

Zaxcom MB1 Transmitter Quick Start Guide

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For Firmware Revision 25

This guide is intended to quickly initiate the user with the basic functions of the MB1 transmitter. For a more detailed description of the Zaxcom Wireless System refer to the [Zaxcom Wireless Operators Manual](#). This guide assumes the firmware version displayed above is installed. The firmware revision code is displayed shortly every time the transmitter is turned on. The end of this document lists the changes made in each firmware revision.

Slim Line Transmitter power up.

Before activating the transmitter ensure that a fully charged battery is attached.

1. Press and hold the **POWER** key. The red LED display will light up with three "8s".
2. Continue to hold down the button for about 1 second after the display goes blank. When done correctly, a single point of red will flash on the display. This is the running light and confirms that the unit is on. This will continue unless the display is changed to a different mode.
3. To turn the transmitter off, press and hold the **POWER** key. At first, you will see the letter "b" with a number from 1 to 9 on the display, this indicates power reserve in the battery. As you continue to hold the button down, you will then see a 3,2,1 count down followed by the word OFF. When you let go of the button, the transmitter has been powered down. If the battery is removed before powering down the unit, the transmitter will remember all settings. *Note: You may access battery reserve display any time the unit is turned on by momentarily pressing the **POWER** key. This is available in any function mode.*

Gold Line Power up.

1 Install 2 AA batteries into the transmitter. Press in the battery door and slide the battery door down to open the compartment. **Be sure to install the batteries with the polarity correct. Damage to the unit may result if the batteries are installed backwards.** The + Positive and - Negative indicators are printed on the battery contacts in the unit. The battery next to the door hinge is positive out and the other battery in negative out. For maximum transmitter time use Energizer Lithium batteries only. This should give a transmitter time of 6-7 hours. On power up the transmitter will display the version number of the software and then will go to a mode where one display LED blinks to indicate power on.

2 The power switch is located on the top of the transmitter. Slide it to the on position to turn on the unit. The power button "PWR" is used to check the battery level of the transmitter.

Transmitter Menu System

The user interface for the transmitter consists of 3 LED digits and 4 buttons:
PWR = Power on/off: Hold for 3 seconds to turn the transmitter on or off. (Slime Line Only)
FNCT = Function/menu page select: Press to cycle through each menu page.
UP/INC = Increment the current parameter selected by the **FNCT** key.
DOWN/DEC = Decrement the current parameter selected by the **FNCT** 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.

| | |
|-----------------------------|--|
| <i>PACIFIER PAGE:</i> | Indicates the unit is on by flashing a single LED. |
| <i>AUDIO GAIN PAGE:</i> | Allows user to change the mic preamp gain. |
| <i>CHANNEL SELECT PAGE:</i> | Selects channel center frequency. |
| <i>LOCK MODE PAGE:</i> | Staying here locks out key presses. PWR+INC exits lock mode. |

The last three menu pages are infrequently used special functions. In order to get to those pages the FNCT key must be held while powering up the transmitter. To exit this special menu system, press the power key shortly.

| | |
|--------------------------------|--|
| <i>ID CODE #0 SELECT PAGE:</i> | Changes the security code (normally should be set to zero) |
| <i>ID CODE #1 SELECT PAGE:</i> | Changes the security code (normally should be set to zero) |
| <i>FORMAT SELECT PAGE:</i> | Changes the transmission data format (normally zero) |
| <i>HIGH-PASS FILTER PAGE:</i> | Changes the cutoff frequency of the high-pass filter |
| <i>RF POWER OUTPUT PAGE:</i> | Changes RF output power. |

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 a single LED will blink periodically to indicate that the transmitter is on. When used in normal conditions the transmitter should be placed in LOCK mode in which no LEDs are lit and the keys have no function. Pressing the power key for a short time will always bring the user to this page (unless in LOCK mode in which case the user must press **PWR+UP**).

AUDIO GAIN PAGE

This page is indicated by the letter 'G' followed by a two-digit number. This two-digit number indicates the gain setting of the mic preamp. This gain setting code will disappear after 1 second and the display will be converted into an audio level meter. When audio is applied to the microphone input the LEDs display the audio level. The audio level is referenced in 6 dB increments as shown on silkscreen above the display. 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 -18 dB to +12 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. This is indicated when 3 horizontal LEDs light simultaneously. The compressor/limiter will activate at about 10 dB from clipping (digital clipping would occur at +20 dB). ***The gain level should be set low enough so the compressor/limiter does not engage even when the talent is shouting.*** This can be accomplished by allowing the talent to shout while decreasing the gain until the unit stops producing a limiting warning. Since actors tend to shout even louder when the cameras are rolling, it is a good idea to decrease the gain a few dB more to allow some headroom. This gain setting will remain intact even when the battery is removed.

CHANNEL SELECT PAGE

This page will display the current channel code. To change channels press the **UP** and **DOWN** keys. The channel code is displayed as the last 3 digits of the true frequency. For example, if the unit is transmitting at a frequency of 532.1 MHz the channel code will be displayed as "321". The transmitting frequency is adjusted in 100 kHz (0.1 MHz) increments.

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.

The unit will automatically store the current channel assignment in non-volatile FLASH ROM so the channel selection will remain in tact when the battery is removed.

When operating multiple transmitters in the same location it is recommended that a channel spacing of at least 1 MHz be maintained. This is achieved with ten steps of increment or decrement in the CHANNEL SELECT page from whatever the adjacent channel is. 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.

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 'LOC'. If left in the **LOCK MODE** display for a few seconds, the unit will lock when the display goes dark. 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 **POWER** key and then press the **UP** key. The display will show 'UNL' indicating that the unit is unlocked. Upon release of the buttons, the single flashing LED returns, showing that the unit is operating in the home pacifier page.

If for some reason, you forget this procedure, you can always just remove the battery, replace it and turn on the transmitter. Disconnecting the battery will automatically unlock the unit.

SPECIALIZED FUNCTIONS MENU

To access the SPECIALIZED FUNCTIONS menu, make sure the transmitter is powered off. Hold down the **FNCT** key while powering up with the **POWER** key. The display will read 'ID' when the unit has powered up. This indicates that the transmitter is in the **ID CODE SELECTION** 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.** A new feature has been added in software revision 10 that allows the user to enter two security ID codes. 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 board room 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 "FoX" where X is the number 0 or 1. **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/ENG 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/ENG 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. This mode is designed for voice or other low frequency signals. When transmitting music or other high frequency signals, US mode 0 is recommended. Check local legal requirements to determine which mode (if any) 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 'HPx' where x is a number from 0 to 6. This indicates different high-pass filter cutoff frequencies as shown below.

- 0: 30 Hz (no digital filter)
- 1: 40 Hz
- 2: 64 Hz
- 3: 102 Hz
- 4: 164 Hz
- 5: 262 Hz
- 6: 419 Hz

These frequencies are logarithmically spaced and the 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 display will show 'PrX' where X is a number from 1 to 3.

- A setting of 1 will produce an RF output of about 20 mW
- A setting of 2 will produce an RF output of about 50 mW
- A setting of 3 will produce an RF output of about 100 mW

This mode may be used to extend battery life or reduce interference with nearby receivers. These settings as well as all other settings are saved even when the battery is removed.

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.

BELT CLIP (Slim Line only)

To remove the belt clip from the transmitter, depress battery release button and slide the battery off the transmitter, then slip the transmitter down to the lower portion of the belt clip. This will release the unit from the clip. No screws, bolts or tools are necessary for this quick and simple operation. To remount the clip, just reverse the procedure, sliding the transmitter up into the clip and then sliding the battery onto the bottom of the transmitter.

Wire Clip (Gold Line only)

The Gold Line transmitter uses a wire belt clip. Attach the clip to the transmitter by inserting the clip into the 2 holes in the sides of the transmitter.

LITHIUM-ION BATTERY (Slim Line only)

The battery module consists of a 4 Volt Lithium Ion rechargeable battery. The battery slides on from left to right and snaps into place. In order to remove the battery module, firmly slide the silver battery release up and then slide the battery to the left.

A fully charged battery supplies 4.2 Volts DC. A battery is considered discharged when it reaches 3.3 Volts DC, at which point the transmitter will cease functioning. The batteries have a very graceful discharge curve, effectively staying above 3.6 Volts for approximately the first 3.5 hours of the 4.5 hour duty cycle.

When you first place a discharged battery in the charger a green LED will illuminate to indicate the charger is in Trickle Charge mode. In a few seconds the charger can enter Rapid Charge mode in which case the yellow LED will illuminate. The battery charger will fully charge a battery in approximately 1.5 hours. When all LEDs go out, the charging cycle is complete. All chargers automatically go into Light Trickle mode at the completion of the charging cycle. You cannot accidentally overcharge the batteries.

If a red LED should appear on the charger, this indicates a damaged battery or low charger supply voltage.

The batteries are designed with automatic over-temperature protection. They also employ an electrical fuse that opens if the battery should be inadvertently shorted. This protection circuit automatically resets itself. Also, if the battery overheats, a thermal sensor will cause the charger to temporarily shut itself down.

Each charger module requires 12 volts DC with 1 amp of DC current. The included 110V AC wall transformer supplies this voltage.

Do not use the wall-wart type charger power supply to power the receiver or a multi-charger unit. This particular power supply can only supply a single charger unit.

MICROPHONES AND OTHER AUDIO INPUT

The Zaxcom transmitter has a balanced microphone input accessed through a 4 pin Micro-Lemo connector. You can use a balanced dynamic microphone or a powered lavalier.

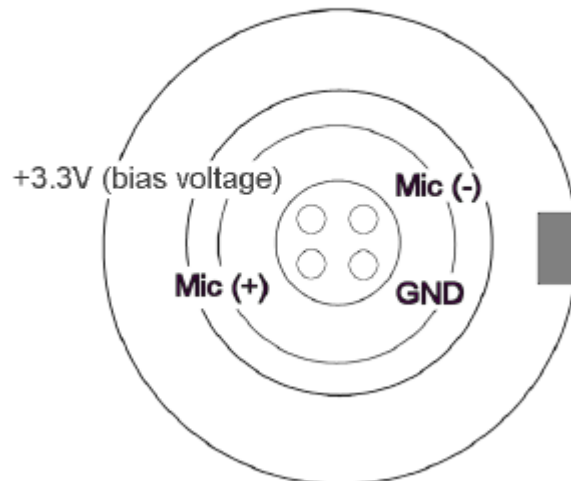
We recommend 3-wire electret condenser lavalieres that utilize a separate ground pin, audio pin and power pin.

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 4 pin Micro-Lemo).

48 Volt phantom microphone powering will require an external 48 Volt power supply.

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 200 Pico Farad 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.

**4 pin mic connector pinout
viewed from top of transmitter**



Zaxcom Remote Control Quick Guide

- 1.0 This is a quick guide to using the Zaxcom Remote Control software on the Compaq iPaq. This document assumes that you are already familiar with using the Zaxcom digital wireless receiver and digital wireless transmitter. The iPaq software generates audio tones necessary to alter the settings on the transmitter. It provides a large user-friendly touch screen that lets the user easily and quickly alter transmitter settings. The remote control features will not work unless you are using version 25 or greater of the digital transmitter firmware. The version is briefly displayed when the transmitter is turned on.
- 2.0 To start the program, use the stylus and press the **Start** system prompt on the top left line of the iPaq. The menu shows a list of programs that includes “**ZAX Remote**” with an icon next to it similar to an antenna. Click on this line to start the program. On the screen you will see six buttons. These are: Decrease Gain, Increase Gain, Special Functions, Utility Functions, Channel, and Exit.
 - 2.1 The Gain buttons immediately decrease or increase the audio gain in 2dB steps on the transmitter. Press the button to listen to the tones generated. When using the iPaq note that the touch screen button changes color when pressed, but does not actually send the tones until it is released. For best results, place the microphone from the transmitter within six inches of the iPaq speaker, which is located near the bottom of the unit on most iPaqs. The transmitter will flash its LEDs on for 1/2 second when a valid command has been received. The volume setting on the iPaq should be one tick below its loudest setting. To easily get to the volume function, press the “**Q**” button on the iPaq quick keys and then select volume.
 - 2.2 The Channel (Frequency) button brings up an entry screen where you can change the channel of the transmitter. The last transmitted channel setting is displayed at the top of the screen. It is very important to make sure that the setting on the receiver matches this transmitter setting! **Warning!** No audio will be received if the transmitter and the receiver's channels do not match. To completely enter a channel, you must enter four digits. Observe how the display changes as each digit is pressed. When the **SEND** button is pressed the remote control software will save this channel for future use. If the **SEND** not pressed, this value is discarded when you leave this screen. Pressing the **Clear** button will enter “000.0” on this display. Use this if you are uncomfortable viewing the shifting display when changing the channel values. To return to the previous screen, press the **Prev Screen** button.
 - 2.3 The Utility Menu has six buttons: TX power, Security, Hi Pass filter, Audio Gain Presets, and Previous Screen.
 - 2.3.1 The TX Power button allows you to change the transmitted RF output power setting from 25mW, 50mW or 100mW. The last transmitted power setting is displayed at the top of the screen. These keys take immediate action.
 - 2.3.2 The Hi Pass Filter screen allows you to alter the transmitter's internal audio high pass filter settings from 30Hz, 40Hz, 65Hz, 100Hz, 160Hz, and 260Hz. These keys take immediate action when pressed. The last transmitted filter setting is not saved.
 - 2.3.3 Security setting is composed of two parts: Id0 and Id1. When these fields are set to 000 and 000 on a transmitter, any receiver can get the audio from a transmitter with just a matching channel. If a transmitter

has values other than Id1 = 000, and Id2 = 000, only a receiver with matching ID codes will receive the audio from the transmitter. The ID settings will not be saved until the **SEND** button is pressed, otherwise, they will be discarded.

2.3.4 The Audio Gain Presets is different from the Main Menu gain. In the Main Menu, the commands are sent to change the audio gain up or down in 2dB steps each time a button is pressed. In the Audio Gain Menu, the gain is set to a fixed value. The current gain value is displayed at the top left of this screen. The current preset gain values are displayed to the right of the preset buttons. The current gain is assigned to a preset, after the desired gain has been selected using the increase and decrease gain buttons, by pressing the desired preset. This function provides a means of setting the transmitter gain to a fixed value without having to repeatedly press the increase or decrease gain buttons.

2.3.5 The Send All button displays the current software version (1.22) and the four settings that are saved on the iPaq. These are Channel, TX Power, Security, and Audio Gain. If the **SEND ALL** button is pressed, all four values will be sent.

2.4 The Special Functions menu has four items: Standby/On, Test Tone On, and Test Tone Off.

2.4.1 The Standby/On button is used to turn off the transmitter's RF circuitry. This reduces the transmitter power consumption by 50%.

2.4.2 The Test Tone On button turns on a 2kHz audio reference tone from the transmitter. There is no time out on this tone. The Tone Off command must explicitly turn it off or you must cycle the transmitter power.

2.4.3 The Test Tone Off button turns off the 2kHz audio reference tone from the transmitter.

Transmitter Software Revision History

- 12-01-01 rom003: first units released
- 12-21-01 rom004: changed tx power table, other minor changes
- 01-22-02 rom005: fixed tx power so F does not revert back to 8
- 01-28-02 rom006: not released – experimental version
- 02-10-02 rom007: major release:
 - reworked US format: must use with receiver's rom005 software
 - added new formats: US and ENG/Europe
 - added more error detection to prevent noise when out of range
 - channel now displayed in decimal
 - increased audio quality
 - changed tx power to only 3 levels
 - ADC gain now calibrated with curve (2 dB steps)
- 03-06-02 rom009: not released
- 03-06-02 rom010: added security mode
 - modified battery display curve to match receiver's display (0-9)
 - made channel limits fall on TV channel boundaries
- 03-19-02 rom12 : added capability for MMT txer hardware
- 04-01-02 rom13 : fixed low level noise bug (NAB sw)
- 04-01-02 rom14 : stereo clothing noise reduction sw for NAB – not released
- 04-17-02 rom15 : added optional mode 5 which always powers up in lock mode
- 04-17-02 rom16 : internal changes
- 04-22-02 rom17 : internal changes
- 05-02-02 rom18 : changed max TV channel to ch 79 = 865.9MHz max channel
- 05-21-02 rom915: beta stereo version for law enforcement applications
- 06-04-02 rom19 : new LED sw
- 06-15-02 rom20 : added optional standby mode for power off/on
- 06-19-02 rom21 : internal changes
- 07-10-02 rom22 : added battery curve tables for MMT and GoldLine
 - added European Enumerated channel mode
- 07-12-02 rom922: European mode for BBC testing
- 07-18-02 rom923: EU: changed format #1 to new audio format
- 08-19-02 rom023: US: shipped new US audio format
- 08-20-02 rom024: added remote control sw
 - swapped menus for ID0, ID1 for better intuitiveness
- 09-26-02 rom025: added "ooo" remote confirmation to LOCK screen
 - added 2khz tone generation (remote control only)