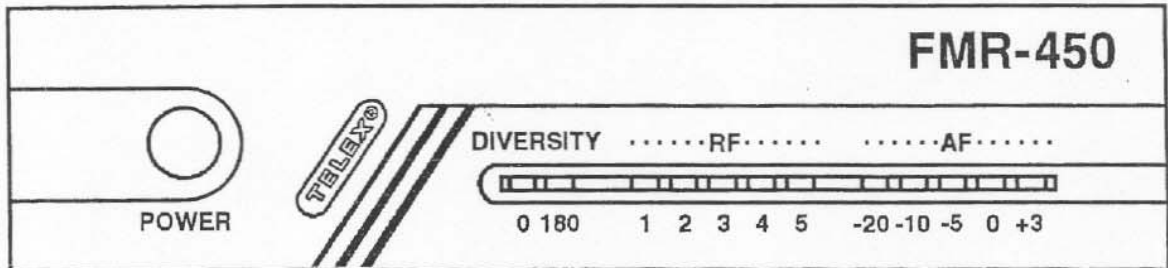


# Telex

## Operating Instructions



### Professional Wireless Microphone Receiver FMR-450

TELEX®

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# INTRODUCTION

## WHAT IS A WIRELESS MICROPHONE?

### MICROPHONE

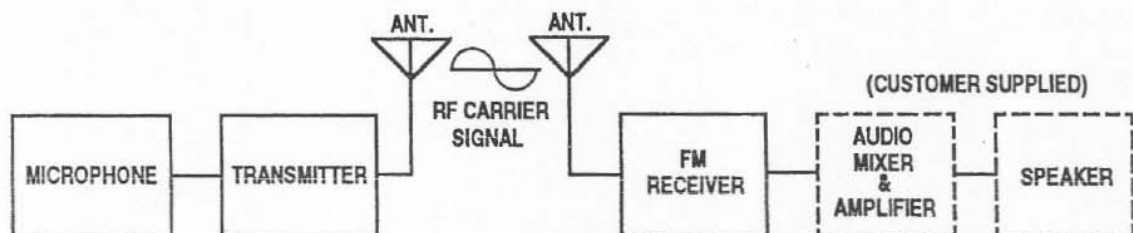
This is an electro-acoustic transducer which responds to sound waves and delivers essentially equivalent electrical waves. These electrical waves are sent to the belt transmitter or hand-held unit.

### TRANSMITTER

The transmitter generates and amplifies an RF (Radio Frequency) carrier signal, modulates this carrier with the microphone signal, and

### RECEIVER

The FM VHF receiver is tuned to the frequency of the transmitter. The receiver picks up the radiated RF signal from the transmitter through the antenna and converts the RF signal into audio voltages for use with PA, Line, Network, etc. The receiver frequency must be matched to the transmitter frequency.



radiates the modulated RF carrier.

**Figure 1**  
Block Diagram of Typical Wireless Microphone System

## WHAT FREQUENCY BAND DOES THE TELEX SYSTEM OPERATE IN?

The Telex systems feature single channel, crystal controlled transmitters and receivers operating in the UHF Bands between 524-608 MHz and 614-746 MHz. The FMR-450 operates on specific standard frequencies within the band, and is specifically designed to complement the Telex UHF transmitters.

The system operates on a fixed frequency which can be computer selected to provide "interference-free" operation. Over a dozen systems can be operated in a single location simultaneously.

**OFTEN ASKED QUESTIONS**

**Q**uestions: Can more than one wireless system be used simultaneously?

**A**nswer: Yes, Over a dozen systems can be operated in a single location simultaneously, however, for every transmitter there must be a receiver on the same frequency. Each additional receiver/transmitter system must be on a different frequency.

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**Q**uestion: Is the system more sensitive in any one particular direction?

**A**nswer: No, the transmitter antenna radiates equally in all directions, but the signal is attenuated by your body, walls or other surrounding objects. The receiving antenna is essentially sensitive in all directions as well, except when using a directional antenna.

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**Q**uestion: When the transmitter is turned off can the receiver pick-up other transmissions?

**A**nswer: Yes it can. The Telex FMR-450 System operates in the UHF Bands between 524-608 MHz and 614-746 MHz. However, it is not susceptible to radio wave skip, CB'ers or FM Radio transmissions. The frequency your system operates on has been computer selected for least interference, but there is no such thing as a 100% clear channel all the time.

If the system is going to be used in a permanent fixed location, the system should operate interference free until such a time or date when someone else begins using the same frequency.

If the system is going to be moving among various locations, you will inevitably run into occasional frequency conflicts.

In either case, when you're not using the wireless microphone, turn the gain down on your audio mixer, just as you would a wired microphone. If mixer control is not available, turn the receiver off when the transmitter is not in use. This will prevent the reception of undesired signals. If no mixer control is available and the system must be left on, the transmitter should be left on to prevent the receiver from picking up outside interference.

---

**Q**uestion: Is Feedback a problem?

**A**nswer: As with all microphones used in PA applications, feedback is a problem. To minimize feedback, the mixer or control operator should use the minimum level to produce the desired audio. If the system then appears to be overly sensitive, reduce the "Microphone Gain" on the back of the transmitter with a small plastic screwdriver (One is supplied with your transmitter) until you obtain the minimum level necessary. NOTE: Using a metal screwdriver may detune your units frequency. Use the minimum gain necessary. Professional equalization of the sound system may be needed.

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# FMR-450 RECEIVER

## TECHNICAL INFORMATION

### SPECIFICATIONS

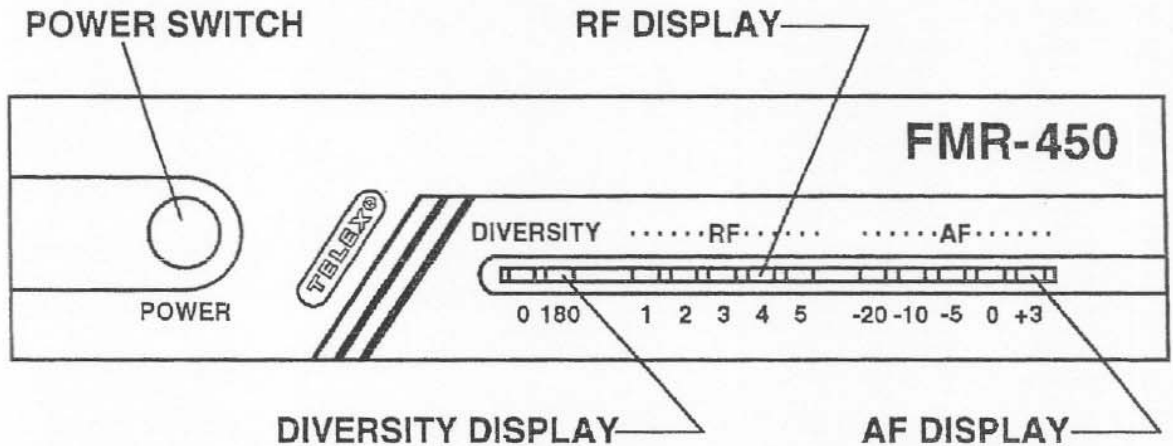
RF Frequency Ranges	524-608 MHz and 614-746 MHz
Frequency Response	50-15,000 Hz +/- 1 dB
RF Sensitivity	Less than 0.5 microvolt, 12 db SINAD
Squelch Quieting	125 dB
Squelch Level	1 microvolt, internal
Ultimate Quieting	100 dB (A weighted)
Antenna Input Impedance	50 ohms nominal
Image Rejection	Better than 75 dB
Hum and Noise	-125 dB
Audio Outputs	Mic: 200 ohms, -10 dBm max. Mic level adj. (Vol) -60 dBm min.
Signal-to-Noise Ratio	104 dB, typical
Temperature Range	-4 degrees F to 130 degrees F (-20 degrees C to 55 degrees C)
Input Power	13.0 VAC RMS with supplied adaptor or 12 to 14 VDC
Size	Approximately 7 1/2" W x 8" D x 1 3/4" H

### FEATURES

The Telex Model FMR-450 is a receiver designed for use wherever compact size with commercial features is required. Features include:

- Powered by an external AC supply via the power jack on the rear of the FMR-450 or with any 13 VAC RMS/12-14VDC source.
- The FMR-450 Receiver has been especially designed to provide the user with a system free from clicks, thumps and noise spikes commonly found in more economical systems. A power delay circuit combined with a relay prevents power up/down thumps.
- True diversity
- Comandor in/out switch
- 0 and 180 degree lights to show diversity operation
- An all metal case for superior shielding
- High performance RF front end that includes a high Q input coupled with a GaAsFet RF amplifier for superior rejection and overload capability.
- Relative RF bar graph indicator to aid in installation or monitoring.
- True noise type squelch
- XLR type AF output connector
- AF output level adjustment control
- An AF bar graph indicator to aid in installation/set up or monitoring audio output.
- Molded type front panel for aesthetic appeal and function

**CONTROLS AND CONNECTIONS**



**Figure 2**  
**Front View FMR-450**

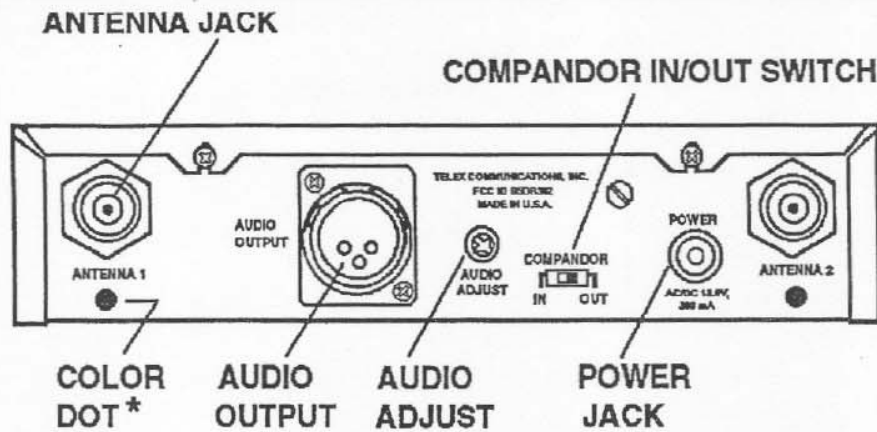
**FRONT PANEL**

**Power Switch:** Push this switch once to turn ON; push it again to turn the power OFF.

**Diversity Display:** A 2-segment LED Bar indicates 0 or 180 degree diversity.

**AF Display:** A 5-segment three-color LED Bar indicates the relative modulation of the system.

**RF Display:** A 5-segment three color LED Bar indicates the transmitted radio frequency signal strength.



(TYPICAL 2 PLACES)

**\*SAME COLOR AS BAND ON ANTENNA**

**ANTENNA COLOR CODE:** The antenna color code for the FMR-450 antenna may not match the antenna color code of the HT-450 or WT-450 antennas. Refer to the following chart for matching antenna color codes for receivers and transmitters.

Frequency Range	Transmitter Antenna Color Code	Receiver Antenna Color Code
524-527.9	Blue	Blue
528-539.9	White	Blue
540-564.9	White	Blue
565-580.9	White	Yellow
581-594.9	Yellow	Yellow
595-614.9	Yellow	Yellow
615-632.9	Yellow	Red
633-644.9	Red	Red
645-659.9	Red	Red
660-689.9	Red	White
690-691.9	Red	Green
692-724.9	Green	Green
725-746	Green	Orange

**Figure 3**  
**Rear View FMR-450**

**REAR PANEL**

**Antenna Jacks:** Two antenna jacks for true diversity. Attach antenna to each jack.

**Audio Output:** XLR connector, outputs to Audio Sound System (Amplifier/Mixer). Output is adjustable via the Audio Adjust potentiometer.

**Audio Adjust:** Screwdriver adjustable potentiometer, controls audio output. Use supplied plastic screwdriver to adjust to desired level.

**Compandor In/Out Switch:** A recessed slide switch that controls compandor operation. Must be set to match transmitter operation. Use supplied plastic screwdriver to slide switch to desired position.

**NOTE:** When using the WT-450 Transmitter the Compandor In/Out Switch on the FMR-450 must be set to the "IN" position.

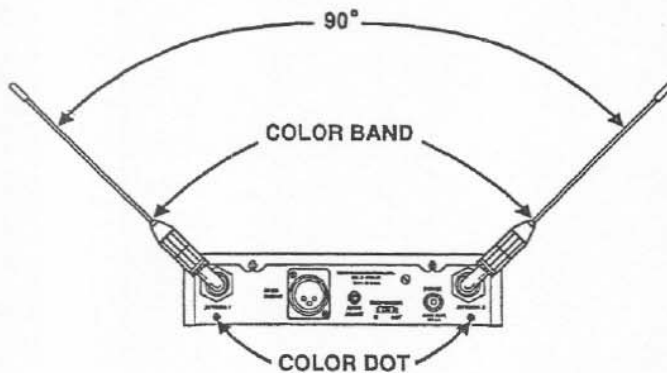
**Power Jack:** For external AC wall supply adaptor (supplied). May use any filtered 12 to 14 VDC/100 mA Source, or 13.0 VAC RMS/100 mA Source.

**ANTENNA INFORMATION AND PLACEMENT****Antenna Color Code**

Be sure the color band on the antennas matches the color dots on the back of the receiver.

**Antenna Mounting**

Attach the two antennas to the back of the receiver at a 90° angle as shown in Figure 4. Tighten the connectors securely.



**Figure 4**  
**Antenna Mounting**

**Antenna Placement**

The antennas and FMR-450 should be placed in a location with a clear "signal path" to the transmitter. This "path" should be as short and free of obstructions as possible. Obstructions, such as walls, ceilings, and metal objects, will reduce range and performance.

**Do not rack mount the FMR-450 with the antennas attached directly on the back of the unit. This will severely decrease the range and performance of the system.**

**Antenna Placement for Optimum Range and Rack mounting**

For maximum range and when rack mounting, the antennas must be remotely located.

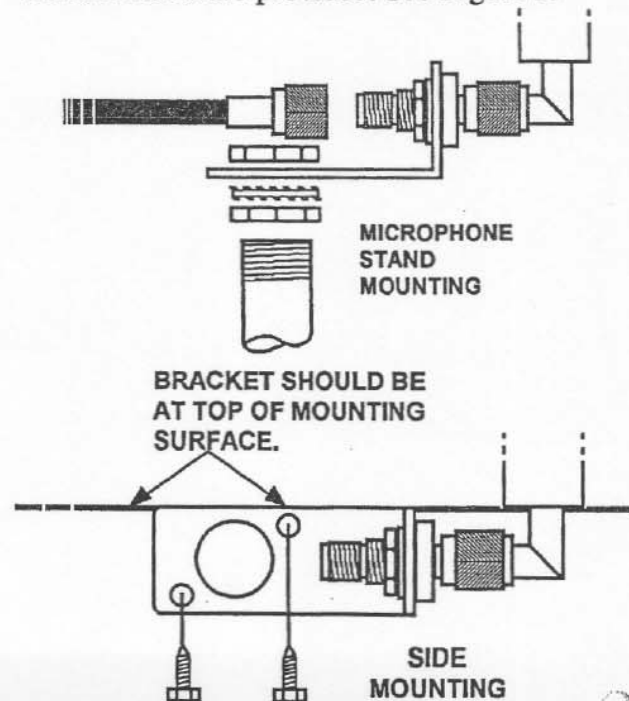
The diversity antenna system operates most efficiently when the two antennas are separated as much as possible.

The antennas should be mounted so that they are at least 6 feet (2 meters) apart for best results. They should be at least 2 feet (60 cm) from near by objects.

Accessories for remote antenna mounting are listed in the back of this manual. See Figure 6 for suggested mounting options.

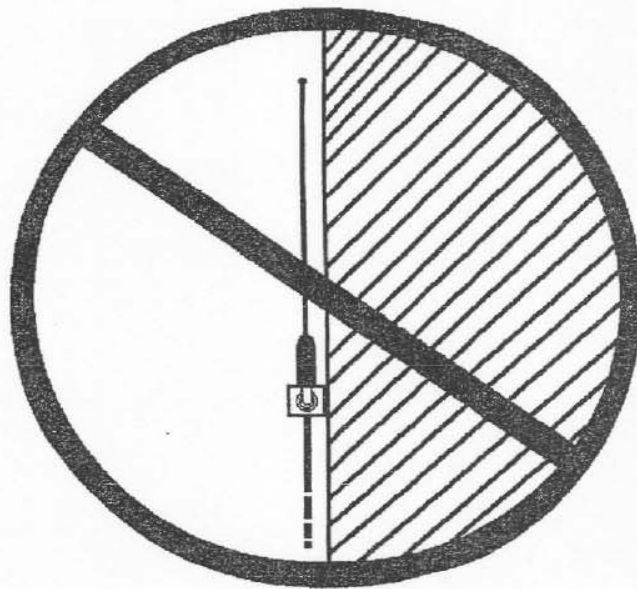
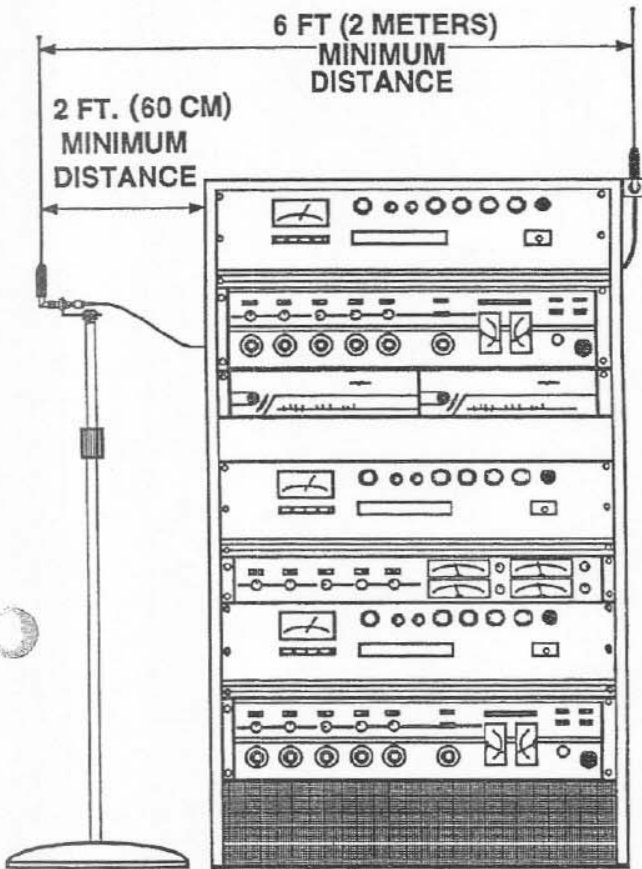
**Bracket Mounting**

The antenna brackets may be either mounted on mic stands or screwed to some other object with the hardware provided. See Figure 5.



**Figure 5**  
**Bracket Mounting**





**DO NOT MOUNT ON WALLS  
OR CLOSE TO  
OTHER OBJECTS**

**Figure 6**  
**Antenna Placement with Accessory Brackets and Cables**

Do not mount the brackets on a wall. See Figure 6 for bracket and antenna placement.

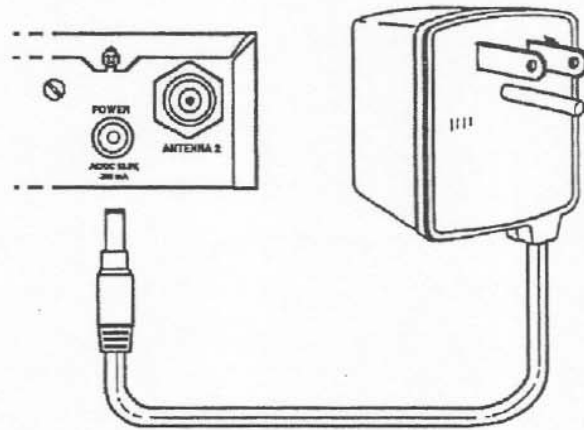
**Antenna Connection**

Attach the two antenna cables to the back of the FMR-450. Be sure the connectors are tightened securely. Route the cable to the antennas and attach in the same manor.

**POWER CONNECTION**

Locate the FMR-450 on a level surface with the rear of the unit facing you.

Connect the supplied AC power adaptor to an AC outlet supplying 105 to 125 volts AC, 60 Hz. The 220 volt export model should connect to an AC outlet supplying 210-240 VAC, 50-60 HZ.



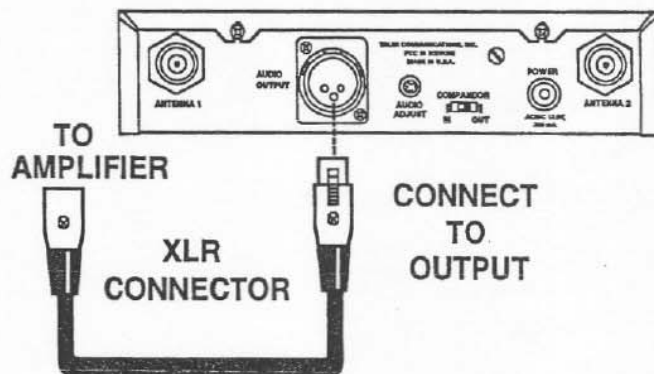
**Figure 7**  
**Power Connection**

**RECEIVER CONNECTION TO SOUND SYSTEM**

The FMR-450 has been shipped with the output set to an output level similar to that of a wired low impedance microphone.

Connect the FMR-450 to your equipment:

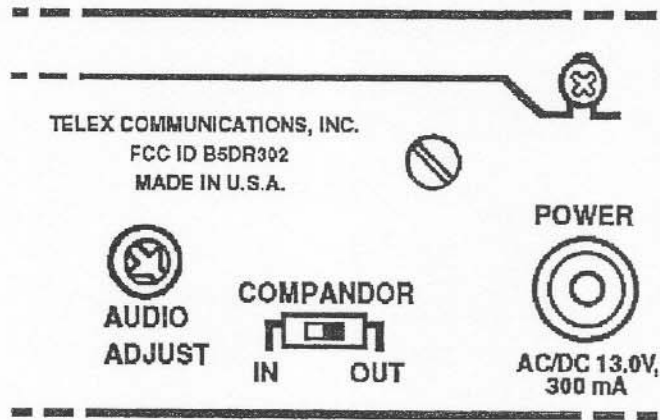
- Insert the female end of the 3 pin "XLR" microphone cable into the Audio Output receptacle on the rear of the FMR-450.
- Insert the male end of the 3 pin "XLR" microphone cable into the "MIC LEVEL" input of your Mixer/Amplifier.
- For audio output adjust see Audio Adjustment in "Setting System Gain Level".



**Figure 8**  
**Connection to Mixer/Amplifier**

**COMPANDOR IN/OUT**

**NOTE:** The Transmitter Compandor IN/OUT Switch must match the position of the receiver Compandor IN/OUT Switch. If the transmitter has no IN/OUT Switch, such as the WT-450, set the receiver switch to "IN".



**Figure 9  
Compandor Switch**

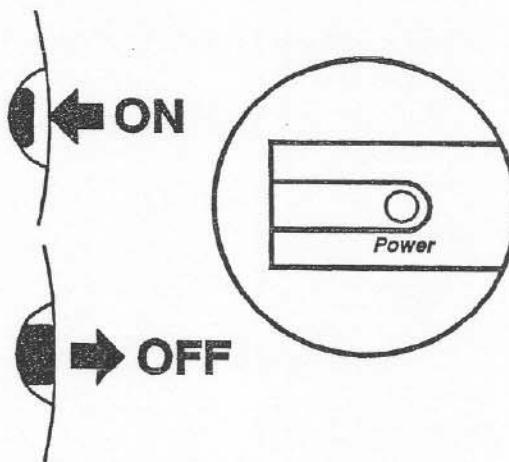
**SYSTEM TURN ON**

**INTRODUCTION**

If you have followed the instructions up to this point, you should now be ready to turn both the transmitter and the receiver "ON" and set optimum signal gain settings on each unit.

**FMR-450 RECEIVER**

Press the power switch on the FMR-450 receiver to the "ON" position. One of the Diversity LED's will illuminate indicating power on.



**Figure 10  
Power ON/OFF**

**SETTING SYSTEM GAIN LEVELS**

**TRANSMITTER SOUND PRESSURE LEVEL (SPL)**

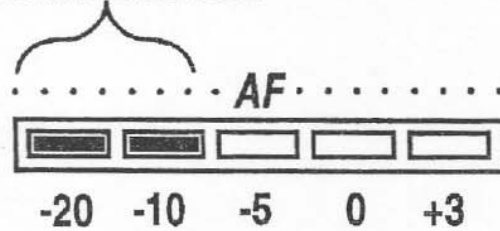
**Normal (SPL) Setting:** The "Audio Gain" potentiometer on your transmitter has been factory set to provide readings on the FMR-450 five-color AF bar graph in the -20 /-10 area for normal vocal application. Readings in this area of the meter give highest dynamic range and no overload. See Figure 11.

**High Level Setting:** If your application is in a high SPL (Sound Pressure Level) area such as singing or instrumentation, the factory gain setting is probably too high. This will result in overloading your receiver, which will result in distortion.

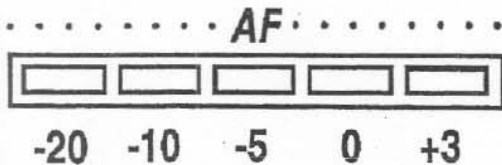
**Low Level Setting:** If your application is low level, such as a very soft spoken individual, the factory gain setting may be too low and could result in poor overall signal-to-noise ratio.

To correct either a too high, or too low condition, simply use the gain adjustment screwdriver provided with your transmitter and adjust the Microphone Gain Control so that average audio causes the meter to indicate in the left (-20 and -10) area of your meter. An occasional overshoot into the yellow area is allowable.

**NORMAL LEVEL**

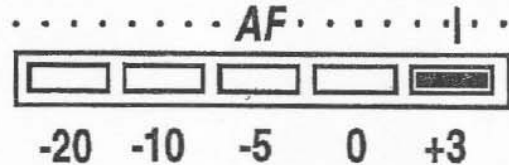


**NO LED'S ILLUMINATED**



**TOO LOW**

**RED**



**BAD INDICATION (DISTORTION)**

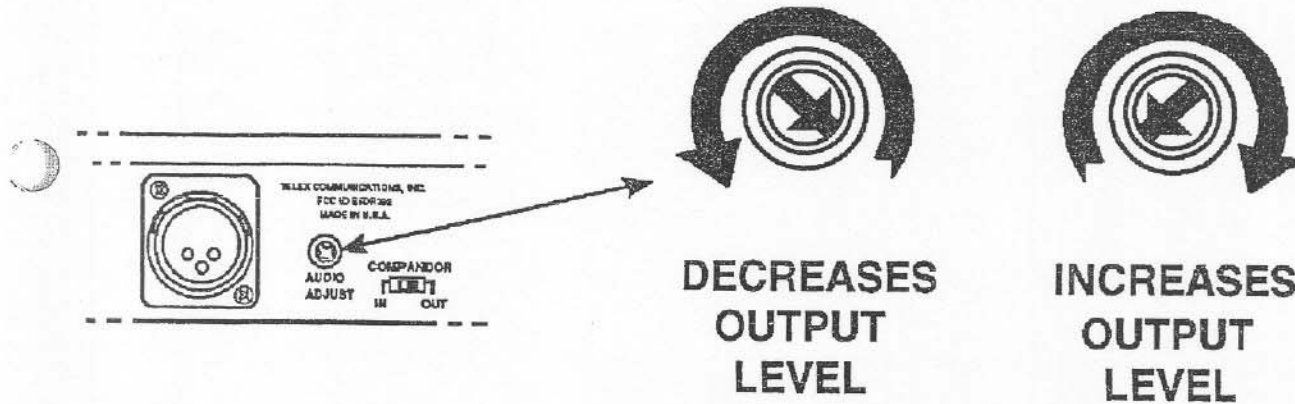
**TOO HIGH**

**Figure 11**  
**Adjusting Microphone Gain**

**RECEIVER AUDIO ADJUST**

Now that you have properly set the transmitter gain setting, you are now ready to set the receiver output level. The purpose of this control is to give the ability to provide an audio output level from the Telex Wireless System that is similar to that of a wired microphone.

The Audio Adjust (screwdriver adjustable) is adjusted while talking into the transmitter microphone. Turn the adjustment screw to achieve the desired output level.



**Figure 12**  
**Audio Adjust Control**

# SYSTEM WALK-THRU

## GENERAL

Now that you have successfully "set up" your Telex Wireless System and turned on your sound equipment (amplifier/mixer, etc.), you are ready to test the overall performance by "walking" the transmitter through the areas in which you will be using it.

## CARRIER INDICATION

Under normal conditions the active bar RF field strength meter should show a reading in the upper portion of the scale (higher number).

"Weak Signal" conditions will result in low meter indication with the potential of actually "hearing" this in the sound system.

The "system walk-thru" can detect RF problems of weak signal strength caused by the following:

- Poor antenna location
- RF "Trouble Spots"
- Operating distance beyond system capability
- Old or used transmitter batteries

## AUDIO FEEDBACK

The system walk-thru can also uncover locations in the performing areas which are prone to audio feedback (usually sounds like a "squeal" or a "howl"). Feedback can be a problem for any microphone - whether wired or wireless. To eliminate feedback, observe placement of the microphone and any nearby loudspeakers.

In 99% of all instances you will set up your Telex Wireless System, walk it through and achieve error-free performance. If in the rare instances your Telex System does not "pass" during your walk-thru evaluation, refer to the next section, which deals with System Troubleshooting.

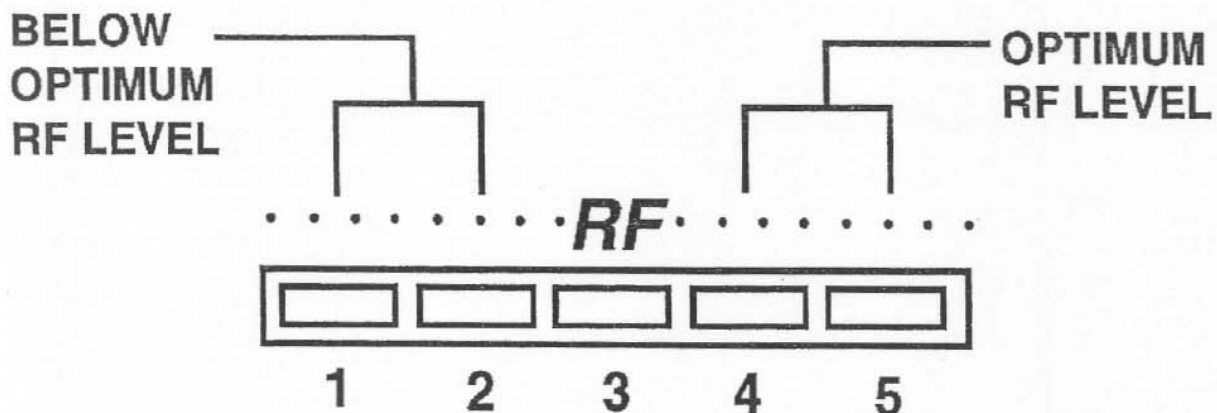


Figure 13  
Optimum and Below Optimum RF Levels

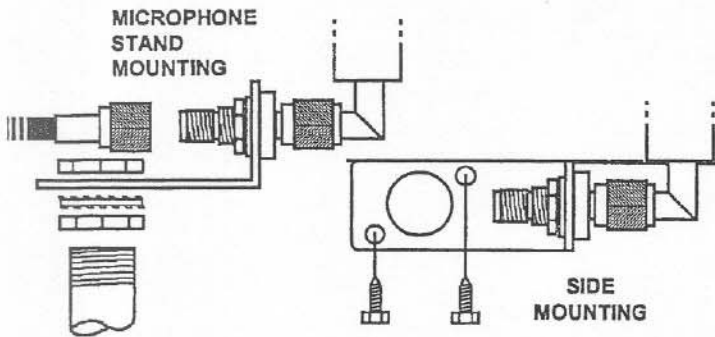
## TROUBLESHOOTING

Reread the sections of this manual to make sure you have completed system set-up properly.

If you are unable to solve the problem, contact the dealer you purchased the system from for assistance.

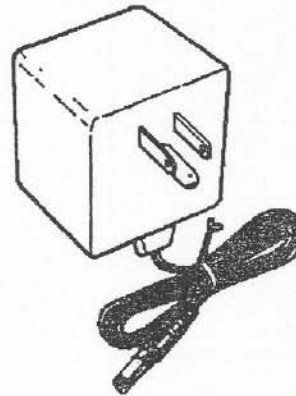
PROBLEM	SOLUTION
<b>DISTORTION</b> - System's audio quality seems distorted at medium to high input levels.	Reduce audio gain on the transmitter by adjusting the gain control as suggested on page 10.
<b>HISS</b> - System seems to produce a "hiss" which is undesirable.	Check the gain setting on the transmitter as indicated on page 10.
<b>DROPOUTS</b> - When moving around the area in which you will be using the system there seem to be locations where the signal "swooshes" or completely disappears.	Make sure the receiver antenna is connected. Follow the location suggestions in the manual. Change the location of the receiver antenna or avoid the bad area with the transmitter. Review antenna information on pages 6 and 7.
<b>INTERFERENCE</b> - System picks up signals other than wireless transmitter.	Make sure the frequency of the transmitter matches the frequency of the receiver. Make sure the transmitter is turned on - this will usually eliminate the interference signal. If problems persist with the transmitter "ON" you will probably need to have your systems frequency changed to another channel.
<b>REDUCED DISTANCE</b> - System doesn't operate as far as it once did. System doesn't operate as well as you think it should.	Transmitter battery is possibly in need of replacement. Receiver antenna possibly not in correct place. Review antenna information on pages 6 and 7.
<b>BATTERIES DON'T LAST</b>	If using "throw away" batteries make sure they are alkaline. If using nickel-cadmium batteries make sure they were fully charged prior to using them and fully drained when you are done before recharging them.
<b>LOW OUTPUT</b> - System produces a lower output level than other wired microphones in sound system.	Check the gain settings on the transmitter as indicated on page 10 and the audio adjustment on the receiver as shown on page 11.
<b>FEEDBACK</b> - Moving around performing area produces "squeal" or "howl" in various locations.	Reduce gain settings on wireless system and sound system. Professional equalization may be needed to cure this problem.

**ACCESSORIES and REPLACEMENT PARTS**



**Model AB-2 Combination Antenna Bracket** with hardware and 10 foot (3 meter) coaxial cable with TNC Connectors

**Order No. 71138000**



**AC Power Supply** 120 Volt, 60 Hz

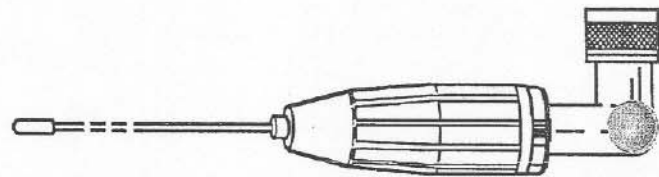
**Order No. 730279000**



**Model ALP-450 450-900 MHz Log Periodic Antenna** with mounting hardware and 10 foot (3 meter) coaxial cable with TNC Connectors

**Order No. 71147000**

Covers all frequencies and increases range.



**Antenna**

Model	Part No.	Band Color	Frequency
CLA-1	870658-1	Blue	520-564.9 MHz
CLA-2	870658-2	Yellow	565-614.9 MHz
CLA-3	870658-3	Red	615-659.9 MHz
CLA-4	870658-4	White	660-689.9 MHz
CLA-5	870658-5	Green	690-724.9 MHz
CLA-6	870658-6	Orange	725-760 MHz



**Model AD-450**  
Four Way Antenna Splitter

**Order No. 71146000**

Feeds four FMR-450's with just two antennas.



## WARRANTY SERVICE INFORMATION

If your receiver or transmitter should need servicing under the warranty, please contact:

Warranty Service Department  
TELEX COMMUNICATIONS, INC.  
8601 East Cornhusker Highway,  
P.O. Box 5579,  
Lincoln, Nebraska 68505-5579 U.S.A.  
Phone: (402) 467-5321 or 465-7021

All claims of defect or shortage should be sent to the above address. When returning items for service, you must provide date and proof of purchase, such as a copy of the sales receipt, to establish warranty. A letter should be included outlining all symptoms and claimed defects. Information on how the equipment was installed and used is very helpful. Please include your phone number and return address in case our service technicians need to contact you.

Units that have been modified cannot be accepted for repair.

Include all information requested by the Service Center. Then pack the unit as follows:

Check the unit to see that all parts and screws are in place. Then wrap it in heavy paper or put it in a plastic bag. If the original carton is not available, place the unit in a strong carton that is at least six inches bigger in all three dimensions than the unit. Fill the carton equally around the unit with resilient packing material (shredded paper, excelsior, etc.). Seal it with gummed paper tape, tie it with a strong cord, and ship it by prepaid express, United Parcel Service or insured parcel post to the Hy-Gain Service Center.

It is very important that the shipment be well-packed and fully insured. Damage claims must be settled between you and the carrier and this can delay repair and return of the unit to you.

Telex reserves the right to make changes in design and improvement on its product without assuming any obligation to install the same on any of its products previously manufactured. Further Telex reserves the right to ship new and/or improved products which are similar to the form, fit and function of products originally ordered.

## FCC INFORMATION

The TELEX Receiver FMR-450 is authorized under Part 15 of the Federal Communication Commission. Licensing of TELEX equipment is the user's responsibility and licensability depends upon the user's classification, and frequency selected. TELEX strongly urges the user to contact the appropriate telecommunications authority before ordering and choosing frequencies other than factory preset frequencies.

**CAUTION:** Changes or modifications made by the user could void the user's authority to operate the equipment.

### PATENT INFORMATION

MANUFACTURED UNDER ONE  
OR MORE OF THE FOLLOWING  
U.S. PATENTS

U.S. PATENT NO. 4,293,955

U.S. PATENT NO. 5,029,238

OTHER PATENTS PENDING

**TELEX<sup>®</sup>**

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PN 802664-1

MADE IN U.S.A.

26 APRIL 1995