THE SHURE® WIRELESS

MODEL W15HT/87
HANDHELD WIRELESS MICROPHONE-TRANSMITTER

The Shure Model W15HT/87 is a handheld microphone and radio transmitter for use with Shure Wireless Microphone receivers. The W15HT/87 uses the Shure SM87 supercardioid condenser microphone cartridge, the heart of one of the finest vocal microphones available today, as its transducer element. Small, compact and lightweight, the W15HT/87 is human-engineered for reliable, unobtrusive operation. The grille is black Teflon coated, and the case is finished in satin black enamel and ridged over its length for optimum gripping. The microphone cartridge is field-replaceable and interchangeable with other Shure Wireless Microphone cartridges.

All operating controls are located in a single area on the microphone's outer surface, and are recessed to minimize accidental movement. The W15HT/87's antenna combines a top-loading RF wire coil of appropriate gauge and length, and the case section immediately above the end cap.

The W15HT/87 uses a standard 9-volt transistor-radio-type battery (alkaline, lithium or heavy-duty nickel-cadmium recommended). The long-life alkaline battery is available everywhere, and replacement is easily accomplished through a locking end cap. An LED indicator provides information on battery condition.

The transmitter operates at a single, crystal-controlled frequency in the VHF 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 specially ordered. This means that a number of wireless microphone systems can be operated in a single sound installation, simultaneously and without intermodulation problems.

The W15HT/87's normal operating range is about 100 meters (330 feet). Operation at greater distances-300 meters (about 1,000 feet) or more - is often accomplished, but the determining factors in each installation will be reflections, obstacles and interference.

The microphone is supplied with a zippered carrying/storage bag, a swivel adapter for mounting the W15HT/87 on most desk and floor stands, a lockplate for locking the microphone in the "on" position, a small screwdriver for adjusting the transmitter gain, and a rubber plug to cover the microphone level adjustment hole.

DESCRIPTION (see Figure 1)

ANTENNA: The W15HT/87's antenna system is not visible. It consists of the case and grille, and a wire coil inside the end cap.

BATTERY (not supplied): Only alkaline (Duracell MN1604 or equivalent), lithium (Kodak U9VL or equivalent), or heavy duty nickel-cadmium (8.4-volt) transistor-radio-type batteries should be used. A fresh alkaline battery should provide approximately 12 hours of operation, lithium about 35 hours, and a fully charged, heavy-duty nicad should provide approximately 3 hours.

BATTERY COMPARTMENT: A locking twist-off end cap exposes the battery compartment.

BATTERY TEST LED Indicator: Flashes briefly when the POWER Switch is turned on and a "good" battery is installed. Indicator will be on and clearly visible in room light when the battery voltage drops to approximately 7.0 volts.

END CAP: The push-twist-remove end cap functions as both battery cover and antenna coil holder. Note that the end cap is color-coded internally to reflect the W15HT/87's operating frequency as follows:

Color	Frequency	Color	Frequency
Green	163-168 MHz	Brown-Red	188-192 MHz
Yellow	168-175 MHz	Brown-Blue	191-195 MHz
White-Red	175-177 MHz	Brown-Orange	192-196 MHz
White-Blue	177-180 MHz	Brown-Green	196-201 MHz
White-Orange	180-182 MHz	Brown-Yellow	199-204 MHz
White-Green	182-185 MHz	Gray-Red	204-210 MHz
White-Yellow	185-188 MHz	Gray-Blue	210-216 MHz

FREQUENCY NAMEPLATE: Located inside the battery compartment, the nameplate specifies the W15HT/87's operating frequency. Note that the operating frequency must be within the end cap frequency range (see above).

GRILLE: Protects the SM87 acoustic transducer of the W15HT/87, and helps minimize the effects of breath sounds and wind noise.

HANDHELD WIRELESS MICROPHONE-TRANSMITTER
MODEL W15HT/87
SHURE®

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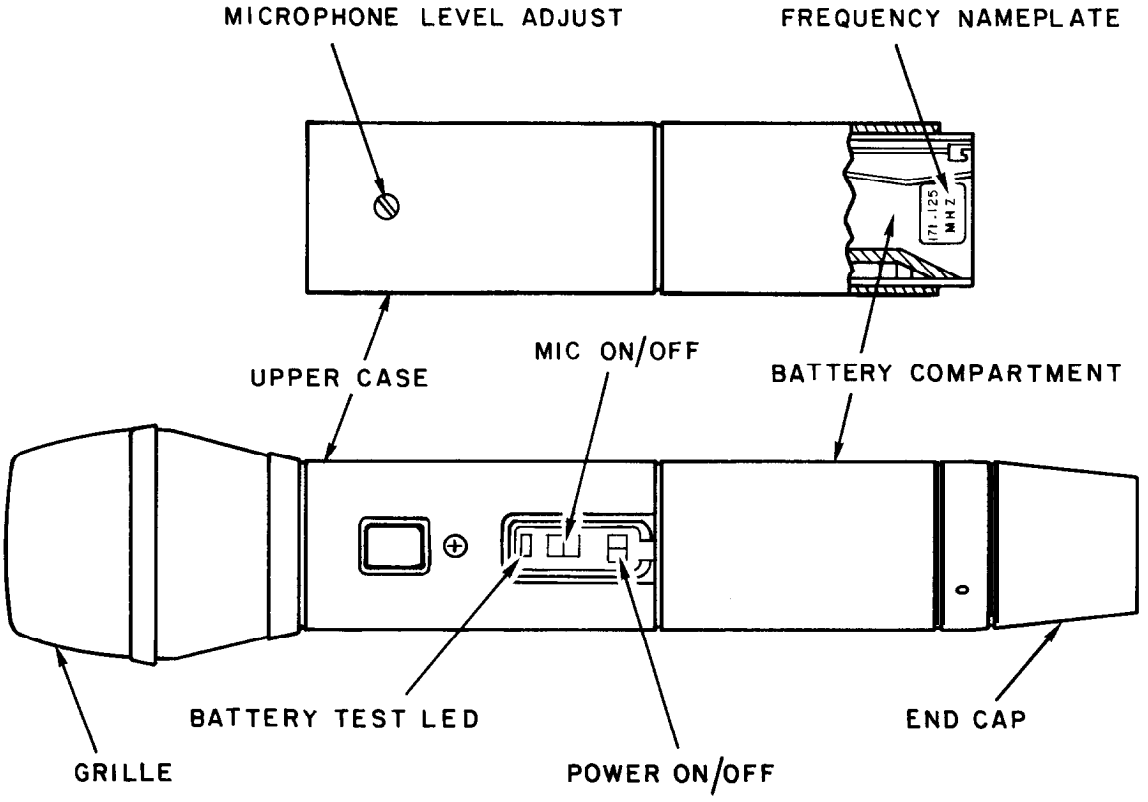


W15HT/87 WIRELESS MICROPHONE
FIGURE 1

MICROPHONE LEVEL Rotary Control: Used in conjunction with the wireless microphone receiver, this control provides audio level adjustments for various sound sources. A small screwdriver is supplied to make adjustments. (NOTE: The supplied screwdriver is plastic; a metal-blade screwdriver may damage the control.) A rubber plug is provided to cover the adjustment hole if desired.

MICROPHONE ON/OFF Slide 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 an "open" receiver.

POWER ON/OFF Slide Switch: Applies power to the transducer and transmitter circuitry. Like the Microphone On/Off switch, it is a low-profile type and is oriented perpendicular to the Microphone On/Off switch to further prevent accidental turn-off.

UPPER CASE: In addition to the controls, this section contains the transmitter circuitry.

LOCKPLATE: Prevents accidental control movement. Installed by removing the upper case screw just above the control area, inserting the lockplate, and replacing the screw.

SETUP

With the transmitter POWER ON/OFF Switch in the OFF position, remove the end cap (push in, twist counterclockwise, and pull). Insert a new 9-volt alkaline or lithium battery in the compartment (carbon-zinc batteries will work, but they provide a diminished operating life of about 2.5 hours). Observe the proper polarity: the large (negative) terminal in the large channel and the small (positive) terminal in the small channel (see battery compartment label).

Operation with a fully charged, heavy-duty, 8.4-volt nickel-cadmium rechargeable battery is also permissible and will provide approximately 3 hours of operation. **IMPORTANT:** Do ***not*** use a "conventional" g-volt-sized nickel-cadmium battery; its 7.2-volt output will not operate the transmitter properly.

BATTERY CHECK

Turn the POWER Switch on and observe the Battery Test LED. The LED should light momentarily, indicating adequate voltage. If it remains lit (clearly visible in normal room light), the battery voltage has dropped below 7.0 volts and the battery should be replaced or recharged (nicad only). If it does not light at all, the battery should be discarded.

SETTING AUDIO LEVEL

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

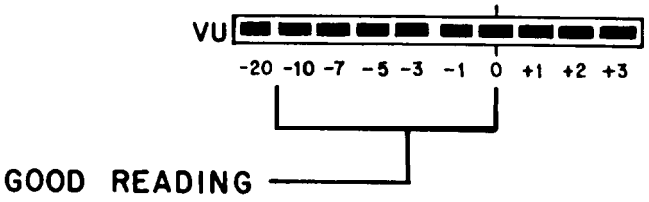
Move the microphone POWER ON/OFF Switch to the On position. Observe the receiver RF SIGNAL LEVEL Indicator. In the Shure W20R receiver, the yellow signal LED should be continually lit, indicating adequate RF signal strength for good transmission. If the LED continually flickers or does not light, consult the Troubleshooting section of the receiver manual.

In the Shure W25DR receiver, 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.

Move the W15HT/87's MICROPHONE ON/OFF Switch to the ON position. The receiver audio level display should now respond to varying sound levels.

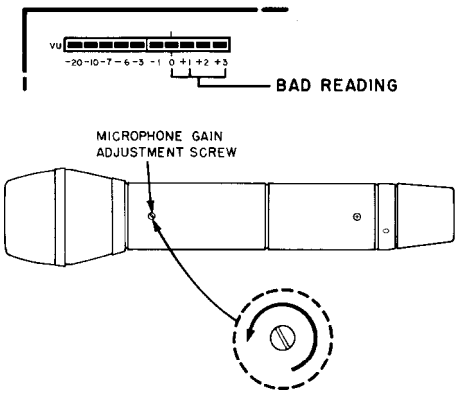
Sound Pressure Levels

Normal. The W15HT/87's Microphone Level control has been factory-set to provide optimum audio modulation at the receiver under typical operating conditions, as indicated by LED illumination in the -10 to 0 range (see Figure 2). Readings in this area will yield the highest dynamic range without overload and resulting distortion.



AUDIO LEVEL DISPLAY
FIGURE 2

High. For high sound pressure level (SPL) applications such as loud singing or musical instruments, the preset microphone level may be too high. To avoid an overload and potential distortion condition, use the supplied screwdriver to turn the Microphone Level control down (counterclockwise; see Figure 3). 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 (-10 to 0) readings are obtained.

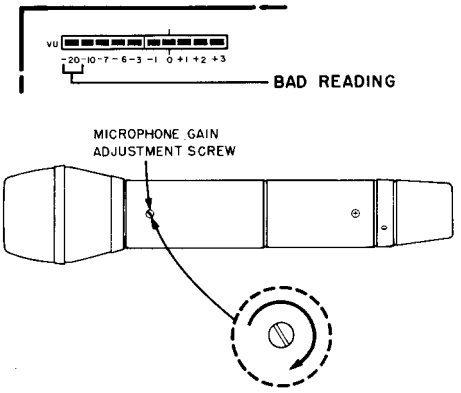


HIGH SPL GAIN ADJUSTMENT
FIGURE 3

Low. Low SPL conditions 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 microphone gain setting. To correct for a low-level condition, turn the Microphone Level control up (clockwise; see Figure 4) until a proper (-10 to 0) LED reading is obtained.

RECEIVER GAIN

The rear-panel receiver OUTPUT can be adjusted using the receiver's 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 mixer input level settings. Turning the receiver's MICROPHONE OUTPUT LEVEL Control counterclockwise decreases the output level, and turning it clockwise increases the output. NOTE: The Shure W25DR OUTPUT LEVEL Control does not function when the OUTPUT Switch is in the LINE position.



LOW SPL GAIN ADJUSTMENT
FIGURE 4

OPERATION

1. Turn on the microphone and receiver POWER Switches.
2. Make sure the W15HT/87 Microphone On/Off switch is on.
3. Talk into the microphone (or play a 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 (the audio level should not change with movement around the performing area, only with changes in source loudness).
5. If the W15HT/87 is to be operated continuously, attach the plastic control lockplate to avoid accidental movement of the controls. Remove the screw just above the control panel. Insert the protruding tip of the lockplate in the slot below the lockplate in the slot below the POWER LED and secure it with the screw previously removed. Note that the lockplate is clear plastic and permits viewing the control positions and access to the POWER switch.

Normal operation is shown by steady illumination of the yellow RF SIGNAL LED on the Shure W20R receiver, or by illumination of any 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 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-can be as much a problem in wireless microphones as in wired mics. The supercardioid pickup pattern of the SM87 is a major step in preventing this problem. 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 loudspeakers 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; 15 mW typical

Modulation
FM (54F3) ± 12 kHz deviation, 50 µsec pre-emphasis

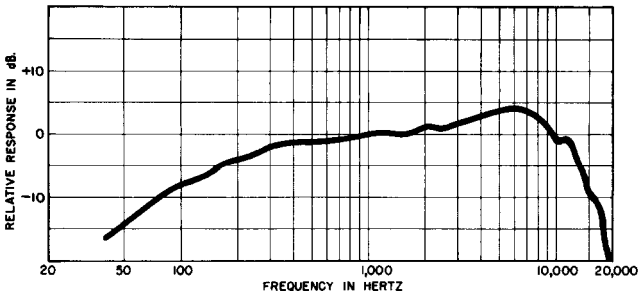
Modulation Limiter
Internal compressor

Audio Level Adjustment Range
>40 dB

Antenna
Integral dipole; end-loading provided by wire coil in battery cap

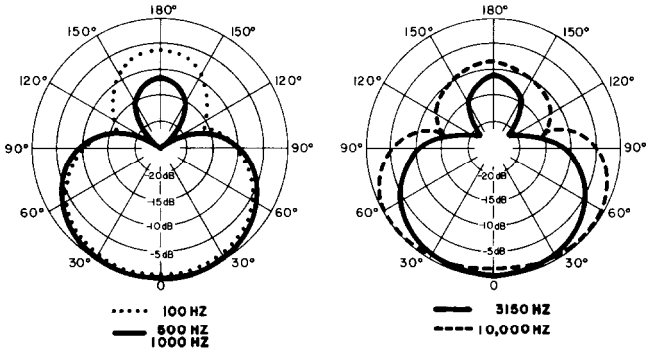
Transducer Type
Condenser (electret bias)

Frequency Response
See Figure 5



TYPICAL FREQUENCY RESPONSE
FIGURE 5

Polar Pattern
Supercardioid response- narrower than cardioid for higher directionality, superior rejection of undesirable sounds (see Figure 6)



TYPICAL POLAR PATTERNS
FIGURE 6

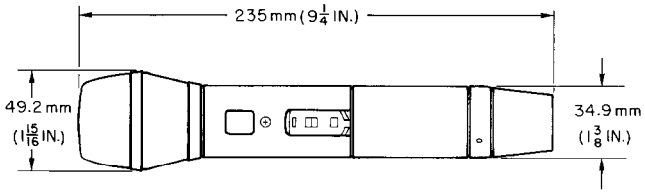
Maximum SPL (for 3% THD at 1 kHz)
118 dB or greater, level control full clockwise; 138 dB or greater, level control set for 20 dB or more attenuation

Noise (level control full clockwise)
SPL equiv. max., A-weighted . . . . . 34 dB
SPL equiv. max., per DIN 45 405 . . . . . 37 dB

Power
Battery Type: 9-volt alkaline (NEDA 1604A) or lithium; 8.4-volt nicad optional
Battery Life: 12 to 14 hours typical (alkaline); 35 hours typical (lithium); 3 hours typical (8.4-volt nicad; per charge)
Current Drain: 24 mA typical; 28 mA max.

Case
Matte black enamel high-impact thermoplastic and steel with black steel grille

Dimensions
See Figure 7



OVERALL DIMENSIONS
FIGURE 7

Net Weight
240 grams (8.5 oz); 285 grams (10.1 oz) with battery

ANTENNA

The W15HT/87's antenna uses a loading coil tuned to the operating frequency of the transmitter (see table under End Cap description). End caps of different wireless microphone transmitters should not be intermixed or improper operation may result. The transmitting antenna is omnidirectional, that is, it radiates equally in all directions. For optimum wireless microphone applications, the area between the W15HT/87 and the receiver should be as free of RF obstructions as possible.

TRANSDUCER

The dynamic transducer has a supercardioid pickup pattern, which is considerably narrower than a cardioid pattern, with points of minimum pickup at approximately 125° from the front rather than the cardioid's 180° null. This results in greater gain-before-feedback and less unwanted pickup of other voices, instruments or noise (microphone "bleed"). In addition, it can be very useful for miking single sources in a reverberant or noisy environment. The W15HT/87 also makes optimum use of proximity effect to give the performer control of low-frequency sound, from the warm intimacy of close miking to the natural sounds of normal-to-distant miking.

The transducer is fully shock-mounted for minimal operation.

BATTERIES

Careful battery selection, installation, use and care will help avoid problems in wireless microphone use. The optimum combination of reliability, long life, availability and low cost at this time is the manganese-alkaline, or alkaline, battery. A 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.

Nine-volt lithium batteries offer greater service life and greatly increased shelf life over comparable alkaline batteries.

Nickel-cadmium (nicad) batteries offer convenience and long-term economy, 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 use in this microphone, but the "9-volt-size" nicads commonly found in stores supply only 7.2 volts and will not provide satisfactory wireless performance.

Carbon-zinc batteries are the least useful for wireless microphone 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 up to room temperature.

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

RECOMMENDED RANGES

	Alkaline	Lithium	Carbon-Zinc	Nicad
Temperature	0° to 38°C (32° to 100°F)	0° to 71°C (32° to 160°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	10 years	6 to 12 months	10 to 80 days

The battery should be removed if the microphone 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 and Number	Volts	Expected Life
Alkaline	Bright Star 7590 Duracell MN1604 ESB A1604 Eveready 522 IEC 6LF22 NEDA 1604A Panasonic 6AM6 Radio Shack 23-553 Ray-O-Vac A1604 U.S. Military BA3090 Varta 4022	9.0	12 to 14 hours
Lithium	Kodak U9VL	9.0	Approximately 35 hours
Nickel-Cadmium	SAFT PS-9 Sears 9375 Varta TR7/8	8.4	2.5 to 3.5 hours per charge
Carbon. Zinc	Duracell M1604 Eveready 216 Ray-O-Vac 1604 Radio Shack 23-464	9.0	2.5 hours
Carbon. Zinc (Heavy-Duty)	Duracell M1604HD Eveready 1222 Ray-O-Vac D1604 Radio Shack 23-583	9.0	2.5 hours

REPLACEMENT PARTS

Microphone Cartridge R150
Screen and Grille Assembly RK214G
End Cap ..... 90-4049 (specify frequency)

FURNISHED ACCESSORIES

Lockplate 65A1611
Carrying/Storage Bag 26B11
Screwdriver 65A1587
Swivel Adapter WA370
Adjustment Hole Plug 66A223

OPTIONAL ACCESSORY

Windscreen A85WS

FCC CERTIFICATION

The Shure Model W15HT/87 microphone 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

All claims of defects or shortage should be directed to the above address. Please furnish model number, operating frequency, and date, place and proof of purchase (such as a copy of the sales receipt) to establish warranty. Your letter should include all pertinent details including applicable model or part numbers and a brief description of the problem. ***Do not*** return any units or parts to Shure unless requested to do so by Shure's Service Department. Any returned items ***must*** have prior authorization. Unauthorized returns are delayed in handling; these delays can be avoided by contacting Shure in advance and furnishing the necessary information.

If you are requested to return the equipment by Shure's Service Department, package the unit (with all information requested) as follows: Check to see that all parts are present and in place. If the original carton is not available, place the unit in a strong shipping carton at least 13 mm (6 in.) larger in all three dimensions than the unit. Fill the surrounding space with a resilient packing material such as shredded paper, excelsior, Styrofoam, etc. Seal and mark the carton in accordance with postal regulations and ship it prepaid to the Shure Service Department.

It is extremely important that the packaged unit be well-packed and fully insured. Damage claims are subject to settlement between the shipper and the carrier, and this can delay repair and return of the unit.

Shure reserves the right to make design changes and product improvements without assuming any obligation to install these changes or improvements on any previously manufactured products. Shure also reserves the right to ship new and/or improved products which are similar to the form, fit and function of the originally ordered products.

SHURE®

Breaking Sound Barriers