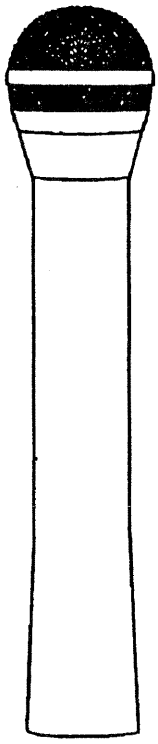
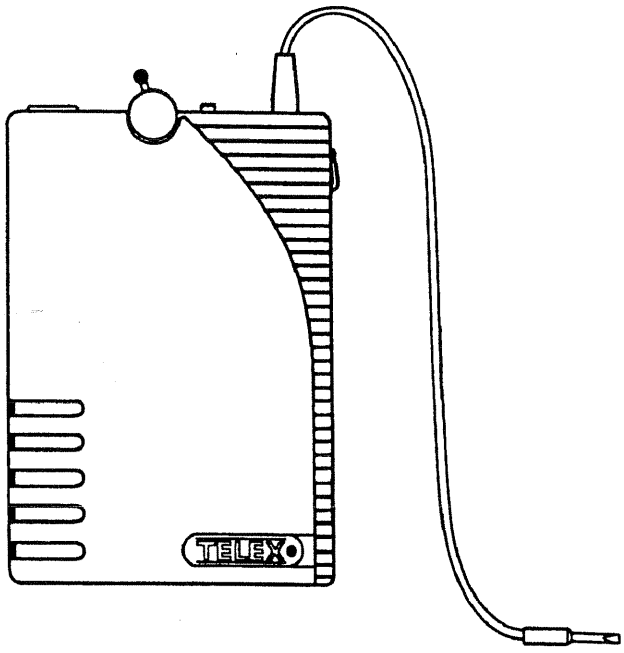
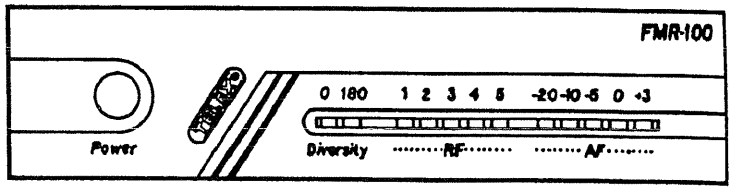
Telex

Operating Instructions







Professional Wireless Microphone System

FMR-100

WT-60

HT-200

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 handheld unit.

TRANSMITTER

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

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.

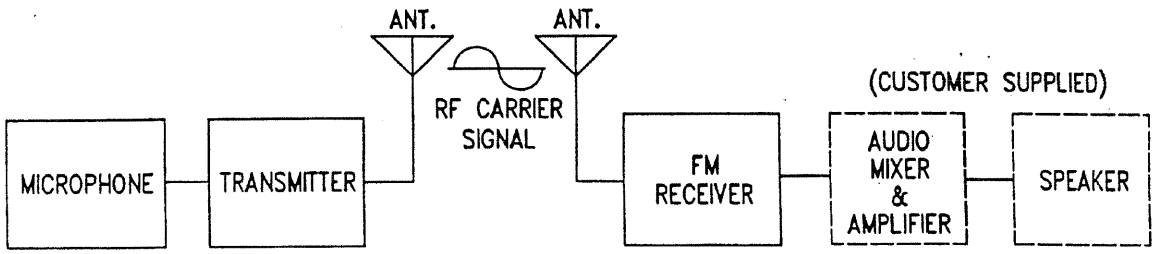


Figure 1
Block Diagram of Typical Wireless Microphone System

WHAT FREQUENCY BAND DOES THE TELEX SYSTEM OPERATE IN?

The Telex systems feature single channel, crystal controlled transmitters and receivers operating in the VHF Band between 150-216 MHz. The FMR-100 operates on specific standard frequencies within the range of 150 to 216 MHz, and is specifically designed to complement the Telex Model WT-60 transmitter or the HT-200 series handheld transmitter.

The FMR-100 is also fully compatible with all Telex Wireless Transmitters manufactured to date. 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

Questions: Can more than one wireless system be used simultaneously?

Answer: 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.

Question: Is the system more sensitive in any one particular direction?

Answer: 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.

Question: When the transmitter is turned off can the receiver pick-up other transmissions?

Answer: Yes it can. The Telex FMR-100 System operates in the VHF Band between 150-216 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, anywhere in the U.S.A., forever!

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.

Question: Is Feedback a problem?

Answer: 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. This is the best way of adjusting "Microphone Gain." Use the minimum gain necessary. Professional equalization of the sound system may be needed.

FMR-100 RECEIVER

TECHNICAL INFORMATION

SPECIFICATIONS

RF Frequency Range	150-216 MHz
Frequency Response	50-15,000 Hz +/-1 dB
RF Sensitivity	Less than 0.5 microvolt, 12 db SINAD
IF Selectivity	8 pole linear phase filter
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-100 is a receiver designed for use wherever compact size with commercial features is required. Features include:

- Powered by an external AC supply, or via the power jack on the rear of the FMR-100 with any 13 VAC RMS/ 12-14VDC source.
- The FMR-100 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 and also serves as a relay squelch circuit to provide the ultimate in squelch quiting.
- True diversity.
- Compandor 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 coupled with a relay type squelch for high isolation
- Linear phase filters for high quality low distortion audio response
- 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

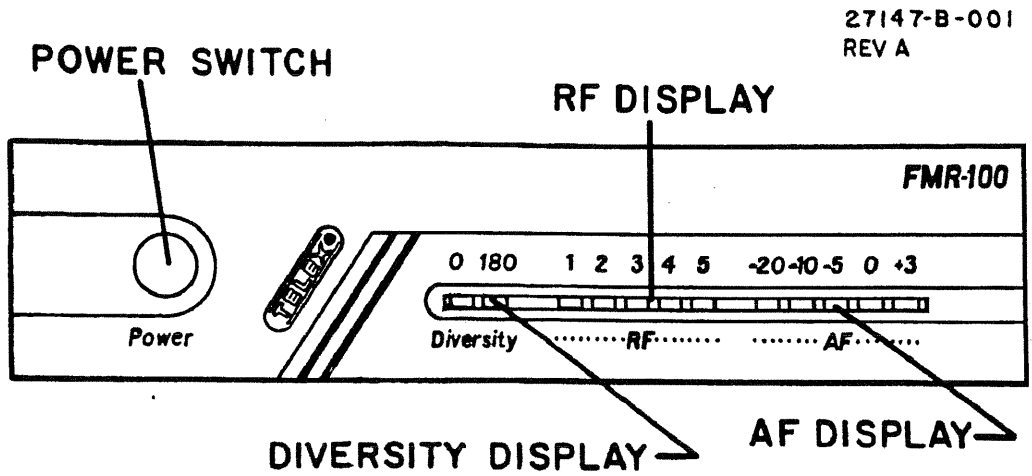


Figure 2
Front View FMR-100

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 FMR-100 receiving the transmitted signal.

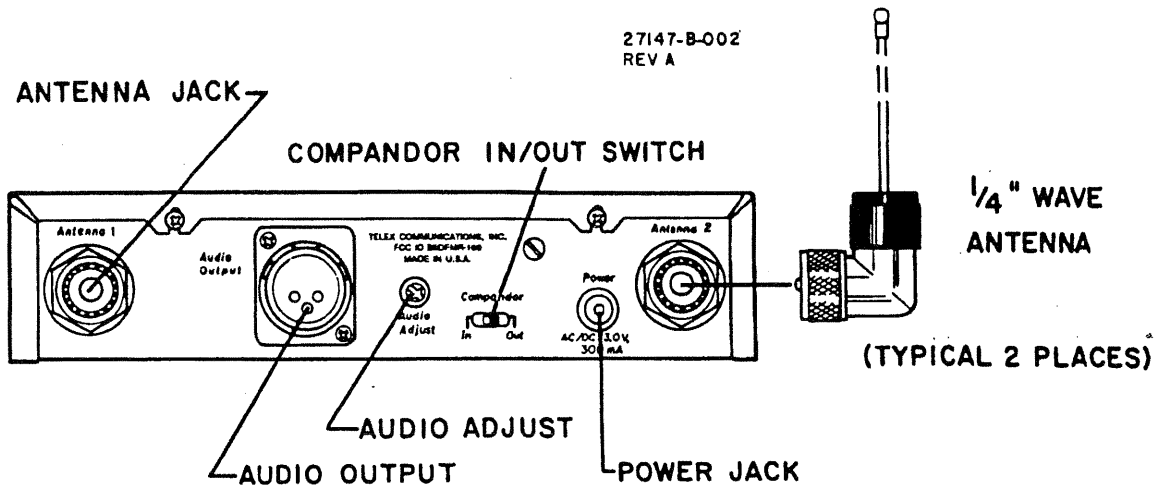


Figure 3
Rear View FMR-100

REAR PANEL

Antenna Jacks: Two antenna jacks for true diversity. Attach 1/4-wave 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-60 or HT-200 Transmitter the Compandor In/Out Switch on the FMR-100 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.

WT-60 WIRELESS BELT TRANSMITTER

TECHNICAL INFORMATION

SPECIFICATIONS: WT-60

RF Frequency Range	150 to 216 MHz
RF Power Output	50 mW maximum 45 mW typical
RF Frequency Stability	0.005% crystal controlled
Modulation	FM, 12 KHz Deviation
Pre-Emphasis	50 µSec
AF Frequency Response	50 to 15000 Hz
Microphone Input	Low impedance, 100-10K ohm Dynamic or Electrect
Current Drain	35 to 40 mA typical
FCC	Type accepted under FCC Part 90 and 74.

FEATURES

A belt-worn, battery powered, VHF FM transmitter which is ideally suited for any activity requiring a cordless portable microphone. Features include:

- The unit is compact, lightweight, and self-contained.
- Low battery and overmodulation indicator.
- Screwdriver adjustable Microphone Gain Control.
- Screwdriver tip trailing wire antenna.
- Uses standard 9 volt battery.
- Microphone ON/OFF Switch to mute microphone.
- Charger pins incorporated into case, allows easy charging of battery.

CONTROLS AND CONNECTIONS

TOP PANEL

Power ON Switch: A low profile slide switch is provided to allow access to power ON but is clearly distinguishable from other controls to prevent accidentally turning off the power.

Low Battery/Overmodulation Indicator LED: Multi-purpose LED.

Low Battery Indicator: Part of the battery check circuit. When the power switch is placed in the "ON" position the LED will flash one time if the battery is good. A poor battery will cause the LED to be illuminated continuously and a bad or unusable battery will not cause illumination at all.

Overmodulation Indicator: Uses the same LED as the low battery indicator. During the transmit mode if microphone gain is too high the LED will illuminate when talking. Adjust micrphone gain and/or microphone mouth spacing so that this LED does not light at all, or only occasionally.

Microphone ON/OFF: A ball tipped toggle switch is provided to allow the user to "MUTE" the microphone if desired. This switch does not turn off the transmitter RF and provides "popless" operation. Again, this switch is clearly distinguishable from other controls for ease of operation This switch does not disable the overmodulation indicator.

Microphone Jack: The WT-60 is designed to easily interface with dynamic or electret microphones in the 100-10k ohm impedance range. A pin on the microphone connector is permanently wired to provide a power source for electret microphones. No XLR adapter is provided with this system. It was designed to utilize the WLM-50 microphone.

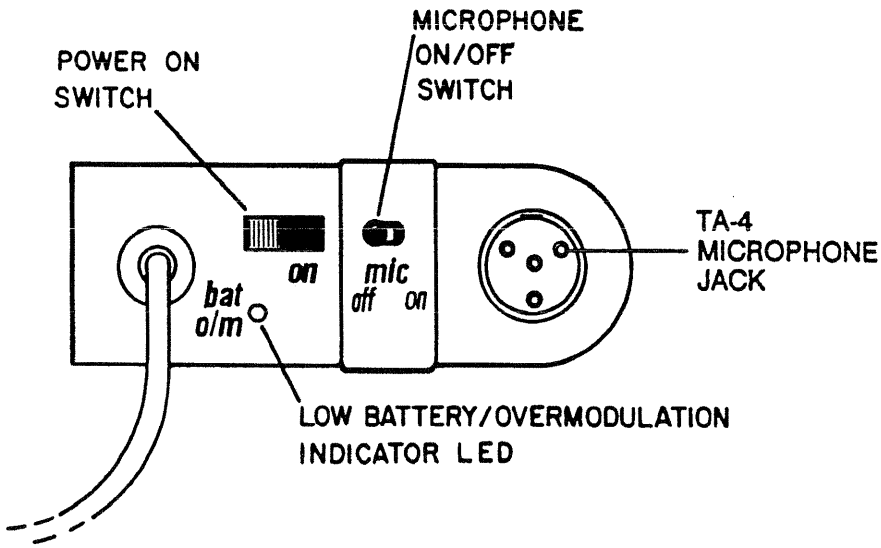


Figure 4
Top View WT-60

BACK PANEL

Trailing Wire Antenna with Screwdriver Tip: The WT-60 features a fully flexible 1/4-wave antenna with a screwdriver tip attached for adjusting microphone gain. The antenna also has a permanent strain relief.

Microphone Gain Control: A screwdriver adjustable control which adjusts the Audio Gain of the microphone either up or down for different voice levels.

Belt Clip: The belt clip is supplied and is attached to the case. The belt clip can be removed and re-attached to provide access to the controls either facing up or down, whichever is most comfortable.

Battery Compartment: Pull downward to expose battery compartment and battery connection terminal. Accepts either an alkaline or nickel-cadmium 9 volt transistor battery.

Charge Pins: The WT-60 also incorporates charge pins to allow the Telex 63912-000 battery to be charged without removing it from the case. Use the BC-60 Battery Charger.

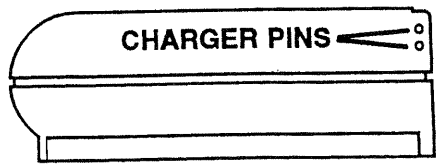


Figure 5
Charger Pins - Bottom of WT-60

Battery Requirement: For maximum uninterrupted service, TELEX recommends that a new 9 volt alkaline battery (Mallory MN 1604 or equivalent) be installed prior to use. TELEX also offers a heavy duty nickel-cadmium, 8.4 volt rechargeable battery. Part Number 63912-000.

Average life on an alkaline battery is 6-8 hours and 1 1/2 to 2 hours per charge on a nickel-cadmium battery.

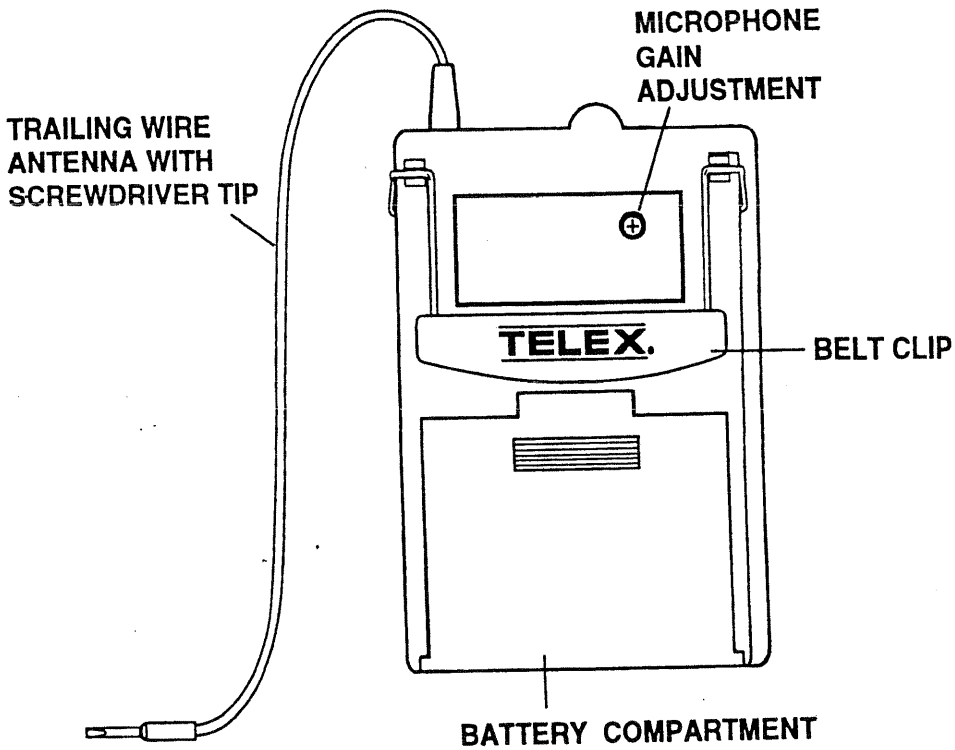


Figure 6
Back View WT-60

HT-200 WIRELESS MICROPHONE

GENERAL DESCRIPTION:

The HT-200 Series is a very versatile microphone which expands your selection to four popular microphone models. Its heavy-duty construction provides lightweight durability and its compact design assures reliability in the field.

Features

- Independent Power and Audio Switches
- Low Battery Indicator
- Screwdriver adjustable Gain Control
- Uses Standard 9 Volt Battery

TRANSMITTER SPECIFICATIONS:

Battery ..... 9 Volt alkaline (NEDA 1604 or equivalent or 8.4 Volt NICAD Type)
Battery Life ..... 10-12 hours typical on alkaline
2 to 3 hours typical on MICAD on one charge
Current Drain ..... 35 mA
Modulation Limiter ..... Internal Compressor
Antenna ..... Integral to unit, omnidirectional
RF Power Output ..... 45 mW typical
Range ..... 1000 ft. (300 m) - Open field conditions, typical
250 ft. (76 m) - Adverse conditions, typical
Audio ..... +\- 1 dB, 50-15000 Hz (without head)
Radiated Harmonic and Spurious Emission Minimum ..... 30 dB below Carrier
Modulation ..... +\- 12 KHz Deviaton, 50 uS pre-emphasis
FCC ..... Type accepted under Parts 90 and 74
Frequency Range ..... 169-216 MHz

Microphone Specifications

HT-200/TE-10 ..... Telex TE-10
Element Type ..... Condenser
Directional Pattern ..... Cardioid
Frequency Response ..... 85-15000 Hz
Maximum SPL ..... 140 dB

HT-200/SM-87 ..... Sure SM-87
Element Type ..... Condenser
Directional PatternSuper ..... Super Cardioid
Frequency Response ..... 85-15000 Hz
Maximum SPL ..... 140 dB

HT-200/EV-757 ..... Electro-Voice N/D757
Directional Pattern ..... Super Cardioid
Frequency Response ..... 50-18000 Hz
Maximum SPL ..... 144 dB

HT-200/SM-58 ..... Shure SM-58
Element Type ..... Dynamic
Directional Pattern ..... Cardioid
Frequency Response ..... 50-15000 Hz
Maximum SPL ..... 140 dB

CONTROLS AND CONNECTIONS

Low Battery Indicator: Located at the bottom of the microphone. The red LED will flash briefly when the microphone is first turned on (with a fresh battery). when the LED stays on, the user has approximately one hour of remaining battery life.

Audio Switch: Located at the bottom of the microphone. The Audio Switch allows the user to switch the audio ON or OFF without introducing a "thump" into the sound system. A high profile slide switch is provided for easy identification.

Audio Gain Control: Accessed thru a hole at the bottom of the handle. A srewdriver is povided.

Power OFF/ON Switch: Located at the bottom of the microphone. A low profile slide switch is provided to allow access to power OFF/ON.

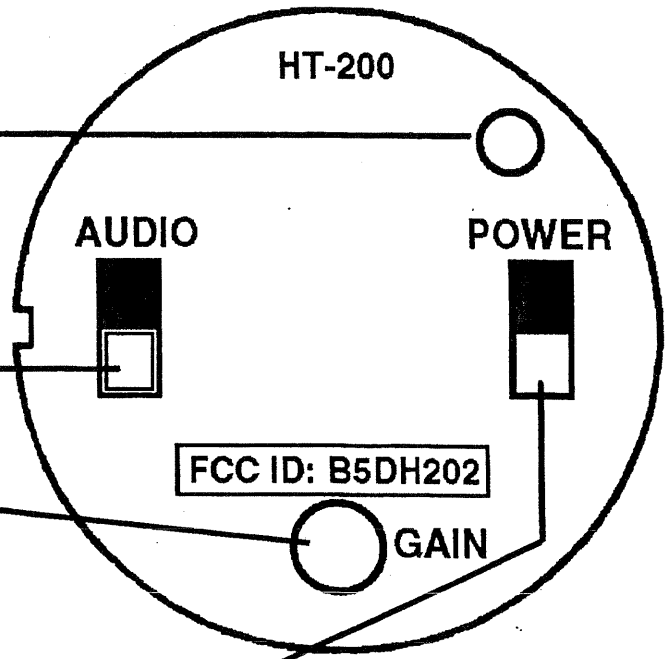


Figure 7A
Bottom View - HT-200

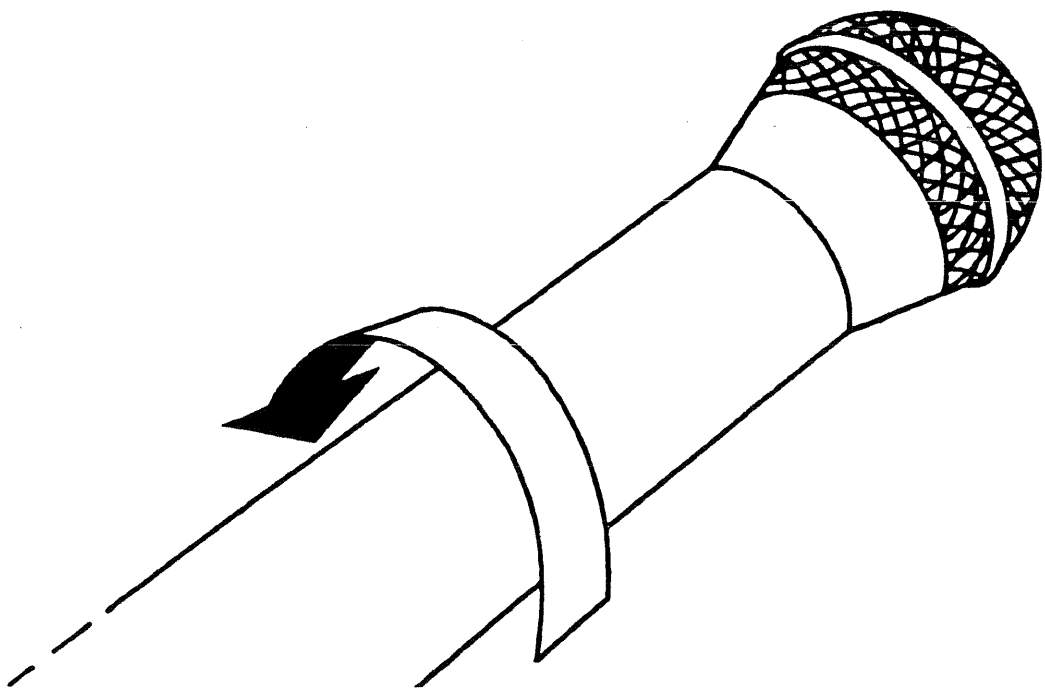


Figure 7B
HT-200 Handle Rotation

EQUIPMENT SET-UP

UNPACKING

Unpack your Wireless Microphone system. If there is any damage or shortage, refer to the "Warranty Service Information" section in this manual.

TRANSMITTER BATTERY INSTALLATION

BATTERY INFORMATION

NOTE: Make sure the power switch is in the "OFF" position when changing or installing new batteries.

For maximum uninterrupted service it is suggested that a new 9 volt alkaline battery (Mallory MN 1604 or equivalent) be installed prior to use. Operation on a heavy duty 8.4 volt nickel-cadmium battery is also permissible. For more information, see Battery Information section.

WT-60

Slide the battery access cover off and insert the battery terminals against the spring contacts, making sure the proper polarity is observed.

DO NOT apply pressure directly to the center of the battery cover when installing the cover.

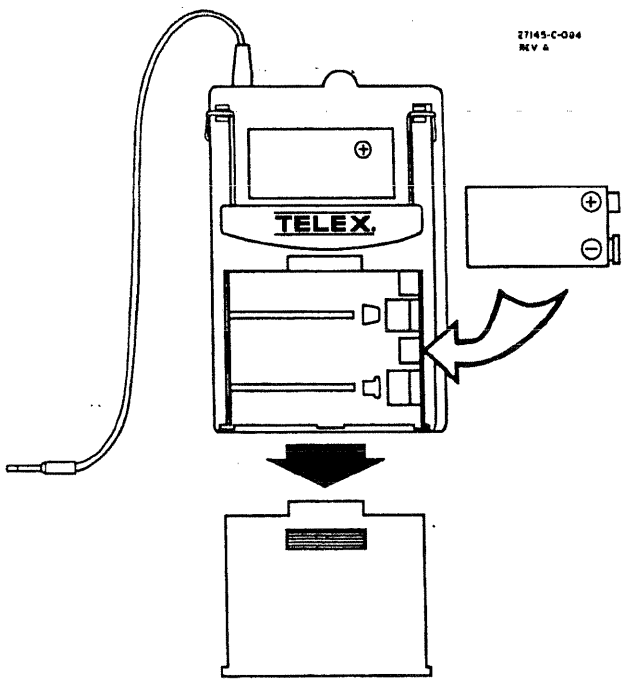


Figure 8
Battery Installation WT-60 Belt Transmitter

Battery Installation: Insure that the power switch is in the "OFF" position. To access the battery compartment, turn the handle of the micropnone counter-clockwise (See Figure 3) and slide the handle down to expose the battery compartment.

The handle will "lock" into place, allowing convenient battery compartment access (See Figure 4).

The battery can be inserted in only one direction in order to prevent incorrect battery insertion.

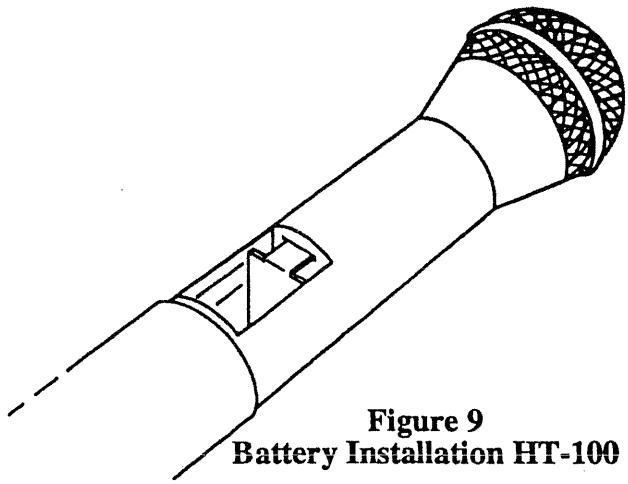


Figure 9
Battery Installation HT-100

TRANSMITTER BATTERY CHECK

WT-60

On the top of the WT-60 is an LED labeled bat o/m. This is the low battery/overmodulation indicator LED. When the power switch is placed in the "ON" position the LED will flash one time if the battery is good. A poor battery will cause the LED to be illuminated continuously and a bad or unusable battery will not cause illumination at all.

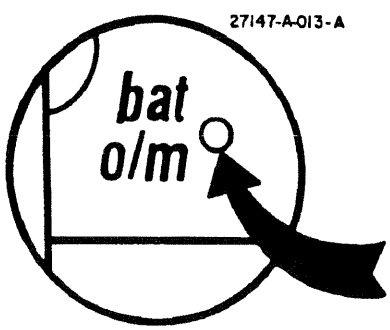


Figure 10
Low Battery/Overmodulation Indicator WT-60

HT-200

Set the power switch to the "ON" position. Note that the battery LED, located on the bottom of the microphone, should flash one time for a good battery. A low power battery will cause the LED to be illuminated continuously and a bad or unusable battery will not cause any illumination at all. Set the power switch to the "OFF" positon.

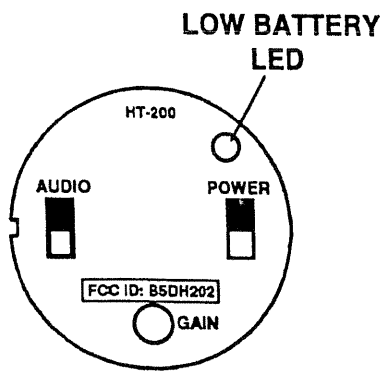


Figure 11
Low Battery LED - HT-100

TRANSMITTER MICROPHONE

WT-60

Plug the microphone you will be using into the microphone jack. If the microphone brand that you are using is other than Telex, refer to the wiring chart towards the end of the manual for interface information.

HT-200

The HT-200 Series comes in several models. All of these will work well with the FMR-100 receiver.

COMPANDOR IN/OUT

NOTE: The Compandor IN/OUT Switch must match the position of the receiver Compandor IN/OUT Switch.

WT-60

The WT-60 always operates with the compandor IN. Therefore your receiver must be set to match in the "IN" position.

HT-200

The HT-200 always operates with the compandor "IN", therefore your receiver must be set to match the "IN" position.

NOTE: When using the WT-60 or HT-200 with the FMR-100 receiver make sure the compandor switch on the FMR-100 is in the "IN" position.

FMR-100 POWER CONNECTION

Locate the FMR-100 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 mode should connect to an AC outlet supplying 210-240 VAC, 50-60 HZ.

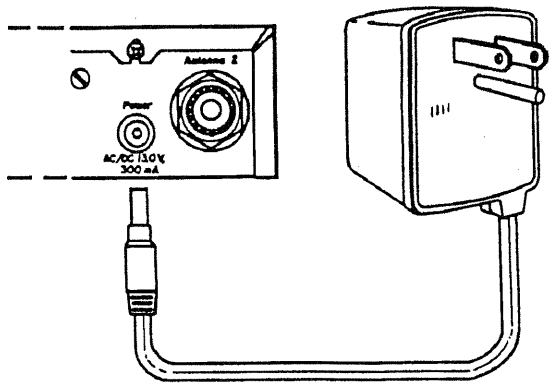


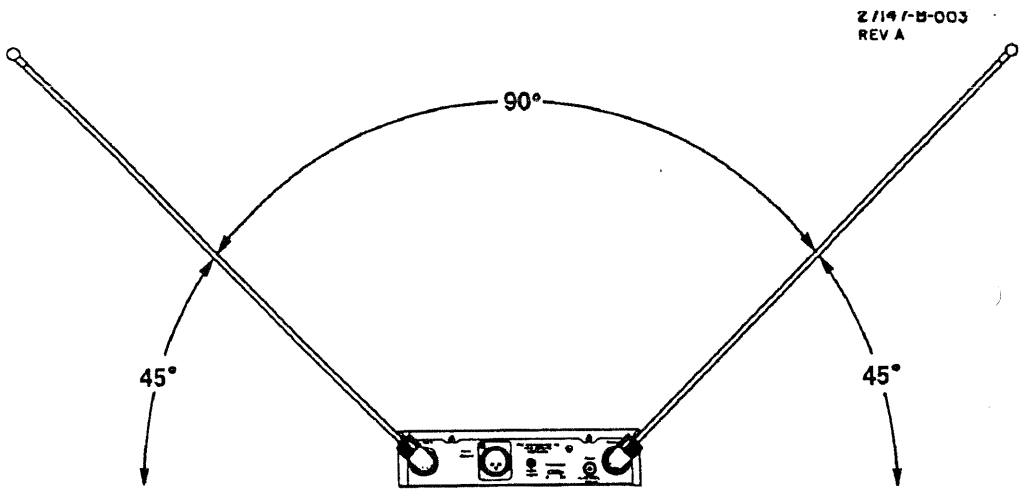
Figure 12
Power Connection

ANTENNA INFORMATION

FMR-100 Antenna Connection

The FMR-100 is supplied with two 1/4-wave vertical antennas. Attach the 1/4-wave antennas to the antenna input receptacle on the rear of the FMR-100 using the supplied connectors.

NOTE: If your FMR-100 receiver is to be located in a shielded rack mount enclosure or other poor RF location, you must use the 5/8-wave gain antennas and coax assemblies, Order No. 63900-000 (Specify frequency with order)



NOTE: THE ABOVE CONFIGURATION IS PROPER ANTENNA ALIGNMENT FOR THE FMR-100 RECEIVER. ANY OTHER ALIGNMENT OF THE ANTENNAS IS NOT ACCEPTABLE AND WILL AFFECT RECEPTION.

Figure 13
Proper Antenna Connection and Alignment

WT-60 ANTENNA PLACEMENT

Proper antenna placement probably has the biggest effect on your TELEX Wireless System's overall performance. The following suggestions will result in optimum performance.

Proper placement of the WT-60 transmitter can be critical. The trailing antenna should "dangle" freely. "Wadding" the antenna up and placing the WT-60 in a pocket, etc., will reduce system distance.

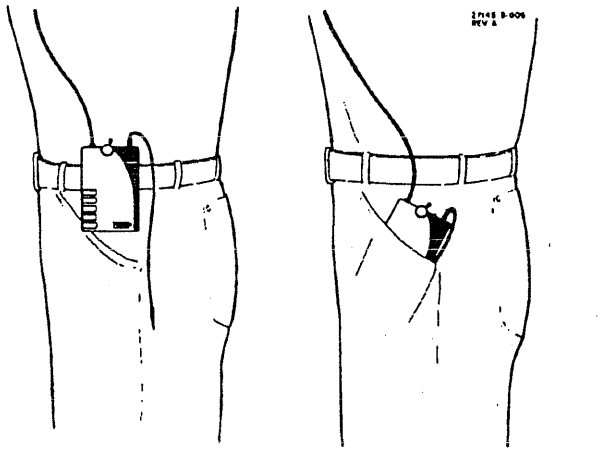


Figure 14
WT-60 Antenna Dressing

HT-200 ANTENNA

The antenna for the HT-200 is located inside the microphone handle. The antenna is efficient and is omnidirectional.

SYSTEM CONFIGURATION

Keep the distance between the transmitter and the FMR-100 antennas as short as possible. The greater the distance, the weaker the signal.

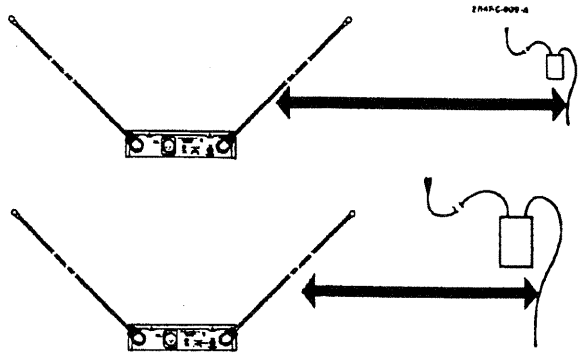


Figure 15
Distance Between Transmitter and Receiver

Make sure the "signal path" between the transmitter and the FMR-100 antennas is unobstructed. You should always be able to visibly locate the antenna at all times.

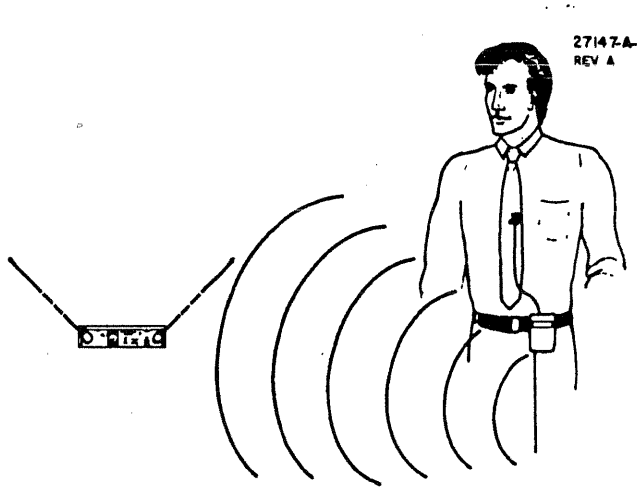


Figure 16
Keeping Site Clear to Antenna

Attempting to operate the wireless system through or around walls, ceilings, metal objects, etc. will reduce system range and performance.

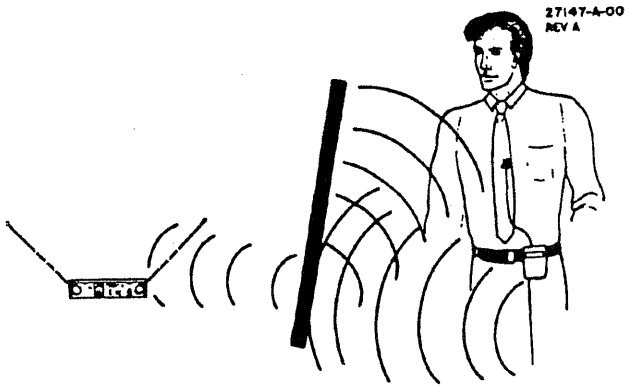


Figure 17
Operating Through Obstructions

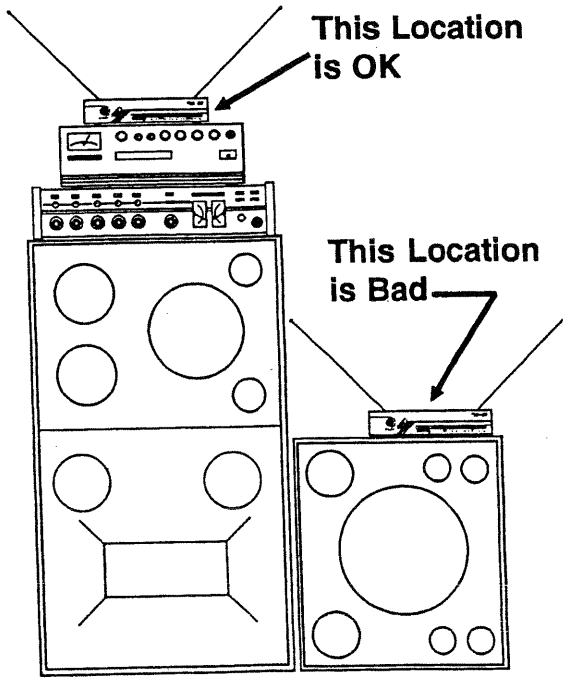


Figure 18
Receiver/Antenna Placement

DO NOT - Mount the receiver on, or next to, metal such as beams, walls with metal studs, equipment racks, etc. This will "detune" the receiving antenna which can result in noise or loss of RF signal at the FMR-100.

INCREASING/IMPROVING RECEPTION AND RANGE

Keeping the distance from the transmitter and receiver as short , and unobstructed as possible will produce the most reliable performance.

The FMR-100 is supplied with two 1/4-wave antennas. This should provide satisfactory system performance in most applications. System range can be enhanced by using 5/8-wave antennas. Telex Order No. 63900-000 will provide one 5/8-wave antenna and a 25' coax cable to remote the antenna. Two antenna's are required for best reception.

NOTE: When rack mounting the FMR-100 use the 5/8 wave antenna (Telex Order No. 63900-000) and remote the antennas. Refer to Figure 20.

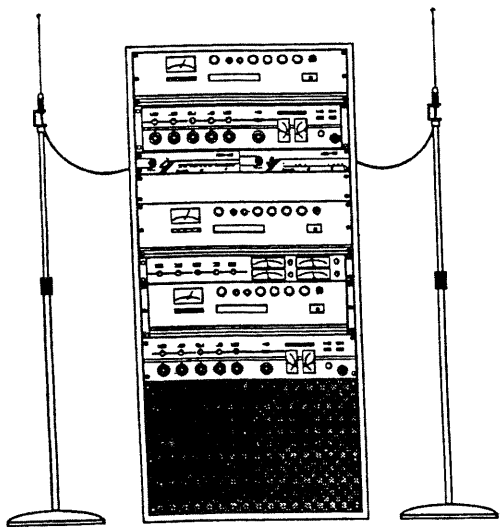


Figure 19
Remoting Antenna

To reduce the number of antennas required when operating more than one FMR-100 system in a given location, the Telex AD-200 amplified antenna splitter (Telex Order No. 64289-001) may be used.

To set up a system of up to four FMR-100 units, two AD-1 splitters must be used. See Figure 20, below.

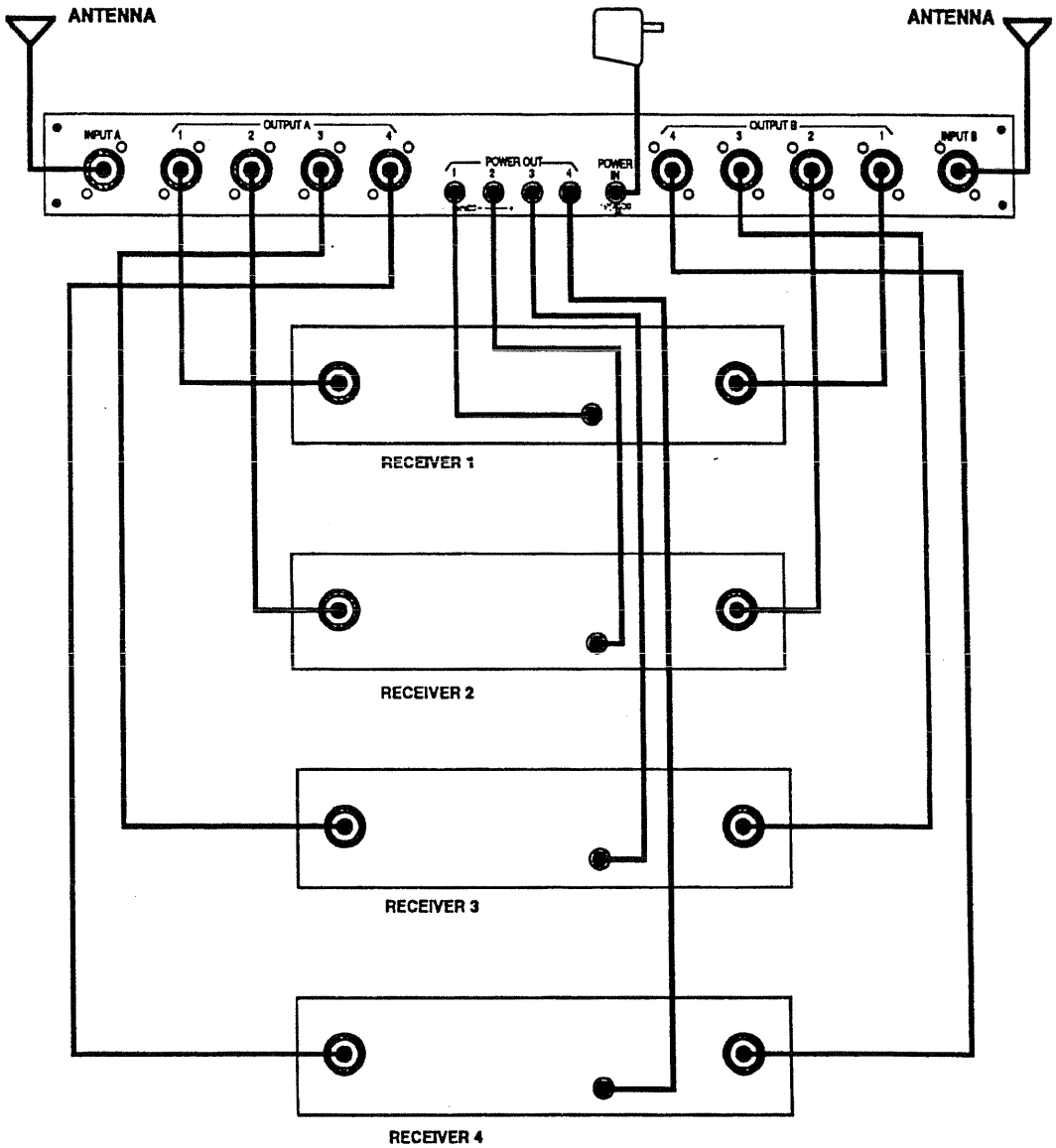


Figure 20
AD-200 Antenna Splitter

RECEIVER CONNECTION TO SOUND SYSTEM

The FMR-100 has been shipped with the output set to an output level similar to that of a wired low impedance microphone.

Connect the FMR-100 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-100.
- Insert the male end of the 3 pin "XLR" microphone cable into the "MIC LEVEL" input ot your Mixer/Amplifier.
- For audio output adjust see Audio Adjustment in Setting System Gain Level

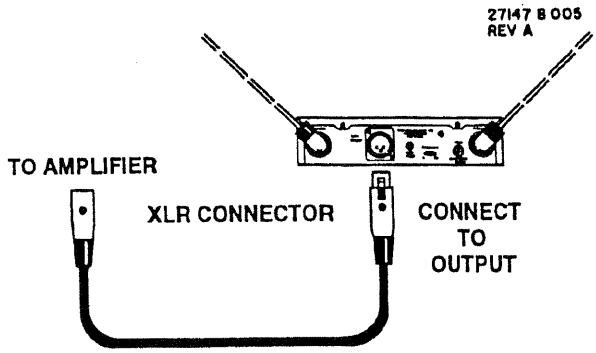


Figure 21
Connection to Mixer/Amplifier

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-100 RECEIVER

Press the power switch on the FMR-100 receiver to the "ON" position. One of the Diversity LED's will illuminate indicating power on.

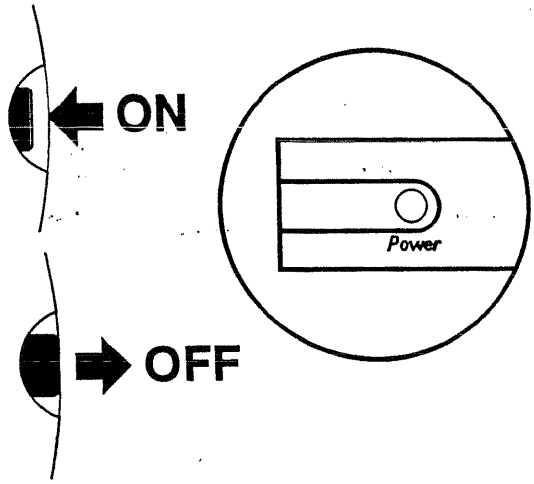


Figure 22
Power ON/OFF Switch

WT-60 BELT TRANSMITTER

Turn your transmitter power "ON". This is accomplished by placing the power on switch to "ON".

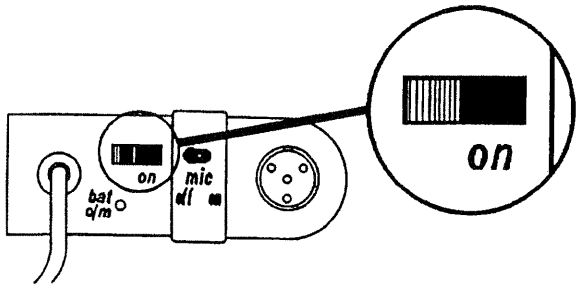


Figure 23
Power ON Switch

NOTE: For both the WT-60 and the HT-200, when units are turned on, the Low Battery LED will flash on breifly with fresh batteries installed. It will stay on continuously with a low battery and will not illuminate at all with a bad or unusable battery.

HT-200 MICROPHONE

Set the HT-200 Power Switch to the "ON" position.

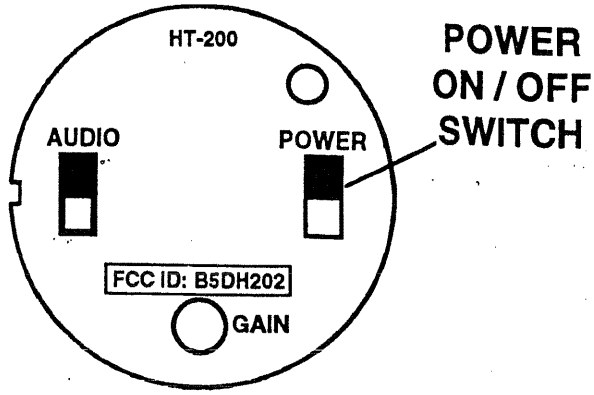


Figure 24
Power ON/OFF Switch - HT-200

SETTING SYSTEM GAIN LEVELS

WT-60 AND HT-200 SOUND PRESSURE LEVEL (SPL)

Normal (SPL) Setting: The "Audio Gain" potentiometer on your transmitter has been factory set to provide readings on the FMR-100 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 26.

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 or a situation where the handheld transmitter is not going to be "close talked", 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 (at the end of the antenna on the WT-60) 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.

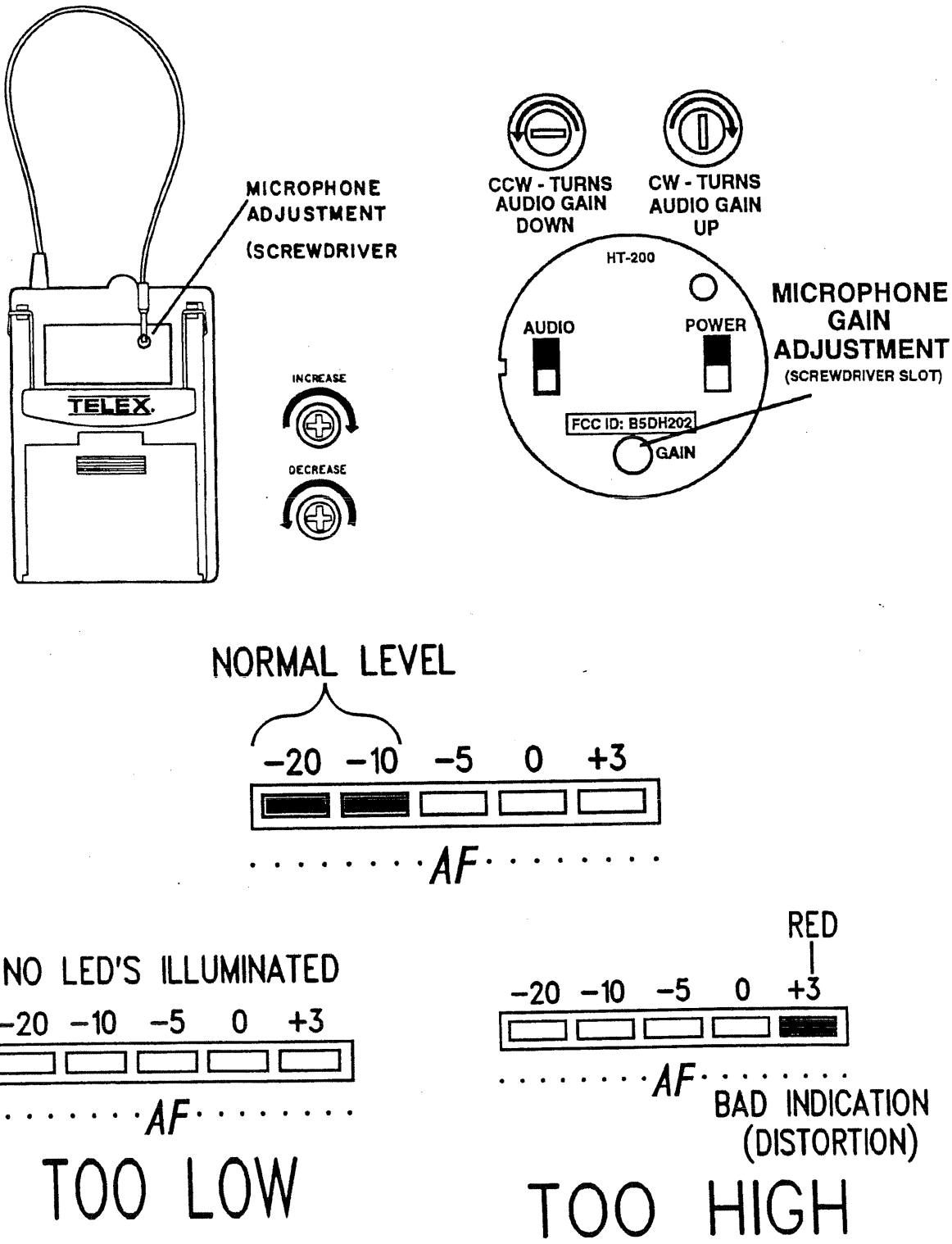


Figure 25
Adjusting Microphone Gain

RECEIVER AUDIO ADJUST

Now that you have properly set the transmitter gain settng 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.

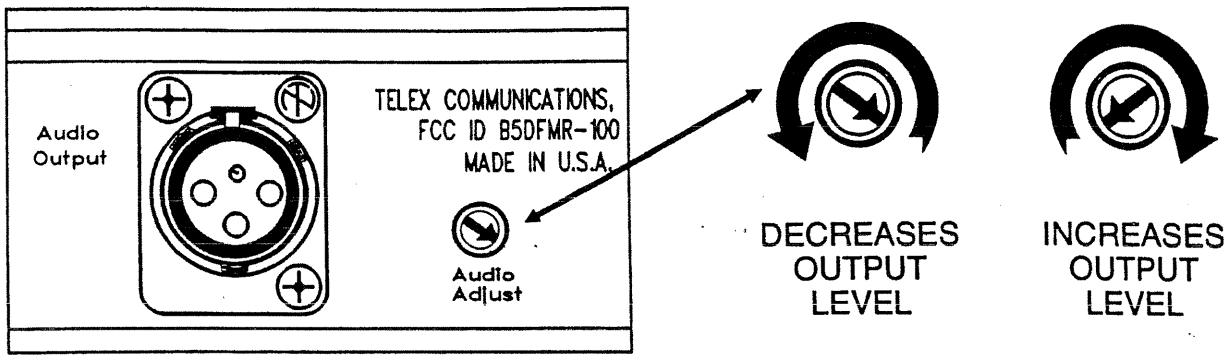


Figure 26
Audio Adjust Control

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 (higer 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 strenth 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.

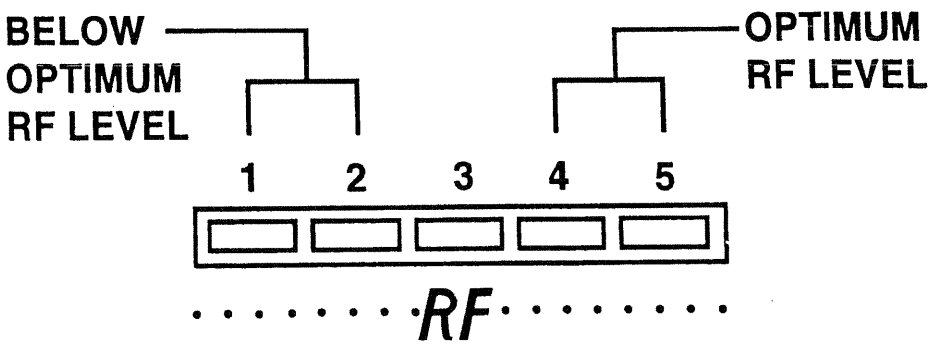


Figure 27
Optimum and Below Optimum RF Levels

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
DISTORTION - System's audio quality seems distorted at medium to high input levels.	Reduce audio gain on transmitter by adjusting the gain control as suggested on page 20.
HISS - System seems to produce a "hiss" which is undesirable.	Check the gain setting on the transmitter as indicated on page 20.
DROPOUTS - 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 and fully extended. 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 14 thru 16.
INTERFERENCE - System picks up signals other than wireless transmitter.	Make sure the frequency of the transmitter matches the freqency 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.
REDUCED DISTANCE - 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 14 thru 16.
BATTERIES DON'T LAST	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.
LOW OUTPUT - System produces a lower output level than other wired microphones in sound system.	Check the gain settings on the transmitter as indicated on page 20 and the audio adjustment on the receiver as shown on page 21.
FEEDBACK - 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.

BATTERY INFORMATION

GENERAL

Improper battery selection, use, installation and care are the cause of numerous wireless microphone system failures.

ALKALINE BATTERIES

Alkaline batteries such as Mallory's MN1604 DURACELL® or Eveready's ENERGIZER® provide the most reliable operation in wireless microphone transmitters. Low cost carbon zinc "bargain" batteries are lower cost but will not sufficiently operate the transmitter.

NICKEL-CADMIUM BATTERIES

Nickel-Cadmium batteries can save you money in the long run, as they can be recharged, but nickel-cadmium's can also cause disappointing wireless performance. If you want to use rechargeable nickel-cadmium batteries you must select a "heavy duty" nickel-cadmium. Conventional "9 volt size" such as GE® or Radio Shack® are only capable of providing 7.2 volts, which is not sufficient to power the Telex WT-60 and HT-200 transmitters.

Battery Type	Volts	Expected Life
Conventional Carbon Zinc	9	Not Recommended
Alkaline MN1604 or Equivalent	9	6 to 8 Hours
GE or Radio Shack Nickel-Cadmium Rechargeable	7.2	Does Not Work
Varta or Gould "Again and Again" Nicikel-Cadmium Rechargeable	8.4	1 1/2 to 2 Hours per charge

Table 1
Battery Information
For HT-200 and WT-60

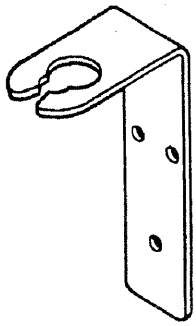
ENERGIZER ® is a registered trademark of Union Carbide Corporation.
DURACELL® is a registered trademark of Duracell Inc.
GE® is a registered trademark of General Electric Company
Radio Shack® is a registered trademark of the Tandy Corp.

MICROPHONE WIRING CHART

LAVALIERS	MODEL NO.	PIN 1	PIN 2	PIN3
SONY	ECM 150	N/C	RED	SHLD
SONY	ECM 50	SHLD	WHITE	RED
SONY	ECM 77	SHLD	WHITE	RED
SONY	ECM 55	SHLD	WHITE	RED
SENNHEISER	MKE-2	SHLD	BLACK	RED
SENNHEISER	MKE-40	SHLD	BLUE	RED
TRAM	TR-50LX	SHLD	BLACK	RED
BEYER	MCE 5.9	OUTER SHLD	GREEN	INNER SHLD
CROWN	PZM	BLACK & SHLD	WHITE	RED
AUDIO TECHNICA	AT 831C	SHLD	YELLOW (2)	RED (2)
AUDIO TECHNICA	AT 803C	SHLD	YELLOW BLACK	WHITE/ RED
SHURE	SM83	SHLD	BLACK	RED
SHURE	SM10-A-HEADSET	BLACK SHLD	RED	N/C
ELECTRO VOICE	CO-90	SHLD	WHITE	RED
COUNTRYMAN	ISOMAX II	BLACK SHLD	WHITE	RED
FENDER	M-1	BLACK SHLD	WHITE	RED
AKG	CK67-3	N/C	SHLD	WHITE
SONY	ECM44	SHLD	WHITE	RED
+BIAS LAVALIER	3 WIRE	SHLD	AUDIO	BIAS
-BIAS LAVALIER	3 WIRE	BIAS	AUDIO	SHLD
+BIAS LAVALIER	2 WIRE	N/C	SHLD	AUDIO
-BIAS LAVALIER	2 WIRE	N/C	AUDIO	SHLD
PIN INFOMATION		**GRND**	**AUDIO**	**BIAS**

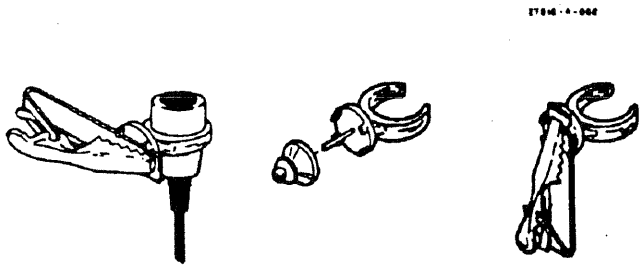
ACCESSORIES

Wall Mount Bracket - For vertical 5/8-wave antenna.
Order No. 63906-000

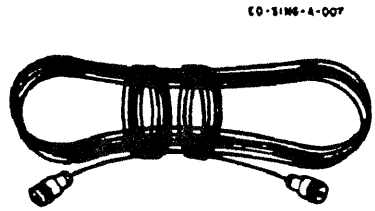


Microphone Stand Bracket Assembly - For mounting vertical 5/8-wave antennas on microphone stand.
Order No. 63907-000

Replacement Tie Clips/Pin for WLM-50
Tie Clip Assembly
Horizontal - **Order No. 63850-004**
Vertical - **Order No. 63850005**
Tie Pin - **Order No. 63848-001**

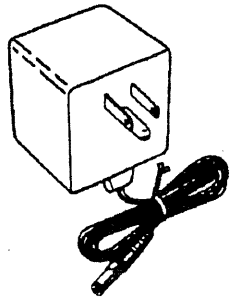


25' Coax Cable
Order No. 63901-000

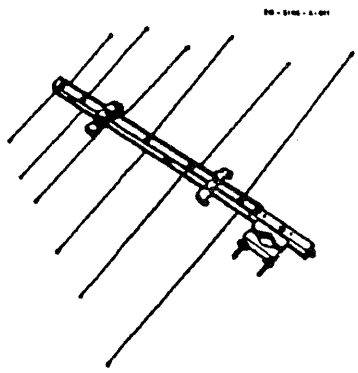


4'Coax Cable
Order No. 63901-001

AC Power Supply
120 Volt, 60 Hz - **Order No. 730279000**

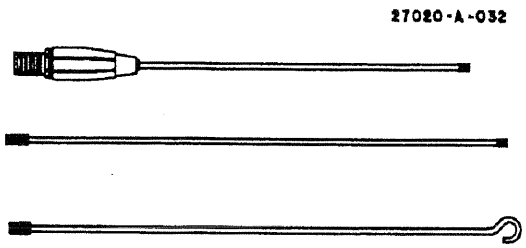


VHF Log Periodic Directional Antenna - 150 - 176 MHz only. Elements fold for compact storage. Comes complete with canvas carrying case.
Order No. 63910-000



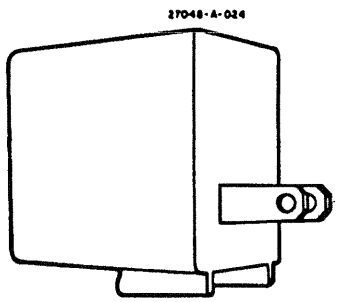
ACCESSORIES (Cont.)

Vertical 5/8-Wave Antenna - Screw apart for easy storing. Comes with 25 feet of coax.
150-176 MHz - **Order No. 63900-000**
176-216 MHz - **Order No. 63900-001**

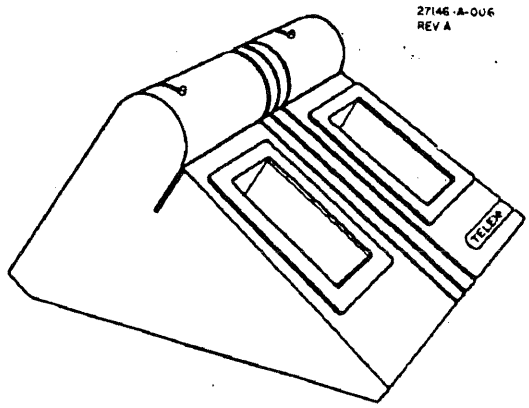


Batteries -
WT-60/HT-100 - Nickel-Cadmium 8.4 volt battery
Order No. 63912-000

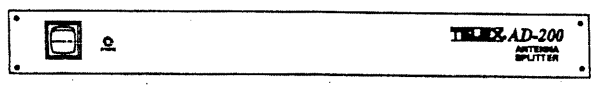
BC-2 Battery Charger - For charging nickel-cadmium battery used in HT-100.
Order No. 64267-00



BC-60 Battery Charger - For charging WT-60 units equipped with nickel-cadmium battery.
Order No. 71020-000



AD-200 - Amplified broadband antenna splitter.
Order No. 71108000



WARRANTY SERVICE INFORMATION

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

Warranty Service Department
TELEX/Hy-Gain
TELEX COMMUNICATIONS, INC.
8601 East Cornhusker Highway
P.O. Box 5579
Lincoln, Nebraska 68505-5579
Phone: (402) 467-5321

All claims of defect or shortage should be addressed to the above address. You must furnish model number, date, place, and proof of purchase, such as a copy of the sales receipt to establish warranty. Your letter should include all pertinent details along with part or item numbers involved. Do Not return anything until requested to do so. Any returned items must have prior authorization. Unexpected returns are greatly delayed in handling. These delays can be avoided by writing in advance and furnishing the necessary information.

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 Model WT-60 and HT-200 Transmitters are Type Accepted under United States Federal Communication Commission Part 90 and 74. The Receiver FMR-100 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.