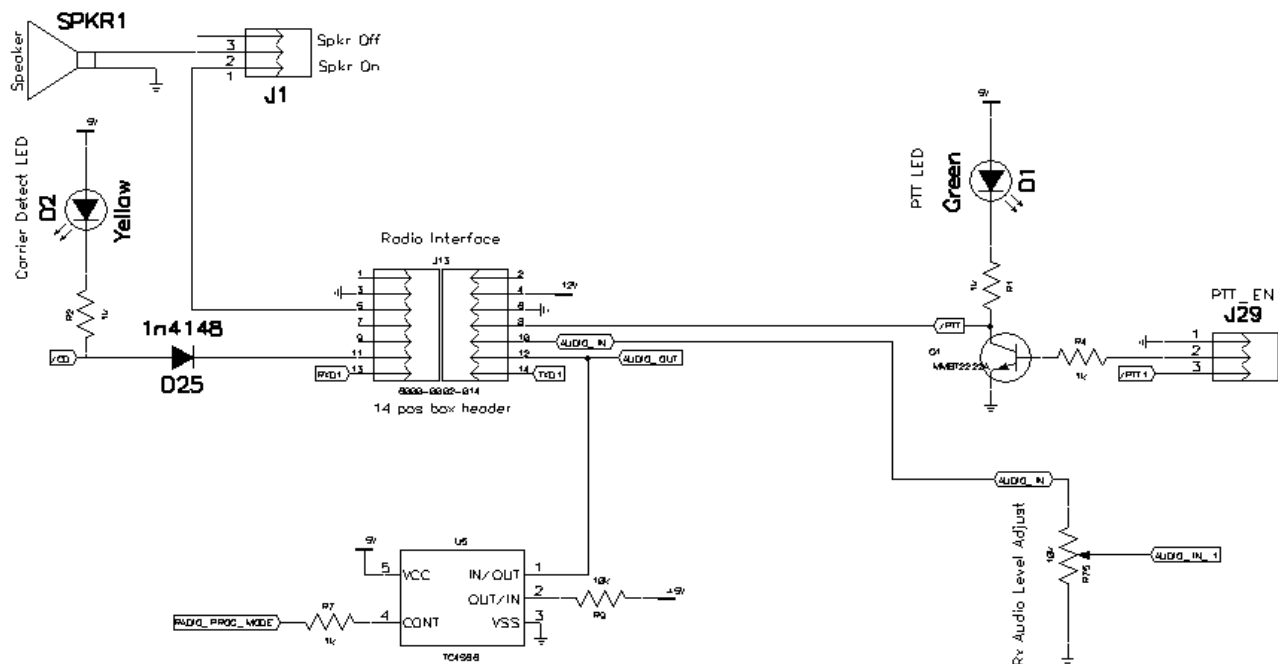
The Rx audio from the Radio Port (J13-pin 10) is supplied directly to the high side of potentiometer R75. This pot should be adjusted to provide **100mV to 200mV** of audio on Test Point 1 (just below R75) when receiving 3.0 Khz deviation of 1000 Hz in wide band and 1.5 Khz deviation in narrow band.



## Setting Tx Audio Levels

The TX potentiometer (R18) is driven from a high impedance amplifier. The audio from the TX pot is AC coupled to the Radio Port pin 12. Adjust this pot for **3.0 to 3.5 Khz deviation** (or 1.2 to 1.5 Khz deviation for Narrow band) from the transceiver at Test Point 2 (just below R18). The audio from the ADPCM, DTMF generator and PWM are all summed and amplified for transmission.

## Radio Interface



### *Radio Audio Levels to PA Port*

*(See Setting PA Port Levels under “PA Audio Port” section of manual)*

### *How To Change Frequency (Maxon Radio Only)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Change DCS/CTCSS (Maxon Radio Only)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Set Wide/Narrow Bands (Maxon Radio Only)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Set Squelch (Maxon Radio Only)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *Returning Radio To Default Settings (Maxon Radio Only)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

## DTMF Decoder

The DTMF decoder circuit monitors to the audio signal from the radio for “Touch-Tone” telephone digits. When the digits are discovered, the circuit decodes them and sends to the microprocessor. Mark is the amount of time that a tone is being transmitted and “Space” is the amount of time that the tone is not being transmitted.

### *DTMF Decoder Characteristics*

The DTMF decoder circuit can accept signals as fast as **20** milliseconds for both Mark and Space timing.

A DTMF string can be anywhere between **2** characters long and **32** characters long.

The decoder circuit requires a gap between character strings of **600** milliseconds to decode the previous string before it can accept another string of characters to decode.

### *Triggering RXC-3000 Off Of A DTMF String*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Enter/Adjust DTMF Strings*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *DTMF Learn Mode*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *“Live Look” (DTMF Digit Grabber)*

*Please refer to the Programming Guide 9000-0000-041 for more information*

## Two Tone Sequential Decoder

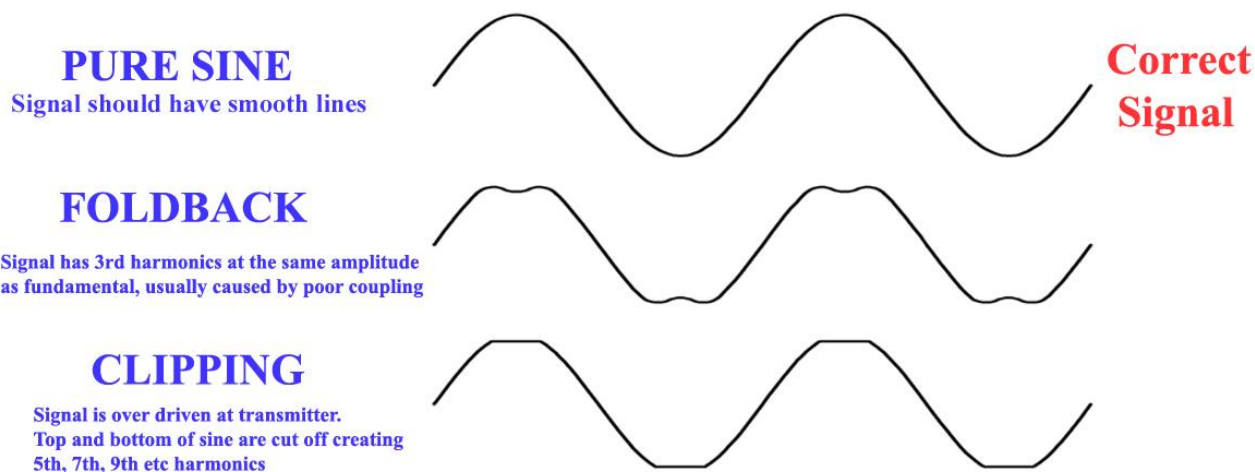
### *Two Tone Decoder Characteristics*

The Two Tone decoder is a “Non-Predictive” decoder. This means that the decoder is not tuned to look for a specific set of tones. Rather, the unit decodes tones it receives over-the-air and sends the tone information to the main chip where they are compared to a list of tones attached to action scripts.

The Two Tone sequential decoder can detect tones between **210 Hz** and **3000 Hz**.

The decoder is equipped with an Auto-Correlator circuit that acts as a filter to remove background noise from the audio presented to the decoder. Only signals that are periodic (tones) will be passed to the decoder.

When decoding simultaneous multiple tones, the RXC-3000 will only pass along the data on the tone with the greatest amplitude. Hence if the CTCSS or DCS tones are near or larger than a 1000 Hz tone signal, the decoder chip will not pass data along about the 1000 Hz tone and since the CTCSS and DCS tones are out of the range for the decoder, they are not decoded. The result is that the RXC-3000 does not respond to the signal. As soon as the 1000 Hz signal is increased above the CTCSS or DCS tones, the RXC-3000 will start to display the tone.

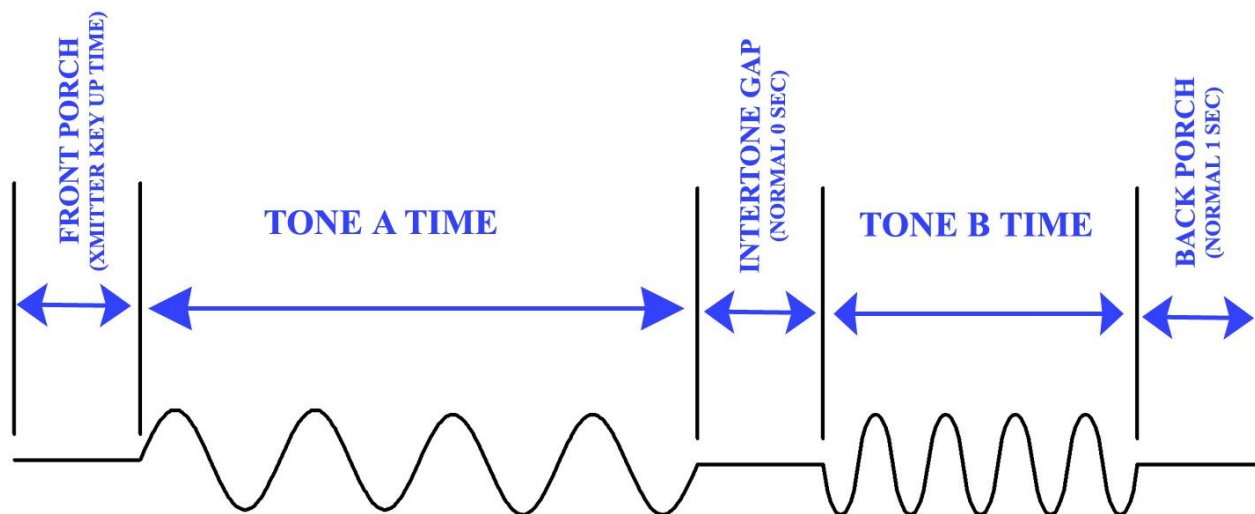


*Illustration 1: Two Tone Sequential Tone Distortion*

It is important to present the RXC-3000 with a clean RF and audio signal from the activation point. If the audio signal is distorted as shown above, the unit will decode the signal, but due to the harmonics riding on the signal, it may not correctly identify the frequency of the tone.



When setting up and programming the RXC-3000 to detect Two Tone Sequential tones, make certain that you have the correct tone frequencies AND the correct tone lengths for both tones. The RXC-3000 has the ability to learn tones over-the-air. However, if the tone lengths vary significantly from the activation point over time or if the tones are generated by hand, the RXC-3000 may not decode them properly.



*Illustration 2: Two Tone Sequential Map*

Here are some reference points for Two Tone sequential tones:

**Front Porch** = Key up time. This is the time required for the transmitter to become stable. This is not a problem with new transmitters, but if the signal is passing through several different pathways to get to the RXC-3000 it may get delayed by up to 250 milliseconds. If not calculated into the A tone time, this would make the A tone appear too short.

**Tone A Time** = Length of time that the first tone is being transmitted. This time may be as short at 700 milliseconds or as long as 25 seconds.

**Inter-tone Gap** = The amount of time when neither A or B tones are transmitted. Normally this is 0 seconds for most systems. The maximum allowed time for the RXC-3000 is 300 milliseconds

**Tone B Time** = Length of time that the second tone is being transmitted. This time may be as short at 700 milliseconds or as long as 25 seconds.

**Back Porch** = Length of time that the transmitter is still operating but no tones are being transmitted. It is recommended that this time be at least one second when transmitting stacked pages.

**Note:** The Inter-tone Gap is NOT the same as the Inter-sequence gap. This is the time between a set of tones and the next set of tones. The Inter-sequence time is normally 1 second in length to allow decoders time to start working on the first set of tones before another set comes in.

### ***Triggering RXC-3000 Off Of A Two Tone Signal***

*Please refer to the Programming Guide 9000-0000-041 for more information*

### ***How To Enter/Adjust Two Tone Signal Strings***

*Please refer to the Programming Guide 9000-0000-041 for more information*

### ***Two Tone Learn Mode***

*Please refer to the Programming Guide 9000-0000-041 for more information*

### ***“Live Look” (Two Tone Grabber)***

*Please refer to the Programming Guide 9000-0000-041 for more information*

## Real Time Clock

### *Triggering RXC-3000 From The Real Time Clock*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Adjust Time*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *How To Set Daylight Savings Dates*

*Please refer to the Programming Guide 9000-0000-041 for more information*

### *Real Time Clock Battery*

The battery for the RTC is a standard 3 Volt CR1612, CR1616, CR1620 or CR1632 battery.

To maintain the current time, replace the battery with power applied to the RXC-3000.

Install the battery into the holder with the negative side facing into the board and the positive side facing the holder.

A CR1616 battery will maintain correct time in the clock for up to 3 years.

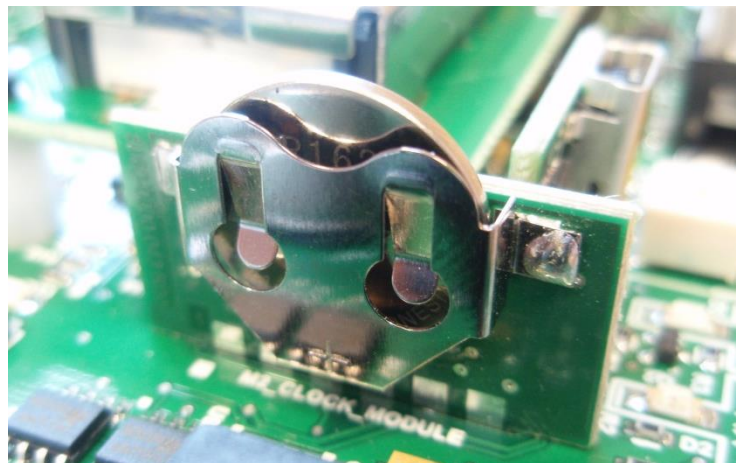
The CR16XX series of batteries are available at most stores and pharmacies.



CR1616 Negative Side



CR1616 Positive Side



## MP3 Audio Player

### *How Sound Files Are Played To The PA Port*

When the RXC-3000 runs a script, if it has been told to play a song/sound file, it turns on the MP3 player and tells the player the file number of the song/sound it is to play. The player automatically selects the file from the SD card and begins playing. At the same time, the RXC-3000 un-mutes the corresponding audio amplifiers and the external PA amplifier circuits.

### *How The RXC-3000 Knows What Audio File To Play*

Each MP3 sound file on the SD card must have a specific name that begins with 3 numbers (from **001** to **098**) followed by a hyphen (example **048-**). The number must include leading zeros and the file name must end in .mp3

Any characters after the hyphen are ignored by the RXC-3000 and are only there to help the programmer identify the files.

**NOTE 1:** The very first audio file (000-.mp3) is **never** used since “PLAY=000” is the code that instructs the RXC to stop playing audio. The file 000-.mp3 is simply a place holder on the SD card but it has to be there for the player to function correctly.

**NOTE 2:** All MP3 files must be located at the Root directory and not within file folders.

**NOTE 3:** Do not use the characters  `!@#$%^&*(){}[]:;<>'~`+=/`  in the file name

Here are how the files on the memory SD card appear to the RXC-3000:

001-Alert_msg_one.mp3	Audio #1 (first useable file)
002-Wail_Siren.MP3	Audio #2
003-Steady.Mp3	Audio #3
007-Longer_File_Name.mp3	Audio #7 (gaps in the numbering sequence are ok)
035-HeresAnotherSound.MP3	Audio #35
020-emergAlert.mp3	Audio #20 (files can be out of number sequence order)
057-UpperandLowerCase.Mp3	Audio #57 (UPPER, lower or MiXeD case is ok)

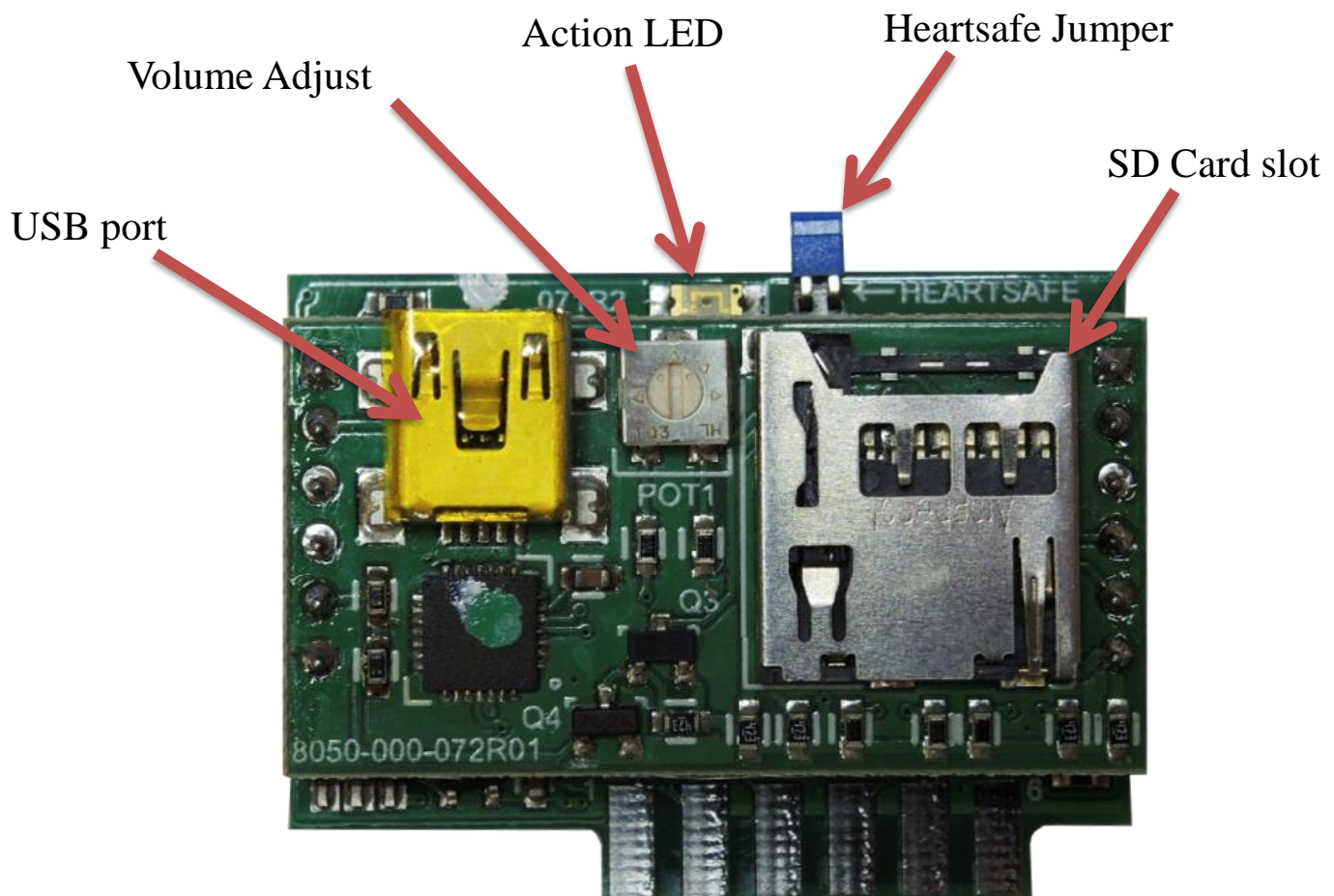
When triggered by the RXC-3000, the MP3 module only looks for files which end in “.mp3”. Then, it looks at the **first four** characters of each file until it finds a match to its search.

**Example:**

When the RXC-3000 runs a script, if for example, the words “PLAY=006;” are in the script, the RXC will turn on its amplifier port and then it will instruct the MP3 module to search for and play audio file 006. The MP3 module then searches the SD card for a file matching “006-\*.MP3”. *The asterisk signifies the portion of the name that isn't, included in the search.* If a match is found, the MP3 module will begin playing the mp3 file.

There are two ways that the audio will end or stop. The first way is for the MP3 to come to the end of the audio file, at which time it will tell the RXC-3000 that the audio is done. The RXC-3000 will then turn off the amplifier port and finish running the script. The second way to stop the play is for a new script to begin running in the RXC-3000 in which the words “PLAY=000;” are part of the script.

**PLAY=000;** tells the RXC-3000 to command the MP3 module to stop playing any files and to shut off the amplifier port.



### *USB Port*

The USB port is a 5 pin Mini USB connector. When the MP3 module is installed in an RXC-3000, this USB port takes the place of USB module M4 which is normally located near the top of the LCD display. All USB functions continue seamlessly.

### *Adjusting Audio Levels*

The output level is adjusted using POT1, on the module. Begin playing the audio file and adjust to the appropriate level. Clockwise increases the volume, Counterclockwise decreases the volume.



### *Action LED*

The LED on the MP3 module is lit steadily while the MP3 module is playing a file.

If the requested MP3 file cannot be found on the SD card, the LED flashes 4 times and the LCD screen of the RXC-3000 will display **“Error: MP3 file xxx not found”**

On power up or insertion of the SD card into the slot, the LED will give one long pulse if the SD card is unformatted, damaged or has a media error.

LED Action	What it means
Steady	MP3 file is being played
4 flashes	MP3 player cannot find the requested file on the card
1 long flash	There is something wrong with the SD card or the files on the SD card



### *Heartsafe*

To prevent startling people who may be near the RXC-3000 when it starts playing audio files, the MP3 module has the exclusive “Heartsafe” feature developed by Genave. Any MP3 audio can begin softly then rise to full volume over 5 seconds. The rise allows people to prepare themselves for full volume.

For maximum flexibility, this feature can be disabled in applications where it is not required, but when enabled, ALL of the files run in Heartsafe mode. Selective application of Heartsafe requires that each actual mp3 file be modified to ramp up.

On the top of the MP3 module is a jumper near the word “HEARTSAFE”. This jumper selects the Heartsafe function.

Jumpered = Heartsafe is disabled.

Unjumpered = Heartsafe audio ramp up enabled.



### *MicroSD Characteristics*

Not all SD cards are not created equal. Use only Class 10 (high speed) memory cards manufactured by quality companies such as Sandisk. These cards will play consistently throughout all of the audio files. Failure to use Class 10 cards may result in loss of audio from the MP3 module.





### *How To Program The SD Card*

To a computer, an SD card looks exactly like a USB memory stick or hard drive. Remove the SD card from the MP3 module and insert it into a USB to SD card adapter.

Plug the USB reader into a USB port on your computer and the operating system will locate the card and start working with it.

Once you have copied the files (remember to add leading numbers and hyphen) to the SD card, insert the card back into the MP3 module and test the files by playing them with their associated actions.





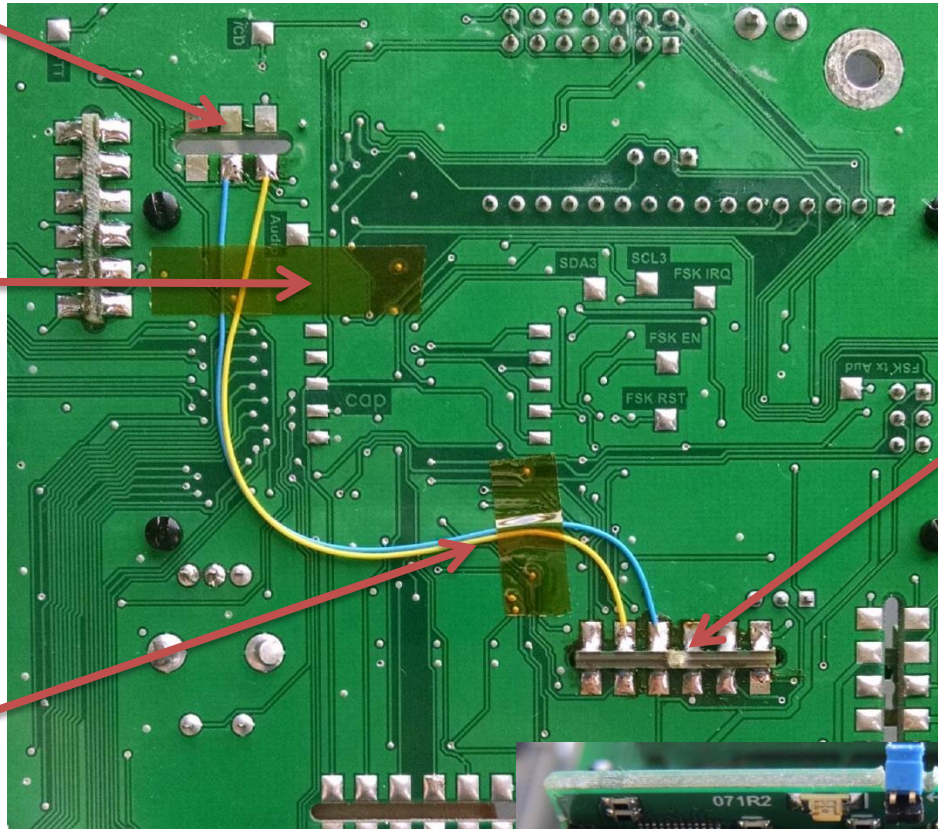
## Installing the MP3 Module

1. Remove USB module if installed.

4. Use the supplied Kapton tape to secure the wires to the PCB.

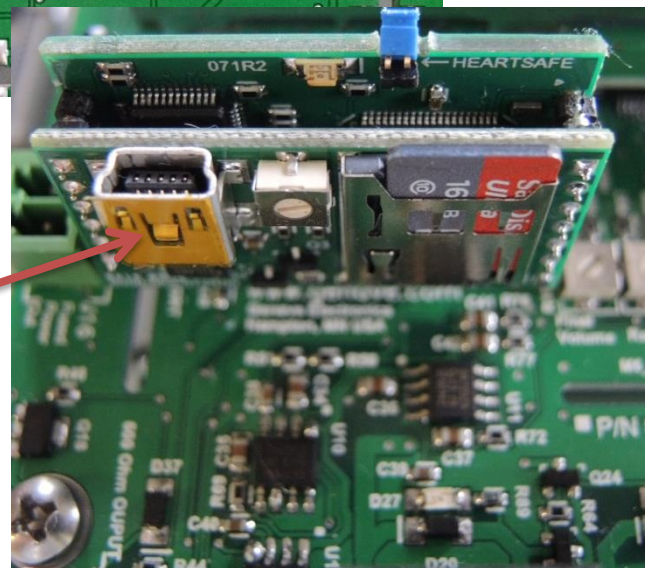
3. Use the supplied blue and yellow wires to make the connections shown.

2. Install MP3 module



The image to the right shows the completed MP3 player installation.

Communication with the RXC is through the USB communication port on the MP3 module. This includes programming of the RXC.

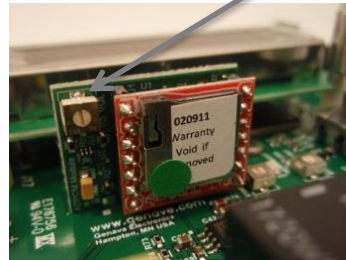


R5 VOL

## ADPCM Audio Player

### *How Sound Files Are Played To The PA Port*

When the RXC-3000 runs a script, if it has been told to play a song/sound file, it turns on the ADPCM player and tells the player the file number of the song/sound it is to play. The player automatically selects the file from the TF card and begins playing. At the same time, the RXC-3000 un-mutes the corresponding audio amplifiers and the external PA amplifier circuits.



### *How The RXC-3000 Knows What Audio To Play*

Each audio sound file in the TF card has a specific address. The address starts at 0000.ad4 and can go to 0098.ad4. The very first audio file (0000.ad4) is never used. It is simply a place holder in the TF card.

Here is how the memory in the TF card looks like to the RXC-3000:

0000.ad4	Empty file, never used
0001.ad4	Audio #1 (first useable file)
0002.ad4	Audio #2
0003.ad4	Audio #3
etc.....	
0098.ad4	Audio #100 (last useable file)

When the RXC-3000 runs a script, if the text “Play 0006;” is in the script, the RXC-3000 will command the ADPCM unit to play audio #6. There are two ways that the audio will end or stop. The first way is for the ADPCM to come to the end of the song, at which time it will tell the RXC-3000 that the audio is done. The second way is for a new script to have the text “Play 0000;” the RXC-3000 will command the ADPCM module to stop all play functions.

### *Adjusting Audio Levels*

The output level is adjusted using dedicated pot, R5, on the module. Begin playing the audio file and adjust to the appropriate level.

### *Creating ADPCM Files From .wav, Etc...*

The ADPCM audio player can only play files that are compressed into a 4 bit ADPCM format (.ad4). Genave supplies a program that converts files from .wav formats into the .ad4 format.

### *TF Card (MicroSD) Characteristics*

All TF cards are not created equal. Use only 2GB TF cards manufactured by Sandisk. These cards will play consistently throughout all of the audio files. Failure to use Sandisk TF cards may result in loss of audio from the ADPCM module.



### *How To Program The TF Card*

To a computer, a TF card looks exactly like a USB memory stick or hard drive. Remove the TF card from the RXC-3000 and insert it into a USB TF card reader. Plug the USB reader into a USB port on your computer and the operating system will locate the card and start working with it.

Once you have converted the audio files from wave to the .ad4 format, you can copy them directly to the TF card. Put the TF card back into the RXC-3000 and start playing the files.



### *How To Put An Audio File On to a TF Flash Card*

*Please refer to the Programming Guide 9000-0000-041 for more information*

## **Misc**

### *Fuse*

The RXC-3000 uses one fuse to supply power to the board and the radio.

The fuse type is a fast acting 5mm x 20mm glass fuse, 250V, 2 Amp



### *LCD Display Backlight*

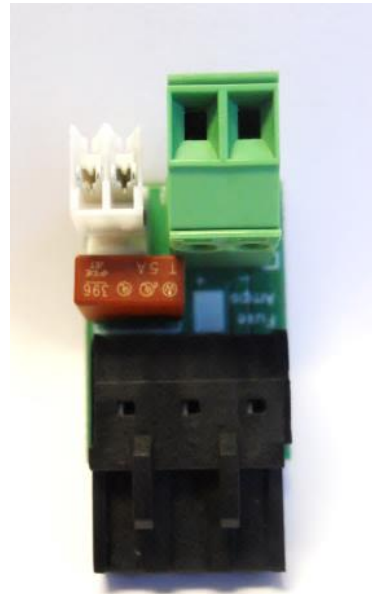
The LCD backlight for the RXC-3000 will automatically turn off to conserve power. All that is required to turn it back on is to rotate the Twist-n-Touch knob.

### *Heartbeat LED*

The Heartbeat LED flashes once per second to indicate that the RXC-3000 is alive and well. If this LED is not flashing, the unit may have a problem.

### *Fused Output Board*

Optional fused output accessory board. Takes a TE5 fuse and has a maximum of 5 amps.



*Optional fused output board  
8060-0000-042*

### *DC – DC Converter*

Optional DC- DC converter. Maximum of 48V in and a maximum of 12V out.



*Optional DC – DC Converter  
8050-0000-033*

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