

UT700

ENCRYPTED DIGITAL UHF HANDHELD TRANSMITTER

OPERATING INSTRUCTIONS and trouble-shooting guide

LECTROSONICS, INC.

Rio Rancho, NM
www.lectrosonics.com

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INTRODUCTION

The 700 Series wireless system provides a combination of outstanding audio quality and secure encryption. This unique combination makes the 700 Series equally suitable for high-end studio and stage applications, and for corporate and government applications where security is a concern.

Several advantages are provided by a digital wireless system:

- A digital radio system provides outstanding signal to noise ratio.
- The signal to noise ratio of a digital radio system stays constant all the way out to the end of the usable range of RF signal strength.
- A DSP controlled analog limiter provides superior level control.
- Eavesdropping is extremely difficult due to the secure encryption.

The UT700 is an integral microphone/transmitter with an internal antenna. The antenna is a dipole type utilizing the two printed circuit boards as the elements. The housing is composed of durable PVC, machined to a natural, comfortable shape. Internal mechanical parts are machined aluminum and brass.

Only the UT700 transmitters are covered in this manual. Companion receivers are covered in separate manuals.

The UT700 transmitter is FCC type accepted under Part 74: 470-608MHz and 614-802MHz.

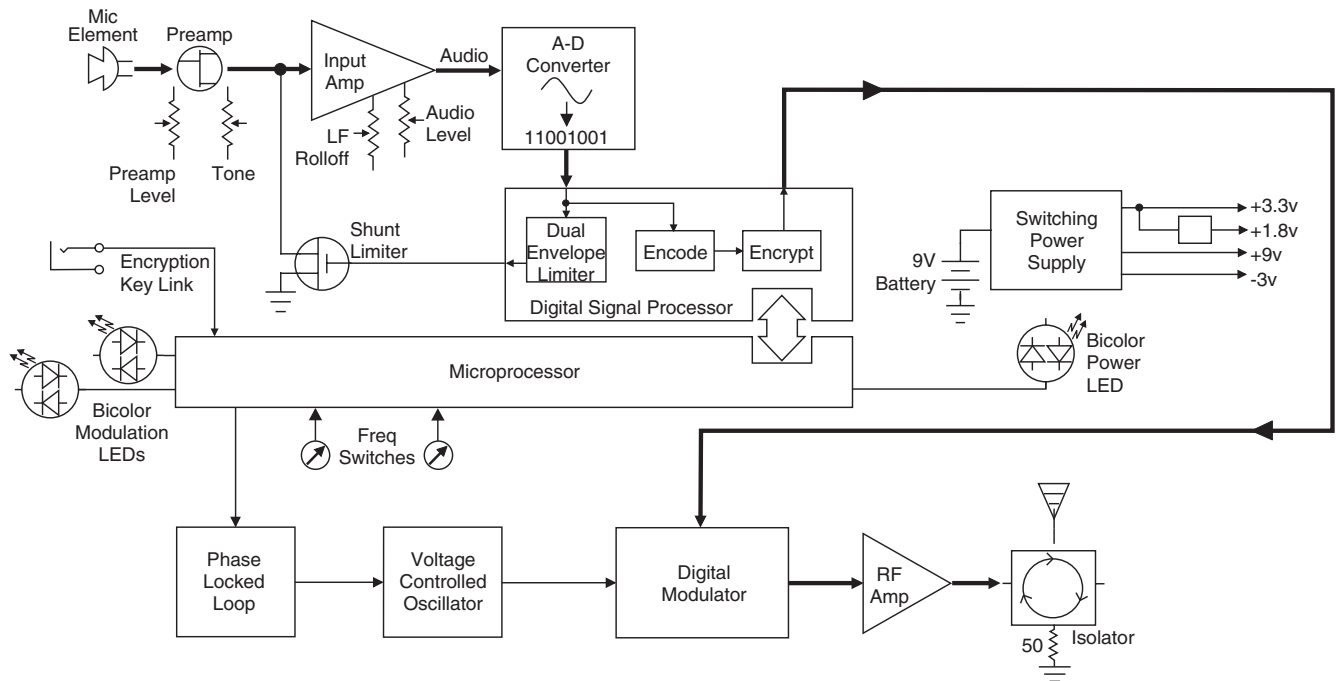
GENERAL TECHNICAL DESCRIPTION

GENERAL

The 700 series encrypted digital wireless microphones use an all-digital communications link for excellent sound quality and data security.

In the transmitter, the audio first passes through a DSP-controlled dual envelope analog limiter. The signal is then digitized and fed to a DSP (digital signal processor). The DSP uses a proprietary audio encoding scheme to lower the bit rate and provide the high entropy required for secure encryption. The bit stream is then encrypted, apportioned into packets, and sent over the air using a proprietary digital modulation scheme.

In the receiver, the digital baseband signal is demodulated to recover the original bit clock and data stream. The DSP separates out the packet headers and decrypts the audio data. The audio data is then decoded to recover the original audio signal.



DSP-CONTROLLED DUAL ENVELOPE ANALOG LIMITER

In order to make the very best use of the high quality A/D converter, microphone audio is limited in the analog domain first before being sampled. The DSP controls this process, but because the limiting is done in analog, levels near the converter's maximum may be used without fear of clipping.

The limiter has a fast attack, but different release characteristics, depending on the nature of the signal that drove the input into limiting. Brief transients result in a fast decay, to avoid "pumping" effects, while sustained loud signals result in a slower decay, to keep distortion to a minimum. The result is a transparent-sounding limiter with excellent low distortion characteristics.

DIGITAL SIGNAL PROCESSING AND MODULATION

The preamplified and limited audio signal is converted to digital using a 24-bit A/D converter and fed to the DSP. Within the DSP, the audio is encoded to reduce the bit rate and increase entropy in the data stream prior to encryption. The data stream is then encrypted and apportioned into packets, delimited by packet headers. The complete bit stream is modulated onto the carrier using a modified pi/4 DQPSK (differential quadrature phase shift keying) method. This modulation method makes efficient use of the RF spectrum and is easy to demodulate reliably.

RF OUTPUT SECTION

Intermodulation (IM) occurs in the final amplifier stages of conventional transmitters when the transmitters are within a few feet of each other. This can create serious problems in multichannel wireless systems when an IM signal falls on the carriers, IF frequencies, local oscillator and image frequencies of the systems being operated. To eliminate this problem in the UT700, the modulated radio signal passes through a circular isolator before entering the antenna. The circular isolator functions like a “one-way check valve” to allow the RF signal to pass through to the antenna, but not to pass backwards into the amplifier stage. RF signals from other nearby transmitters cannot reach the output amplifier in the UT700. This provides excellent stability and eliminates IM in the output stage of the transmitter.

LONG BATTERY LIFE

High efficiency circuits and switching power supplies throughout the design allow over 4.5 hours of operation using a single 9 Volt alkaline battery. (A 9V lithium battery will provide over 14 hours of operation.) The battery compartment is a unique mechanical design which automatically adjusts to fit any brand of battery. The battery contacts are spring loaded to prevent “rattle” as the unit is handled.

FREQUENCY AGILITY

700 Series wireless systems are available on eight different “blocks” of 256 frequencies, from 537.600 to 767.900 MHz. Each of these blocks provides 256 selectable frequencies in 100 kHz steps over a 25.6 MHz bandwidth. This wide variety of selectable frequencies alleviates carrier interference problems in mobile or traveling applications. Two 16-position rotary switches on the side panel of the unit are used to select the frequency.

The UT700 transmitter section uses a synthesized, frequency selectable main oscillator. The frequency is extremely stable over a wide temperature range and over time.

ENCRYPTION SYSTEM

The 700 Series employs state-of-the-art 128-bit encryption for exceptional data security. (128-bit encryption means there are 300 trillion, trillion, *trillion* possible keys, assigned with equal probability.) The system offers three levels of security, trading off ease of use for immunity to attack.

LEVEL 1 offers the most intuitive operation. Once the key has been set, the equipment may be operated exactly the same as a traditional analog system. The transmitter and receiver may be powered on in any sequence, and the transmitter may move in and out of range without consequence (except normal squelching). Security in this mode is excellent, but the scrambling sequence repeats approximately every 20,000 bits, theoretically exposing the user to differential attacks. Due to its ease of use and quite effective security, level 1 is the default security level.

LEVEL 2 offers much greater encryption strength, at the cost of slightly less intuitive operation. In level 2, the scrambling sequence never repeats (i.e. the PRNG is free-running), so the receiver must be on and ready to receive when the transmitter is first switched on. Some signal loss is tolerated but if the transmitter should wander out of range for more than ten seconds, it will be necessary to switch it off and on again to restart the sequence, resynchronizing with the receiver. Security in this mode is a great deal stronger than level 1, since the scrambling sequence never repeats. Only if the sequence is deliberately reused (i.e. by cycling transmitter power after prolonged signal loss, or by reusing the same key session after session) is a differential attack possible even in theory.

LEVEL 3 offers the strongest encryption of all, again at the cost of some convenience. Level 3 is much like level 2, except that the equipment itself enforces a policy that **NO PORTION OF ANY SCRAMBLING SEQUENCE SHALL EVER BE USED MORE THAN ONCE**. This is a fundamental tenet of cryptography: key reuse leads to vulnerability. Thus, level 3 security is about as close to the holy grail of the one-time pad as any wireless vendor is likely to offer at a reasonable price. Operation is a little different in level 3:

- The transmitter starts sending immediately after receiving a key **ONLY**. It does not send when first powered on.
- Only one transmitter may receive each key.
- If the transmitter is out of range of the receiver for more than ten seconds, it will be necessary to generate a new key in order to continue using the system.

All three levels offer strong encryption, so each user may make a policy decision based on an assessment of risk. Those requiring ease of use may relax, knowing that eavesdropping is extremely difficult even in level 1. Many users may find level 2 to be just as convenient, allowing them to use greater encryption strength. Those users willing to follow stricter security procedures can use level 3, the strongest encryption available today from a wireless microphone.

MICROPHONE ELEMENT

The UT400 includes the Lectrosonics VariMic mic element. The VariMic is a cardioid condenser back electret microphone that is adapted for the unique circumstances of wireless microphones. The problems it solves are dynamic range, handling noise and low frequency noise (rumble or wind).

In the VariMic, an unusual pumped source FET circuit increases the usable dynamic range 12dB and greatly reduces distortion, just as if the FET were being supplied with 48 Volts. In addition, a unique 16 position sensitivity control at the element itself can adjust the sensitivity in 15 steps over a 15 dB range. This is in addition to the normal gain control in the wireless microphone. The result is the widest dynamic range of any condenser mic in a wireless microphone.

The VariMic has a three point damped rubber suspension to reduce high frequency handling noise and a generous sized windscreen to keep wind noise and breath pops away from the microphone.

CONTROLS AND FUNCTIONS

“P” SWITCH – POWER ON/OFF

A slide switch (located on the outside bottom of the unit) which turns battery power on and off.

The Power LED glows green when the battery is good and the ON/OFF switch is ON. The lamp will glow red as the battery voltage drops and finally flashes when there is about 30 minutes of operation left with the recommended alkaline battery. A NiMh battery will give little or no warning when it is depleted. If you wish to use NiMh batteries in the unit, we recommend trying fully charged batteries, noting the length of time that the batteries will run the unit and in the future use somewhat less than that time to determine when the battery needs to be replaced. A weak battery will sometimes light the POWER LED to the “good” green indication immediately after being put in the unit, but will soon discharge to the point where the LED will go red or shut down, just like a flashlight with “dead” batteries. If the lamp fails to light, the battery should be replaced.



ENCRYPTION KEY LINK

This jack is used to connect the transmitter to the receiver to generate an encryption key. Since this handheld transmitter doesn't have a mic connector, this jack is provided to interconnect with the receiver using a special cable for key generation. Please refer to the receiver manual for further details.

LED POWERUP SEQUENCE

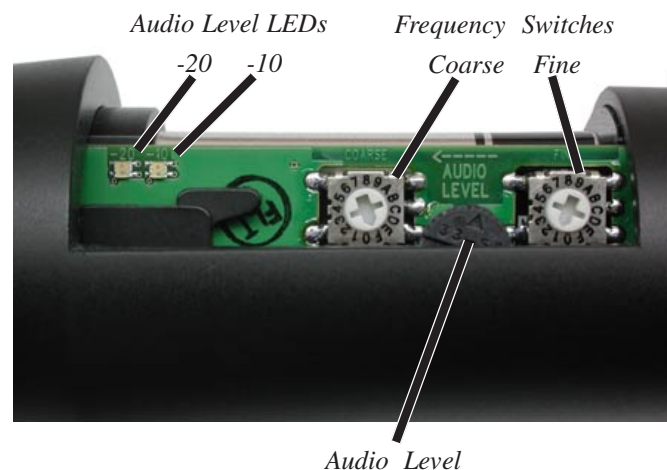
The UT700 is unique among 700 series transmitters in that its audio LEDs are located under a cover and often aren't visible. Because of this, the blink code indicating the current operating mode is issued using the power LED instead of the audio LEDs.

LOCKED MODE

The UT700 can be placed in a locked mode where neither the power switch nor the frequency switches have any further effect on operation. This protects the unit from accidental poweroff or misadjustment after it has been prepared for use.

To enter locked mode, toggle the power switch off and on again rapidly three times. (Each toggle must take no longer than two seconds and no more than ten seconds may elapse between successive toggles.) During the first two toggles, the power LED will behave normally, blinking slowly red while the switch is in the off position to warn that the power will go off, then returning to normal battery status indication when the switch is on again. After the third toggle, the power LED will go out briefly, then blink the code that indicates the current mode (in red, indicating locked mode), just as it does when the unit is first powered on. This blink code reprise (in red) serves as a confirmation that the switches are now locked.

Locked mode can be cleared by removing the battery. Note that removing the battery bypasses the normal delayed poweroff circuit, so it may cause noise at the receiver.

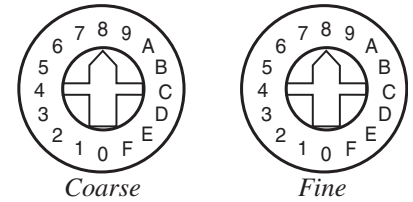


HIDING THE POWER LED

This unit has no provision for disabling the LEDs. The audio LEDs are covered during normal use but the power LED is exposed. If the light is objectionable, we recommend covering the LED with a piece of tape.

FREQUENCY ADJUST

Two rotary switches (located under the battery door) adjust the center frequency of the carrier. The Coarse adjustment adjusts the frequency in 1.6 MHz steps and the fine in 100 kHz steps. Each transmitter is factory aligned at the center of its operating range for uniform operation across the entire band. The default position of the frequency select switches is in the center of the transmitter range.



MOD LEVEL LEDs

These LEDs (located under the battery door) indicate the proper setting of the MIC LEVEL control. There are two bicolor modulation LEDs that can light either red or green.

- “-20dB level” One modulation LED glows green and the transmitter is 20 dB below full modulation.
- “-10 dB level” Both modulation LEDs glow green and the transmitter is close to full modulation.
- “+0 dB level” The -20 LED glows red and the -10 LED glows green. The transmitter is in slight limiting and is fully modulated. This is probably desirable. See the discussion below under **Input Limiter**.
- “+10 dB level” Both LEDs are red. The transmitter is in limiting and you may want to reduce the transmitter audio gain. See the discussion below under **Input Limiter**.

INPUT LIMITER

The 700 series transmitters employ a digitally-controlled analog audio limiter just before the analog-to-digital converter. The limiter has a range of more than 30dB for excellent overload protection. A dual release envelope makes the limiter acoustically transparent while maintaining low distortion. It can be thought of as two limiters in series, connected as a fast attack and release limiter followed by a slow attack and release limiter. The limiter recovers quickly from brief transients, so that its action is hidden from the listener, but recovers slowly from sustained high levels, to both keep audio distortion low and preserve short term dynamic changes.

The audio level LEDs indicate limiter activity. The first red LED indicates that the limiter is active and that the transmitter is fully modulated (audio level is between +0 and +10 dB). The second red LED indicates that the level is 10dB or more into limiting. Occasional forays into the red are desirable for most applications, since the distortion introduced by the limiter is so minimal, and full modulation is thus assured. We strongly recommend setting the gain of the transmitter high enough so that the first red LED occasionally lights.

Generally speaking, some limiting is desirable in normal operation to improve the signal to noise ratio of the system. The limiting action is not audible and does not create distortion. A highly trained ear would hear only the compression of the peaks in the audio signal, which is desirable with most recorders and many sound reinforcement systems.

AUDIO LEVEL

This knob (located under the battery door) is operated while speaking or singing into the transmitter to adjust the audio gain of the transmitter for the correct amount of modulation. The LEDs located next to it indicate the modulation level as the gain is adjusted. See the Operating Instructions section for details on this very important adjustment.

VARIMIC CONTROLS

Caution - Due to the high RF levels surrounding the transmitter, the sound of the VariMic capsule may be temporarily affected if the metal windscreen is not in place. Always make the final decision about sound balance and quality with the windscreen in place.

The VariMic head includes adjustments for Bass, Midrange and Treble response. There is also an attenuation adjustment to provide up to 15dB of additional headroom if needed.

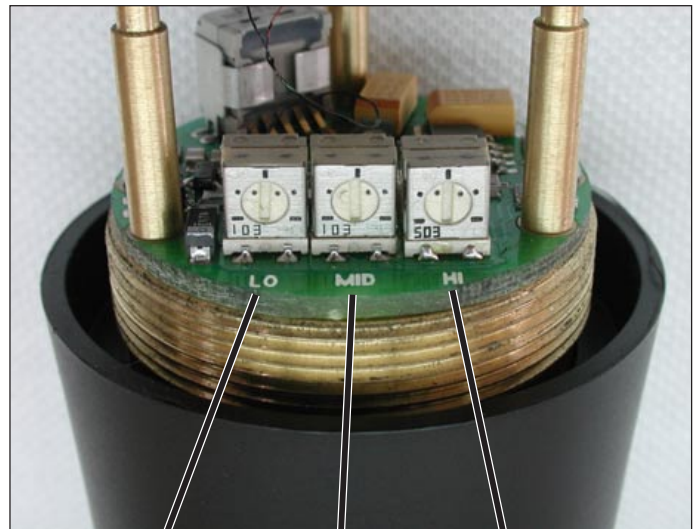
BASS / MID / TREBLE (LO / MID / HI)

The bass and treble controls will boost/cut by up to approximately 8dB while the Mid control will boost/cut up to about 6dB. These controls operate as standard tone controls. Counter-clockwise will reduce the response in that band and clockwise will provide a true boost. These controls can be accessed by removing the windscreen. To remove the windscreen, grasp the body of the transmitter in one hand and the windscreen in the other hand. Carefully unscrew the wind-screen counter-clockwise until it comes off then carefully slide the windscreen past the mic element.

- Set flat, the mic capsule is very wide range and sounds a lot like a large competitor's top line condenser mic.
- Bass cut gives a dry but highly intelligible sound. Crisp.
- Bass boost "fattens" the sound but is very listenable. Does not get midbass boomy.
- Midrange cut sounds very smooth. Almost a "crooner" quality. A sweet sound.
- Midrange boost is likely to be useful in a system that is midrange shy.
- Treble cut has a "mellow" sound. The capsule has a solid high end so a little cut does not ruin the response.
- Treble boost might be fine on some sound systems. The sound doesn't get harsh (showing that the response was smooth) but sibilants are a little too much. Should be used in moderation.

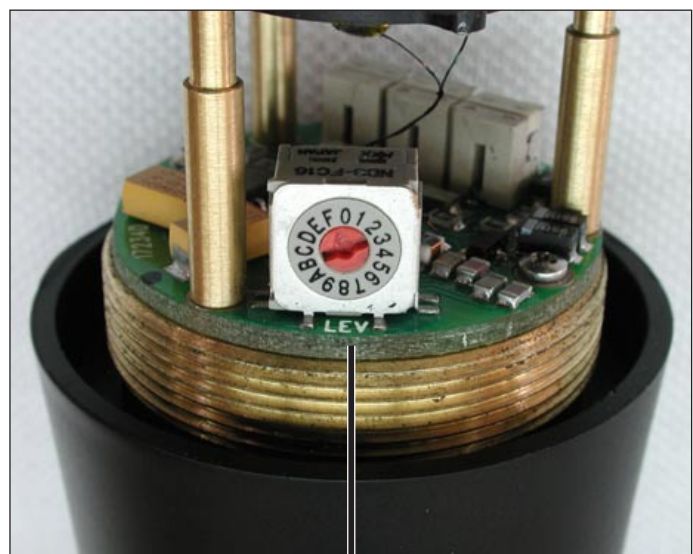
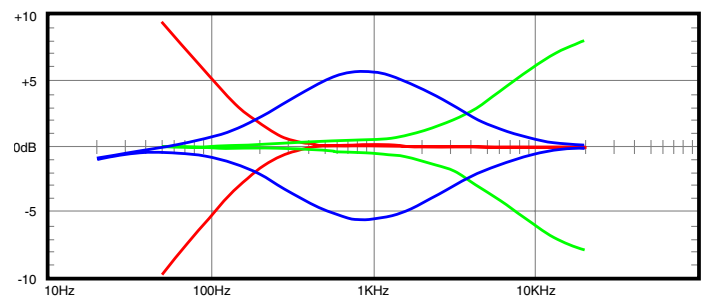
PREAMP LEVEL CONTROL

The VariMic head includes an attenuator to provide an additional 15dB of headroom when needed. The attenuator should only be used when the normal Mic Level pot is already turned down as far as it will go and the signal through the mic is still too hot. The attenuator control is a 16-position switch marked 0 through F. "F" is minimum attenuation or the highest signal level. "0" is maximum attenuation or the lowest signal level. For the maximum amount of headroom, set the switch to "0."



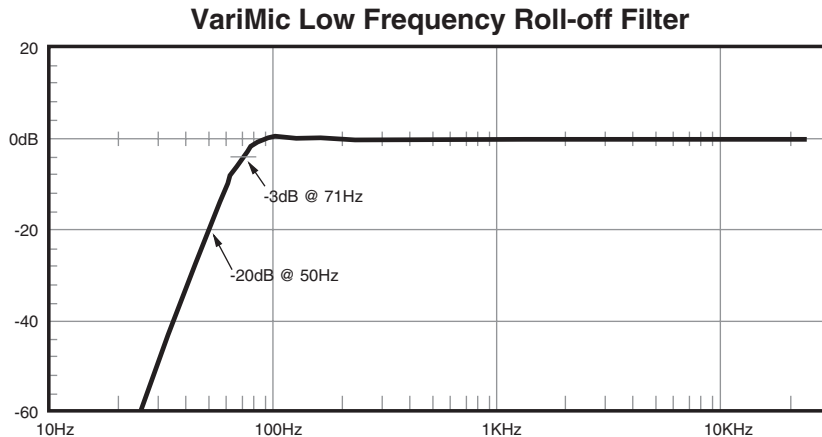
Bass (LO) Mid (MID) Treble (HI)

Bass/Midrange/Treble Boost/Cut



Preamp Level Control

Note: The attenuator should not be used as a level control. The Audio Level control inside the battery compartment is the main level control. Adjust the attenuator only when the Audio Level control is turned completely down and more headroom is still needed. Be sure to set the attenuator back to its original setting for normal operation.



BASS FILTER

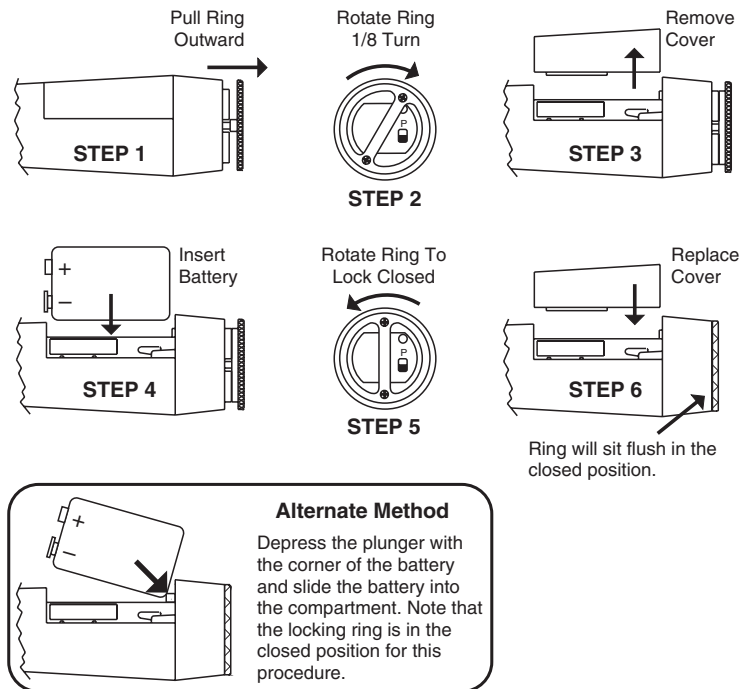
In addition to the tone controls, the UT700 also has a built in bass filter. This filter is fixed and cannot be adjusted or defeated. Low frequency noise is much more of a problem with wireless microphones than with conventional microphones. With a regular mic, low frequency wind noise, breath thumps or handling rumble can be filtered out at the control board before the noise causes problems with the following electronics or speaker systems. But with a wireless microphone, the electronics that will be overdriven are right in the wireless microphone. Filtering at the control board is much too late. To solve this problem, the VariMic has a low frequency filter that is so sharp that it can remove low frequency noise without affecting any wanted vocals. It consists of a 36 dB per octave filter circuit to sharply remove low frequency noise below 75 Hz without affecting vocal fundamentals. The lowest operatic bass voice fundamental is 82 Hz.

BATTERY INSTALLATION

The transmitter is powered by a standard alkaline or lithium 9 Volt battery. It is important that you use **ONLY** an ALKALINE or LITHIUM battery for longest life. Standard zinc-carbon batteries marked “**heavy-duty**” or “**long-lasting**” are not adequate. Ni-cad rechargeable batteries will only provide 1.5 hours of operation, or less, and will run down quite abruptly. Unless it is cold, alkaline batteries provide over 4.5 hours of operation. Lithium batteries can be used to provide up to 14 hours. Care should be taken not to leave a fully discharged lithium battery in the transmitter, as swelling of the battery can make it difficult to remove from the compartment. The battery status circuitry is designed for the voltage drop over the life of alkaline batteries.

To open the battery compartment, press outward on the cover door in the direction of the arrow as shown in the drawing. Only firm, sliding pressure is needed to open and close the battery door. Swing the door open and take note of the polarity marked inside showing the location of the positive (+) and negative (-) terminals. You can see the large and small contact holes inside the battery compartment with the door open.

Insert the battery correctly and close the cover by pressing the door closed and across, reversing the opening procedure illustrated above. If the battery is inserted incorrectly, the door will not close. Do not force the door closed.



OPERATING INSTRUCTIONS

ADJUSTING THE GAIN

- 1) Install a fresh battery. Leave the battery cover off for further adjustment.
- 2) On the bottom panel, move the “P” (power) switch to ON, toward the LED. Observe that the battery status LED is glowing green indicating a good battery. If the LED is glowing red, replace the battery.

Note: If the security level is set to “2”, the receiver must be powered on before the transmitter.

If the security level is set to “3”, communications do not begin until a fresh key is transferred.

- 3) Hold the microphone in the same position that it will be used in actual operation.
- 4) While speaking or singing at the same voice level that will actually be used, observe the MODULATION LEDs. Adjust the AUDIO LEVEL control knob until the LEDs begin to light. At too low a setting neither LED will light as you speak. Gradually, turn the gain up until the -20 dB LED lights green and then the -10 dB lights green. We strongly recommend setting the gain of the transmitter even higher so that the first red LED occasionally lights.

If you find that the AUDIO LEVEL control is set to minimum and the LIMIT LED is still on often, then adjust the preamp level control. This control is located under the windscreen. Unscrew the windscreen and carefully lift it off the top of the unit. See the VERIMIC CONTROLS section for these adjustments. If you need to change these controls, be sure to repeat the gain adjustment procedure beginning at step 3.

- 5) Once the gain has been adjusted, the audio system audio can be turned on to make level adjustments in the main audio system.

SETTING THE ENCRYPTION KEY

Please refer to the receiver manual for instruction on setting the encryption key.

OPERATING NOTES

The AUDIO LEVEL control knob should not be used to control the volume of your sound system or recorder levels. This gain adjustment matches the transmitter gain with the user’s voice level and microphone positioning.

If the audio level is too high — both red LEDs will light frequently or stay lit. This condition may reduce the dynamic range of the audio signal.

If the audio level is too low — neither LED will light, or only the -20 LED will light green. This condition may cause hiss and noise in the audio.

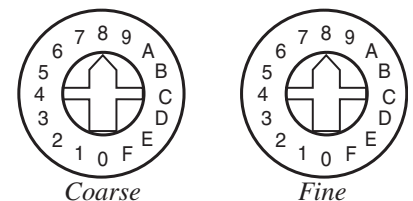
Different voices will usually require different settings of the AUDIO LEVEL control, so check this adjustment as each new person uses the system. If several different people will be using the transmitter and there is not time to make the adjustment for each individual, adjust it for the loudest voice.

ADJUSTING THE TRANSMITTER FREQUENCY

If you are experiencing interference from another signal on your frequency, you may want to change the operating frequency of your system. The left switch changes the operating frequency by 1.6 MHz per step and the right switch changes it 100 kHz per step. If you are experiencing interference, change the operating frequency in 100 kHz steps to find a clear channel. If it is not possible to find a clear channel using the 100 kHz switch, return it to its original position and change the 1.6 MHz switch by one click then try the 100 kHz switch again.

To gain access to these switches, slide the access door sideways with a fingernail.

The UDR700 receiver front panel will indicate the correct switch settings to match the receiver frequency.



TROUBLESHOOTING

Before going through the following chart, be sure that you have a good battery in the transmitter. It is important that you follow these steps in the sequence listed.

| SYMPTOM | POSSIBLE CAUSE |
|--|--|
| TRANSMITTER BATTERY LED OFF | <ol style="list-style-type: none"> 1) Battery is inserted backwards. 2) Battery is dead, or too low to be used. |
| NO TRANSMITTER MOD LEVEL LEDS | <ol style="list-style-type: none"> 1) Gain control turned all the way down. 2) Battery is in backwards. Check power LED. 3) Mic capsule is damaged or malfunctioning. Contact the factory for repair. |
| RECEIVER RF LAMP OFF | <ol style="list-style-type: none"> 1) Transmitter not turned on. 2) Transmitter battery is dead. 3) Receiver antenna missing or improperly positioned. 4) Transmitter and receiver not on same frequency. Check labels on transmitter and receiver and the frequency switch settings. 5) Operating range is too great. |
| NO SOUND BUT RECEIVER AUDIO LEVEL METER INDICATES | <ol style="list-style-type: none"> 1) Receiver audio is muted or set too low. 2) Receiver audio output is disconnected or cable defective or mis-wired. 3) Sound system or recorder input is turned down. |
| DISTORTED SOUND AND/OR MOTORBOATING | <ol style="list-style-type: none"> 1) Transmitter gain (audio level) is too high. Speak or sing into the transmitter and check mod level lamps on transmitter and receiver. 2) Receiver output level may be too high for the sound system or recorder input. 3) Excessive wind noise or breath "pops." Microphone may require an additional wind screen. 4) Transmitter frequency switches mis-set. 5) RF feedback getting into VariMic mic capsule. Ensure that the windscreen is present and screwed down snugly. |
| HISS AND NOISE -- AUDIBLE DROPOUTS | <ol style="list-style-type: none"> 1) Transmitter gain (audio level) too low. 2) Receiver antenna missing or obstructed. 3) Operating range too great. 4) Transmitter frequency switches mis-set. |
| EXCESSIVE FEEDBACK | <ol style="list-style-type: none"> 1) Transmitter gain (audio level) too high. Check gain adjustment and/or reduce receiver output level. 2) Microphone too close to speaker system. 3) Move microphone closer to the user's mouth, and lower the sound system volume. |

MICROPHONE HAS A “WHINE” NOISE IN THE BACKGROUND WHICH VARIES AS THE MIC CABLE IS MOVED

1) Install bypass capacitors at both ends of the mic cable use the factory supplied microphone.

RECEIVER OUTPUTS AN EXTREMELY LOUD, HISSY, SWISHY SOUND

1) Encryption keys in transmitter and receiver do not match. Refer to receiver manual to choose a new key and send it to the transmitter.

NO AUDIO OUTPUT, AUDIO LEDS BLINK IN SEQUENCE, LED DISPLAY SHOWS “POWER TX OFF+ON” OR “NEW KEY REQUIRED”

1) System is in security level 3 and is not synchronized. to correct this in security level 2, turn the transmitter off then on again. In level 3, a new key must be generated.

SECURITY FEATURES DIFFERENT FROM THE DOCUMENTATION

1) This manual applies only to UDR700 version 3.0/3.0 and higher.

SPECIFICATIONS AND FEATURES

| | |
|---|---|
| Operating principle: | Proprietary digital modulation with encryption |
| Modulation type: | Modified pi/4 DQPSK |
| Sample rate: | 44.1 ksps |
| Audio coder: | Proprietary sub-band ADPCM |
| Encryption key length: | 128 bit (300 trillion trillion trillion keys) |
| Bit rate: | 220,500 bps including packet overhead |
| Operating frequencies: | 537.600 to 793.500 MHz depending upon local regulations |
| Frequency selection: | 256 frequencies in 100kHz steps |
| RF Power output: | 50 mW (nominal) |
| Frequency stability: | ± 0.001% |
| Equivalent input noise: | -119 dBV, A-Weighted |
| Spurious radiation: | 70 dB below carrier |
| Input Level: | Nominal 2 mV to 300 mV before limiting Greater than 1V maximum with limiting |
| Input compressor: | Dual-envelope limiter; 30 dB range |
| Gain control range: | 43 dB; semi-log rotary control |
| Modulation indicators: | Dual multi-color LEDs indicate modulation level in 4 steps at -20, -10, 0, +10 dB with green and red indications |
| Low frequency roll-off adjustment: | -18dB/octave; 35Hz to 150Hz |
| Controls: | 2 position "ON-OFF" slide switch. Knob in battery compartment adjusts audio gain. Rotary switches in battery compartment adjust transmitter frequency. |
| Battery: | Precision compartment auto-adjusts to accept any known alkaline 9 Volt battery. (We've tried 246 different ones!) |
| Battery Life: | 3.5 hours (alkaline); 6.5 hours (lithium) |
| Weight: | 12.4 ozs. with VeriMic capsule and lithium battery |
| Dimensions: | 9" long, x 2.05" diameter at largest point with VeriMic capsule |
| Emission Designator: | 180KQ2E |
| System Specifications | |
| Audio frequency response: | 40Hz to 20kHz, +/- 1dB |
| Audio dynamic range: | >100 dB before limiting |
| Audio Distortion: | 0.05% THD + noise at 1kHz |

Specifications subject to change without notice.

SERVICE AND REPAIR

If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check out the interconnecting cords and then go through the TROUBLE SHOOTING section in the manual

We strongly recommend that you **do not** try to repair the equipment yourself and **do not** have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. **There are no adjustments inside that will make a malfunctioning unit start working.**

LECTROSONICS service department is equipped and staffed to quickly repair your equipment. In-warranty repairs are made at no charge in accordance with the terms of the warranty. Out of warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to make the repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out of warranty repairs.

RETURNING UNITS FOR REPAIR

You will save yourself time and trouble if you will follow the steps below:

- A.** DO NOT return equipment to the factory for repair without first contacting us by letter or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 am to 4 pm (Mountain Standard Time).
- B.** After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.
- C.** Pack the equipment carefully and ship to us, shipping costs prepaid. If necessary, we can provide you with the proper packing materials. UPS is usually the best way to ship the units. Heavy units should be "double-boxed" for safe transport.
- D.** We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

Mailing address:
Lectrosonics, Inc.
PO Box 15900
Rio Rancho, NM 87174
USA

Shipping address:
Lectrosonics, Inc.
581 Laser Rd.
Rio Rancho, NM 87124
USA

Telephones:
Regular: (505) 892-4501
Toll Free (800) 821-1121
FAX: (505) 892-6243

World Wide Web: <http://www.lectrosonics.com>

Email: sales@lectrosonics.com

LIMITED ONE YEAR WARRANTY

The equipment is warranted for one year from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.

Should any defect develop, Lectrosonics, Inc. will, at our option, repair or replace any defective parts without charge for either parts or labor. If Lectrosonics, Inc. cannot correct the defect in your equipment, it will be replaced at no charge with a similar new item. Lectrosonics, Inc. will pay for the cost of returning your equipment to you.

This warranty applies only to items returned to Lectrosonics, Inc. or an authorized dealer, shipping costs prepaid, within one year from the date of purchase.

This Limited Warranty is governed by the laws of the State of New Mexico. It states the entire liability of Lectrosonics Inc. and the entire remedy of the purchaser for any breach of warranty as outlined above. NEITHER LECTROSONICS, INC. NOR ANYONE INVOLVED IN THE PRODUCTION OR DELIVERY OF THE EQUIPMENT SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS EQUIPMENT EVEN IF LECTROSONICS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF LECTROSONICS, INC. EXCEED THE PURCHASE PRICE OF ANY DEFECTIVE EQUIPMENT.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

LECTROSONICS, INC.

581 LASER ROAD
RIO RANCHO, NM 87124 USA
www.lectrosonics.com