

THE SHURE® WIRELESS

MODEL W10BT TRANSMITTER



The Shure Model W10BT is a body-pack radio transmitter for use in the Shure Wireless Microphone System. Small, compact and lightweight, the W10BT is human-engineered for reliable, unobtrusive operation. The microphone connector and all operating controls are located on the upper surface, and the controls are differentiated in size and shape to minimize incorrect or accidental movement. (The gain control is generally only used in setup, and is therefore recessed on the rear panel.) A rugged belt clip provides secure attachment to a belt, pocket or waistband. The antenna, a short piece of thin, highly flexible wire, is an optimum choice for minimum visibility and maximum durability.

The W10BT uses a standard 9-volt transistor-radio-type battery (alkaline recommended). This long-life battery is available everywhere, and replacement is easily accomplished through a locking slide-off cover plate; no screws or hinges are used. A battery test switch and LED indicator provides information on battery condition.

The transmitter operates at a single, crystal-controlled frequency in the VHF-FM band between 150 and 216 MHz. A total of 15 frequencies, computer-selected for interference-free operation, are readily available, and other frequencies can be ordered on a special basis. This means that a number of wireless microphone systems can be operated in a single sound installation, simultaneously and without intermodulation problems.

The W10BT has a maximum output power of 50 milliwatts, based on Federal Communications Commission regulations. This means that the transmitter-to-receiver-antenna distance should be kept as short as possible, with about 150 meters (500 feet) considered a

maximum. Operation at greater distances -300 meters (1,000 feet) or more-is often accomplished, but the determining factors in each installation will be reflections, obstacles and interference.

The transmitter is supplied with a zippered carrying storage bag and a small screwdriver for adjusting the transmitter gain.

DESCRIPTION (see Figure 1)

ANTENNA: This is a flexible, 1/4-wave vertically polarized antenna approximately 30 cm (12 in.) in length and permanently attached to the bottom surface of the transmitter. For proper operation, the antenna *must* be in the vertical position, not coiled or bundled.

BATTERY (not supplied): Only alkaline (Duracell MN1604 or equivalent) or heavy-duty nickel-cadmium (8.4-volt) transistor-radio-type batteries should be used. A fresh alkaline battery should provide approximately 8 hours of operation, and a fully charged nicad should provide 1-1/2 to 2 hours.

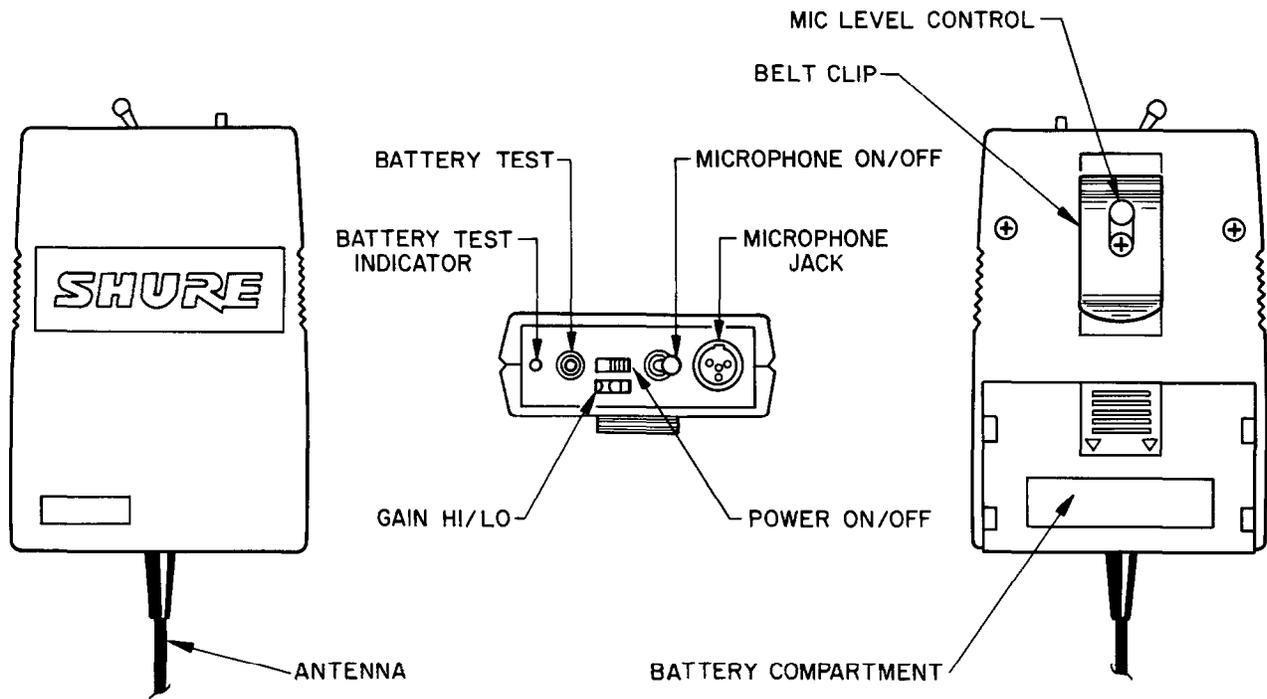
BATTERY COMPARTMENT: Slide-off cover exposes the battery compartment.

BATTERY TEST Push-Button Switch: Permits checking the condition of the installed battery when the power switch is on. The Battery Test LED Indicator will fail to light if the battery is weak or dead (or if the Power switch is off). Note that if the battery is tested periodically during use, an impending battery failure can be detected: the LED will fail to light at 7.25 volts. At that time, approximately 1 hour of battery life remains (alkaline batteries only).

BELT CLIP: Permits convenient attachment to the user's belt, waistband or other clothing.

GAIN HI/LO Slide Switch: Selects the High Gain position to boost the signal of low-output (low-impedance) microphones, or the Low Gain position for high-output (high-impedance) microphones or musical instruments. Allows maximum modulation without clipping.

MICROPHONE JACK: This is a 4-pin, miniature, male Tini Q-G connector designed to mate with Switchcraft TA4F or equivalent connectors. A built-in 20-kilohm load resistor provides proper matching for dynamic, ribbon or condenser microphones. Connector pin 2 supplies +5-volt bias voltage for condenser microphone phantom powering. In addition to microphones with TA4F connectors, Shure has available an adapter cable with a standard XLR female connector for use with conventional microphones (WA310), and a musical instrument



W10BT TRANSMITTER
FIGURE 1

adapter cable with a 1/4-in. phone plug on the equipment end (WA300).

MICROPHONE LEVEL Rotary Control: In conjunction with the Gain Hi/Lo switch, this control provides additional audio level adjustment. A small screwdriver is supplied to make adjustments.

MICROPHONE ON/OFF Toggle Switch: Permits the user to "mute" the microphone without turning the transmitter off. This avoids the "pop" that may accompany power turn-on and turn-off, and generally prevents pickup of unwanted signals by the receiver.

POWER ON/OFF Slide Switch: Applies power to the transmitter circuitry. The switch is a low-profile type to minimize accidental turn-off.

SETUP AND CONNECTIONS

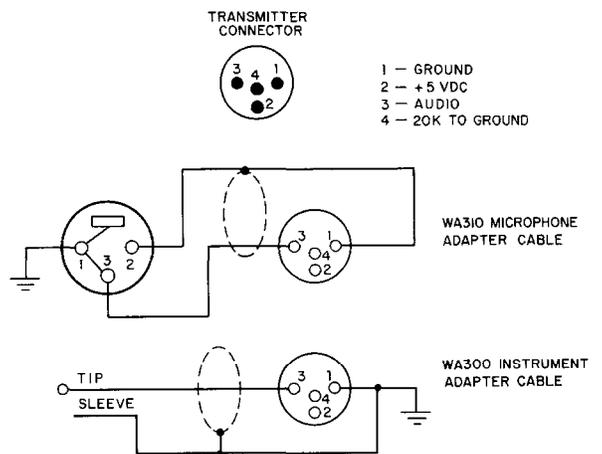
With the transmitter POWER ON/OFF Switch in the OFF position, slide the battery compartment access cover down and off the transmitter case. Insert a new 9-volt transistor-radio-type battery (Duracell MN1604 or equivalent) in the compartment. Observe the proper polarity: the large (negative) terminal in the large channel and the small (positive) terminal in the small channel. Operation with a full charged, heavy-duty, 8.4-volt nickel-cadmium rechargeable battery is also permissible. **IMPORTANT:** Do not use a "conventional" g-volt-sized nickel-cadmium battery; its 7.2-volt output will operate the transmitter for about 15 minutes. Carbon-zinc batteries will also result in diminished operating life (about 1 hour).

Microphone Connections

The Shure WL83 lavalier condenser microphone or similar microphones with identical wiring and a Switch-

craft TA4F type connector can be plugged directly into the transmitter microphone jack. The WL83 will operate using the transmitter's regulated +5 Vdc available on pin 2 (see Figure 2). Self-powered (battery) condenser microphones can be used with the transmitter *only* if they can be operated in an *unbalanced* mode (one side grounded). Other non-self-powered condenser microphones may require special wiring; contact Shure's Service Department for further information. Phantom-powered condenser microphones will not operate with the W10BT.

A high- or low-impedance dynamic or ribbon microphone with pin 2 output can be directly connected to the transmitter using the supplied WA310 microphone adapter cable. The cable has a 3-socket XLR connector



TRANSMITTER CONNECTIONS AND
ACCESSORY WIRING
FIGURE 2

on the microphone end and a Switchcraft TA4F connector on the transmitter end, and is wired for unbalanced low-impedance operation only (see Figure 2). Shure high-impedance microphones are not wired to operate with the transmitter. If a Shure high-impedance microphone must be used, pins 2 and 3 should be reversed (by qualified service personnel). Using a low-output, low-impedance dynamic lavalier microphone such as Shure's SM11 may require raising the mixer input gain appreciably, which in turn may result in an increase in noise and signal "pumping."

Instrument Connections

To connect the transmitter to a guitar or other musical instrument pickup, obtain an instrument adapter cable such as Shure's WA300. This cable has a 1/4-inch phone plug on one end and a Switchcraft TA4F on the other (see Figure 2) and should function normally with any high-impedance instrument pickup.

Battery Check

Turn the transmitter power on and depress the BATTERY TEST Switch. The adjacent LED should light, indicating adequate transmitter input voltage. If the LED does not light, the battery voltage has dropped below 7.25 volts and the battery should be replaced or recharged (nicad only).

If the battery is tested periodically, the failure of the LED to light indicates approximately one hour of battery life left (alkaline only).

SETTING GAIN LEVEL

Place the POWER Switch of the receiver in the ON position. The green POWER LED will light.

Turn the transmitter POWER ON/OFF Switch on. Observe the receiver RF SIGNAL LEVEL indicator. With Shure W20R receivers, the signal yellow LED should be continually lit, indicating adequate RF signal strength for good transmission. If the LED continually flickers or does not light, consult the Troubleshooting section of the receiver manual.

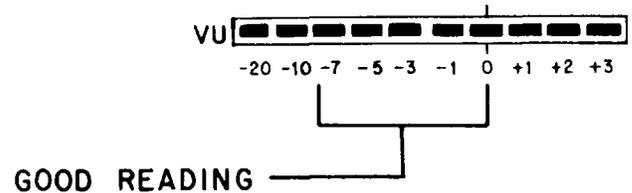
With Shure W25DR receivers, one of the green LED segments should light, indicating adequate RF signal strength for good transmission. A yellow LED indication means less than optimum signal transmission and/or reception, and a red LED indicates less than satisfactory operation.

Turn the transmitter MIC ON/OFF Switch to the ON position. With a microphone connected to the transmitter, the receiver audio level display will now respond to varying sound levels.

SET the transmitter GAIN Switch as dictated by the type of input: HI for low-impedance microphones; LO for high-impedance microphones and instrument pickups.

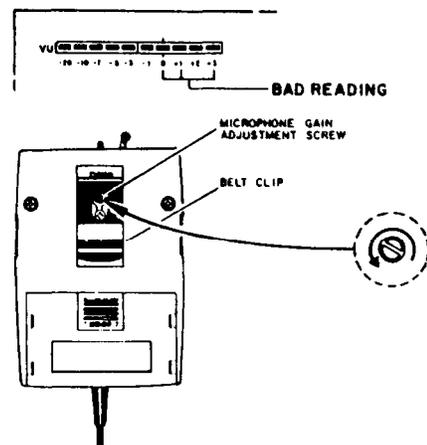
Sound Pressure Levels

Normal. The transmitter MIC LEVEL Control has been factory-set to provide optimum audio modulation at the receiver, as indicated by LED illumination in the -7 to 0 range (see Figure 3). Readings in this area will yield the highest dynamic range without overload and resulting distortion.



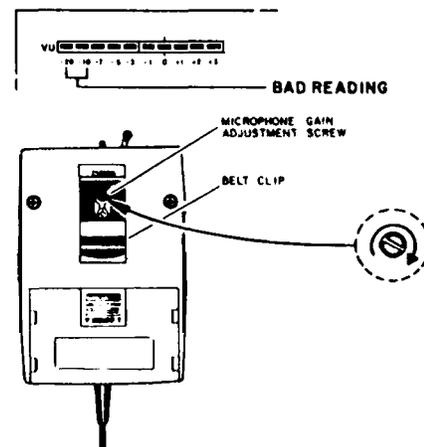
AUDIO LEVEL DISPLAY
FIGURE 3

High. For high sound pressure level (SPL) applications such as loud singing or musical instruments, the preset transmitter level may be too high. To avoid this overload and potential distortion condition, use the supplied screwdriver to turn the transmitter MIC LEVEL Control down (counterclockwise; see Figure 4). This adjustment should be made under the expected operating conditions, that is, with the high SPL singer or musical instrument in use at the microphone. Turn the control down until the optimum (-7 to 0) readings are obtained.



HIGH SPL GAIN ADJUSTMENT
FIGURE 4

Low. Low SPL applications such as soft-spoken individuals or conditions where the microphone must be at a greater-than-normal distance from the sound source, may require an increase in the transmitter gain setting. To correct for a low-level condition, turn the MIC LEVEL Control up (clockwise; see Figure 5) until a proper (-7 to 0) LED reading is obtained.



LOW SPL GAIN ADJUSTMENT
FIGURE 5

RECEIVER GAIN

The rear-panel receiver OUTPUT can be adjusted using the MICROPHONE OUTPUT LEVEL Control. In this way, the wireless system output can be made identical to that of a conventional wired microphone, avoiding extreme differences in input level settings. Turning the MICROPHONE OUTPUT LEVEL Control counter-clockwise decreases the output level, and turning it clockwise increases the output.

OPERATION

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 the connected musical instrument) and observe the receiver display for proper audio and RF indications.
4. Continue talking or playing and move around the performing area. In each area, observe the receiver displays and make sure the RF signal strength is adequate.

Normal operation is shown by steady illumination of the green RF SIGNAL LED on the Shure W20R receiver, or by illumination of at least one green LED of the RF SIGNAL LEVEL display on the W25DR receiver. Weak signals are evidenced by intermittent operation of the W20R LED and by illumination of the lower LEDs on the W25DR.

In most cases, the problem of weak RF signal strength is also indicated by audible evidence: signal dropout, either continuous or intermittent, or noisy, distorted operation. The condition is generally caused by poor antenna location, RF signal blocking, or operation beyond the system capability. Refer to the Troubleshooting section of the receiver manual for remedies.

Feedback-the annoying howl or squeal heard in the sound system- is as much a problem in wireless microphones as in wired mics. Checking microphone operation throughout the performing area will probably uncover any locations that are prone to audio feedback. If the problem cannot be solved by a slight lowering of the receiver output level or the associated amplifier gain, relocation of the speakers or possibly professional equalization of the sound system is recommended.

IMPORTANT

Every wireless microphone installation is a unique situation, and can present a variety of problems. Never attempt a live performance without a "walkthrough" first. And if major changes (furniture, scenery, etc.) were made since the walkthrough, check the wireless microphone operation again.

SPECIFICATIONS

RF Power Output

50 mW maximum; 30 mW typical

Modulation

54F3 ± 12 kHz deviation, 50 µsec pre-emphasis

Modulation Limiter

Internal compressor

Input Impedance

Actual: 16k (20k dc), pin 4 wired to pin 3 for WL83 microphone; 91k, pin 4 open for microphone or instrument pickup

Gain Switch

High position 0.0065 Vrms required for 100% modulation
Low position 0.065 Vrms required for 100% modulation

Gain Adjustment Range

Low Position 20 dB
High Position 30 dB

Antenna

Attached, 305 mm (12 in.), omnidirectional, flexible wire

Power

Battery Type 9-volt alkaline (NEDA 1604A); 8.4-volt nicad optional

Battery Life 6 to 8 hours typical (alkaline); 1.5 to 2 hours typical (8.4-volt nicad; per charge)

Current Drain 35 mA typical

Dimensions

102 mm H x 69.8 mm W x 25.4 mm D (4 in. x 2-3/4 in. x 1 in.) (not including antenna, controls and belt clip)

Weight

113 grams (4 oz); 170 grams (6 oz) with battery

ANTENNA

The transmitter antenna is a permanently attached, flexible wire, 1/4-wave antenna. It has an omnidirectional pickup pattern (equally effective in all directions) and is designed to operate in a vertically polarized mode. This means that the antenna should hang downward during operation; coiling or wadding it to minimize visibility will reduce the system's operating distance.

BATTERIES

Careful transmitter battery selection, installation, use and care will help avoid problems in wireless microphone use. The most dependable, long-lived batteries at this time are the manganese-alkaline, or alkaline, types. In addition to offering the longest expected operating life, they are commonly available.

One small word of caution about alkaline batteries: they are not all the same size. Make certain the battery you buy will make contact inside the battery compartment.

Nickel-cadmium (nicad) batteries can save money through their rechargeability, but the tradeoff is in shorter expected life per charge. In addition, forgetting to recharge can be disastrous.

Another major consideration in nicads is that of operating voltage. The "heavy-duty" 8.4-volt nicads are satisfactory for transmitter use, but the "9-volt-size" nicads commonly found in stores are only 7.2 volts and will not provide satisfactory wireless performance.

Mercury batteries in the "9-volt-size" are also actually 8.4 volts. However, their discharge characteristics are such that they will yield between 10 and 15 hours of operation with the transmitter.

Carbon-zinc batteries are the least useful for transmitter operation. Their low cost is more than offset by their extremely short operating and shelf life. Although the "heavy-duty" (HD) carbon-zinc types offer better low-temperature performance and service capacity at moderate to high current drain, they will not offer appreciably better transmitter performance than standard carbon-zinc batteries.

Although battery operation is inhibited at low temperatures, storing batteries at low temperatures will increase their shelf life. They should be sealed in bags and, when ready for use, allowed to warm up to room temperature (never heated!). Cold-stored batteries should be used as soon as possible after bringing to room temperature.

Battery life is shortened by high-temperature storage such as on amplifiers or in vehicles exposed to direct sunlight.

RECOMMENDED RANGES

	Alkaline	Mercury	Carbon-Zinc	Nicad
Temperature	0° to 38°C (32° to 100°F)	4° to 54°C (40° to 130°F)	7° to 32°C (45° to 90°F)	-20° to 45°C (-4° to 113°F)
Shelf Life (room temperature; to 80% of capacity)	30 months	30 months	6 to 12 months	10 to 80 days

The battery should be removed if the transmitter malfunctions, or if it is to be stored for a long period. Most batteries have a protective jacket, but partly or completely exhausted batteries are more prone to leakage.

Do not attempt to recharge replaceable (primary) batteries using "chargers", heat or other methods. This may cause leakage or explosion. Do not disassemble batteries or dispose of them in fire.

BATTERY TYPE	MANUFACTURER & NO.	VOLTS	EXPECTED LIFE
Alkaline	Bright Star 7590 Duracell MN1604 ESB A1604 Eveready 522 IEC 6LF22 NEDA 1604A Panasonic 6AM6 Radio Shack 23-553 Ray-0-Vac A1604 U.S. Military BA3090 Varta 4022	9.0	6 to 7 hours
Mercury	Burgess H146X Duracell TR146X Eveready E146X NEDA 1604M Panasonic TR146 U.S. Military BA1090/U	8.4	10 to 15 hours
Nickel-Cadmium	SAFT PS-9 Varta TR7/8	8.4	1-1/2 to 2 hours per charge

Carbon-Zinc	Duracell M1604 Eveready 216 Ray-0-Vac 1604 Radio Shack 23-464	9.0	1 hour
Carbon-Zinc (Heavy Duty)	Duracell M1604HD Eveready 1222 Ray-0-Vac D1604 Radio Shack 23-583	9.0	1 hour

ACCESSORIES

The following Shure transmitter accessories are available through your Shure dealer. (Replacement parts can be ordered from Shure's Service Department; information is available from Shure's Service Department.)

MODEL WL83 LAVALIER CONDENSER MICROPHONE

- This is a tiny electret condenser microphone designed for high-quality sound reproduction in broadcasting, film and sound reinforcement applications. The WL83 plugs directly into the W10BT transmitter, and is supplied with a variety of mounting options.

MODEL WA300 INSTRUMENT CABLE - This is a 1.2m (4 ft), single-conductor, shielded cable with a 1/4-inch phone plug on one end and a Switchcraft TA4F on the other. It is used for connecting the W10BT transmitter to a guitar or other musical instrument pickup.

MODEL WA310 MICROPHONE CABLE - A 1.2m (4 ft), single-conductor, shielded cable with a 3-socket (female) XLR connector on one end and a Switchcraft TA4F on the other. The WA310 is designed to connect the W10BT to a low-impedance dynamic or condenser microphone for *unbalanced* operation.

MODEL WA330 MICROPHONE CONNECTOR - This TA4F miniature connector permits microphones such as the Shure SM10A or SM98 to be connected directly to the W10BT transmitter.

FCC CERTIFICATION

The Shure Model W10BT transmitter is Type-Accepted under Federal Communications Commission Parts 90 and 74. 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 before choosing and ordering frequencies other than factory-preset frequencies. This recommendation applies to both original equipment purchase and subsequent frequency modification by Shure.

WARRANTY SERVICE

If your Shure wireless microphone equipment should require servicing under the Shure warranty, please contact:

Shure Brothers Inc.
Attention: Service Department
222 Hartrey Avenue
Evanston, Illinois 60202-3696 U.S.A.
Telephone: (312) 866-5730

Refer to receiver manual for details on warranty service.