

M-216 OPERATOR'S MANUAL

M-216
Wireless
Microphone
Transmitter



COMTEK[®]

INTRODUCTION

M-216 ***Wireless*** ***Microphone*** ***Transmitter***

The M-216 wireless microphone transmitter offers the ultimate performance and versatility for assistive listening, language interpretation, tour guide presentations, personal cueing, and for other personal remote transmission situations.

The M-216 incorporates the latest digital and analog technologies to produce low residual noise, wide dynamic range, and extended frequency response rendering the most natural sound possible from a wireless microphone.

The transmitter's microcontroller automatically sets the modulation deviation, companding or non-companding audio processing, and the EQ when corresponding channels are selected. Because of this comprehensive feature, this versatile transmitter can transmit on 19 high fidelity channels and 38 standard channels ensuring compatibility with receivers conforming to regulations regarding Low Power Radio Service (LRPS) transmissions in the 216-217 MHz band under Part 95 of the FCC regulations.



M-216 OPERATING INSTRUCTIONS

Setup

a. Check to ensure that the M-216 transmitter's radio frequency channel is the same as the associated COMTEK receiver's channel. (Channels are indicated by the rotary channel selector switches on the back of the transmitter. See page 3.)

b. Open the battery door cover on the transmitter (see page 4) and insert a new nine volt alkaline battery (Eveready E522 or equivalent). This type of battery will offer up to 40 hours of operation. *Replace the battery before every use if the demand for fail-safe operation outweighs battery cost. The use of carbon batteries is not recommended.*

NOTE: If a rechargeable battery is to be used, ensure that it has been allowed to charge at least twelve hours to bring it to full charge (see page 7 for battery charger instructions).

c. Connect the microphone to the transmitter by inserting the microphone plug into the receptacle on the top of the transmitter. The transmitter is operating when the transmitter power switch is turned on and the battery status/on indicator illuminates.

NOTE: The 36-inch microphone cord also functions as part of the transmitter's antenna system. For optimum performance, this cord should be fully extended. Coiling or bunching the microphone cord may reduce the range of the transmitter. The transmitter should be carried by the snap-on belt clip (included) or in a pocket or belt-clip pouch.

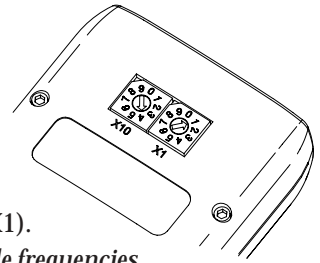
d. In a situation where an extremely loud voice or a very soft voice is used, it is necessary to adjust the audio input gain control while observing the audio "voice" level modulation indicator. A full bright LED indicates full audio compression at 100% modulation. For best performance, the audio input gain should be adjusted for some low level LED luminescence during normal audio levels with occasional full bright peaks indicating 100% modulation.

M-216 OPERATING INSTRUCTIONS

Frequency Selection (216-217 MHz)

The M-216 transmitter can operate on one of 57 available channels between 216 MHz and 217 MHz. COMTEK's channel designations indicate both standard narrow-band channels and high-fidelity, wide-band companded channels. Channels 1-40 are narrow-band channels (5 kHz deviation) offering compatibility with other manufacturers' receivers such as the Phonak MicroEar. Channels 41-60 are high-fidelity, wide-band companded channels (10 kHz deviation) for use with COMTEK transmitters. COMTEK transmitters automatically transmit the proper modulation when set to channels 1-40 for narrow-band or 41-60 for wide-band companded channels.

After you have determined the channel on which you are going to operate, position the two rotary switches to indicate the channel. The left rotary switch is for *tens* and the right rotary switch is for *ones*. To select channel 41 (216.0250 MHz), position the left rotary switch to point to 4 (X10), and position the right rotary switch to point to 1 (X1).



Refer to frequency charts on pages 9 and 10 for selectable frequencies.

Multiple Channel Operation

When multiple transmitters are broadcasting in the same immediate area (within 100 feet), the RF signals will “mix” together generating additional signals. If these product frequencies are too close to a frequency which you are using, you will experience intermodulation interference. This condition is common to all radio receivers to some extent.

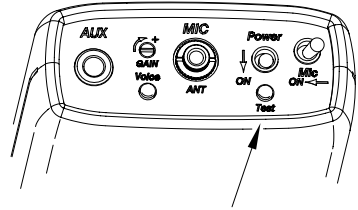
Simultaneous operation of more than three channels requires frequency coordination to avoid intermodulation interference, which could result in poor or unusable performance.

To avoid this type of interference, you should select frequencies from one of the standard groups (see frequency group charts on page 10), or use COMTEK's frequency selection software (www.comtek.com/software.htm) to determine appropriate frequencies or contact COMTEK to obtain a free copy.

M-216 OPERATING INSTRUCTIONS

Low Battery Indicator

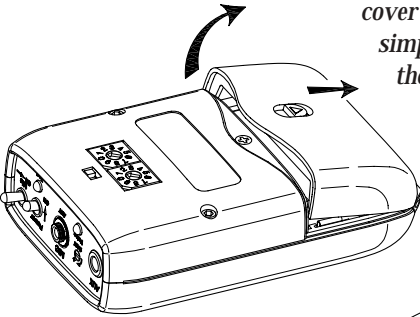
The LED on the top of the transmitter indicates the status of the battery as well as indicating that the unit is turned on. When turned on, the LED illuminates. If the battery is low the green LED will blink rapidly to warn you that the battery will soon be dead. Replace a low battery immediately.



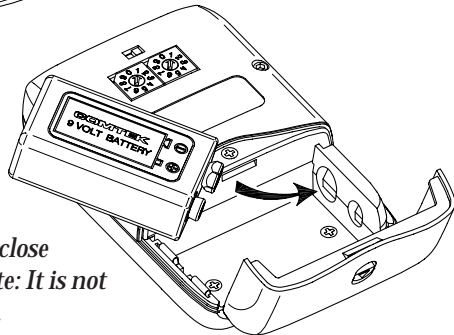
Battery indicator LED

Battery Removal / Replacement

Pull back battery door latch and allow battery cover door to spring open. To remove battery, simply manipulate the bottom of battery out of the compartment and remove.



To insert battery, face battery with negative terminal in line with large hole in battery compartment, press battery into compartment and close battery door until it snaps shut. Note: It is not possible to put battery in backwards.



M-216 OPERATING INSTRUCTIONS

Auxiliary Audio Input Operation

The M-216 transmitter may transmit from a variety of audio sources such as tape and C.D. players, TV and VCR's, or any audio device having an auxiliary or line level audio output.

The auxiliary input cable supplied with the M-216 transmitter (CB-36 ST) will operate with any device having a mini 3.5 mm jack, stereo or mono, and with line level or earphone level output.

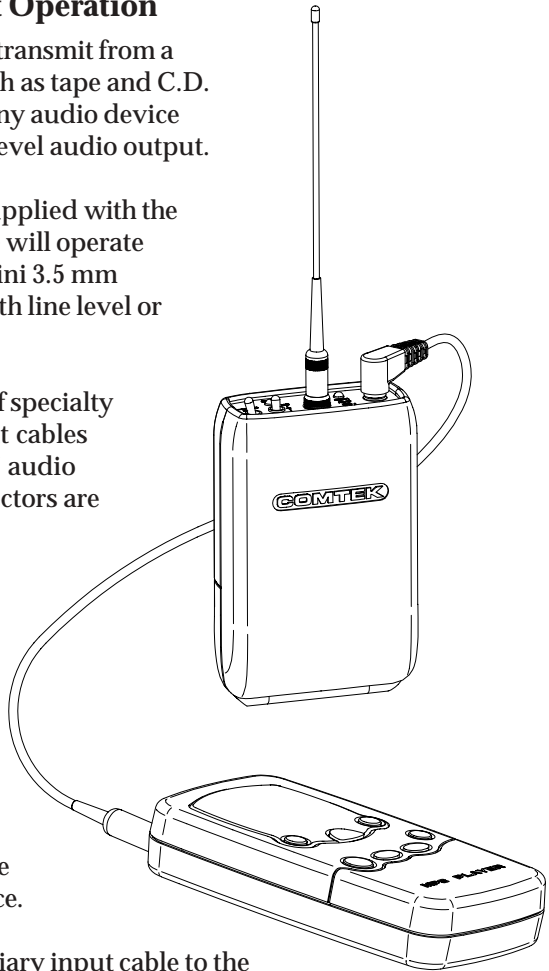
To accommodate a variety of specialty applications, auxiliary input cables with RCA phono plug, 1/4" audio phone plug, and XLR connectors are available from COMTEK.

Setup

a. Plug the micro-mini screw-lock whip antenna into the top center jack (mic/ant.) of the M-216 transmitter. The whip antenna should be in a vertical position away from any metallic objects to insure maximum range performance.

b. Connect the proper auxiliary input cable to the audio source. Connect the right-angle mini plug end of the auxiliary input cable in the "AUX" input jack of the M-216 transmitter.

Note: Check to ensure that the audio source is a line level, earphone level, or fixed AUX level output.



(continued)

M-216 OPERATING INSTRUCTIONS

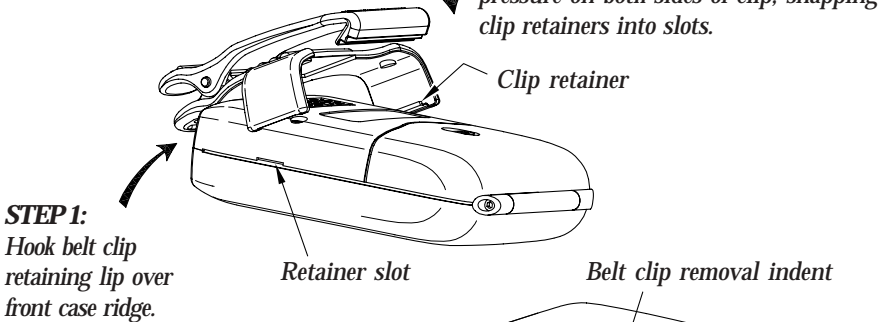
c. Turn on the transmitter with program from the audio source being fed to the transmitter. Observe the audio “voice” level modulation indicator. A full bright LED indicates full audio compression at 100% modulation. For best performance, the audio input gain should be adjusted for some low level LED luminescence during normal audio levels with occasional full bright peaks indicating 100% modulation.

d. When using the auxiliary audio input with the microphone plugged into the transmitter, priority should be given to the microphone gain adjustment. The mixing balance between the auxiliary audio and the microphone should be made with the volume control of the auxiliary audio source.

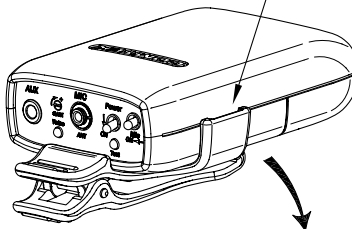
Note: The optional microphone mute switch only affects the microphone. It does not affect the auxiliary audio input.

M-216 SNAP-ON BELT CLIP (Included)

Belt clip installation



Belt clip removal



Flex out and pull down with your thumb or a large coin (quarter) to unsnap belt clip from case.

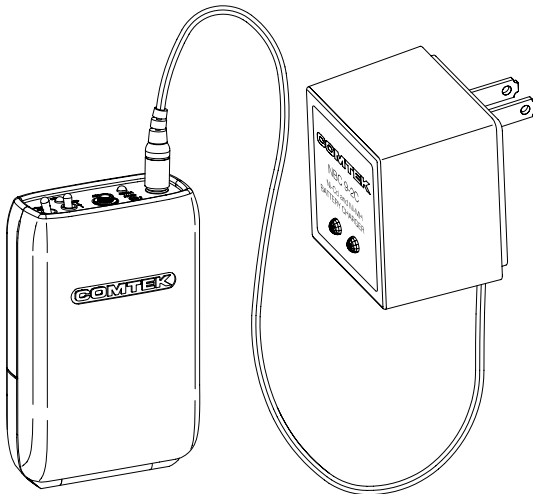
M-216 OPERATING INSTRUCTIONS

Battery Charge

To charge the M-216 with the NBC 9-2C charger:



1. Make sure that a Ni-MH or Ni-Cad rechargeable battery is used.
(Alkaline batteries must not be charged with the NBC 9-2C charger.)
2. Make sure the M-216 is turned **OFF**.
3. Note that the red charging indicator on the NBC 9-2C should turn on when the charger output cord is plugged into the AUX input receptacle on the transmitter.
4. Charge the battery for 12 hours to allow 12 hours of operation when Ni-MH battery is used. Note that immediately after charging, the battery will be warm. This is normal and not cause for alarm.
5. On stored COMTEK units, periodically open the battery compartment to check for battery leakage. If a battery is leaking, it must be discarded, and the battery compartment must be cleaned or returned to COMTEK's service department for repairs.



M-216 CONTROLS

❶ COMPAND AUTO / OFF SWITCH: This switch overrides the automatic selection of the companded channels to non-companded operation.

❷ CHANNEL SWITCHES: These rotary switches are set to the same channel as the receiver. Actual frequency of operation must agree with the receiver.
(See page 10 for frequency selection chart.)

❸ BATTERY COMPARTMENT: The battery compartment features a hinged battery cover and an alignment system that ensures proper battery polarity. Battery installation and removal is facilitated by simply manipulating the bottom of the battery.

❹ AUXILIARY AUDIO INPUT JACK: Allows transmitter to use line level, earphone level, or fixed AUX as an audio source.

❺ AUDIO “VOICE” MODULATION INDICATOR: This indicator is used in making adjustment with the Audio Input Gain Control.

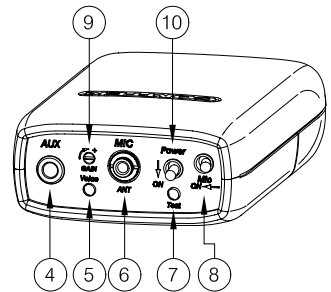
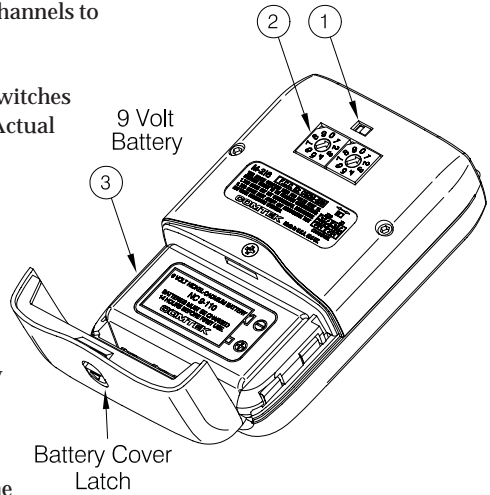
❻ MIC / ANTENNA JACK: This jack accepts an electret type microphone having a 36” long cord with a micro-mini 2.5mm mono plug. This jack is also used for the R.F. output for the screw-in whip antenna when the auxiliary audio input is used.

❼ POWER / BATTERY STATUS INDICATOR: This LED indicator will illuminate continuously when the unit is on, indicating normal operation. When the battery voltage drops below 6 volts, the LED will flash *rapidly*, indicating that a new battery is needed.

❽ OPTIONAL MIC MUTE SWITCH: This switch turns off the microphone without turning off the transmitter carrier.

❾ AUDIO INPUT GAIN CONTROL: This is a microphone and AUX level input gain control. This control is used with the “Voice” modulation indicator.

❿ ON / OFF SWITCH: This switch turns the transmitter on and off.



M-216 FREQUENCY CHART

Narrow-Band Channels; 5 kHz dev.
For use with COMTEK and other manufacturers
(Educational Standard)

CHANNEL (SWITCH POSITION)	FREQUENCY
01	216.0125 MHz
02	216.0375 MHz
03	216.0625 MHz
04	216.0875 MHz
05	216.1125 MHz
06	216.1375 MHz
07	216.1625 MHz
08	216.1875 MHz
09	216.2125 MHz
10	216.2375 MHz
11	216.2625 MHz
12	216.2875 MHz
13	216.3125 MHz
14	216.3375 MHz
15	216.3625 MHz
16	216.3875 MHz
17	216.4125 MHz
18	216.4375 MHz
21	216.5125 MHz
22	216.5375 MHz
23	216.5625 MHz
24	216.5875 MHz
25	216.6125 MHz
26	216.6375 MHz
27	216.6625 MHz
28	216.6875 MHz
29	216.7125 MHz
30	216.7375 MHz
31	216.7625 MHz
32	216.7875 MHz
33	216.8125 MHz
34	216.8375 MHz
35	216.8625 MHz
36	216.8875 MHz
37	216.9125 MHz
38	216.9375 MHz
39	216.9625 MHz
40	216.9875 MHz

High-Fidelity Channels; 10 kHz dev.
For use with COMTEK equipment only
(Companded)

CHANNEL (SWITCH POSITION)	FREQUENCY
41	216.0250 MHz
42	216.0750 MHz
43	216.1250 MHz
44	216.1750 MHz
45	216.2250 MHz
46	216.2750 MHz
47	216.3250 MHz
48	216.3750 MHz
49	216.4250 MHz
51	216.5250 MHz
52	216.5750 MHz
53	216.6250 MHz
54	216.6750 MHz
55	216.7250 MHz
56	216.7750 MHz
57	216.8250 MHz
58	216.8750 MHz
59	216.9250 MHz
60	216.9750 MHz
61	216.0250 MHz
62	216.0750 MHz
63	216.1250 MHz
64	216.1750 MHz
65	216.2250 MHz
66	216.2750 MHz
67	216.3250 MHz
68	216.3750 MHz
69	216.4250 MHz
71	216.5250 MHz
72	216.5750 MHz
73	216.6250 MHz
74	216.6750 MHz
75	216.7250 MHz
76	216.7750 MHz
77	216.8250 MHz
78	216.8750 MHz
79	216.9250 MHz
70	216.9750 MHz

M-216
216 MHz
NARROW-BAND
FREQUENCY GROUPS
 Compatible with COMTEK
 and other manufacturers
 (5 kHz deviation)

GROUP A

CHANNEL	FREQUENCY
1	216.0125 MHz
9	216.2125 MHz
15	216.3625 MHz
24	216.5875 MHz
31	216.7625 MHz
36	216.8875 MHz

GROUP B

CHANNEL	FREQUENCY
4	216.0875 MHz
10	216.2375 MHz
14	216.3375 MHz
32	216.6875 MHz
35	216.8875 MHz
40	216.9875 MHz

GROUP C

CHANNEL	FREQUENCY
3	216.0624 MHz
5	216.1125 MHz
12	216.2875 MHz
22	216.5375 MHz
38	216.9375 MHz

GROUP D

CHANNEL	FREQUENCY
17	216.4125 MHz
23	216.5625 MHz
30	216.7375 MHz
34	216.8375 MHz
39	216.9625 MHz

M-216
216 MHz
WIDE-BAND
FREQUENCY GROUPS
 For COMTEK
 equipment only
 (10 kHz deviation)

GROUP 1

CHANNEL	FREQUENCY
41	216.0250 MHz
44	216.1750 MHz
51	216.5250 MHz
55	216.7250 MHz
60	216.9750 MHz

GROUP 2

CHANNEL	FREQUENCY
42	216.0750 MHz
49	216.4250 MHz
53	216.6250 MHz
58	216.8750 MHz

GROUP 3

CHANNEL	FREQUENCY
43	216.1250 MHz
46	216.2750 MHz
51	216.5250 MHz
57	216.8250 MHz

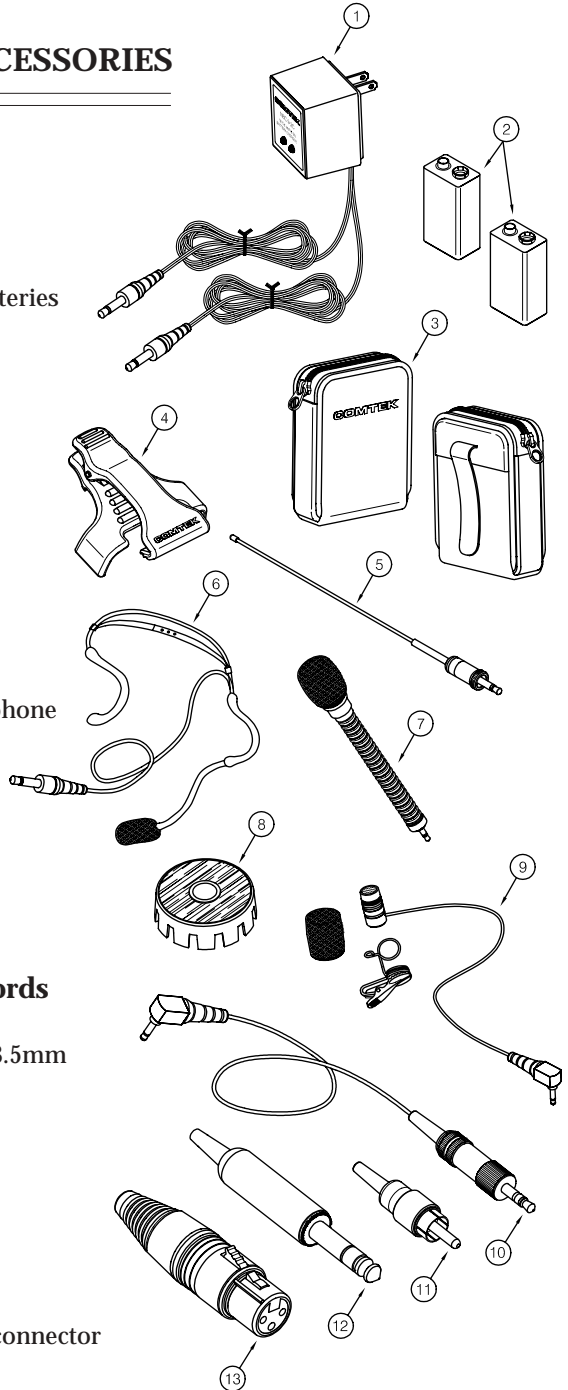
GROUP 4

CHANNEL	FREQUENCY
44	216.1750 MHz
47	216.3250 MHz
54	216.6750 MHz
59	216.9250 MHz

M-216 OPTIONAL ACCESSORIES

Optional Accessories

1. NBC 9-2C Battery charger
2. NH9-150 Rechargeable batteries
3. P1 Universal pouch
4. BC-216 Snap-on belt clip (supplied with M-216)
5. LW-216 Whip antenna (supplied with M-216)
6. PSC-HM Headworn unidirectional electret microphone
7. HH-185 Hand held microphone boom adaptor
8. TM-10 Conference table microphone adaptor
9. SM-185 Unidirectional electret condenser microphone



Auxiliary Audio Input Cords

10. CB-36 STM Stereo mini 3.5mm (supplied with M-216)
11. CB-36 RCA Phono plug (optional)
12. CB-36 ST1/4 Stereo 1/4" (optional)
13. CB-36 XLR XLR-F 3 pin connector (optional)

M-216 SPECIFICATIONS

Audio Input:

- Microphone input impedance for electret type microphone - 3000 ohm
- Aux/Line input impedance - 10 k ohm at 0 dB nominal

Connectors:

Microphone - Micro-mini mono 2.5mm

Auxiliary - Mini stereo 3.5mm

Audio: Tip and sleeve

Battery Charging: Tip and sleeve

Controls and Indicators:

- Synthesized channel selection switches
- Power On/Off switch
- Optional microphone muting switch
- Audio input gain control
- Power/Battery status indicator
- Audio (voice level) modulation indicator
- Companded auto/off switch

Frequency Response:

80 Hz to 10 kHz

Audio Distortion:

Less than 1% at 80% modulation

Modulation Limiter:

Soft compressor with 30 dB linear overload protection, attack time - less than 1 ms, recovery time - 10 ms

Modulation:

- 5 kHz deviation Ch. 1-40 (non-companded)
- 10 kHz deviation Ch. 41-60 (companded)

Operating Radio Frequency:

57 synthesized channels in the 216-217 MHz LPRS band under FCC part 95

Out-of-Band Emissions:

Better than 45 dB below carrier

R.F. Stability:

20 ppm XTL controlled
Digitally synthesized

RF Power Output:

10 mW to antenna system

Antenna System:

Body worn microphone cord, or loaded whip plugged directly into microphone connector when auxiliary input is used

Current Drain:

13 mA constant current

Battery:

- 9 volt alkaline Eveready 522 or equivalent for up to 40 hours of operation
- 9 volt Nickel-Metal Hydride rechargeable battery for up to 12 hours of operation

Dimensions:

1 1/16" x 2 1/4" x 3 1/2"
(27 mm x 57 mm x 89 mm)

Weight:

5 ounces (140 grams)

FCC Compliance:

Certification under Part 95

NOTE: Specifications subject to change without notice or obligation

M-216 WARRANTY AND SERVICE

Warranty

COMTEK warrants this product to be free from defects in workmanship and material under normal use and conditions for a period of one year from date of original purchase. Items such as batteries, neckloops, and cords are not covered by the warranty. Damage due to misuse, ill treatment and unauthorized modification and repairs are not covered by this warranty. COMTEK is not liable for consequential damages arising out of any failure of the equipment to perform as intended. COMTEK shall bear no responsibility or obligation with respect to the manner of use of any equipment sold by it. COMTEK SPECIFICALLY DISCLAIMS AND NEGATES ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF SUCH EQUIPMENT INCLUDING, WITHOUT LIMITATION, ANY WARRANTY THAT THE USE OF SUCH EQUIPMENT FOR ANY PURPOSE WILL COMPLY WITH APPLICABLE LAWS AND REGULATIONS.

Service Policies

Warranty repairs must be done by COMTEK. Only factory technicians are authorized to perform warranty service on the M-216 transmitter. Before returning the M-216 for service, a Return Authorization Number should be obtained from the service department by calling 1-800-496-3463 or 1-801-466-3463. Return the unit to the factory with the original or comparable packing. COMTEK will pay for insurance and ground return shipping costs in the United States for all warranty service.

COMTEK[®]

First Quality in Wireless Sound

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