Zaxcom TRX900/900AA Transmitter Guide

Zaxcom Inc. 230 West Parkway, Unit 9, Pompton Plains, NJ 07444 - 973-835-5000
Document Revision 1.02
For Firmware Revision 33 and Higher

This guide assumes the firmware version displayed above is installed. The firmware revision code is displayed shortly every time the transmitter is turned on.

Important Note for TRX900AA Wireless Transmitters*: Only Lithium or rechargeable NiMH should be used in these models. Any other battery chemistry (including Alkaline and "Ultra" batteries) will have a substantially reduced run-time compared to Lithium or rechargeable NiMH cells. This is true for all Zaxcom transmitter models that accept AA batteries. Never use any battery that is missing insulation on its body. This can allow a short circuit in the battery compartment causing damage to the transmitter.*

TRX900 Power up
Install 1 CR123 battery into the TRX900 transmitter. Install 2 AA batteries into the TRX900AA Close the battery door**. Be sure to install the batteries with the correct polarity**. **Damage to the unit may result if the batteries are installed backwards.** The negative contact always connects to the spring contact. For maximum transmitter time use Energizer Lithium batteries. This should give a transmitter time of 10 hours for TRX900AA (5 hours TRX900) . On power up the transmitter will display the version number of the software in the top right corner of the display.

The power switch is located on the top of the transmitter. Slide it to the *on* position to turn on the unit.

Transmitter Menu System

The user interface for the transmitter consists of a graphic LCD display and 3 buttons:
 MENU = Function/menu page select: Press to cycle through each menu page.
 UP/INC = Increment the current parameter selected by the MENU key.
 DOWN/DEC   = Decrement the current parameter selected by the MENU key.

The transmitter has a few menu pages that allow the user to change various settings. Note that the transmitter will store the user's settings in FLASH ROM when power is removed. There is no secondary memory battery so the settings will always remain secure without any power. The available menu pages are summarized below.

PACIFIER PAGE: Indicates TX frequency battery level and record mode.
AUDIO GAIN PAGE: Allows user to change the mic preamp gain.
TXCHANNEL SELECT PAGE: Selects TX channel center frequency.
RXCHANNEL SELECT PAGE: Selects RX channel center frequency.

LOCK MODE PAGE: Staying here locks out key presses. MENU+INC exits lock mode.

The last seven menu pages are infrequently used special functions. In order to get to those pages the MENU key must be held while powering up the transmitter. To exit this special menu system cycle power off then back on.

ID CODE #0 SELECT PAGE:	Changes the security0 code (normally should be set to zero)
ID CODE #1 SELECT PAGE:	Changes the security1 code (normally should be set to zero)
FORMAT SELECT PAGE:	Changes the transmission data format
HIGH-PASS FILTER PAGE:	Changes the cutoff frequency of the high-pass filter
Limiter ON/OFF PAGE:	Changes the peak limiter state
Group SELECT PAGE:	Changes the selection of a control group for remote control
UNIT SELECT PAGE:	Changes the unit ID code for remote control
TEXT NAME PAGE	Allows entry of Text identification metadata for file output
POWER UP LOCK/UNLOCK	Selects the lock mode on power up

Repeatedly press the **FNCT** key to cycle through the following menu pages.

PACIFIER PAGE
At power-up the transmitter will enter the home pacifier page. The **UP** and **DOWN** keys have no function in this page. In this page the unit will display the Txfrequency, battery level and the mode of the recording.

AUDIO GAIN PAGE(s)
This page is indicated by the word GAIN on the left side of the display. The two-digit number indicates the gain setting of the mic preamp. When audio is applied to the microphone input the LCD will display the audio level. The mic preamp gain may be adjusted in this page by pressing the INC or DEC keys repeatedly. Unless a microphone is connected to the unit's input the display will go blank but stay in the gain setting mode. If a significant audio signal is present, the display will meter the signal level horizontally from left to right, from -40 dB to 0 dB. As you speak into the microphone, you can raise and lower the gain with the **UP** key and the **DOWN** key. The gain is adjusted in increments of 2 dB.

One of the key features of the unit is a digitally controlled analog limiter located before the A/D converter. This means that the digital signal processor can automatically turn down the mic preamp gain when excessive audio is detected to prevent clipping of the A/D converter. This compressor/limiter will engage before signal exceeds the digital capabilities of the signal path. The compressor/limiter will activate at about 6 dB from clipping digital clipping would occur at 0 dB). ***The gain level should be set low enough so the compressor/limiter does not engage even when the talent is shouting.*** This gain setting will remain intact even when the battery is removed.

TX CHANNEL SELECT PAGE
This page will display the current TX channel . To change channels, press the **UP** and **DOWN** keys. The TX channel is displayed directly in MHz.

Changing the channel will prevent the transmitter from transmitting for 1 second. This allows the user to change channels without transmitting over every single channel that is encountered while obtaining the desired destination channel frequency. If the channel is changed quickly the transmitter will remain quiet until the desired channel has been selected.

When operating multiple transmitters in the same location it is recommended that a channel spacing of at least 1 MHz be maintained. If channel frequencies are difficult to obtain the minimum channel spacing can be as low as .7 MHz when set to US modulation or .5 MHz when

set to European modulation. The transmitters allow a channel frequency to be chosen anywhere in a 30 MHz range. Utilizing a large channel spread between transmitters will aid reception. Maintaining a distance of 20 feet or more between any transmitter and receiver will also aid in reception when many transmitters are in use at the same time. This prevents any transmitters from de-sensing the receiver.

Channel plan programs used to prevent intermod problems are not needed when using the Zaxcom Digital Wireless system. However, if regular FM mics are being used close to the Zaxcom system then the user must choose channels wisely to prevent intermod. When two FM transmitters come close to each other they can transmit interference on adjacent channels. Since this interference is transmitted into the air there is no way for the Zaxcom receiver to reject this interference. The Zaxcom transmitters do not suffer from this problem.

LOCK MODE ACTIVATION PAGE
The purpose of the **LOCK MODE** is to prevent users from pressing buttons accidentally. LOCK mode is a safety feature that disables all button functions except the ability to unlock. The display will show 'LOCKED'. If left in the **LOCK MODE** page for a few seconds, the unit will lock when the display counts down to Zero. If you scan past the LOC display to the next menu item, the **LOCK MODE** will not be engaged.

To unlock the transmitter, hold the **MENU** key and then press the **UP** key. The display will show 'UNLOCKED' indicating that the unit is unlocked.

SPECIALIZED FUNCTIONS MENU

To access the SPECIALIZED FUNCTIONS menu, make sure the transmitter is powered off. Hold down the **MENU** key while powering up with unit. The display will read 'EXT MENU' when the unit has powered up. This indicates that the transmitter is in the **EXTENTED MENU SYSTEM** page.

ID CODE SELECTION
The transmitter has two user selectable Security Identification Codes called ID0 and ID1. **Both ID codes should be set to 000 to allow normal, un-coded operation**. The user may enter two 3-digit security ID codes that internally are concatenated to form one 6-digit code. If the exact same codes are not present in the receiver, the receiver will not be able to decode any audio from this transmitter. The two ID codes are merely the upper and lower half of a single binary security key. This key is used to scramble all transmitted data.

Unless a receiver has the same security key, it will not be able to make any use of the transmitted data. This security mode is useful in a corporate boardroom setting where sensitive information must not be made public. If an FM transmitter were to be used in this situation the transmitted audio could be heard over 2 miles away by using a cheap scanner and a high gain antenna. If an un-coded Zaxcom transmitter were to be used, the unintended listener would not be able to use a scanner to receive the audio, but he could receive the audio if he had a Zaxcom receiver. By coding the transmitted audio with a security key the unintended listener would have to check each of 8 million codes before he could receive any audio.

If a receiver has been programmed with a security code, it will still receive an un-coded transmitter (both ID#0 and ID#1 codes set to 000). Since this receiver has to check for two possible code situations a slight performance penalty may occur during long-range reception. Therefore it is recommended that the transmitter and receiver codes both be set to 000,000 when high security is not needed.

TRANSMISSION FORMAT SELECTION

The display will show "Format X" where X is US or EU. *If this item is not set correctly the receiver will not be able to receive any audio from this transmitter.* This item allows the user to choose between US mode and European mode. *This user selection will not take effect until the unit has been powered down and restarted.* The US mode (mode 0) transmits a signal that occupies a bandwidth of 200 kHz. This is legal in the US and several other countries. This mode provides the best audio quality. The European mode (mode 1) is designed to occupy a 140 kHz bandwidth. This mode will allow a greater transmitter range and will allow more transmitters to operate simultaneously than the US mode. Check local legal requirements to determine which mode is allowed in the country you are operating in. In the future, there will be more modes to choose from which will increase range and audio quality even further.

Visit www.zaxcom.com for future software additions and updates. By upgrading the software in the transmitter and receiver the range and feature set will dramatically increase over time. Zaxcom has a reputation for constantly adding new features and user suggestions during the entire lifetime of a product. This ensures that your wireless system will perform better and better the longer you own it.

HIGH-PASS FILTER SELECTION

The display will show 'HIGH PASS' and the high pass frequency. This indicates different high-pass filter cutoff frequencies. Selection is from 20Hz to 220Hz
Filters are implemented digitally. Note that since the high-pass filter is implemented in the digital domain, the automatic compressor/limiter may engage even when the user hears no substantial audio. The purpose of the limiter is to prevent the mic preamp from over-driving the A/D converter. Therefore the limiter operates on audio before it has been processed by the high-pass filter. If there is a massive amount of low frequency audio content being filtered out by the high pass filter (such as wind noise) the user may hear the effects of the limiter without hearing the audio that caused the limiter to engage. If this problem occurs then the gain is set too high. Reduce the mic preamp gain well below that which will trigger the limiter.

RF POWER OUTPUT SELECTION

The power output is fixed at 34mW. The new hardware design uses higher battery power when the RF output power is reduced making this the optimum power level for this hardware version. Power can be lowered where the legal limit requires a lower power level. Consult the factory for adjustment information.

Programming

The TRX990/TRX990AA can be programmed by downloading the operating program from the Zaxcom web site and loading it onto a Mini SD memory card. Once the program is on the card insert the card in the TRX900. Hold down the "Increment and Decrement" key at the same time and switch on the power. The unit should show the word programming. This process will take about 10 seconds. After it is done power down the unit and power back up to run the new program.

Hardware and Accessories

Antenna
The transmitter uses a gold plated SSMA connector. Included is an antenna cut to the correct length for your transmitter's specific frequency. The connector is a simple coaxial thread-on. It is a good idea to periodically check that the connector is securely mounted.

Wire Clip
The TRX900 and TRX900AA transmitters use a wire belt clip. Attach the clip to the transmitter by inserting the clip into the 2 holes in the sides of the transmitter. Hold the clip carefully in order to not scratch the side of the transmitter.

MICROPHONES AND OTHER AUDIO INPUT

Sennheiser MKE2 Platinum   (Do not use the Gold model)
Countryman B6
Countryman EMW
DPA 4063   (ask for the Zaxcom 3.3v model)
Shure WL50

Other microphones will be added as soon as verification of 3.3v power performance and RF interference susceptibility can be checked.

The Zaxcom transmitter has an unbalanced microphone input accessed through a 3 pin Micro-Lemo connector. You can use an unbalanced dynamic microphone or a powered lavaliere. Zaxcom recommends 3-wire lavalieres that utilize a separate ground pin, audio pin and power pin.

If it is necessary to transmit a line level input, an inline pad will be required on the standard dynamic microphone input cable (3 pin XLR to 3 pin Micro-Lemo).
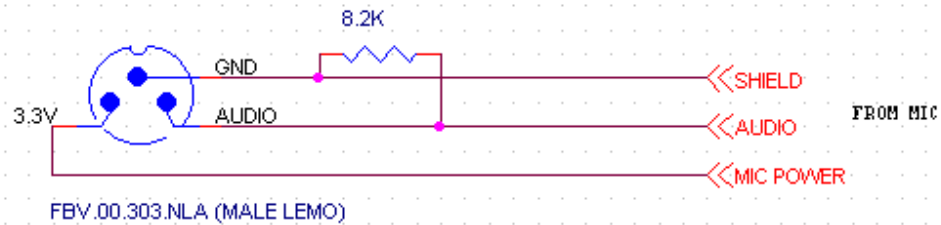
48 Volt phantom microphone powering will require an external 48 Volt power supply when using the TRX900 and TRX900AA. The MMT transmitter and TRX990 are the only Zaxcom transmitters with a built in 48V supply.

Warning   **Deneke 48 V power supplies will blow up the mic preamp of the transmitter if they are connected to the transmitter when their power is switched on. The Deneke puts a 48V spike into the transmitter when this happens. Please avoid this unit if at all possible.**
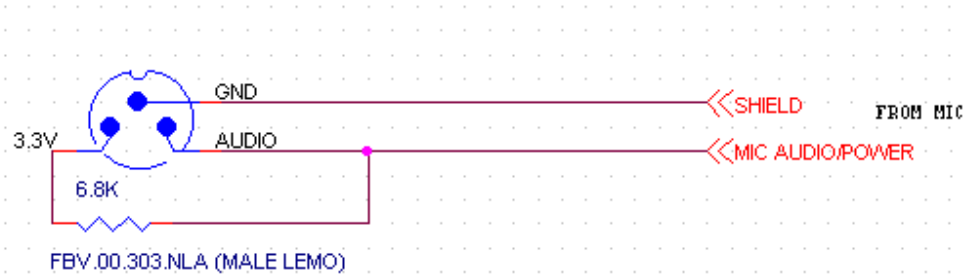
When wiring a microphone it is necessary to connect the shield of the cable to the shell of the Lemo connector as well as to the ground of the microphone. Separating some ground strands and pressing them between the shell of the connector and the internal cable strain relief can accomplish this. To avoid RF interference from getting into the audio it will also be necessary to add a 200pF capacitor between Mic+ and Ground pins. A 0402 surface mount capacitor (supplied with all connectors) should be fitted directly between the pins in the connector. If RF noise is present in the audio then this connection procedure has not been followed properly or there is a bad connection inside the mic connector.

Each microphone connected to the TRX900/TRX900AA must have a bias resistor inside the microphone connector. This bias resistor allows the use of any type of LAV microphone with the TRX900/TRX900 AA. Two wire microphones are typically biased to the 3.3V supply pin. Three wire microphone are typically biased to ground.
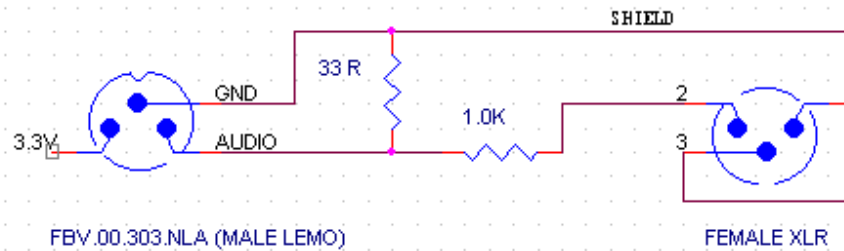
THREE WIRE MIC CONFIGURATION

8.2K

GND

3.3V   AUDIO

<< SHIELD

<< AUDIO   FROM MIC

<< MIC POWER

FBV.00.303.NLA (MALE LEMO)

TWO WIRE MIC CONFIGURATION

GND

3.3V   AUDIO

<< SHIELD   FROM MIC

<< MIC AUDIO/POWER

6.8K

FBV.00.303.NLA (MALE LEMO)

BALANCED LINE IN TO TRX900

SHIELD

33 R

GND

3.3V   AUDIO

1.0K

2   1

3

FBV.00.303.NLA (MALE LEMO)

FEMALE XLR

Transmission Formats

A transmitter with the CNR option is merely a stereo transmitter with special software installed. In the extended menu pages the user may choose between 3 transmission formats (Fo0, Fo1, Fo2):

Format 0 (US): This setting transmits in wideband CNR mono mode This mode is recommended for US customers or other countries where a 200kHz channel bandwidth is legal.

Format 1 (European): This setting transmits in narrowband (less than 160kHz) CNR mono mode. This setting is recommended for European customers where the channel bandwidth requirements are stricter.

Transmitter Software Revision History