

# IR T2

Infrared Transmitter

USER MANUAL



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## 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.**

	<b>CAUTION</b> 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.		

	<b>AVIS</b> RISQUE 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 À L'INTÉRIEUR AUCUNE PIÈCE POUVANT ÊTRE RÉPARÉE PAR L'USAGER. S'À DRESSER À 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 AV. 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 exigences du Règlement sur le matériel brouilleur du Canada.

## Recycling Instructions

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



### Product Recycling:

Please do NOT dispose of your Williams AV 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

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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 AV 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 baseband 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

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### 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.

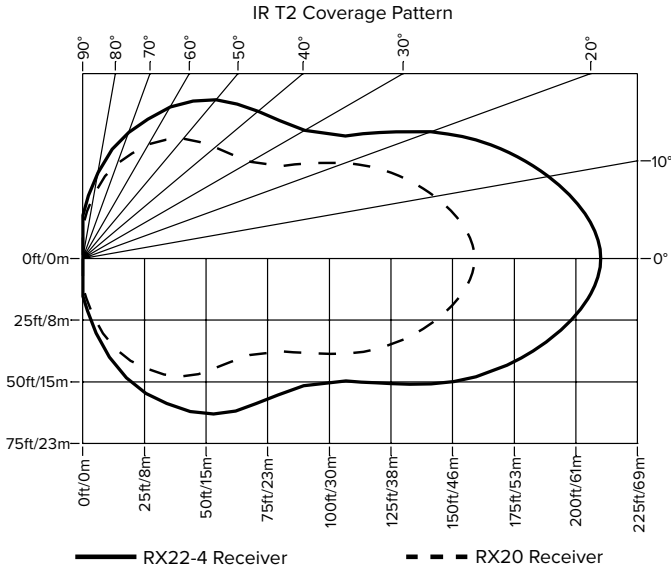
**Important: Remember to point the transmitter towards the listening audience.**

**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.

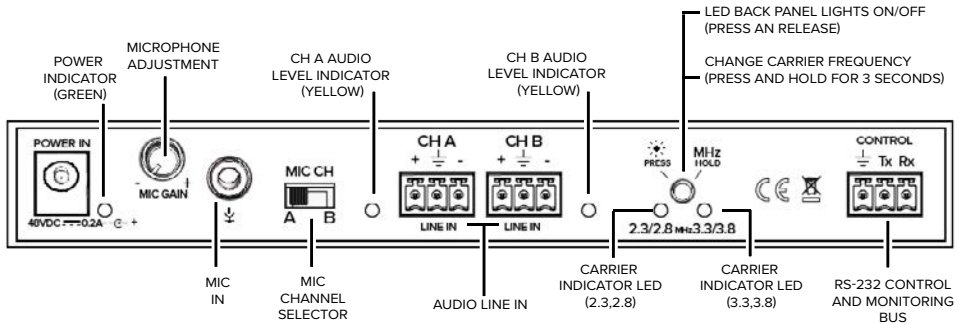
**Do not paint the front face of the IR T2.**

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



## 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 057/061: 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.

## Power over Ethernet (POE)

The IR T2 can also be powered by POE.

**NOTE: The IR T2 is not compatible with POE+ power supplies.**

Williams AV provides POE solutions that also allow the connection to send either control commands or to send audio along the same wire. Purchase the POE KT1 or the POE KT2 to get POE cords that can easily meet these needs. A CAT5 or higher cable may also be used.

For more information, please download the **IR T2 Power Over Ethernet Wiring Guide** from the Williams AV website on the IR T2 product page.

# Connecting the Audio Source

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## 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.

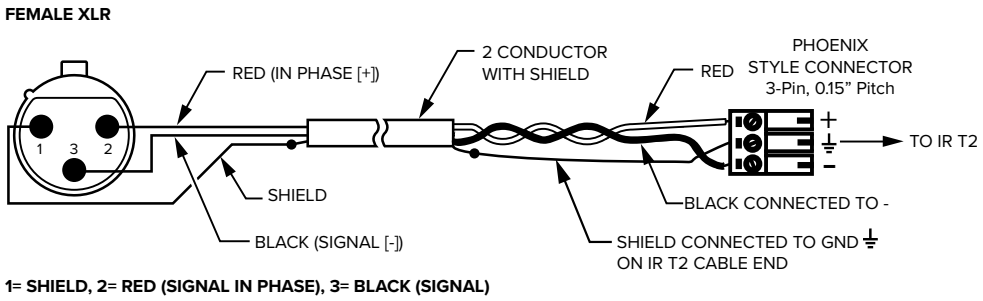
## Microphone Source (3.5 mm Mono Plug)

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.

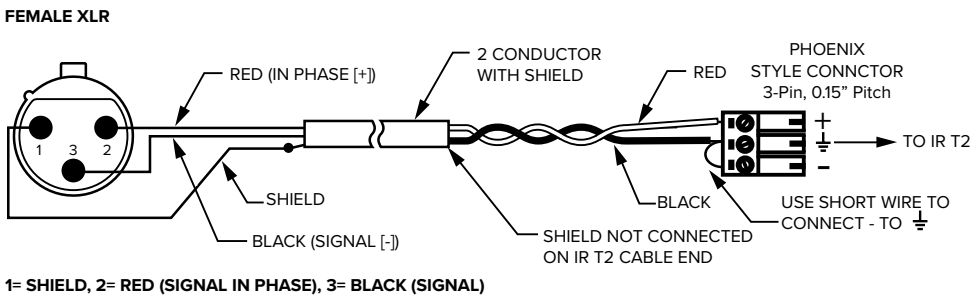
## Line Level Source (Phoenix style connectors)

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: Balanced line out (XLR) to IR T2 line input (Phoenix style connector)**



**Figure 4: Unbalanced line out (XLR) to IR T2 line input (Phoenix style connector)**



## 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*.

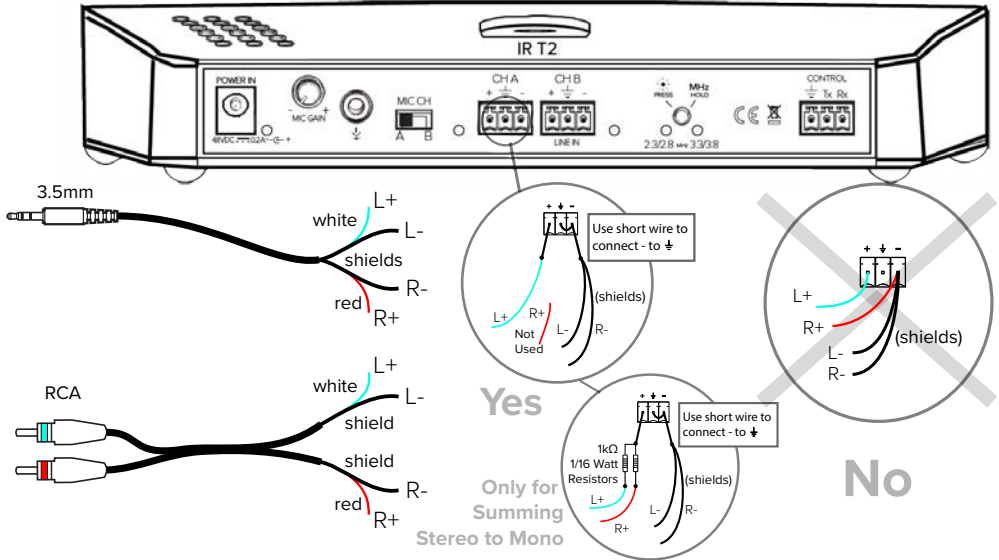
**Proper Wiring (Yes circle in Figure 5):** The L+ cable can be connected directly to the + connector. The R + cables should not be used at all.

When summing for stereo to mono only, 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

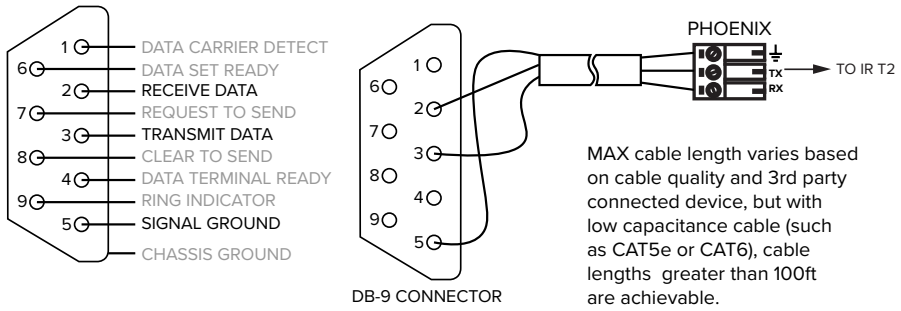
If a third-party controller (Crestron, AMX, Extron, etc.) is desired, the IR T2 has RS-232 control and monitoring available. Figure 6 shows how to make a custom RS-232 control cable if the third party controller has a DB-9 connector.

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**



## 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 AV dealer or representative. You may also reach our TechBlue team by calling 1-800-328-6190 and asking for TechBlue.

## IR T2 Blink Codes

The IR T2 has indicator lights on the back that display the current settings or alert that there is an error.

LIGHT PATTERN	MEANING
All visible LEDs on the back of the unit are on for 2 seconds	Unit has rebooted
When enabling the visible LEDs, the CH A audio LED blinks twice before displaying audio level	CH A audio is transmitting on all infrared emitters
When enabling the visible LEDs, the CH B audio LED blinks twice before displaying audio level	CH B audio is transmitting on all infrared emitters
When enabling the visible LEDs, the CH A and CH B audio LED blinks twice together before displaying audio level	CH A audio is transmitting on half of the infrared emitters, CH B audio is transmitting on half of the infrared emitters.
When enabling the visible LEDs, neither CH A nor CH B audio LEDs blink	Unit is in sleep mode and is not transmitting
Power LED rapidly blinks	Unit has encountered an error. See the IR T2 Programmer's Guide for how to get more information
Power LED rapidly blinks, and then power LEDs on for two seconds	Unit is rebooting repeatedly in an attempt to recover from errors. See the IR T2 Programmer's Guide for how to get more information
Power LED fades from brightly lit to dim	No audio is detected by the system. Troubleshoot audio source or audio connections.

**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 049 - Omnidirectional conference microphone

MIC 090 - Lavalier microphone

MIC 100 - Rear-wear headset microphone

WCA 105 - RCA to Phoenix cable

### Optional Receivers

WIR RX22-4 Receiver

IR RX20 Receiver

# Infrared Transmitter Specifications

## Model IR T2

<b>Dimensions, Weight:</b>	9.0" W (229 mm) x 3.8" D (97 mm) x 1.4" H (36 mm), 0.84 lb. (0.38 kg)
<b>Color:</b>	Black
<b>Power Supply:</b>	TFP 057 (or TFP 061 with certain systems) desktop style international certified power supply with IEC line cord, 100-240 VAC input, 50-60 Hz, 18 W; 48 VDC output
<b>DC Power Input:</b>	2.1 mm ID barrel connector, 48 VDC, 0.2A, center positive
<b>Power Indicator:</b>	Green LED
<b>Sleep/Power Save Mode:</b>	Shuts off carrier when no audio is present for 12 minutes
<b>Modulation:</b>	FM Wideband, $\pm 50$ kHz deviation max, 50 $\mu$ S pre-emphasis
<b>Emitter IR Power:</b>	0.7 W
<b>Baseband Frequencies:</b>	2.3, 2.8, 3.3, 3.8 MHz
<b>Channels:</b>	Indicators: Yellow LEDs indicate whether 2.3/2.8 MHz or 3.3/3.8 MHz baseband frequencies are selected
<b>Coverage Area:</b>	Up to 18,000 sq. ft (1,673 sq. m) in single-channel mode with the RX22-4 receiver Up to 11,500 sq. ft (1,068 sq. m) with the RX20 receiver
<b>Microphone input:</b>	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)
<b>Microphone gain adjust:</b>	Rotary 10 dB range
<b>Microphone channel switch:</b>	Selects microphone input to Ch. A or Ch. B
<b>Audio Inputs / Controls:</b>	Line inputs: Phoenix style connector jack for Ch A and Ch B accept line level, balanced or unbalanced audio
<b>Audio indicators:</b>	One yellow LED per channel. Lights up and stay on steady with minimum audio level.
<b>Indicators On/Off:</b>	Momentary contact switch turns on/off indicator lights
<b>Frequency Selection:</b>	Press and hold momentary contact switch to change carrier frequency group.
<b>Signal-to-Noise Ratio:</b>	70 dB (line input)
<b>Frequency Response:</b>	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)
<b>Total Harmonic Distortion:</b>	<1% (1 kHz, nominal deviation, line or microphone input)
<b>Control/Monitoring:</b>	3-wire RS-232 bus, standard ASCII commands/replies, 115200 Baud rate (8N1). See the IR T2 Programmers Guide for more information.
<b>Operating Requirements:</b>	32°-122°F (0-50°C)
<b>Mounting Kit:</b>	Wall or Ceiling mount: BKT 024 Omnidirectional mount
<b>Warranty:</b>	5 Years
<b>Approvals:</b>	CE, FCC, Industry Canada, WEEE, RoHS, CB Scheme, RCM, PSE
<b>Compatible Receivers:</b>	WIR RX22-4, IR RX20

**NOTE:** Specifications subject to change without notice.

Visit our website for the latest specifications and publications: [www.williamsav.com](http://www.williamsav.com)

Hereby, Williams AV declares that the infrared equipment is in compliance with Directives 2014/30/EU, 2014/35/EU and other Union harmonization as applicable. The full text of the EU declaration of conformity is available by contacting Williams AV at the following email address: [regulatory@williamsav.com](mailto:regulatory@williamsav.com)

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## Limited Warranty

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Williams AV products are engineered, designed, and manufactured under carefully controlled conditions to provide many years of reliable service. Williams AV 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 AV HAS NO CONTROL OVER THE CONDITIONS UNDER WHICH THIS PRODUCT IS USED. WILLIAMS AV, 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 AV 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 AV 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 AV**  
**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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**WILLIAMS AV**

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