



# portable FM 863 MHz



863.050

63.200

863.400

863.5



Listen (M, 2006) Salt Lake City, Utah, USA - Listen Technologies Corporation is pleased to announce that Dan Platt has joined the company as the Graphic Designer and overall creator of the marketing team. In his role, Platt will develop the images used in a variety of creative projects, including presentation brochures, advertisements, direct mail, and electronic products and packaging.

Platt's experience and abilities bring an excellent fit for Listen and our marketing team. "Dan's creative and artistic eye are an excellent fit for Listen and our marketing team," said Gary Schaeffer, Listen's Vice President of sales and marketing. "We are so glad to have Dan on our marketing team."

Platt comes to us with extensive experience in the print production industry and has built a strong portfolio over the past few years in print, web, and video design and media. He is a graduate from Weber State University and a Utah native.

"I'm excited to be part of such a growing, innovative company," said Platt. "I'm looking forward to working with the Listen team to increase and enhance our promotional presence. Working a great job is to have meaning to a new, new level and I am proud to be part of that initiative."

**About Listen Technologies Corporation:**  
Listen Technologies Corporation manufactures and distributes wireless audio products and accessories, including: hand-held, floor-mount, portable, and conference applications. Listen products provide superb audio performance, reliability and ease of use, making them ideal for schools, houses of worship, churches, and other entities. For more information, visit [www.ListenTech.com](http://www.ListenTech.com) or call 800-330-0991.

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## Portable FM System Design Guide and Manual

**Listen**<sup>®</sup>  
www.listen-tech.com





Dear Valued Customer,

Thank you for choosing Listen! All of us at Listen are dedicated to providing you with the highest quality products available. We take great pride in their outstanding performance because we care that you are completely satisfied. That's why we independently certify them to the highest quality standards and back them with a limited lifetime guarantee. We stand ready to answer any questions you might have during installation or in the operation of our products. Should you experience any problems whatsoever with your Listen products, we are ready to help you in any way we can with prompt, efficient customer care. Because at Listen, it's all about you! And should you have any comments on how we might improve our products or our service, we're here to listen.

Here's how to reach us:  
801.233.8992  
800.330.0891 North America  
801.233.8995 Fax  
support@listentech.com  
www.listentech.com

Thank you and enjoy your listening experience!

Best regards,  
Russell Gentner and the Listen Team

### ***Lifetime Warranty – the best in the business!***

Listen's full-time technical support is passionate about what they do and you can depend on them to solve any equipment issues with confidence. In the few instances where repairs were needed, 99% of all clients indicated that they were happy with repair turn-around-times and 85% of the time, clients were without their product for less than 10 days!

Overall client satisfaction of working with Listen was rated 4.8 out of 5.

### ***The Word Around Listen***

"Please continue with your excellent attitude toward customer satisfaction. You guys are great!"

"I've never had such good service from any company. Keep up the good work!"

"You stand behind your product wonderfully."





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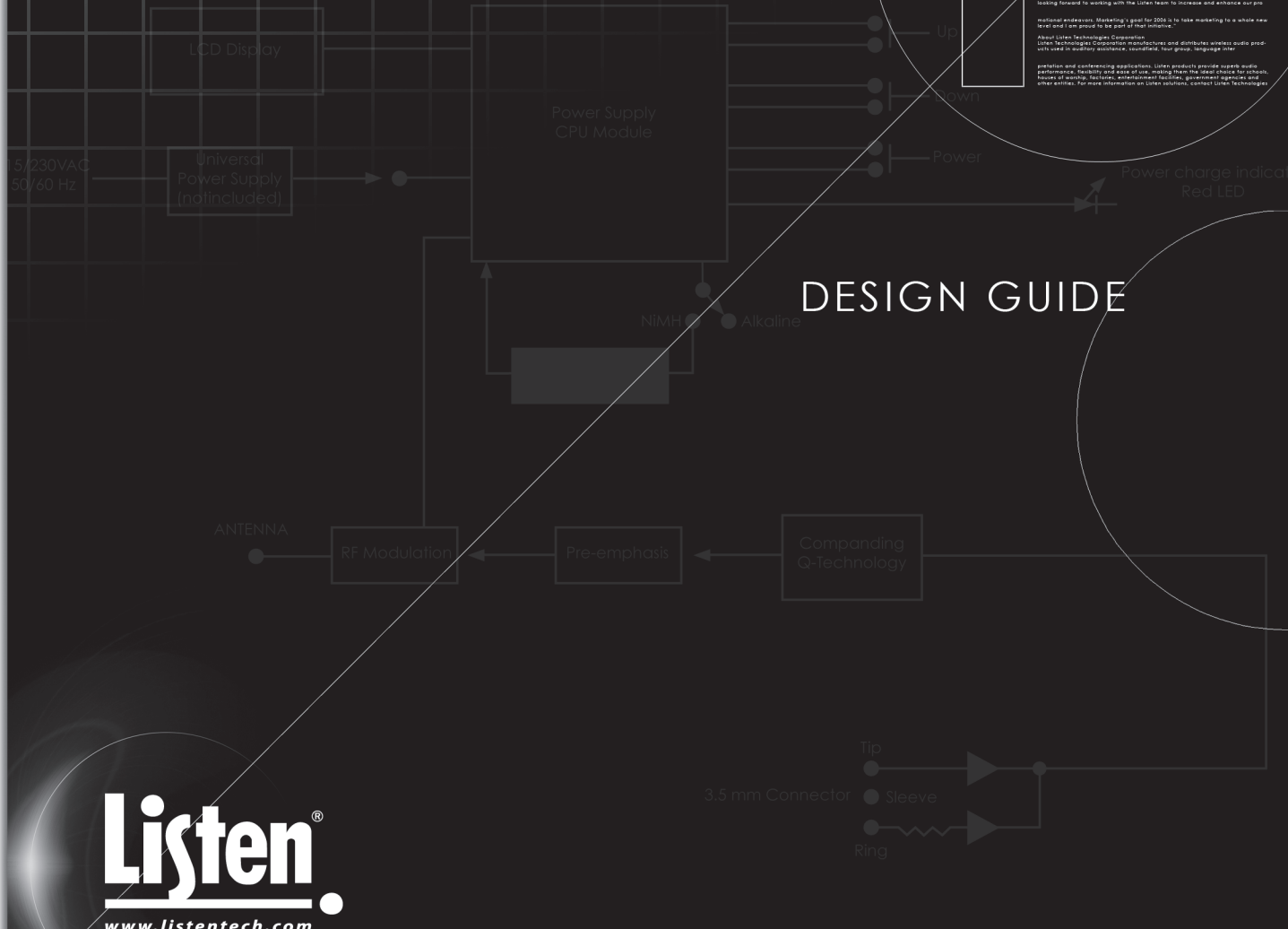


# portable FM 863 MHz

863.050

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863.400 863.



## DESIGN GUIDE

January 19, 2006 Salt Lake City, Utah, USA — Listen Technologies Corporation is pleased to announce that Sam Platt has joined the company as the Graphic Designer and the recent member of the marketing team. In his role, Platt will develop the visual look for a variety of creative projects, including presentations, brochures, advertisements, catalogs, direct mail, corporate identity and packaging solutions. He will be responsible for the successful execution of all marketing materials.

"Sam's experience and ambitious energy are an excellent fit for Listen and our marketing team," said Curt Schaefer, Listen's vice president of sales and marketing. "We are glad to have Sam on our marketing team."

Platt comes to us with extensive experience in the latest graphic technology and has both a strong portfolio over the past few years in print, web and other electronic media. He is a graduate from Texas State University and a top achiever.

"I'm excited to be part of such a growing, innovative company," said Platt. "I'm looking forward to working with the Listen team to increase and enhance our promotional and marketing applications. Listen products provide superb audio performance, flexibility and ease of use, making them the ideal choice for schools, houses of worship, lectures, entertainment facilities, government agencies and other entities. For more information on Listen solutions, contact L.

Listen Technologies at 800-330-0891, or visit [www.ListenTech.com](http://www.ListenTech.com).

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# *Portable FM Design Guide Table of Contents*

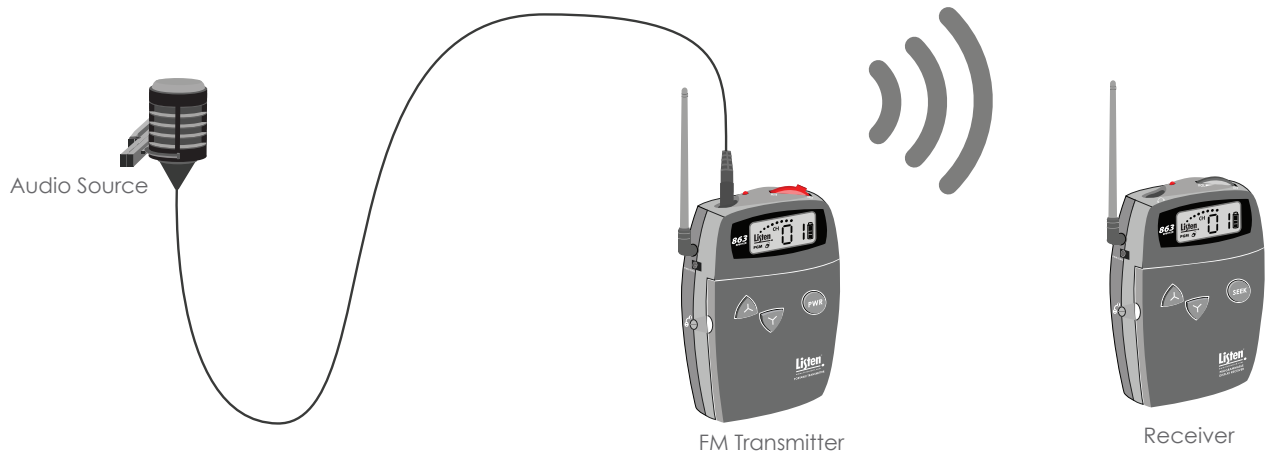
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# Frequency Modulation (FM) Technology Overview

Frequency modulation or FM is a means of transmitting audio using electromagnetic waves. This same technology is used by local FM radio stations to broadcast music. FM signals can travel through most barriers – walls, floors, and ceilings. The distance a signal travels has many different variables such as Radio Frequency (RF) output power, the type and placement of the antenna, and the broadcasted frequency. This section of the manual will help you design a system that will get the best range with the least amount of interference.



When designing an FM system it is important to keep the following in mind:

- **Multipath**

Multipath distortion is a form of RF interference that occurs when radio signals have more than one path between the receiver and the transmitter. This could occur in rooms with metallic or other RF-reflective surfaces, such as furniture, walls, or coated glass. The result of multipath is the receiver audio coming in and out of squelch when the receiver is moved. Portable applications are much more susceptible to multipath than those that are stationary. Multipath distortion is often worse as the distance between transmitter and receiver increases (RF power decreases). Multipath can decrease the audio quality of the transmission (refer to page 9 for strategies on eliminating multipath).

- **Antenna Positioning**

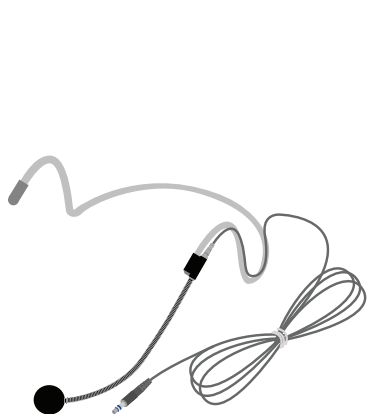
For full RF functionality of the portable system, the antenna on both the LT-700 transmitter and receiver (LR-400/500) must be in the upright position (shown below).





# System Overview

There are three main parts to a Portable FM System – Input source, transmitter, and receiver.



LA-278  
Behind-the-Head Microphone



LT-700  
Portable Display FM  
Transmitter (863 MHz)



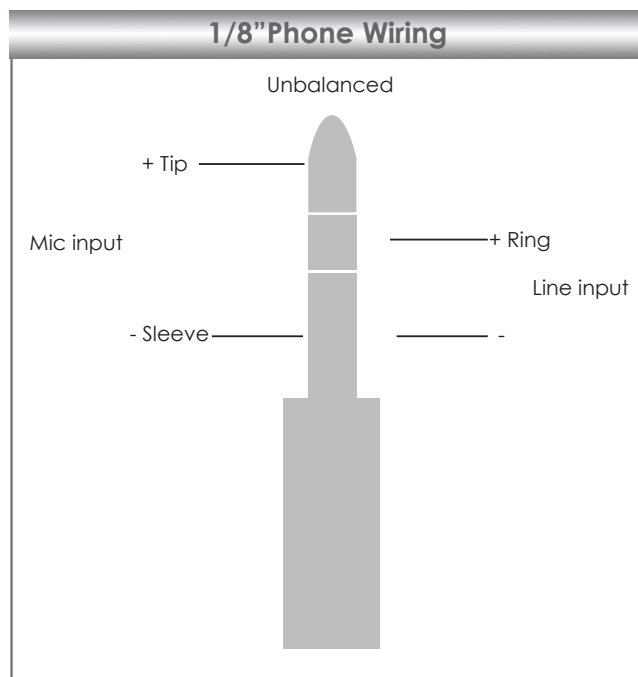
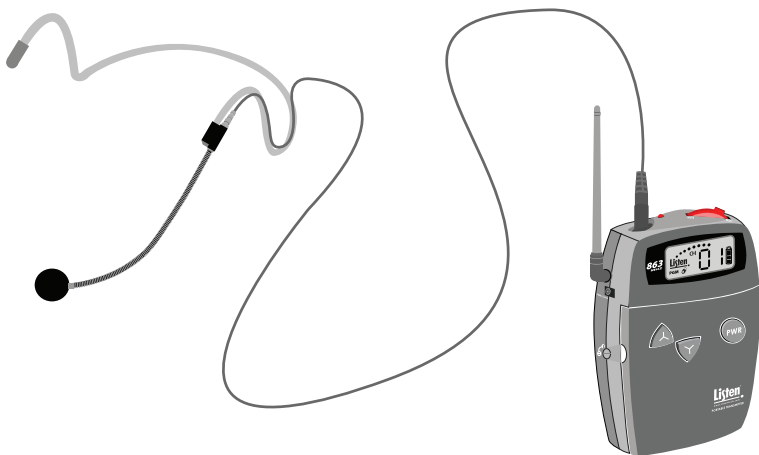
LR-400  
Portable Display FM  
Receiver (863 MHz)



LR-500  
Portable Programmable  
Display FM Receiver (863 MHz)

## Input Source

A microphone is the most common input source for the LT-700 transmitter, although, the LT-700 can transmit two audio inputs at once on one transmission channel. With the use of the LA-263 line cable both the inputs will be mixed. Thus, a person can use a line input source and mic source.



# System Overview

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## Transmitter

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The LT-700 modulates the audio on an FM carrier and transmits the signal via an antenna on the unit.



LT-700  
Portable Display FM  
Transmitter (863 MHz)

## Receivers

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Listen offers two different portable receivers.



LR-400  
Portable Display FM  
Receiver (863 MHz)



LR-500  
Portable Programmable  
Display FM Receiver (863 MHz)

# Key concepts in designing a portable FM system

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## Channel Selection

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Use this section of the guide to choose the channel settings for the transmitter and receivers.

- The goal is to find a transmission channel(s) that is free from interference. Interference originates from other transmitters and from other equipment (such as a computer).
- Listen products offer 17 different channels to choose from. This increases the chance you'll find an interference free channel.
- The best way to check for interference is to use the "SEEK" button on the receiver. Be sure all Listen transmitters have been turned off if there is interference, the receiver will find these channels. If the receiver finds a frequency in use, do not use this channel.
- In general, most of the channels will be free from interference.
- Interference can be overcome by maximizing the transmission power and by using the receivers close to the transmitting antenna.
- If more than one channel is in use, space the channels further from each other. Use the Listen frequency chart on page 61 to determine the channels frequency and space the number of channels further from each other.

**EXAMPLE: 2 channel system use channels 01 & 11**  
**3 channel system use channels 01, 06 & 11**

## Range

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The range of a portable transmission will vary from one application to another. There are many different obstructions that could minimize the range. In most applications, the range will be approximately as shown below (P= Power Level - refer to page 26 for programming power levels of the LT-700).

P1 – 100 ft

P2 – 150 ft

P3 – 200 ft

Range varies depending on environment.

### Maximizing Range

Here are some tips to maximize the transmission range:

- Eliminate or minimize obstructions between the transmitter and receivers.
- Minimize the distance between the transmitter and receivers.
- Move transmitter and receivers away from metal objects.
- Orient both transmitting and receiving antennas vertically.

# Key concepts in designing a portable FM system

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## ***Eliminating Multipath***

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As mentioned on page 5, multipath can occur with portable RF systems. The audio quality of the transmission can decrease with the occurrence of multipath. Here are a few potential improvements that can help if multipath takes place:

### ***Squelch***

Squelching the receiver will mute the audio output when the signal from the transmitter is turned off or the signal is too weak to be received. Without squelch you would hear radio noise in your earphone. "Tightening" the squelch will turn the receiver off if it is chattering because of multipath (refer to page 48 for programming squelch).

### ***Transmitter power level***

The RF power level can be adjusted on the LT-700 (refer to page 26 for programming LT-700 power levels). The lower the power setting, the less range the transmitter will broadcast. Decreasing the broadcast range will keep the receivers closer to the transmitter.

## ***Multiple Portable Systems***

---

In many applications, there will be more than one RF transmission in the same general vicinity. Intermodulation interference can occur if the transmission frequencies are too close together. Here are some ways to eliminate the chance of RF interference:

### ***Squelch***

Much like a multipath situation, "tightening" the squelch on the receiver will mute the audio output when the signal is too weak to be received. Without squelch you would hear radio noise in your earphone. Tightening the squelch will help with keeping the receiver tuned to the nearest transmitter (refer to page 48 for programming squelch).

### ***Transmitter power level***

The RF power level can be adjusted on the LT-700 (refer to page 26 for programming LT-700 power levels). The lower the power setting, the less range the transmitter will broadcast. Decreasing the broadcast range will keep the receivers closer to the transmitter.

### ***Spacing of channels***

Use a Listen frequency chart (on page 61) to determine the channels frequency and space the number of channels further from each other.

### ***DX/Local***

The receiver can be adjusted to receive only the strongest signals (refer to page 50 for DX/Local information).

# Notes

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# Notes

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# portable FM 863 MHz

863.050 863.200 863.400 863.5



**Listen**  
www.ListenTech.com  
PORTABLE TRANSMITTER

LT-700 Portable FM Display Transmitter

**Listen**<sup>®</sup>  
www.listentech.com

FREQUENCY MODULATION TECHNOLOGY



# LT-700 User's Manual Table of Contents

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## LT-700 Package Contents

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- LT-700
- Quick Reference Card



LT-700  
Portable Display FM  
Transmitter (863 MHz)

## Listen Configurations

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- LT-700-863



# LT-700-863 Specifications

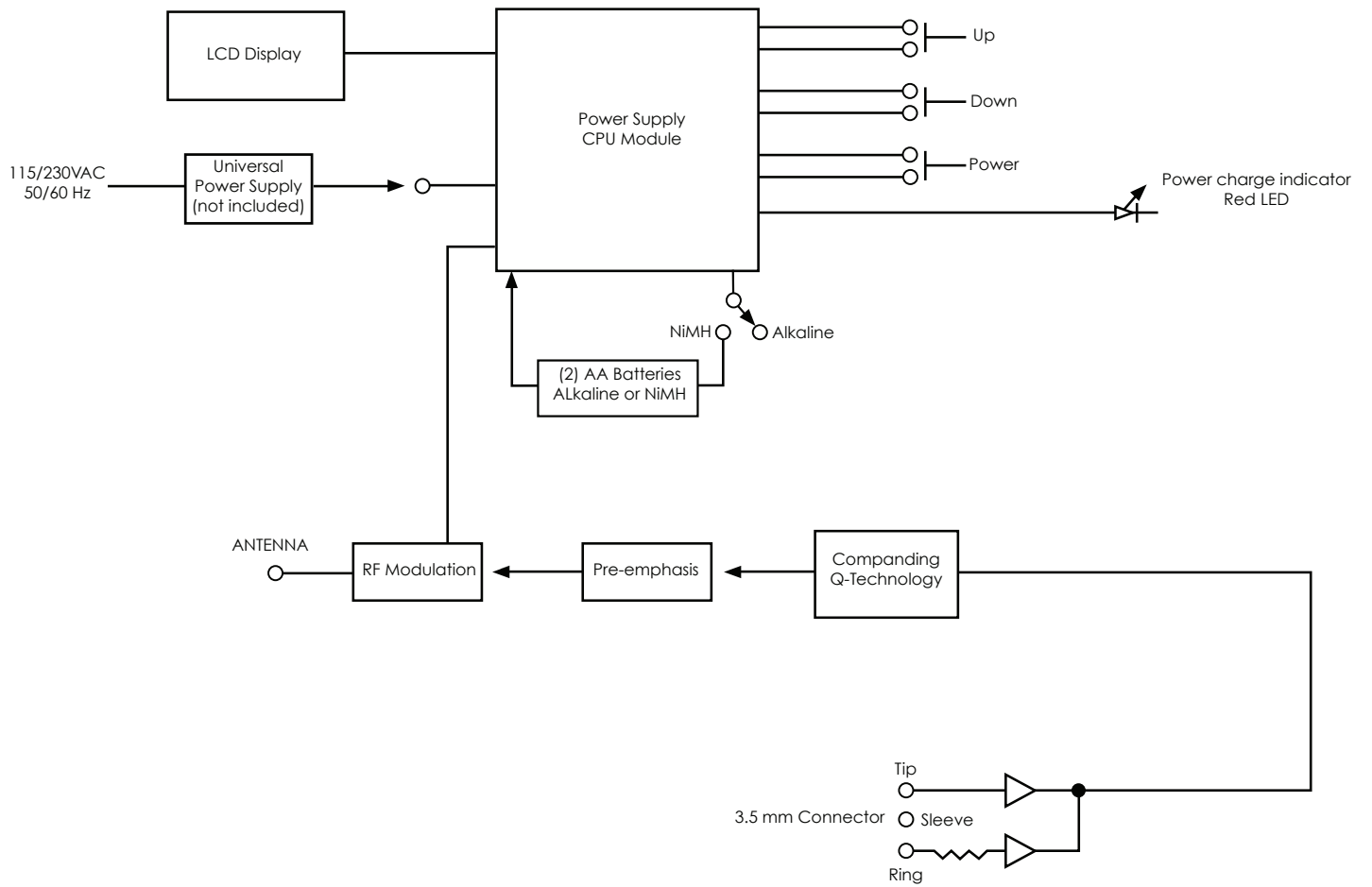
## Architectural Specification

The LT-700-863 portable FM Transmitter shall be capable of broadcasting on 17 channels. Channel tuning shall be capable of being locked. The transmitter shall have a SNR of 70 db or greater. The output power shall be adjustable to quarter, half or full. The device shall have an audio frequency response of 50 Hz to 15 kHz, +/-3db. The device shall incorporate a microphone sensitivity switch. The device shall incorporate a mute switch. The unit shall operate off of 2 AA batteries. The battery door shall be capable of being mechanically locked. The device shall incorporate an LCD display that indicates battery level, channel, channel lock, low battery, battery charging, programming, and RF signal strength. The portable transmitter shall incorporate automatic battery charging circuitry for recharging of NiMH batteries. The Listen LT-700-863 is specified.

	Specifications	LT-700-863
RF	RF Frequency Range	863.050 - 864.950 MHz
	Number of Channels	17 Wideband
	Frequency Accuracy	+/- .005% stability 0- 50C
	Transmitter Stability	50 PPM
	Output Power	10mW maximum (adjustable)
	Peak Deviation	+/- 50 kHz
	Antenna	Integrated External Antenna
	Compliance	CE, ETSI, RoHS
Audio	System Frequency Response	50Hz - 15kHz (+/-3db)
	System Signal to Noise Ratio	70db (A-Weighted)
	System Distortion	<2% THD @ 80% modulation
	Microphone Input	Unbalanced, tip of 3.5mm connector, -20 dbu nominal, -30 dbu maximum, impedance 21 ohms
	Microphone Sensitivity	Three position switch: high, middle, and low; 6db increments
	Line Input	Unbalanced, ring of 3.5mm connector, -10dbu nominal input level, -3dbu maximum, impedance 10K ohms
	Microphone power	3VDC Bias
Controls	User Controls	Power, mute, channel up/down, volume
	Set-up Controls (battery compartment)	Mic sensitivity, NiMH/alkaline battery switch
	Programming	Channel Lock Out, Channel Lock On, RF Power
Indicators	LED	Red, illuminated when unit is on. Flashes when batteries are low, or to indicate charging. Flashes quickly when muted.
	RF Power	Indicated on the LCD (low, mid, high)
	LCD Display	Channel Designation, lock status, RF power level, programming
Power	Battery Type	Type: 2 AA batteries, alkaline or NiMH
	Battery Life (Listen batteries)	15 hours alkaline (LA-361), 8 hours NiMH rechargeable (LA-362)
	Battery Charging (NiMH only)	Fully Automatic, 14 hours maximum
	Power Supply (LA-208-03)	7.5VDC, center positive 300mA. Drop in contact points for use with charging cases. Power supply not included (LA-208)
	Power Supply Connector	2.3 mm OD by .7mm ID, barrel type
	Power Supply Compliance	RoHS, WEEE, UL, PSE, CE, CUL, TUV, CB compliant
Physical	Dimensions (H x W x D)	5.0 x 3.0 x 1.0 in (13 x 7.6 x 2.5 cm)
	Color	Dark Grey with white silk screening
	Unit Weight	3.9 oz (111g)
	Unit Weight with batteries	5.8 oz (164g)
	Shipping Weight	1.0 lbs. (0.45kg)
	Door	Manually Lockable. Up, down, and power buttons through door. Other controls behind door (see controls)
Environmental	Temperature - Operation	-10C (14F) to +40C (104F)
	Temperature - Storage	-20C (-4F) to +50C (122F)
	Humidity	0 to 95% Relative Humidity, non condensing

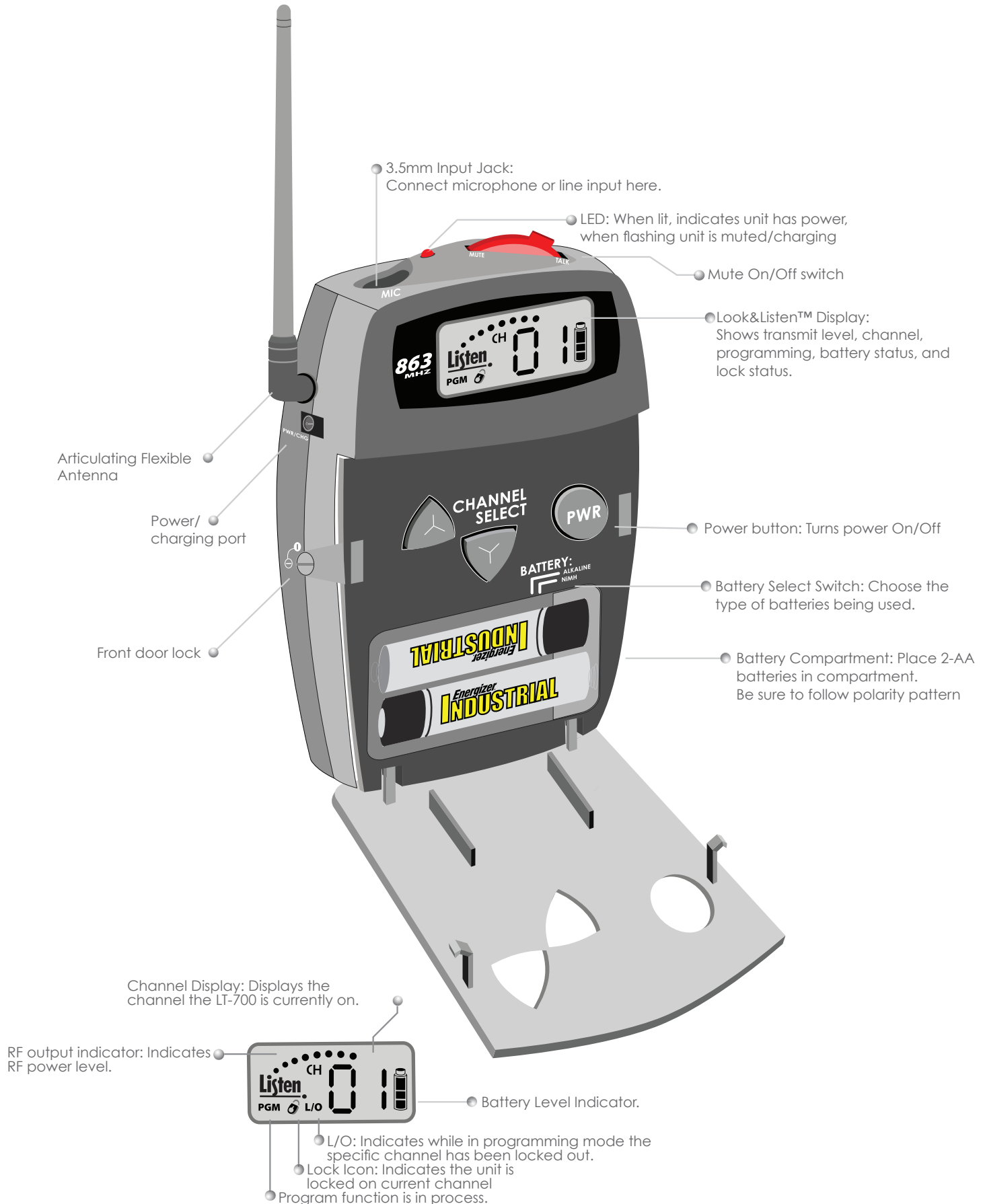
Specifications are subject to change without notification

# LT-700 Block Diagram



LT-700

# LT-700 Quick Reference





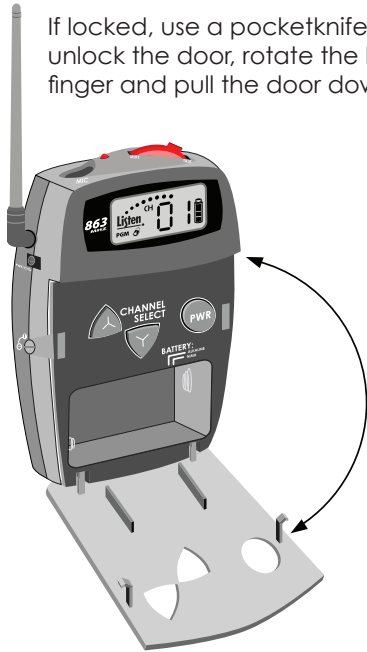
# LT-700 Setup

## 1 Unpack the Product

Remove outer packaging and plastic cover. Inspect for physical damage. If damage is apparent, please contact the dealer from which the product was purchased or Listen Technologies Corporation technical support for assistance (refer to page 66 for contact information).

## 2 Open the front access door

If locked, use a pocketknife or small screwdriver to unlock the door locks on both sides of the unit. To unlock the door, rotate the lock 1/4 turn counterclockwise. Grip the two tabs with your thumb and index finger and pull the door downward. DO NOT place batteries in the unit at this time.

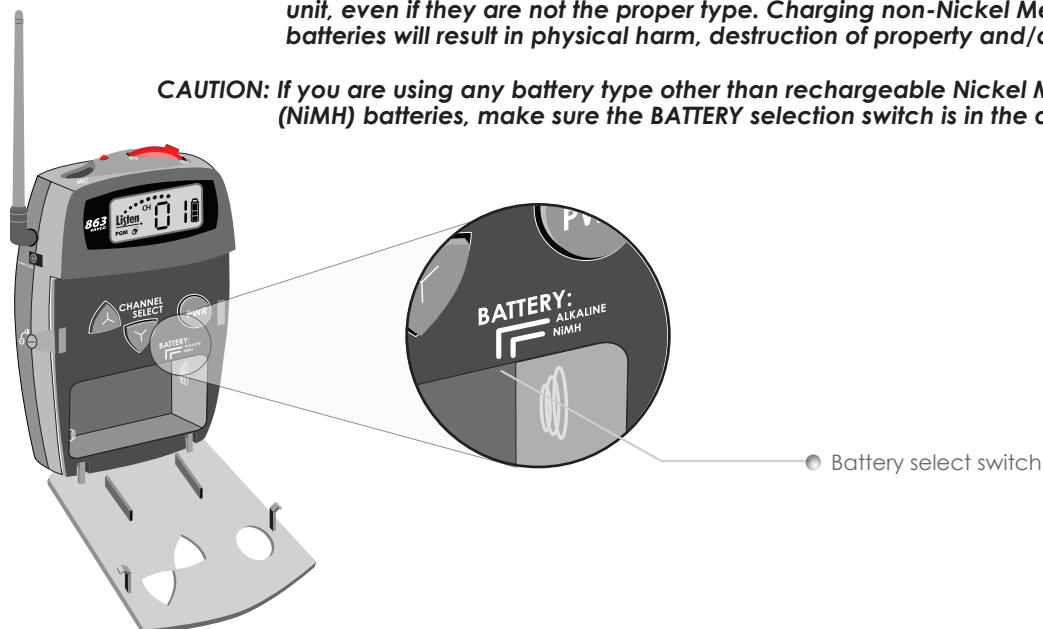


## 3 Select Battery Type

Two types of batteries may be used: NiMH and Alkaline. The unit is shipped with the switch in the Alkaline position. Use a pen or small screwdriver to select the battery type.

**WARNING:** Do not place the BATTERY switch in the NiMH position if you are not using Nickel Metal Hydride Batteries. The NiMH position will attempt to charge any batteries in the unit, even if they are not the proper type. Charging non-Nickel Metal Hydride (NiMH) batteries will result in physical harm, destruction of property and/or fire.

**CAUTION:** If you are using any battery type other than rechargeable Nickel Metal Hydride (NiMH) batteries, make sure the BATTERY selection switch is in the alkaline position.



# LT-700 Setup

## 4 Set Mic Sensitivity Switch

The microphone sensitivity switch is located inside the battery compartment, to the left of the BATTERY selection switch. The LT-700 is shipped with this switch in the center (MED) position. Listen recommends the following settings for our microphones. If you are using a microphone from another vendor, you may need to experiment with different settings.

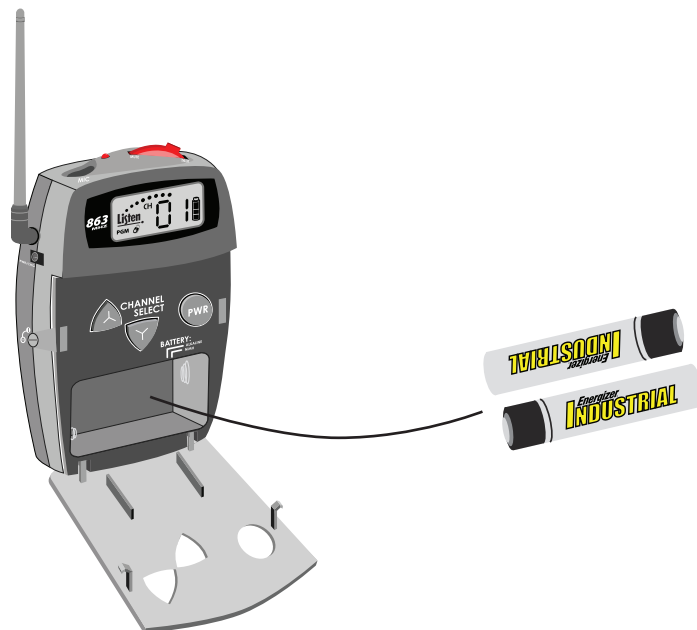
### Part # Description Setting

LA-261 Lavalier Microphone MED

LA-278 Behind-the-Head Microphone MED

## 5 Place Batteries in Unit

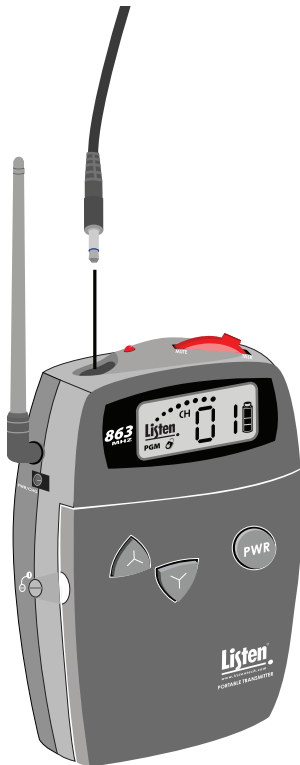
Place two AA batteries in the compartment, making note of the battery polarity shown in the battery compartment, and again verifying that the BATTERY SELECT switch is in the correct position for the batteries you are using. (Alkaline should be selected for all battery types other than NiMH).



# LT-700 Setup

## 6 Connect the Microphone

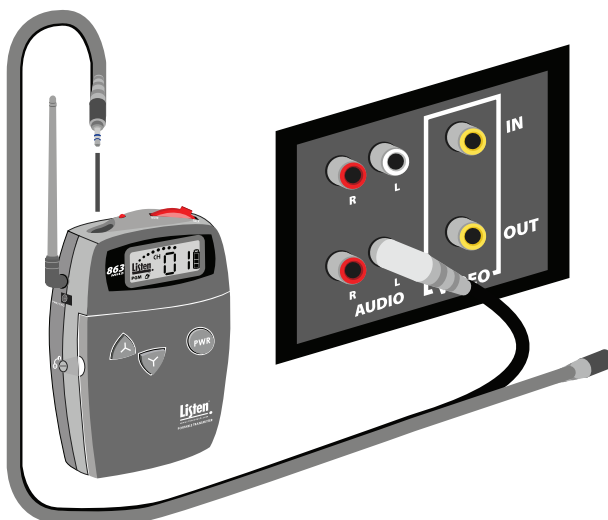
The microphone jack is located on top of the unit.



## 7 Connect the Line Input Cable (Optional)

This cable allows you to connect a TV, CD player or other equipment to the LT-700. To do this, you must order the Listen LA-263 Line Input Cable (not included with your unit). This cable allows you to connect both a microphone and line input to the jack on top of the LT-700. See the diagram below for connection information. You can use the microphone and the line input at the same time.

**NOTE: The MUTE switch mutes only the microphone; the line source will continue transmitting when the switch is in the MUTE position.**



# LT-700 Operating Instructions

## 1 Turn Unit On

### 1A Power On/Off Button

When you press the power button, the LED on top of the unit will be illuminated and the LCD display will be visible.

## 2 Antenna Positioning

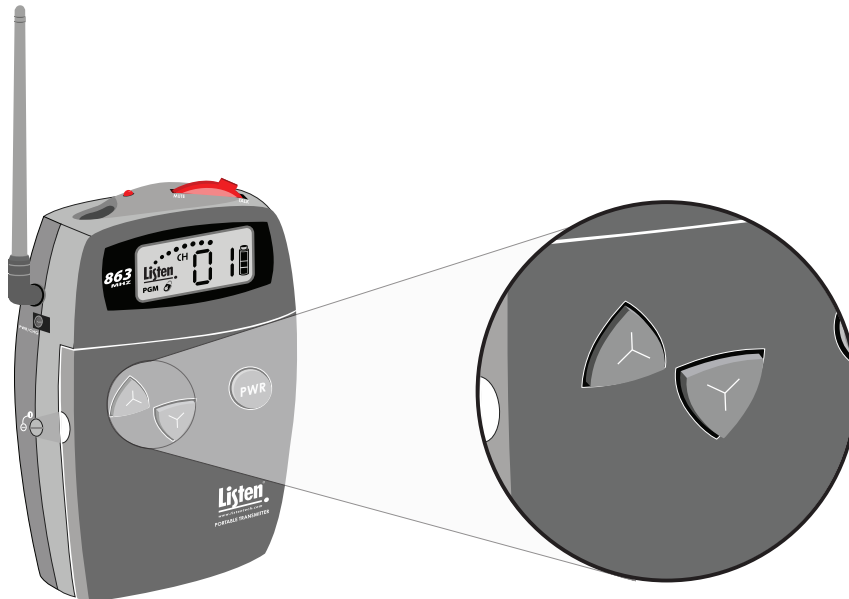
Raise the antenna to the upright position. When the antenna is fully upright, it will click into position.

**NOTE:** Be aware that the transmission range could decrease if the antenna is not in an upright position.



## 3 Select the channel for transmitting

863 MHz operates on 17 wide band channels. Channels are display numerically (i.e. 01-17) (refer to Channel Selection in design guide page 8) for guidelines on choosing an interference free channel.



# LT-700 Operating Instructions

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## 4 Using the MUTE / TALK switch

Slide the switch to the mute position and the microphone audio is muted. When the microphone audio is muted, the LED on top of the unit flashes rapidly. Slide the switch back to the talk position and the microphone audio will return to the transmission. If you are using line level audio, it will not be affected by the mute/talk switch.



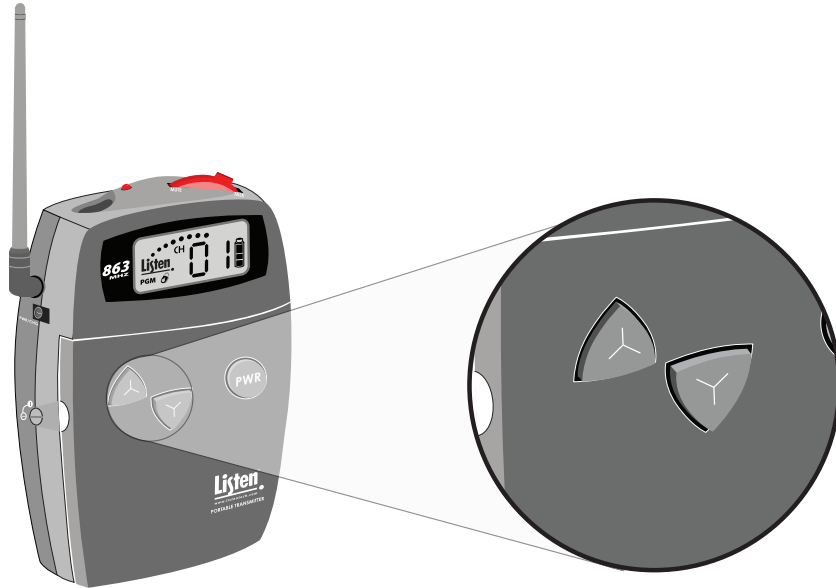
# LT-700 Programming Instructions

## Program Mode Overview

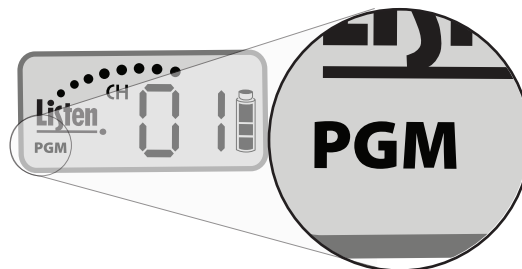
The LT-700 can be programmed to transmit on a limited number of channels. For applications where users are required to select a channel (such as classrooms or language interpretation application), and you don't want them to have to scroll through all of the available channels, this feature is ideal. The LT-700 can also be changed from high to low power levels. Adjusting the power settings allows you to set the range of the transmission.

## Entering Program Mode

- 1 While the unit is ON, press and hold the channel down and up buttons simultaneously for 3 seconds.



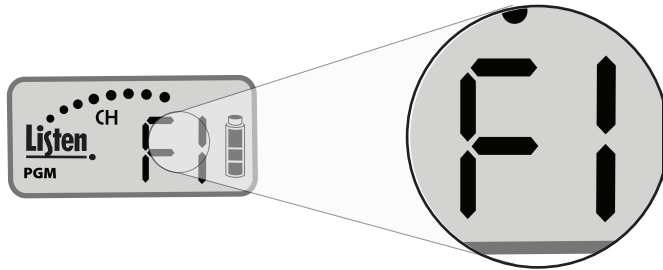
- 2 The "PGM" icon on the LCD will appear indicating program mode is entered.



# LT-700 Programming Instructions

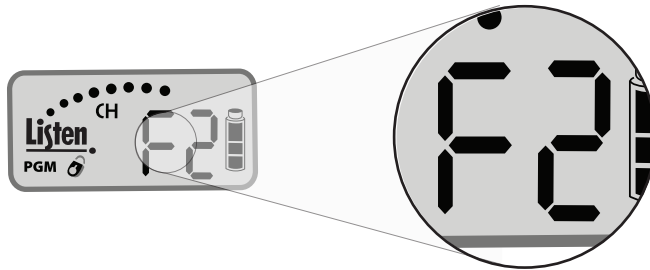
- 3 Once in the program mode, a function menu is displayed. Function 1 (F1) is displayed as default. Pressing the channel up or down buttons will scroll through the functions. Pressing the power button will enter that function.

F1- Channel Lock out. No channels are locked out as default. Pressing the up and down buttons will scroll through channels. Pressing the power button will toggle between lock/lockout for that channel. When a channel is locked out, the L/O on the LCD shall be displayed



F2- Transmitter Power. High transmit power (P3) is the default. Pressing the channel up button will toggle through the following settings:

- Low power: LCD displays "P1"
- Med power: LCD displays "P2"
- High power: LCD displays "P3"



- 4 When no button is pressed for 10 seconds, the program menu is exited altogether, regardless of whether a function is entered or not. To exit out of the program menu or function manually:
- 4A When in the programming menu: Press and hold power for 2 seconds. This exits the program mode.
  - 4B When in a programming function: Press and hold power for 2 seconds. This exits the function and goes back to the programming menu.
  - 4C Pressing and holding power for a full 4 seconds will exit both programming function and programming menu.



# LT-700 Programming Instructions

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## Resetting to defaults

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To reset the receiver to default settings, follow these instructions:

### 1 Reset to default settings

#### 1A Press and hold the Up and Down channel buttons while turning the unit on.

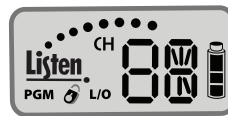
Press and hold the Up and Down channel buttons while turning the unit on. This will light up all segments of the display.

#### 1B After the receiver has been reset

After the transmitter has been reset, the display will return with defaults present.

**NOTE:** The defaults are

- Power Level: P3
- Channel: 01
- \* Channel lockout: All channels active



# Accessories for LT-700

## Accessories



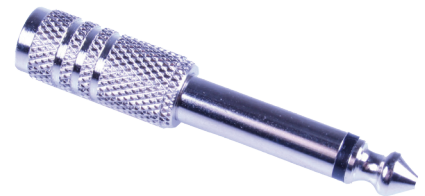
LA-261  
Lavalier Microphone



LA-278  
Behind-the-Head  
Microphone



- LA-311 16-Unit Portable Charging/Carrying Case • LA-313 16-Unit Portable Carrying Case
- LA-317 4-Unit Portable Charging/Carrying Case
- LA-318 4-Unit Portable Carrying Case
- LA-320 Configurable Carrying Case
- LA-321 8-Unit Portable Charging/Carrying Case
- LA-322 8-Unit Portable Carrying Case
- LA-323 4-Unit Portable Charging/Carrying Case w/Removable Lid
- LA-324 8-Unit Portable Charging/Carrying Case w/Removable Lid
- LA-325 16-Unit Portable Charging/Carrying Case w/Removable Lid



LA-280



LA-361  
High Capacity AA Alkaline Batteries (2)



LA-362  
Rechargeable AA NiMH Batteries (2)

# Notes

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# Notes

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LT-700







# portable FM 863 MHz



863.050

863.200

863.400

863.5

Listen (M, 2006) Salt Lake City, Utah, USA - Listen Technologies Corporation is pleased to announce that Sam Platt has joined the company as the Graphic Designer and overall creator of the marketing team. In his role, Platt will develop the images used in a variety of creative projects, including presentation brochures, literature, brochures, direct mail, and corporate promotional packaging.

"Sam's experience and ambitious energy are an excellent fit for Listen and our marketing team," said Cory Schaeffer, Listen's Vice President of sales and marketing. "We are so glad to have him on our marketing team."

Platt comes to us with extensive experience in the Listen product technology and has built a strong portfolio over the past few years in print, web and digital advertising media. He is a graduate from Weber State University and a Utah Native.

"I'm excited to be part of such a growing, innovative company," said Platt. "I'm looking forward to working with the Listen team to increase and enhance our promotional endeavors. Marketing's goal for 2006 is to have marketing be a more fun and profitable part of our business."

**About Listen Technologies Corporation**  
Listen Technologies Corporation manufactures and distributes wireless audio products used in auxiliary assistance, soundfield, tour group, language interpretation and conferencing applications. Listen products provide superb audio performance, mobility and ease of use, making

...for schools, houses of worship, hotels, restaurants, and other venues. For more information, contact Listen Technologies at 800-330-0991, or visit [www.ListenTech.com](http://www.ListenTech.com).

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LR-400 Portable Display FM Receiver  
 LR-500 Portable Programmable Display FM Receiver







# LR-400/500 User's Manual Table of Contents

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Block Diagram	39
Quick Reference	40
Setup Instructions	42
Operating Instructions	45
Programming Instructions (LR-500 only)	51
Accessories	52
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## LR-400/500 Package Contents

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- LR-400/500
- Quick Reference card



LR-400  
Portable Display  
FM Receiver  
(863 MHz)



LR-500  
Portable Programmable  
Display FM Receiver  
(863 MHz)

## Listen Configurations

---

- LR-400-863
- LR-500-863



# LR-400 Specifications

## Architectural Specification

The LR-400-863 FM receiver shall be capable of receiving on 17 wide band channels with a SNR of 70dB or greater. The device shall be able to be locked on a single channel. The receiver shall be capable of seeking channels. The device shall have an adjustable squelch. The device shall have an audio frequency response of 50 Hz to 15 KHz,  $\pm 3$  dB. The device will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset. The device shall incorporate an LCD display that indicates channel, battery level, low battery, battery charging, and RF signal strength. The receiver shall be able to function in both DX and Local mode. The unit shall operate off of 2 AA batteries. The receiver shall incorporate automatic battery charging circuitry for recharging of NiMH batteries. The Listen LR-400-863 is specified.

	Specifications	LR-400-863
RF	RF Frequency Range	863.050 - 864.950 MHz
	Number of Channels	17 Wideband
	Frequency Accuracy	+/- .005% stability 0- 50C
	Peak Deviation	+/- 50 kHz
	Squelch	Programmable in 20 Steps
	Antenna	Integrated External Antenna
	Compliance	CE, ETSI, RoHS
Audio	System Frequency Response	50Hz - 15kHz (+/-3db)
	System Signal to Noise Ratio	70db (A-Weighted)
	System Distortion	<2% THD @ 80% modulation
	Output	3.5 mm connector, unbalanced, 0dBu nominal output level, 16 mW maximum, impedance 32 Ohms
Controls	User Controls	Channel up/down, SEEK, volume
	Set-up Controls (battery compartment)	NiMH/alkaline battery switch
	Programming	Channel Lock On, RF Power, DX/Local
Indicators	LED	Red, illuminated when unit is on. Flashes when batteries are low, or to indicate charging. Flashes when locked and SEEK is pushed.
	LCD Display	Channel Designation, lock status, signal strength indication, programming
Power	Battery Type	Type: 2 AA batteries, alkaline or NiMH
	Battery Life (Listen batteries)	30 hours alkaline (LA-361), 15 hours NiMH rechargeable (LA-362)
	Battery Charging (NiMH only)	Fully Automatic, 14 hours maximum
	Power Supply (LA-208-03)	7.5VDC, center positive 300mA. Drop in contact points for use with charging cases. Power supply not included (LA-208)
	Power Supply Connector	2.3 mm OD by .7mm ID, barrel type
	Power Supply Compliance	RoHS, WEEE, UL, PSE, CE, CUL, TUV, CB compliant
Physical	Dimensions (H x W x D)	5.0 x 3.0 x 1.0 in (13 x 7.6 x 2.5 cm)
	Color	Dark Grey with white silk screening
	Unit Weight	3.9 oz (111g)
	Unit Weight with batteries	5.8 oz (164g)
	Shipping Weight	1.0 lbs. (0.45kg)
	Door	Manually Lockable. Up, down, and power buttons behind door. Other controls behind door (see controls)
Environmental	Temperature - Operation	-10C (14F) to +40C (104F)
	Temperature - Storage	-20C (-4F) to +50C (122F)
	Humidity	0 to 95% Relative Humidity, non condensing

Specifications are subject to change without notification

# LR-500 Specifications

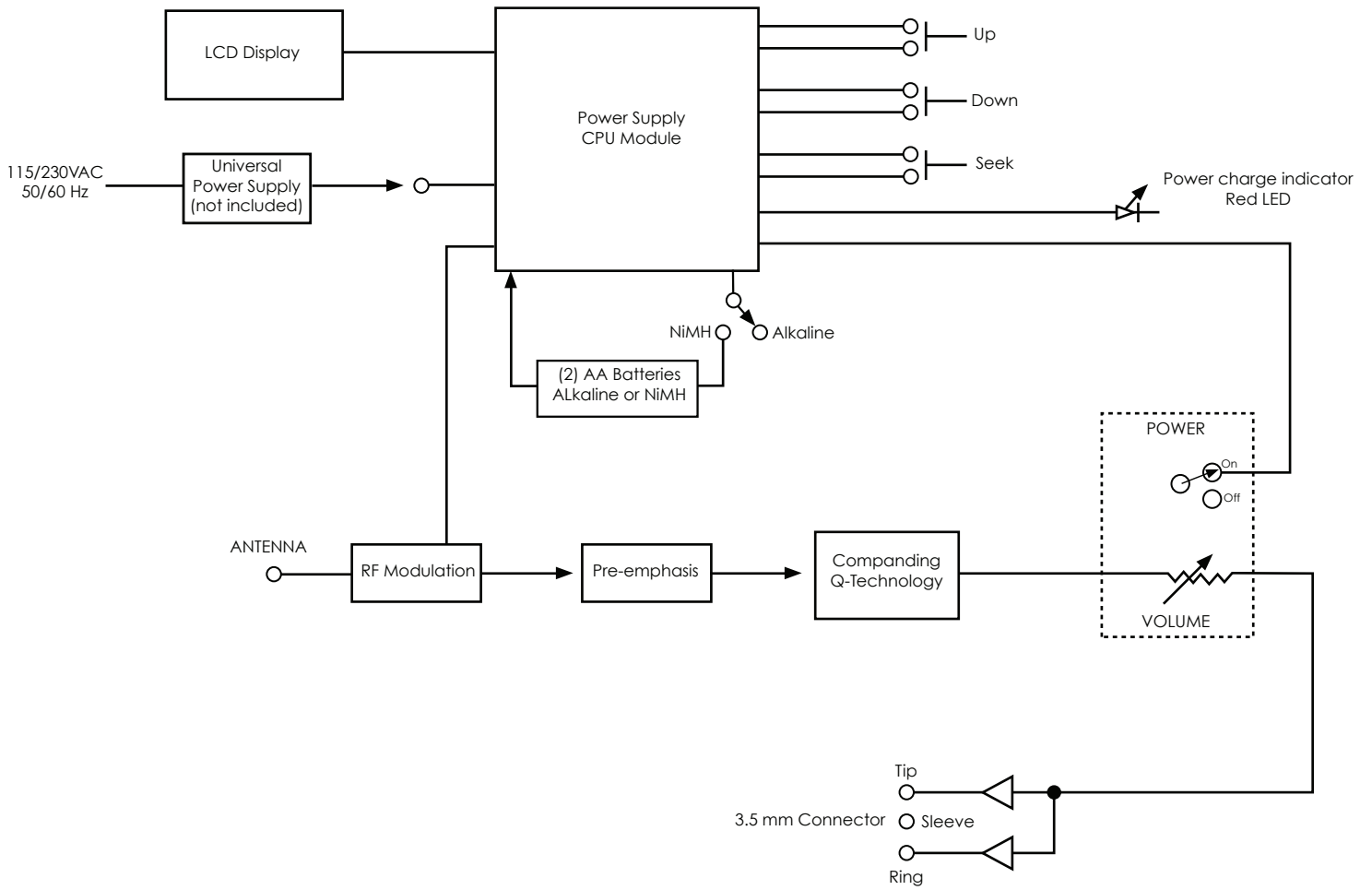
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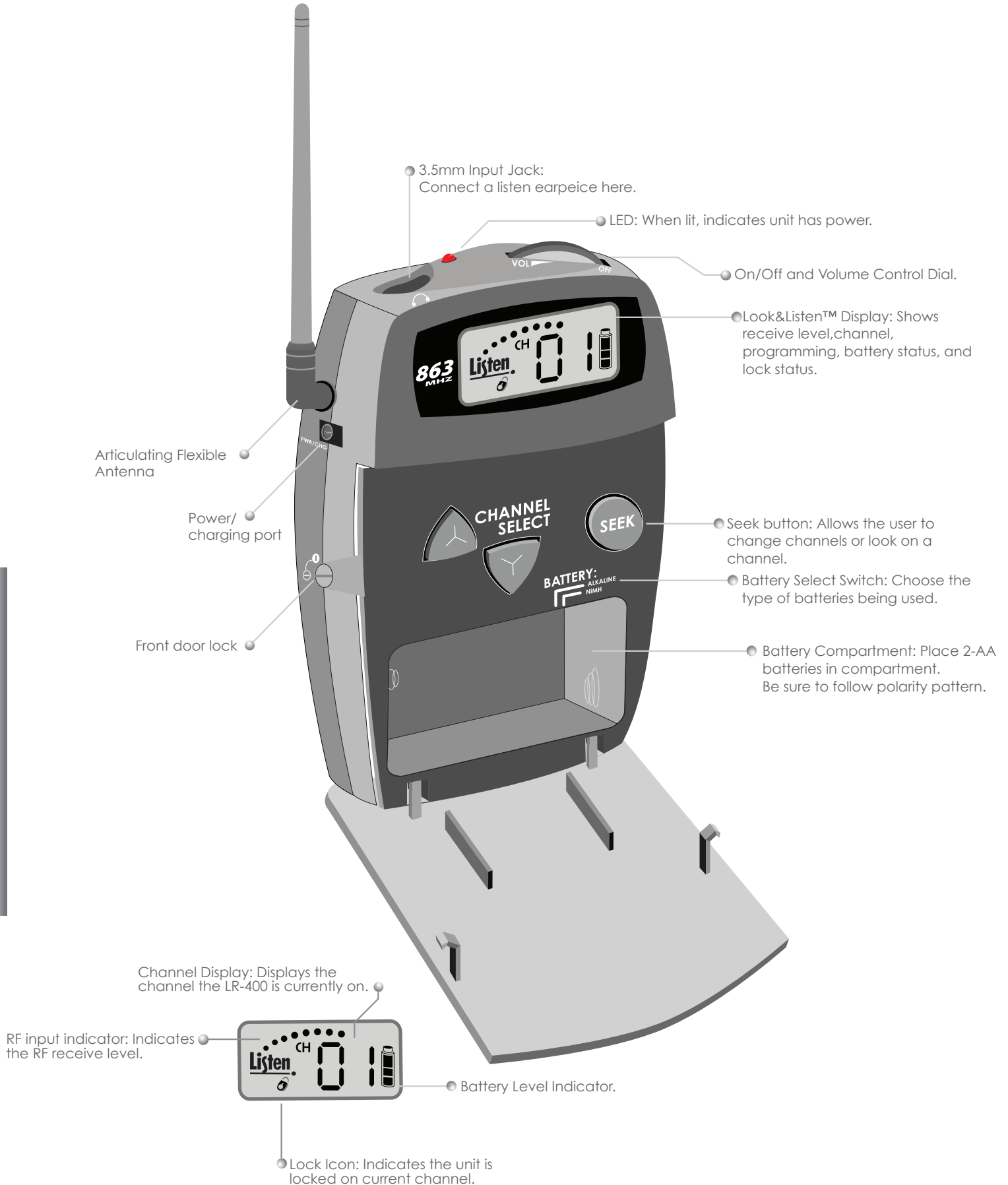
	Specifications	LR-500-863
RF	RF Frequency Range	863.050 - 864.950 MHz
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	Peak Deviation	+/- 50 kHz
	Squelch	Programmable in 20 Steps
	Antenna	Integrated External Antenna
	Compliance	CE, ETSI, RoHS
Audio	System Frequency Response	50Hz - 15kHz (+/-3db)
	System Signal to Noise Ratio	70db (A-Weighted)
	System Distortion	<2% THD @ 80% modulation
	Output	3.5 mm connector, unbalanced, 0dBu nominal output level, 16 mW maximum, impedance 32 Ohms
Controls	User Controls	Channel up/down, SEEK, volume
	Set-up Controls (battery compartment)	NiMH/alkaline battery switch
	Programming	Channel Lock Out, Channel Lock On, DX/Local
Indicators	LED	Red, illuminated when unit is on. Flashes when batteries are low, or to indicate charging. Flashes when locked and SEEK is pushed.
	LCD Display	Channel Designation, lock status, signal strength indication, programming
Power	Battery Type	Type: 2 AA batteries, alkaline or NiMH
	Battery Life (Listen batteries)	30 hours alkaline (LA-361), 15 hours NiMH rechargeable (LA-362)
	Battery Charging (NiMH only)	Fully Automatic, 14 hours maximum
	Power Supply (LA-208-03)	7.5VDC, center positive 300mA. Drop in contact points for use with charging cases. Power supply not included (LA-208-03)
	Power Supply Connector	2.3 mm OD by .7mm ID, barrel type
	Power Supply Compliance	RoHS, WEEE, UL, PSE, CE, CUL, TUV, CB compliant
Physical	Dimensions (H x W x D)	5.0 x 3.0 x 1.0 in (13 x 7.6 x 2.5 cm)
	Color	Dark Grey with white silk screening
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	Unit Weight with batteries	5.8 oz (164g)
	Shipping Weight	1.0 lbs. (0.45kg)
	Door	Manually Lockable. Up, down, and power buttons through door. Other controls behind door (see controls)
Environmental	Temperature - Operation	-10C (14F) to +40C (104F)
	Temperature - Storage	-20C (-4F) to +50C (122F)
	Humidity	0 to 95% Relative Humidity, non condensing

Specifications are subject to change without notification

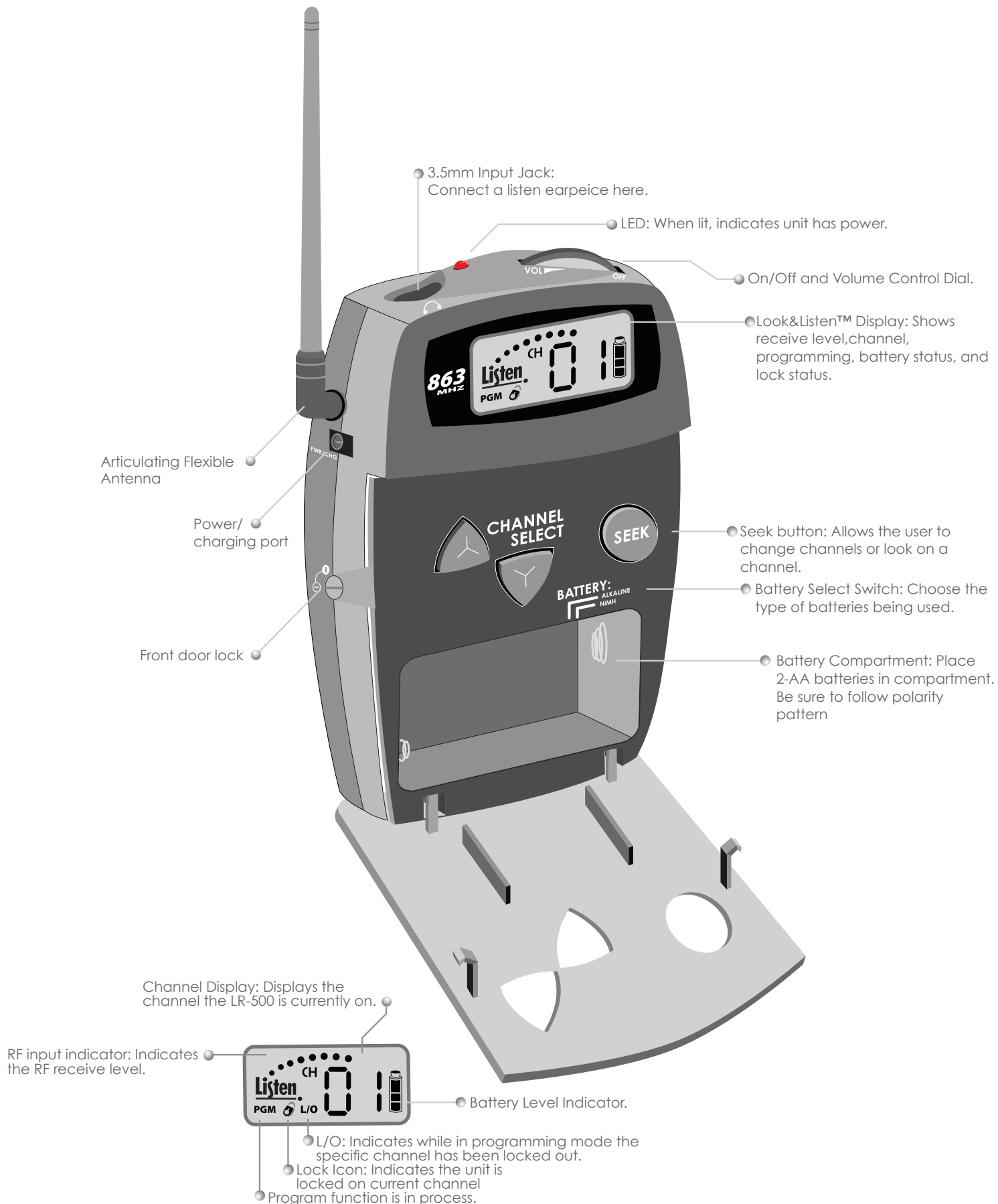
# LR-400/500 Block Diagram



# LR-400 Quick Reference



# LR-500 Quick Reference



LR-400/500

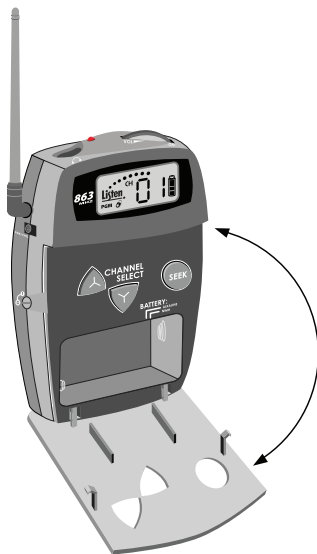
# LR-400/500 Setup Instructions

## 1 Remove the product

Remove outer packaging and plastic cover. Inspect for physical damage. If damage is apparent, please contact the dealer from which the product was purchased or Listen Technologies Corporation technical support for assistance (refer to page 66 for contact information).

## 2 Open the front access door

If locked, use a pocketknife or small screwdriver to unlock the door locks on both sides of the unit. To unlock the door, rotate the lock ¼ turn counterclockwise. Grip the two tabs with your thumb and index finger and pull the door downward. DO NOT place batteries in the unit at this time.

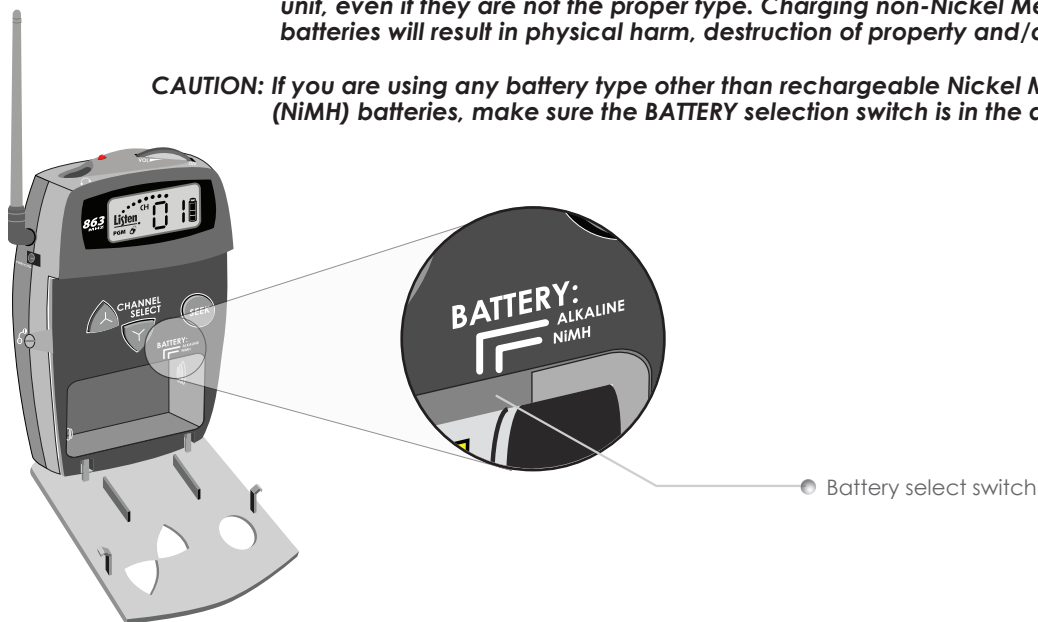


## 3 Select Battery Type

Two types of batteries may be used: The unit is shipped with the switch in the Alkaline position. Use a pen or small screwdriver to select the battery type.

**WARNING:** Do not place the BATTERY switch in the NiMH position if you are not using Nickel Metal Hydride Batteries. The NiMH position will attempt to charge any batteries in the unit, even if they are not the proper type. Charging non-Nickel Metal Hydride (NiMH) batteries will result in physical harm, destruction of property and/or fire.

**CAUTION:** If you are using any battery type other than rechargeable Nickel Metal Hydride (NiMH) batteries, make sure the BATTERY selection switch is in the alkaline position.





# LR-400/500 Setup Instructions

## 4 Place Batteries in Unit

Place two AA batteries in the compartment, making note of the battery polarity shown in the battery compartment, and again verifying that the BATTERY SELECT switch is in the correct position for the batteries you are using. (Alkaline should be selected for all battery types other than NiMH).

**NOTE:** Listen provides industrial strength AA alkaline batteries (part number LA-361) and high performance AA Nickel Metal Hydride batteries (part number LA-362). These may be purchased from your Listen dealer.



## 5 Connect an Earphone or Headset

Your headset or earphone will connect to the jack on the top of the unit. Either mono or stereo connectors may be used with a Listen receiver. Make certain you push the plug all the way into the jack.



# LR-400/500 Setup Instructions

---

## 6 Turn the Unit On

Receivers are turned on by rotating the volume dial counterclockwise. The red LED on top of the unit should activate and the LCD display should illuminate. If they do not, make sure you have installed the batteries correctly and that you are using fully charged batteries.



# LR-400/500 Operating Instructions

## 1 Turn Unit On

### 1A Volume knob

Rotate the volume knob counterclockwise with an earphone or headset connected to the unit.

**WARNING: Excessive volume may result in hearing damage.**

## 2 Antenna Placement

### 2A Antenna Position

Raise the antenna to the upright position. When the antenna is fully extended, it will click into position.

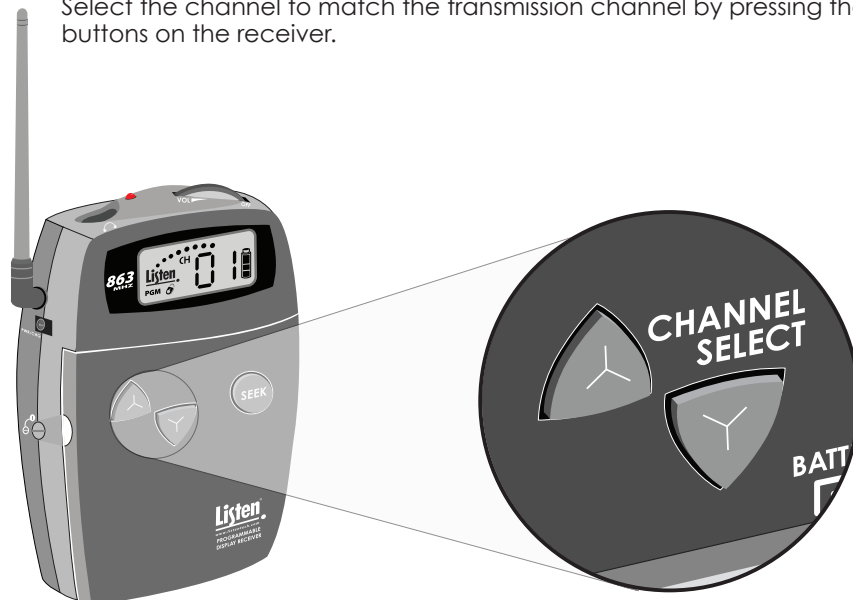
**NOTE: Be aware that the transmission range could decrease if the antenna is not in an upright position.**



## 3 Select a Channel

### 3A Select the channel using channel select buttons

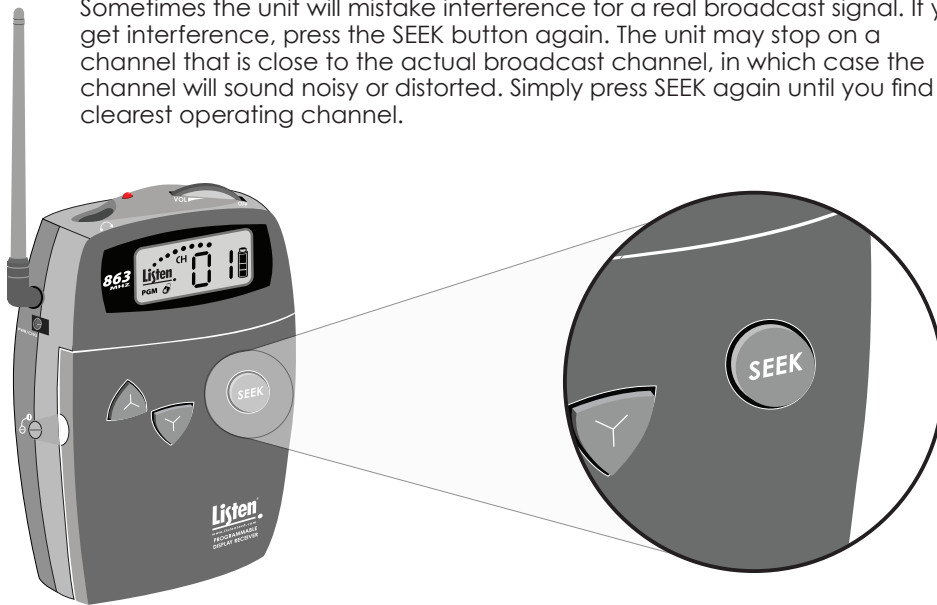
Select the channel to match the transmission channel by pressing the UP and DOWN buttons on the receiver.



# LR-400/500 Operating Instructions

## 3B Select the channel using SEEK

Another way to find a channel on the LR-400/500 is to use the SEEK button. When you do this, the Listen receiver looks for the next active channel. Sometimes the unit will mistake interference for a real broadcast signal. If you get interference, press the SEEK button again. The unit may stop on a channel that is close to the actual broadcast channel, in which case the channel will sound noisy or distorted. Simply press SEEK again until you find the clearest operating channel.



## 4 Adjust the volume control

Use the control dial on the top of the unit to adjust the volume to a comfortable level.



# LR-400/500 Operating Instructions

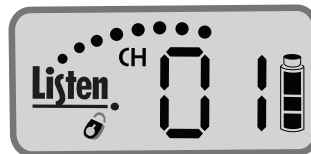
## Locking the Receiver on One Channel

The unit can be electronically locked on one channel so that it will not change channels even if the "SEEK" button is pressed. It is recommended to lock the receiver on a channel that is being used in a single channel system or when multiple systems are in the same area.

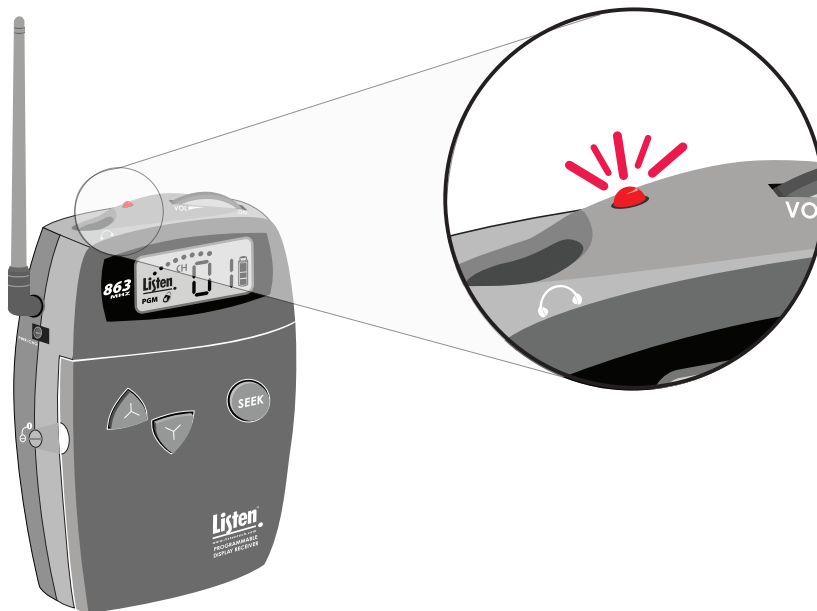
### 1 To lock on a channel

#### 1A Press and hold the SEEK button for 5 seconds

Press and hold the SEEK button for 5 seconds to lock a receiver onto the currently tuned channel. Press and hold the button again to unlock. When locked the LED on top of the unit will flash when you press the SEEK button.



**NOTE:** On the LR-400/500, when the channel is locked, a lock icon will appear underneath "Listen" on the display. Also if the unit is locked, the red LED on top of the receiver will flash when the SEEK button is pressed.



# LR-400/500 Operating Instructions

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## Squelch Programming

### Entering Squelch Program Mode

- 1 Turn unit off
- 2 Press and hold the SEEK button; while holding SEEK button down, turn the ON/OFF/VOLUME dial to turn the unit on.
- 3 Release the SEEK button when the Listen name disappears (approximately 2 seconds) and a two digit display is seen.

### Adjusting the Squelch level

- 1 Use the Channel UP and DOWN buttons to raise or lower the squelch sensitivity settings (refer to the chart on page 49 for settings).
- 2 Lower numbers mean that a less powerful and possibly noisy signal will be heard, but you can have a longer range before the unit will squelch.
- 3 Once the desired squelch setting is found, press SEEK to exit the squelch programming mode.

**NOTE: Keep in mind, low squelch may allow multipath and squelch chattering at long distances.**

Squelch setting 00 is no squelch; this setting disables the squelching capabilities of the receiver. Squelch setting 20 is maximum squelch sensitivity; when on this setting, there must be a very strong and stable RF signal for the unit to not engage the squelch feature.

**NOTE: For squelch settings 1-3, the squelch function is slow which allows for maximum transmission range. For squelch settings 4-20 the squelch function is fast to ensure little radio noise is heard during the squelch function.**



# LR-400/500 Operating Instructions

## Squelch

The purpose of squelch is to mute the audio output of your receiver when the signal from the transmitter is turned off or is too weak to be received. Without squelch you would hear radio noise in your earphone. The squelch on your receiver can be adjusted so that it will mute the audio on different RF signal strengths. This is useful as follows:

### **Set the squelch setting to the highest level**

To ensure that users don't hear transmissions from other transmitters, set the squelch setting to the highest level that doesn't squelch the receiver.

### **If the receiver is close to the transmitter, set the squelch high**

If the receiver is going to be close to the transmitter (i.e. in a classroom), setting the squelch setting high so that when the transmitter is turned off it immediately squelches and ignores transmitters in other rooms.

### **If in an area that has a lot of interference, set the squelch high**


If you are in an area that has a lot of interference, you may want to set the squelch setting to a high setting to ensure the interference is not picked by the receiver.

### **For maximum amount of range, set the squelch to a low level**

If you need the maximum amount of range, you may want to consider setting the squelch setting to a low level (0, 1 or 2).

**NOTE: Default squelch setting is 3**

**CAUTION: When setting the squelch level low the reliability of squelch function is compromised. This will cause radio noise to be heard in the earphone and there is a possibility of hearing damage.**

Squelch Setting	Squelch
0	
1	
2	
3 (default)	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

# LR-400/500 Operating Instructions

## DX/Local

DX is the normal operational mode. Local mode can effectively limit any inter-modulation and/or interference in a busy RF environment. This is done by limiting the amount of RF gain in the receiver. When local mode is selected, the range of the receiver is compromised. Depending on your application and environment, Local mode may be necessary for better performance. DX mode is default.

### DX Mode (default)

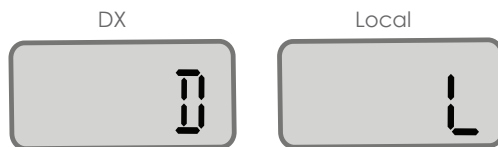
DX is normal operation. The local mode feature can be used when many frequencies are being used.

### Local mode

Only strong channels will be automatically tuned in

#### 1 To change to DX/Local mode

- 1A While the unit is OFF, press and hold the channel down button and turn the unit on.
- 1B The LCD shall indicate the current setting "D" or "L".
- 1C Pressing the down button will toggle between Local and DX Mode; "D" or "L".
- 1D Pressing seek will enter the setting and return to normal operational mode.



## Resetting to defaults

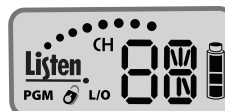
To reset the receiver to default settings, follow these instructions:

#### 1 Reset to default settings

- 1A **Press and hold the Up and Down channel buttons while turning the unit on.**  
Press and hold the Up and Down channel buttons while turning the unit on. This will light up all segments of the display.
- 1B **After the receiver has been reset**  
After the transmitter has been reset, the display will return with defaults present.

#### NOTE: The defaults are

- Power Level: P3
- Channel: 01
- \* Channel lockout: All channels active





# LR-500 Programming Instructions (LR-500 only)

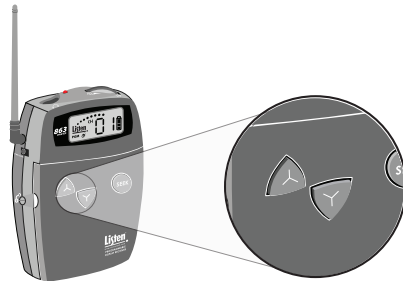
## Program Mode Overview

The LR-500 is a programmable receiver. In applications where users are required to select a channel (such as language interpretation or classrooms), it may not be necessary for the receiver to search 17 channels looking for the appropriate channel. The LR-500 can lockout unused channels so the user can toggle only between occupied frequencies.

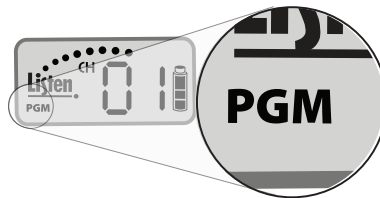
## Entering Program Mode

### 1 To enter program mode

- 1A While the unit is ON, press and hold the channel down and up buttons simultaneously for 3 seconds.

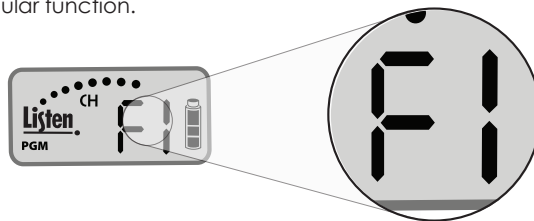


- 1B The "PGM" icon on the LCD will appear indicating program mode is active.



### 2 To program

- 2A Once in the program mode, a function menu is displayed. Function 1 (F1) is displayed as default. Pressing the channel up or down buttons will scroll through the functions (f1). Pressing the seek button will enter that particular function.



F1- Channel Lock out. No channels are locked out as default. Pressing the up and down buttons will scroll through channels. Pressing the seek button will toggle between available and locked out for that channel. When a channel is locked out, the L/O on the LCD shall be displayed.

- 3 When no button is pressed for 10 seconds, the program menu is exited altogether, regardless of whether a function is entered or not. To exit out of the program menu or function manually:

- 3A When in the programming menu: Press and hold power for 2 seconds. This exits the program mode.
- 3B When in a programming function: Press and hold power for 2 seconds. This exits the function and goes back to the programming menu.
- 3C Pressing and holding power for a full 4 seconds will exit both programming function and programming menu.

# Accessories for LR-400/500

## Accessories



LA-161  
Single Ear Bud



LA-162  
Stereo Ear Buds



LA-163  
Replacement Cushions for  
Ear Buds (20)



LA-164  
Ear Speaker



LA-165  
Stereo Headphones



LA-166  
Neck Loop



- LA-311 16-Unit Portable Charging/Carrying Case
- LA-313 16-Unit Portable Carrying Case
- LA-317 4-Unit Portable Charging/Carrying Case
- LA-318 4-Unit Portable Carrying Case
- LA-320 Configurable Carrying Case
- LA-321 8-Unit Portable Charging/Carrying Case
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LA-170  
Behind-the-Head  
Stereo Headphones



LA-361  
High Capacity AA Alkaline Batteries  
(2)



LA-362  
Rechargeable AA NiMH Batteries (2)

# Notes

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# Notes

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LR-400/500







# portable FM 863 MHz

863.050

863.200

863.400

863.5

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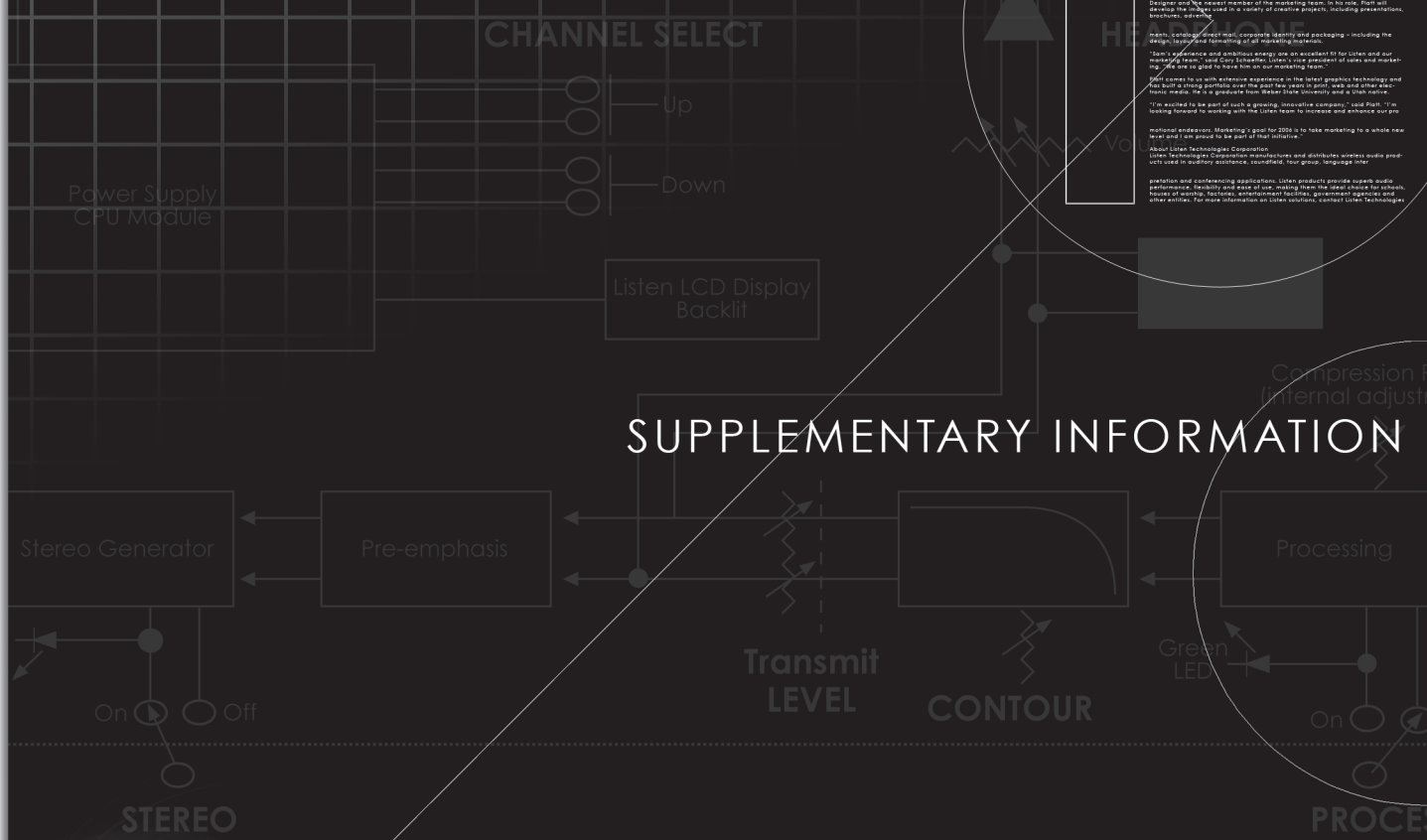
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## SUPPLEMENTARY INFORMATION







## Supplementary Information Table of Contents

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Frequency Chart	61
Battery Charging Information	62
Troubleshooting	63
Frequently Asked Questions	65
Compliance, Warranty and Contact Information	67
Notes	68



# Frequency Chart

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Frequencies	
Channel	Frequency (MHz)
01	863.050
02	863.200
03	863.400
04	863.550
05	863.750
06	863.900
07	864.100
08	864.250
09	864.450
10	864.600
11	864.800
12	864.950
13	863.300
14	863.650
15	864.000
16	864.350
17	864.700

# Battery Charging Information

The LT-700 and both Listen receivers are unique because they have SmartCharge™ chargers built in. When any of these units are connected to an LA-208 wall transformer or dropped into a Listen charging case, NiMH batteries will be charged.

SmartCharge™ uses a pulse charging, which greatly extends the life of Nickel Metal Hydride (NiMH) batteries. The entire charging process takes about 13 hours. Listen recommends that you allow the charger to complete its full cycle every time for maximum battery life.

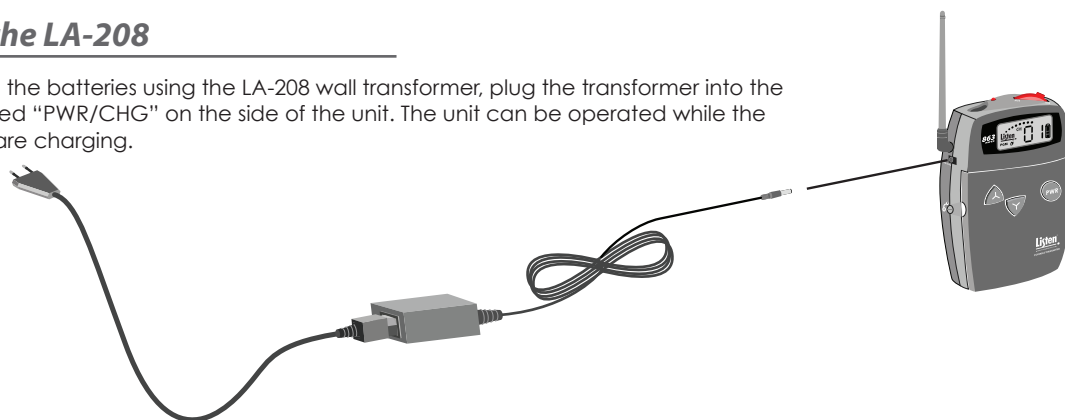
During the charge cycle, the red LED on top of the Listen product will flash slowly. When charging is completed, the LED will turn off. It is not necessary to unplug the charger; however, if you unplug the unit from the charger and then plug it back in, it will begin the 13-hour charge cycle over again. (show top of a receiver [LED])

When not using the receiver, it is recommended to leave the unit on the charger. The charger provides a "maintenance" charge that keeps the battery at 100%. If the unit is not on the charger, the battery will lose up to 20% of its charge per month.

**NOTE: Listen provides 2000mAh (milli-Amp-hour) constant current NiMH Nickel Metal Hydride) batteries. These may be purchased from Listen (part number LA-362).**

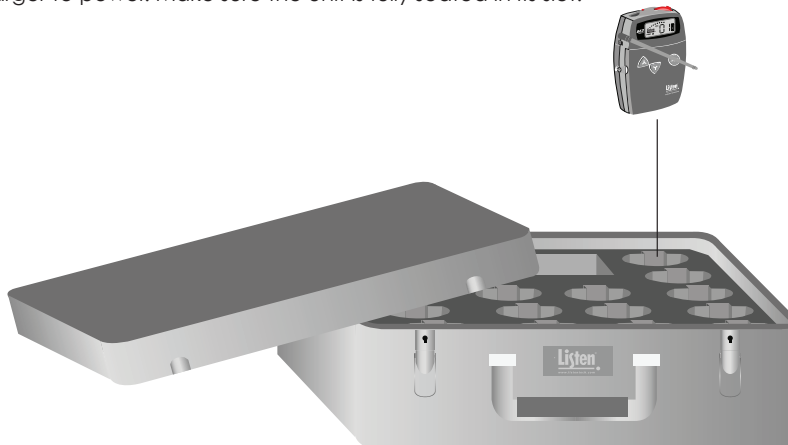
## Charging with the LA-208

To charge the batteries using the LA-208 wall transformer, plug the transformer into the jack marked "PWR/CHG" on the side of the unit. The unit can be operated while the batteries are charging.



## Charging with a drop-in charger

To charge the batteries using a drop-in charger, simply place the unit into a slot in the charger and connect the charger to power. Make sure the unit is fully seated in its slot.



**IMPORTANT: DO NOT ATTEMPT TO CHARGE ANY TYPE OF BATTERY OTHER THAN NiMH (NICKEL METAL HYDRIDE) with your Listen equipment. Alkaline batteries may explode when connected to a charger. Other risks of charging non-NiMH batteries include destruction of property or fire.**

**IMPORTANT: In order to charge NiMH batteries, the BATTERY SELECT switch in your Listen product must be set to the NiMH setting. Use a pen or small screwdriver to move the switch (located in the battery compartment) to the proper position.**

**WARNING: The case lid MUST be open or removed while the units are charging. The charging process generates heat. Air ventilation is required. It is best to store your charging case at room temperature away from heat sources and direct sunlight**

# Troubleshooting

## Troubleshooting

### **The unit has no power.**

Make sure the unit has fully charged batteries, or has a Listen LA-208 wall transformer connected to it. Press the ON button. If this does not work, try a different set of batteries. Make sure the batteries are installed correctly.

### **There is no audio.**

Make sure the MUTE/TALK switch is in the TALK position. Make sure you have the microphone plugged all the way in to the input jack. Make sure you are using a Listen approved microphone (see list on page 21). If you are using the line input, make sure you have connected a line level, unbalanced input at the "ring" of the connector.

### **The audio is distorted.**

Make sure you are using an approved Listen microphone. Try using a different mic sensitivity switch setting (the switch is located inside the battery compartment of the unit). If you are using a line level input, try turning down the level of the input. Make sure the receiver is "ON" and receiving the appropriate channel.

### **There is hum in the audio.**

The microphone may be too close to a transformer. Try moving away from the transformer and see if the hum goes away.

### **The microphone level is low.**

The mic sensitivity switch may be on the wrong setting, (see page 21). Try a different setting (the switch is located inside the battery compartment). Some microphones have directional pickups, ensure that the microphone in use is oriented and positioned properly (pointing at the speaker's mouth). The microphone must be in close proximity to the person who is speaking. If this does not work, try using a head-worn microphone.

### **There is too much noise.**

This is most likely because the microphone is not close enough to the talker's mouth, and it is picking up background noise. Try positioning the microphone closer or try using a microphone that is directional (such as a head-worn mic). Try another setting on the mic sensitivity switch (located inside the battery compartment).

### **There is interference.**

Try a different frequency to find a clear channel. Use a receiver to sweep the area without any transmitters "on". The receiver will stop on any channels that are being broadcasted in the area. Avoid the channels that the receiver detects having a signal.

### **I cannot pick up the signal on the receiver**

Make sure the transmitter and the receiver are on the same frequency channel.

### **It's confusing for users to have 17 available channels**

Use the PROGRAM function (LT-700 and LR-500 only) to lock out unwanted channels. Users will only be able to scroll through available channels.

### **I cannot change the channel**

The transmitter or receiver may be locked on a channel (check for the padlock icon). To unlock, press and hold the UP or DOWN button for 5 seconds.

# Troubleshooting

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## Troubleshooting

### ***My batteries are not charging***

Make sure you are using NiMH batteries and that the BATTERY SELECT switch (inside the battery compartment) is set to the NiMH position. Make sure the batteries are installed correctly. Make sure you are using the right kind of wall transformer (Listen part number LA-208) or charging case. Make sure the charging case is connected to power and the unit is securely pushed into its slot in the case.

***NOTE: Listen uses 2000mAh (milli-Amp-hour) constant current NiMH (Nickel Metal Hydride) batteries. These may be purchased from a Listen dealer (ask for part number LA-362).***

# Frequently Asked Questions

## Frequently Asked Questions

- Q** Do I need a transmitter for each audio source?  
**A** Yes. To transmit two different frequencies, there must be two separate transmitters.
- 
- Q** What is the range of the LT-700 Transmitter?  
**A** The range of the LT-700 will depend upon the power setting and interference (refer to page 14). Generally the range is up to 150 ft.
- 
- Q** Is there a limit to the number of transmitters I can use in one room?  
**A** Yes. Listen recommends that no more than 8 channels are used simultaneously (refer to page 15 on using multiple channels in the same room).
- 
- Q** What receiver should be used with multiple transmitters?  
**A** We recommend the LR-500 for use with multiple transmitters, because the LR-500 is programmable and can lock out unused channels.
- 
- Q** How many channels can I program into the LR-500?  
**A** 1 to 17. The receiver has 17 channels and you can program it to have just the channels you want to have access to. It can be a two channel receiver, a 12 channel receiver, or keep all 17.
- 
- Q** How many receivers can I have in a system?  
**A** As many as you need, the number is endless.
- 
- Q** What are the major differences between the LR-400 and the LR-500?  
**A** Both receivers can tune to 17 broadband channels. However, the LR-400 has the buttons under the battery compartment door and the LR-400 is not programmable to lock out channels. If you plan to use one receiver with multiple transmitters you should use the LR-500 which is programmable to just those channels you need.
- 
- Q** What is the battery life of the LT-700 Transmitter?  
**A** Eight hours alkaline. Five hours NiMH.

# Frequently Asked Questions

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## Frequently Asked Questions

**Q** Can the receiver be "locked" on a channel if needed?

**A** Yes. All Listen receivers can be locked on a single channel.

**Q** What is the battery life of a receiver?

**A** 20 hours using alkaline batteries. 12 hours using NiMH batteries.



# Compliance, Warranty and Contact Information

## Compliance Information

The following compliance information applies to the LT-700-863, LA-140-GY, LA-140-WH, LR-42, LR-44 and LA-350.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003.

These devices are RoHS compliant.



## Warranty

Listen Technologies Corporation (Listen) warrants its transmitters and receivers (LT-700-863, LT-700, LT-800, LR-100, LR-42, LR-44, LR-300, LR-400, LR-500, LR-600) to be free from defects in workmanship and material under normal use and conditions for the useful lifetime of the product from date of purchase.

Listen warrants its Stationary IR Radiators (LA-140) to be free from defects in workmanship and material under normal use and conditions for three years from the date of purchase.

Listen warrants its Noise Canceling Microphone (LA-270) to be free from defects in workmanship and material under normal use and conditions for one year from date of purchase.

All other products and accessories are warranted for 90 days from date of purchase.

This warranty is only available to the original end purchaser of the product and cannot be transferred. Warranty is only valid if warranty card has been returned within 90 days of purchase. This warranty is void if damage occurred because of misuse or if the product has been repaired or modified by anyone other than a factory authorized service technician. Warranty does not cover normal wear and tear on the product or any other physical damage unless the damage was the result of a manufacturing defect. Listen is not liable for consequential damages due to any failure of equipment to perform as intended. Listen shall bear no responsibility or obligation with respect to the manner of use of any equipment sold by it. Listen specifically disclaims and negates any warranty of merchantability or fitness of use of such equipment including, without limitation, any warranty that the use of such equipment for any purpose will comply with applicable laws and regulations. The terms of the warranty are governed by the laws of the state of Utah.

In the first ninety days after purchase, any defective product will be replaced with a new unit. After 90 days, Listen will, at its own discretion either repair or replace transmitters and receivers with a new unit or a unit of similar type and condition. Product that is not covered under warranty shall be repaired or replaced with a unit of similar type and condition based on a flat fee. Contact Listen for details.

This limited warranty, prices and the specifications of products are subject to change without notice.

## Contacting Listen

If technical service is needed, please contact Listen. Pre-authorization is required before returning Listen products. If products were damaged in shipment, please contact the carrier, then contact Listen for replacement or repair requirements payable by the carrier.

All Listen European markets are supported through the Listen Technologies GmbH office located in Oberasbach, Germany. For more information on Listen solutions, contact Listen Technologies at +1.801.233.8992, +1.800.330.0891 North America, Listen Technologies GmbH at +49 911 955159-0 or visit [www.listentech.com](http://www.listentech.com) For Europe, Middle East, Africa and India office visit [www.listentech.de](http://www.listentech.de).

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# Notes

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