WILLIAMS SOUND ®

IR T2
Infrared Transmitter 2.3, 2.8, 3.3, 3.8 MHz

USER MANUAL

Table of Contents

Important Safety Instructions

Please read and keep these instructions.

Receiver Safety Warnings

HEARING SAFETY

⚠ CAUTION!

Many Williams Sound receivers are designed to amplify sounds to a high volume level, which could potentially cause hearing damage if used improperly. To protect your hearing and the hearing of others:

1. Make sure the volume is turned down before putting on the earphone or headphone—only then adjust the volume to a comfortable level.

2. Set the volume level at the minimum setting that you need to hear.

3. Do not allow children or other unauthorized persons access to this product.

BATTERY SAFETY AND DISPOSAL

⚠ CAUTION!

Some Williams Sound receivers are supplied with non-rechargeable alkaline batteries. Do not attempt to recharge non-rechargeable batteries; they may explode, release dangerous chemicals, cause burns, or cause other serious harm to the user or product.

PACEMAKER SAFETY

⚠ CAUTION!

If you have a pacemaker or other medical device, make sure that you are using the Williams Sound receiver in accordance with safety guidelines established by your physician or the pacemaker/medical device manufacturer.

Transmitter Safety Warnings

WARNING! To reduce the risk of fire or electric shock, do not expose the system to rain or moisture. Do not use this apparatus near water. The system should not be exposed to dripping or splashing, and objects filled with liquids such as beverages should not be placed on the transmitter or receivers. Clean only with a dry cloth.

⚡	**CAUTION** RISK OF ELECTRICAL SHOCK — DO NOT OPEN	⚠
	CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR SIDES). NO USER-SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.	

⚡	**AVIS** RIQUE DE CHOC ÉLECTRIQUE. NE PAS OUVRIR	⚠
	ATTENTION: POUR RÉDUIRE LE RISQUE DE DÉCHARGE ÉLECTRIQUE, NE RETIREZ PAS LE COUVERCLE (OU CÔTÉS). IL NE SE TROUVE AL'INTÉRIEUR AUCUNE PIECE POUVANT ETRE RÉPARÉE PAR L'USAGER. S'A DRESSER A UN RÉPARATEUR COMPÉTENT.	

Servicing or attempting to service this device will void the warranty

Refer servicing to qualified personnel. Servicing is required when the system has been damaged in any way: if liquid has been spilled or objects have fallen into the unit, if the unit has been exposed to moisture, if the unit does not operate normally, or if the unit has been dropped.

Do not block any ventilation openings. Install in accordance with manufacturer's instructions.

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produces heat.

Use only attachments/accessories specified by the manufacturer.

Unplug the transmitter during lightning storms or when unused for long periods of time.

Be advised that different operating voltages require the use of different types of line cord and attachment plugs. Check the voltage in your area and use the correct type.

Use only the power supply provided by Williams Sound. Other power supplies may have similar specifications, but may not be equivalent in emissions ratings, in-rush current, etc. Use of an unapproved power supply may leave the device partially or completely inoperable, and will void the warranty.

This apparatus has been designed with class-1 construction and must be connected to a main socket outlet with a protective ground connection (the third grounding prong).

Protect the power cord from being walked on or pinched, particularly at plugs, receptacles, and near the power jack on the transmitter.

The MAINS plug or an appliance coupler is used as the disconnect device, so the disconnect device should remain readily operable.

For Customers in The United States

WARNING: Use a three-wire grounding-type line cord as is supplied with the product. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to part 15 of the FCC rules.

For Customers in Canada

This Class B digital device meets all requirements of the Canadian Interference-causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigencies du Règlement sur le matériel brouilleur du Canada.

Recycling Instructions

Help Williams Sound protect the environment. Please take the time to dispose of your equipment properly.

Product Recycling:
Please do NOT dispose of your Williams Sound equipment in the household trash. Take the equipment to a electronics recycling center, or return the product to the factory for proper disposal.

System Overview

The IR T2 is a two-channel infrared transmitter combining infrared modulator and emitter technology into a single mountable enclosure—which reduces operating costs, eliminates the need for rack space and eases set-up.

The IR T2 is capable of transmitting on four different carriers in single-channel mode, but it can only transmit on two channels simultaneously. It can be set to transmit on 2.3 and 2.8 MHz simultaneously, or it can be set to transmit on 3.3 and 3.8 MHz simultaneously. The IR T2 cannot simultaneously transmit in any other carrier combination. If other channel configurations are needed, contact Williams Sound for other product options.

The IR T2 Infrared Transmitter includes Phoenix style connectors for the line level audio inputs.

The IR T2 is ideal for high-quality audio programs such as music, theater and audio description. The IR T2 will accept any line level, balanced or unbalanced audio inputs. Infrared receivers detect the transmission and convert the light signals back into audio signals. The IR T2 operating frequencies (2.3, 2.8, 3.3, 3.8 MHz) minimize high-efficiency lighting interference.

No FCC license or radio approval is required with this equipment. Please check the laws of your country for any additional regulation before using this device.

NOTE: **This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause interference in which case the user will be required to correct the interference at his own expense.**

NOTE: **A PLASMA MONITOR OR TELEVISION CAN DEGRADE THE AUDIO QUALITY OF THE IR T2 TRANSMITTER. FOR BEST PERFORMANCE, THE TRANSMITTER SHOULD BE POSITIONED AS FAR AWAY AS POSSIBLE FROM ANY PLASMA MONITOR OR TELEVISION.**

Installation Procedures

Determine Coverage Area

When using the IR T2 transmitter in single-channel mode with the RX22-4 receiver, the system coverage area will cover up to 18,000 sq. ft. (1,673 sq. m.). IR T2 units automatically adjust to give the greatest coverage area possible in both 1-channel and 2-channel modes.

Figure 1 illustrates typical coverage pattern for the IR T2. This can be affected by direct/indirect sunlight, reflections on walls and room construction. Reflections of the infrared light from walls, ceilings, and floors may change these patterns.

Important: Remember to point the transmitter towards the listening audience.

Remember: Most objects block infrared light. The transmitter cannot be concealed behind walls, glass, curtains, etc.

These patterns are the direct radiation pattern. The infrared radiation does not drop to zero outside the illustrated patterns; it decreases. It still may be usable at a greater distance, depending on the receiver sensitivity and the reflective characteristics of the room.
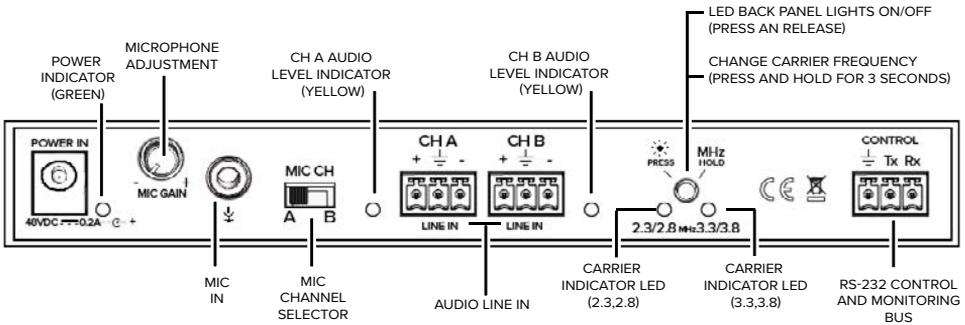
Do not paint the front face of the IR T2.

Figure 1: Receiver coverage area with IR T2 transmitter in single channel mode.

IR T2 Coverage Pattern with RX22-4 Receiver
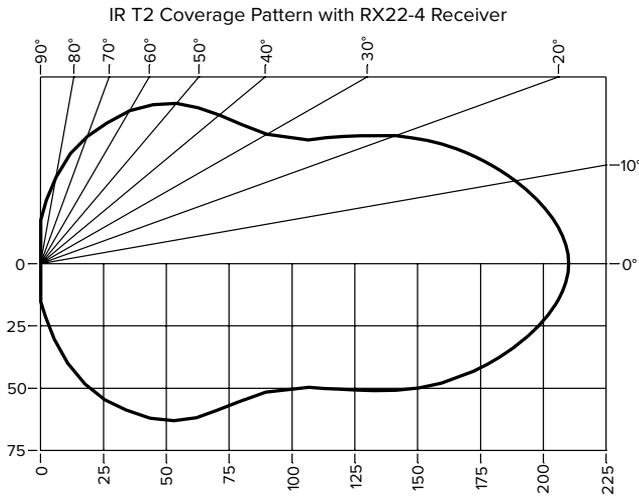
Control Panel

Figure 2: IR T2 rear view

Connecting Power

⚠️ **WARNING: MAINS VOLTAGE MUST NOT FALL BELOW 100 VAC, OR SYSTEM PERFORMANCE WILL BE GREATLY REDUCED. UNIT MAY ENTER RESET MODE UNTIL POWER IS RESTORED.**

1. Plug the power supply output cord into Power In on the IR T2.

2. Attach a line cord to the power supply.

3. Plug the power supply into the AC outlet. TFP 057: 100-240 VAC IN, 50 / 60 Hz.

This system is designed for class 2, low-voltage wiring. Always follow local electrical codes when using low-voltage wiring.

Green Power

The IR T2 is equipped with a sleep/power save feature. If no audio is present on either channel for twelve minutes, the transmitter will automatically go into sleep/power save mode. This mode decreases power consumption by 80 percent. Units will automatically start up when audio is activated.

While operating, the IR T2 performs a self-test to detect damage due to shipping, handling, tampering or incorrect operation. If any failure is present, the power indicator light will blink rapidly. The unit will attempt to recover automatically by rebooting.

See IR T2 Indicators table on page 11 for instructions on how to read indicator lights.

Connecting the Audio Source

Automatic Channel Detection/ Shutdown

The IR T2 offers two simultaneous carrier frequencies settings: Ch A (2.3 MHz) and Ch B (2.8 MHz) or Ch A (3.3 MHz) and Ch B (3.8 MHz).

The unit automatically detects the presence of audio on the microphone and Phoenix style audio inputs, and transmits on either/both channels when an audio signal is present on that channel. If audio is present on both the microphone and Phoenix style audio input for a given channel, the audio signals will be mixed. This setting may manually be adjusted by using the carrier selection button on the back of the device to toggle between 2.3/2.8 MHz or 3.3/3.8 MHz.

If no audio is detected on either channel when the IR T2 is turned on, the unit will immediately go into power save mode and shut off the IR.

While operating, when no audio signal is present on a channel for twelve minutes, the IR T2 will shut down that channel. Operating the IR T2 in single-channel mode provides a 40 percent increase in range over two-channel mode.
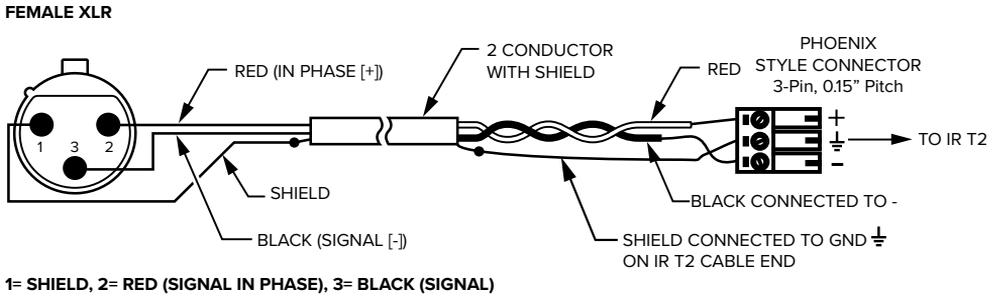
Microphone Source (3.5 mm Mono Plug)

Plug an electret microphone into the 3.5mm Mic In jack (MIC 027, MIC 100, or MIC 090). To assign the microphone to Ch A use the Mic Channel Selector to select Ch A. To assign the microphone to Ch B use the Mic Channel Selector to select Ch B.

Line Level Source (Phoenix style connectors)
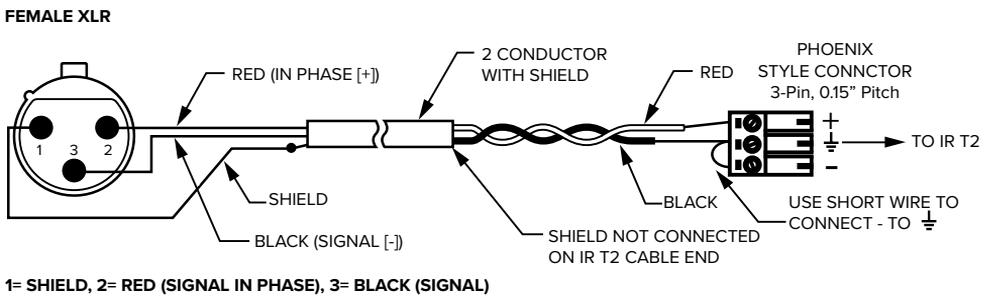
The IR T2 will accept line level balanced or unbalanced audio inputs. Select the frequency you wish to transmit on and connect your audio source(s) to the appropriate Phoenix style connectors. No adjustment needs to be made for balanced or unbalanced inputs; this is internally detected & managed. See Figure 3 and Figure 4 for balanced and unbalanced cable configurations.

Figure 3: <u>Balanced</u> line out (XLR) to IR T2 line input (Phoenix style connector)

FEMALE XLR

RED (IN PHASE [+])

2 CONDUCTOR
WITH SHIELD

RED

PHOENIX
STYLE CONNECTOR
3-Pin, 0.15" Pitch

TO IR T2

BLACK CONNECTED TO -

SHIELD

SHIELD CONNECTED TO GND
ON IR T2 CABLE END

BLACK (SIGNAL [-])

1= SHIELD, 2= RED (SIGNAL IN PHASE), 3= BLACK (SIGNAL)

Figure 4: <u>Unbalanced</u> line out (XLR) to IR T2 line input (Phoenix style connector)

FEMALE XLR

RED (IN PHASE [+])

2 CONDUCTOR
WITH SHIELD

RED

PHOENIX
STYLE CONNCTOR
3-Pin, 0.15" Pitch

TO IR T2

USE SHORT WIRE TO
CONNECT - TO

BLACK

SHIELD

SHIELD NOT CONNECTED
ON IR T2 CABLE END

BLACK (SIGNAL [-])

1= SHIELD, 2= RED (SIGNAL IN PHASE), 3= BLACK (SIGNAL)

## Summing an unbalanced stereo line-level source to a single mono input

If using a stereo source for an input, the stereo signal will be combined to mono, and heard in mono, on the A or B channel of the IR T2.

The + and - phoenix terminals on the IR T2 are *each tied internally to single differential amplifiers.*

Proper Wiring (Yes circle in Figure 5**):** The resistors, along with the jumper between - and ground, are necessary to allow the left and right signals to be summed before being preamplified by the *single differential (single-ended) amplifier inside the IR T2.*

Improper Wiring (No circle in Figure 5**):** If the left and right positive leads from the source were connected to the + and - pins on the Phoenix style connector, and their grounds (shields) were connected to the ground terminal, the result would be the *difference* of the left and right channels. The main part of the audio signal (what is common to both the left and right channels) would be missing, as this is thrown away during *differential amplification*. The difference is *very little*, resulting in a very low input signal. In this case, most of the original audio would not be heard!

Figure 5: Summing an unbalanced stereo source to a single mono input
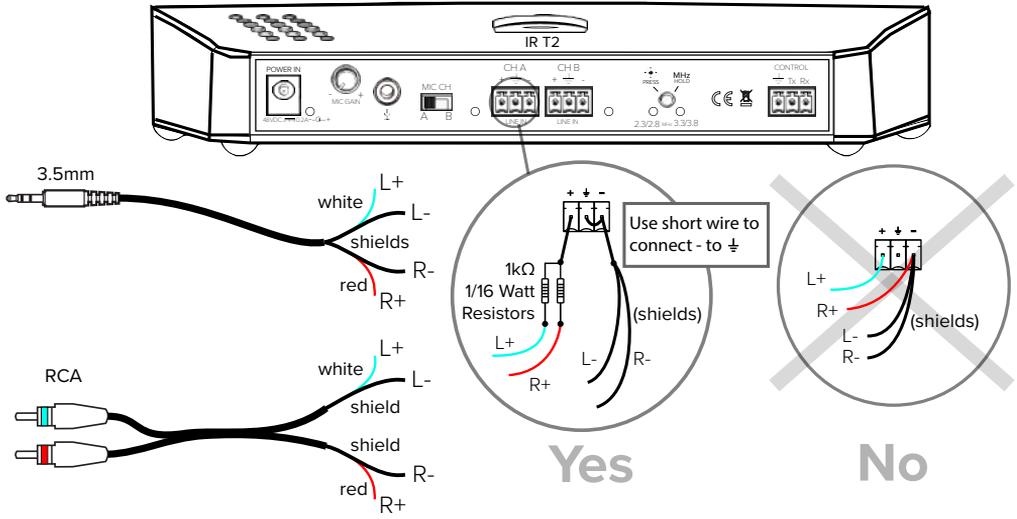
Adjusting the Audio Level

Line Level Source

After an audio signal has been connected to the transmitter, adjust the audio source gain until the IR T2 audio-level indicator for that channel blinks periodically.

Microphone Source

Speak into the microphone from a normal distance and at a natural voice level. Use the microphone gain adjustment on the IR T2 to set the gain to the point where the audio level indicator on the selected channel blinks periodically. If the audio level indicator is always on or is on most of the time, the level is too high. If the audio level indicator is never on, the level is too low.

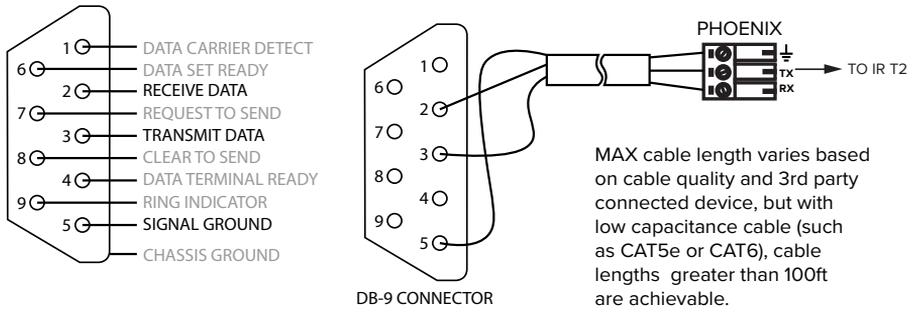# Remote Control and Monitoring

RS-232 Cable Wiring

If a third-party controller (Crestron, AMX, Extron, etc.) is desired, the IR T2 has RS-232 control and monitoring available. Figure 6 shows how to make a custom RS-232 control cable if the third party controller has a DB-9 connector.

The only pins required are 2, 3 and 5. Pins 2 and 3 are reversed from one end to the other: the "receive" on the DB-9 is connected to "transmit" on the Phoenix style connector, and "transmit" on the DB-9 is connected to "receive" on Phoenix style connector. This circuit facilitates 2-way communication between the third-party controller (Crestron, AMX, Extron, etc.) and the IR T2.

If the third-party controller also has a Phoenix style connector (not a DB-9 connector), follow the same convention where the TX and RX pins are reversed from one end to the other.

See the **IR T2 Programmers Guide** for additional information.

Figure 6: RS-232 Standard Cable Pinout Configuration

1	DATA CARRIER DETECT
6	DATA SET READY
2	RECEIVE DATA
7	REQUEST TO SEND
3	TRANSMIT DATA
8	CLEAR TO SEND
4	DATA TERMINAL READY
9	RING INDICATOR
5	SIGNAL GROUND
	CHASSIS GROUND

DB-9 CONNECTOR

PHOENIX
TX
RX
TO IR T2

MAX cable length varies based on cable quality and 3rd party connected device, but with low capacitance cable (such as CAT5e or CAT6), cable lengths greater than 100ft are achievable.

Troubleshooting

For easier troubleshooting, the IR T2 units are equipped with a series of self-tests and indications. Please see IR T2 indicator lights table on page 11 to aid in troubleshooting.

The IR T2's Power Indicator is not lit:
- Make sure the power supply is plugged into the transmitter and any remote power switch is on.
- Press the LED on/off switch on the back panel to make sure the LEDs are enabled. The green power LED and the carrier indicator LED should light.
- Make sure the electrical outlet is on.
- Make sure the 48 VDC power supply is working.

The IR T2's Ch A or Ch B Audio-level Indicator does not light:
- Make sure the IR T2 is plugged in.
- Press the LED on/off switch on the back panel to make sure the LEDs are enabled. The green power LED and the carrier indicator LED should light.
- Make sure the audio input is connected properly. Refer to Figure 3 or Figure 4 depending on the connection being used.
- Make sure an active and adequate level audio signal is being sent to the IR T2 transmitter.

No Sound through Receivers:
- Check to make sure the receiver is operating on the same frequency as the transmitter.
- Make sure the front of the receiver is facing the transmitter.
- If some of the receivers work but others don't, check for bad batteries or earphones.
- If none of the receivers work, check to see if the power and audio input cables are connected to the transmitter. Verify that the Power Indicator is on steady, and Ch A or Ch B audio-level indicator blinks periodically.
- Check to see if the transmitter is connected properly to the audio source. If the indicators are enabled, the audio-level indicators should flash on channels that have audio.
- Make certain the transmitter is not covered by objects which would block infrared light.

Sound Through the Receivers is Weak and Noisy:
- Try adjusting the audio input level (see page 9). If the signal sounds okay, you may need to reposition the transmitter beam.

Buzzing or Humming Noise in Sound System:
- Check for ground loops or noise on the input signal. Reference Figure 5 for more details.

If these instructions do not address your problem or the issue persists, please call your authorized Williams Sound dealer or representative. You may also reach our TechBlue team by calling 1-800-328-6190 and asking for TechBlue.

IR T2 Indicator lights

INDICATOR	STATE	DESCRIPTION
Power Indicator – Green (round)	On steady	Unit is powered and actively transmitting
	Fade-on, Fade-off... (continuous)	Unit is powered and in sleep/power-save mode (no audio signal detected, unit is not transmitting)
	Fast blink (continuous)	Self test has detected a failure on this unit and will attempt recovery by rebooting.
Audio Level Indicators – Yellow (round) (Ch A or Ch B)	Blinking periodically	Audio is present on this channel and is set to the optimum level
	On steady (or most of the time)	Audio is present on this channel, but the level is too high
	Off	Audio is not present OR audio level is too low on this channel
All indicators	On for 2 seconds, Off for 1 second, resumes normal states	Initial power-on sequence OR unit has reset
	On for 2 seconds, Off for 1 second... (continuous)	Unit is continuously resetting - may be due to a low voltage supply condition (possibly caused by bad power supply, improper user connection or signal level)

NOTE: The indicator lights can all be turned off AFTER initial set-up to allow for less conspicuous operation. Press and release the LED on/off button on the back of the device.

Mounting Options

BKT 024 - Universal wall / ceiling mount (included)
MLB 003 - Linking bar for stacking transmitters
STD 007 - Tabletop tripod stand
The IR T2 can be mounted on any camera tripod stands with a 1/4" - 20 threaded connector.
Do not paint the front of the IR T2.

Accessories

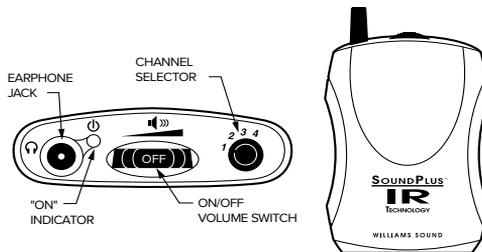MIC 027 - Hand-held unidirectional microphone
MIC 090 - Lavaliere microphone
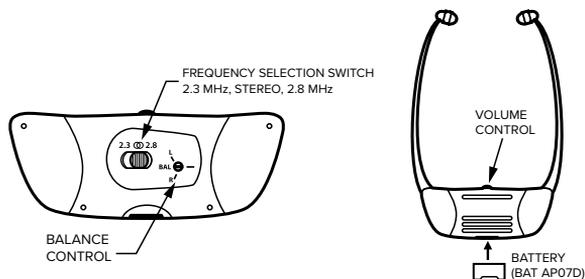MIC 100 - Rear-wear headset microphone
WCA 105 - RCA to Phoenix cable

Optional Receivers

WIR RX22-4 Receiver: (4-channel receiver: Channel 1=2.3 MHz, channel 2=2.8 MHz, channel 3=3.3 MHz, and channel 4=3.8 MHz).

WIR RX18 Receiver

Infrared Transmitter Specifications

Model IR T2

Dimensions, Weight:	9.0" W (229 mm) x 3.8" D (97 mm) x 1.4" H (36 mm), 0.84 lb. (0.38 kg)
Color:	Black
Power Supply:	TFP 057 Desktop style international certified power supply with IEC line cord, 100-240 VAC input, 50-60 Hz, 18 W; 48 VDC output
DC Power Input:	2.1 mm ID barrel connector, 48 VDC, 0.2A, center positive
Power Indicator:	Green LED
Sleep/Power Save Mode:	Shuts off carrier when no audio is present for 12 minutes
Modulation:	FM Wideband, ±50 kHz deviation max, 50 μS pre-emphasis
Emitter IR Power:	0.7 W
Transmit Frequencies:	2.3, 2.8, 3.3, 3.8 MHz
Transmit Channel:	Indicators: Yellow LEDs indicate whether 2.3/2.8 MHz or 3.3./3.8 MHz transmission frequencies are selected
Coverage Area:	Up to 18,000 sq. ft (1,673 sq. m) in single-channel mode with the RX22-4 receiver
Microphone input:	3.5 mm, stereo jack with signal and bias connected to tip, electret microphone compatible (6 VDC bias supply with 2.7 k ohm series resistor)
Microphone gain adjust:	Rotary 10 dB range
Microphone channel switch:	Selects microphone input to Ch. A or Ch. B
Audio Inputs / Controls:	Line inputs: Phoenix style connector jack for Ch A and Ch B accept line level, balanced or unbalanced audio
Audio indicators:	Yellow LED blinks at nominal audio level. One per channel
Indicators On/Off:	Momentary contact switch turns on/off indicator lights
Frequency Selection:	Press and hold momentary contact switch to change carrier frequency group.
Signal-to-Noise Ratio:	70 dB (line input)
Frequency Response:	95 Hz to 17.6 kHz, -3 dB re 1 kHz (line inputs) 125 Hz to 17.0 KHz, -3 dB re 1 kHz (microphone input)
Total Harmonic Distortion:	<1% (1 kHz, nominal deviation, line or microphone input)
Control/Monitoring:	3-wire RS-232 bus, standard ASCII commands/replies, 115200 Baud rate (8N1). See the IR T2 Programmers Guide for more information.
Operating Requirements:	32°-122°F (0-50°C)
Mounting Kit:	Wall or Ceiling mount: BKT 024 Omnidirectional mount
Warranty:	5 Years
Approvals:	CE, FCC, Industry Canada, WEEE, RoHS, CB Scheme, RCM, PSE
Compatible Receivers:	WIR RX22-4, WIR RX18, IR R1

NOTE: Specifications subject to change without notice.

Visit our website for the latest specifications and publications: www.williamssound.com

Limited Warranty

Williams Sound products are engineered, designed, and manufactured under carefully controlled conditions to provide many years of reliable service. Williams Sound warrants the IR T2 infrared listening system against defects in materials and workmanship for five (5) years. During the first five years from the purchase date, we will promptly repair or replace the IR T2 infrared listening system.

Microphones, earphones, headphones, batteries, chargers, cables, carry cases, and all other accessory products carry a 90-day warranty.

WILLIAMS SOUND HAS NO CONTROL OVER THE CONDITIONS UNDER WHICH THIS PRODUCT IS USED. WILLIAMS SOUND, THEREFORE, DISCLAIMS ALL WARRANTIES NOT SET FORTH ABOVE, BOTH EXPRESS AND IMPLIED, WITH RESPECT TO THE IR T2 INFRARED LISTENING SYSTEM, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WILLIAMS SOUND SHALL NOT BE LIABLE TO ANY PERSON OR ENTITY FOR ANY MEDICAL EXPENSES OR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES CAUSED BY ANY USE, DEFECT, FAILURE OR MALFUNCTIONING OF THE PRODUCT, WHETHER A CLAIM FOR SUCH DAMAGES IS BASED UPON WARRANTY, CONTRACT, TORT OR OTHERWISE, THE SOLE REMEDY FOR ANY DEFECT, FAILURE OR MALFUNCTION OF THE PRODUCTS REPLACEMENT OF THE PRODUCT. NO PERSON HAS ANY AUTHORITY TO BIND WILLIAMS SOUND TO ANY REPRESENTATION OR WARRANTY WITH RESPECT TO THE IR T2 INFRARED LISTENING SYSTEM. UNAUTHORIZED REPAIRS OR MODIFICATIONS WILL VOID THE WARRANTY.

The exclusions and limitations set out above are not intended to, and should not be construed so as to contravene mandatory provisions of applicable law. If any part or term of this Disclaimer of Warranty is held to be illegal, unenforceable, or in conflict with applicable law by a court of competent jurisdiction, the validity of the remaining portions of this Disclaimer of Warranty shall not be affected, and all rights and obligations shall be construed and enforced as if this Limited Warranty did not contain the particular part or term held to be invalid.

If you experience difficulty with your system, call toll-free for customer assistance: **1-800-843-3544 (U.S.A.) or +1 952 943 2252** (outside the U.S.A.)

If it is necessary to return the system for service, your Customer Service Representative will give you a Return Authorization Number (RA) and shipping instructions.

Pack the system carefully and send it to:

Williams Sound
Attn: Repair Dept.
10300 Valley View Road
Eden Prairie, MN 55344 USA

Your warranty becomes effective the date you purchase your system. If your sales receipt is not available, the date code on the product will determine your warranty status.

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