APPENDIX H

: USER'S MANUAL

MSC-400 System

Narrow Band RF Remotes Trigger Automation of RS-232, IR and Relay Controlled Components and Systems

MSC-400 Master System Controller

High performance audio video systems can include IR (infrared controlled devices such as Satellite and Cable set top boxes, DVD players etc.), RS-232 (serial controlled devices such as projectors, surround sound receivers and media servers), and Relay and Voltage controlled devices (such as lights, drapes, curtains and blinds). The MSC-400 Master System Controller is designed to seamlessly automate all of these types of devices. Installation of the MSC-400 insures that any future purchase can be successfully integrated regardless of its control method.

Variety of User Interfaces

In the MSC-400 System,there are four compatible remote controls which can be programmed to interface with the Master System Controller; the MX-3000, MX-950, TX-1000 and the MX-900. All have unique options for customization to any client's tastes and needs, up to a unique graphical style for every room and every user.

The Combination - Ultimate Reliability, Flexibility and Power

In a system equipped with an MSC-400, the remote control in the hands of the user has a very easy task compared to lesser systems. Instead of sending multi-step macros (each step vulnerable to a mistake in pointing or other accidental interference), the remote sends an instantaneous digital RF (Radio Frequency) command to the MSC-400. This RF command is constructed with a unique error correction algorithm for incredible RF range and reliability. Once the RF "trigger" command is received by the MSC-400, sophisticated sensors, control ports, vast memory and machine intelligence go to work.

COMPLETE CONTROL

UNIVERSAL® remote control

MSC-400 System Control Capabilities

A ***Control up to 12 Devices via IR -*** Controls standard IR (Infrared) controlled audio video components. There are six IR-only outputs, and six IR or RS-232 outputs. Each can be individually adjusted and is compatible with rear panel IR inputs on components or can be connected to IR emitters (6 IR emitters are included with the MSC-400, additional emitters can be purchased six at a time).

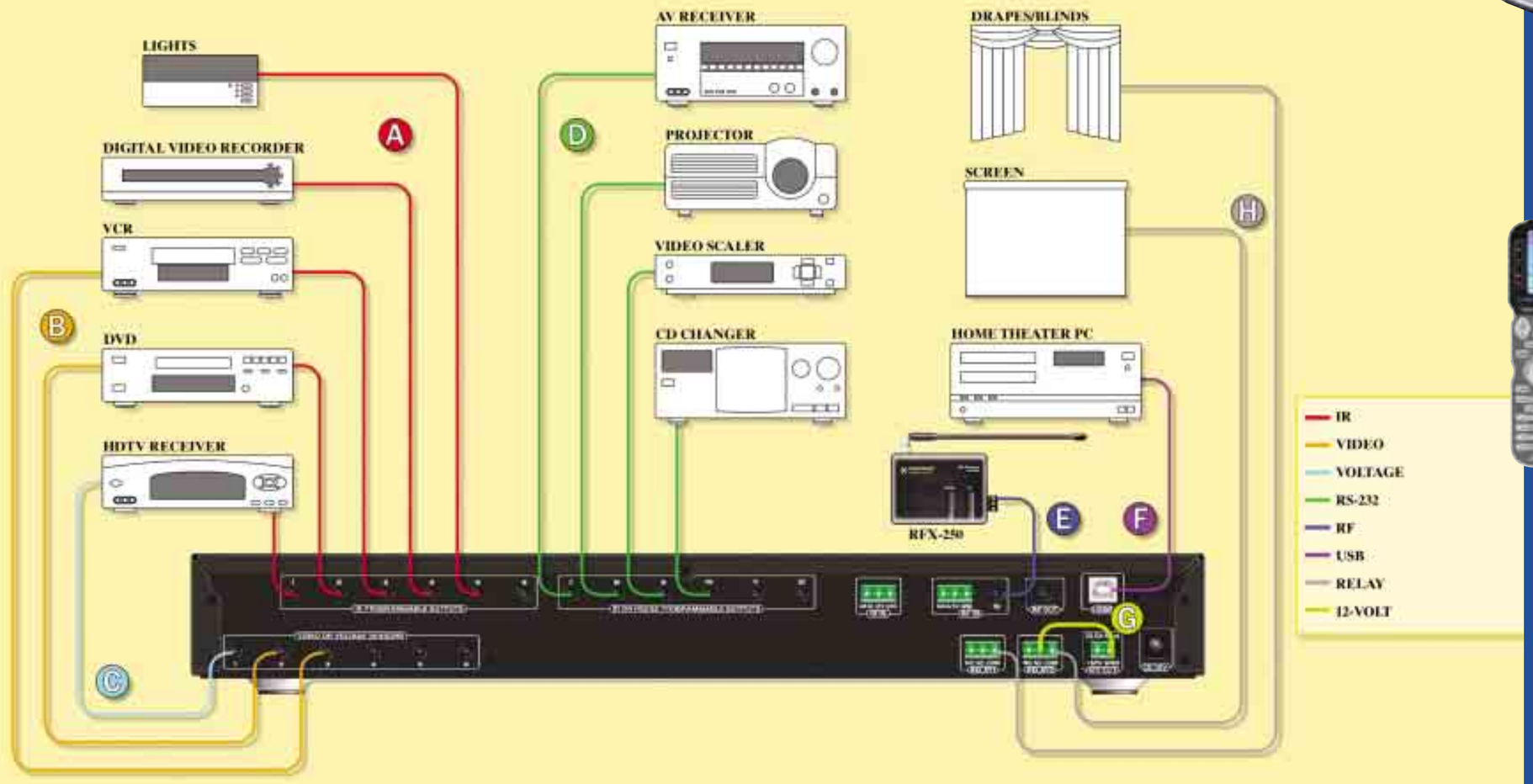
B **C** ***On/Off Status of up to 6 Devices -*** There are six video or voltage sensor inputs to test whether a component is On or Off. Components like DVD players and VCRs output video when on, no video when off. By installing a URC VID Video Sensor and connecting to the MSC-400, the MSC-400 will detect that the component is on or off. Components like CATV set top boxes have a switched outlet. If a low voltage wall adapter (5-24 V AC or DC) is plugged into the components switched outlet and then connected to a URC VS-100 Voltage Sensor, the MSC-400 can detect whether the component is on or off. By combining the optional VS-100 with products from other companies that detect light, current, RF etc. the MSC-400 can reliably test on off status of almost any kind of component.

D ***Control up to 6 Devices via RS-232 -*** IR ports 7-12 can be configured to be RS-232 instead of IR. The installer uses the optional URC RS232 cables and when needed, the URC MM6 Male to Male gender adapter to connect the MSC-400 to any RS-232 device that can be controlled via TX, RX and GND only.

E ***Expand RF Range to Cover Estates, Connect up to 3 RF Receivers -*** The MSC-400 includes one RFX-250 RF Receiver. The receiver is separate from the Master System Controller to optimize freedom from RF Interference and speed installation. Via the MSC-400s RF Inputs, up to three RFX-250s can be connected. Since each RFX-250 typically gives 50-100 feet of range, huge estates can be given robust, reliable RF via a network of wired RF receivers.

F ***Use remotes as PC Keyboards -*** Via the USB connector on the rear of the MSC-400, Complete Control remotes can be programmed to act as PC keyboards on any Windows PC with a USB port.

G **H** ***Control Screens, Drapes and Lifts -*** Via the two relay connectors and the convenient 12v power outlet on the rear of the MSC-400, devices that are controlled by applying a 12v Trigger voltage or by contacts opening and closing, can be automated by the MSC-400.



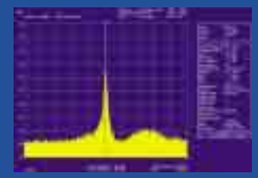
New Narrow Band RF Transmission & Reception

Any audio video system, by its very nature, includes components with high speed microprocessors which produce wide band localized RF interference. The combination of new versions of the MX-3000, MX-950, TX-1000 and the MX-900 with the RFX-250 provides ultra reliable RF via the extraordinarily specific narrow band reception of the RFX-250. A new protocol enables hundreds of complex macros, each with hundreds of steps and all stored in the MSC-400 to be individually triggered with a single button push on the remote control regardless of the interference and noise in the environment.

MX-950 Hybrid LCD

MX-3000 Color Touch Screen

The combination of very narrow transmission of digitally encoded packets sent THREE times at digital speeds in milliseconds, assures that every button press on the remote will be received by the MSC-400. The MSC-400's sophisticated error correction circuitry stores all three packets and compares them. Once two packets are identified as identical, the MSC-400 goes to work.



Narrow Band RF Transmission

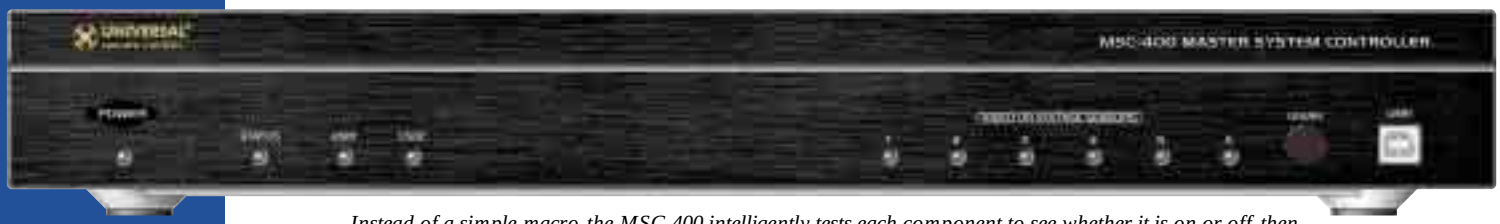
This new technology not only increases range, but increases reliability by a vast margin. Only the Complete Control MX-3000, MX-950, TX-1000 and MX-900 are equipped with both the new Narrow Band Transmitters and the new RF Protocol.

TX-1000 Tablet Style

MX-900 Wand Style

RFX-250 Narrow Band RF Receiver (Included with the MSC-400)

COMPLETE CONTROL™



Instead of a simple macro, the MSC-400 intelligently tests each component to see whether it is on or off, then sends the exact commands needed to reconfigure the system. As a result, the system responds perfectly to the user, as if an invisible engineer was concealed in the system cabinet, operating the system for them.

MX-3000

MX-950

TX-1000

MX-900

Hardware Designed for Professional Installers - Equips You with Instant Diagnostic Tools

Installing and programming the MSC-400 Master System Controller is sped enormously by a combination of hardware and software design features. The MSC-400 is optimized for installation in a equipment rack or cabinet. Softly glowing blue and green LED's on the front panel indicate connections, sensor status and the RF environment. In one glance, the professional installer can diagnose the system. When programming is required, the installer simply connects a laptop via USB cable to the front panel programming port. No controls are accessible to the end user (even if the end user were to connect to the MSC-400's programming port, they cannot upload the configuration).

Software Designed for Professional Installers - Optimizes Programming Flexibility with SPEED

MRF Editor software offers extensive control options, RS232 Two Way Diagnosis, IF/ELSE nesting logic and elaborate speed options, like the channel favorites tool, which enables installers to program dozens of numeric keypad macros in seconds. The result, no limits on your imagination when it comes to dreaming up new features to make operation easier and fast, fast programming...

Expands to Control 22 Components

The unique Master/Slave programming options enables installers to combine two MSC-400's into one equipment location with complete integration of all macros in one Master MSC-400. The two MSC-400's are slaved together via the #12 RS-232 Ports on both units. Thus a combined system controls 22 components.

Specifications

Microprocessor: Advanced ARM7TDMI microprocessor enables the MSC-400 to perform sophisticated logic, with nested IF ELSE statements and tests of sensors and variables.

Memory: 32 Megabytes of SDRAM and 64 Megabytes of NAND Flash Memory enable the MSC-400 to support vast, complex configurations.

Macro Capability: Supports up to 32,640 macros of 255 steps in each macro. Since Macros can be nested as one step inside another Macro, there is no realistic limit for macro steps.

Learning Capability: Standard frequencies (15kHz to 460kHz)

RF Range: (Radio Frequency): 50 to 100 feet, depending upon the environment

RF Frequency: 418 MHz

Weight: 77.6 oz.

Size: 17.25" x 8.5" x 2.5"

COMPLETE CONTROL™

UNIVERSAL® remote control

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MSC-400 System Quick Reference Guide

MSC-400
Master System Controller
Front Panel

Power LED indicates that the MSC-400 is powered on.

USB 1 LED indicates that the USB Programming Port (Front Panel USB) is connected to a PC.

Learning Sensor for learning IR commands. Normally, learning is more convenient via a remote.

Status LED lights whenever an RF signal is received and UNDERSTOOD. The LED will continue to light with each step of a macro.

USB 2 LED indicates that the USB PC Keyboard Port (Rear Panel USB) is connected to a PC.

Sensor LEDs light when a Sensor is sensing that a component is ON (Video is present or Voltage is high).

Front Panel USB port is used ONLY for PROGRAMMING

NOTE: MSC Editor Software is not included with the MSC-400. It can only be downloaded from the URC Dealer Only website. If you have not registered yet, call your distributor or sales representative for a registration code and use the Dealer Login at: www.universalremote.com

Notice to User

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 equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Note : The manufacturer is not responsible for any Radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

RFX-250
Narrow Band RF Receiver
Front Panel

Start with the antenna angle set to 45 degrees and positioned so that the long side of the antenna is facing the customer's favorite seating position.

Once the RFX-250 is correctly connected, the POWER LED lights.

If the RF LED lights without a button push on the remote, the RFX-250 must be moved to a new mounting location. It is receiving in-band RF INTERFERENCE.
When a button is pushed, the RF LED indicates a signal is detected.

Front Views - Flip for Rear Views

MSC-400 System Quick Reference Guide

MSC-400 Master System Controller Rear Panel

IR and RS232 Outputs

For RS-232: Connect to Outputs 7-12 only. Order either **RS232M** (Male connector for component) or **RS232F** (Female connector for component). No RS232 cables are included with the MSC-400.
For IR: Outputs 1-6 are IR only. Outputs 7-12 can be used for either RS232 or IR. Standard emitters can be used on 1-6, sleeved emitters should be used for Outputs 7-12. Control the IR output level via the adjustment screws on the top panel.

Standard Emitter for Outputs 1-6 (can be used temporarily in Outputs 7-12). Compatible with MRF-300. Six are included with the MSC-400. Order **IR6** - Six emitters in one box.

Sleeved Emitter for Outputs 7-12. Can be used with 1-6 as well.None are included with the MSC-400. Order **IRS6** - Six sleeved emitters in one box.

RS-232 Connector for Outputs 7-12. None are included with the MSC-400. Order **RS232M** (Male DB-9 connector for component) or **RS232F** (Female DB-9 connector for component).

USB2

This port allows keyboard control of a PC. This port cannot be used for programming.

DC12V

Plug the included AC adapter in here to power the MSC-400.

Video or Voltage Sensor Inputs

Sense video via the **VID-6** Video sensor (six to a box) or sense a 3-25 V AC or DC voltage via the VS-100 Voltage Sensor (Order the **VS1006**, six VS-100s to a box). The VS-100 Voltage Sensor is necessary when using other manufacturer's current, light or RF sensors.No video or voltage sensors are included with the MSC-400.

IR Input

This port enables an IR Keypad or connecting block to route IR signals to all emitters.

RF Input

This port connects to up to three RFX-250s in parallel.

RF Output

This port connects to other MRF or MSC units in the same location.

Relays 1 and 2

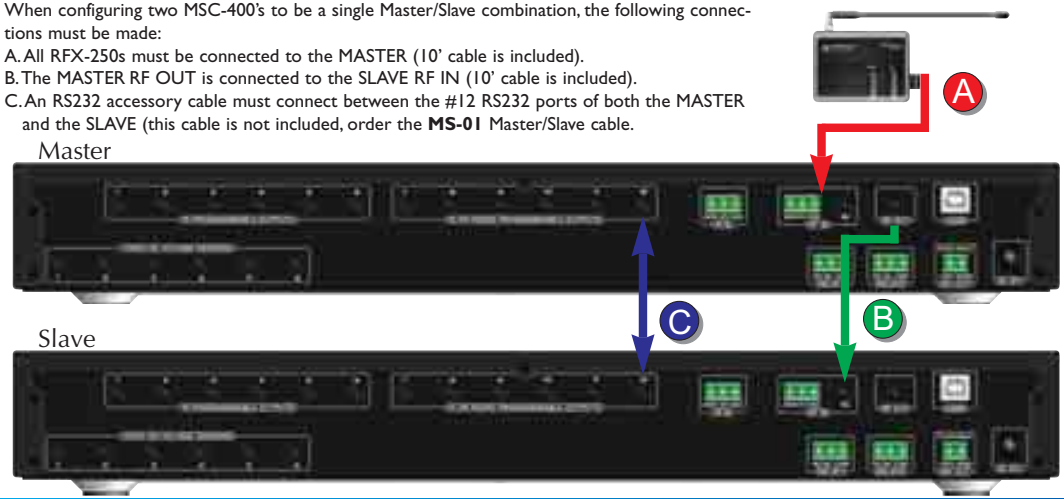
Each relay is compatible with Low Voltage applications (less than 30V with no more than .5 amps maximum current). The relay can be programmed to Open, Close or Toggle its state in three ways: 1. Latching 2. Momentary for a specified time 3. Momentary for as a long as the button is pressed and held.

12V Output

This is not programmable, simply a convenient power supply for any Relay 1 or 2 controlled device that needs 12V (less than .5 amp).

Combining Two MSC-400's in Master Slave Configuration

When configuring two MSC-400's to be a single Master/Slave combination, the following connections must be made:
A. All RFX-250s must be connected to the MASTER (10' cable is included).
B. The MASTER RF OUT is connected to the SLAVE RF IN (10' cable is included).
C. An RS232 accessory cable must connect between the #12 RS232 ports of both the MASTER and the SLAVE (this cable is not included, order the **MS-01** Master/Slave cable.



RFX-250 RF Receiver

RFX-250 Side View

MSC-400 Rear View

Connect ONE (only) of either of the RFX-250's RF OUT connectors to ONE (only) of either of the RF IN connectors on the MSC-400 using either your cable or the supplied cable.
Note that 5V and GND positions are different on the RFX-250 compared to the MSC-400. The Data connects to Data, 5 V connects to 5V and GND connects to GND.

Rear Views - Flip for Front Views