Telex

Operating Instructions
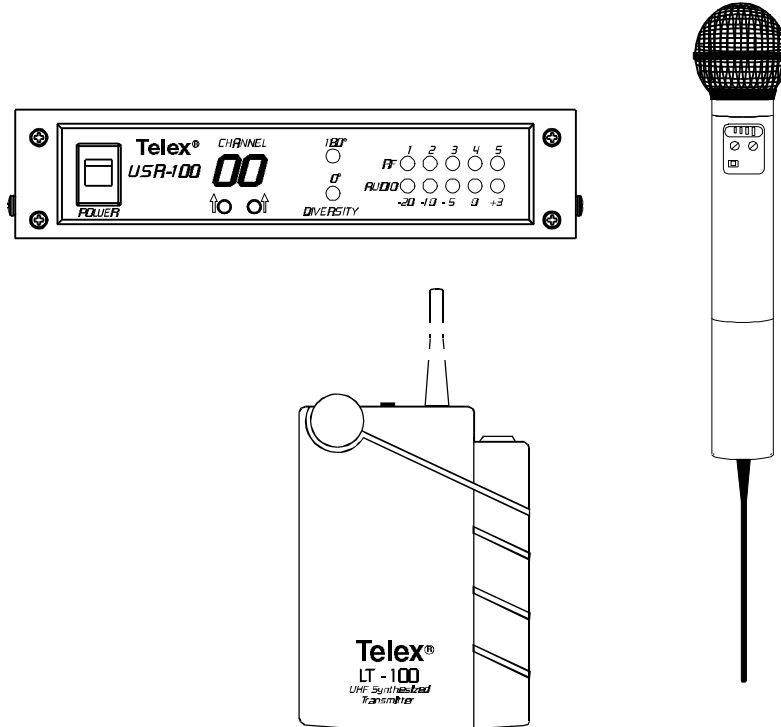
USR-100

UHF Wireless Microphone System

TELEX®

Table of Contents

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GENERAL INFORMATION

The Telex Model USR-100 Receiver and associated Transmitters is a 100 Channel, frequency-selectable full diversity system operating within the frequency range of 668.0 to 746.0 MHz on specific pre-set frequencies. Systems consisting of the USR-100 and its companion transmitter are capable of operating on at least 5 frequencies in a TV channel simultaneously, sometimes more depending on the individual venue. Certain frequencies can be combined to form a set of systems compatible for simultaneous use. Digital frequency control of the USR-100 permits flexibility within a given area and assures confidence in the equipment capability.

FEATURES

Frequency Agility

The USR-100 features a pair of unique UP-UP channel slewing push buttons that makes channel changing easy. Simply press each button until the desired digit appears. A 2 digit 7 Segment LED indicates the Channel. If there is any interference from other wireless users or a TV station in the area, it is a simple matter to change the USR-100 frequency. The frequency agility of the USR-100 is also very useful for itinerant users and rental customers.

Channel Lockout

Prevents channel changes by unauthorized personnel or accident. The lockout status is unaffected when the unit is turned off or unplugged. The channel display will flash 4 times when the USR is turned on if the lockout is enabled. The display will flash rapidly if someone tries to change the channel when the lockout is enabled.

Dual Squelch

The USR-100 features not only a Tone Coded Squelch on a little used tone frequency of 31.250 KHz but also uses RSSI Amplitude Squelch. In the case where there is an RF carrier or noise interference on the channel, the squelch will not open because there is no accompanying tone. The USR-100 must receive the correct tone from the transmitter and the RF carrier before the squelch will open.

Posi Phase Diversity

The USR-100 receiver utilizes Telex's patented Posi Phase auto diversity circuit. Unlike other types of diversity which receive with only one antenna at a time, Posi Phase utilizes both antennas at all times. This results in a stronger signal from the microphone for cleaner audio and greater range.

If the microphone signal begins to go out of phase (a common cause of "drop outs" with other types of diversity) the Posi Phase circuit adjusts the phase angle between the two antennas' receiving circuits to prevent phase cancellation. This action is indicated by the 0 and 180 degree diversity lights on the front panel

Antennas

There are two TNC type antenna connectors on the rear panel. These connectors are superior to the more common BNC connectors, both electrically and mechanically. TNC connectors are becoming the standard of the industry due to their heavy use in the Cellular Phone industry. Quarter wave antennas are supplied for normal use or an optional antenna accessory kit can be used to rack mount the antennas. Optional half wave antennas with coax can be used for remote installations. Both antennas must be used as both are active at all times, unlike other types of diversity that only use one antenna at a time.

Computer Controlled Channels

The VCO (Voltage Controlled Oscillator), which is the heart of any Phase Locked Loop Receiver, is controlled by an on-board PIC microprocessor. Each individual USR-100 RF stage tuning element is also under the direct control of the microprocessor. This directs the receiver to undergo an "Automatic Self Tune" step each time the channel is changed. This is unlike many receivers on the market that simply have "wide band" designs that allow interference to enter the most sensitive stages of a receiver to cause inter-modulation and noise. Other items under processor control are the channel selection, spacing and display, the AF and RF displays and diversity operations. This marriage of digital precision with real analog sound provides the user with the best of both technologies.

Displays

1. The 7 Segment LED channel display already mentioned (00 to 99).

2. A 5 segment LED light array for AF, that aids in setting microphone gains and monitoring receiver microphone and line level outputs. Light numbers 4 and 5 have a Peak Hold feature.

3. A 5 segment LED light array for RF, that aids in checking the transmitter and monitoring for the possibility of initial interference.

4. A 2 segment LED array that indicates diversity action and antenna configuration.

Audio Output

An XLR type connector is located on the rear panel that provides either line level audio or microphone level audio output, which is controlled by a slide type switch also located on the rear pane. The output level is adjustable with a screwdriver accessible potentiometer located on the rear panel.

Power

The USR-100 will operate from the supplied AC adapter or any nominal 12-15 volt AC/DC 600 mA supply.

Audio

The USR-100 audio circuitry is designed to complement the transmitter audio. A compandor circuit is utilized to enhance the dynamic range. A slow turn-on circuit prevents the audio output stage from passing noise spikes present during receiver power up conditions.

USR-100 Receiver
Specifications

RF Frequency Range. . . . . 668.0 to 746.0 MHz

Channels . . . . . .   100 (0-99) (within TV Ch. 47/48 & 58/59)

R.F. Stability . . . . 0.005% or better

Modulation Type . . . . FM, 40 KHz nominal

Type. . . . . Single Conversion, 10.7 MHz I.F.

I.F. Bandwidth. . . . . 230 KHz at -3 db points.

Image Rejection . . . . 65dB or better

Squelch . . . . 31.250 KHz Tone + RSSI Amplitude

Audio Output . . . . Level, 0.775V RMS/100k load

-20 dBV, 600 Ohm load

Receiver Sensitivity . . . Less than 0.8 uV for 12 dB SINAD

FCC. . . . . Notification, Part 15

Diversity . . . . Continuous Posi Phase Diversity

Both antennas are fully employed at all times
to maximize signals.

RF Selectivity . . . . Tracked Ceramic Resonators.

Not Broadband.

Model SH-100 Transmitter
Specifications

Frequency of operation . . . . 668.000 to 746.000 MHz.
(Current models operate in 2 frequency ranges.)
668.000 to 679.500 MHz and 734.100 to 745.500 MHz.

Number of Channels . . . . 100 User Selectable Channels
in each range.

Power Output (Terminated). . . 10 mW, High switch setting,
1.0 mW Low.

Antenna . . . . Permanently attached.

Modulation . . . . FM, +/- 40 KHz Deviation,
50 us pre-emphasis.

Frequency Response (System) . . . . 50 Hz to 15000 Hz

Microphone . . . . Dynamic or Electret, + 5 VDC Bias.

Tone Squelch. Full time, 31250 Hz

DC Power . . . . 2 AA Size Alkaline Batteries.

Battery Life . . . . 9 Hours, High Power, 12 Hours Low

Low Battery Indicator . . . . Built-in Fuel Gauge, Test Switch

Approvals . . . . FCC, Part 74H
Industry Canada, RSS123

Model LT-100 Transmitter
Specifications

Frequency of operation . . . . 668.000 to 746.000 MHz.
(Current models operate in 2 frequency ranges.)
668.000 to 679.500 MHz and 734.100 to 745.500 MHz.

Number of Channels . . . . 100 User Selectable
Channels in each range.
Power Output (Terminated). . . . 10 mW, High switch setting,
1.0 mW Low
Antenna . . . . Permanently attached
Modulation . . . . FM, +/- 40 KHz Deviation,
50 us pre-emphasis.
Frequency Response (System) . . . . 50 Hz to 15000 Hz
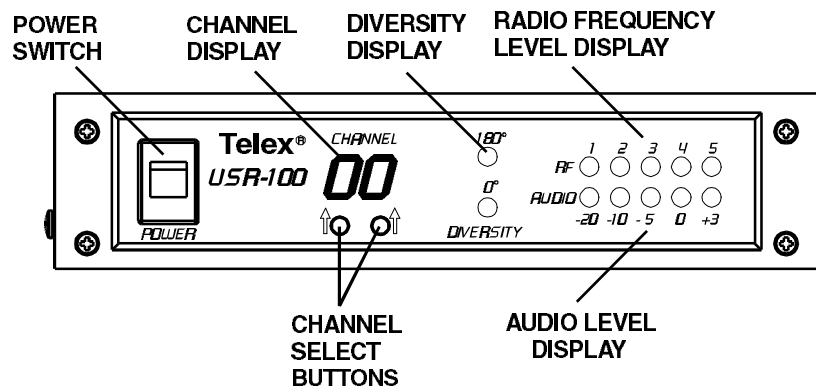Microphone . . . . Dynamic or Electret, + 5 VDC Bias
Tone Squelch. Full time, 31250 Hz
DC Power . . . . 2 AA Size Alkaline Batteries
Battery Life . . . . 9 Hours, High Power, 12 Hours Low
Low Battery Indicator . . . . Built-in Fuel Gauge, Test Switch
Approvals . . . . FCC, Part 74H
Industry Canada, RSS123

Figure 1
Front Panel

Power Switch: When turned on, the channel display illuminates and one of the diversity lights will come on.
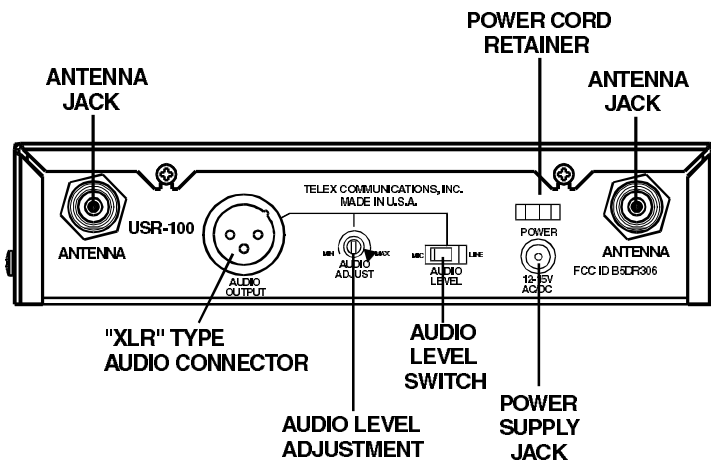
Channel Select Buttons: Push once to increase display by one. Push and hold to increase display more than one. Left button changes "10's", Right button changes "1's".

Channel Lockout: To enable/disable Channel Lockout function, press both channel select buttons simultaneously and hold them in until the channel readout stops blinking. When the buttons are released, the lockout mode will be the opposite of before. To check status of lockout, press one channel button. If the display changes, the lockout is disabled. If the display blinks rapidly, the lockout is activated.

Diversity Display: LED's indicate diversity operation.

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

RF Display: A 5-segment three color LED Display indicates the relative signal strength from the transmitter.

POWER CORD
RETAINER

ANTENNA
JACK

ANTENNA
JACK

TELEX COMMUNICATIONS, INC.
MADE IN U.S.A.

USR-100

ANTENNA

POWER

ANTENNA

FCC ID B5DR306

AUDIO
OUTPUT

AUDIO
ADJUST

AUDIO
LEVEL

12-15V
AC/DC

"XLR" TYPE
AUDIO CONNECTOR

AUDIO
LEVEL
SWITCH

AUDIO LEVEL
ADJUSTMENT

POWER
SUPPLY
JACK

Figure 2
Rear Panel

Antenna Jacks: Two antenna jacks for posi phase diversity reception. Attach an antenna to each jack.

Audio Output: XLR type jack connects to audio sound system (Amplifier/Mixer). Pin 1 ground, Pin 2 +, Pin 3 -.

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

Audio Level: Set switch to match the input characteristics of your audio sound system.

Power Jack: For external AC wall supply adapter (supplied). Will accept 12-15 volts AC/DC at 600 mA. Plug size is 2.1mm x 5.5 mm.

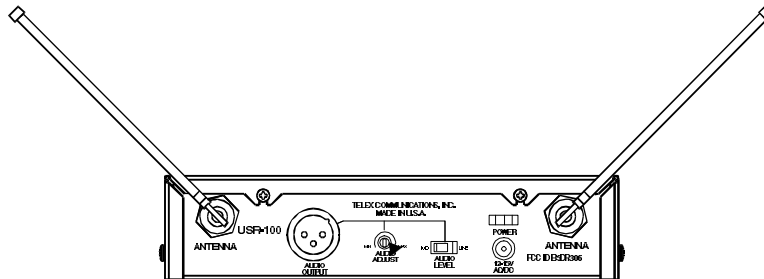**Power Cord Retainer:** To prevent accidental pull out of the power plug.

Receiver Set-up

Connect the supplied AC power adapter to an AC outlet supplying 105 to 125 volts AC, 60 Hz. The 230 volt export model should connect to an AC outlet supplying 210-240 VAC, 50-60 Hz.
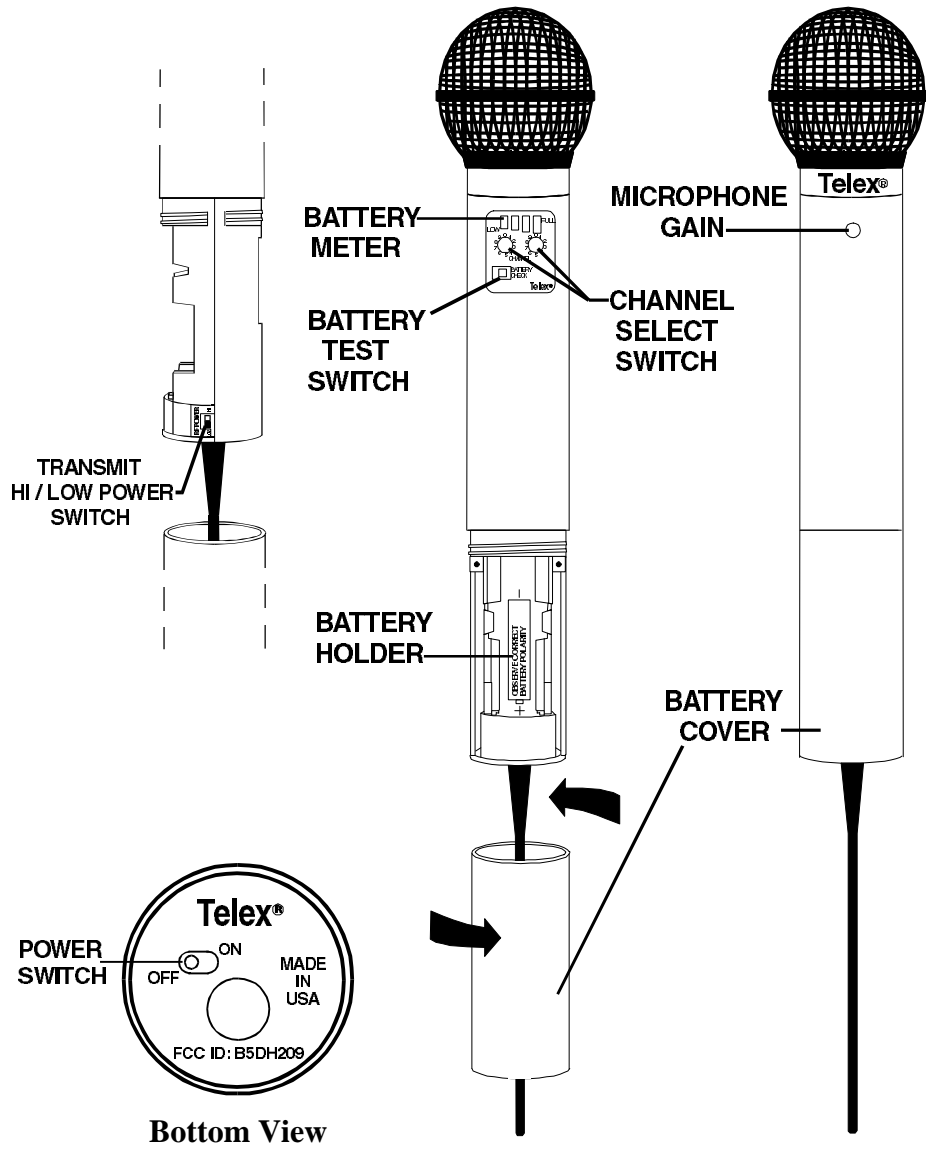
Connect the USR-100 to your equipment:

· Insert a 3 pin female "XLR" audio connector and cable into the Audio Output receptacle on the rear of the USR-100.

· Insert the other end of the audio cable into the input of your Mixer/Amplifier.

· Set the Audio Level Switch on the USR-100 to match the input level of your audio system.

If utilizing the two 1/4 wave antennas supplied, connect both of them to the back of the receiver at a 90˚ angle as shown in Figure 3. Tighten the connectors securely. (If using other types of antennas, refer to the placement instructions on page 14 of this manual.)

Figure 3
Antenna Mounting

BATTERY METER

BATTERY TEST SWITCH

TRANSMIT HI / LOW POWER SWITCH

MICROPHONE GAIN

CHANNEL SELECT SWITCH

BATTERY HOLDER

OBSERVE CORRECT BATTERY POLARITY

BATTERY COVER

Telex®

POWER SWITCH

ON

OFF

MADE IN USA

FCC ID: B5DH209

Bottom View

Figure 4
SH-100

SH-100

Power Switch: Located on the bottom of the handle.

Battery Test Button: Press to check the remaining life of the batteries.

Battery Meter: The number of segments that light when the Battery Test Button is pushed indicate the approximate time of battery life remaining.

Battery Meter		
Number of Lights	Time Remaining High Power (alkaline batteries, intermittent usage)	Time Remaining Low Power (alkaline batteries, intermittent usage)
4 - 3 grn 1 red	9 hours or less	12 hours or less
3 - 2 grn 1 red	7 1/2 hours or less	9 hours or less
2 - 1 grn 1 red	6 hours or less	7 hours or less
1 - 1 red	2 hours or less	2 1/2 hours or less
1 - red flashing	1/2 hour or less	1/2 hour or less
4 lights flashing	batteries almost dead- will not transmit	batteries almost dead- will not transmit

Channel Select Switches: Control the transmit channel. Must be set to match the channel of the receiver.

Microphone Gain: Controls the gain of the audio circuit to prevent under or over modulation.

Transmit Power Switch: Set to high for maximum range. Set to low to prolong battery life.

Set-Up

NOTE: Do not use carbon-zinc batteries. Ni-Cad batteries may be used but will yield shorter run times.

- Unscrew the handle and install 2 "AA" size alkaline batteries. Be sure the battery polarity matches the diagram printed inside the battery holder.

- Set the transmit power switch to high or low depending on the situation and requirements of the venue.

- Screw the handle back on.

Top View

Side View   **Back View**
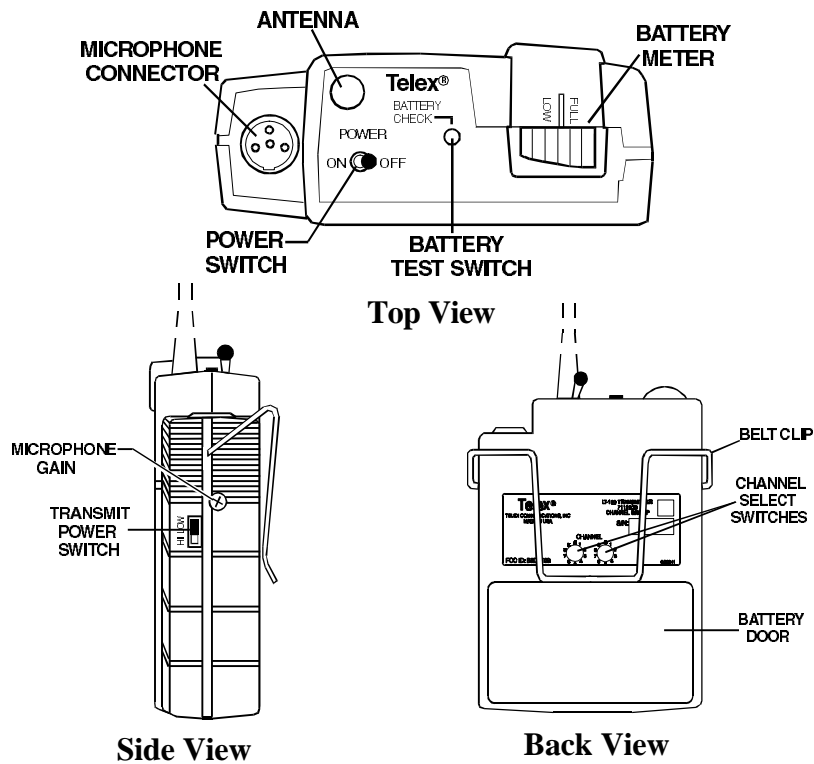
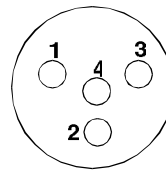**Figure 5**
LT-100

LT-100

Power Switch: Located on the top of the case.

Battery Test Button: Press to check the remaining life of the batteries.

Battery Meter: The number of segments that light when the Battery Test Button is pushed indicate the approximate time of battery life remaining.

Microphone Connector: wired as follows:

        Pin 1   Ground
        Pin 2   Mic
        Pin 3   +5 volt bias
        Pin 4   +5 volt bias fed through a 3K ohm
                   resistor for 2 wire electrets.

Battery Meter		
Number of Lights	Time Remaining High Power (alkaline batteries, intermittent usage)	Time Remaining Low Power (alkaline batteries, intermittent usage)
4 - 3 grn 1 red	9 hours or less	12 hours or less
3 - 2 grn 1 red	7 1/2 hours or less	9 hours or less
2 - 1 grn 1 red	6 hours or less	7 hours or less
1 - 1 red	2 hours or less	2 1/2 hours or less
1 - red flashing	1/2 hour or less	1/2 hour or less
4 lights flashing	batteries almost dead- will not transmit	batteries almost dead- will not transmit

Channel Select Switches: Control the transmit channel. Must be set to match the channel of the receiver.

Microphone Gain: Controls the gain of the audio circuit to prevent under or over modulation.

Transmit Power Switch: Set to high for maximum range. Set to low to prolong battery life.

Set-Up
NOTE: Do not use carbon-zinc batteries. Ni-Cad batteries may be used but will yield shorter run times.

* Remove the battery door and install 2 "AA" size alkaline batteries. Be sure the battery polarity matches the diagram printed inside the battery holder.

* Set the transmit power switch to high or low depending on the situation and requirements of the venue.

* Replace the battery door.

* Insert the microphone plug into the connector.

System Set-Up

NOTE: Whe employing two or more wireless microphones, the transmitters should be a minimum of 10-15 feet away from the receiver(s) to prevent "front-end" overload.

Turn on the receiver. Set the Channel to the number desired on both the transmitter and receiver. Check the RF lights. If any light except light #1 is on, this indicates interference and another channel should be selected. Turn on the transmitter. Speak into the microphone and adjust the gain so that the Audio Meter on the receiver just illuminates the 0 (or yellow) light on the loudest sounds.

If necessary, vary the Audio Adjust on the back of the receiver to suit your equipment.

Walk the transmitter through the expected use area to check for "drop-outs". To minimize the chance for drop-outs, read the section on antenna placement.

Antenna Placement

The antennas and USR-100 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 USR-100 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 better range and when rack mounting, the antennas must be located on the front of the rack mounts or use optional ground independent antennas and remote mount them. See the accessories section of this manual for cable kits to front mount the antennas.

Remote mounting antennas will increase the effective reception range when appropriately positioned. The two 1/4 wave antennas supplied are not ground independent and therefore not appropriate for remote mounting. See the accessories section of this manual for remote-mountable antenna options.

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 nearby objects.
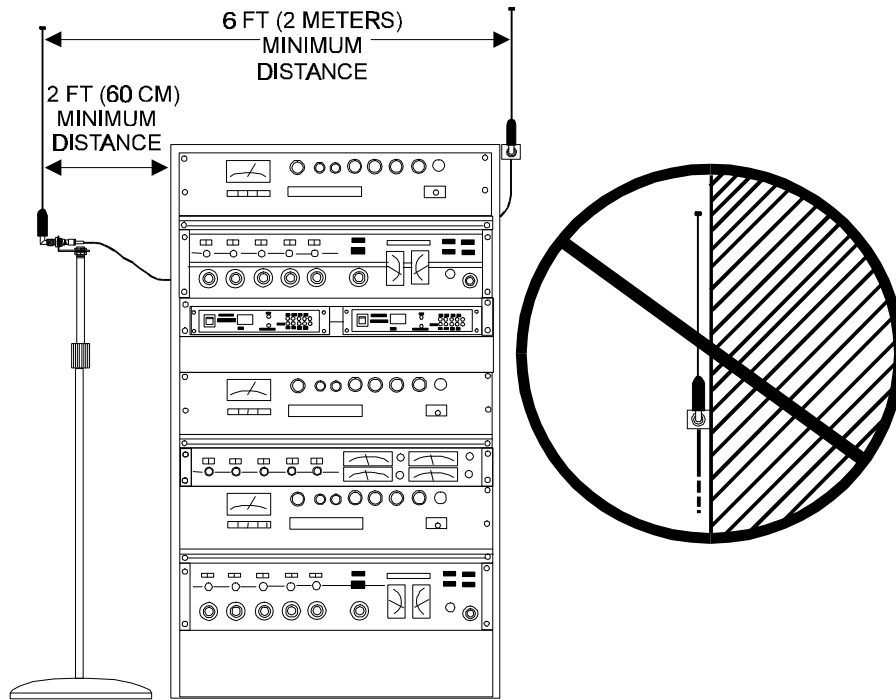
Accessories for remote antenna mounting are listed in the back of this manual. See Figures 6 and 7 for suggested mounting options.

Bracket Mounting
The antenna brackets may be either mounted on mic stands or secured to some other object with the hardware provided.
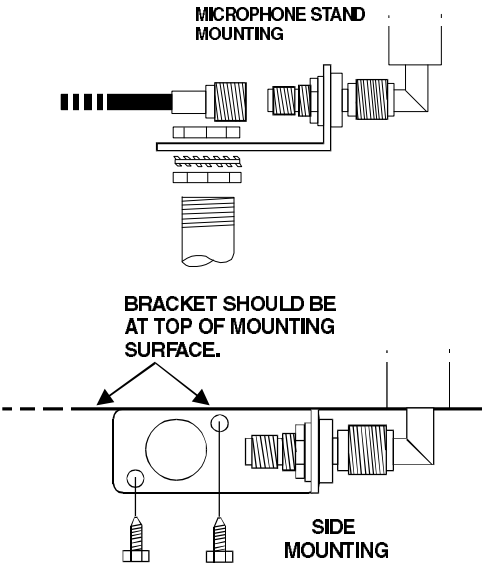
Figure 6
Bracket Mounting

Figure 7
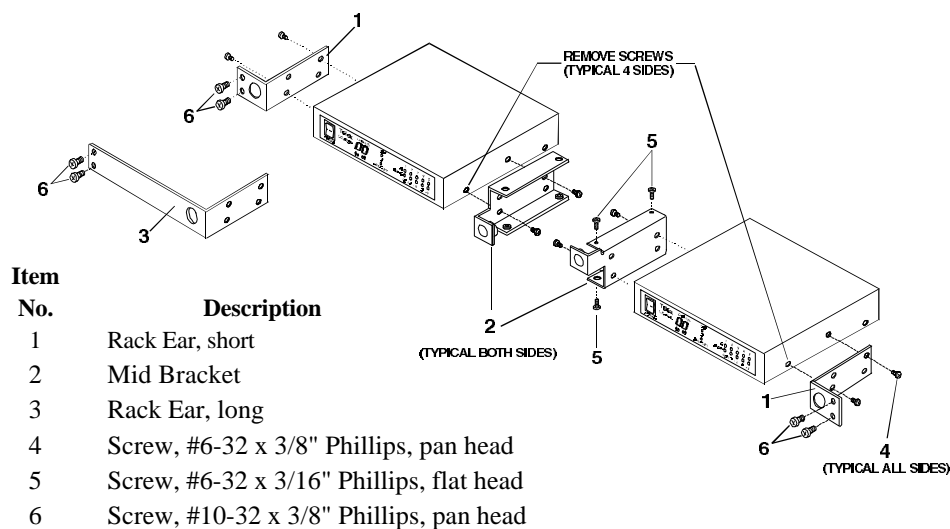**Antenna Placement with Accessory Brackets and Cables**

If possible, do not mount the brackets on a wall. See Figure 7 for bracket and antenna placement.

Antenna Connection

Attach the two antenna cables to the back of the USR-100. Be sure the connectors are tightened securely. Route the cable to the antennas and attach in the same manner.

Installing Rack Mounts

The USR-100 is supplied with rack mounts for both double and single mounting in a 19" equipment rack. For single mounting, the long and short rack "ears" are used. For dual mounting, use the short "ears and the mid brackets from two USR-100's.

Item No.	Description
1	Rack Ear, short
2	Mid Bracket
3	Rack Ear, long
4	Screw, #6-32 x 3/8" Phillips, pan head
5	Screw, #6-32 x 3/16" Phillips, flat head
6	Screw, #10-32 x 3/8" Phillips, pan head

Figure 8
Assembly of Rack Mount

Assembly

To assemble the rack mount to the unit(s) and install it into a 19" rack, proceed as follows:

· Remove the front Phillips head screws from each side of each unit. Refer to Figure 1.

· Align the rack ear (Item No. 1 or 3) with the holes on the side of the unit. Install the previously removed screws. Insert an additional screw (Item No. 4 provided in the parts pack) into the remaining hole. Repeat this step for the opposite side of the unit. Tighten all screws securely.

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Double Mounting:

- Align the mid brackets (Item No. 2) with the holes on the adjacent sides of each unit.

- Install the previously removed screws. Insert an additional screw (Item No. 4 provided in the parts pack) into the remaining holes. Tighten all screws securely.

- Place the two assemblies side by side with the mid brackets together. (The left bracket should fit above the right so that the countersinks are visible.) Install 4 flat head screws (Item No. 5) Tighten all screws securely.

Place the assembly into the 19 inch rack enclosure and insert four #10-32 x 3/8" Phillips pan head screws (supplied) in each corner of the rack ears and secure to your enclosure.

ACCESSORIES AND REPLACEMENT PARTS
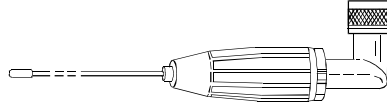
Model CLA-X - 1/2 Wave Antenna
- for remote mounting

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
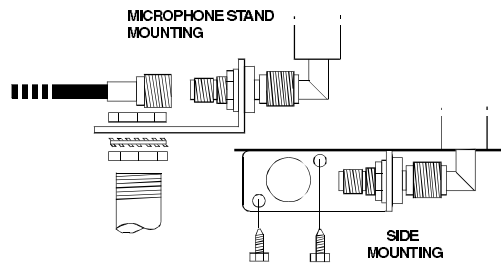
Model AB-2 Combination Antenna Bracket
with hardware and 10 foot (3 meter) coaxial cable
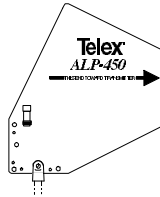TNC Connectors. Use with Model CAL-X Antennas.
Order No. 71138000

1/4 Wave Replacement Antenna
Part No. 879010
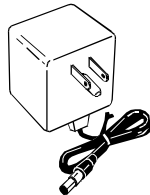
AC Power Supply 120 Volt, 60 Hz

Order No. 730131

Model ALP-450 450-900 MHz Directional Log Periodic Antenna
includes mounting hardware and 10 foot (3 meter) coaxial cable with
TNC Connectors. 9 1/2" long x 11" high. Unique forward coverage
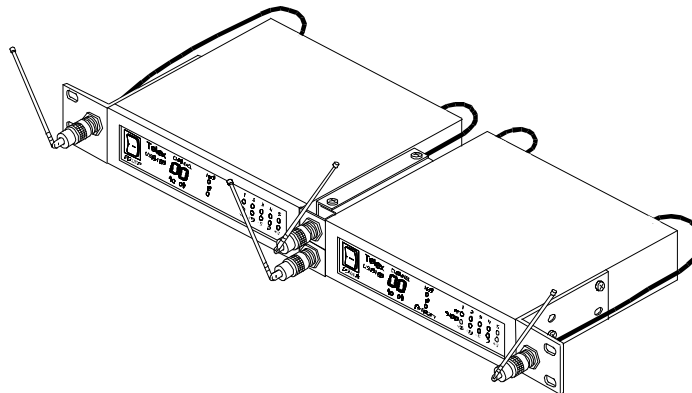pattern increases signal gain up to 5 db. Covers all frequencies and
increases range.

Order No. 71147000
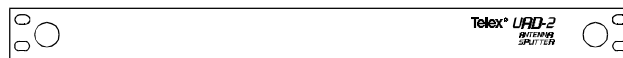
Model UAD-2 Four Way Antenna Splitter
Order No. 71253000
Feeds four USR-100's with just two antennas. Also supplies power.
Eliminates 3-power supplies and 6 antennas

Front Connector Mounting Kit
Part No. 878978
This kit consists of 4 cable and connector assemblies with "TNC" type
connectors. They attach to the rack mounts by removing the filler
plugs and installing a single nut.

FCC INFORMATION

The TELEX Model USR-100 receiver 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.

The Telex Model SH-100 and LT-100 transmitters are Type Accepted under United States Federal Communications Commission Part 74. Licensing of Telex equipment is the user's responsibility and licensability depends upon the user's classification, user's application, and frequency selected. Telex strongly urges the user to contact the appropriate telecommunications authority for any desired clarification.

CAUTION: Any changes or modifications made to the above equipment could void the user's authority to operate the equipment.

CUSTOMER SERVICE INFORMATION

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

> Customer 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
> FAX: (402) 467-3279

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 Department. 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.

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.

TELEX ®