

# IR +

## Infrared and Wi-Fi Assistive Listening System

**USER MANUAL**



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## Safety Warnings and Instructions

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**WARNING!** TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

**CAUTION!** TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

### POWER CORD NOTICE FOR INTERNATIONAL

**OPERATION** - Please call Williams AV Customer Service at 800.328.6190 to order the appropriate power cord for the country of use.

#### Important Safety Instructions:

1. Read and follow these instructions
2. Keep these instructions
3. Clean only with dry cloth.
4. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
5. Do not install near any heat sources such as radiators, heat registers, stoves, or other appliance (including amplifiers) that produce heat.
6. 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.
7. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the appliance.
8. Only use attachments/accessories specified by the manufacturer.
9. Unplug this appliance during lightning storms or when unused for long periods of time.
10. Power Sources - The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. Object and Liquid Entry - Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through the openings. Do not use this appliance near water or expose it to liquids.
12. Servicing - The user should not attempt to service

the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

#### Precautions:

1. Power – WARNING, BEFORE TURNING ON THE POWER FOR THE FIRST TIME, READ THE FOLLOWING SECTION CAREFULLY. The unit is designed for use only with the line cord of the region in which it will be operated.
2. Voltage Label (Rear Panel) – A label located at the rear panel power connection indicates the DC power input for the unit. The label will read 48VDC.
3. Do Not Plug in the input, output, Ethernet, or Dante connections while the power switch is switched to the ON position.
4. Do Not Touch the IR M1 with wet hands. Do not handle the IR M1 or power cord when your hands are wet or damp. If water or any other liquid enters the IR M1 cabinet, take the IR M1 to qualified service personnel for inspection.
5. Place the IR M1 in a well ventilated location. Take special care to provide plenty of ventilation on all sides of the IR M1 especially when it is placed in an audio rack. If ventilation is blocked, the IR M1 may over heat and malfunction. Do not expose the IR M1 to direct sun light or heating units as the IR M1 internal components temperature may rise and shorten the life of the components. Avoid damp and dusty places.
6. Care – From time to time you should wipe off the front and side panels and the cabinet with a soft cloth. Do not use rough material, thinners, alcohol or other chemical solvents or cloths since this may damage the finish or remove the panel graphics.

## Avertissements et instructions de sécurité

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**AVERTISSEMENT!** POUR RÉDUIRE LES RISQUES D'INCENDIE OU DE CHOC ÉLECTRIQUE, NE PAS EXPOSER CET APPAREIL À LA PLUIE OU À L'HUMIDITÉ.

**MISE EN GARDE!** POUR RÉDUIRE LE RISQUE DE CHOC ÉLECTRIQUE, NE PAS RETIRER LE COUVERCLE. L'APPAREIL NE CONTIENT AUCUNE PIÈCE RÉPARABLE PAR L'UTILISATEUR. CONFIER LES RÉPARATIONS À UN RÉPARATEUR QUALIFIÉ.

### AVIS CONCERNANT LE CORDON D'ALIMENTATION POUR UNE UTILISATION HORS DES ÉTATS-UNIS –

Prière d'appeler le service à la clientèle de Williams AV au 800.328.6190 pour commander le cordon d'alimentation adapté au pays dans lequel l'appareil va être utilisé.

#### Consignes de sécurité importantes :

1. Lire ces instructions
2. Conserver ces instructions
3. Nettoyer avec un chiffon sec uniquement.

4. Ne pas bloquer les événements de ventilation. Installer conformément aux instructions du fabricant.
5. Ne pas installer à proximité de sources de chaleur telles que radiateurs, registres de chaleur, cuisinières ou autres appareils (y compris les amplificateurs) qui produisent de la chaleur.
6. Ne pas supprimer ou contourner la fonction de sécurité de la fiche polarisée ou de mise à la terre. Une fiche polarisée a deux broches dont l'une est plus large que l'autre. Une fiche de mise à la terre a deux broches et une troisième broche de mise à la terre. La lame large ou la troisième broche est fournie à des fins de sécurité. Si la fiche fournie ne rentre pas dans la prise, consulter un électricien pour le remplacement de la prise obsolète.
7. Protéger le cordon d'alimentation contre tout piétinement ou pincement, en particulier au niveau des fiches, des prises de courant et de l'endroit où il sort de l'appareil.
8. Utiliser uniquement les pièces/accessoires spécifiés par le fabricant.
9. Débrancher cet appareil pendant les orages ou lorsqu'il n'est pas utilisé pendant de longues périodes.
10. Sources d'alimentation - L'appareil doit être connecté à une alimentation électrique uniquement du type décrit dans le mode d'emploi ou tel qu'indiqué sur l'appareil.
11. Pénétration d'objets et de liquides - Des précautions doivent être prises pour que des objets ne tombent pas et que des liquides ne soient pas renversés dans le boîtier par les ouvertures.
11. Réparation et entretien - L'utilisateur ne doit pas tenter de réparer l'appareil autrement que de la manière décrite dans le mode d'emploi. Toute autre tâche d'entretien ou de réparation doit être confiée à un technicien qualifié.

#### **Précautions :**

1. Alimentation – AVERTISSEMENT : AVANT DE METTRE L'APPAREIL EN MARCHÉ POUR LA PREMIÈRE FOIS, LIRE SOIGNEUSEMENT LA SECTION QUI SUIT. L'amplificateur est conçu pour être utilisé uniquement avec un cordon d'alimentation adapté à la région dans laquelle il sera utilisé.
2. Étiquette de tension (panneau arrière) - Une étiquette située au niveau du raccordement électrique sur le panneau arrière indique la puissance consommée CA de l'appareil. L'étiquette indiquera 48VDC.
3. Ne pas brancher les connexions

- d'entrée, de sortie, Ethernet ou USB lorsque l'interrupteur d'alimentation est sur la position de marche.
4. Ne pas toucher le IR M1 avec les mains mouillées. Ne pas manipuler le IR M1 ou le cordon d'alimentation avec les mains mouillées ou humides. Si de l'eau ou tout autre liquide pénètre dans l'armoire du IR M1, confier l'appareil à un technicien qualifié pour inspection.
  5. Placer le IR M1 dans un endroit bien ventilé. Veiller tout particulièrement à assurer une ventilation suffisante de tous les côtés du IR M1, en particulier lorsqu'il est placé dans un rack audio. Si la ventilation est bloquée, le IR M1 peut surchauffer et dysfonctionner. Ne pas exposer le IR M1 à la lumière directe du soleil ou à des appareils de chauffage, car la température des composants internes du IR M1 pourrait augmenter et réduire la durée de vie des composants. Éviter les endroits humides et poussiéreux.
  6. Entretien - De temps en temps, essuyer les panneaux avant et latéraux et le boîtier avec un chiffon doux. Ne pas utiliser un matériel abrasif, des diluants, de l'alcool ou d'autres solvants ou chiffons contenant des produits chimiques, au risque d'endommager la finition ou d'effacer les indications fournies sur le panneau.

## Wi-Fi Network Required

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The IR M1 connects to the installation location's Wi-Fi Network. It does not provide a network on its own. The Wi-Fi network will need to be installed and established before the Wi-Fi features of the IR M1 can be used.

## 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 equipment or batteries in the household trash. Please take the equipment to an electronics recycling center for proper disposal.

## System Overview

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The IR + System uses invisible infrared (IR) light to broadcast speech or music to wireless infrared receivers. Listeners can also use their own personal electronic devices with Wi-Fi.

The new IR + is designed to support those who want to use their own smartphones and headphones for a more discreet assistive listening experience. Simplicity is also available for those who want a more traditional assistive listening system with a dedicated IR receiver and headset. Venues no longer need to choose between providing IR or Wi-Fi assistive listening systems. IR + supports the iOS and Android WaveCAST Receiver Apps and the Wi-Fi Receiver-- in addition to all of the current and legacy Williams AV IR receivers.

The system is designed to transmit high quality audio for hearing assistance and language translation applications. Because the system uses infrared light for transmission, it is not affected by interference from radio equipment and does not interfere with radio equipment. No FCC license or radio approval is required.

The system can be used with microphones as a stand-alone system, or can be connected to other sound equipment. Infrared systems generally cannot be used in direct sunlight because of sunlight's large amount of interfering infrared light.

**Note:** This equipment has been tested and found to comply with the limits for a Class A 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**NOTICE:** A plasma monitor can degrade the audio quality of the IR Plus.

## Router and Network Equipment Selection

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The IR + is intended to be set up on an already existing Wi-Fi network; however, upgrades to your network equipment may be necessary depending on the performance desired from the IR +. For instance, a higher-end, more powerful router will allow more users to connect to your audio stream than using a cheaper, less powerful router.

The Wi-Fi network will need to be accessible to the users who will be listening to the audio. A public or Guest Wi-Fi network will usually be ideal for ease of accessibility. If the user's devices cannot connect to the network due to security settings, they will not be able to hear the audio.

The IR + system will put a demand on the network. If the network cannot handle the demand, whether because it is being used for other networking needs or because the networking hardware is not strong enough, the IR + will be unable to reach its maximum audience.

When streaming to a small or medium sized audience, a basic networking configuration may suffice. When streaming music using multiple channels (such as having several IR + units on your network), a powerful router and network configuration is more likely to be required.

The **WaveCAST Networking Guide** is available on the Williams AV website for additional networking tips. The WaveCAST networking guide applies to the FM + as well as other WaveCAST products.

### Multiple Units

Up to 4 WaveCAST systems (including WaveCAST, FM+ and more) can be used on the same Wi-Fi network. Multiple devices will work better on more powerful networks and routers.

The number of servers on the network is visible on the front panel of the IR M1. The number assigned to a specific server is also visible.

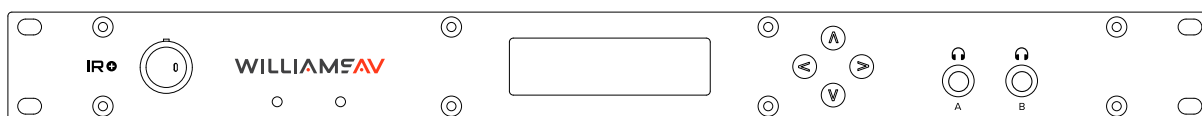
## Quick Setup Guide

1. Place your IR M1 Control Center in a location where you will be able to place the IR E4 emitters connected to the IR M1 in the listening area.
2. Plug in the power supply to the power connection on the IR M1. **Important Note: Do NOT turn on the IR M1 until all connections are installed (Step 8). Doing so may void the warranty.**
3. Connect an audio source to the Line/Mic In port for the channel(s) you'd like to use.
4. Connect an Ethernet cable to the ETHERNET port. Connect the other end of the Ethernet cable to a multicast-enabled router with an internet connection.
5. If using IR A4 emitter arrays, connect the provided IR A4 power supplies to the IR A4s. Connect IR E4s to the ports on the front of the IR A4 with an Ethernet cable. Note: The IR A4 is not rated for use in plenum spaces and will need to be installed in a plenum box for use in such areas.
6. Connect one or more IR E4 emitters or IR A4 emitter arrays to the Output to Emitter ports on the back of the IR M1 with an Ethernet cable. No additional power is required for an IR E4.
7. Place the IR E4 emitters in the listening area so that they are above the audience without interference. Multiple IR E4 emitters should be placed apart from one another to expand the coverage area.
8. Turn on the IR M1.
9. On the front panel of the IR M1, an IP address should be displayed. Write down the IP address and go to a computer that is on the same network as the IR+. If you do not see an IP address, check your network connection.
10. In Chrome or Edge, type the IP address into the URL bar. A webpage for the IR+ system will load. The default username is admin and the default password is admin.
11. Click the Settings tab. Configure each IR E4 emitter for the channels it will broadcast, and the IR Band the system should emit.
12. Click the Audio tab and set the audio device type and desired settings for each audio channel.
13. Change other settings as desired.
14. For more advanced system setup, please see the full user manual.

## IR M1 Front and Back Panel

The IR M1 works as a control center for the IR Plus system. Additional devices, such as emitters, are controlled through the IR M1.

### Front Panel



### Power Button

The IR M1 has a switch that turns the Control Center on or off. The desktop power supply provides power to the unit at all times.

### OLED Display

This shows current status of channels and of the IR M1. Each time the power of the unit is turned on, the OLED Display shows a Williams AV start-up screen followed by the firmware blob version number. After several seconds, the default Main Info Screen screen will be displayed.

### Screen Time Out

If no buttons are pressed on the IR M1 for a while, the display will shut off. Pressing any button on the front panel will re-activate the screen.

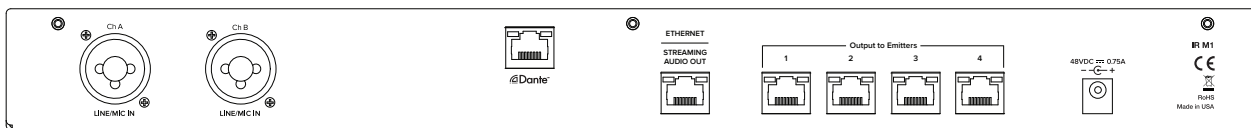
### Navigating the Front Panel

The arrow buttons (up, down, left and right) on the front panel of the IR M1 are used to navigate the front panel menu. See "Front Panel Interface" on page 22 for how to use the arrows on each screen.

### Headphone Jacks

Two headphone jacks are available on the front panel to listen to the raw audio input, one for channel A and one for channel B. The headphone jack audio is affected by negative gain, but not any positive gain, compression or filtering adjustments as it is connected directly to the audio signal source.

## Back Panel



### Audio Input

Two audio devices can be connected via the Line/Mic In ports. Each port is for one audio output channel. The source will need to be set via the web interface or front panel for the IR M1 to configure the gain level for the audio source correctly.

### Dante™ (Optional)

An input for connecting to a Dante audio network is available on IR M1 D Control Centers. This feature is not on every model.

### Ethernet

The Ethernet connect is for connecting to a network and/or providing an internet connection. No emitters or other devices should be connected to the Ethernet port.

### Output to Emitters

Emitters and expansion arrays are connected to the Output to Emitter ports. There are four ports on the IR M1. These specific ports will often be referred to as Ports throughout the website and this manual.

Although a standard Ethernet cable is used for these connections, no network information is provided through these ports. Only approved Williams AV devices may be connected to the Output to Emitter ports on the back of the IR M1. Use the designated Ethernet port on the back of the IR M1 for network and internet connections.

### Power

Connect the provided power supply to the power port. **Do NOT turn on the IR M1 until all connections are installed. Doing so may void the warranty.**

## Additional Devices

To create a full IR system, additional devices will need to be connected to the IR M1. Note that devices can be disconnected or connected to the IR M1 at any time without needing to shut off or power cycle the IR M1.

The IR E4 is an IR Emitter and up to four can be directly connected to the IR M1. The IR A4 is a distributed emitter array, with four ports available on it. Up to four IR A4's can be connected to the IR M1, letting you connect up to 16 IR E4's to a single IR M1.

### Device Types

Several types of devices may be plugged into the IR M1 Control Center. The IR M1 identifies the type of each connected device on the front panel screen and on the webpage. Not all of these device types are valid and can indicate a problem with the IR + setup or device.



DEVICE TYPE	TYPE CODE	MEANING
IR A4 Emitter Array	IR A4	Valid Device. This is a distributed emitter array that IR E4's can be connected to.
IR E4 Emitter	IR E4	Valid Device. An IR Emitter.
Unknown	UNKWN	This type of device is not recognized. There may be a short in the device that is preventing the system from detecting what it is.
Invalid	INVLD	This device is not connected in a usable manner. The IR + system may not have a required firmware update to recognize this device type, or the connection may be invalid. For example, an IR A4 cannot have another IR A4 connected to it
None	---	Nothing is detected as being plugged into the port.

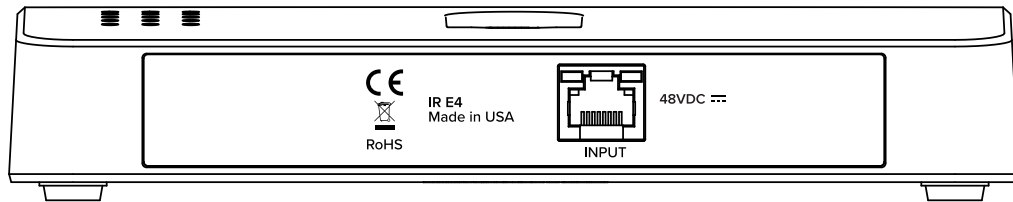
### Wiring and Cabling

Ethernet cables must be used for connecting devices. They are not required to be shielded. The maximum recommended cable length is 300 ft (91.4 m).

Each Ethernet cable connection from the IR M1 system to the IR E4 emitters carries the following signals:

- Baseband signals for 1 or 2 IR channels
- +48V power supply for the IR E4
- RS-485 bus communications

### IR E4



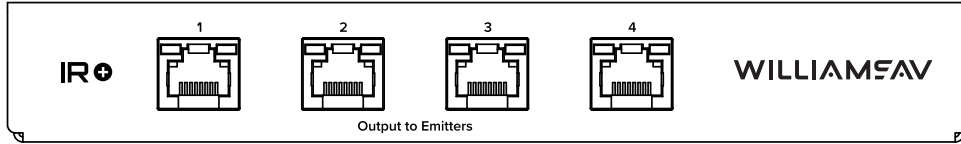
**Back Panel of IR E4**

The IR E4 is connected to the IR M1 via an Ethernet cable. Once connected, any changes required can be made through the IR M1's webpage.

The IR E4 receives its power from the Ethernet cable and no additional power supply is required.

**Note:** Although the IR E4 receives power from an Ethernet cable, it does not follow the formal Power over Ethernet (PoE) standard.

## IR A4



The IR A4 is connected to the IR M1 via an Ethernet cable. The IR A4 requires a separate power supply, and does not use the same power connector as the IR M1.

Once powered on, IR E4's can be connected to the IR A4 via an Ethernet cable, just as if they were connected to an IR M1.

Additional IR A4s cannot be connected to an IR A4. IR A4's can only be connected to the IR M1 itself on the four back ports, so only four IR A4's can be used at one time.

**Note:** The IR A4 is not rated for use in plenum spaces and will need to be installed in a plenum box for use in such areas.

## Installation Instructions

The IR M1 Control Center is the key component to the IR+ system. Audio devices, emitters, and more can be connected to the IR M1. This section will cover the installation instructions for physically setting up your IR + system.

**Important Note:** Do NOT turn on the IR M1 until all connections are installed. Doing so may void the warranty.

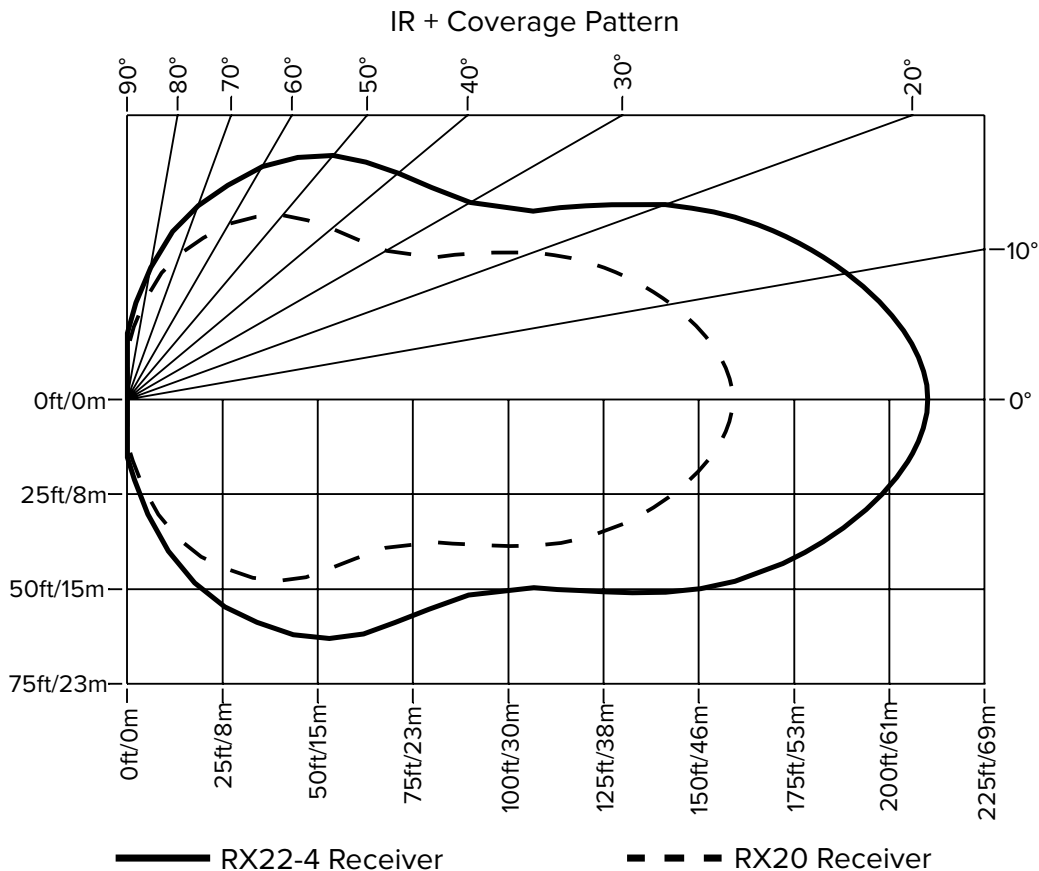
### Determine Coverage Area

When using the IR + system 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.) per IR E4 emitter. When in two-channel mode, the maximum IR coverage area will drop to accommodate for broadcasting two different audio signals instead of one. Decreasing the emitter power level will also decrease the coverage area.

The IR E4 will use full power, single channel mode by default. Single channel or dual channel mode, and emitter output power, can be selected using the system webpage.

Connect the number of E4's needed to cover the space required.

### Interference



Most objects block infrared light. The coverage area may be affected by direct/indirect sunlight, reflections on walls and room construction. The emitter cannot be concealed behind walls, glass, curtains, etc. Reflections of the infrared light from walls, ceilings, and floors may alter the direct infrared radiation pattern.

The infrared radiation decreases but does not drop to zero outside the illustrated patterns. It still may be usable at a greater distance, depending on the receiver sensitivity and the reflective characteristics of the room.

**Important: Point the emitter towards the listening audience from high up. Bodies can block the infrared signal from reaching various parts of the audience if at a poorly selected angle.**

**Do not paint the front face of the IR E4.**

## Determine Location

The IR M1 Control Center is usually located with the sound system amplifier or mixer for easy access to an audio input signal. For portable systems, the Control Center can be placed near the emitter(s) or in another convenient location.

Position the IR E4 emitters so the area is well covered and has minimal interference. The emitters should be placed high on the wall, aimed into the coverage area and angled down toward the audience. For help determining ideal IR coverage area or avoiding obstacles, contact Tech Blue Design and Support Services (see "Troubleshooting" on page 24).

## Network Cable Connection

The **Ethernet** port can be used to connect the IR M1 to a local network. A network connection is required to access the IR M1 webpage. The webpage is needed to configure some device settings after the system is set up.

An Ethernet connection alone will not allow the Wi-Fi broadcast features to work; a Wi-Fi connection must be available on the network. However, a network connection is not required for broadcasting over infrared.

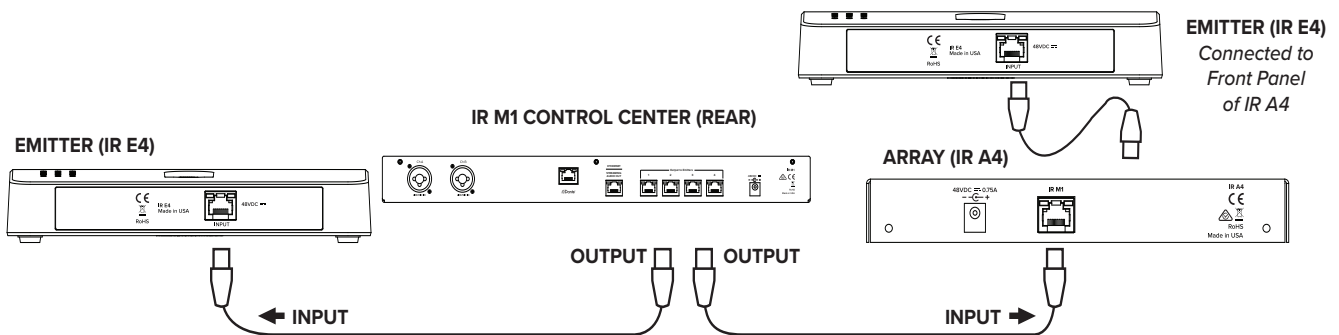
Once a connection has been established, an IP address will automatically be assigned to the IR M1 (see the front panel section's "Front Panel Interface" on page 22 for help finding the IP Address). Device settings can then be set via the web interface, including changing any network settings.

## Cable Connection to Emitters and Emitter Arrays

The IR M1 can directly drive four IR E4 emitters without the use of an emitter array. Up to 4 IR A4 emitter arrays can be directly connected to the IR M1. Up to 16 emitters can be connected with the use of IR A4 emitter arrays.

The outputs **MUST NOT** be split with Ethernet splitters.

Determine the length of an Ethernet cable needed to reach from the Emitter or Emitter Array to the Control Center unit. **Do NOT turn on the IR M1 until all connections are installed. Doing so may void the warranty.**



## Audio Source Connections

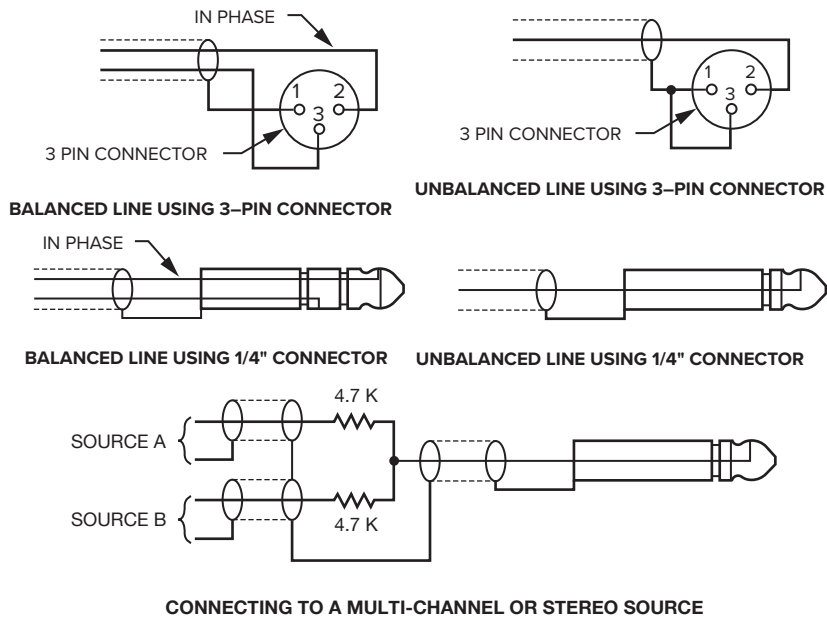
The IR M1 Control Center will accept the following audio sources:

1. Balanced Microphone with or without 12-volt phantom power (DIN 45596) on a 3-pin (XLR) connector.
2. Balanced/Unbalanced microphone with or without phantom power on 1/4 inch (TRS) jack
3. Balanced/Unbalanced Line on a 3-pin (XLR) connector.
4. Balanced/Unbalanced Line on 1/4 inch (TRS) jack.
5. Dante on an RJ-45 jack (optional).



**WARNING:**

The IR + is not designed to accept 70 volt speaker signals! This may result in damage to your system. The sound source should come directly from the system mixer or digital source as a low-level or unprocessed signal.



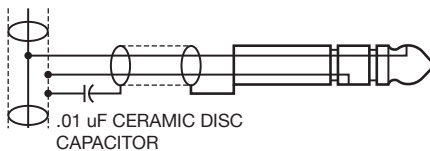
## Multi-Channel Sources

By constructing a simple resistive mixer, stereo (or 3 channel) sources can be connected to the IR +. Additional channels can be accommodated by adding a resistor for each source.

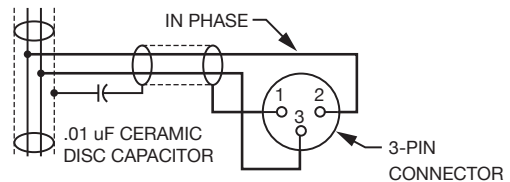
Note: The Dante audio input will automatically mix the left and right channels.

## Avoiding Hum in the Audio (as a Result of a Ground Loop)

A hum created by a ground loop can often be eliminated by connecting a capacitor in series with the audio line shield to the IR M1's ground. This method also maintains good radio frequency (RF) shielding. Determining the effectiveness of this method for your installation usually requires some experimentation.



**BREAKING A GROUND LOOP WHEN CONNECTING TO A UNBALANCED LINE**



**BREAKING A GROUND LOOP WHEN CONNECTING TO A BALANCED LINE**

## System Settings

Most settings are adjusted via the web interface by using a computer (see "Web Control Interface" on page 15). A handful of settings can be adjusted via the front panel display (see "Front Panel Interface" on page 22).

Any configuration to the IR+ system is done through the IR M1, which passes the configuration setting onto other IR+ devices.

### Audio Settings

The Audio Settings provide the ability to change the audio characteristics for different listening applications.

#### Audio Input Source

The Audio Input Source menu has five possible selections to choose from: Line In, Mic In, 400Hz Test Tone, Mic + Phantom Power, or Dante.

#### Selecting an Audio Source Appropriate for Hearing Impaired Listeners

The IR + transmits audio with excellent fidelity. Therefore, the audio source signal should be of the highest audio quality and not subject to a compressor, limiter, reverberation, or other signal processing equipment. While compressed audio is available through the IR +, excessive compression is not helpful to the hearing impaired and can contribute to excessive noise in the audio.

The IR + audio source signal is usually connected to a mixer's line output signal which is behind the mixer's parametric equalizers but ahead of any equalization used for house loudspeakers.

If audio delay is available for use in large auditoriums, it's usually best to use it. Because radio signals travel faster than sound, delaying the transmitted audio so that an average listener (in the middle of the listening area) hears the transmitted audio a few milliseconds after audio from the main sound reinforcement system speaker is helpful. This will also help audience members who lip read.

#### Audio Input Gain

The Audio Input Gain adjusts the audio output level from the IR M1. Changes to the input level will affect the level indicated by the front panel display when audio is present. The gain can be adjusted from -60dB to +24dB.

**NOTE: Negative gain sets the analog attenuator and positive gain sets the digital amplifier. For audio clarity, it is generally best practice to have the gain set so that it is negative. The VU meters should peak near 0 dB. If using Line In mode, consider raising the volume at the source to ensure this practice.**

#### Audio Presets

The Audio Presets allow the user to quickly and easily configure the IR M1 for common applications. The audio preset can only be adjusted via the Web Interface.

There are three pre-configured to choose from: **Hearing Assist, Music, and Voice**. When one of these selections is made, the performance of the IR M1 is immediately optimized for the needs of that application (an adjustment is automatically made to the Low-pass Filter, High-pass Filter, and Compression).

By default, the IR M1 is shipped in the **Music** mode. For music, concerts, and other applications where the highest audio quality is desirable, **Music** is the recommended mode of operation.

For hearing assistance applications, or applications where the message is critical for listening, **Hearing Assist** is the recommended mode of operation.

For speaking and other voice applications, **Voice** is the preferred mode of operation.

A **Custom** preset is also available for configuring channel-specific audio settings.

#### Audio Input Level Indicator

The bar graph indicator shows audio level in 3dB steps at the output of the audio level processing circuit. The indicator is peak responding and is calibrated so that optimum level is reached when the VU meter only fully lit (+9dB) occasionally and typically hovers around 2/3rds lit (0dB). Adjust the audio levels from the front panel (see "Audio Channel Menu" on page 23) or from the web interface (see "Audio Page" on page 18).

#### Input Overload Indication

The OLED Display shows an exclamation mark (!) above each channel's VU meter as an overload warning each time the audio signal exceeds the capacity of the input circuit. Either the source of the audio coming in to the IR M1 needs to be adjusted to correct this or the Audio Input Gain needs to be adjusted. A warning will also appear on the web interface if overloaded.

## Server Description

The Server Description field allows the user to easily identify the IR M1. This typically comes into play when multiple IR M1s need to be distinguished from one another. The description appears on the front main info screen, and also on the web page. In a rack, all the user has to do is activate the main info screen with a touch of any button on the front, and the description is displayed as one of the fields on the main info screen.

The description can only be edited from the web interface.

## Audio Channel Name

The Audio Channel Name allows the listeners to easily identify the channel. The description appears on the on the web page and in the WaveCAST App. The channel description can only be edited from the web interface.

## IR Baseband Output

The IR baseband frequencies will broadcast audio output channels A and B. The frequencies can either be 2.3 MHz for Channel A and 2.8 MHz for channel B, or be 3.3 MHz for Channel A and 3.8 MHz for Channel B. Which frequencies the IR + system is broadcasting over is adjustable via the web interface.

On a Williams AV IR Receiver, the numeric channel numbers on the receiver represent a specific IR frequency. The receiver should be set to use the channel with the frequency that the audio output channel is being sent over.

IR OUTPUT CHANNEL	FREQUENCY (MHZ)	AUDIO OUTPUT CHANNEL
1	2.3	A
2	2.8	B
3	3.3	A
4	3.8	B

Audio will not output to IR emitters if:

- an audio output channel is muted (silent for too long). This timeout can be adjusted via the web interface.
- no IR Emitter is connected to any port, or any connected emitters are disabled.
- there is no emitter configured to use that channel

Audio will output over Wi-Fi as long as Wi-Fi audio is enabled for that channel.

## LEDs

The LED lights on the Ethernet and Output to Emitter ports can be used to help troubleshoot issues, but may be distracting if left on during normal usage. These LEDs may be disabled on the via the Web Interface for attached devices, but they cannot be disabled on the IR M1.

- **Green – Communication Active:** Flashes as long as there are communications ongoing over that port, otherwise remaining dark.
- **Amber – Channel Signals Present:** On the IR M1, the amber light flashes when audio is sent to an attached device. On attached devices, the amber light flashes when audio is received by the attached device. The flashing will speed up when both channels are in use. The pacing of the light does not indicate the audio rate, like a VU meter. The light is merely an indicator that data transfer is occurring. Otherwise, if audio is not being sent or received, the amber light remains dark.

## Network Configuration

Network Settings can only be edited from the web interface. An IP address will be automatically assigned to the IR M1 once an Ethernet cable has been connected between the IR M1 and the router and a network connection has been found. Additional configuration is made through the web interface.

### Adjusting Network Settings

The Network Settings screen where the IP Address Mode, the IP Address, and the Subnet Mask are set via the web interface. See "Network Page" on page 20 for details on how to use the web interface.

**IP Address Mode** Static or DHCP

**IP Address** If the IP Address Mode is set to Static, this is where the IP Address is manually entered

**Subnet Mask** If the IP Address Mode is set to Static, this is where the Subnet Mask is manually entered

**Gateway** If the IP Address Mode is set to Static, this is where the gateway is manually entered

**Multicast Address** If needed, the multicast cast address can be enabled and either manually set. If not manually set, a preset fixed address will be assigned by the IR M1. This setting is under the Options menu and is set per channel.

DHCP IP Addresses are automatically created, and are usually preferred to a manual static IP address.

To set up a static IP Address:

1. Determine an appropriate static IP address for the IR M1.
  - a. If someone set up your network, they may be able to help you determine an appropriate IP address (i.e. network system administrator).
  - b. There should be no other device having this same address on the network.
  - c. This will be an address on the same subnet as the router.  
For example, if the router's address is 192.168.1.100, the first three sets of numbers will be the same (i.e. 192.168.1), and the last number will be the number you decide for the IR M1 (You may choose another number instead of .100).  
When you determine this address, write it down for a later step.
2. Set the Static IP Address for the IR M1 via the web interface of the IR M1 (see "Network Page" on page 20).
  - a. Select the connection type to be Static.
  - b. Enter the IP Address you determined earlier.
  - c. Network settings in the IR M1 take place after saving and rebooting.

## Restore Factory Defaults

The Restore Factory Defaults action will restore the IR M1 to its original factory settings. Restoring defaults from the front panel of the IR M1 will reset all settings.

On the front panel menu, it is hidden on the main screen ("Main Menu" on page 22).

Restoring defaults from the web page will reset all settings except Network connectivity settings (IP Address, Subnet Mask, IP Address Mode, and Web Password). The same IP address will most likely be used by the system since no network changes occurred; however, the device will be offline while it is rebooting. The webpage will need to be refreshed after the system has restarted to continue adjusting settings.

In the web interface, this feature is under the Admin menu.

## Web Control Interface

The IR M1 provides a web interface to manage the device settings. These web pages can be accessed over either a hardwired or wireless network connection with the Chrome browser.

Changes take effect when applied or saved. Any updates made through the front panel will show up on the web interface once the current page has been navigated away from, either by refreshing the page or going to a new page.

1. Open Chrome.
2. In the address bar of the browser, type in the IP address of the IR M1 and hit Enter.
3. The web page will say 'Fetching Data' as it connects to the IR M1 and gathers data of every connected machine. **This may take several seconds.**
4. You should see the Login Page of the IR M1.
  - If you only see a page asking for a firmware update, your device may have been corrupted. See "Website problems" on page 24

## Login Page

Login

---

The default User name is "admin" and the default password is "admin". The user name and the password can (and should) be changed on the website's Admin page.

Check with your system administrator for the most recent login credentials.

## Status Page

**Connected Device Status**

Port	Device	State	Ch A	Ch B	Temp	Power	Status
1	IR E4	Online		X	OK	OK	OK
2	---	Online			--	--	OK
3	IR E4	Online	X	X	OK	OK	OK
4	---	Online			--	--	OK

Device statuses are not available when the device is offline or disabled.  
 An 'X' on channel status indicates that channel has been selected for broadcasting.  
 Green Background: device is currently broadcasting that channel.  
 Grey Background: device is not currently broadcasting that channel.

The status screen displays the current status of any devices connected to the IR M1. It displays the port the device is connected to, the type of device, whether audio is broadcasting over a channel, whether a channel is configured to broadcast audio, and alerts on the temperature, power level, or other errors.

If a device is offline or disabled, this will be stated in the State column. Offline devices may still be booting or experiencing an error. Disabled devices are manually set to be disabled on the settings menu. Disabled or offline devices are unable to broadcast. Online devices are fully available to broadcast. The online or offline status does not indicate any internet or network connectivity.

Rarely, a device type cannot be properly detected. See "Device Types" on page 8 for more information.

Unlike other pages on the website, this page will automatically update after a short delay with new device information when it is available.

### Errors

Port	Device	State	Ch A	Ch B	Temp	Power	Status
1	IR E4	Offline		X	--	--	Error

**Error: (847) ERR\_IRDEV\_FW\_VERSION**  
 Please provide the error code to Tech Support if needed.

[Click here to reset the error.](#)

When an error occurs, the device will automatically switch to offline status (or remain disabled). The system will then report what it can about the problem that occurred.

Three type of errors are available on the status screen. If a device has overheated, the Temp field will show there is an error. If a device is having an issue with power, the power field may show an error. There is also an area to display other error information, if there is an error unrelated to heat or power.

If the device has detailed error information, it will display in a red box under the device information.

The IR M1 can attempt to repair certain errors. When an error appears on the status screen, click the reset the error button. The connected device may go offline briefly while the system attempts to repair the error.

Not all errors can be corrected automatically; if the error persists, you should contact TechBlue Technical Support Services for help with your device (see "Troubleshooting" on page 24). When called or e-mailed, TechBlue may ask for the error code or error number shown in the red information box on the status screen. There may or may not be additional troubleshooting information available for power or temperature types of errors, and these errors likely cannot be automatically repaired.

### Current Status

When a device is offline or disabled, the temp, power and error status cannot be guaranteed to be currently accurate. The system is reporting the last known status before the device was set into offline mode to help troubleshoot what may have caused the issue. If the device has not indicated there was an error with temp, power, and/or status, these fields will display '--'.

Once the device is repaired and online again, the current status will be 'OK'.



## Settings Page

### Modulator Information

Model: **IR\_M1**

Description:

IR Band:

IR Mute Timeout:

### Device Settings

In order to retain data you may have edited, this page will not automatically update when a device has been inserted or removed. Navigate to a new tab and come back if an update is required.

Port #	Device Type	Name	Ch A	Ch B	Power Level	Lights	Disabled
1	IR E4	<input type="text" value="P1E1"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text" value="FULL"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	N/A	<input type="text" value="P2E1"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text" value="FULL"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	N/A	<input type="text" value="P3 E1"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text" value="MEDIUM"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	N/A	<input type="text" value="P4E1"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="FULL"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Settings page is used to adjust settings for Williams AV devices attached to the IR M1 as well as settings for the IR M1 itself.

### Modulator Information

Control Center information is adjusted on the Settings page. These are settings specific to the IR M1. The IR M1 can be named by editing the Description field. The IR band used for broadcasting is set here. The IR Mute timeout is how long the device waits during silence to shut off the IR transmission and can be adjusted.

### Device Settings

A list of ports and their stored device settings will be shown. Some fields will be editable if the device is connected, but data may still be displayed if a device has been disconnected.

For each connected device, several settings can be adjusted. The name of the device can be set. Channel A and B can be enabled and disabled, with Channel A enabled by default on each device. The power level used for the IR transmission can be set to full power, or medium power (about half of the full power level). LED lights on the ports can be enabled or disabled, meaning the lights will stay dark when operating. The connected device can be completely disabled or enabled; a disabled device will be treated similarly to as if it was disconnected.

### Connected, Disabled and Disconnected Devices and Settings Transfer

The settings screen will display the settings stored for the device usually connected to that port, even if it is not currently physically connected via an Ethernet cable. These default settings are stored by the IR M1 and are saved for each Output to Emitter port.

If a device is disconnected from that port, and a different device of the same type is connected (for example, an IR E4 is replaced with a different IR E4), the stored settings will transfer automatically to that new devices. Connecting a device of a different type will not transfer the settings.

Changes to the settings can only be made when a device is connected and enabled. Disabled or currently disconnected device's settings cannot be edited. A disabled device can be re-enabled from the web interface if it is connected to the IR M1.

Disabled devices are not being provided power by the Control Center. This can be useful if it is difficult to physically unplug the device.

**NOTE: Do not cut any cable connected to a M1, regardless of if it's powered or not. (Disabling a device does not make it safe to cut the wire.)**

If a connected device is in an error state, it will be treated as if it is disabled until the error is corrected.

Devices cannot be enabled if their firmware is out-of-date. See "Administration Page" on page 21 for more information on Firmware Updates.

## Audio Page

The Audio page displays all current audio settings. Most of the settings on the audio page are per audio channel. Settings for channel A are edited separately from channel B.

Two VU meters are visible at the top of the page. The VU meters are for informational purposes only, and do not change any settings.

**Note: Network speed can affect the audio monitor updating and web page performance.**

Each Audio channel can be globally enabled or disabled. This will prevent the channel from broadcasting over IR or Wi-Fi on any emitter. To disable audio only on specific emitters instead of globally, use the disable feature on the Settings page.

Audio Input Gain adjusts the audio sensitivity of the IR M1. Use the Down and Up buttons to make changes to the gain.

The Audio Input Source selects the type of audio source that is connected to the selected channel.

Audio Presets adjust the sound to specific settings to improve the audio quality depending on if you are broadcasting audio that is primarily voice, music, or for an audience requiring hearing assistance. The audio settings (including high pass filter, low pass filter, and compression) can also be manually adjusted in the custom presets section.

See "Audio Settings" on page 13 for more details on adjusting any of these settings.

**Channel A**

**Channel B**

Channel A Name

Channel A Name:

Channel A - Audio Input Source

Channel A - Audio Input Gain

-3 dB       

Channel A - Audio Presets

**High Pass Filter: 31 Hz Low Pass Filter: 16 kHz Compression: 1:1**

Channel B Name

Channel B:

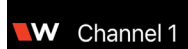
Channel B - Audio Input Source

Channel B - Audio Input Gain

-4 dB

## Upload Image

An image can be uploaded that will display next to the channel name for any users listening using the WaveCAST Receiver app.



This image can be used to easily distinguish the content of your audio broadcast. The image must be under 128kB and be in PNG or JPG format. If no custom image is uploaded, a Williams AV W logo will display instead.

The image can be replaced at any time. To completely remove the image, the device must be fully restored to factory defaults via the front panel menu (see "Restoring Defaults" on page 23).

### Channel Image Upload

This image will be displayed to viewers of this channel on the WaveCAST App, which works with the Wi-Fi features of the IR +. It can be used to show a logo, a language for interpretation, or any creative icon. *File size limited to 128kB and must be PNG or JPG format.*

**Image for Channel A**

No file chosen

**Image for Channel B**

No file chosen

## Network Page

The Network Settings page affects settings specific to the server as a whole. The page displays network connectivity settings, which are typically not needed after initial installation.

Changing a static IP address or subnet will not instantly take place. The changed IP address or subnet will only take effect once the device is rebooted. The device will automatically reboot when submitting changes to the IP Address settings.

**Note: If the IP address or subnet of the device was changed and the device is being rebooted, the website may not be available at the same URL location. Take note of the network information before rebooting the device.**

TTL can be modified if there is a need. The recommended setting for the least latency is 1, but it can be set up to 31. This setting should not be adjusted without proper consideration for your system setup.

If audio is not streaming smoothly, adjusting the Network Compensation Buffer setting will change the time delay buffer on the WaveCAST App. Changing the buffer can be helpful when a network connection is not sending the packets of audio data at a rate that results in smooth audio streaming.

For each channel, the security settings and the multicast information of the channel can be adjusted.

Secure Mode can be enabled or disabled, and a 6-digit PIN number can be assigned. If enabled, users will need to use this PIN to log on to the audio stream. Users attempting to listen to the stream without the PIN will be unable to do so.

A multicast address can be automatically assigned. If a specific multicast address is required, the device administrator can enter the desired multicast address. There is no unicast mode of the IR +.

Additional networking information is described in "Network Configuration" on page 14.

DHCP  Static

### Static IP

192 168 1 30

### Subnet Mask

255 0 0 0

### Gateway

10 0 0 1

### TTL

1

A TTL of 1 is recommended for the least latency. The maximum value is 31.  
Changing the IP address, subnet address, or gateway address will reboot the device.

**Submit and Reboot**

### Secure Mode

#### Channel A

Enabled  Disabled 6-digit PIN: 12345

#### Channel B

Enabled  Disabled 6-digit PIN:

### Broadcast Settings

Wi-Fi Audio Disabled  Wi-Fi Audio Enabled

Multicast addresses are typically automatically assigned, but a custom address may also be used.

#### Channel A

Channel Available over Wi-fi

#### Ch. A Multicast Address

The current Multicast Address is 8.8.8.8. To change it, please click the Declare Custom Multicast checkbox.

Declare Custom Address 8 8 8 8

#### Channel B

Channel Available over Wi-fi

## Administration Page

The Admin page displays administrative controls that can be used for remote site troubleshooting purposes.

The login username and password for the website can be set from this screen. If the username or password is ever forgotten, it can be restored to its default value by restoring defaults via the front panel menu.

The panel lock will prevent the front panel on the device from being used, forcing all changes and information to be seen via the web interface. This can also be enabled and disabled from the IR M1's front panel.

Restore Defaults will fully reset the device to factory settings. Network connection and login information will be reset, which may make the website unavailable at the current IP address. See "Restoring Defaults" on page 23 for more information.

Updating or rebooting the device will make the website temporarily unavailable. While the device is restoring, a message warning you to not power off the device will display on the OLED screen.

### Firmware Updates

Firmware updates are performed from the Admin page. At the bottom of the page, upload the firmware file (provided by Williams AV) and hit the update button. Your system will begin the update process from there, which will include a reboot. Firmware updates are available on [www.williamsav.com](http://www.williamsav.com).

Updates will also push an update to all connected devices. If a device is not connected during the main update process, the IR M1 will update it when it is connected. If the update for the connected device is cancelled or incomplete, the device will be unable to be used until the update is complete and will throw an error.

### Change Password

When using Chrome, you may get a pop-up that your password has been stolen. This is due to choosing a non-unique username and password combination that has been used elsewhere on the internet. [This process is fully controlled by Chrome and can be ignored if you so choose.](#)

User Name

Password

Password Verify

[Set Password](#)

---

### Additional Functions

Panel Locked

[Reboot](#)
[Limited Restore Defaults](#)
[Download Error Log](#)

---

### System Update

Updates can be downloaded off our our company website. [Click here to check for the latest update](#)

**Package Version:0.0.6**

[More Information](#)

---

No file chosen

[Update](#)

## Front Panel Interface

The front panel of the IR M1 can be used to change some system settings. For changing additional settings, the web interface will need to be used (see "Web Control Interface" on page 15).

### Main Menu

Some settings appear as you navigate the menu, and may not be visible when the menu is not being navigated.

Use the arrow buttons to highlight menu options. Left and right buttons navigate between fields, while the up and down buttons adjust the field's value. To select an option from a menu, hold down the right arrow button. Menu items will typically time out after 10 seconds if no further button presses are made.

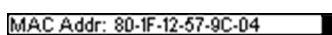


The **System Name** of the IR M1 is displayed in large text on the front panel. This can be adjusted via the web interface (see "Settings Page" on page 17).

The **IR Output Channel** is indicated in the lower left corner of main screen underneath the IR M1 name. The Output Channel will list either CH 1 | CH 2 or CH 3 | CH 4. This information can be highlighted and adjusted using the up and down arrows. For an in-depth explanation of this setting, see "IR Baseband Output" on page 14.

### Network and Wi-Fi Audio Status

If an IP Address is displayed, a network connection is available and the web interface will be usable, regardless of if Wi-Fi audio is enabled or not.



Selecting the IP Address and pressing the up or down arrows will toggle between displaying the IP Address or the MAC Address. If an address is not available, dim dashes will appear instead.



The Wi-Fi icon indicates whether WaveCAST Wi-Fi Audio is enabled. If an X icon is over the network icon (as shown in the full-screen image), Wi-Fi Audio is disabled. **This icon does not indicate network availability.**

The availability of WaveCAST Wi-Fi audio is also displayed in text above the IR M1's name. This text can be highlighted using the right or left arrow buttons. Once highlighted, push the up or down arrow buttons to turn the Wi-Fi Audio on or off.

If Wi-Fi audio has been disabled, the text on the front panel will say so. Wi-Fi audio can be enabled by scrolling over the Wi-Fi audio option and pressing the up arrow.

### Port Information

The port information shows information for the devices connected under the Output to Emitter ports (see "Back Panel" on page 8). This includes which channels are active for that port, and the connected device's operating status, if available. Errors on the device are indicated by the triangle icon, as seen in the main menu image for port 4. If the lower left corner of the box is empty, there is no device connected, the connected device is disabled, or the connected device is not a Williams AV supported device.

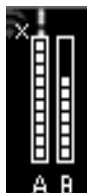
**NOTE: A device may have an empty lower left corner if the IR M1 has recently booted and is still gathering device information.**

When a channel is disabled, it will show up in a darker grey on the main menu. In this picture, channel A is disabled on port 1.

Port 2 is entirely greyed out because no device is connected to that port. It may also be greyed out because the device has been disabled via the web interface.

Port 3 is entirely bright, indicating the device is working properly and both channels are active.

To view additional port information, scroll over any of the four port's information on the main menu, then hold down the right arrow.



### Channel VU Meter

The VU meter will work as long as there is audio actively playing, even when a channel is not currently broadcasting anywhere. If the audio channel is not being broadcast, the VU meter will show up in grey instead of white.

When a channel's audio is overloaded, an exclamation point will appear over that channel's VU meter. Adjust the audio for that channel to fix the issue. There is no low level audio indicator.

When channel A's VU meter is highlighted via the left or right arrow buttons, the gain for the channel will display and be adjustable using the up and down arrows. Holding the left or right arrow button will display additional information on the Audio Channel Menu screen.

### Restoring Defaults

**Restore Factory Defaults** Restore Factory Defaults is a hidden option underneath the device name. Selecting this option will reset the device to its factory settings, including network and login settings for the Web Control Interface. Two confirmation prompts will appear before the settings are reset, including one to press down to confirm the restoration.



### Audio Channel Menu



On the main menu, highlight an audio channel's VU meter and press and hold the right arrow to view additional information.

Some audio channel settings can be edited. Use the up and down arrows to disable or enable the channel, or adjust the input source.

The preset is visible on this screen, but can only be adjusted from the web interface. The VU meter is also visible on this screen, but no additional settings are available.

To exit, keep pressing the right or left arrow buttons until the Exit option appears, then hold the right or left arrow to exit.

### Port Information Screen



On the main menu, scroll over any of the four port's information box, then hold down the right arrow. This will take you to the Port Information Screen.

The additional information displays the connected device's name, status, used channels, power level and LED light status.

The device name is not in a labeled column. It is the first item in a row. In the picture, the device name is IR E4.

When a channel has been configured to broadcast on a particular port, it will be listed under IR Chs as A or B; otherwise, a line will appear instead of a letter. If a channel is actively broadcasting, the letter will be white. If the channel is not broadcasting, the letter will be grey. If an IR A4 is connected to the IR M1, channels A and B will be shown as white or as grey, depending on if any IR E4 connected to that A4 is actively broadcasting that channel.

If there is an error, the status ERR will be displayed. If a status of - - is displayed, the IR M1 is no longer communicating with the attached device due to the device being disabled or some other non-error related reason.

From the Port Information Screen screen, highlight the device name by pressing the left or right arrow buttons, then hold the left or right arrow buttons to see the Device Detail Page.

To exit, keep pressing the right or left arrow buttons until the Exit option appears, then hold the right or left arrow to exit.

### Device Detail Page



On the Port Information Screen, highlight the device name by pressing the left or right arrow buttons, then hold the left or right arrow buttons to see the Device Detail Page.

The Device Detail page shows information about a specific device connected to an Output to Emitter port. It includes a device description, ID number, firmware

versions and device status. This information may be useful when troubleshooting with TechBlue Technical Support Services (see "Troubleshooting" on page 24).

### Locking the Front Panel



To lock or unlock the front panel, hold both the left and right arrows for a few seconds while on the main menu. A pop up will let you know the device is locked. While locked, a pop up message that the device is locked will appear.

## WaveCAST Receiver App

The WaveCAST Receiver app allows listeners to hear the audio on their personal, Wi-Fi connected devices, such as a mobile phone. The WaveCAST App can be downloaded from the Google Play Store for Android devices or the Apple App Store for iOS devices.

### Download the WaveCAST App

Download the WaveCAST app from the Apple App Store for iOS devices or Google Play Store for Android devices.

It is recommended that the app is downloaded in advance over an internet-connected wi-fi network or cellular network.

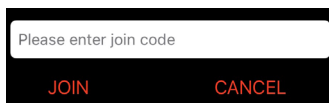
### Join the WaveCAST Wi-Fi Network

Once the WaveCAST App is downloaded, join the same Wi-Fi network that the audio is being broadcast over. If no channels are listed when selecting an audio channel, there is no audio being streamed on this Wi-Fi network. Ensure you are on the correct Wi-Fi network.

### Select an Audio Channel



When the App is opened for the first time, a list of available channels will appear. Tap on the channel to listen to the audio. The venue should provide the name of the channel to listen to for your event if more than one is available.



Channels marked with a lock icon require a code to join. Enter the join code assigned to the channel when prompted. If a channel is currently streaming, it will have a blue checkmark next to its channel name.

If there are many servers on your network, or your network is set so that servers cannot be discovered by outside devices, the WaveCAST app can connect to a server via IP address. Tap the **Discover by IP** text at the bottom of the channel screen then enter the IP address of the WaveCAST server. The channels being broadcast by that server will then be available on the channel select screen. *It is recommended that this feature is not used with a general audience as they may not type the IP address correctly.*

### Listen to the Audio

Once an audio channel has been selected, the audio should start playing automatically. The volume of the audio can be adjusted using the slider in the middle of the screen, or with the physical volume controls on the personal device.



To mute the audio, tap the speaker icon. Tap it again to unmute the audio.

To switch channels, hit the back arrow at the top of the screen.

### Note on Wi-Fi Assist/Smart Network Switching

The WaveCAST **does not require** an internet connection. It can be placed on an internal network with no internet connection.

Some phones expect network connections to provide internet access. When the phone cannot reach the internet, it may automatically try to switch to a network connection with an internet connection. Sometimes, the phone determines that the best internet connection is through a mobile data network.

This is not the desired behavior when using the WaveCAST network. The phone will automatically take the user off of the WaveCAST audio streaming network, and onto a unrelated internet network connection. This will prevent the user from hearing the audio, and they may not realize their phone switched networks on them.

Steps for disabling this feature will differ for every phone, but is typically found under the Wi-Fi or Mobile network settings. Look in the manual for your phone for instructions on disabling this feature.

## Troubleshooting

Follow the troubleshooting advice in this section to potentially resolve any issues. If the troubleshooting guide does not fix the problem, please contact our Tech Blue design and support team at [techblue@williamsav.com](mailto:techblue@williamsav.com) or by calling +1-952-943-2252.

### Website problems

**The normal IR+ website is unavailable.**

- If a webpage loads that only allows the installation a firmware update, the website stored on the IR M1 has been corrupted, likely by a power outage. Install the firmware for your current version (or newer) of the IR M1 via the firmware update page to restore the website. Firmware is available on [www.williamsav.com](http://www.williamsav.com).
- Check your network settings. The IP address is viewable on the front panel of the device. If the IP Address displays as dashes, check the Ethernet connection to the IR M1.



**Lost username or password**

- Using the front panel menu, restore defaults. See "Restoring Defaults" on page 23.

**Website not behaving as expected**

- The website will only work with a modern browser. Do not use the website with Internet Explorer or other outdated browsers.
- Do not use the website with Firefox; there are known communication issues with the website when using this browser.
- Try switching browsers. Google Chrome is our recommended browser. The website may have problems communicating with the Control Center when using other browsers.

**Audio problems****Noise or Distortion in the Audio**

- Check to see if there is noise in the audio source. To find out, disconnect the audio cable. If the noise disappears your noise problem is in the source. Correct or repair your audio source.
- Check for ground loops or noise on the input signal. If you are still having trouble, call your authorized Williams AV dealer or representative.
- If audio sounds clipped or is too loud, try to turn down the gain for the channel. These issues may be more noticeable if the VU meter for the channel is displaying the ! overload warning.

**Noise in audio grows when program is silent**

- Check the IR M1 Compression Ratio, which may be inappropriate for the type of program being transmitted. Try setting the Compression Ratio to 1:1 (compression off).

**Headphone Audio not adjusting for Compression or Other Changes**

- The headphone audio is for listening to the audio source directly. No audio adjustments are fed through the headphone jack.
- Use an IR Receiver to hear adjusted audio.

**Reception Difficulties****No WaveCAST App Reception**

- Ensure the listeners have the correct app open are listening on the same channel as the IR M1.
- Ensure the phone is on the correct Wi-Fi network.
- If using Wi-Fi Audio, ensure that Wi-Fi Audio is enabled on the IR M1. IR Audio is not detected by the app.
- Force close the app and reopen it.

**Missing Channel Image on App**

- Images may not load when many users are connected. Try reloading the list of channels.

**Ch A or Ch B VU Meter does not show audio**

- Make sure the IR M1 has power and is turned on.
- Make sure the audio input is connected properly.
- Make sure an active and adequate level audio signal is being sent to the IR M1 Control Center.
- Make sure your audio input is selected properly. If you're using a microphone and the channel is set for Line In, the audio level will be too low.
- Try turning up the audio at the source, or using the gain adjustment on the IR M1. The IR M1 does not provide a low audio level indication.

**No Sound through Receivers**

- Check to make sure the receiver is operating on the same frequency as the transmission.
- Make sure the front of the receiver is facing an emitter.
- 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 IR M1. Verify that the VU meters are showing audio levels.
- Check the Port Status via the front panel or web interface of the IR M1. Both displays can show if Ch A and/or B are active and audio is transmitting. This indicates the problem is not with your IR transmission, but with the receivers, or installation.
- Make certain the emitter is not covered by objects which would block infrared light.
- Audio Gain or the audio level may not be loud enough.

**Users must turn receiver volume controls up near maximum to get enough volume**

- Ensure the emitters are pointed towards the audience and not blocked by anything.
- The audio gain control may be set incorrectly on the IR M1. Correct the Audio Gain control setting by adjusting it until the sound level peaks near 0 dB.
- Some users may not be helped by this system. Severe hearing loss may require using the system with a T-coil and personal hearing aid rather than headphones. Some phones and tablets have the ability to broadcast to a T-coil; research the phone model to see if this is an option.

**Sound Through The Receivers Is Weak And Noisy.**

- Listen to the audio signal through the Phones jack of the IR M1 Control Center. You can also hold a receiver in front of the built-in emitters on the front of the IR M1 Control Center and listen to the audio signal. Hold the receiver within a few feet of the IR M1.
- If the signal is weak and noisy here, check that the audio source selected is correct and that the VU meter is typically at 70% of maximum level. Adjust the gain if necessary to calibrate VU levels.
- Increase the volume of the source or adjust the gain of the M1 if necessary to raise VU levels. If the signal sounds okay, you may need to re-position the emitter(s).

**NOTE: Make sure the powerline voltage does not fall below 94V, or system performance will be greatly reduced!**

**Buzz in other equipment**

- This is likely caused by incorrect audio connections, a ground loop, or defective equipment. To remedy, use proper audio wiring practice to make connections.
- Make certain the chassis is connected to the equipment cabinet rails. Buzz/hum in system may be experienced when the IR M1 chassis is insufficiently grounded. In this case, install a ground wire to the IR M1 chassis and terminate to a verified ground source.

**Device is not working over the hardwired Ethernet network**

**Note: If you have a network system administrator, please contact them first before attempting to troubleshoot the network yourself. If you don't have a system administrator, the following steps can be tried on a small, non-managed network.**

In this situation you have to check the entire signal path between the control device (laptop or desktop computer) and the IR M1.

1. Check all of the wiring between the network the IR M1. Make sure every device in the signal path is plugged in, connected, and powered on. Unplug and plug back in firmly all Ethernet cables in the path between the computer and the IR M1. If you find one that was loose, plug it in and test the device connection again. If none are loose, you could also replace Ethernet cables.

**Note: When checking connections, make sure the IR M1 Ethernet cable is plugged into one of the LAN ports on the router, not the WAN port.**

2. If no loose cables were found, try re-booting in this order
  - the router
  - the IR M1 (turn it off for 10 seconds then turn it back on)Wait at least two full minutes for the IR M1 to re-establish itself on the network. Then try testing the connection again.
3. Open an internet browser on the computer. Type the IP address of the IR M1 into the address bar of the Internet browser.
4. Verify the connection by changing a setting on the IR M1 through the internet browser. If you can change settings and get feedback on the web page (or verify the change on the front display of the IR M1), you are now connected to the IR M1.
5. If you can make changes to the IR M1 initially, but then lose that ability (get disconnected), you may have to look at network issues such as IP address conflicts, power issues, or even settings in the router.
6. You can try restoring the IR M1 to factory settings. This will clear out any changes and allow you to start clean.
7. Try directly connecting the IR M1's Ethernet cable to a PC to verify that the IR M1 and Ethernet cable are operational.
8. If you have tried all of these steps and still can't connect, call Williams AV for additional troubleshooting help. Note that Williams AV cannot help in all cases, as there are many variables within networks.

## Device is not working over Wi-Fi

**Note:** If you have a network system administrator, please contact them first before attempting to troubleshoot the network yourself. If you don't have a system administrator, the following steps can be tried on a small, non-managed network.

This situation is most often caused by the mobile device losing connection to the router when the Wi-Fi on the mobile device has been turned off (or the Wi-Fi reception is unstable).

1. In order to perform these steps you will need the SSID (Wi-Fi network name) of the router, the router Wi-Fi connection password, and the IP address of the IR M1. You can find the IP address on the front panel of the IR M1.
2. Make sure the IR M1 and router are both ON.
3. Make sure the Ethernet cable going to the IR M1 is plugged into one of the LAN ports on the router (not the WAN port).
4. Is the mobile device connected to the router? On the mobile device, go into the Wi-Fi Settings, and make sure Wi-Fi is turned on or enabled. More than one router may show up in the list of possible connections, depending upon how many routers are nearby. If you don't see the router that is connected to the IR M1 in the list, make sure the router is on and broadcasting its SSID.
5. If you see the desired router SSID in the list, connect to it by clicking on it. Usually there is a check mark or some other indication of which router/SSID you are connected to. You may need to enter the Wi-Fi password/passkey to the router to connect to it.
6. Once you have verified that you have connected the mobile device to the router, exit the Wi-Fi settings on the mobile device (without shutting off the Wi-Fi) and open an internet browser. Type the IP address of the IR M1 into the address bar of the Internet browser and hit the Enter key. You should see the IR M1 login web page come up.
7. Verify the connection by changing a setting on the IR M1 through the internet browser. If you can change settings and get feedback on the web page (or verify the change on the front display of the IR M1), you are now connected to and controlling the IR M1.
8. On the portable device, attempt the following steps:
  - Enable Network Permissions for the Wavecast App
  - Disable Private IP Addressing
  - Disable Random MAC address
  - Reopen App or Reboot portable device
9. If there are still connection issues, try re-booting in this order
  - the router
  - the IR M1 (turn it off for 10 seconds then turn it back on)
 Wait at least two full minutes for the IR M1 to re-establish itself on the network. Then try testing the connection again.
10. If you can make changes to the IR M1 initially, but then lose that ability (get disconnected), you may have to look at deeper network issues such as IP address conflicts, power issues, or even settings in the router.
11. If there is interference, or low Wi-Fi signal on the mobile device, try moving the router to a better location.
12. Some mobile devices have known issues with certain routers. To fix this, you can investigate updating the operating system on the mobile device. Try a different mobile device just to verify that ANY wireless device can connect. If you can get one device connected, but not another, chances are the device that cannot connect has issues. A different brand/model of router may also fix the problem with certain devices not connecting.
13. Try connecting to the IR M1 using Wi-Fi on a laptop, rather than a mobile device, to verify that the mobile device is/is not the problem. If you can connect with a laptop, check the Wi-Fi settings on the mobile device and make sure Wi-Fi is turned On.
14. You can try restoring the IR M1 to factory settings. This will clear out any changes and allow you to start clean.
15. If you have tried all of these steps and still can't connect, call Williams AV for additional troubleshooting help. Note that Williams AV cannot help in all cases, as there are many variables within networks.

## Checking Software Versions

Checking the software version will ensure that your system has the most up-to-date firmware possible. When the device is starting, the firmware package version will be visible on the front panel.

Via the web interface, on the Administration page various version numbers for the IR M1 are visible under System Update -> More information. This may be helpful when troubleshooting with TechBlue Technical Support Services.

## Specifications

### IR M1

Dimensions:	19" (W) x 1.75" (H) x 8.2" (D) (48.3 cm x 4.5 cm x 20.8 cm)
Weight:	5.2lb. (2.4 kg)
Color:	Black
Rack Mount:	Single Rack Unit
Power Supply:	International Desktop Supply Input: 36 W, 110-240 VAC 50-60 Hz Output: +48VDC, 0.75A center-positive
Power Switch:	Rocker switch with LED
Modulation:	FM Wideband, +50kHz deviation, 50uS pre-emphasis
Carrier Frequency:	Selectable, 2.3/2.8 or 3.3/3.8MHz
Signal to Noise Ratio:	67dB (typical)
Frequency Response:	40 to 16,000Hz, +1 dB, -3dB, electrical response
Total Harmonic Distortion:	Less than 2%, electrical response
Audio Processor Functions:	DSP based; Compression 1:1, 1.5:1, or 2:1; High-pass and low-pass filter frequency control
Auto Carrier Shut-Off:	Adjustable timer shuts off carrier when no audio is present. Adjustable through webpage.
Audio Input:	(2x) Combination 3-pin XLR, 1/4" (TRS) jack for balanced or unbalanced line level, or balanced or unbalanced microphone with selectable phantom power
Dante:	Optional
Internal Test Tone:	400 Hz internal test tone selectable as audio input source for setup and diagnostics
Remote Configuration:	Available through embedded website
Headphone Output:	(2) 1/4" headphone jacks on front panel for monitoring CH A and CH B audio inputs
Emitter Output Jack:	Four RJ-45 ports for CAT5e cables; provides +48VDC Power, RS-485 communication, and Baseband signals for IR transmission.
Operating requirements:	0-50°C ambient temperature, non-condensing, non-corrosive atmosphere
Approvals:	CE, FCC, RoHS, RCM, WEEE, CB Scheme, ISED, VCCI
Warranty:	2 years on Control Center, 90 days on accessories

\*\* Stresses above these ratings may cause permanent damage. Exposure for extended periods may degrade reliability.

### IR E4

Dimensions:	7.5" (W) x 1.4" (H) x 3.6" (D) (19.1 cm x 3.6 cm x 9.1 cm)
Weight:	0.8 lb (362 g)
Color:	Black
Power:	48 VDC supplied by IR M1 via CAT 5e cable.
Coverage Area:	Up to 18,000 square feet (1,670 sq. m) in single channel mode
Connectivity:	+48VDC Power, RS-485 communication, and Baseband signals for IR transmission are all provided via a single CAT5e cable inserted into an RJ-45 jack from the IR M1.
Operating requirements:	0-50°C ambient temperature, non-condensing, non-corrosive atmosphere
Approvals:	CE, FCC, RoHS, RCM, WEEE, CB Scheme, ISED, VCCI
Warranty:	2 years on Emitter; 90 days on accessories

### IR A4

<b>Dimensions:</b>	7.6"W x 6.6"D x 1.1"H (193mm x 168mm x 28mm)
<b>Weight:</b>	2.4 lb (1100g)
<b>Color:</b>	Black
<b>Power:</b>	48 VDC, 0.75A
<b>Connectivity:</b>	+48VDC Power, RS-485 communication, and Baseband signals for IR transmission are all provided via CAT5e cable(s) inserted into an RJ-45 jack from the IR M1 and out to the IR E4(s).
<b>Heat Dissipation:</b>	1W
<b>Max Cable Length:</b>	328 feet (100m)
<b>Plenum Rating:</b>	The IR A4 is not rated for use in plenum spaces and will need to be installed in a plenum box for use in such areas.
<b>Approvals:</b>	CE, FCC, RoHS, RCM, WEEE, CB Scheme, ISED, VCCI
<b>Warranty:</b>	2 years

NOTE: SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

## Mounting Options

BKT 024 - Universal wall / ceiling mount (included)

MLB 003 - Linking bar for stacking emitters

STD 007 - Tabletop tripod stand

The IR E4 can be mounted on any camera tripod stand with a 1/4" - 20 threaded connector.

### Optional Receivers

WIR RX22-4 Receiver

IR RX20 Receiver

## Regulatory Statements

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### FCC

#### FCC Compliance Statement

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 in a residential installation.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

**Caution:** Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

### ISED

#### Innovation, Science and Economic Development Canada Statement

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.

Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation

Cet équipement est conforme aux limites d'exposition de rayonnement d'IC RSS-102 déterminées pour un environnement non contrôlé. Cet

Son utilisation est soumise aux deux conditions suivantes:

1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.

### VCCI



この装置は、クラスA機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-A

This is a Class A equipment. Operation of this equipment in a residential environment could cause radio interference. In such a case, the user may be required to take corrective actions. VCCI-A

## IR M1: 2-Year Warranty Statement

Williams AV, a brand owned by Williams AV, products are engineered, designed, and manufactured under carefully controlled conditions to provide you with many years of reliable service.

Williams AV warrants the IR M1 Control Center against defects in materials and workmanship under normal use and conditions for the 2-years from the product from date of purchase.

This warranty is available to the original end purchaser of the product and can be transferred to subsequent purchasers of the product.

Microphones, earphones, headphones, batteries, chargers, cables, carry cases, and most 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 M1, including but not limited to, any implied warranty of merchantability or fitness of use of such equipment including, without limitation, any warranty that the use of such equipment for any purpose will comply with applicable laws and regulations. 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 is replacement of the product. No person has any authority to bind Williams AV to any representation or warranty with respect to the IR M1 System. Unauthorized repairs or modifications will void the warranty. This warranty is void if damage occurred because of misuse, or if the product has been repaired or modified by anyone other than a factory authorized service technician. Warranty does not cover normal wear and tear on the product or any other physical damage unless the damage was the result of a manufacturing defect. Williams AV is not liable for consequential damages due to any failure of equipment to perform as intended. Williams AV shall bear no responsibility or obligation with respect to the manner of use of any equipment sold by it.

This warranty does not cover reimbursement for your costs of removing and transporting the product for warranty service evaluation or installation of any replacement product provided under this 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 warranty did not contain the particular part or term held to be invalid. The terms of the warranty are governed by the laws of the State of Minnesota.

Prices and the specifications of the products are subject to change without notice.

For Complete Warranty Statement go to: <https://williamsav.com/support/warranty-product-registration/>

NOTICE: Williams AV products are NOT designed for use in extreme temperature, humidity or chemical environments. The introduction of chemicals such as chlorine, salt water or human sweat into the product will cause damage to the circuitry. Damage due to these causes is NOT covered under the Product Warranty.

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.

## IR E4: 2-Year Warranty Statement

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Williams AV, a brand owned by Williams AV, products are engineered, designed, and manufactured under carefully controlled conditions to provide you with many years of reliable service.

Williams AV warrants the IR E4 emitter against defects in materials and workmanship under normal use and conditions for the 2-years from the product from date of purchase.

This warranty is available to the original end purchaser of the product and can be transferred to subsequent purchasers of the product.

Microphones, earphones, headphones, batteries, chargers, cables, carry cases, and most 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 E4, including but not limited to, any implied warranty of merchantability or fitness of use of such equipment including, without limitation, any warranty that the use of such equipment for any purpose will comply with applicable laws and regulations. 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 is replacement of the product. No person has any authority to bind Williams AV to any representation or warranty with respect to the IR E4. Unauthorized repairs or modifications will void the warranty. This warranty is void if damage occurred because of misuse, or if the product has been repaired or modified by anyone other than a factory authorized service technician. Warranty does not cover normal wear and tear on the product or any other physical damage unless the damage was the result of a manufacturing defect. Williams AV is not liable for consequential damages due to any failure of equipment to perform as intended. Williams AV shall bear no responsibility or obligation with respect to the manner of use of any equipment sold by it.

This warranty does not cover reimbursement for your costs of removing and transporting the product for warranty service evaluation or installation of any replacement product provided under this 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 warranty did not contain the particular part or term held to be invalid. The terms of the warranty are governed by the laws of the State of Minnesota.

Prices and the specifications of the products are subject to change without notice. For Complete Warranty Statement go to: <https://williamsav.com/support/warranty-product-registration/>

NOTICE: Williams AV products are NOT designed for use in extreme temperature, humidity or chemical environments. The introduction of chemicals such as chlorine, salt water or human sweat into the product will cause damage to the circuitry. Damage due to these causes is NOT covered under the Product Warranty.

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.



## IR A4: 2-Year Warranty Statement

Williams AV, a brand owned by Williams AV, products are engineered, designed, and manufactured under carefully controlled conditions to provide you with many years of reliable service.

Williams AV warrants the IR A4 emitter against defects in materials and workmanship under normal use and conditions for the 2-years from the product from date of purchase.

This warranty is available to the original end purchaser of the product and can be transferred to subsequent purchasers of the product.

Microphones, earphones, headphones, batteries, chargers, cables, carry cases, and most 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 A4, including but not limited to, any implied warranty of merchantability or fitness of use of such equipment including, without limitation, any warranty that the use of such equipment for any purpose will comply with applicable laws and regulations. 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 is replacement of the product. No person has any authority to bind Williams AV to any representation or warranty with respect to the IR A4. Unauthorized repairs or modifications will void the warranty. This warranty is void if damage occurred because of misuse, or if the product has been repaired or modified by anyone other than a factory authorized service technician. Warranty does not cover normal wear and tear on the product or any other physical damage unless the damage was the result of a manufacturing defect. Williams AV is not liable for consequential damages due to any failure of equipment to perform as intended. Williams AV shall bear no responsibility or obligation with respect to the manner of use of any equipment sold by it.

This warranty does not cover reimbursement for your costs of removing and transporting the product for warranty service evaluation or installation of any replacement product provided under this 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 warranty did not contain the particular part or term held to be invalid. The terms of the warranty are governed by the laws of the State of Minnesota.

Prices and the specifications of the products are subject to change without notice. For Complete Warranty Statement go to: <https://williamsav.com/support/warranty-product-registration/>

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