Crestron **QM-MD5x1**
QuickMedia™ Matrix Switcher/Mixer
Operations Guide

CRESTRON®

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Contents

QuickMedia™ Matrix Switcher/Mixer: QM-MD5x1

Introduction

Features and Functions

The Crestron® QuickMedia Matrix Switcher/Mixer, QM-MD5x1 (hereinafter referred to as MD5x1) is part of the Crestron MediaManager line of network devices, room control systems, and signal routing solutions.

Functional Summary

- Multimedia switcher/mixer with video, audio, RGB, and QuickMedia inputs
- Two composite/S-video/component video (three BNC connectors) inputs and two RGBHV (15-pin) inputs with built-in sync sensing
- One RGBHV monitor pass-through connector
- One QuickMedia input port can receive RGB, S-video, composite video, and multi-channel audio signals from another QM switcher or QM FlipTop/Wall Plate transmitters.
- One QuickMedia™ output port for connection to QM receivers or other QM switchers
- Four unbalanced stereo audio inputs
- Two-channel MIC mixer mixes QM microphone signals with electronically adjustable 4-band graphic equalization for output to respective audio mixers and QM outputs
- One line-level, balanced/unbalanced, local audio output consisting of a stereo program channel and a mono speech channel that follows the respective QM output (Audio Output same as QM Output)
- Mixer at the local audio output allows independent mixing of left program, right program, and microphone signals for each local output channel
- Local audio output features electronically adjustable volume, bass, treble, mute and 12-band parametric/graphic equalizer
- Separate switching of audio and video portions of each input signal

(continued on next page)

Functional Summary (continued)

- Auto Compensation automatically recalls microphone EQ settings, source compensation settings and peak and boost preset values of multiple QM origination points when acting as an endpoint
- Stores and transmits audio parameters for recall by a QM receiver when acting as a QM origination point
- Cresnet® connector for each QM port simplifies the use of QM cables
- Switching operations can be performed through a Crestron control system or the MD5x1's front panel
- Custom-labeled front panel buttons provide local control of switching functions
- Expandable switching capabilities by connecting to another MD5x1, a QM-MD7x2, a QM-MD8x8, or a QM-MD4x2 switcher
- Touch-settable ID (TSID) ready

The MD5x1 is a QuickMedia™ (also known as QM) signal routing device used for the mixing, switching, and routing of audio, video, microphone, and QM signals within a QM system. Audio and video input signals can be switched to the QM/line-level output port. The presence of an MD5x1 in a system does not necessarily improve or degrade QM signal quality, nor does it increase or decrease the length of QM cable that can be used. An MD5x1 can be connected to another MD5x1 or other QM switcher (such as the QM-MD8x8, QM-MD7x2, or QM-MD4x2) to provide additional switching capabilities.

Switching

Audio and video input signals are independently switched to the output port.

Any of the five video input signals can be switched to the QM output. The five audio inputs can be switched to the QM output and mixed into the program audio or speech channels of the local audio output.

Mixing

The MD5x1 has built in mixers for the mixing of microphone and program audio signals.

Microphone Mixing

The QM input can carry up to two microphone channels from a remote QM transmitter.

The microphone signals are fed into a microphone mixer while four bands of equalization are applied to each microphone signal. The output is routed to the microphone channel of the QM output and the speech and program audio mixers of the local audio output.

Program Mixing

A mixing stage is provided at the line-level output. The microphone mix described previously, and the selected audio input is fed to this mixer. The mixer mixes the program audio and the microphone signal into two outputs, program (stereo) and speech (monaural). The microphone mix can be mixed into the stereo program and the stereo program can be mixed into the speech. After mixing, volume, equalization and tone control can be applied.

The following diagram represents the switching and mixing capabilities of the MD5x1. The MD5x1 can be operated locally (local mode) using buttons on the front panel, or remotely from a control system (system mode). For more information, refer to "Operating Modes" on page 58.

*Functional Diagram of the QM-MD5x1*
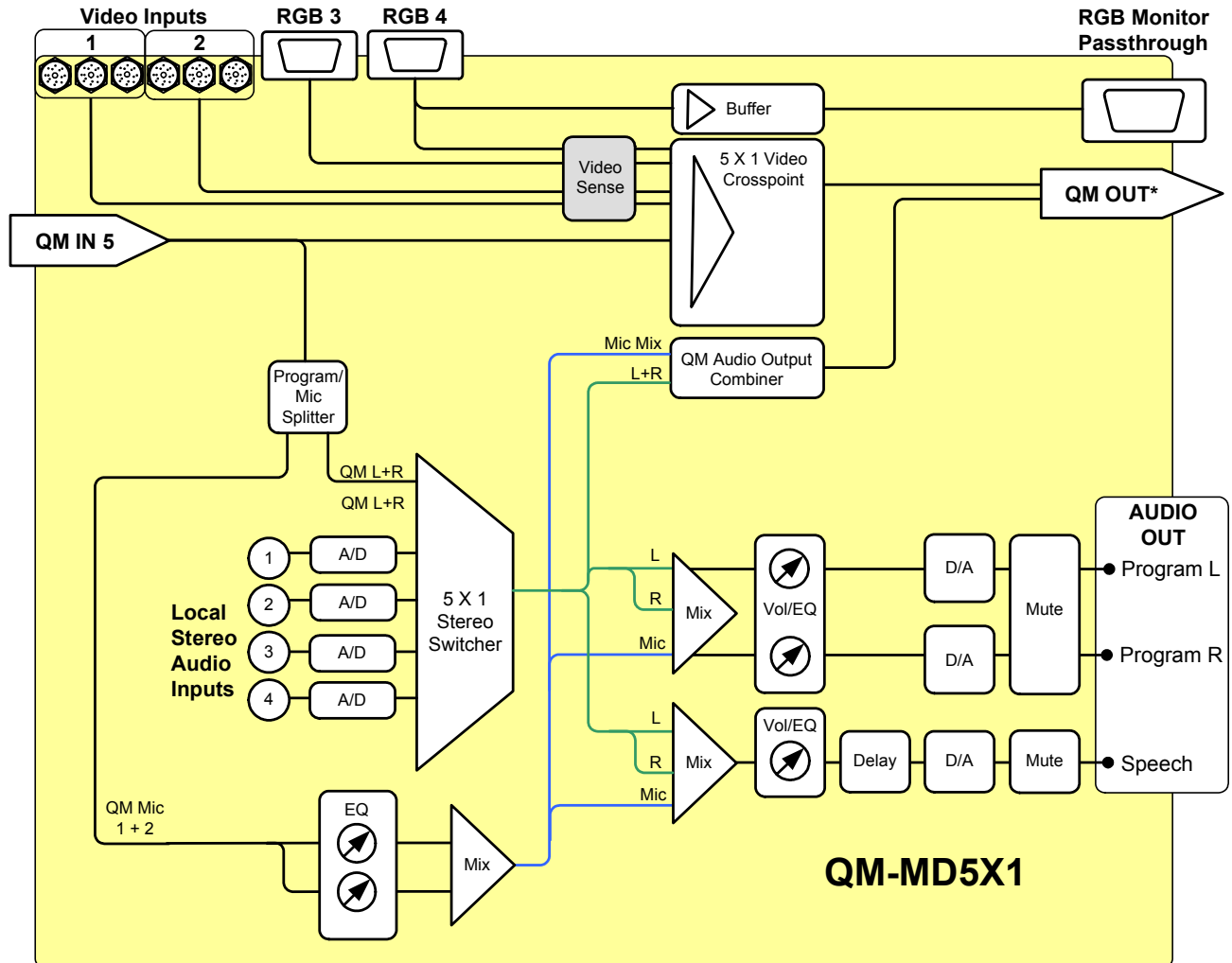
*   ALL QM MICROPHONE MIX SIGNALS FROM THE QM-MD5X1 ARE SENT OUT ON THE MIC 1 CHANNEL OF THE QM OUTPUT. THERE ARE NO MICROPHONE SIGNALS ON THE MIC 2 CHANNEL OF THE QM OUTPUT.

A MD5x1 can also be connected to another MD5x1, a QM-MD8x8 switcher, a QM-MD4x2 switcher or any combination of QM switching devices. This provides additional inputs for one MD5x1 as shown in the following diagrams.

QM-MD5x1 Connected with Other QM-Switching Devices
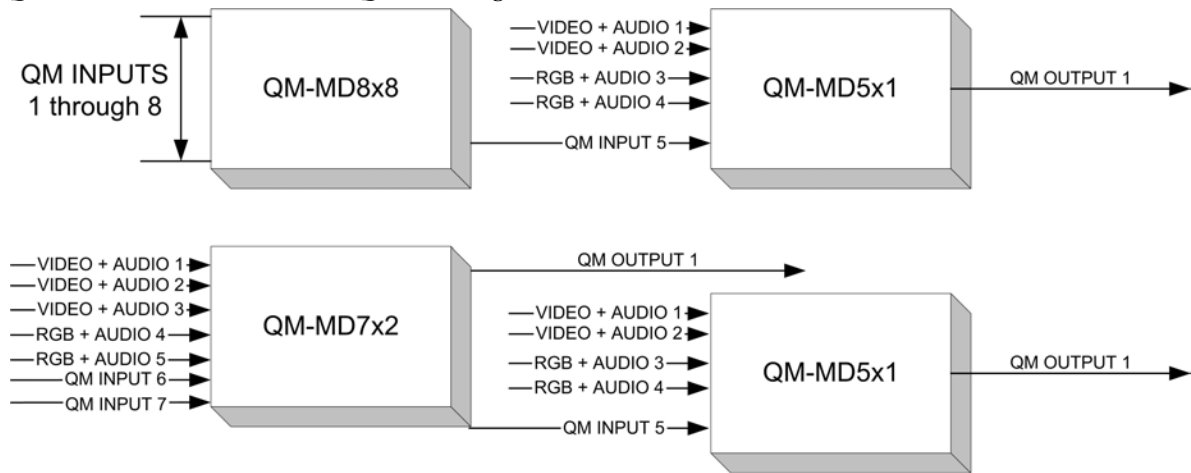
NOTE: When connecting multiple QM devices, the route between a QM origination point (e.g. QM-WMC) and a QM endpoint (e.g. QM-RMCRX) cannot have more than two midpoints (e.g. MD5x1 or other QM switchers). Refer to the following diagram when configuring a QM network.

QM Network Topology
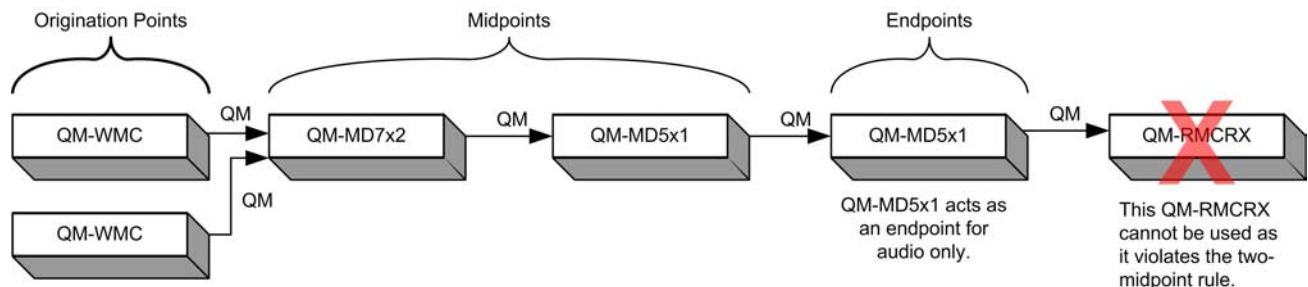
Applications

The MD5x1 is part of the Crestron MediaManager line of integrated presentation solutions. It is ideally suited to work with Crestron's MediaManager distribution systems, wall plate media centers, FlipTop media centers, receivers and control processors to allow quick switching of multiple A/V sources in a presentation system. MediaManager devices are designed for conference room, auditorium, and lecture hall applications, or anywhere else where audio, video, or computer equipment needs to be easily connected and disconnected from a presentation system or room control system.

The following diagram shows an MD5x1 in a lectern application.

QM Solution in Lectern using QM-MD5x1
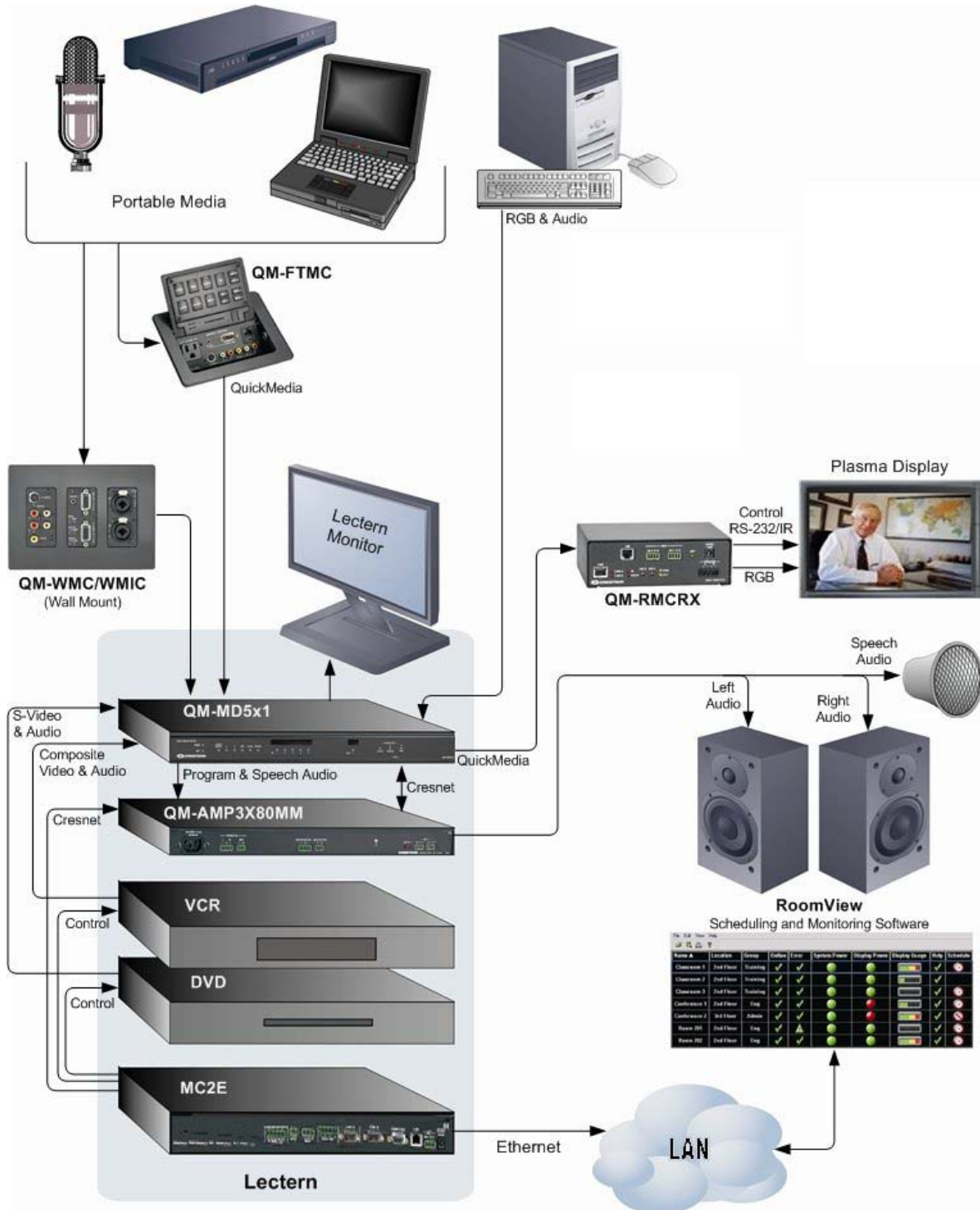
For more information on this and other QM applications, refer to the latest revision of the Crestron MediaManager Control, Switching and Management Applications Guide (Doc. 6244) which can be downloaded from the Crestron website (http://www.crestron.com/manuals).

Specifications

Specifications for the QM-MD5x1 are listed in the following table.

QM-MD5x1 Specifications

SPECIFICATION	DETAILS
Cresnet Power Usage	25 Watts (1.04 Amp @ 24 VDC)
Default Net ID	1D
Control System Update Files 2-Series Control System[1, 2]	Version C2-V3.137.CUZ or later
Input Channels	(2) Composite/RGB/S-video/component video over BNC with built-in sensing (2) RGBHV with built-in sensing (4) Stereo unbalanced audio (1) QuickMedia channel over RJ-45
Output Channels	(1) Buffered RGBHV output for port RGB4 (1) Stereo balanced/unbalanced audio output (1) Monaural Speech balanced/unbalanced audio outputs (1) QuickMedia channel over RJ-45
Video Input Details (BNC)	
Gain	YP_BP_R/RGB: 0 dB (Unity gain, 75 Ohm termination) S-video: 0 dB (Unity gain, 75 Ohm termination) Composite: 0 dB (Unity gain, 75 Ohm termination)
Maximum Input	P_BP_R/RB: 0.7 V_{PP}, Y/G: 1.0 V_{PP} S-video: 1.0 V_{PP} Composite: 1.0 V_{PP}
Input Impedance	YP_BP_R/RGB: 75 Ohm S-video: 75 Ohm Composite: 75 Ohm
Signal Sense	YP_BP_R: On Y RGB: On G S-video: On Luma Composite: On Composite
Signal Sync:	YP_BP_R: On Y RGB: On G
Resolution	Up to 1600 x1200 @ 60 Hz vertical rate, NTSC up to HDTV
Bandwidth (Composite & S-video)	> 100 MHz (-3 dB) at unity gain
RGBHV Input Details (DB15HD)	
Gain	0 dB (Unity gain, double termination)
Maximum Input	R/G/B: 0.7 V_{PP}, H/V: 5.0 V_{PP}
Maximum Resolution	1600 x 1200 @ 60 Hz vertical rate with CAT5/5E/6 cable length of 100 meters and skew rating ≤ 15 ns / 100 meters[3]
Signal Sense	On H
Signal Sync:	Separate H & V

(continued on next page)

QM-MD5x1 Specifications (continued)

SPECIFICATION	DETAILS
Audio Input Details	
Format	Stereo, unbalanced
Maximum Line-level Input	$2\ V_{RMS}$
Input Impedance	10k Ohm
Bandwidth	20 Hz to 20k Hz
Audio Output Performance	
Max. Line-level output	$2\ V_{RMS}$ unbalanced, $4\ V_{RMS}$ balanced
Output Impedance	100 Ohms unbalanced, 200 Ohms balanced
Bandwidth	20 Hz to 20k Hz
Signal-to-Noise Ratio	90 dB max
Total Harmonic Distortion	0.05%
QuickMedia Performance	
Gain	0 dB
Nominal input impedance	100 Ohms
Nominal output impedance	100 Ohms
Differential input impedance	50 Ohms common
Differential output impedance	50 Ohms common
QM-MD5x1 Firmware	QM-MD5x1.v4.3.031.upg or later
Rack Space	1U high
Operating Temperature and Humidity	41º to 104º F (5º to 40º C), 10 to 90% Relative Humidity (non-condensing)
Dimensions and Weight	Height: 1.70 in (4.32 cm) without mounting feet Width: 17.03 in (43.24 cm) without mounting ears Depth: 7.15 in (18.17cm) Weight: 3.2 lbs (1.5 kg)

1. The latest software versions can be obtained from the Crestron website. Refer to the NOTE following these footnotes.

2. Crestron 2-Series control systems include the AV2 and PRO2. Consult the latest Crestron Product Catalog for a complete list of 2-Series control systems.

3. Longer lengths of CAT5/5E/6 cable can be used. However, the cumulative skew must be ≤ 15 ns for the entire length of cable used between all QM devices. Longer lengths of cable may experience eventual loss of bandwidth when viewing higher resolution sources. For more information, refer to "QuickMedia Wiring" on page 16.

NOTE: Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

Physical Description

The MD5x1 is housed in a black enclosure with labeling on the front and rear panels. Fifteen buttons with accompanying light emitting diodes (LEDs) on the front panel are used for local control of source and destination signal switching and volume adjustment. The source and destination selection buttons can be custom-labeled with Crestron Engraver software and 100-pound paper. Two LEDs on the front panel indicate power and network activity. All audio, video, QM, Cresnet®, and power connections are made to the back of the unit. A pushbutton on the rear panel with an accompanying LED is used to set the MD5x1's network ID. Refer to the following illustrations of the front and rear panels and the physical views.

Two mounting ears are provided for rack mounting, and four square rubber feet are supplied for stability and to prevent slippage in tabletop placement or stacking configurations.
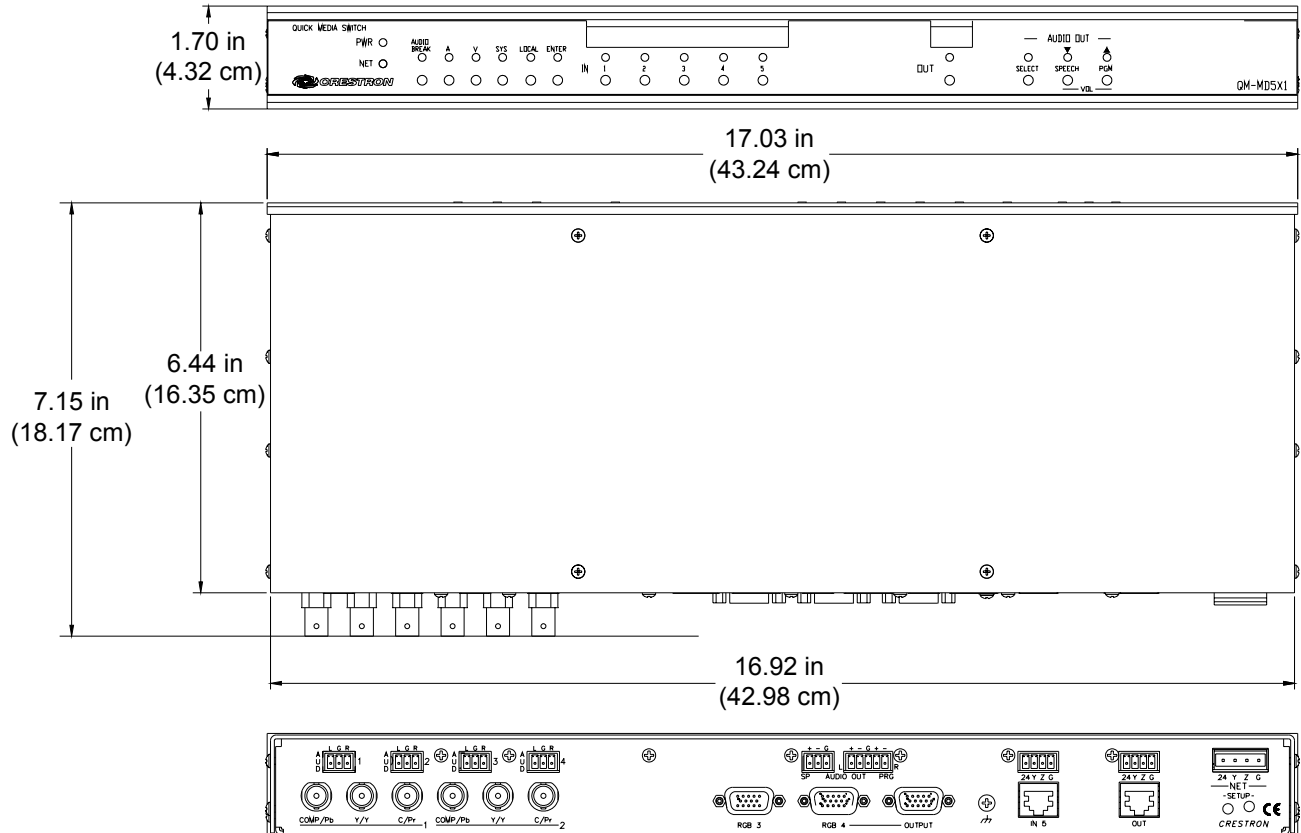
QM-MD5x1 Physical View (Front)
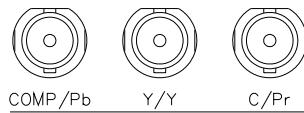

QM-MD5x1 Physical View (Rear)

QM-MD5x1 Physical Views

Ports

All connections to the MD5x1 are made through the ports on the rear panel. Refer to the illustrations and descriptions that follow.

NOTE: Interface connectors for the audio and NET ports are provided with the MD5x1.
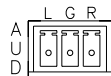
VIDEO IN

The MD5x1 contains two video inputs for connecting component, RGB (sync-on-green), S-video, and composite video source signals using three BNC connectors for each input. Each input is linked to a respective audio input (Video In 1 linked to the AUD 1 port).

Connect the appropriate connectors for each incoming video signal. The following table lists the connections to be used for each signal format as well as the signal lines used for sync and signal detection.

Video Input Connections

SIGNAL TYPE	COMP/P$_B$	Y/Y	C/P$_R$	SYNC	SENSE
Component	P$_B$	Y	P$_R$	Y	Y
RGB	Blue	Green	Red	G	G
S-video	Not connected	Luma	Chroma	N/A	Luma
Composite	Composite	Not Connected	Not Connected	N/A	Composite

AUD

The MD5x1 contains four audio inputs that correspond to the two video inputs and two RGBHV inputs. These inputs receive unbalanced stereo audio signals through a 3-position mini-terminal block connector. Inputs 1 and 2 correspond to video inputs 1 and 2 while audio inputs 3 and 4 correspond to RGB inputs 3 and 4 respectively. The following table lists the pin assignments for the audio input connector.

Audio Input Connections

PIN NAME	SIGNAL NAME
L	Left
G	Ground
R	Right

RGB
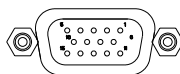
The MD5x1 is equipped with two RGBHV inputs for receiving a computer's RGB video output signal. These ports can automatically detect the presence of an RGB signal using the H-sync signal on pin 13 and can sync on the H signal on pin 13 or the V signal on pin 14. A buffered pass-through port for connecting a secondary computer display is connected to the port labeled RGB 4. Refer to the following table for pin-assignments.

RGB DB15HD Pin Assignments

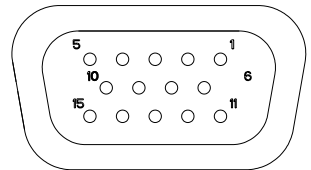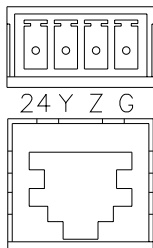| PIN	FUNCTION	PIN	FUNCTION
1	Red Video	9	No Connect
2	Green Video	10	Ground
3	Blue Video	11	No Connect
4	Reserved	12	Monitor Sense 1
5	Ground	13	Horizontal Sync
6	Red Ground	14	Vertical Sync
7	Green Ground	15	Monitor Sense 2
8	Blue Ground		

NOTE: When looking at the MD5x1, pin 1 is the top-right pin on the connector. Pin 15 is located on the bottom-left of the connector.

IN 5

The MD5x1 contains a QM input port for connecting a QM source. This port is designated as input 5. The QM port has an RJ-45 port for QM signals and a corresponding 4-position mini-terminal block connector for Cresnet control signals.

For wiring information, refer to "QuickMedia Wiring" on page 16 and "Network Wiring" on page 14.

RJ-45 Pin Assignments

PIN	WIRE COLORS (568B)	QM ASSIGNMENT: RGB	QM ASSIGNMENT COMPOSITE, S-VIDEO AND AUDIO
1	WHITE/ORANGE	- RGB Red	- CHROMINANCE
2	ORANGE	+ RGB Red	+ CHROMINANCE
3	WHITE/GREEN	- RGB Green	- LUMINANCE
4	BLUE	+ Digital Audio	+ AUDIO
5	WHITE/BLUE	- Digital Audio	- AUDIO
6	GREEN	+ RGB Green	+ LUMINANCE
7	WHITE/BROWN	- RGB Blue	- COMPOSITE
8	BROWN	+ RGB Blue	+ COMPOSITE

NOTE: When transmitting S-video, luminance uses the green video pathway, and chrominance uses the red video pathway. When transmitting composite video, the signal is carried on the blue video pathway.

NOTE: Use Crescat-QM, or good quality CAT5E / CAT6 cable to make QM connections. The cumulative skew over the entire length must be less than 15 ns. Refer to "QuickMedia Wiring" on page 16 for cable specifications.

NOTE: When using Crescat-QM wiring, four additional wires are included for making Cresnet connections. Refer to "QuickMedia Wiring" on page 16 for cable specifications.
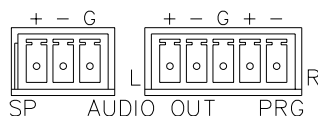
AUDIO OUT

The line-level audio output follows the output of the QM output port. The output consists of a 3-position mini-terminal block connector for speech output and a 5-position mini-terminal block connector for stereo program audio output. This output provides balanced or unbalanced line-level output for use by an audio amplifier.

The following tables list the pin assignments (from left to right) for the 3-position and 5-position mini-terminal block connectors. For additional information, refer to "Hardware Hookup" on page 22.

Speech Output Connections

PIN NAME	SIGNAL NAME
+	Positive
-	Negative
G	Ground

Program Audio Output Connections (left to right)

PIN NAME	SIGNAL NAME
+	Positive (left)
-	Negative (left)
G	Ground (right and left)
+	Positive (right)
-	Negative (right)

OUT

The MD5x1 has a QM port for connecting a QM receiver or any other device with a QM input. The QM port has an RJ-45 connector for QM signals and a corresponding 4-position mini-terminal block connector for Cresnet control signals.

The QM pin assignments for the OUT port are the same as the IN 5 port described previously.

For wiring information, refer to "QuickMedia Wiring" on page 16 and "Network Wiring" on page 14.

For additional information, refer to "Hardware Hookup" on page 22.
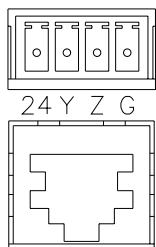
NET
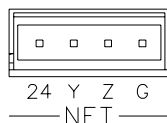
This 4-position terminal block connector is used to connect the MD5x1 to the Cresnet system. Data and power for the MD5x1 are provided via the connection. Refer to "Network Wiring" on page 14.

Indicators & Pushbuttons

The MD5x1s indicators and pushbuttons are described in the following paragraphs.

PWR (Power)

This LED, located on the front panel, illuminates when 24 VDC is supplied to the MD5x1 via the NET port.

NET

This LED, located on the front panel, illuminates when communication between the control system and the MD5x1 is established (the unit is polled on the network).

Illumination indicates that the SIMPL Windows program currently loaded has a network device defined at the same Net ID as the MD5x1. The LED flashes when communication with the processor occurs.

AUDIO BREAK

When operating in the local mode, press this button to enable separate switching of a QM signal's audio and video portions. Push again to disable this feature and enable simultaneous switching. When the accompanying LED is illuminated, a QM signal's audio and video portions can be switched separately. When the LED is not illuminated, the QM signals audio and video portions are switched simultaneously.

For more information on the MD5x1's operating modes, refer to "Operating Modes" on page 58.

A

Press this button to switch the audio portion of an input signal when operating in the local mode. When the accompanying LED is illuminated, only the audio portion of a QM signal will be switched. Audio can be switched separately from video only when the **AUDIO BREAK** LED is illuminated.

While in the system mode, pressing **A** will indicate where the audio portion of a signal is routed. For more information on the MD5x1's operating modes, refer to "Operating Modes" on page 58.

V

Press this button to switch the video portion of an input signal when in the local mode. When the accompanying LED is illuminated, only the video portion of a QM signal will be switched. Video can be switched separately from audio only when the **AUDIO BREAK** LED is illuminated.

While in the system mode, pressing **V** will indicate where the video portion of a signal is routed. For more information on the MD5x1's operating modes, refer to "Operating Modes" on page 58.

SYS (System)

Press this button to set the MD5x1 to the system mode. When the accompanying LED is illuminated, all switching functions are controlled by the Crestron control system. While in the system mode, routing paths for each input can be viewed on the front panel by pressing an input or output button. For more information on the MD5x1's operating modes, refer to "Operating Modes" on 58.

LOCAL

Press this button to set the MD5x1 to the local mode. When the accompanying LED is illuminated, all switching functions are controlled by MD5x1's front panel. For more information on the MD5x1's operating modes, refer to "Operating Modes" on page 58.

ENTER

When switching signals in the local mode, switch changes are not implemented until the **ENTER** button is pressed. After selecting an input source and an output destination, press **ENTER** to implement the change.

IN (1 through 5)

Select an input source to view or switch (depending on the selected operating mode) by pressing the corresponding **IN** button. If audio break is enabled (indicated by the **AUDIO BREAK** LED), only the audio or video portion (indicated by the **A** or **V** LED) will be switched or viewed (depending on the selected mode). For information on operating modes and selecting input sources, refer to "Operation" on page 58.

OUT

Enable the output destination to view or switch (depending on the selected operating mode) by pressing the **OUT** button. If audio break is enabled (indicated by the **AUDIO BREAK** LED), only the audio or video portion (indicated by the **A** or **V** LED) will be switched or viewed (depending on the selected mode). For information on operating modes and selecting output destinations, refer to "Operation" on page 58.

AUDIO OUT

Use these buttons to adjust the speech and program audio volume levels for the audio output. Press **SELECT** to toggle between speech audio, program audio, speech and program audio, or none. Adjust the selected volume level (indicated by LED) by pressing the ▼ or ▲ buttons.

SETUP LED and Pushbutton

The MD5x1 is TSID ready. Located on the rear of the MD5x1, the **SETUP** pushbutton and its associated LED are used for setting up the unit's network ID during the initial configuration of a Cresnet system or when the device is being added/replaced. Refer to "Method B (Touch Settable ID)" on page 19 for detailed information.

Industry Compliance

As of the date of manufacture, the QM-MD5x1 has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.

NOTE: 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.

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 or 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.

Setup

Network Wiring

CAUTION: In order to ensure optimum performance over the full range of your installation topology, Crestron Certified Wire, and only Crestron Certified Wire, should be used. Failure to do so, may incur additional charges if support is required to identify performance deficiencies as a result of using improper wire.

CAUTION: Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

CAUTION: Provide sufficient power to the system. Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator (www.crestron.com/calculators) to help calculate how much power is needed for the system.

CAUTION: Possible equipment damage if miswired.

NOTE: When installing network wiring, refer to the latest revision of the wiring diagram(s) appropriate to your specific system configuration, available from the Crestron website.

NOTE: Do not power up system until all wiring is verified. Care should be taken to ensure data (Y, Z) and power (24, G) connections are not crossed.

When calculating the wire gauge for a particular Cresnet run, the length of the run and the Cresnet power usage of each Cresnet unit to be connected must be taken into consideration. If Cresnet units are to be daisy-chained on the run, the Cresnet power usage of each network unit to be daisy-chained must be added together to determine the Cresnet power usage of the entire chain. The length of the run in feet and the Cresnet power usage of the run should be used in the following resistance equation to calculate the value on the right side of the equation.

Resistance Equation

$$R < \frac{40,000}{L \times P}$$

Where: R = Resistance (refer to the following table).
L = Length of run (or chain) in feet.
P = Cresnet power usage of entire run (or chain).

The required wire gauge should be chosen such that the resistance value is less than the value calculated in the resistance equation. Refer to the table after this paragraph.

Wire Gauge Values

RESISTANCE (R)	WIRE GAUGE
4	16
6	18
10	20
15	22
13	Doubled CAT5
8.7	Tripled CAT5

NOTE: All network wiring must consist of two twisted pairs. One twisted pair is the +24V conductor and the GND conductor. The other twisted pair is the Y and Z conductors.

NOTE: When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector, and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three conductors.

NOTE: For larger networks (i.e., greater than 28 network devices), it may become necessary to add a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality throughout the network. Also, for networks with lengthy cable runs, it may be necessary to add a Hub/Repeater after only 20 devices.

QuickMedia Wiring

The Crestron QuickMedia cable (sold under the name "Crescat-QM") contains one CAT5E cable and one Cresnet cable in siamese jackets. Installation of any QM device is as simple as installing one set of QM wires from the output of one device to the input of another. Installations are flexible, affordable, and fast.

CRESCAT-QM Cable
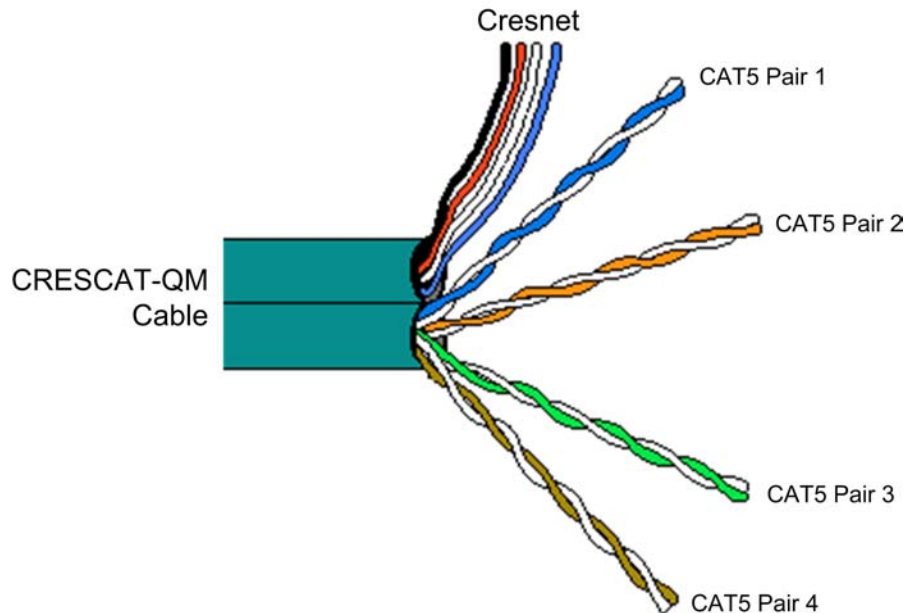
NOTE: Do not untwist the two wires in a single pair for more than 1/3-1/2" (0.84 - 1.27 cm) when making a connection. The twists are critical to canceling out interference between the wires.

The QM transport mechanism (receiver) uses frequency compensation on each twisted pair video input to maintain high resolutions (1600 x 1200) with CRESCAT-QM cable (which contains both Cresnet and CAT5E wiring) and most good quality CAT5E and CAT6 cables (where skew rating is ≤ 15 ns / 100 meters). The total accumulated length of the cable determines the actual skew. For example, when connecting the QM-WMC to an MD5x1 and then to the QM-RMCRX, the total accumulated skew must not exceed 15 ns and the total cable length cannot exceed 300 feet.

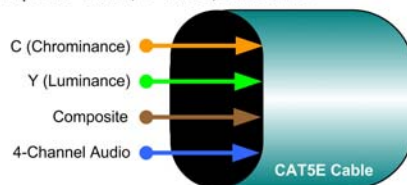**NOTE:** The length of CAT5/5E/6 cable that can be used can vary. However, the total skew must be ≤ 15 ns.

NOTE: Longer lengths of cable may experience eventual loss of bandwidth when viewing higher resolution sources.
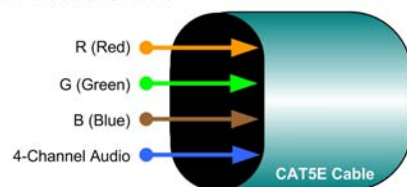
The following diagram illustrates how composite, S-video, and RGB video signals are transmitted over the CAT5E wire.

*Quick Media Video Signals on CAT5E*

Composite Video, S-Video, and Audio

C (Chrominance)
Y (Luminance)
Composite
4-Channel Audio

CAT5E Cable

RGB Video and Audio

R (Red)
G (Green)
B (Blue)
4-Channel Audio

CAT5E Cable

NOTE: When transmitting S-video or composite video, luminance uses the green video pathway, chrominance uses the red video pathway, and composite uses the blue video pathway.

The pin assignments for Crescat-QM, CAT5, CAT5E, and CAT6 wiring are based on the EIA/TIA 568B RJ-45 Jack standard.

RJ-45 QuickMedia Connector
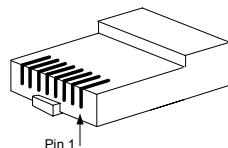
Pin 1

To determine which pin is number 1, hold the cable so that the end of the eight-pin modular jack is facing you, with the clip down and the copper side up. When looking down at the copper connections, pin 1 is on the far right. The following table lists the pin assignments on the RJ-45 connector.

Pin and Pair Assignment

RJ-45 PIN #	CAT5E PAIR #	WIRE COLORS (568B)	QM ASSIGNMENT RGB AND AUDIO	QM ASSIGNMENT COMPOSITE, S-VIDEO AND AUDIO
1	2	WHITE/ORANGE	- RGB RED	- CHROMINANCE
2	2	ORANGE	+ RGB RED	+ CHROMINANCE
3	3	WHITE/GREEN	- RGB GREEN	- LUMINANCE
4	1	BLUE	+ AUDIO	+ AUDIO
5	1	WHITE/BLUE	- AUDIO	- AUDIO
6	3	GREEN	+ RGB GREEN	+ LUMINANCE
7	4	WHITE/BROWN	- RGB BLUE	- COMPOSITE
8	4	BROWN	+ RGB BLUE	+ COMPOSITE

NOTE: When using Crescat-QM wiring, a cable containing four wires is included for making Cresnet connections.

Identity Code

All equipment and user interfaces within the network require a unique identity code (Net ID). These codes are two-digit hexadecimal numbers from 03 to FE. The Net ID of each unit must match an ID code specified in the SIMPL Windows program. Refer to "Setting the Net ID in Device Settings" on page 26 for details of the SIMPL Windows procedure.

Refer to the note on page 54 for a definition of Viewport.

The Net ID of the MD5x1 has been factory set to **1D**. The Net IDs of multiple MD5x1s in the same system must be unique. Net IDs are changed from a personal computer (PC) via the Crestron Viewport.

NOTE: For detailed information on establishing communication between the PC and control system, refer to "Communication Settings" on page 54. If communication cannot be established, refer to the "Troubleshooting Communications" section in the respective Operations Guide for the control system.

There are two different methods—Method A or Method B—for setting the Net ID:

Method A (Cresnet address-settable ID), described on the below, applies to devices in a Cresnet system with a 2-Series control system that require a single unit be the only network device connected to the control system.

Method B (Touch Settable ID or TSID), which begins on page 19, applies to all TSID-ready devices in a Cresnet system with 2-Series control system upgrade file (CUZ) version 3.029 or later. TSID functionality makes it possible for the control system to recognize a network device via its serial number, which is stored in the device's memory. This method does not require that any devices be disconnected from the network; Net IDs may be set with the entire Cresnet system intact. This method requires the use of the Crestron Viewport version 3.35 or later.

Use the appropriate method to set the Net ID.

Method A (Cresnet address-settable ID)

1. Ensure that the device requiring a Net ID change is the only unit connected to the control system.

2. Open the Crestron Viewport.

3. From the Viewport menu, select **Functions | Set Network ID**. The software checks the baud rate and then opens the "Set Network ID" window.

4. In the "Set Network ID" window, select the device requiring a Net ID change from the *Current Network Devices* text window.

5. Select the new Net ID for the device from the *Choose the new network ID for the selected device (Hex)*: text box.

6. Click Set ID to initiate the change. This will display the "ID command has been sent" window.

7. In the "Command Complete" window, click **OK**.

8. In the *Current Network Devices* text window, verify the new Net ID code.

9. In the "Set Network ID" window, click **Close**.

NOTE: The new Net ID code may also be verified by selecting **Diagnostic | Report Network Devices** in the Viewport (alternately, select **F4**).

10. Repeat this procedure for each additional network device requiring a Net ID change.

Method B (Touch Settable ID)

Before using this method, you should have a list of all current network devices and their Net IDs, to avoid assigning duplicate IDs.

Set Net ID by TSID

These procedures are for TSID-enabled network devices during the initial configuration of a Cresnet system or when such devices are being added/replaced.

1. Ensure that all network devices are connected to the control system.

2. Open the Crestron Viewport version 3.35 or later.

3. From the Viewport menu, select **Functions | Assign Cresnet ID by Serial Number**. The "Set Net ID by TSID" window appears. The window is first displayed with the data fields empty.

4. Click on the **Search for Touch Settable Devices** button. The system searches the network and lists all TSID-enabled devices found. The list is similar to the report produced by pressing **F4** (Report Network Devices); the first eight digits of each line constitute the TSID number (hexadecimal form of the serial number).

"Set Net ID by TSID" Window

5.   Enter either the serial number or TSID number of the device that requires a change. The list scrolls to and highlights the device listing. The listing should show the device's default Cresnet ID (a.k.a. Net ID).

6.   Enter the Cresnet ID that the device should be set to and click **OK**. The number you enter should appear on the list.

CAUTION: This function does not prevent you from setting duplicate IDs. Be sure to check current assignments before entering the desired Cresnet ID number.

Serial Number to TSID Conversion

This utility is useful in a case where there are multiple devices of the same type on a network, you need to locate a particular one, you know the TSID but not the serial number, and your site installation list is based on device serial numbers. In this (or the reverse) situation, do the following:

1.   Open the Crestron Viewport.

2.   From the Viewport menu, select **Functions | Serial Number ←→ TSID Conversion Tool**. The "Serial Number ←→TSID Conversion Tool" window is displayed.

"Serial Number to TSID Conversion Tool" Window
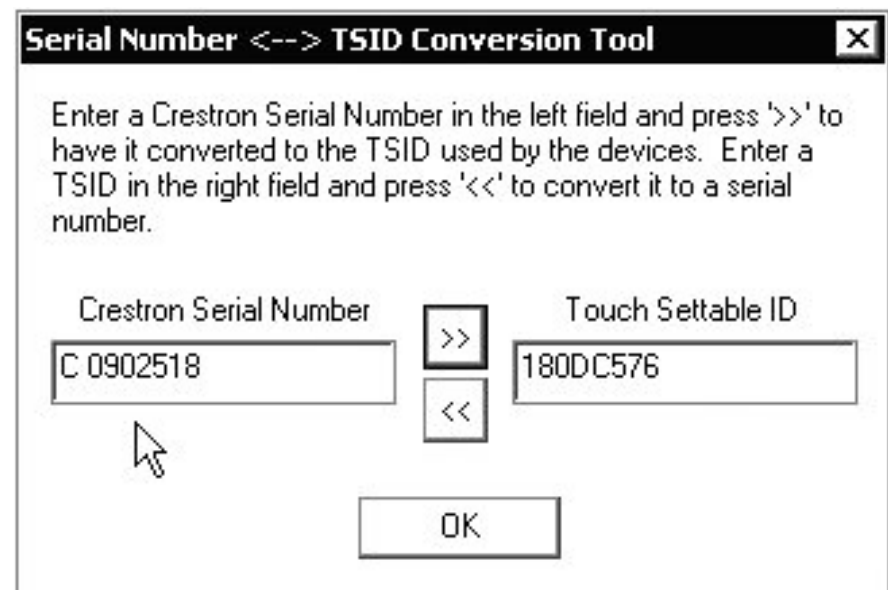
3.   Enter the serial number or TSID number as instructed; press the appropriate button to obtain the corresponding number.

NOTE: Enter serial numbers, including spaces, exactly as they appear on the unit label. Alpha characters in serial numbers or TSID numbers may be entered in upper or lower case.

Rack Mounting

WARNING: To prevent bodily injury when mounting or servicing this unit in a rack, take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

NOTE: If rack mounting is not required, rubber feet are provided for tabletop mounting or stacking. Apply the feet near the corner edges on the underside of the unit. Refer to "Stacking" on page 22 for details.

NOTE: Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit. (e.g., use of power strips).

Two "ears" are provided with the MD5x1 so that the unit can be rack mounted. These ears must be installed prior to mounting. Complete the following procedure to attach the ears to the unit. The only tool required is a #1 Phillips screwdriver.

1. There are screws (#4-40 x 0.3125" LG) that secure each side of the MD5x1 top cover. Using a #1 Phillips screwdriver, remove the three screws closest to the front panel from one side of the unit. Refer to the diagram following step 3 for a detailed view.

2. Position a rack ear so that its mounting holes align with the holes vacated by the screws in step 1.

3. Secure the ear to the unit with three screws from step 1, as shown in the following diagram.

Ear Attachment for Rack Mounting

USE COVER SCREWS
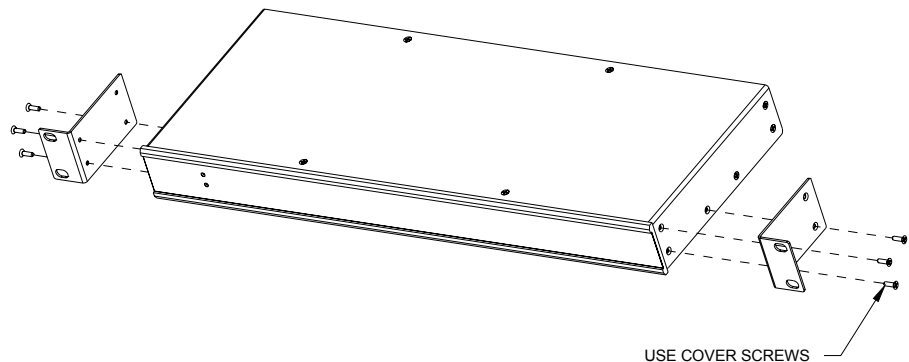
4. Repeat procedure (steps 1 through 3) to attach the remaining ear to the opposite side.

Stacking
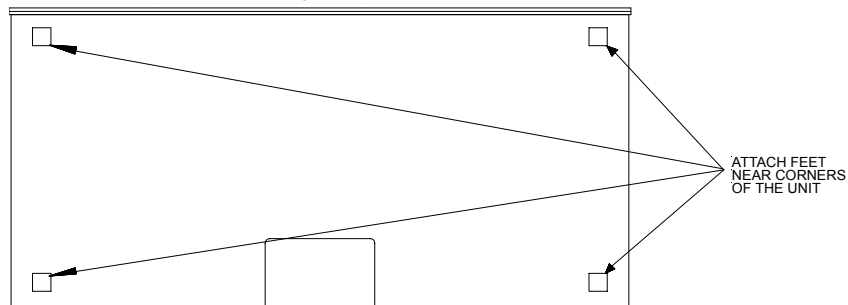
Four "feet" are provided with the MD5x1 so that if the unit is not rack mounted, the rubber feet can provide stability when the unit is placed on a flat surface or stacked. These feet should be attached prior to the hookup procedure. Refer to the illustration below for placement of the feet.

Feet Location (Bottom View of Unit)

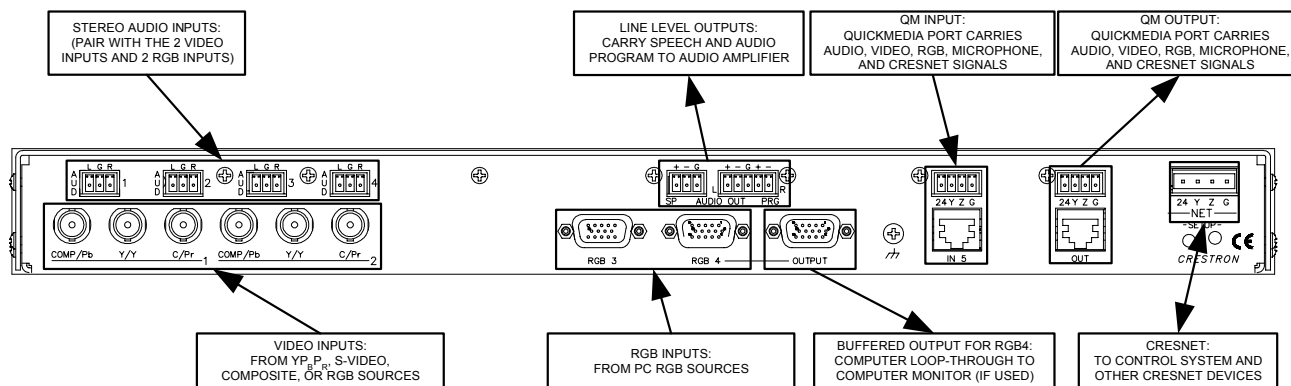ATTACH FEET
NEAR CORNERS
OF THE UNIT

Hardware Hookup

Refer to the following hookup diagram and, aside from attaching power last, complete the connections in any order. Refer to "Network Wiring" on page 14 when making network connections.

NOTE: To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consideration must be given if installed in a closed or multi-unit rack assembly since the operating ambient temperature of the rack environment may be greater than the room ambient. Contact with thermal insulating materials should be avoided on all sides of the unit.

NOTE: The maximum continuous current from equipment under any external load conditions shall not exceed a current limit that is suitable for the minimum wire gauge used in interconnecting cables. The ratings on the connecting unit's supply input should be considered to prevent overloading the wiring.

Hardware Connections for the QM-MD5x1 (Back of the Unit is Shown)

STEREO AUDIO INPUTS:
(PAIR WITH THE 2 VIDEO
INPUTS AND 2 RGB INPUTS)

LINE LEVEL OUTPUTS:
CARRY SPEECH AND AUDIO
PROGRAM TO AUDIO AMPLIFIER

QM INPUT:
QUICKMEDIA PORT CARRIES
AUDIO, VIDEO, RGB, MICROPHONE,
AND CRESNET SIGNALS

QM OUTPUT:
QUICKMEDIA PORT CARRIES
AUDIO, VIDEO, RGB, MICROPHONE,
AND CRESNET SIGNALS

VIDEO INPUTS:
FROM YP$_B$P$_R$, S-VIDEO,
COMPOSITE, OR RGB SOURCES

RGB INPUTS:
FROM PC RGB SOURCES

BUFFERED OUTPUT FOR RGB4:
COMPUTER LOOP-THROUGH TO
COMPUTER MONITOR (IF USED)

CRESNET:
TO CONTROL SYSTEM AND
OTHER CRESNET DEVICES

NOTE: The MD5x1 can only be powered by the 4-position terminal block connector labeled "NET". Power cannot be supplied from network devices that are connected to the mini-terminal block connectors located on the QM ports.

NOTE: The Y and Z Cresnet data lines from the network are connected to the NET connector, which is internally wired to the 4-position mini-terminal block connector at each QM connector.

The MD5x1 can transmit balanced or unbalanced audio signals. Refer to the following diagrams when connecting balanced and unbalanced signals to the MD5x1.

Wiring for Unbalanced Signals (left) and Balanced Signals (right)
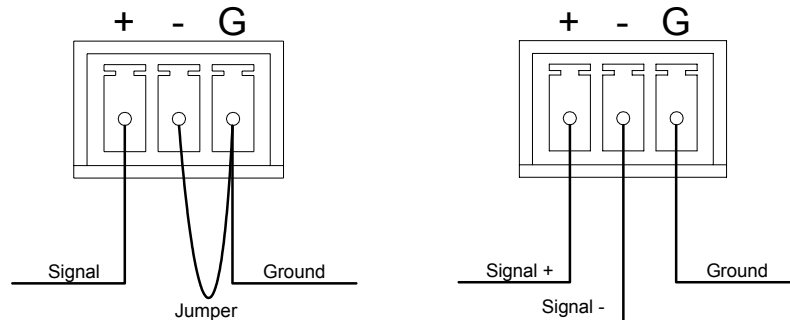
Programming Software

Have a question or comment about Crestron software?

Answers to frequently asked questions (FAQs) can be viewed in the Online Help section of the Crestron website. To post your own question or view questions you have submitted to Crestron's True Blue Support, log in at http://support.crestron.com. First-time users will need to establish a user account.

Setup is easy thanks to Crestron's Windows®-based programming software. Crestron's SystemBuilder software creates a complete project, with no special programming required. SystemBuilder completes all necessary programming for a base system including all touchpanel screens and the control system program. The program output of SystemBuilder is a SIMPL Windows program with much of the functionality encapsulated in macros and templates. Once SystemBuilder creates the project, the system interfaces and program logic can be customized in SystemBuilder or can be easily modified with Crestron development tools (i.e., SIMPL Windows and Crestron VisionTools® Pro-e (VT Pro-e) software packages).

SystemBuilder comes with templates for all supported interfaces. If a user wishes to create a touchpanel project using templates with a different look-and-feel, this can be accomplished by making a custom template. This custom template can then be used by SystemBuilder to create the final project files to be loaded into the panels. Alternatively, VT Pro-e can be used to tweak projects created with the SystemBuilder or develop original touchpanel screen designs.

Once the program created by SystemBuilder is loaded into the control system, Digital Media Tools (DMT) Software can be used to tune the system for optimal performance. DMT software can be used to test the quality of audio and video signals as well as fine-tune audio and video settings.

NOTE: Crestron recommends the use of SystemBuilder and Digital Media Tools software for creating and fine-tuning a QuickMedia system.

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

NOTE: Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

Earliest Version Software Requirements for the PC

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

The following are the earliest useable software version requirements for the PC:

- (Optional) SystemBuilder version 2.0 (due in first quarter of 2005) or later with SystemBuilder Templates version 1.0.1or later. Requires SIMPL Windows.

- SIMPL Windows version 2.05.22 or later with Library Update 320 or later. Requires SIMPL+ Cross Compiler version 1.1.

- Crestron Database version 16.4.1 or later. Required by SIMPL Windows, and Crestron Engraver.

- Crestron Engraver 2.3.0.0 or later.

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the MD5x1, it is recommended to use SystemBuilder and Digital Media Tools software for configuring and tuning a QuickMedia system.

NOTE: The following are acceptable file extensions for programs that include a MD5x1, developed for specific control system types:
.smw: *projectname*.smw (SIMPL Windows source file)
.spz: *projectname*.spz (compiled file for 2-series)
.usp: *projectname*.usp (source code module for SIMPL+)
.umc: *projectname*.umc (user macro for SIMPL)

SIMPL Windows is Crestron's software for programming Crestron control systems. It provides a well-designed graphical environment with a number of workspaces (i.e., windows) in which a programmer can select, configure, program, test, and monitor a Crestron control system. SIMPL Windows offers drag and drop functionality in a familiar Windows® environment.

NOTE: The following assumes that the reader has knowledge of SIMPL Windows. If not, refer to the extensive help information provided with the software.


NOTE: In the following description, the QM-RMCRX control system is used.

This section explains how to create a SIMPL Windows program that includes an MD5x1.

Configuration Manager is where programmers "build" a Crestron control system by selecting hardware from the *Device Library*. In Configuration Manager, drag the QM-RMCRX from the Control Systems folder of the *Device Library* and drop it in the upper pane of the *System Views*. The QM-RMCRX with its associated communication ports is displayed in the *System Views* upper pane.

QM-RMCRX System View
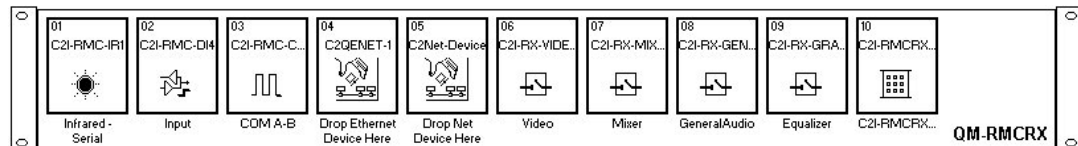
The *System Views* lower pane displays the QM-RMCRX system tree. This tree can be expanded to display and configure the communications ports.

Expanded QM-RMCRX System Tree
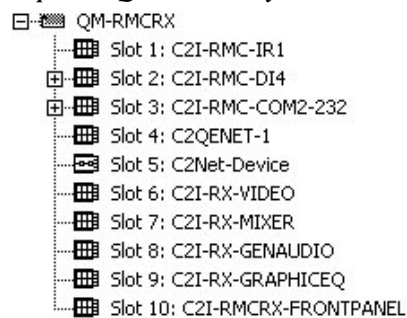
C2Net-Device Slot in Configuration Manager

To incorporate an MD5x1 into the system, drag the QM-MD5x1 from the Cresnet Control Modules | QM Series folder of the *Device Library* and drop it in *System Views*. The QM-RMCRX system tree displays the QM-MD5x1 in Slot 5, with a default Net ID of 1D as shown in the following illustration.

Auto Compensation is a feature that is used to recall the stored source compensation settings on a QM transmitter. If Auto Compensation is to be used, all QM transmitters, midpoints, and endpoints in a program must use QM devices with Auto Compensation. Devices with Auto Compensation capabilities are listed in the *Device Library* along with devices that do not have Auto Compensation.

The MD5x1 symbol already has Auto Compensation installed. There is no MD5x1 device without Auto Compensation.

QM devices with Auto Compensation can be used in a system that does not use Auto Compensation. However, the Auto Compensation feature will not be available. QM devices without Auto Compensation can be upgraded to include Auto Compensation via firmware upgrade.

When using SystemBuilder to build a system, parameters that would be managed by Auto Compensation are automatically programmed in SystemBuilder.
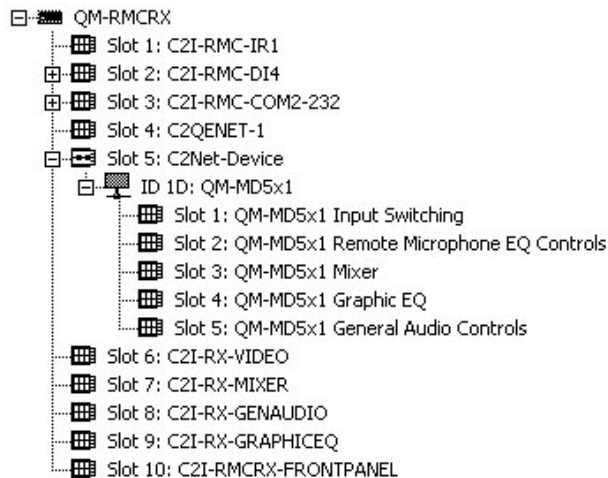
For more information on Audio Compensation, refer to "Slot 5: General Audio Controls" on page 47.

NOTE: The first MD5x1 in a system is preset with a Net ID of 1D when its symbol is dragged into the upper pane of *System Views*. Additional units are assigned different Net ID numbers as they are added.

C2Net Device, Slot 5

Setting the Net ID in Device Settings

Double-click the QM-MD5x1 icon in the upper pane to open the "Device Settings" window. This window displays the device information for the MD5x1. The Net ID can be changed in this window using the *Net ID* tab, as shown in the following figure.

"QM-MD5x1 Device Settings" Window
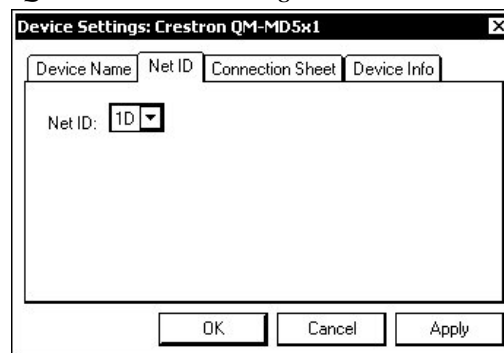
NOTE: This procedure sets the Net ID for the MD5x1 in the program only. It does not automatically set the Net ID for the MD5x1 itself. SIMPL Windows automatically changes Net ID values of a device added to a program if a duplicate device or a device with the same Net ID already exists in the program. Always ensure that the hardware and software settings of the Net ID match. For Net ID hardware setting details, refer to "Identity Code" on page 18.

QM-MD5x1 Symbols in Programming Manager

Programming Manager is where programmers "program" a Crestron control system by assigning signals to symbols. The MD5x1 is broken down into five slots. Each slot contains a programming symbol for specific functions of the MD5x1.

The programming symbol in slot (Slot 1) is for programming the switching functions of the MD5x1. The second slot (Slot 2) is for programming the MD5x1's microphone controls. Slot 3 is for programming the mixer (EQ) settings for the microphone signals that are received from the QM input. Slot 4 contains the programming symbol for the audio output's graphic EQ controls. Slot 5 is for programming the MD5x1's general audio controls.

The following describes each of the symbols contained in the MD5x1 object in the SIMPL Windows Programming Manager.

Slot 1: Input Switching

The Input Switching module is built into Slot 1 of the MD5x1. It provides a 5-input, single-output audio/video crosspoint.

The MD5x1 provides the following local video inputs:

- Two sets of (three) BNC inputs labeled 1 and 2, which accept up to two composite, S-video or component video sources.

- Two RGB video inputs labeled RGB 3 and RGB 4, for computer sources.

The MD5x1 provides the following local audio inputs:

- Four stereo line-level unbalanced audio inputs labeled AUD 1 through AUD 4.

In addition to the local AV inputs, the unit provides a QM input labeled IN 5 that can receive video, stereo program audio and two channels of microphone audio (MIC 1 and MIC 2) from QM transmitters via CAT5.

The QM input is a QM audio receiver circuit that supports up to 254 "QM Link" presets for peaking and boost. The peaking and boost settings improve the transmission of the encoded audio signal over long cable lengths.

The MD5x1 provides the following audio/video outputs:

- One QM output labeled OUT.

- One stereo line-level program balanced audio output with mute relays labeled AUDIO OUT PRG.

- One monaural line-level speech balanced audio output with mute relays labeled AUDIO OUT SP

The unit provides the following switching scheme:

- Any of the five video sources can be switched into the QM output.

- Any of the five program audio sources can be switched into the stereo program channel of the QM output. The audio source that is switched to the QM output will also be routed to the mixing section of AUDIO OUT.

- The remote microphone pair from IN 5 can be switched and mixed into the MIC 1 channel of OUT. The same mic mix will be routed to the mixing section of AUDIO OUT.

The Input Switching symbol provides two methods for sending switching commands to the MD5x1:

1. By programming the digital and analog signals, or

2. By programming serial strings.

The two methods should not be used simultaneously.

While using the SIMPL Windows Programming Manager, double-click on **Slot 1** of the QM-MD5x1 to view the details of the Input Switching symbol as shown in the following diagram.

Input Switching Symbol (Slot 1) in SIMPL Windows Programming Manager
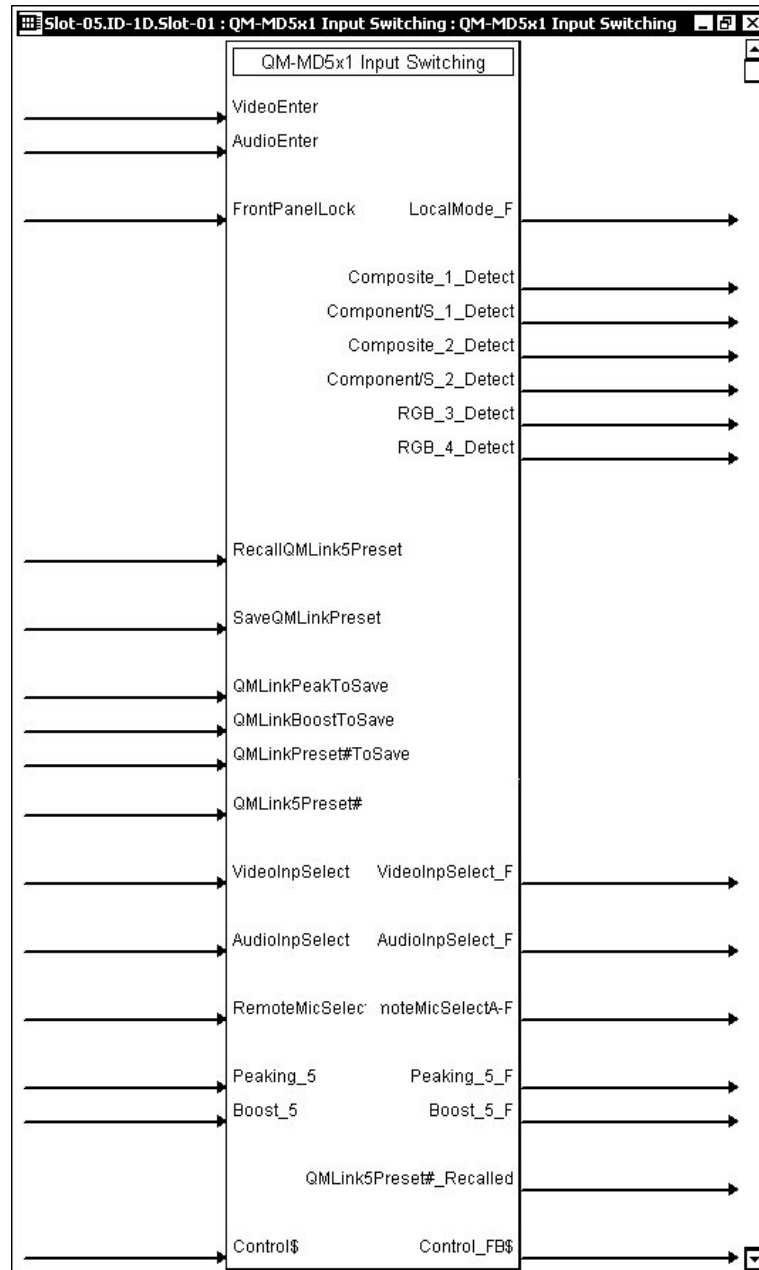
NOTE: The symbol image has been altered to fit the page.

QM-MD5x1, Slot 1 Digital Input Signal Descriptions

INPUT	DESCRIPTION
VideoEnter	Enables the video source select analogs, for as long as the input remains high. For most applications this input should be set high, which will allow all video sources to propagate to the outputs immediately. High/1 (level sensitive) = Enable video switching; Low/0 = Disable switching.
AudioEnter	Enables the source select analogs for program audio and remote mic audio, for as long as the input remains high. For most applications this input should be set high, which will allow all audio/remote mic sources to propagate to the outputs immediately. High/1 (level sensitive) = Enable audio/remote mic switching; Low/0 = Disable switching
FrontPanelLock	Locks out the **LOCAL** button on the front panel of the MD5x1 for as long as the input remains high. When this input is high, the user cannot switch the unit into Local mode. If the unit is already in Local mode, the activation of this signal will take the unit back into System mode. High/1 (level sensitive) = Lock out Local button; Low/0 = Enable Local mode
RecallQMLink5Preset	[This signal is operative only if Auto Compensation is NOT enabled.] Recalls the peaking and boost values saved in the preset given by **QMLink5Preset#** when the input is held high. The peaking and boost are applied at IN 5. High/1 (level sensitive) = Recall preset (to IN 5); Low/0 = No preset recall
SaveQMLinkPreset	Saves the peaking and boost values given by the analog signal **QMLinkPeakToSave** and **QMLinkBoostToSave** to the preset given by the analog signal **QMLinkPreset#ToSave**, when the input is held high. If the save is asserted at the same time as a recall, the recall operation takes precedence and the save is ignored. High/1 (level sensitive) = Save preset; Low/0 = No preset save

NOTE: When the front panel is locked, the MD5x1 will switch to the system mode and use the switch configuration and preset settings specified by the control system.

QM-MD5x1, Slot 1 Analog Input Signal Descriptions

INPUT	DESCRIPTION
QMLinkPeakToSave	Sets the peaking value that will be saved to the preset given by **QMLinkPreset#ToSave** when **SaveQMLinkPreset** is held high. Peaking improves the transmission of the encoded audio signal over cable lengths up to 300 feet. Peaking values range from 0% to 100%, adjustable in 1% increments. Peaking is also programmable using DMT software. The following table lists recommended peak/boost values for various cable lengths. <table><tr><th>Cable Length (ft)</th><th>Recommended Peak Value (%)</th><th>Recommended Boost Value (%)</th></tr><tr><td>0</td><td>0%</td><td>20%</td></tr><tr><td>50</td><td>5%</td><td>23%</td></tr><tr><td>100</td><td>10%</td><td>25%</td></tr><tr><td>150</td><td>15%</td><td>28%</td></tr><tr><td>200</td><td>20%</td><td>30%</td></tr><tr><td>250</td><td>25%</td><td>33%</td></tr><tr><td>300</td><td>30%</td><td>35%</td></tr></table>
QMLinkBoostToSave	Sets the boost that will be saved to the preset given by **QMLinkPreset#ToSave** when **SaveQMLinkPreset** is held high. Boost improves the transmission of the encoded audio signal over cable lengths up to 300 feet. Valid boost values range from 0% to 100%, adjustable in 1% increments. Boost is also programmable using DMT software. The following table lists recommended peak/boost values for various cable lengths. <table><tr><th>Cable Length (ft)</th><th>Recommended Peak Value (%)</th><th>Recommended Boost Value (%)</th></tr><tr><td>0</td><td>0%</td><td>20%</td></tr><tr><td>50</td><td>5%</td><td>23%</td></tr><tr><td>100</td><td>10%</td><td>25%</td></tr><tr><td>150</td><td>15%</td><td>28%</td></tr><tr><td>200</td><td>20%</td><td>30%</td></tr><tr><td>250</td><td>25%</td><td>33%</td></tr><tr><td>300</td><td>30%</td><td>35%</td></tr></table>
QMLinkPreset#ToSave	[This signal is operative only if Auto Compensation is NOT enabled.] Sets the preset number where the peaking and boost values given by **QMLinkPeakToSave** and **QMLinkBoostToSave** will be saved. The peaking and boost are saved when **SaveQMLinkPreset** is held high. Valid analog values range from 1d to 254d. Out-of-range values are ignored.

(continued on next page)

QM-MD5x1, Slot 1 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
QMLink5Preset#	[This signal is operative only if Auto Compensation is NOT enabled.] Sets the preset number that will be recalled when **RecallQMLink5Preset** is held high. The peaking and boost values are applied to IN 5. Valid analog values range from 1d to 254d. Out-of-range values are ignored. If no preset numbers are specified, IN 5 will recall preset 1 when the MD5x1 is rebooted.
VideoInpSelect	Select the video source to be switched to the QM output. Valid analog values range from 0 (for no source) through 5. Out-of-range values are ignored. Thus to route a video source from RGB 4 to the QM output, initialize **VideoInpSelect** to 4d.
AudioInpSelect	Selects the audio source to be switched to the program audio portion of the QM output. Valid analog values range from 0 (for no source) through 5. Out-of-range values are ignored. Thus to route an audio source from AUD 4 to the QM output, initialize **AudioInpSelect** to 4d.
RemoteMicSelectA	Selects the remote microphone pair that will be mixed with the two local microphones and switched to the MIC 1 channel of OUT and the mixing section of AUDIO OUT. This remote microphone pair is referred to as MIC A-1 and MIC A-2. Valid analog values range from 0d to 1d. Out-of-range values are ignored. • 0d = No remote microphone source • 1d = Remote microphone pair of IN 5
Peaking_5	Applies peaking at IN 5. Peaking improves the transmission of the encoded audio signal over cable lengths up to 300 feet. Valid peaking values range from 0% to 100%, adjustable in 1% increments. Peaking is also programmable using DMT Software. The following table lists recommended peak/boost values for various cable lengths. <table><tr><th>Cable Length (ft)</th><th>Recommended Peak Value (%)</th><th>Recommended Boost Value (%)</th></tr><tr><td>0</td><td>0%</td><td>20%</td></tr><tr><td>50</td><td>5%</td><td>23%</td></tr><tr><td>100</td><td>10%</td><td>25%</td></tr><tr><td>150</td><td>15%</td><td>28%</td></tr><tr><td>200</td><td>20%</td><td>30%</td></tr><tr><td>250</td><td>25%</td><td>33%</td></tr><tr><td>300</td><td>30%</td><td>35%</td></tr></table>

QM-MD5x1, Slot 1 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
Boost_5	Applies boost at IN 5. Boost improves the transmission of the encoded audio signal over cable lengths up to 300 feet. Valid peaking boost values range from 0% to 100%, adjustable in 1% increments. Boost is also programmable using DMT Software. The following table lists recommended peak/boost values for various cable lengths.

Cable Length (ft)	Recommended Peak Value (%)	Recommended Boost Value (%)
0	0%	20%
50	5%	23%
100	10%	25%
150	15%	28%
200	20%	30%
250	25%	33%
300	30%	35%

NOTE: When programming the MD5x1 using digital and analog input signals, serial input signals should not be used.

Signal Values for VideoInpSelect Selections

SIGNAL VALUE	SOURCE
0	Mutes the video output
1	Selects video input 1
2	Selects video input 2
3	Selects RGB input 3
4	Selects RGB input 4
5	Selects video portion of the QM input

Signal Values for AudioInpSelect Selections

SIGNAL VALUE	SOURCE
0	Mutes the audio output
1	Selects audio input 1
2	Selects audio input 2
3	Selects audio input 3
4	Selects audio input 4
5	Selects left and right program audio portion of the QM input

Signal Values for RemoteMicSelectA and RemoteMicSelectB Selections

SIGNAL VALUE	SOURCE
0	No remote microphone source
1	Remote microphone pair of IN 5

NOTE: Use an Analog Initialize to send a decimal input signal to the symbol.

QM-MD5x1, Slot 1 Serial Input Signal Descriptions

INPUT	DESCRIPTION
Control$	Accepts serial commands for routing signals. Allows users to query the switch for current status. Refer to "Appendix: Serial Protocol" on page 64.

NOTE: When programming the MD5x1 using serial commands, digital and analog switching commands should not be used. However, digital and analog mixing commands can still be used. Similarly, if the MD5x1 is to be programmed with digital and analog switching commands, serial commands should not be used.

QM-MD5x1, Slot 1 Digital Output Signal Descriptions

OUTPUT	DESCRIPTION
LocalMode-F	Indicates that the MD5x1 has been put into local mode via the **LOCAL** button on the unit. The output remains high for as long as the unit is in Local mode. The analog feedback outputs will report the audio/video sources present at the QM output regardless of the mode. High/1 = Unit in local mode; Low/0 = Unit not in local mode
Composite_1_Detect and Composite_2_Detect	Indicates that video sync levels are detected on the BNC connector marked **COMP/Pb** on Video Input 1 or 2. The feedback remains high for as long as video is detected. High/1 = Composite video detected on a COMP/P$_b$ (Video In) input; Low/0 = No video detected
Component/S_1_Detect, Component/S_2_Detect	Indicates that video sync levels are detected on the BNC connector marked **Y/Y** on Video Input 1 or 2. The feedback remains high for as long as video is detected. High/1 = Component video or S-video detected on a Y/Y (Video In) input; Low/0 = No video detected
RGB_3_Detect and RGB_4_Detect	Indicates that TTL H-sync is detected on the RGB 3 or RGB 4 input. The feedback remains high for as long as video is detected. High/1 = Computer video detected on an RGB input; Low/0 = No video detected

QM-MD5x1, Slot 1 Analog Output Signal Descriptions

OUTPUT	DESCRIPTION
VideoInpSelect_F	Indicates the video source that is currently present at OUT.
AudioInpSelect_F	Indicates the audio source that is currently present at OUT.
RemoteMicSelectA-F	Indicates the remote microphone pair currently present on the MIC 1 channel of OUT as well as the mixing section of AUDIO OUT.
Peaking_5_F	Indicates the peaking level currently applied at IN 5.
Boost_5_F	Indicates the boost level currently applied at IN 5.
QMLink5Preset#_Recalled	Reports the preset number currently being recalled.

NOTE: Returned values match values that were selected for the **VideoInpSelect** and **AudioInpSelect** inputs.

QM-MD5x1, Slot 1 Serial Output Signal Descriptions

OUTPUT	DESCRIPTION
Control-FB$	Sends out unsolicited changes that occur within the MD5x1 and provides complete switch feedback when queried. Refer to "Appendix: Serial Protocol" on page 64.

Slot 2: Remote Microphone Controls

NOTE: This slot is operative only if Auto Compensation is NOT enabled. If Auto Compensation is enabled (via the **EnableAudioAutoComp** input on Slot 05 – General Audio Controls), then this signifies that the microphone trims that are stored at the QM origination point will be propagated to the MD5x1.

The MD5x1 provides a QM input, labeled IN 5. The QM input contains two remote microphone channels called MIC A-1 and MIC A-2.

The MD5x1 can mix MIC A-1 and MIC A-2 and switch the resulting Mic Mix to the MIC 1 channel of the QM output, OUT. The same mic mix can be routed to the mixer section of the line-level audio output, labeled AUDIO OUT.

The MD5x1 provides four bands of equalization (160Hz, 500Hz, 1.2kHz, and 3kHz) for MIC A-1 and MIC A-2.

The MD5x1 provides up to 16 EQ trim presets, where a trim preset is a set of eight EQ trims (four trims each for MIC A-1 and MIC A-2). This way, the system can save and recall presets for each microphone in a QM origination point.

While using the SIMPL Windows programming manager, double-click on **Slot 2** of the QM-MD5x1 to view the details of the Remote Microphone EQ Controls symbol as shown in the following diagram.

Remote Microphone Controls Symbol (Slot 2) in SIMPL Windows Programming Manager
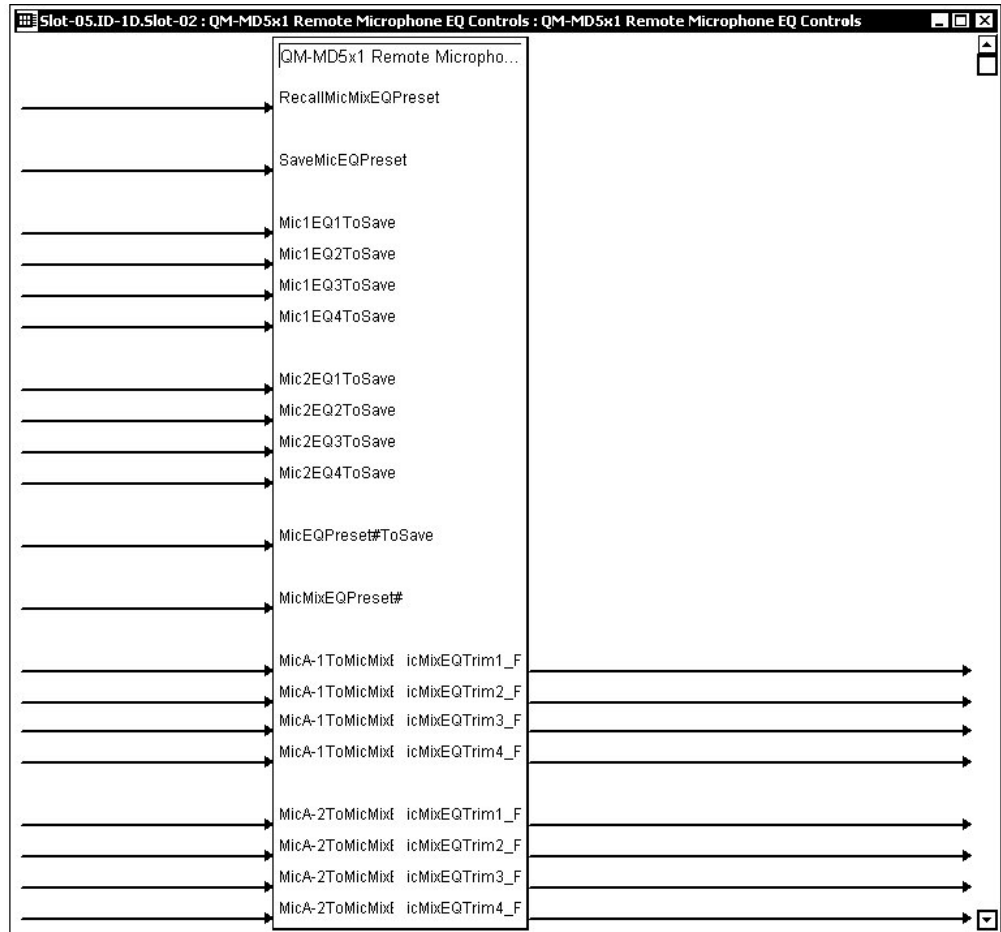
NOTE: The symbol image has been altered to fit the page.

QM-MD5x1, Slot 2 Digital Input Signal Descriptions

INPUT	DESCRIPTION
RecallMicMixEQPreset	Recalls the Mic Mix EQ preset defined by **MicMixEQPreset#** when the input is held high.
	Recalling a preset applies the eight EQ trims to each band (160Hz, 500Hz, 1.2kHz, and 3kHz) of the MIC A-1 and MIC A-2 equalizers.
	High/1 (level-sensitive) = Recall Mic Mix EQ preset; Low/0 = No preset recall
SaveMicEQPreset	Saves the four EQ trims defined by **Mic1EQTrim1ToSave** through **Mic1EQTrim4ToSave**; and the four EQ trims defined by **Mic2EQTrim1ToSave** through **Mic2EQTrim4ToSave**; to the preset number given by **MicEQPreset#ToSave** when the input is held high.
	High/1 (level-sensitive) = Save preset; Low/0 = No preset save

QM-MD5x1, Slot 2 Analog Input Signal Descriptions

INPUT	DESCRIPTION
Mic1EQ1ToSave through Mic1EQ4ToSave	Sets the four MIC 1 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz) that will be saved when **SaveMicEQPreset** is held high. The preset will be saved in the preset number defined by **MicEQPreset#ToSave**. Valid analog values range from –120d (-12 dB) to +120d (+12 dB), adjustable in increments of 0.1 dB. Thus changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
Mic2EQ1ToSave through Mic2EQ4ToSave	Sets the four MIC 2 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz) that will be saved when **SaveMicEQPreset** is held high. The preset will be saved in the preset number defined by **MicEQPreset#ToSave**. Valid analog values range from –120d (-12 dB) to +120d (+12 dB), adjustable in increments of 0.1 dB. Thus changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
MicEQPreset#ToSave	Sets the preset number where the eight EQ trims for MIC 1 and MIC 2 will be saved when **SaveMicEQPreset** is driven high. Valid analog values range from 1d to 16d. Out-of-range values are ignored.
MicMixEQPreset#	Sets the Mic Mix preset number that will be recalled when **RecallMicMixEQPreset** is held high. Recalling a preset applies the eight EQ trims to each band (160Hz, 500Hz, 1.2kHz, and 3kHz) of the MIC A-1 and MIC A-2 equalizers. Valid analog values range from 1d to 16d. Out-of-range values are ignored.
MicA-1ToMicMixEQTrim1 through MicA-1ToMicMixEQTrim4	Sets the four MIC A-1 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz). Valid analog values range from –120d (-12 dB) to +120d (+12 dB), adjustable in increments of 0.1 dB. Thus changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
MicA-2ToMicMixEQTrim1 through MicA-2ToMicMixEQTrim4	Sets the four MIC A-2 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz). Valid analog values range from –120d (-12 dB) to +120d (+12 dB), adjustable in increments of 0.1 dB. Thus changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.

QM-MD5x1, Slot 2 Analog Output Signal Descriptions

OUTPUT	DESCRIPTION
MicA-1ToMicMixEQTrim1_F through MicA-1ToMicMixEQTrim4_F	Indicates the trim being applied to each band of the MIC A-1 equalizer.
MicA-2ToMicMixEQTrim1_F through MicA-2ToMicMixEQTrim4_F	Indicates the trim being applied to each band of the MIC A-2 equalizer.

Slot 3: Mixer

The MD5x1 provides one QM input, which contains up to two remote microphone channels (MIC A-1 and MIC A-2).

At the MD5x1 output is a microphone mixer. The microphone mixer can mix MIC A-1 and MIC A-2. Before mixing, 4-band equalization can be applied to each mic (via the Graphic EQ module on slot 2). In addition, the microphone mixer supports NOM (**N**umber of **O**pen **M**ics) attenuation for automatic mic gain adjustment. This decreases the overall gain of the mic mixer by 3dB for every doubling of the number of open microphones feeding the mixer.

The resulting microphone mix (called "Mic Mix") is routed to the MIC 1 channel of the QM output and to the mixer section of the line level stereo audio output, labeled AUDIO OUT.

AUDIO OUT provides a mixing section. The selected program audio from one of the stereo program sources and the "Mic Mix" mix described above are inputs to this mixer. The mixer mixes the program and the microphone into the three AUDIO OUT channels: PRG L, PRG R, and SP. Up to 40 ms delay can be applied to the SP channel.

The Mixer module provides up to five mixer presets, where a mixer preset consists of nine mixing values for AUDIO OUT (three mixing levels each for PRG L, PRG R and SP).

The Mixer module also provides up to 16 mic mixer presets, where a mic mixer preset consists of two mixing levels (for MIC A-1 and MIC A-2).

The microphone mix can be mixed into the stereo program and the stereo program can be mixed into the speech. After mixing, volume, equalization and tone control can be applied (via the General Audio Controls module on slot 5).

While using the SIMPL Windows programming manager, double-click on **Slot 3** of the QM-MD5x1 to view the details of the Mixer symbol as shown in the following diagram.

Mixer Symbol (Slot 3) in SIMPL Windows Programming Manager

NOTE: The symbol image has been altered to fit the page.

QM-MD5x1, Slot 3 Digital Input Signal Descriptions

INPUT	DESCRIPTION
SaveMicMixerPreset	Saves the two mixing levels for remote MIC A-1 and MIC A-2, as defined by the **MicA-1ToMicMix** and MicA-2ToMicMix analogs.
	The mixing levels are saved to the preset given by **MicMixerPreset#** when the input is held high.
	If the save is asserted at the same time as a recall, the recall takes precedence and the save is ignored.
	High/1 (level-sensitive) = Save mic mixer preset; Low/0 = No preset save

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QM-MD5x1, Slot 3 Digital Input Signal Descriptions (continued)

INPUT	DESCRIPTION
RecallMicMixerPreset	Recalls the preset given by **MicMixerPreset#** when the input is held high.
	Recalling a preset adjusts the mixing levels for remote MIC A-1 and MIC A-2.
	High/1 (level-sensitive) = Recall mic mixer preset; Low/0 = No preset recall
SaveAudioOutMixerPreset	Saves the nine mixing levels for AUDIO OUT (three mixing levels each for PRG L, PRG R and SP) as defined by the nine **…ToAudioOut…** analogs.
	The mixing levels are saved to the preset given by **AudioOutMixerPreset#** when the input is held high.
	If the save is asserted at the same time as a recall, the recall takes precedence and the save is ignored.
	High/1 (level-sensitive) = Save mixer preset; Low/0 = No preset save
RecallAudioOutMixerPreset	Recalls the mixer preset given by **AudioOutMixerPreset#** when the input is held high.
	Recalling a preset adjusts the nine mixing levels for AUDIO OUT (three mixing levels each for PRG L, PRG R and SP).
	High/1 (level-sensitive) = Recall mixer preset; Low/0 = No preset recall

QM-MD5x1, Slot 3 Analog Input Signal Descriptions

INPUT	DESCRIPTION
MicMixerPreset#	Sets the mic mixer preset number that will save or recall the four mixing levels for remote MIC A-1 and MIC A-2.
	Valid analog values range from 1d to 16d. Out-of-range values are ignored.
AudioOutMixerPreset#	Sets the mixer preset number that will save or recall the nine mixing values for AUDIO OUT (three mixing levels each for PRG L, PRG R and SP).
	Valid analog values range from 1d to 5d. Out-of-range values are ignored.
MicA-1ToMicMix	Sets the mixing level for remote MIC A-1. Remote MIC A-1 is mixed with remote MIC A-2. The resulting "Mic Mix" is routed to the MIC1 channel of OUT and to the AUDIO OUT mixing section for mixing into the speech and program audio outputs.
	Valid analog values range from –800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of –800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.

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QM-MD5x1, Slot 3 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
MicA-2ToMicMix	Sets the mixing level for remote MIC A-2. Remote MIC A-2 is mixed with remote MIC A-1. The resulting "Mic Mix" is routed to the MIC1 channel of OUT and to the AUDIO OUT mixing section for mixing into the speech and program audio outputs.
	Valid analog values range from –800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of –800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
MicMixToAudioOutSp	Sets the mixing level for "Mic Mix".
	The "Mic Mix" audio is mixed with the Left and Right program channels of the selected program audio source and routed to the SP channel of AUDIO OUT.
	Valid analog values range from –800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of –800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
LeftToAudioOutSp	Sets the mixing level for the Left program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Left program channel is mixed with the Right program channel and "Mic Mix", and routed to the SP channel of AUDIO OUT.
	Valid analog values range from –800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of –800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.

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QM-MD5x1, Slot 3 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
RightToAudioOutSp	Sets the mixing level for the Right program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Right program channel is mixed with the Left program channel and "Mic Mix", and routed to the SP channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
MicMixToAudioOutL	Sets the mixing level for "Mic Mix".
	The "Mic Mix" audio is mixed with the Left and Right program channels of the selected audio source and routed to the PRG L channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
LeftToAudioOutL	Sets the mixing level for the Left program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Left program channel is mixed with the Right program channel and "Mic Mix", and routed to the PRG L channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.

QM-MD5x1, Slot 3 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
RightToAudioOutL	Sets the mixing level for the Right program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Right program channel is mixed with the Left program channel and "Mic Mix", and routed to the PRG L channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
MicMixToAudioOutR	Sets the mixing level for "Mic Mix".
	The "Mic Mix" audio is mixed with the Left and Right program channels of the selected audio source and routed to the PRG R channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
LeftToAudioOutR	Sets the mixing level for the Left program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Left program channel is mixed with the Right program channel and "Mic Mix", and routed to the PRG R channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.

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QM-MD5x1, Slot 3 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
RightToAudioOutR	Sets the mixing level for the Right program channel of the selected audio source (audio source selection is accomplished via the Input Switching module on slot 01).
	The Right program channel is mixed with the Left program channel and "Mic Mix", and routed to the PRG R channel of AUDIO OUT.
	Valid analog values range from -800d (-80 dB) to 0d (0 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A value of -800d (-80 dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0 dB) means that the signal will pass unaffected.
NOM_to_MicMix	Sets the NOM (**N**umber of **O**pen **M**ics) for automatic mic gain adjustment. This decreases the overall gain of the mic mixer by 3dB for every doubling of the number of open microphones feeding the mixer.
	Valid values range from 0d to 2d, corresponding to the number of currently open mic channels.
	There are several ways to use this input:
	1. Use an Analog Initialize symbol (speedkey: INIT) to set the value to the expected maximum number of open microphones.
	2. For systems in which manual muting of microphones is acceptable, the microphone feedback signals can be used to calculate the number of open microphones. Invert the microphone mute feedback signals and connect them to the inputs of a Digital Sum symbol (speedkey: DSUM). Connect the output of the DSUM to **NOM_to_MicMix**.
	3. For systems requiring automatic handling of NOM gain adjustment, connect the gating outputs of the local switcher and remote QM microphones to the inputs of a Digital Sum symbol. Connect the output of the DSUM to **NOM_to_MicMix**.

QM-MD5x1, Slot 3 Analog Output Signal Descriptions

OUTPUT	DESCRIPTION
MicA-1ToMicMix_F	Indicates the current mixing level being applied to remote MIC A-1.
MicA-2ToMicMix_F	Indicates the current mixing level being applied to remote MIC A-2.
MicMixToAudioOutSp_F	Indicates the current mixing level being applied to "Mic Mix" (on the SP channel of AUDIO OUT).
LeftToAudioOutSp_F	Indicates the current mixing level being applied to the Left program channel of the selected audio source (on the SP channel of AUDIO OUT).

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QM-MD5x1, Slot 3 Analog Output Signal Descriptions (continued)

OUTPUT	DESCRIPTION
RightToAudioOutSp_F	Indicates the current mixing level being applied to the Right program channel of the selected audio source (on the SP channel of AUDIO OUT).
MicMixToAudioOutL_F	Indicates the current mixing level being applied to "Mic Mix" (on the PRG L channel of AUDIO OUT).
LeftToAudioOutL_F	Indicates the current mixing level being applied to the Left program channel of the selected audio source (on the PRG L channel of AUDIO OUT).
RightToAudioOutL_F	Indicates the current mixing level being applied to the Right program channel of the selected audio source (on the PRG L channel of AUDIO OUT).
MicMixToAudioOutR_F	Indicates the current mixing level being applied to "Mic Mix" (on the PRG R channel of AUDIO OUT).
LeftToAudioOutR_F	Indicates the current mixing level being applied to the Left program channel of the selected audio source (on the PRG R channel of AUDIO OUT).
RightToAudioOutR_F	Indicates the current mixing level being applied to the Right program channel of the selected audio source (on the PRG R channel of AUDIO OUT).

Slot 4: Graphic EQ

The MD5x1 provides a line-level audio output labeled AUDIO OUT. The output has three channels labeled PRG L, PRG R and SP.

The MD5x1 provides graphic and parametric EQ for each of the three AUDIO OUT channels. The graphic EQ portion can be programmed using either SIMPL Windows or Crestron Digital Media Tools (DMT) software. The parametric equalizer and fixed frequencies of the graphic equalizer can only be programmed using DMT Software.

The MD5x1 provides 12 filters for each output channel, with a maximum of 10 filters available for graphic EQ. The unit supports five modes of audio equalization (settable using DMT Software):

- 10 bands graphic EQ + 2 band parametric EQ. In this mode, the first 10 filters of the three channels are used to set up the fixed frequencies for graphic equalization, leaving filters #11 and #12 available for parametric EQ.

- 3 bands graphic + 9 bands parametric. In this mode, the first three filters of the three channels are used to set up the fixed frequencies for graphic equalization, leaving filters 4 through 12 available for parametric EQ.

- 5 bands graphic + 7 bands parametric. In this mode, the first five filters of the three channels are used to set up the fixed frequencies for graphic equalization, leaving filters 6 through 12 available for parametric EQ.

- 5 bands graphic + 7 bands parametric, with speech optimization. In this mode, the first five filters of the three channels are used to set up the graphic equalizer within the frequency ranges of the human voice, leaving filters 6 through 12 available for parametric EQ.

- 12 bands parametric (0 bands graphic). In this mode, all of the filters are used for parametric equalization.

Programming the graphic equalizer through SIMPL Windows may override the DMT Software settings. For example, if the 12-band parametric equalizer mode is selected in DMT and the SIMPL Windows program changes filter #2, the system will allow the change.

The MD5x1 provides 10 trim presets, where a trim preset consists of 30 EQ trims (10 EQ trims each for PRG L, PRG R and SP).

In addition to the 10 trim presets, the MD5x1 provides five filter presets (settable using DMT Software).

While using the SIMPL Windows programming manager, double-click on **Slot 4** of the QM-MD5x1 to view the details of the Graphic EQ symbol as shown in the following diagram.

Graphic EQ Symbol (Slot 4) in SIMPL Windows Programming Manager
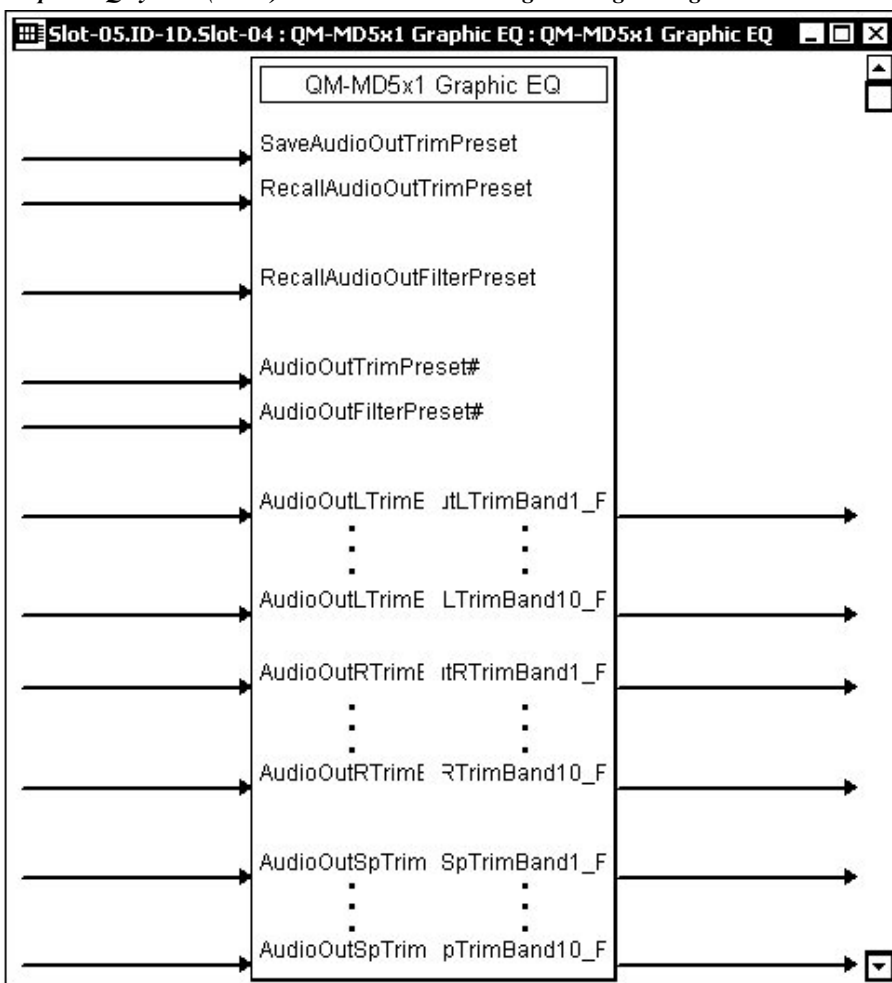
NOTE: The symbol image has been altered to fit the page.

QM-MD5x1, Slot 4 Digital Input Signal Descriptions

INPUT	DESCRIPTION
SaveAudioOutTrimPreset	Saves the 30 trim values to the trim preset given by the analog signal **AudioOutTrimPreset#** when the input is held high.
	The trims are defined by the **AudioOut...TrimBand1** through **AudioOut...TrimBand10** analogs.
	High/1 (level-sensitive) = Save trim preset; Low/0 = No trim preset save
RecallAudioOutTrimPreset	Recalls the trim preset given by the analog signal **AudioOutTrimPreset#** when the input is held high.
	Recalling a preset adjusts 30 trims (10 trims each for the PRG L, PRG R, and SP channels of AUDIO OUT).
	High/1 (level-sensitive) = Recall trim preset; Low/0 = No trim preset recall
RecallAudioOutFilterPreset	Recalls the filter preset given by the analog signal **AudioOutFilterPreset#** when the input is held high. The filters can only be adjusted with DMT Software.
	High/1 (level-sensitive) = Recall filter preset; Low/0 = No filter preset recall

QM-MD5x1, Slot 4 Analog Input Signal Descriptions

INPUT	DESCRIPTION
AudioOutTrimPreset#	Sets the trim preset number that will be saved or recalled.
	Valid analog values range from 1d to 10d. Out-of-range values are ignored.
AudioOutFilterPreset#	Sets the filter preset number that will be recalled when **RecallAudioOutFilterPreset** is held high.
	Valid analog values range from 1d to 5d. Out-of-range values are ignored.
AudioOutLTrimBand1 through AudioOutLTrimBand10	Sets the 10 trim values for the PRG L channel of AUDIO OUT.
	Valid analog values range from -100d (-10 dB) to +100d (+10 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A trim of 0d (0 dB) means that the signal will pass unaffected.
AudioOutRTrimBand1 through AudioOutRTrimBand10	Sets the 10 trim values for the PRG R channel of AUDIO OUT.
	Valid analog values range from -100d (-10 dB) to +100d (+10 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A trim of 0d (0 dB) means that the signal will pass unaffected.

QM-MD5x1, Slot 4 Analog Input Signal Descriptions

INPUT	DESCRIPTION
AudioOutSpTrimBand1 through AudioOutSpTrimBand10	Sets the 10 trim values for the SP channel of AUDIO OUT.
	Valid analog values range from -100d (-10 dB) to +100d (+10 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.
	A trim of 0d (0 dB) means that the signal will pass unaffected.

QM-MD5x1, Slot 4 Analog Output Signal Descriptions

OUTPUT	DESCRIPTION
AudioOutLTrimBand1_F through AudioOutLTrimBand10_F	Indicates the 10 trim values being applied to the PRG L channel of AUDIO OUT.
AudioOutRTrimBand1_F through AudioOutRTrimBand10_F	Indicates the 10 trim values being applied to the PRG R channel of AUDIO OUT.
AudioOutSpTrimBand1_F through AudioOutSpTrimBand10_F	Indicates the 10 trim values being applied to the SP channel of AUDIO OUT.

Slot 5: General Audio Controls

The MD5x1 provides a line-level audio output labeled AUDIO OUT. The output contains three channels labeled PRG L, PRG R and SP.

Each channel has controls for muting, volume, and tone functions.

Settings for input compensation and microphone equalization can be stored on a QM receiver or on a QM transmitter. To simplify management of these settings, use the Auto Compensation feature to recall the stored source compensation settings on the QM transmitter. Peak and boost values are still stored in the receiver.

In large networks that **do not** use Auto Compensation, presets for peak, boost, input compensation, and microphone equalization will need to be manually created, stored, and recalled on each receiver for each transmitter on the network.

When Auto Compensation is enabled, each transmitter automatically transmits an ID, input compensation, and microphone equalization presets for the selected input, and then embeds them in the audio data stream. When this data stream is connected to a receiver, the receiver automatically decodes the embedded parameters and then uses the ID to recall the proper preset for peak and boost to properly receive the signal.

In a network without Auto Compensation, when switching between QM transmitters, the receiver will not know which transmitter it is connected to. Therefore, it also does not know what peak and boost values to use to receive the settings embedded in the audio data stream. To overcome this problem, when Auto Compensation is enabled, the receiver will hunt for peak and boost values that will allow the receipt of the audio data stream. This hunt algorithm will not optimize the video, but will still be able find appropriate peak and boost settings to allow reading of the required parameters that are embedded in the audio data stream. The receiver will use the Net ID that is embedded in the data stream to recall the preset peak and boost values. Once the required peak and boost values are recalled, optimum audio and video settings are recalled by the receiver.

Auto Compensation requires the following firmware to be installed on QM origination points and QM receivers:

*Firmware Requirements for Auto Compensation*

DEVICE	FUNCTION	MINIMUM REQUIRED FIRMWARE VERSION
QM-RMCRX	Endpoint	C2-V3.137.CUZ or later
QM-WMC	Origination Point	QM-WMC.v3.02.upg or later
QM-MD7x2	Origination / Endpoint Point*	QM7x2-v4.3.031.upg or later
QM-MD5x1	Origination / Endpoint Point*	QM5x1-v4.3.031.upg or later
QM-FTCC	Origination Point	QM-FTCC.V.3.07.upg or later
QM-FTDC	Origination Point	QM-FTDC.V.3.07.upg or later
QM-FTMC	Origination Point	QM-FTMC.V.3.07.upg or later
QM-FTMCSC	Origination Point	QM-FTMCSC.V.3.07.upg or later
QM-FTSC	Origination Point	QM-FTSC.V.3.07.upg or later

*   The QM-MD7x2 and QM-MD5x1 can also act as a midpoint between a QM origination point and a QM endpoint. When acting as a midpoint, these devices pass on the audio parameters stored by the QM origination point.

If Auto Compensation is NOT enabled, the MD5x1 supports up to 192 source gain compensation presets, which allow for normalization of audio levels between different sources. Each compensation preset applies to the cable connection between the MD5x1 and a specific QM transmitter. If Auto Compensation is enabled (via the **EnableAudioAutoComp** input), the audio compensation presets are not used. Instead, the audio compensation value stored at the QM transmitter for the selected audio source is propagated to the MD5x1.

While using the SIMPL Windows programming manager, double-click on **Slot 5** of the MD5x1 to view the details of the General Audio Controls symbol as shown in the following diagram.

General Audio Controls Symbol (Slot 5) in SIMPL Windows Programming Manager
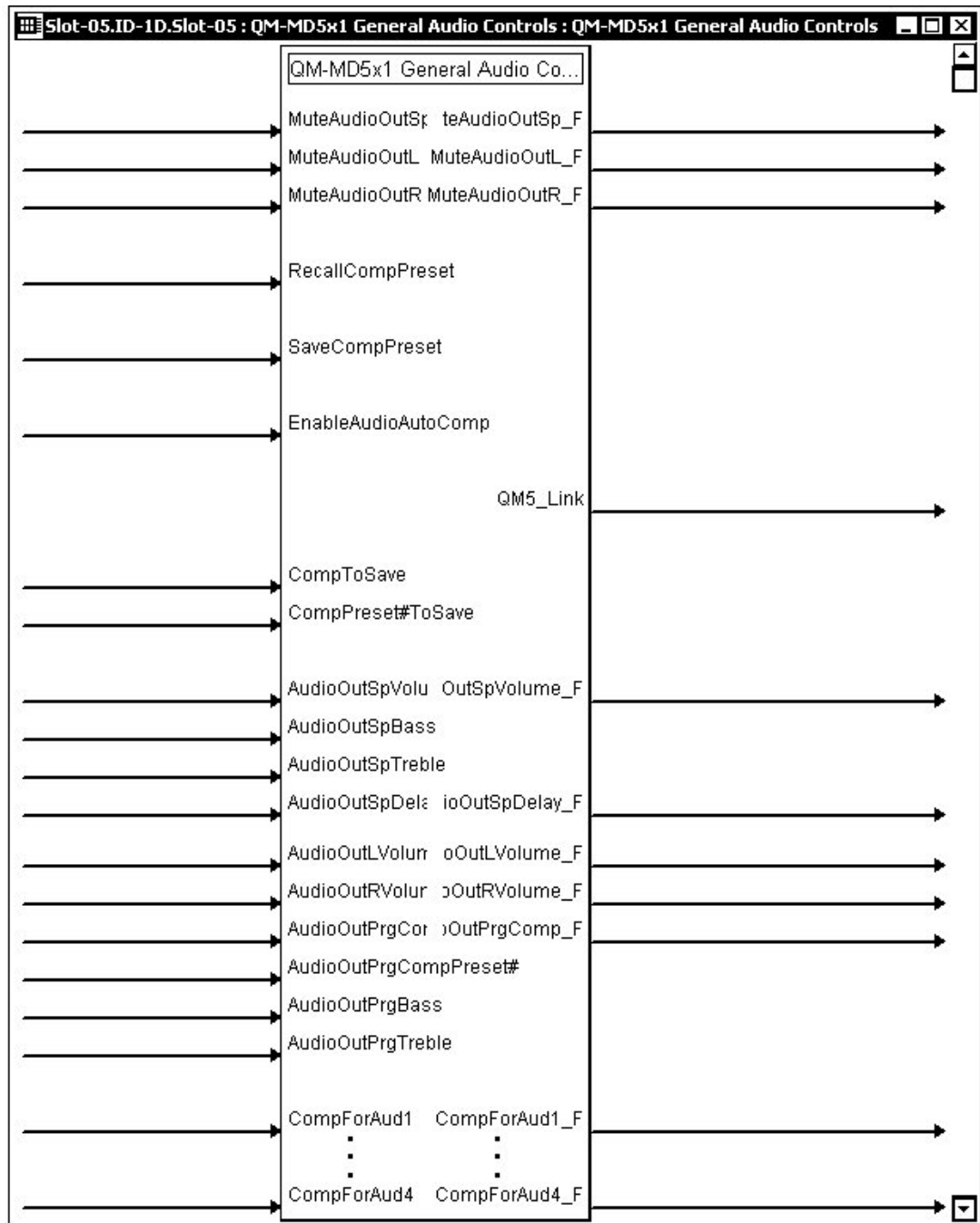
NOTE: The symbol image has been altered to fit the page.

QM-MD5x1, Slot 5 Digital Input Signal Descriptions

INPUT	DESCRIPTION
MuteAudioOutSp	Mutes the SP channel of AUDIO OUT, for as long as the input is high. This soft mute smoothly attenuates the speech audio to avoid audible pops. High/1 (level-sensitive) = Mute SP channel of AUDIO OUT; Low/0 = Un-mute audio
MuteAudioOutL	Mutes the PRG L channel of AUDIO OUT, for as long as the input is high. This soft mute smoothly attenuates the speech audio to avoid audible pops. High/1 (level-sensitive) = Mute PRG L channel of AUDIO OUT; Low/0 = Un-mute audio
MuteAudioOutR	Mutes the PRG R channel of AUDIO OUT, for as long as the input is high. This soft mute smoothly attenuates the speech audio to avoid audible pops. High/1 (level-sensitive) = Mute PRG R channel of AUDIO OUT; Low/0 = Un-mute audio
RecallCompPreset	[This signal is operative only if Auto Compensation is enabled.] Recalls the source gain compensation preset given by the analog signal **AudioOutPrgCompPreset#** when the input is held high. The source gain compensation is added to program volume and is applied equally to both the PRG L and PRG R channels of AUDIO OUT. High/1 (level-sensitive) = Recall AUDIO OUT compensation preset; Low/0 = No preset recall
SaveCompPreset	[This signal is operative only if Auto Compensation is enabled.] Saves the source gain compensation given by the analog signal **CompToSave** to the preset given by the analog signal **CompPreset#ToSave** when the input is held high. High/1 (level-sensitive) = Save compensation preset; Low/0 = No preset save
EnableAudioAutoComp	Enables Auto Compensation for as long as the input is high. This signifies that the source gain compensation will be set at the QM origination point. High/1 (level sensitive) = Enable Auto Compensation; Low/0 = Disable Auto Compensation (set compensation at the receiver)

QM-MD5x1, Slot 5 Analog Input Signal Descriptions

INPUT	DESCRIPTION
CompToSave	[This signal is operative only if Auto Compensation is NOT enabled.] Sets the source gain compensation that will be saved to the preset given by the analog signal **CompPreset#ToSave** when the digital signal **SaveCompPreset** is held high. Valid analog values range from -100d (-10 dB) to +100d (+10 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels. A trim of 0d (0 dB) means that the signal will pass unaffected.
CompPreset#ToSave	[This signal is operative only if Auto Compensation is NOT enabled.] Sets the preset number where the source gain compensation given by the analog signal **CompToSave** will be saved. Valid values range from 1d to 254d. Out-of range values are ignored.
AudioOutSpVolume	Adjusts the volume level of the SP channel of AUDIO OUT. Valid values range from 0% (-80 dB) to 100% (+20 dB).
AudioOutSpBass and AudioOutSpTreble	Adjusts the treble and bass levels of the SP channel of AUDIO OUT. Valid values range from 0% (-15 dB) to 100% (+15 dB). A value of 50% signifies a flat level corresponding to 0 dB.
AudioOutSpDelay	Sets the speech delay, in milliseconds, on the SP channel of AUDIO OUT. Valid analog values range from 0d (0ms) to 40d (40ms).
AudioOutLVolume	Adjusts the volume level of the PRG L channel of AUDIO OUT. Valid values range from 0% (-80 dB) to 100% (+20 dB).
AudioOutRVolume	Adjusts the volume level of the PRG R channel of AUDIO OUT. Valid values range from 0% (-80 dB) to 100% (+20 dB).
AudioOutPrgComp	[This signal is operative only if Auto Compensation is NOT enabled.] Adjusts the source gain compensation on the PRG L and PRG R channels of AUDIO OUT. The source gain compensation is added to the program volume and is applied equally to both channels. Valid analog values range from -100d (-10 dB) to +100d (+10 dB), adjustable in increments of 0.1 dB. Changing the analog value by 1d signifies a boost or attenuation of 0.1 decibels.

(continued on next page)

QM-MD5x1, Slot 5 Analog Input Signal Descriptions (continued)

INPUT	DESCRIPTION
AudioOutPrgCompPreset#	[This signal is operative only if Auto Compensation is NOT enabled.] Sets the source gain compensation preset number that will be recalled when the digital signal **RecallCompPreset** is held high. Valid values range from 1d to 192d. Out-of-range values are ignored. On power up, the system recalls Preset #1.
AudioOutPrgBass and AudioOutPrgTreble	Adjusts the treble and bass levels of the PRG L and PRG R channels of AUDIO OUT. Valid values range from 0% (-15 dB) to 100% (+15 dB). A value of 50% signifies a flat level corresponding to 0 dB. The treble and bass are applied equally to both channels.
CompForAud1 through CompForAud4	[These signals are operative only if Auto Compensation is enabled.] Adjusts the source gain compensation for the AUD 1 through AUD 4 inputs. Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB).

QM-MD5x1, Slot 5 Digital Output Signal Descriptions

OUTPUT	DESCRIPTION
MuteAudioOutSp_F	Indicates the mute status of the SP channel of AUDIO OUT. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted; Low/0 = Audio is un-muted
MuteAudioOutL_F	Indicates the mute status of the L channel of AUDIO OUT. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted; Low/0 = Audio is un-muted
MuteAudioOutR_F	Indicates the mute status of the R channel of AUDIO OUT. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted; Low/0 = Audio is un-muted
QM5_Link	Indicates that the QM audio connection from the QM transmitter (i.e., a QM-WMC) to IN 5 is present and valid. The signal will remain high for as long as the audio connection to IN 5 is valid. QM video source detection occurs on the transmitter side. The feedback would indicate a failure if, for example, the QM cable is disconnected or damaged, since both audio and video are transmitted on the same CAT5 cable (on different wire pairs). High/1 = Connection valid on IN 5; Low/0 = Connection broken on IN 5

QM-MD5x1, Slot 5 Analog Output Signal Descriptions

OUTPUT	DESCRIPTION
AudioOutSpVolume_F	Indicates the volume level of the SP channel of AUDIO OUT.
AudioOutSpDelay_F	Indicates the speech delay being applied to the SP channel of AUDIO OUT.
AudioOutLVolume_F	Indicates the volume level of the PRG L channel of AUDIO OUT.
AudioOutRVolume_F	Indicates the volume level of the PRG R channel of AUDIO OUT.
AudioOutPrgComp_F	Indicates the current source gain compensation being applied to the PRG L and PRG R channels of AUDIO OUT.
CompForAud1_F through CompForAud4_F	Indicates the current source gain compensation being applied to the AUD 1 through AUD 4 inputs.

Example Program

An example program for the MD5x1 is available from the "Example Programs" section of the Crestron website (www.crestron.com/exampleprograms). Search for QM-MD5x1.zip.

Programming with VisionTools Pro-e

Touchpanel screens should be created in VT Pro-e to allow switching of source signals to the outputs, control audio functions, and recall and/or store preset settings. There are no special programming requirements to use the functions of the MD5x1 in a room-control system.

Creating Labels with Crestron Engraver

Use Crestron Engraver software to print custom labels for each input and output button. Using the templates in Engraver, print labels on 100-pound paper. Paper weighing less than 100 pounds will be harder to slide in, while paper weighing more than 100 pounds will not fit.

Uploading and Upgrading

NOTE: Crestron recommends that you use the latest software and that each device contains the latest firmware to take advantage of the most recently released features. Please check the Crestron website (http://www.crestron.com/updates) for the latest versions of software and firmware. New users are required to register to obtain access to this site.

Assuming a PC is properly connected to the entire system, Crestron programming software allows the programmer to upload programs and projects after their development to the system and network devices. However, there are times when the files for the program and projects are compiled and not uploaded. Instead, compiled files may be distributed from programmers to installers, from Crestron to dealers, etc. Even firmware upgrades are available from the Crestron website as new features are developed after product releases. In those instances, one has the option to upload via the programming software or to upload and upgrade via the Crestron Viewport.

NOTE: The Crestron Viewport is available as a pull-down command from SIMPL Windows and VT Pro-e (**Tools | Viewport**) or as a standalone utility. The Viewport utility accomplishes multiple system tasks, primarily via an RS-232 or TCP/IP connection between the control system and a PC. It is used to observe system processes, upload new operating systems and firmware, change system and network parameters, and communicate with network device consoles and touchpanels, among many other tasks. Viewport can also function as a terminal emulator for generic file transfer. All of these functions are accessed through the commands and options in the Viewport menus. Therefore, for its effectiveness as a support and diagnostic tool, the Crestron Viewport may be preferred over development tools when uploading programs and projects.

The following sections define how one would upload a SIMPL Windows program or upgrade the firmware of the MD5x1. However, before attempting to upload or upgrade, it is necessary to establish communications.

Communication Settings

NOTE: For laptops and other PCs without a built-in RS-232 port, Crestron recommends the use of PCMCIA cards, rather than USB-to-serial adapters. If a USB-to-serial adapter must be used, Crestron has tested the following devices with good results:

> Belkin (large model) F5U103
> I/O Gear GUC232A
> Keyspan USA-19QW (Discontinued)

Results may vary depending on the computer being used. Other models, even from the same manufacturer, may not yield the same results.

The procedure in this section provides details for RS-232 communication between the PC and the control system. If TCP/IP communication is preferred, consult the latest version of the Crestron e-Control Reference Guide (Doc. 6052) or the Crestron 2-Series Control System Reference Guide (Doc. 6256). These documents are available from the Crestron website. Refer to the following diagram for a typical connection diagram when uploading files.

NOTE: When connecting a PC to the QM-RMCRX, use a standard DB9 female-to-female "null modem" cable. To connect to other control systems refer to the Operations Guide included with the control system.

*Typical Connection Diagram when Uploading*
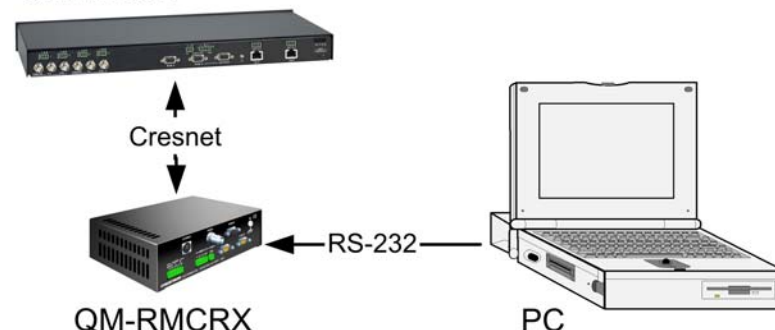
1. Open the Crestron Viewport.
    Either launch the stand-alone version of Viewport or start SIMPL
    Windows and from the menu bar, select **Tools | Viewport**.

2. Refer to the following figure after this step. From the Viewport menu,
    select **Setup | Communications settings** (alternatively, press **Alt+D)**
    to open the "Port Settings" window.

Setup | Communications Settings Command
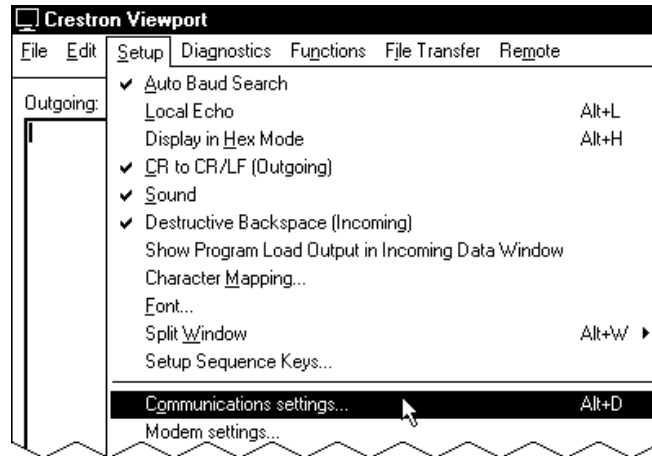
3. Select **RS-232** as the connection type. Verify that an available COM
    port (COM 1 is shown after this step) is selected, and that all
    communication parameters and necessary options from the "Port
    Settings" window are selected as shown after this step. Click the **OK**
    button to save the settings and close the window.

"Port Settings" Window
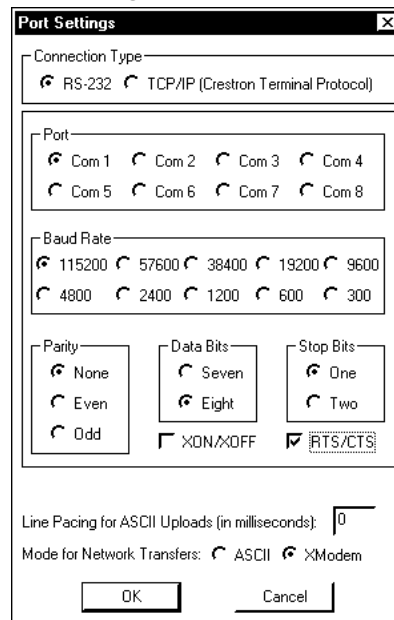
NOTE: The parameters shown in the illustration above are the port settings for a
2-Series control system.

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4. To verify communication, select **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the COM port and baud rate. If communication cannot be established, refer to the "Troubleshooting Communications" section in the latest version of the Crestron 2-Series Control System Reference Guide (Doc. 6256) for details.

Uploading a SIMPL Windows Program

A control system source file has the extension .smw. A compiled SIMPL Windows file has the extension .spz for a 2-Series control system.

The SIMPL Windows file can be uploaded to the control system using SIMPL Windows or via the Crestron Viewport.

Upload via SIMPL Windows

1. Start SIMPL Windows.

2. Select **File | Open** to view the "Open" window, navigate to the SIMPL Window file (.smw), and click **Open**.

3. Select **Project | Transfer Program**.

Upload via Crestron Viewport

1. Verify that the procedure for "Communication Settings" that begins on page 54 has been performed.

2. As shown after this step, select **File Transfer | Send Program** (alternatively, press **Alt+P**) from the Viewport menu.

File Transfer | Send Program Command
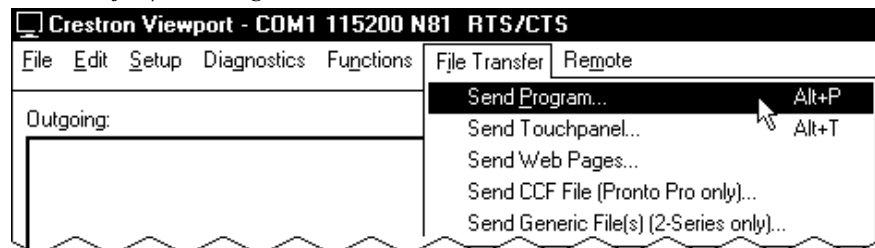
3. The "Send Program" window appears, as shown after this step. Click **Browse**, locate the compiled file (.spz) and click **Open**. This will display the program's header information and enable one or both of the *What to Send* check boxes. If the program does not contain any SIMPL+ modules, only the *SIMPL Program* check box will be enabled. If it does contain SIMPL+ modules, then the *SIMPL+Program(s)* check box will also be enabled. Select one or both check boxes and then click **Send Program** to begin the transfer.

NOTE: Refer to the latest version of the Crestron 2-Series Control Systems Reference Guide (Doc. 6256) or the respective Operations Guide for the control system for details about the other fields shown on the "Send Program" window.

"Send Program" Window
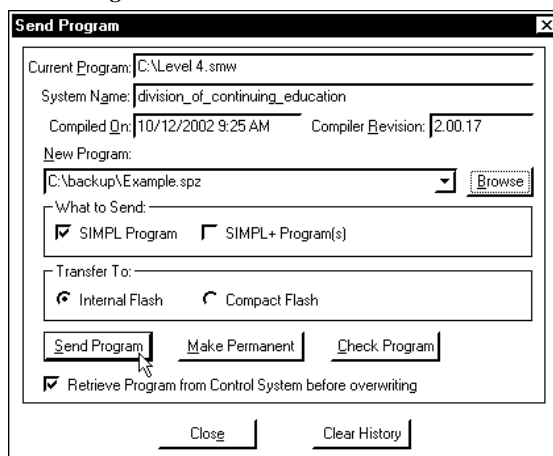
4. To verify that the program has been transferred successfully, select
   **Diagnostics | Report Program Information** or press **F7**. This should
    display a window that provides details about the current program loaded
    into the control system.

Firmware Upgrade

A firmware upgrade file has the extension .upg.

To take advantage of all the available features, it is important that the unit contains
the latest firmware available. Therefore, please check the Crestron website for the
latest version of firmware. Not every product has a firmware upgrade, but as Crestron
improves functions, adds new features, and extends the capabilities of its products,
firmware upgrades are posted. To upgrade the firmware, complete the following
steps.

1. Verify that the procedure for "Communication Settings" that begins on
    page 54 has been performed.

2. As shown after this step, select **File Transfer | Update Network
    Device Firmware…** from the Viewport menu bar.

File Transfer | Update Network Device Firmware… Command
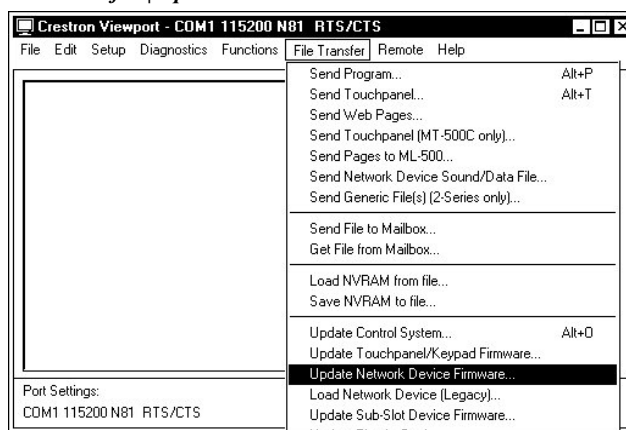
3. As shown after this step, select the Net ID of the MD5x1 and then click
    OK. The "Open" window appears (refer to the subsequent graphic).

"Select Network ID" Window
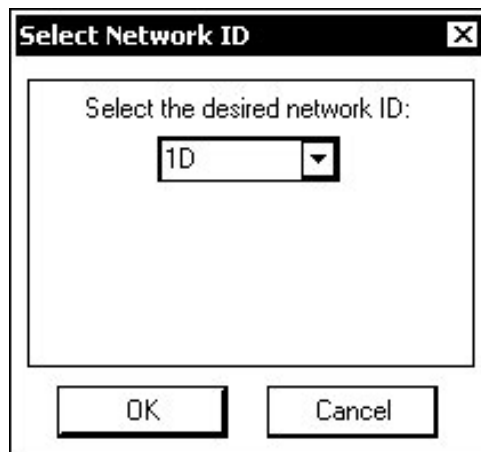
"Open" Window
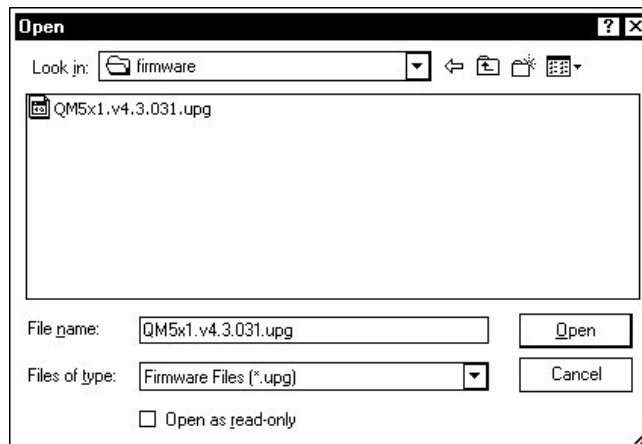
4.   Browse to the desired .upg file and click **Open** to begin the transfer.

Operation

Operating Modes

The MD5x1 operates in either the system mode or the local mode. When operating in the system mode, all switching functions are controlled by the control system. Additionally, signal routing information can be viewed using the front panel controls of the MD5x1. When operating in the local mode, all switching functions are controlled by the buttons on the front panel.

Press the **SYS** button located on the front panel to select the system mode or press the **LOCAL** button to select the local mode. The **SYS** LED will illuminate when the MD5x1 is operating in the system mode. The **LOCAL** LED will flash when the MD5x1 is in the local mode.

NOTE: The local mode may not be available if the buttons on the front panel are locked by the control system. The **LOCAL** LED will rapidly flash three times and turn off to indicate that the local mode is not available when the front panel is locked.

Viewing Signal Routes in the System Mode

When in the system mode (**SYS** LED is illuminated), pressing an input signal button will display all of the outputs that are routed to it. Pressing the output signal button will display the input signal that is connected to it.

The **AUDIO BREAK** LED will illuminate if there is any difference between the audio and video route for any signal. The **A** and **V** LEDs indicate which portion of a signal is displayed. Press **A** or **V** to select the portion to display.

NOTE: The **AUDIO BREAK** button has no function when the MD5x1 is operating in the system mode.

Switching Signals in the Local Mode

Any of the signals coming in to the MD5x1 can be switched to the output. Additionally, the audio and video portions of an input signal can be switched simultaneously or separately. For example, the audio and video portions from one signal can be sent to the output. Alternatively, a video signal from one input and an audio signal from another input can be sent to the output.

Switching Audio & Video Simultaneously:

1. Make sure that the MD5x1 is in the local mode (the **LOCAL** LED is flashing slowly).

2. If not already disabled, disable the audio break function by pressing the **AUDIO BREAK** button. Audio break is disabled when the **AUDIO BREAK** LED is off and the **V** LED is on.

NOTE: When disabling the audio break function, routes will switch if needed so that the audio output will have the same input as the video output. This means that when an audio output has a different input than the video output, the output's selected audio input will change to match the selected video input.

3. Select the input to be switched by pressing its corresponding button.

4. Enable the output by pressing the output button until the output LED is lit. When the output's LED is lit, the input signal will be routed to the output. When the output's LED is off, the output is disabled.

NOTE: If a button-press causes a change to the current switching schema, the **ENTER** LED will flash rapidly.

5. Press **ENTER** to enable the new signal routes. The **ENTER** LED will turn off.

6. Repeat for other input signals to be switched.

NOTE: Changes made on the front panel are made only after the **ENTER** button is pressed.

Switching Audio & Video Separately:

1. Make sure that the MD5x1 is in the local mode (the **LOCAL** LED is flashing slowly).

2. Enable the audio break function by pressing **AUDIO BREAK**. When audio break is enabled, the **AUDIO BREAK** and **A** LEDs will illuminate.

3. Select the audio portion of an input to be switched by pressing its corresponding button.

4. Enable the output by pressing the output button until the output LED is lit. When the output's LED is lit, the input signal will be routed to the output. When the output's LED is off, the output is disabled.

NOTE: If a button-press causes a change to the current switching architecture, the **ENTER** LED will flash rapidly.

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5. Press **V** to switch the video portion of the signal.

6. Enable the output by pressing the output button until the output LED is lit. When the output's LED is lit, the input signal will be routed to the output. When the output's LED is off, the output is disabled.

7. Press **ENTER** to enable the new signal routes. The **ENTER** LED will turn off.

8. Repeat for other input signals to be switched.

NOTE: Changes made on the front panel are made only after the **ENTER** button is pressed.

Adjusting Speech and Program Audio Levels

The volume levels of the Speech and Program Audio signals at the line-level outputs can be adjusted on the MD5x1's front panel. The volume levels of the Speech and Audio Program can be adjusted individually or simultaneously for each output channel.

Before making any volume adjustments, the volume controls must be set to adjust the desired parameter. Repeatedly press the **SELECT** button to toggle between the four adjustment modes: None, Speech, Program Audio, or Speech + Program Audio. When neither of the LEDs are illuminated, the volume adjustment buttons will not function. When the **SPEECH** LED is illuminated, any changes in volume will be made to the Speech portion of the audio signal. When the **PGM** LED is illuminated, any changes in volume will be made to the Program Audio portion of the audio signal. When the **SPEECH** and **PGM** LEDs are illuminated, any changes in volume will be made to the Speech and Program Audio portions of the audio signal.

NOTE: Depending on the mixer setting of the MD5x1, the actual volume that is adjusted can be varied.

For example, if the program audio output contains program audio and speech components, then raising the program output volume will raise the volume of both components simultaneously.

Similarly, if the speech output contains program audio and speech components, then raising the speech output volume will raise the volume of both components simultaneously.

Adjusting the Speech Signal Volume

To adjust the volume level of the Speech portion of an audio signal, perform the following steps.

1. To select the Speech or Program Audio controls, press the **SELECT** button until the **SPEECH** LED is illuminated. The **SELECT** LED will flash. When the **SPEECH** LED is illuminated, any changes in the volume level will be made to the Speech portion of the audio signal.

2. Press ▼ or ▲ to raise or lower the volume of the Speech portion of the audio signal.

   When raising the volume, the ▲ LED will flash. When the upper limit is reached, the ▲ LED will stop flashing.

   When lowering the volume, the ▼ LED will flash. When the lower limit is reached, the ▼ LED will stop flashing.

Adjusting the Program Audio Signal Volume

To adjust the volume level of the Program Audio portion of an audio signal, perform the following steps.

1. To select the Program Audio controls, press the **SELECT** button until the **PGM** LED is illuminated. The **SELECT** LED will flash. When the **PGM** LED is illuminated, any changes in the volume level will be made to the Program Audio portion of the audio signal.

2. Press ▼ or ▲ to raise or lower the volume of the Program Audio portion of the audio signal.

   When raising the volume, the ▲ LED will flash. When the upper limit is reached, the ▲ LED will stop flashing.

   When lowering the volume, the ▼ LED will flash. When the lower limit is reached, the ▼ LED will stop flashing.

Adjusting the Speech and Program Audio Simultaneously

To adjust the volume level of the Speech and Program Audio signals at the same time, perform the following steps.

1. To select the Program Audio controls, press the **SELECT** button until the **SPEECH** and **PGM** LED are illuminated. The **SELECT** LED will flash. When the **SPEECH** and **PGM** LED are illuminated, any changes in the volume level will be made to the Speech and Program Audio signals.

2. Press ▼ or ▲ to raise or lower the volume of the Speech and Program Audio signals.

   When raising the volume, the ▲ LED will flash. When the upper limit is reached, the ▼ LED will stop flashing.

   When lowering the volume, the ▼ LED will flash. When the lower limit is reached, the ▼ LED will stop flashing.

Problem Solving

Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

QM-MD5x1 Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
PWR LED does not illuminate.	MD5x1 is not receiving power.	Verify that cables plugged into the NET ports are secure.
NET LED does not illuminate.	MD5x1 Net ID is not correct.	In Viewport, poll the network to verify Net ID.
	MD5x1 Net ID is not set to match the Net ID specified in SIMPL Windows.	Verify SIMPL Windows program for setting Net ID.
Poor picture quality.	Cables improperly connected.	Verify that all cables are secure.
	Incorrect skew settings in the QM-RMCRX device.	Use Digital Media Tools software to set correct skew settings for each QM-RMCRX in the system.
Remote microphone produces harsh, distorted sound.	Input gain at remote device is set too high.	Lower microphone input gain at remote QM device.
"Hum" in microphone audio.	QM device is improperly grounded.	Ensure that all devices in the system are properly grounded.

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876]. For assistance in your local time zone, refer to the Crestron website (www.crestron.com) for a listing of Crestron worldwide offices.

You can also log onto the online help section of the Crestron website to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the QM-MD5x1, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website periodically for manual update availability and its relevance. Updates are identified as an "Addendum" in the Download column.

Appendix: Serial Protocol

All commands and responses are printable ASCII and are terminated with a <CR> (\x0D).

The serial commands listed here are grouped into front panel functions, verbose mode functions, and switching/routing functions.

Multiple serial commands cannot be strung together.

NOTE: When programming the MD5x1 using serial commands, digital and analog switching commands should not be used. However, digital and analog mixing commands can still be used. Similarly, if the MD5x1 is to be programmed with digital and analog switching commands, serial commands should not be used.

Front Panel Functions

Front Panel Lock Commands

COMMAND	FUNCTION
L0\r	Unlock front panel
L1\r	Lock front panel
L?\r	Get lock status

If the MD5x1 is in the local mode and the "Lock front panel" is sent, the MD5x1 will switch to the system mode and use the switching schema specified by the control system. If the MD5x1 is already in the system mode, the operating mode will not change.

When set via serial command, the front panel lock setting is not retained when power to the MD5x1 is recycled. To retain the panel lock setting, a digital signal must be used.

When the verbose mode is on and the lock state changes, or if the MD5x1 is polled for the status of the front panel lock, the MD5x1 replies with one of the responses listed in the following table.

Panel Lock Status Replies

MESSAGE	DEFINITION
L1\r	Front panel is locked
L0\r	Front panel unlocked

Verbose Mode Functions

The MD5x1 has a verbose mode, which can be turned on or off via serial commands only. The verbose mode is used to automatically report any changes made to the switching schema. The default setting for the verbose mode is off. If the verbose mode is on, whenever a parameter of the switch changes, a message is sent from the MD5x1 that indicates the new state of the parameter. If verbose mode is off, the MD5x1 will only send messages when queried.

The setting for the verbose mode is retained even after power to the MD5x1 is cycled.

Commands can be sent to the MD5x1 regardless of the status of the verbose mode.

Verbose Mode Commands

COMMAND	FUNCTION
R0\r	Verbose mode off
R1\r	Verbose mode on
R?\r	Get verbose mode status

When the state of the verbose mode changes to on, or if polled for status, the MD5x1 replies with one of the responses listed in the following table.

Verbose Mode Status Replies

MESSAGE	DEFINITION
R1\r	Verbose mode on
R0\r	Verbose mode off

Switching/Routing Functions

Switching/Routing Commands

COMMAND*	FUNCTION*
IxO1A\r	Switch input x to the QM output audio only*.
IxO1V\r	Switch input x to the QM output video only*.
IxO1M\r	Switches the remote microphone input to the QM output. Where "**x**" can be equal to 0 (off) or 1 (QM5 microphone pair).
IxO1\r	Switch audio and video input x, and the microphone input on QM5 to the QM output *.
CA1V1M1\r	Switches all outputs. Where **A1** is the audio input routed to the QM output, **V1** is the video input routed to the QM output, and M1 is the remote microphone input (QM5) routed to the QM output. Each audio and video input value is 2 digits, and thus can range from 00 (for no source) to 05, corresponding to inputs 1 through 5. Acceptable microphone switching values are 00 (for no microphone) or 01 (for QM5 microphone. The "**XX**" (or "**xx**") specifier should be used to denote a "don't care" condition, in which case the respective output should retain its state. Refer to the example on page 66.
O1A?\r	Get status of output A (audio).
O1V?\r	Get status of output V (video).
O1M?\r	Get status of output M (microphone).
S?\r	Get status of all output channels.

* Where "x" should equal 0 (for no source) through 5, corresponding to inputs 1 through 5;. Thus to route a digital audio source from IN 4 (RGB) to the QM output, set the **Control$** input to "I4O1A\r". Alternatively, the command string can consist of 2-digit values, e.g.,"I04O01A\r".

Any switches made to the microphone or audio inputs will use the current mixer settings.

NOTE: If an input greater than "5" or "05" is sent, the command is ignored. If an output destination less than or greater than "1" / "01" is sent to the MD5x1, the command is ignored.

When the verbose mode is on and the routing status changes while the MD5x1 is in the system mode, or if the MD5x1 is polled for the status of an output, the MD5x1 replies with one of the responses listed in the following table.

Switching/Routing Status Replies

MESSAGE	DEFINITION
IxO1A\r	New audio route if audio route has changed where x will be a two-digit number from 00 to 05.
IxO1V\r	New video route if video route has changed where x will be a two-digit number from 00 to 05.
SA1V1M1\r	Current switching schema of all of the outputs where a1 is the input routed to the QM output audio channel, v1 is the input routed to the QM output video channel, and m1 is the microphone input routed to the QM output microphone channel. Each number will be two digits.

If a switch command is sent and an output is already at the new setting, serial feedback will not be provided for that output.

NOTE: There is no serial feedback for any switches made while the MD5x1 is in the local mode, even if the verbose mode is on. Use the **LocalMode-FB** digital signal to signal when the device leaves local mode in order to trigger the "S?\r" command to query the MD5x1 for the current status of all outputs.

"Switch All" Example

The string "C020401\r" sends the following command:

• Switch Audio Input 2, Video Input 4 and no microphone signal to QM Out.

If polled for the status of all outputs (S?\r), the device response on **Control-FB$** will be: "S020400\r".

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2. Products may be returned for credit, exchange, or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.

3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

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