

# CITY THEATRICAL

NEW YORK • LONDON

## Multiverse<sup>®</sup> Studio Receiver 900MHz / 2.4GHz P/N 5904

### User's Manual Rev 1.1

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Multiverse Transmitters are covered by U.S. Patents #7,432,803 B2, #10,129,964 B1, and other patents pending.

The 900MHz band is licensed for use in North America only.

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## Compliance

### FCC Compliance Statement (United States)

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules.

Operation is subject to the following two conditions:

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

**CAUTION:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

### IC Statement

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### Safety Notices

Please read this entire manual before using your new equipment. Please keep the manual in a safe place so you can refer to it in the future as required.

The Multiverse wireless DMX/RDM System is intended for use only by qualified professionals. Connection, installation, and hanging of this equipment must be performed in accordance with all pertinent local, regional, and national safety codes and regulations.

Do not operate in excessive heat/direct sunlight. Be sure installation provides adequate ventilation. There are no user-serviceable parts inside! Refer to qualified service personnel!

**RF Exposure:** The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

## Introduction

City Theatrical's 5904 Multiverse® Studio Receiver 900MHz/2.4GHz brings the advanced features of the Multiverse wireless DMX/RDM system to the film and video world, where fast setup and reliability are key objectives. The weather resistant Multiverse Studio Receiver contains a long-life lithium-ion polymer battery giving 20 hours of use. The Multiverse Studio Receiver has a full four button user interface with a backlit LED display that makes setup easy and gives feedback on system performance.

The 5904 Multiverse Studio Receiver contains two built-in radios, 2.4GHz (for worldwide use) and 900MHz (for use in the Americas only), which allow the user to select which single universe to receive, and which radio band to use via the Multiverse SHoW ID.

The DMX corded connector allows the Multiverse Studio Receiver and external antenna to hang below the lighting fixture, giving improved data fidelity.

## 5904 Multiverse Studio Receiver Features

- **Choice Of Broadcast Radio**  
Transmit and receive on either the 2.4GHz band or the 900MHz band.
- **Long Life Rechargeable Battery**  
20 hour battery life with default settings
- **Rugged and Splashproof**  
The IP61 rated plastic case makes it splashproof and rainproof (but not for permanent outdoor use).
- **User Selectable SHoW IDs**  
City Theatrical has always produced wireless DMX products that allow the user to select the optimum transmission method. Users may select full bandwidth hopping, hopping limited to a section of the spectrum (including areas of the spectrum outside of the Wi-Fi range), or adaptive hopping.
- **mDMX** (Multiverse SHoW IDs only)  
mDMX is a form of DMX optimized for wireless broadcast that dramatically reduces data being broadcast, thereby reducing unneeded radio energy.
- **mRDM** (Multiverse SHoW IDs only)  
Multiverse is able to broadcast RDM information without disrupting the DMX broadcast. This feature is not available even in wired RDM systems.
- **SHoW Key Security** (Multiverse SHoW IDs only)  
SHoW Key is an additional three-digit code that can be added to the Multiverse SHoW ID that will prevent any other system set on the same SHoW ID from interfering with your system.
- **Forward Error Correction** (Multiverse SHoW IDs only)  
Allows the Receiver to detect and correct errors that may occur in the wireless transmission of data.

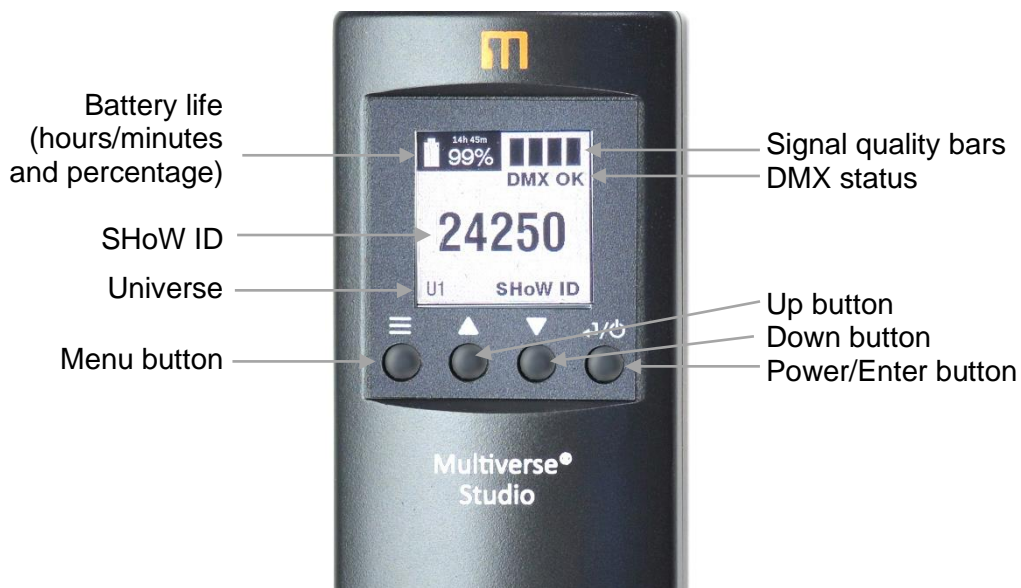
- **Ultra Low Latency**  
Total average system latency of 4ms.
- **Adaptive Spread Spectrum Frequency Hopping**  
Adaptive Spread Spectrum Frequency Hopping identifies and masks off hopping channels that contain interference, replacing them in the hop sequence with alternate channels.
- **Adjustable Output Power**  
Sometimes an application calls for the most available broadcast power, but many entertainment systems can utilize lower output power to reduce detrimental effects on other radio systems in the venue, reduce reflections, and improve performance.
- Protocols supported: ANSI E1.11 DMX512-A; E1.20 RDM
- Compatible with all Multiverse and SHoW DMX Neo products
- User can select a single universe to receive
- A very simple user interface to set SHoW ID, universe, and other features
- RDM proxy and responder functions
- Firmware updateable via USB port
- USB-Power Adaptor and USB-A to USB-C cable included
- Selectable display timeout and brightness level
- Selectable Auto Off Timeout
- Battery Time Remaining displayed in both hours/minutes and percent
- Contactless charging

## Installation

Multiverse Studio Receiver can either be powered with its internal battery, or with 5VDC power into its USB-C connector from its included external power supply (100-240VAC in, 5VDC out) or from another external power supply (such as a lighting fixture) providing 5VDC. Turn the Receiver on or off by pushing and holding the Power/Enter button.

## User Interface Screen

Upon power up, the Multiverse Studio Receiver displays the SHoW ID, universe, radio signal quality, and DMX connection status. Pressing the “Up” or “Down” button will take you to the universe selection screen.



Pressing “Enter” will select SHoW ID or universe for editing and will commit the change when done.

Pressing the “Menu” button will take you to the Menu screen. Holding the Menu button will cancel the current edit. See page 7 for a full explanation of Menu items.

## SHoW ID

Default SHoW ID is 24250

It is recommended that users perform a site survey using City Theatrical’s RadioScan™ Spectrum Analyzer before choosing a SHoW ID, to insure optimum radio performance.

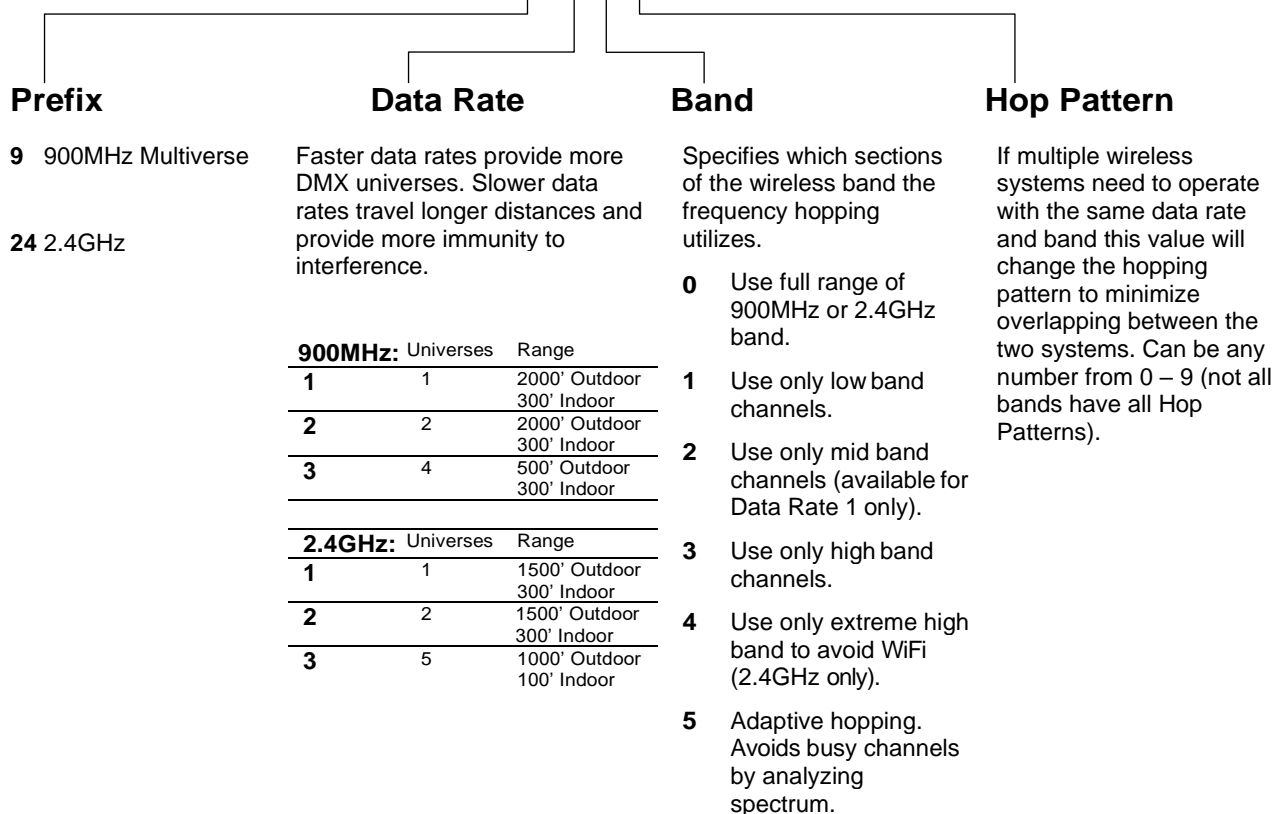
Use the default SHoW ID, or choose a SHoW ID and enter that SHoW ID into the user interface of your Multiverse transmitter (Multiverse SHoW Baby, Multiverse Node, or Multiverse Transmitter) and all receivers. **The SHoW ID and universe number (and SHoW Key, if used) must match on your transmitter and all receivers.**

Multiverse Studio is backwards compatible with SHoW DMX Neo products when using SHoW DMX Neo SHoW IDs. See **Table 6** on page 14 for a list of SHoW DMX Neo SHoW IDs.

Here is further explanation of the Multiverse SHoW ID numbering system:

**Table 1: Selecting Your Multiverse SHoW ID**

### Multiverse SHoW ID Example: 24302



Note: Not all combinations of digits are possible and unused numbers are reserved for future use.

## Universe

Default universe is 1.

When the Multiverse Studio Receiver is a receiver in a multi universe system with a Multiverse Transmitter you can select the universe the Multiverse Studio Receiver will receive and output. The selected universe must match a valid universe being transmitted.

Note: If universe selected is not being broadcast by the transmitter, the universe number will be shown in a color opposite of the background color on the user interface to alert you to the incorrect selection.

## Signal Quality Bars

The signal quality bars give a visualization of signal quality as seen at the Receiver. Four bars is excellent signal quality, three bars is good signal quality, two bars is marginal, and one bar is low.

## DMX

When no DMX is present “NO DMX” is displayed in red type, and “DMX” is displayed in black type when DMX is present. These colors can vary if colored backgrounds are selected.

## Battery

Battery life remaining is shown in both percentage, and in hours and minutes remaining.

## SHoW ID/Universe

If the SHoW ID is displayed prominently, the universe is displayed in smaller type at the bottom of the screen, and vice versa.

## Menu Screen

Pressing the “Menu” button takes you to the Menu screen.

- **Power**

Output power may be user selected as Low, Med, Hi, or Max. It is a best practice to use the least amount of output power to achieve a successful broadcast. This helps to reduce reflections which can reduce signal fidelity and to reduce any potential negative effect on other radio users in the area. You can monitor signal strength via RDM. Default is Maximum.

- **Antenna**

If a panel (P/N 5981) or Yagi (P/N 5982) antenna is used instead of the default omni antenna, choose it on this menu for optimum performance and to remain in compliance with FCC and other radio compliance regulations. An (P/N 5638) adapter cable is required to use a panel or Yagi antenna.

- **SHoW Key** (Multiverse SHoW IDs only)

The SHoW Key setting allows a user to enter a key to privatize their SHoW ID from another system on the same SHoW ID. SHoW IDs and SHoW Keys need to match in order for receivers and transmitters to talk to each other. Keeping your SHoW Key private will provide a level of security to your Multiverse system from unauthorized use. The range is 0 (Default) to 500.

**Table 2: SHoW IDs and SHoW Keys**

Situation		Condition	Outcome
Same SHoW Key	with	Different SHoW IDs	OK
Different SHoW Keys	with	Same SHoW IDs	Not OK
Different SHoW Keys	with	Different SHoW IDs	OK

- **Display Color**  
The background color of the display can be changed from white to magenta, cyan, green, yellow, or red. Default is white.
- **RDM Traffic**  
The RDM Traffic setting determines whether RDM data is passed downstream of the Multiverse Studio Receiver. It does not affect whether the Multiverse Studio Receiver is detectable by devices upstream. Default is On.
- **Auto Off Time**  
Auto Off allows the user to set a time to turn off the Multiverse Studio if no radio signal is detected from a Multiverse Transmitter while battery power is being used. Settings are 30 minutes to 10 hours, or off. Default is 8h 00m. Whenever a radio signal is received, or when the user presses a button, the time counter begins again.
- **Backlight Time**  
The Backlight Timeout setting determines how long the LCD backlight will remain on after the last button press. The timeout can be set to off (backlight will never timeout) or any interval from 10 seconds to 30 minutes. Default is off. After a screen timeout, pushing any button will wake up the screen without changing the screen selection.
- **Backlight Level**  
Controls Backlight brightness. Range is 25%-100%. Default is 70%, which allows 20 hour battery life. 100% brightness allows 16 hours battery life.
- **Lock Screen**  
The user interface screen can be locked to prevent accidental or malicious changes, while leaving the SHoW ID/Universe display visible. To unlock the screen, use a long press on the menu button.
- **Factory Defaults**  
Resets all settings to factory defaults.
- **Battery Info**  
Provides information on battery status
- **Multiverse Info**  
Provides information on Multiverse Studio's radio
- **Firmware Info**  
Lists all firmware versions loaded
- **Update Firmware**  
Puts Multiverse Studio into firmware update mode



## RDM Settings

The Multiverse Studio Receiver can be configured remotely with a compatible RDM controller, such as DMXcat®. All of the settings available through the menu can be set via RDM. Aside from settings, you can also view the Device Model, Manufacturer, Firmware Versions, RDM UID, RF Signal Quality, RF Signal Strength, and Battery Charge %. You can also give each device a unique RDM Device Label to help with identification for configuration and troubleshooting.

## Updating Firmware

Firmware updates and instructions for performing them are available on the product pages of the City Theatrical website.

## Troubleshooting

**Table 3: Troubleshooting Guide**

Symptom	Solution(s)
Unit does not power up.	Check that battery has sufficient charge
	Check that power cable is properly installed using external power
Fixtures connected to the receiver are not responding.	Check that the Tx symbol on transmitters is solid, and that DMX symbol is shown on Multiverse Studio Receiver.
	Check that SHoW ID, Universe, and SHoW Key (if used) match on all transmitters and receivers.

## Specifications

**Table 4: Physical Characteristics**

Product Information	
Product Name	Multiverse Studio Receiver (900MHz/2.4GHz)
Part Number	5904
Maximum Concurrent Universes	1
Frequency Range:	2400 – 2480 MHz
	902 – 928 MHz

Physical Specifications	
Length	95.25mm (3.75 in)
Length with antenna	139.7mm (5.5 in)
Width	46.0mm (1.812 in)
Height	25.4mm (1.0 in)
Antenna	Dual band 900MHz / 2.4GHz 1.8dBi / 3.8dBi
User Interface	4 Button/Backlit LCD display
Construction	ABS plastic

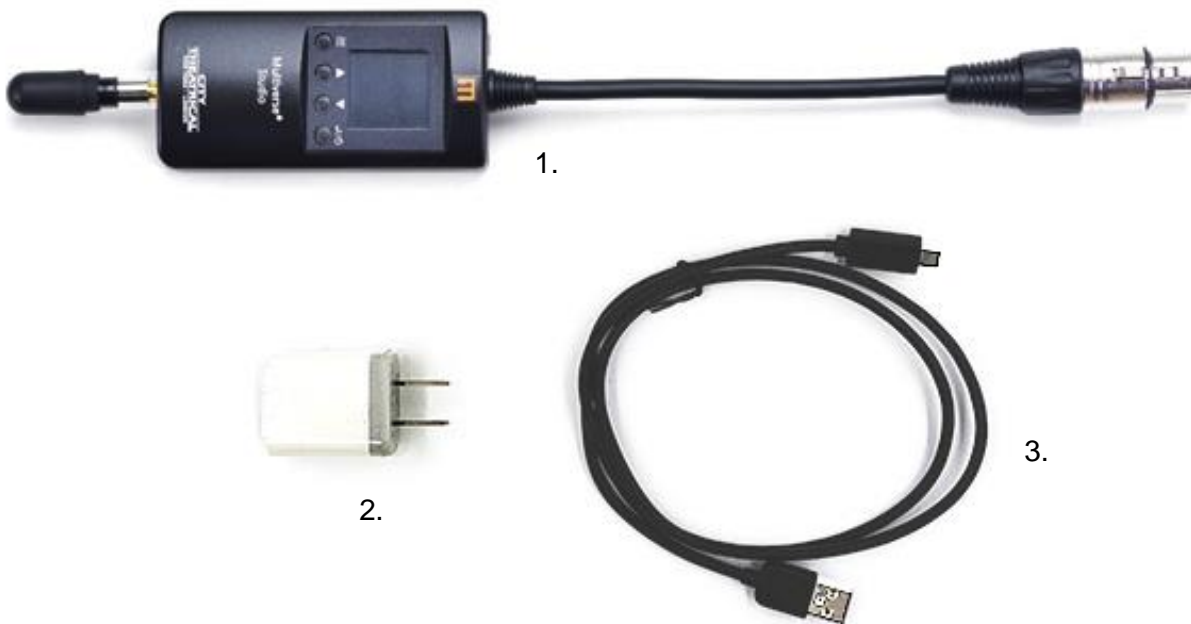
Electrical	
Power	Internal battery; included external power supply 100-240VAC input, 5VDC output USB-A
Battery	Internal lithium-ion polymer, 20-hour life on default operating settings
Charge time	- Contactless charger: 3.5 hours - USB-C: 2.5 hours

(Continued)

Radio Technology	
Latency	4 ms average
RF Sensitivity	-95dBm
Loss of Data Behavior	Output stops
Broadcast Power	3.2mW, 10mW, 32mW, 100mW EIRP
Broadcast Modes	Adaptive, Full, Low, Mid, High, Max
Show IDs	Multiverse: 307; Neo: 70
RDM Features	RDM Proxy, RDM Responder

Product Information	
Use Environment	Indoor, Outdoor (splashproof, but not for permanent outdoor use)
Operating Temperature	-20° to 50°C, 0 to 40°C when charging
IP Rating	IP61
Compliance	FCC, IC
Warranty	One year

### What's Included



**Figure 1: What's Included**

**Table 5: Included Item Descriptions and Part Numbers**

Label in Figure	Item Description	Part Number
1	Multiverse Studio Receiver 900MHz/2.4GHz	5904
2	Power Supply, 100-240VAC input, 5VDC output USB-A	5969
3	USB-A to USB-C cable, 1m	5987

## Face Panel



Figure 2: Face Panel

## Mounting



*Figure 3: Connected to and Being Powered by USC Cable to Lighting Fixture*

*Table 6: Commonly Used SHoW DMX Neo SHoW IDs for Use with the 2.4GHz Radio in Single Universe Systems*

SHoW DMX Neo SHoW ID	Broadcast Location
201	Adaptive hopping
102	Full bandwidth hopping
117	Low band hopping
133	Mid band hopping
149	High band hopping
165	Max band hopping