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## EC Series Wireless Systems User Guide

# EC SERIES WIRELESS MICROPHONE SYSTEMS

### GENERAL

The Shure EC Series wireless microphone systems are configurable, single-channel systems operating in the VHF band between 169.445 MHz and 216.100 MHz. All EC systems feature state-of-the-art, phase-locked loop (PLL) digital frequency control to generate an exceptionally clean, low-noise signal. This built-in frequency control makes EC systems ideal for installations where multiple wireless systems are to be used. The PLL frequency control circuit is also programmable, so any factory-authorized technician can change the carrier frequency of any EC transmitter and receiver.

### SYSTEM COMPONENTS

Each EC wireless system consists of a handheld EC2 Microphone-Transmitter or an EC1 Body-Pack Transmitter with a lavalier microphone or a WA302 instrument adapter cable, and an EC4 Receiver.

**EC2 Hand-Held Microphone-Transmitter.** The EC2 is a hand-held microphone with a built-in transmitter. It features PLL frequency control, an external antenna for increased range and freedom from dropouts, superb frequency response, extended dynamic range, an LED status indicator, rugged metal handle, and heavy-duty grille with built-in pop filter. The EC2 is supplied in four models:

- EC2/58, which includes the world-famous Shure SM58 cardioid dynamic microphone.
- EC2/87, which includes Shure's SM87 supercardioid condenser microphone.
- EC2/Beta 58, which features Shure's premium supercardioid dynamic Beta 58 vocal microphone.
- EC2/Beta 87, which features Shure's premium supercardioid condenser Beta 87 vocal microphone.

**EC1 Body-Pack Transmitter.** The EC1 features PLL frequency control, extended dynamic range, a universal input, a battery test light, noiseless muting, and a rugged case.

**WL93A Micro-Lavalier Microphone:** The WL93A is an omnidirectional micro-lavalier electret condenser microphone that plugs into the microphone input on the EC1 Body-Pack

Transmitter. It features smooth frequency response, low distortion and low RF susceptibility. The WL93 can also be used as a pickup for acoustic instruments such as guitar, woodwinds and strings. The WL84 supercardioid lavalier is also available.

**WA302 Instrument Adapter Cable:** The WA302 instrument adapter cable plugs into the EC1 Body-Pack Transmitter. It is designed for use with electric guitar and other electric instruments.

**EC4 Diversity Receiver.** The EC4 features Shure's exclusive MARCAD® (MAXimum Ratio Combining Audio Diversity) circuitry. With MARCAD, the EC4 constantly monitors signals on each of two receivers and combines them when both signals are usable. The result is increased RF gain, improved reception, and exceptional freedom from dropouts. The EC4 also uses PLL frequency control to lock onto a precise carrier frequency, reducing the possibility of interference from local sources.

### PERFORMANCE CHARACTERISTICS

**Operating Frequencies.** Shure EC wireless systems are configured to operate interference-free on one of 28 standard frequencies. Frequency changes can be made by factory authorized service personnel.

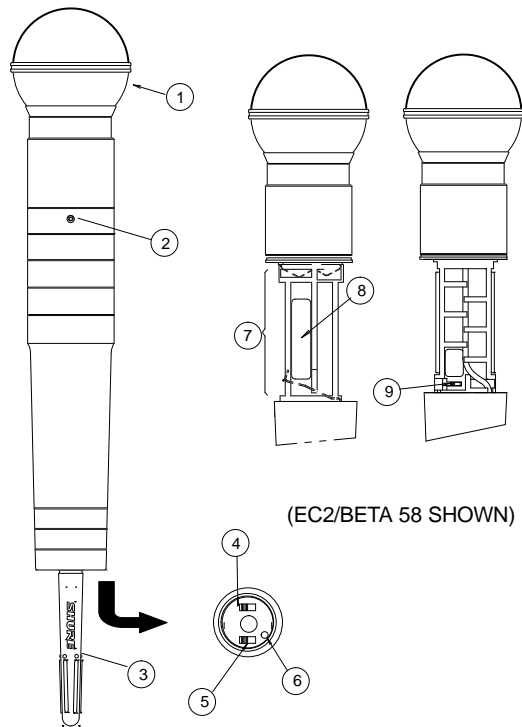
**Multiple System Installations.** Up to 15 EC Series systems can be operated simultaneously in a single installation without intermodulation problems. However, each system must operate at a different frequency.

**Directional Sensitivity.** The EC Series transmitters are omnidirectional in the horizontal plane; that is, they radiate equal amounts of RF energy in all directions. Similarly, the receiver antenna is equally sensitive in all directions in the horizontal plane when mounted vertically.

**Operating Range.** The recommended maximum operating range for any EC system is 600 feet (182.8 meters), although successful operation at up to 1000 feet (300 meters) is often accomplished. Conditions at the installation site (reflective surfaces, obstacles, radio interference, etc.) will ultimately dictate the system's operating range.

**Power Requirements.** The EC4 receiver can be operated from any filtered 12.5 to 18 Vdc, 200 mA power source. A separate 120 Vac adapter is included with each system. The EC2 and EC1 transmitters operate on most 9 volt alkaline batteries. Battery life depends on the type and brand of battery (Duracell MN1604 recommended).

**EC2 MICROPHONE-TRANSMITTER  
FEATURES AND CONTROLS (FIGURE 1)**

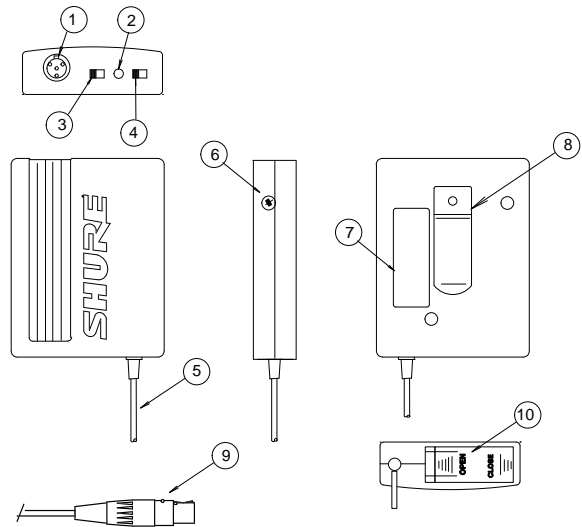


(EC2/BETA 58 SHOWN)

EC2 MICROPHONE-TRANSMITTER FEATURES AND CONTROLS  
**FIGURE 1**

1. **Grille:** Protects the microphone element of the EC2, and helps minimize breath and wind noise. (The various models have different grille styling.)
2. **Set Screw:** Loosen only to change microphone heads.
3. **Antenna:** The EC2 uses a replaceable external helical antenna with a female SMA connector. The transmitter SMA connector and the antenna are color-coded with white, red, blue, yellow, green, or brown stripes that correspond to the system's operating frequency range. Make sure the connector and the antenna share the same color code.
4. **MIC ON/OFF Slide Switch:** Permits user to "mute" the microphone without turning the transmitter off. This avoids the "pop" that may occur when the microphone is turned on or off and prevents the receiver from picking up unwanted signals.
5. **POWER ON/OFF Switch:** Turns transmitter power on and off.
6. **Battery Test Light:** Illuminates when the POWER switch is turned on and a "good" battery is installed. When this light does not illuminate, the transmitter will not work.
7. **Battery Compartment:** Unscrewing the handle and sliding it downward exposes the battery compartment and the audio GAIN Switch (9).
8. **Frequency Identification Label:** Located inside the battery compartment, this label lists the transmitter's original operating frequency.
9. **Audio HI/LO GAIN Switch:** Controls audio level of the microphone.

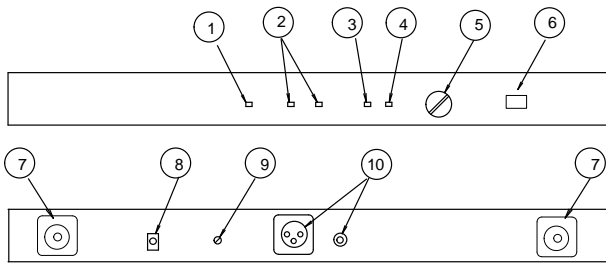
**EC11 BODY-PACK TRANSMITTER  
FEATURES AND CONTROLS (FIGURE 2)**



EC11 BODY-PACK TRANSMITTER FEATURES AND CONTROLS  
**FIGURE 2**

1. **INPUT Jack:** The microphone cable or the WA300 instrument adapter cable plugs into this connector.
2. **Battery Test Light:** Illuminates when the POWER switch is turned on and a "good" battery is installed. If this light does not turn on, the transmitter will not work.
3. **MICROPHONE ON/OFF Switch:** "Mutes" the microphone *without* turning the transmitter off, so no "pop" sounds occur.
4. **POWER ON/OFF Switch:** Turns transmitter on and off.
5. **Antenna:** A flexible antenna wire is permanently attached to the bottom of the body-pack transmitter. *For proper operation, the antenna must hang in the vertical position, not coiled or bundled.*
6. **Audio Level Control:** Allows audio level adjustments for various sound sources. A small screwdriver is supplied to make adjustments (see page 5).
7. **Frequency Identification Label:** This label identifies the transmitter's original operating frequency.
8. **Belt Clip:** Allows the transmitter to be worn on a belt, waistband or guitar strap. It can be removed, if desired.
9. **TA4F Microphone Cable Connector:** Plugs into 4-pin input jack on the body-pack transmitter.
10. **Battery Compartment:** Hinged cover on bottom surface exposes the battery compartment.

## EC4 RECEIVER CONTROLS AND INDICATORS (FIGURE 3)



EC4 RECEIVER FEATURES AND CONTROLS  
FIGURE 3

1. **POWER ON Indicator:** This green light glows when the POWER button is turned on.
2. **DIVERSITY Signal Indicators:** Yellow lights glow to show usable RF signals from antenna A, antenna B, or both. Normal operation is indicated when either or both lights glow. Note that these lights are *not* indicators of signal *strength*, but barely flickering lights may indicate marginally acceptable signals.
3. **AUDIO NORMAL Indicator:** This green light flashes regularly to show normal audio operation.
4. **AUDIO PEAK Indicator:** This light glows red to show approaching audio overload condition. Normal operation will cause occasional flashing of this light on loud signals; constant glowing indicates excessive audio level and need to lower transmitter Audio Gain switch or rotary control.
5. **VOLUME Rotary Control:** Determines signal level at both receiver OUTPUT connectors.
6. **POWER On/Off Button:** Applies power from the DC power input jack to the receiver circuitry. The green POWER light glows and remains on when power is applied to the receiver.
7. **ANTENNA Connectors:** UHF type connectors provide connection to 1/4-wave vertical antennas supplied with the EC4, to the coaxial cable in the optional WA420 Antenna Cable Kit, or to the optional 1/2-wave high-gain antennas (WA380).
8. **12 VDC Negative Ground Coaxial POWER Jack:** Accepts power from the supplied ac adapter, or from any well filtered 12.5 to 18 Vdc (200 mA) power supply.
9. **SQUELCH Screwdriver Control:** Automatically quiets or “mutes” the receiver when no transmitter signal is received. This control is factory-set for optimum operation in most applications, but can be adjusted for unusual conditions. See the “EC4 Receiver Squelch Control Adjustment” paragraph.
10. **OUTPUT Connectors:** XLR connector provides balanced low impedance microphone-level output; 1/4-inch phone jack provides unbalanced auxiliary level output to audio mixer or amplifier.

### PRE-INSTALLATION REQUIREMENTS

Before attempting to install the EC wireless microphone system, make sure you have the following items:

- A 9V alkaline battery for the transmitter (Duracell MN1604 or equivalent). A rechargeable, heavy duty 8.4V nickel-cadmium (NiCad) battery may also be used.
- A microphone for the EC1 transmitter—either one designed specifically for the transmitter (such as a Shure WL84 or WL93), or a low impedance dynamic microphone with a micro-

phone adapter cable WA310. If the system is to be connected to the electrical output of a musical instrument, an instrument cable such as the Shure WA302 must be used.

**IMPORTANT:** Other manufacturer’s microphones specified for wireless use are generally *not* compatible, as supplied, with Shure wireless systems.

- A receiver-to-mixer cable with a 3-pin XLR connector (for balanced microphone level EC4 receiver output), or 1/4-inch 2-circuit phone plug on one end (for unbalanced auxiliary level EC4 receiver output), and a mixer input connector on the other.

### EC4 RECEIVER SETUP AND CONNECTIONS

1. Place the receiver in its operating position. Avoid placing the receiver near RF noise sources such as light dimmers, computers and other digital devices (e.g., CD players and digital delays).
2. If the receiver is placed on a horizontal surface, attach the four adhesive bumpers to the bottom corners of the receiver. If the receiver is to be rack mounted, remove the screws on each side of the receiver case, position the mounting brackets over the holes, and secure the brackets with the two removed screws and the two supplied screws.
3. Plug the AC adapter into the POWER jack on the rear panel of the receiver.
4. Plug the AC adapter into a 120V, 60 Hz power source.
5. Attach the supplied 1/4-wave antennas to the ANTENNA connectors on the receiver. Make sure they are pointing up and are within the line of sight of the transmitter. Obstructions or reflecting objects will degrade system performance.
6. Attach the audio connecting cable with an XLR connector or a 1/4-inch phone plug on the receiver end between the desired EC4 OUTPUT connector and the mixer or amplifier input.

**IMPORTANT:** Improved diversity receiver performance may be obtained by remotely locating one or both antennas so that they are separated by 1.5 meters (60 inches) or more. Optional Shure WA380 1/2-Wave High-Gain Antennas are recommended for this application. They may be remotely located using one or two Shure WA420 Antenna Cable Kits. If the receiver is to be rack mounted, both antennas *must* be remotely located or mounted on the front of the rack using the Shure WA440 accessory rack-mount kit. To operate up to four receivers with only two antennas, use the Shure WA404 amplified Antenna/DC Power Distribution System.

### Transmitter Battery Selection

Only two types of batteries are recommended for use with the EC1 and EC2 transmitters:

- 9V alkaline batteries (Duracell MN1604 or equivalent). A fresh 9V alkaline battery should provide 7 hours of operation.
- Rechargeable, heavy duty 8.4V nickel-cadmium (NiCad) batteries. NiCad batteries will only provide 1.5 to 2 hours of operation.

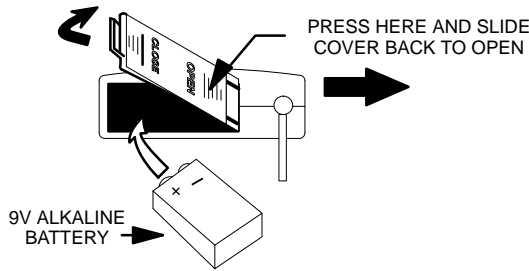
**IMPORTANT:** Use only a 9V alkaline battery or a heavy-duty, rechargeable 8.4V NiCad battery. Carbon-zinc and zinc-chloride batteries will not provide sufficient power for proper operation, and are not recommended.

### EC1 TRANSMITTER SETUP

#### EC1 Transmitter Battery Installation

1. With the transmitter POWER ON/OFF switch in the OFF position, slide the battery compartment access cover toward the OPEN arrow until the cover pivots open. See Figure 4 below.

- Insert a new 9V alkaline battery into the battery compartment. Observe proper battery polarity (“+” and “-”).



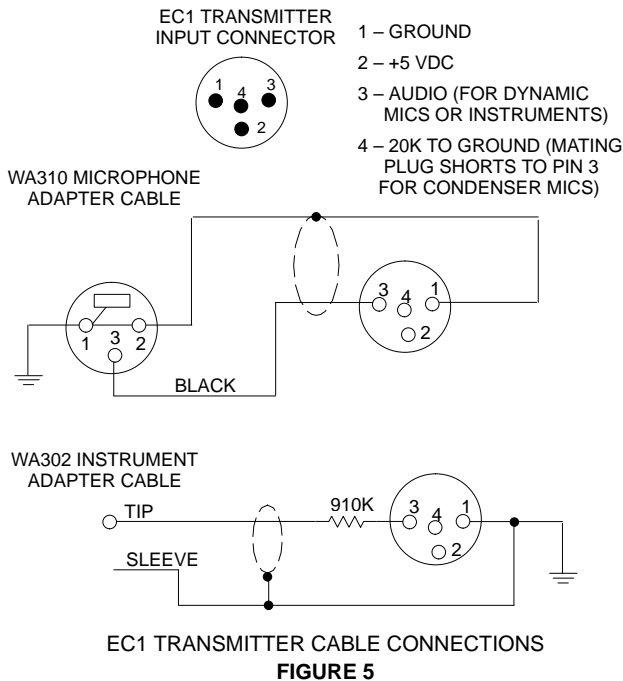
EC1 BATTERY INSTALLATION  
FIGURE 4

### Checking the EC1 Transmitter Battery

To check the battery in the EC1 transmitter, turn the transmitter POWER switch on and observe the Battery Test light. It should be bright and clearly visible, indicating adequate voltage. If the light is dim, the battery voltage has dropped below 6.5 volts and the battery should be replaced (9V alkaline or recharged Ni-Cad only). If the light does not turn on, the transmitter will not operate and the battery should be replaced.

### Microphone Connections

- Plug the lavalier microphone cable or the WA302 instrument adapter cable into the 4-pin connector on the EC1.
- If you are using a lavalier microphone, press the microphone into the necktie mounting block and clip it to your tie or lapel. If you are using an electric instrument, plug the WA302 instrument adapter cable into your guitar or instrument.



EC1 TRANSMITTER CABLE CONNECTIONS  
FIGURE 5

Any Shure wireless lavalier microphone or accessory cable with a Switchcraft TA4F type 4-pin (female) connector plugs directly into the transmitter input connector. Many other condenser microphones will operate using the transmitter’s regulated +5 V DC power on pin 2. Low impedance dynamic or ribbon microphones with pin 2 output can be used with the optional WA310 adapter cable. See Figure 5.

**NOTE:** Phantom powered condenser microphones will not normally operate with the EC1/WA310 transmitter configuration.

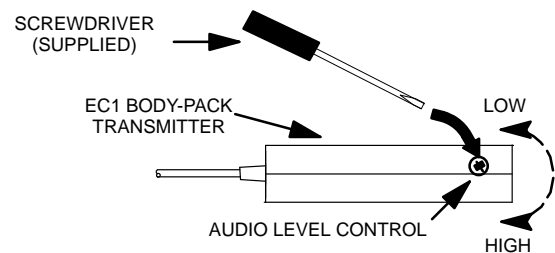
### EC1 Audio Gain Adjustment

The EC1 transmitter audio gain has been factory set to provide a typical level. However, for SPL applications such as loud singing or loud musical instruments, the preset audio gain level on the EC1 transmitter may be too high, as indicated by the steady glow of the red AUDIO PEAK light on the EC4 receiver when an RF signal is present.

For low SPL applications, such as soft-spoken presenters, the audio gain setting may need to be increased, as indicated by the failure of the AUDIO PEAK light to turn on when an audio signal is present.

If necessary, adjust the audio gain on the EC1 as follows:

- For High SPL Applications:** Using the supplied screwdriver, turn the MIC LEVEL control on the transmitter counterclockwise while the vocalist is speaking or an instrument is being played. See Figure 6.
- For Low SPL Applications:** Using the supplied screwdriver, turn the MIC LEVEL control on the transmitter clockwise until the red AUDIO PEAK indicator on the receiver flickers occasionally while the microphone is in use. Refer to Figure 6.



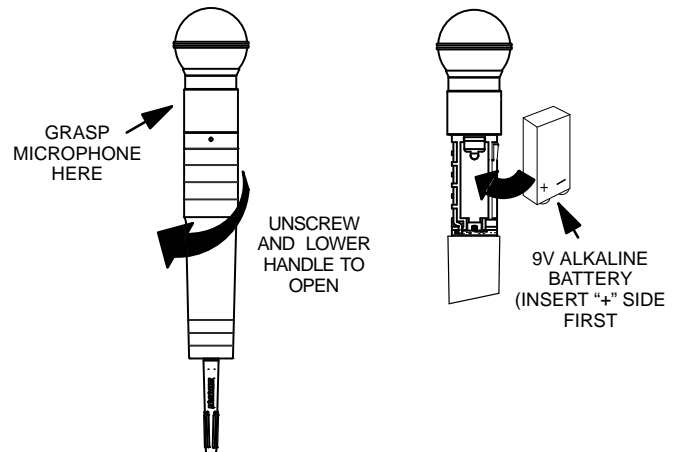
EC1 AUDIO GAIN ADJUSTMENT  
FIGURE 6

**NOTE:** When the EC4 receiver is ON and the EC1 or EC2 transmitter is OFF, the audio mixer gain should be turned down, since the receiver can receive signals from other sources. If the mixer controls are not accessible, turn the receiver volume down when the transmitter is not in use to prevent unwanted signal pickup. The transmitter may also be left on (muted) to guard against outside interference. See the Squelch Control adjustment paragraph.

### EC2 TRANSMITTER SETUP

#### EC2 Transmitter Battery Installation

- Make sure the transmitter POWER ON/OFF switch is in the OFF position.
- While holding the upper part of the transmitter, unscrew the lower handle and slide it downward, as shown in Figure 7.



EC2 BATTERY INSTALLATION  
FIGURE 7

3. Insert a new 9V alkaline battery into the battery compartment. Observe proper battery polarity (“+” and “-”). Close the battery compartment after the battery has been installed.

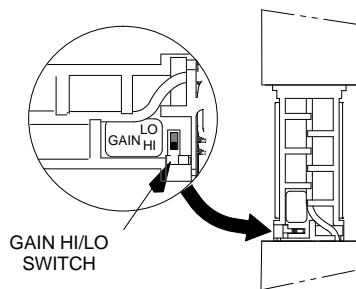
### Checking the EC2 Transmitter Battery

To check the battery in the EC2 transmitter, turn the transmitter POWER switch on and observe the Battery Test light. The light should be bright and clearly visible, indicating adequate voltage. If it is dim, the battery voltage has dropped below 6.5 volts and the battery should be replaced (alkaline or recharged NiCad only). If the light does not glow at all, the transmitter will not operate and the battery should be discarded or recharged.

### EC2 Audio Gain Adjustment

The EC2 audio gain has been factory set in the LO position for high sound pressure level (SPL) applications. For low SPL applications, the preset audio gain may be too low. If necessary, adjust the audio gain on the EC2 as follows:

1. Unscrew the handle and locate the audio GAIN switch adjacent to the battery holder. See Figure 8.



EC2 AUDIO GAIN ADJUSTMENT

FIGURE 8

2. With the system ON and the transmitter in use, select either the LO gain or HI gain position so that the receiver's AUDIO PEAK light flickers only occasionally.

**NOTE:** Some very loud vocalists may experience audible overload even when the audio GAIN switch is in the LO position. The EC2 can be easily modified for higher SPL input. For more information, contact your dealer or the Shure Service Department.

### OPERATING THE SYSTEM

1. Turn on the transmitter and receiver POWER switches.
2. Make sure the transmitter MIC ON/OFF switch is on.
3. Talk into the microphone (or play a musical instrument) and observe the AUDIO PEAK and DIVERSITY lights on the EC4 receiver. Normal operation is indicated by:
  - Steady glow of one or both DIVERSITY lights on the EC4 receiver (indicates good RF signal).
  - Steady glow or flashing AUDIO NORM light (indicates good AUDIO signal).
  - Occasional flashing of the red AUDIO PEAK light.
4. Continue talking or playing into the microphone and move around the performing area. At each location, observe the receiver display and make sure the RF signal is adequate. If the yellow DIVERSITY lights flicker, reposition the EC4 receiver or the WA380 antennas. The audio level should only change when the loudness of the audio source changes; it should not change when the microphone is moved around the perform-

ing area. Checking microphone operation in this manner will also uncover locations that are prone to audio feedback.

**IMPORTANT:** Every wireless microphone installation is unique, and can present a variety of problems. Never attempt a live performance without a “walkthrough” first. If major changes (equipment, scenery, etc.) have been made since the walk-through, check the wireless microphone operation again—as close to performance time as possible.

### EC4 Receiver Squelch Control Adjustment

The SQUELCH control is preset for most operating conditions and does not normally require readjustment. However, if this setting needs to be changed to compensate for the effects of other equipment in the system or for the RF conditions at the installation site, proceed as follows:

1. Place the wireless system in the location where it will be used during a performance.
  2. Turn off the transmitter POWER switch.
  3. Turn the receiver VOLUME control full counterclockwise and turn the POWER switch on.
  4. Observe the lights on the receiver front panel. If the DIVERSITY A or B, AUDIO NORM, or PEAK lights are glowing, the SQUELCH control needs to be readjusted. Slowly turn the SQUELCH control clockwise until all the lights turn off. Continue turning the SQUELCH control slightly past this point.
- NOTE:** Turning the SQUELCH control clockwise will prevent unwanted signals and noise from overriding the squelch circuit when the microphone signal is not present, but will effectively decrease the system's operating range.
5. To return the SQUELCH control to the factory setting, rotate it back to the midrange (straight up) position.

### EC4 Receiver Volume Control

The VOLUME control on the EC4 receiver affects both outputs on the rear panel. This control can be adjusted to make the system output identical to that of a conventional wired microphone, avoiding extreme differences in mixer input level settings. Turning the VOLUME control counterclockwise decreases the output level; turning it clockwise increases output.

### Changing Operating Frequency

The carrier frequency of any EC Series transmitter and receiver may be changed by a factory-authorized technician. Please contact your local dealer, sound system contractor, or the Shure Service Department for details. The modifications require factory training and cannot be made by the end user.

### Controlling Multipath Transmission

Multipath transmission (or “dropout”) occurs when the direct RF signal and a reflected signal arrive at the receiver at different times or out of phase, or when the signal path is completely obstructed. The result is excessive noise or temporary signal loss. To avoid this phenomenon, observe the following precautions:

- Maintain line-of-sight transmission. Ideally, the transmitter user should always be able to see at least one of the receiver antennas.
- Keep the distance between the transmitter and the receiver antennas as short as possible.
- Avoid operating the wireless microphone around reflective surfaces, especially metal surfaces.
- Make sure both transmitter and receiver antennas are positioned vertically.

## TROUBLESHOOTING

If the installation and setup instructions have been followed and a problem still exists, perform the troubleshooting procedures in

the table below. If the problem persists, contact your dealer or the Shure Service Department.

PROBLEM	SOLUTION
No receiver sound; neither DIVERSITY light on receiver is glowing	Make sure POWER switch on transmitter and receiver is ON (Both green LEDs are illuminated). Check transmitter battery and receiver power source. Check receiver squelch setting. Check receiver antenna connections. Make sure transmitter and receiver are on same operating frequency. Make sure transmitter and receiver antennas follow line of sight. If necessary, reduce the distance between the transmitter and the receiver. Higher gain antennas (WA380) may be required.
No receiver sound; one or both DIVERSITY lights are glowing	With the microphone POWER switch ON, turn up the receiver volume control. Make sure transmitter MIC switch is ON. Check transmitter microphone MUTE switch. Make sure microphone cable plug is locked into transmitter connector. Check connection between receiver and microphone mixer. Talk into the microphone and observe the receiver AUDIO light. If the light is glowing, the problem is elsewhere in sound system.
Noise from receiver with transmitter off; DIVERSITY lights on receiver glow or flicker	Look for strong local interference sources such as other radio signals. (Nearby motors or lighting equipment could also be the problem.) Reposition antennas. SQUELCH control may be set too low. Readjust as necessary.
Received signal is noisy or contains extraneous sounds with transmitter on	Look for strong local interference sources such as other radio signals, nearby motors or lighting equipment. Remove the source of interference, reposition the receiver, or reposition the antennas. Two transmitters may be operating on the same frequency. Locate and turn one off. Signal may be too weak. Reposition antennas. If possible, move them closer to the transmitter. Optional 1/2 wave high gain antennas (WA380) and antenna cable kit (WA420) are available SQUELCH control may be set too low. Readjust as necessary.

## SPECIFICATIONS

### OVERALL SYSTEM

#### RF Carrier Frequency Range

169.445 MHz to 216.100 MHz

#### Frequency Stability

±32.5 ppm, ±5.5 kHz (Complies with FCC regulations)

#### Working Range (average conditions)

600 feet (182.8 m) at 50 mW

#### Modulation

±15 kHz deviation compressor-expander system with pre- and de-emphasis

#### Total Harmonic Distortion (ref. ±15 kHz deviation, 1 kHz modulation)

0.4% typical, 0.7% maximum

#### Dynamic Range

>102 dB A-weighted

#### Audio Frequency Response

80 to 15,000 Hz, ±2 dB (NOTE: Overall system response depends on microphone element; refer to microphone frequency response curves on page 8)

#### Operating Temperature Range

−4° to 122° F (−20° to 50° C)

### EC4 RECEIVER

#### RF Sensitivity

0.45 μV for 12 dB SINAD typical

#### Image Rejection

90 dB typical

#### Spurious Rejection

80 dB typical

#### Ultimate Quieting (reference 15 kHz deviation)

>94 dB A-weighted

#### Squelch Quieting (reference 15 kHz deviation)

>94 dB A-weighted

#### Squelch Threshold

2.0 μV preset, adjustable from 2.0 to 50 μV

#### Output

−2 dBV, 1 kΩ output impedance, unbalanced; −18 dBV, 150Ω output impedance, balanced (volume full clockwise; full deviation; unloaded)

#### Antenna Input Impedance

50Ω nominal

#### Antenna

Plastic sheathed stainless steel, 1/4 wavelength, 428 mm, PL-259 UHF connectors

#### Power Requirements

12.5 to 18 VDC (negative ground), 200 mA; 120 Vac, 60 Hz Model PS20 external AC adapter supplied (Model PS20E 220/240 Vac, 50/60 Hz available optional)

#### Overall Dimensions

1.75 in. H x 17.125 in. W x 7.87 in. D  
(44.5 mm x 435 mm x 200 mm)

Includes front panel controls and rear panel UHF connectors; does not include antennas or rack ears

#### Weight

4.32 lbs (1.962 kilograms)

#### Certification

Complies with FCC Part 15 (FCC ID: DD4L4)  
Power supply UL listed, CSA listed as Certified  
Conforms to European Union Directives, eligible to bear CE marking; meets European EMC Immunity Requirements (EN 50 082-1, 1992); ESD (IEC 801-2); RF radiated (IEC 801-3); EFT (IEC 801-4).

### EC1 BODY-PACK TRANSMITTER

#### RF Power Output

50 mW maximum

#### Modulation

FM (40K0F3E, FCC Part 90, FCC Part 74) ±15 kHz deviation, 62 μsec pre-emphasis

### Audio Gain Adjustment Range

40 dB

### Input Impedance

Actual: 17 k $\Omega$ , pin 4 wired to pin 3 for WL93 or other wireless condenser microphone; 100 k $\Omega$ , pin 4 open for dynamic microphone or instrument pickup

### Power Requirements

Battery Type: 9 volt alkaline (Duracell 1604 or equivalent)  
8.4-volt nicad optional  
Battery Life: 7 hours minimum (alkaline)  
1.5 to 2 hours typical (nicad, per charge)  
Current Drain: 55 mA typical

### Antenna

Attached, 15.2 in. (386 mm), flexible wire

### Modulation Limiter

Internal compressor

### Audio Polarity

#### EC1 Transmitter with Shure Wireless Microphones:

Positive pressure on microphone diaphragm produces positive voltage on pin 2 with respect to pin 3 of low-impedance output, and on tip with respect to ground of aux output.

#### EC1 Transmitter with WA302 or WA310 Cable:

Positive voltage applied to tip of WA302 phone plug or to pin 3 of WA310 XLR connector results in positive voltage at pin 2 with respect to pin 3 of low-impedance output or on trip with respect to ground of aux output.

### Dimensions (excluding antenna and belt clip)

82.6 mm High x 63.5 mm Wide x 26.2 mm Deep  
(3 $\frac{1}{4}$  in. x 2 $\frac{1}{2}$  in. x 1 $\frac{1}{32}$  in.)

### Weight

Without Battery: 96.4 g (3.4 oz)  
With Battery: 142 g (5 oz)

### Certification

Complies with FCC Parts 74 and 90 (FCC ID: DD4L11)  
Conforms to European Union Directives, eligible to bear CE marking; meets European EMC Immunity Requirements (EN 50 082-1, 1992); ESD (IEC 801-2); RF radiated (IEC 801-3); EFT (IEC 801-4).

## EC2 TRANSMITTER

### RF Power Output

50 mW maximum

### Modulation

FM (60K0F3E)  $\pm$ 15 kHz deviation, 62  $\mu$ s pre-emphasis

### Modulation Limiter

Internal compressor

### Audio Polarity

Positive pressure on microphone diaphragm produces positive voltage on tip (with respect to ground) of unbalanced output, and on pin 2 (with respect to pin 3) of balanced output

### Audio Gain Adjustment Range

15 dB (2-position switch); additional -6 dB internal pad

### Antenna

Removable, external  $\frac{1}{4}$ -wave helical antenna (antenna is color-keyed to transmitter frequency range).

### Power Requirements

Battery Type: 9 volt alkaline (Duracell MN1604 or equivalent)  
8.4-volt nicad optional  
Battery Life: 7 hours minimum (alkaline)  
1.5 to 2 hours typical (nicad, per charge)  
Current Drain: 55 mA typical

### EC2 Transducer Type

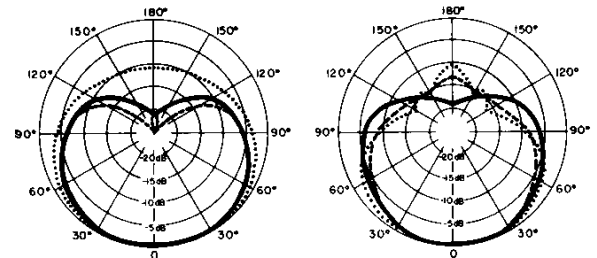
EC2/58, EC2/Beta 58: Dynamic  
EC2/87, EC2/Beta 87: Electret bias condenser

### EC2 Polar Patterns (See Figure 10)

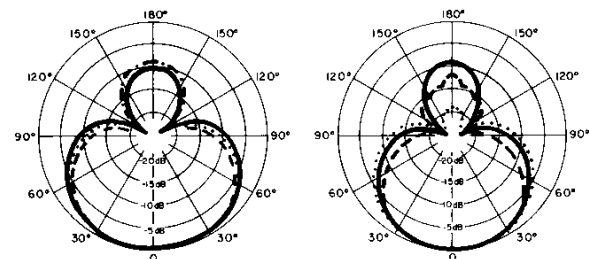
Uniform with frequency, symmetrical about axis

Cardioid (EC2/58)

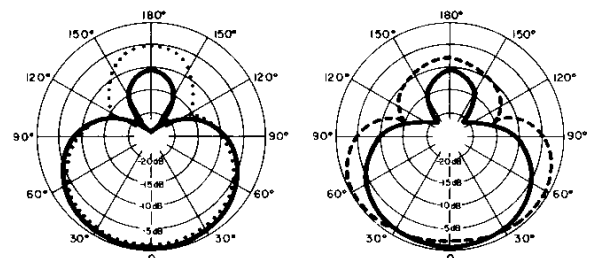
Supercardioid (EC2/Beta 58, EC2/87, EC2/Beta 87)



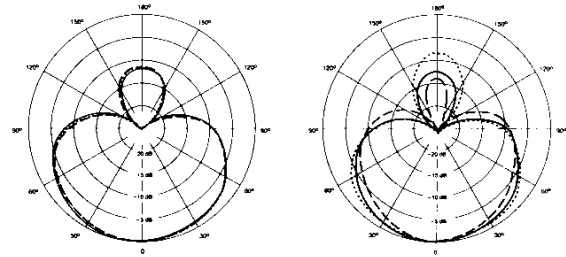
MODEL EC2/58



MODEL EC2/BETA 58



MODEL EC2/87

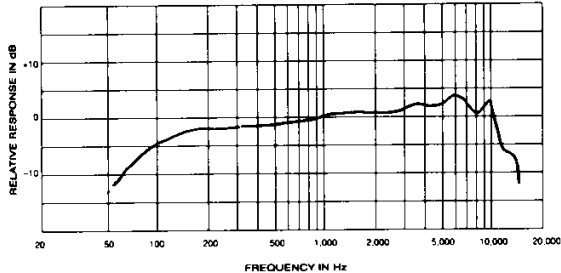


MODEL EC2/BETA 87

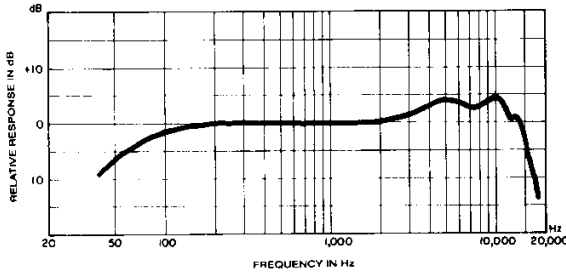
TYPICAL POLAR PATTERNS  
FIGURE 10

## EC2 Frequency Response (See Figure 11)

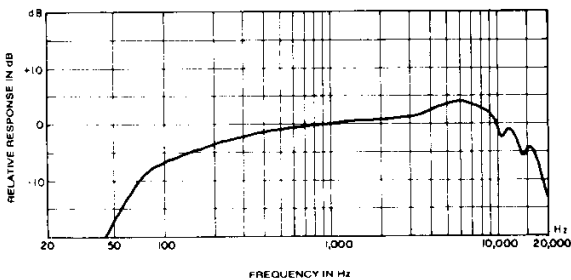
Frequency response curves below were measured in a free field at a distance of 0.6 meters (2 feet) from the sound source.



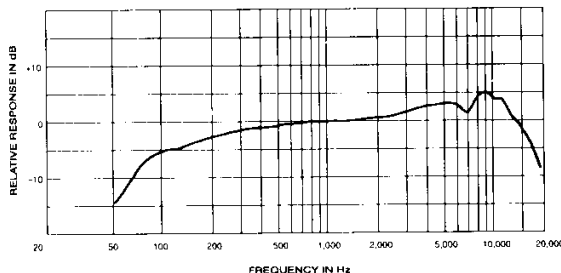
MODEL EC2/58



MODEL EC2/BETA 58



MODEL EC2/87



MODEL EC2/BETA 87

TYPICAL FREQUENCY RESPONSE CURVES  
FIGURE 11

## Overall Dimensions (excluding antenna)

EC2/58, EC2/Beta 58: 237 mm x 50.8 mm (9 5/16 in. x 2 in.)  
EC2/87, EC2/Beta 87: 213 mm x 50.8 mm (8 3/8 in. x 2 in.)

## Weight

Model	Without Battery	With Battery
EC2/58	453.6 g (16.0 oz)	496.1 g (17.5 oz)
EC2/Beta 58	411.1 g (14.5 oz)	453.6 g (16.0 oz)
EC2/87	337.2 g (11.9 oz)	382.7 g (13.4 oz)
EC2/Beta 87	337.2 g (11.9 oz)	382.7 g (13.4 oz)

## Certification

Complies with FCC Parts 74 and 90 (FCC ID: DD4L2)  
Conforms to European Union Directives, eligible to bear CE marking; meets European EMC Immunity Requirements (EN 50 082-1, 1992); ESD (IEC 801-2); RF radiated (IEC 801-3); EFT (IEC 801-4).

## REPLACEMENT PARTS

SM58 Cartridge	R158
Beta 58 Cartridge	R160
SM87 Cartridge	R128
SM58 Grille	RK143G
Beta 58 Grille	RK265G
SM87 Grille	RK277G
Beta 87 Cartridge	N/A*
Beta 87 Grille	90B3955
EC4 AC Adapter	PS20 (120V);PS20E (220/240V)
EC4 1/4-Wave Antenna Assembly	90C8342

\* Replacement cartridges for the Beta 87 are available only through factory exchange or through Shure Distribution Centers.

## FURNISHED ACCESSORIES

Rack Panel Bracket (EC4)	48A8012
Swivel Adapter (EC2)	WA370A
Storage Bag (EC1)	26A13
Storage Bag (EC2)	26A14

## OPTIONAL ACCESSORIES

Miniature 4-Socket Connector (EC1 Body-Pack)	WA330
In-Line Audio Switch (EC1)	WA360
1/2-Wave Antenna (EC4; specify frequency)	WA380A/B/C/D
Antenna Distribution System	WA400
Antenna/Power Distribution System	WA404
Antenna Cable Kit (EC4)	WA420**
Antenna Rack Mount Kit (EC4)	WA440

\*\*Includes cable, UHF adapter, and wall-mount bracket.

## INFORMATION TO THE USER

The EC4 Receiver complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

The EC4 Receiver has been tested and found to comply with the limits of Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- (1) Reorient or relocate the receiving antenna.
- (2) Increase the separation between the equipment and radio or TV receiver.

(3) Connect the equipment into an outlet on a circuit different from that to which the radio or TV receiver is connected.

(4) Consult the dealer or an experienced radio/TV technician for help.

**CAUTION:** Changes or modifications not expressly approved by Shure Brothers, Inc. could void your authority to operate the equipment.

## FCC LICENSING INFORMATION

Shure Model EC1 and EC2 Transmitters are Type-Accepted under FCC Parts 74 and 90.

**IMPORTANT: Licensing of Shure wireless microphone equipment is the user's responsibility, and licensability depends on the user's classification and application, and on the selected frequency.** Shure strongly urges the user to contact the appropriate telecommunications authority concerning proper licensing.