Crestron **QM-AE**
QuickMedia™ Audio Extractor
Operations Guide

CRESTRON®

This document was prepared and written by the Technical Documentation department at:

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QuickMedia™ Audio Extractor: QM-AE

Introduction

Features and Functions

The QM-AE is a QuickMedia™ (QM) device designed to extract the audio portion of a QM signal and provide a balanced line-level audio output. As part of a complete MediaManager A/V presentation system, the QM-AE uses an exclusive QuickMedia transport from Crestron®, allowing the QM-AE to receive audio signals over a single inexpensive CresCAT-QM cable from any QuickMedia Wall Plate, FlipTop Box, QM Processor, or QM Distribution Center.

The QM-AE breaks out the audio (program left, program right and microphone) signals to feed the respective inputs of an audio amplifier. The QM signal, which contains the audio and the video information, is looped through the QM-AE. This permits the QM-AE to be inserted anywhere within the QM network.

Functional Summary

- Programmable logic via SystemBuilder™ and SIMPL Windows, including SIMPL+®.
- Line-level speech, program left, and program right balanced/unbalanced outputs.
- Independent mixing of program left, right and microphone signals for each output.
- Electronically adjustable volume, bass, treble, mute and 12-band parametric equalizer.
- Speech delay of up to 40 ms for loudspeaker alignment.
- Automatic compensation recalls microphone equalizer settings and source compensation settings of multiple QuickMedia origination points.
- Two QuickMedia passthrough ports.
- Two Cresnet passthrough ports.
- Rack mountable with optional ST-RMK (1 space height).

Block Diagram of the QM-AE
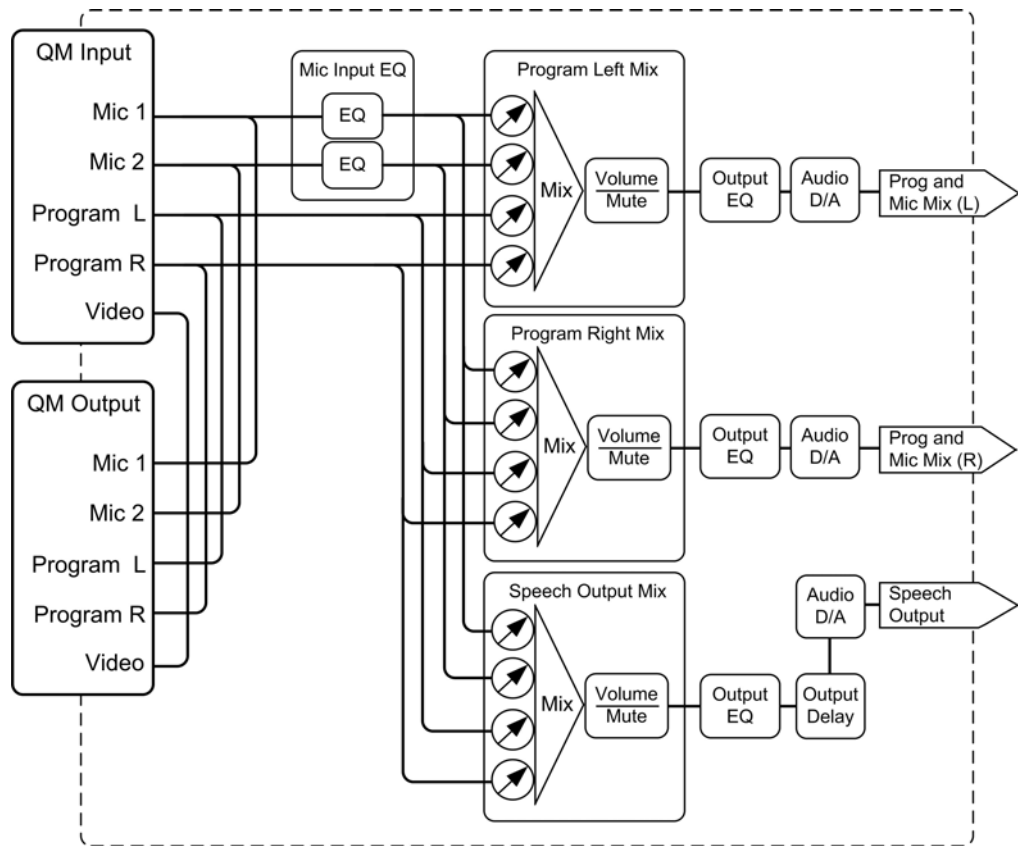
Microphone Mixing

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 then routed to the three audio mixers, left, right and speech.

Program Mixing

The microphone mix described previously, and the program left and right audio inputs are fed to a mixing stage. The mixer combines the program audio and the microphone signals into three outputs, program (stereo left and right) and speech (monaural). The microphone signals 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.

NOTE: The QM-AE is compatible with 2-Series control systems only.

NOTE: 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).

QuickMedia Transport System

Using a new, proprietary signal routing solution, signals such as composite video, S-video, RGBHV, audio, and microphone are all transported using a single cable solution called QuickMedia (QM).

The QM transport system port is capable of managing computer, video, and audio signals simultaneously through one CresCAT-QM UTP (unshielded twisted pair) wire, simplifying installations.

Routing CresCAT-QM UTP cable is less expensive and much simpler than routing multi-colored, multi-conductor coax cable. All Crestron products using the QM transport system are capable of sending and receiving QM signals via standard CresCAT-QM cable. Installation of any QM device is as simple as installing one set of QM wires from output to input. Installations are flexible, affordable, and fast.

The Crestron QuickMedia cable "CresCAT-QM" contains one CAT5E cable and one Cresnet® cable in siamese jackets.

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 QuickMedia transport mechanism performs delay compensation on each video input to compensate for signal skew, and frequency/bandwidth compensation for cable length. Signal skew occurs when part of the signal is delayed with respect to other signal components. The amount of skew largely depends on the length and the design of the wire. Because CAT5 consists of twisted pairs that are twisted together in the cable, unequal wire lengths are created.

The maximum aggregate cable length from QM transmitter to QM receiver is limited by the loss of bandwidth over long distances and the amount of available skew compensation. A cable rated at 22 ns of skew per 100 meters (328 ft.) means that a cable will have no more than a 22 ns difference between the fastest and slowest RGB signals over 100 meters of cable.

To determine the allowable maximum length of installed cable, the installer must first perform a calculation based on the skew rating of the cable.

Skew compensation is primarily relevant to RGB sources; however, any/all video or VGA signals may experience a loss of quality over very long lengths of cable. This phenomenon is due to the added resistance and capacitance of longer cable lengths, and is not particular to either Crestron and/or QuickMedia systems. To ensure sufficient bandwidth to support signal resolutions up to 1600 x 1200, the maximum aggregate cable length should not exceed 328 feet. The use of lower-resolution signals may allow increased cable length but must be tested by the installer with the sources to be used. Refer to page 9 for additional QM network wiring information.

Specifications

Specifications for the QM-AE are given in the following table.

QM-AE Specifications

SPECIFICATION	DETAILS
Cresnet Power Usage	5 W (.21 A @ 24 VDC)
Default Cresnet ID	21
Firmware Version	1.14
2-Series Control System Update Files[1,2]	PRO2 minimum cuz version 3.17 or later
	MP2 minimum cuz version 3.139 or later
	QM-RMCRX minimum cuz 3.125 (without auto compensation)
	QM-RMCRX minimum cuz 3.147 or later (with auto compensation)
Ports/Connectors	
QM	Two QuickMedia 8-wire RJ-45 ports Connects via CresCAT-QM to a QuickMedia system. (Refer to the note following the specifications table)
Cresnet	Two 4-pin 3.5 mm detachable terminal blocks. Connects to Cresnet control network
Line Out	Three 3-pin detachable terminal blocks, audio line-level balanced output connectors for left, right and speech
	Maximum line-level output 4 V_{RMS} (Balanced) 2 V_{RMS} (Unbalanced)
	Output impedance 200 Ω (Balanced) 100 Ω (Unbalanced)
	Frequency response 20 Hz to 20 kHz, +/- 0.5 dB
	Signal-to-noise ratio 20 Hz to 20 kHz, 90 dB A-weighted
	Total harmonic distortion 20 Hz to 20 kHz, 0.05%
Rack Space	1 unit high, ½ unit wide
Environmental Temperature	41° to 104°F (5° to 40°C)
Environmental Humidity	10% to 90% RH (non-condensing)
Dimensions & Weight	Height: 1.80 in (4.58 cm) Width: 7.07 in (17.96 cm) Depth: 6.33 in (16.08 cm) Weight: 2.00 lb (0.91 kg)
Accessories	ST-RMK Rack Mount Kit (Not included)

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.

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).

NOTE: Purchase CresCAT-QM for the most cost-effective cabling solution. For plenum applications, use CresCAT-QM-P. Maximum aggregate cable length is approximately 300 feet (with a delay skew of less than 22 ns) from QM transmitter to QM receiver. A maximum of two QM distribution centers may be inserted in-line (refer to page 9).

Physical Description

The QM-AE is housed in a black enclosure with labels on the front and rear panels. There are two LEDs on the front of the unit for indicating the unit's current status. All connections, except for the Cresnet and QuickMedia connections, are made on the back of the unit. There are four rubber feet on the base of the unit for stability and to prevent slippage. Refer to the following physical views.
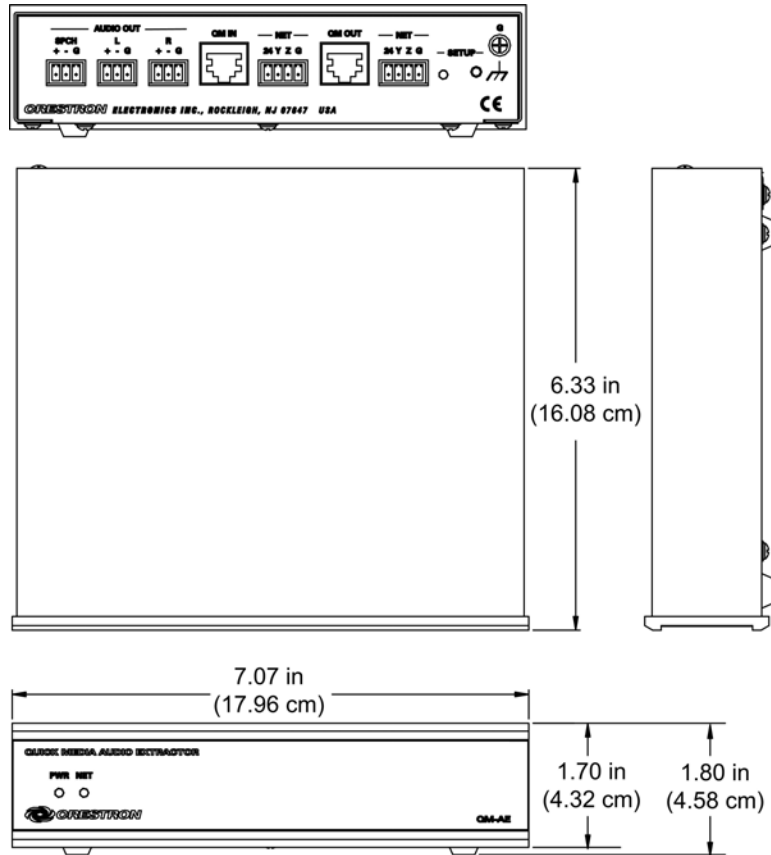
Front View

Rear View

QM-AE Physical Dimensions

Indicators

The QM-AE front panel indicators are described as follows.

PWR (Power)

This green LED illuminates when the unit is connected to Cresnet and receives 24 VDC.

NET

This yellow LED illuminates when the QM-AE communicates with the control system.

Rear Panel Ports

The QM-AE rear panel ports are illustrated and described as follows.
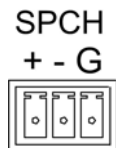
AUDIO OUT - SPCH

This 3-pin terminal connector provides a balanced audio output for the microphone (MIC) components of a QM system. (Program audio left and right can be mixed into this output.)
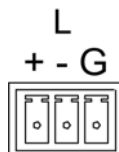
AUDIO OUT - L

This 3-pin terminal connector provides a balanced audio output for the left program audio portion of a QM system. (Speech components can be mixed into this output.)

AUDIO OUT - R

This 3-pin terminal connector provides a balanced audio output for the right program audio portion of a QM system.

QM (IN and OUT)

The two 8-pin RJ-45 QuickMedia transport ports accept CresCAT-QM audio and control signals. The audio portion of the QM signal is extracted from the QM IN connector. The QM OUT connector contains all of the original QM signals and is used to pass these signals on to another QM device. The QM port conforms to the 568B wiring standard.

RJ-45 QuickMedia Connector Pin and Pair Assignment

MALE RJ-45 CONNECTOR

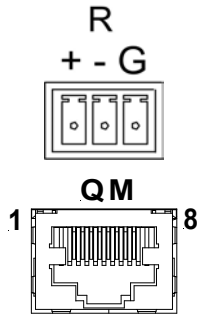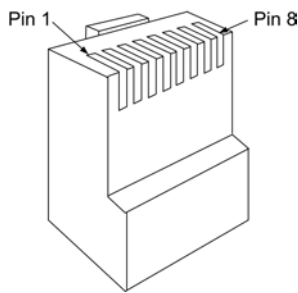| RJ-45 PIN NUMBER	WIRE COLORS (EIA 568B)	QM ASSIGNMENT RGB AND AUDIO	QM ASSIGNMENT COMPOSITE, S-VIDEO AND AUDIO
1	WHITE/ORANGE	- RGB RED	- CHROMINANCE
2	ORANGE	+ RGB RED	+ CHROMINANCE
3	WHITE/GREEN	- RGB GREEN	- LUMINANCE
4	BLUE	+ AUDIO	+ AUDIO
5	WHITE/BLUE	- AUDIO	- AUDIO
6	GREEN	+ RGB GREEN	+ LUMINANCE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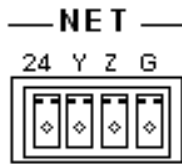
NET (Loop-through)

The two four-pin 5 mm detachable terminal block NET connectors are used for connection to Cresnet and expansion to other peripherals.

Pins 24 and G provide 24 VDC and ground.

Pins Y and Z provide communications (data).

Power to the unit (5 W) is supplied through this connector.

SETUP LED and Pushbutton

The QM-AE is TouchSettable ID (TSID) ready. The **SETUP** pushbutton and its associated LED are located on the rear of the unit and are used for setup of the QM-AE network ID during the initial configuration of a Cresnet system or when the device is being added or replaced.

Industry Compliance

As of the date of manufacture, the QM-AE 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.

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, may 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 to help calculate how much power is needed for the system (http://www.crestron.com/calculators).

When calculating the length of wire for a particular Cresnet run, the wire gauge and the Cresnet power usage of each network unit to be connected must be taken into consideration. Use Crestron Certified Wire only. 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. If the unit is a home-run from a Crestron system power supply network port, the Cresnet power usage of that unit is the Cresnet power usage of the entire run. The wire gauge and the Cresnet power usage of the run should be used in the following equation to calculate the cable length value on the equation's left side.

Cable Length Equation

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

Where: L = Length of run (or chain) in feet.
R = 6 Ohms (Crestron Certified Wire: 18 AWG (0.75 MM^2))
P = Cresnet power usage of entire run (or chain).

Make sure the cable length value is less than the value calculated on the right side of the equation. For example, a Cresnet run drawing 20 watts should not have a length of run more than 333 feet.

NOTE: All Crestron certified Cresnet wiring must consist of two twisted pairs. One twisted pair is the +24V conductor and the GND conductor, and the other twisted pair is the Y conductor and the Z conductor.

> **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., freater 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.

QM Network Wiring

For the QuickMedia transport, use CRESCAT-QM cable.

When connecting multiple QM devices, the route between a QM origination point (transmitter) and a QM endpoint (receiver) cannot have more than two midpoints (e.g., QM-MD7x2 or other QM switchers).

> **NOTE:** The QM-AE does not count as a midpoint device. It may be placed anywhere in the QM network because it only taps the audio portion of the signal. All video is passed through unaffected. Refer to the following diagram when configuring a QM network.

> **NOTE:** The QM-AE should always come before the QM-RX.

QM Network Topology
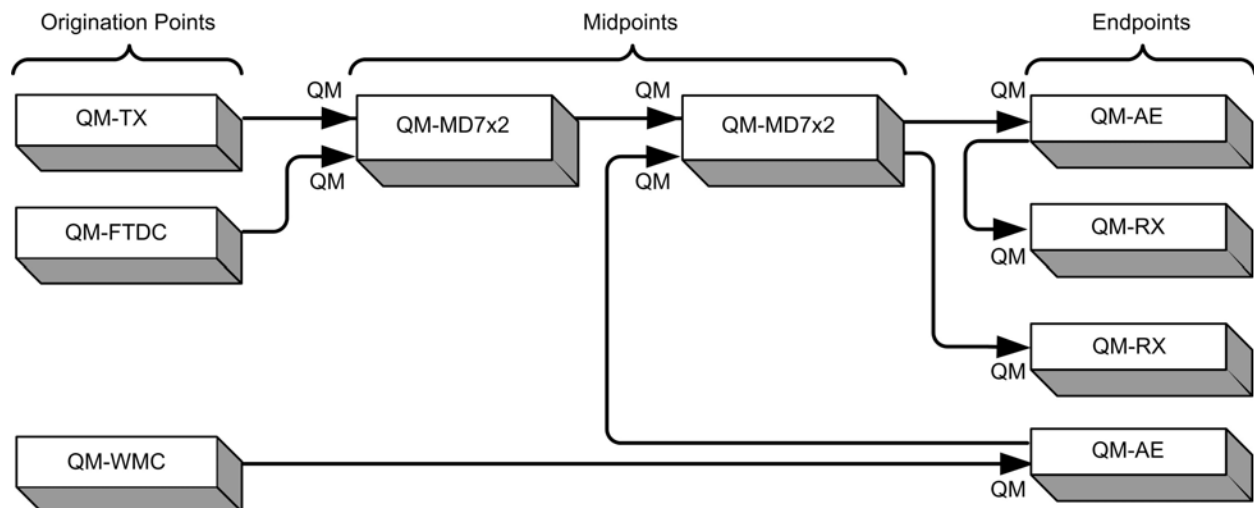
Crestron Toolbox

The Crestron Toolbox (replacement for Crestron Viewport, you may continue use Viewport if desired) is a broad-based software package that accomplishes multiple system tasks, primarily using an RS-232 or TCP/IP connection between a PC and one or more Crestron control systems.

You can use the Crestron Toolbox to:

- Observe system processes.

- Upload operating systems and firmware.

- Upload programs and touchpanel projects.

- Set or change device Network IDs.

- Change serial numbers.

- Run scripts to automate tasks.

- Perform system diagnostics, and much more.

The Crestron Toolbox allows you to perform these functions using simple graphical views and click and drag methods.

Identity Code

Every equipment and user interface within the network requires 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 21 for details of the SIMPL Windows procedure.

The Net ID of the QM-AE has been factory set to **21**. The Net IDs of multiple QM-AEs in the same system must be unique. Net IDs are changed from a personal computer (PC) via the Crestron Toolbox.

NOTE: For detailed information on establishing communication between the PC, control system, and the QM-AE, refer to "Communication Settings" on page 34. If communication cannot be established, refer to the "Troubleshooting Communications" section in the latest version of the 2-Series Control System Reference Guide (Doc. 6256), which is available from the Crestron website.

The Crestron Toolbox provides several methods to easily set or change device Net IDs for any device on the network. The following method permits you to change the Net ID of any device in the network through the "Network Device Tree" window.

NOTE: This method prevents you from setting duplicate IDs.

This method permits you to manually set the Net ID for any device in the network, can be used to set any known Net IDs that may require changing, and may also be used for non-TSID equipment. This method will not permit you to choose an ID already in use by another device. A warning message will appear if you attempt to use an ID that is already in use.

Duplicate Net ID Warning Message
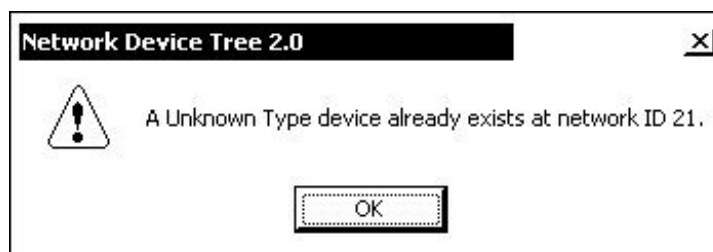
This method does not change the Net ID as assigned in SIMPL windows. Refer to page 21 for the SIMPL Windows ID change procedure.

NOTE: You may also use SystemBuilder to perform Network ID setup. Refer to page 18 for Net ID setup details using SystemBuilder.

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

2. Open Crestron Toolbox and click **Tools | Manage Address Book** and select or define the address entry for the control system.

Network Device Tree – Address Book
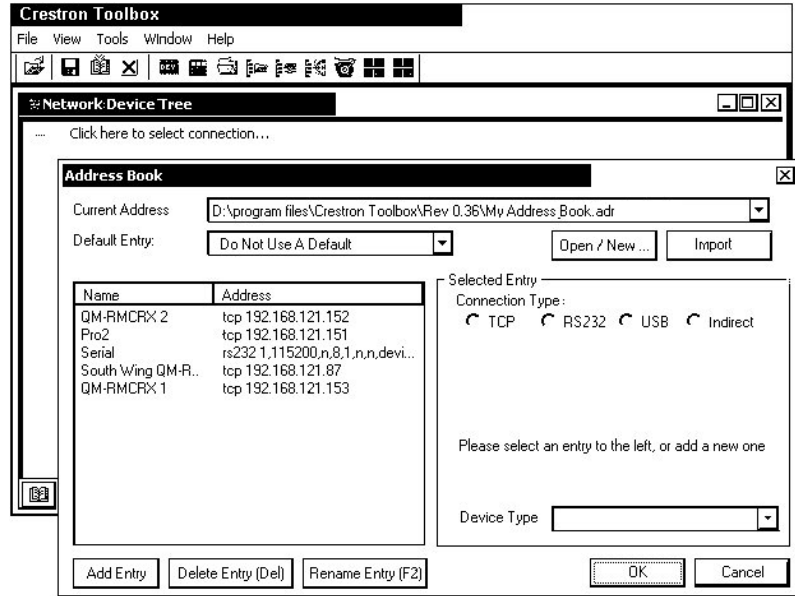
3. Once communication is established, select the Network Device Tree icon, or select **Tools | Network Device Tree**.

4. Select the connection using the pull down list or click "Click here to select connection…" to open the address book.

Network Device Tree – Pull Down Connection List
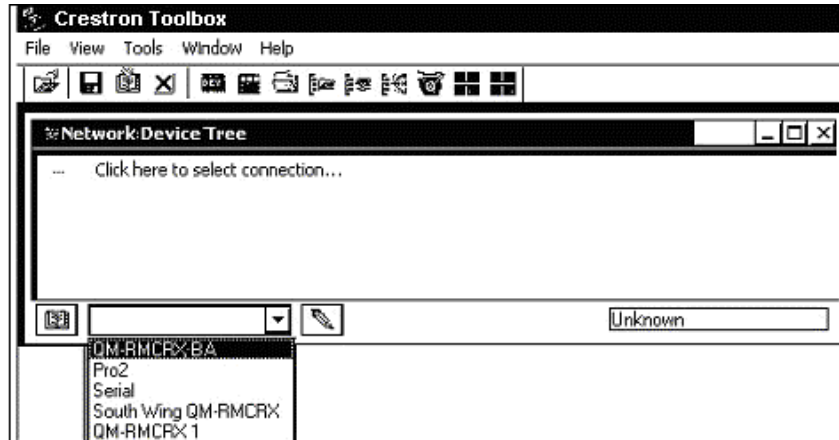
4. Select the connection (TCP or RS-232) and click **OK**.

5. The Network Device Tree displays all devices on the current network.

Network Device Tree
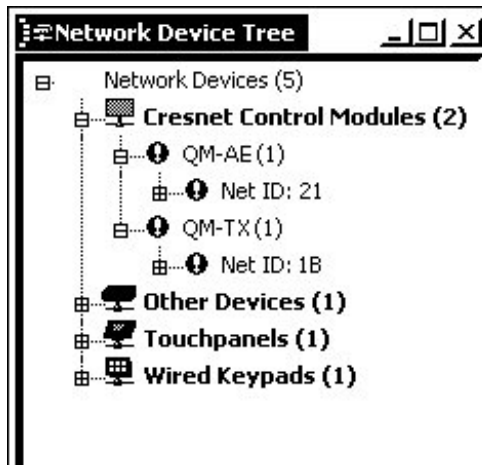
6. Right-click on the device Net ID, and when the sub-menu appears, select **Change Network ID** from the sub-menu.

Network Device Tree – Sub-Menu
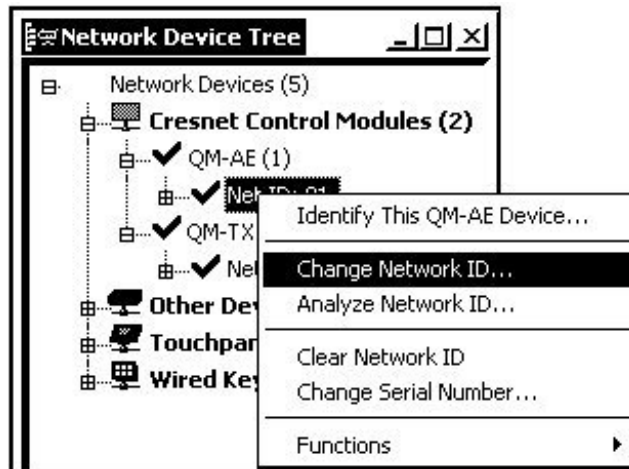
7. Enter a new Net ID and press **Enter**.

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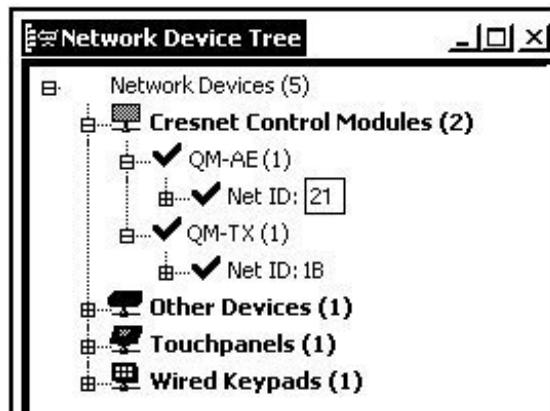
Repeat this procedure for each additional network device requiring a Net ID change.

Hardware Hookup

Refer to the following hookup diagram and, aside from attaching power last, complete the connections in any order.

NOTE: To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the specifications table. 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.

QM-AE Hookup
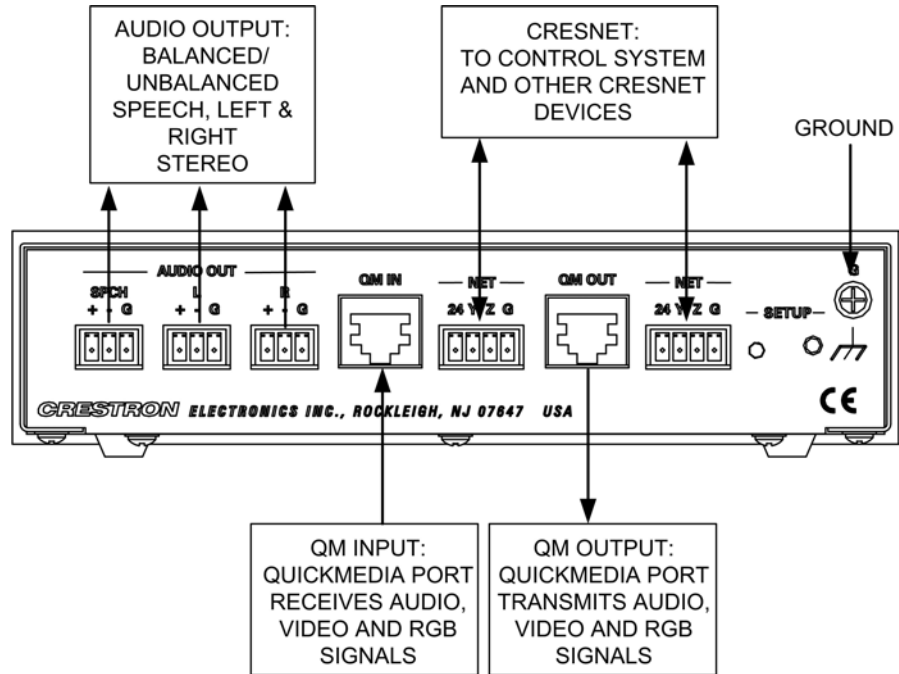
Balanced Audio Hookup to an Amplifier – Speech Example
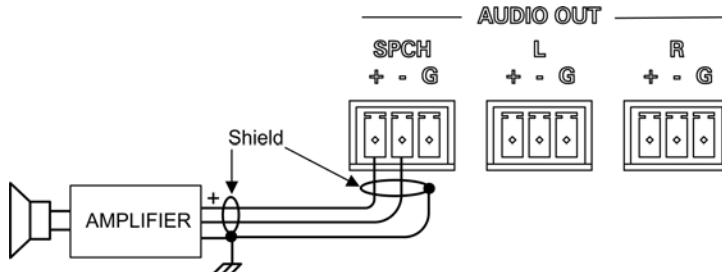
Unbalanced Audio Hookup – Stereo Left and Right Example
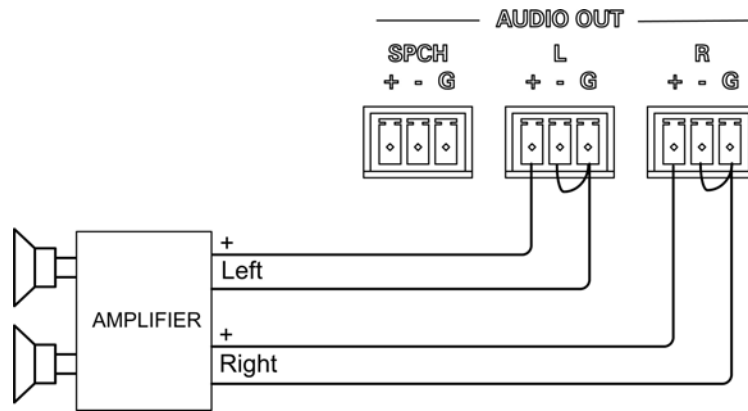
Ground Wire Connections

Proper grounding is required. Connect the ground from the QM-AE to earth ground. Connect the Cresnet shield lead at the control processor to the ground lead. The control processor chassis must also be connected to an earth ground (building steel). Refer to the following grounding diagram.

Ground Wire Connections
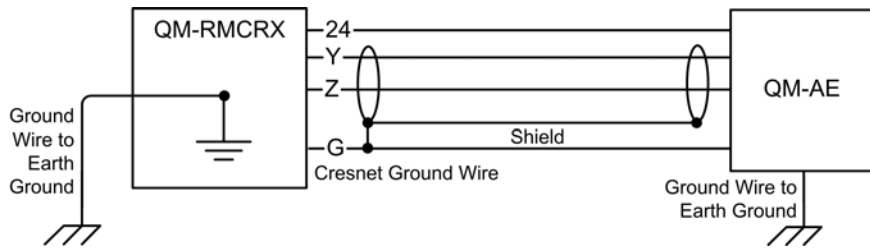
NOTE: Do not connect the shield to earth ground at the QM-AE.

Configuration 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 a 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.

Configuration is easy thanks to Crestron's Windows-based programming software. Crestron 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.

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.

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

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

- SIMPL Windows version 2.06 or later, Library 335 and SIMPL+ Cross Compiler version 1.1.

- Crestron Database version 16.4.0 or later. Required by SIMPL Windows.

- Crestron Toolbox version 1.0 or later.

- (Optional but highly recommended) SystemBuilder version 2.0. SystemBuilder 2.0 will require later versions of the following software programs: SIMPL Windows, VT Pro-e, Crestron database, and Crestron Engraver.

Programming with Crestron SystemBuilder™

The easiest method of programming, but does not offer as much flexibility as SIMPL Windows.

Crestron SystemBuilder offers automatic programming for such residential and commercial applications as audio distribution, home theater, video conferencing, and lighting. The interface of this tool guides you through a few basic steps for designating rooms and specifying the control system, touchpanels, devices, and functionality. Crestron System Builder then programs the system, including all touchpanel projects and control system logic.

Crestron SystemBuilder is fully integrated with Crestron's suite of software development tools, including SIMPL Windows, VT Pro-e, Crestron Database, User IR Database, and User Modules Directory. Crestron System Builder accesses these tools behind the scenes, enabling you to easily create robust systems.

NOTE: Modifications to the program that are made outside of SystemBuilder (for example, in VT Pro-e or SIMPL Windows) are not preserved when you reenter SystemBuilder.

SystemBuilder

After entering the appropriate information in each step, SystemBuilder creates the control system logic and touchpanel pages, ready to upload to the controller.

NOTE: Crestron SystemBuilder version 2.0 or higher is required.

The following information is a general procedure for setting up a QuickMedia system using SystemBuilder. Refer to the SystemBuilder help file for more detailed instructions.

Creating a QuickMedia System in SystemBuilder

1. Open SystemBuilder and select **File | New**. Select a **Blank System**.

   SystemBuilder – New Blank System
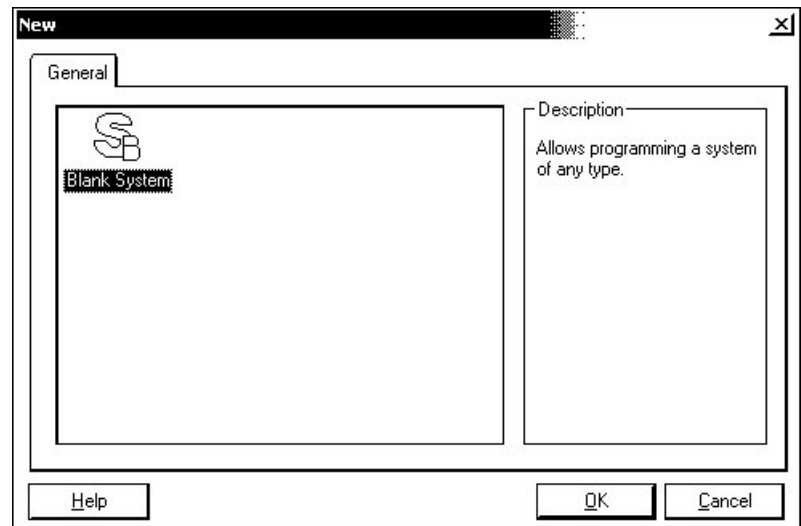
2. Select the plug-in for a QuickMedia system.

"Plug-in Selection" Window
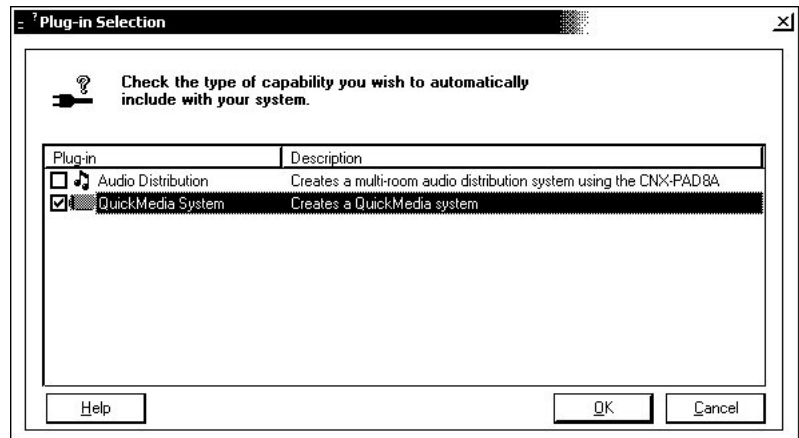
3. Select the control processor.

SystemBuilder – Select a Control Processor
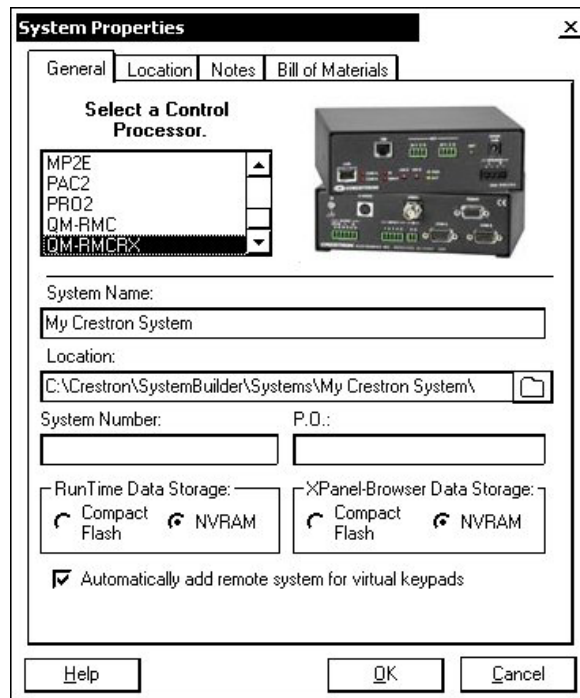
4. Specify the audio configuration.

"Audio Configuration" Window
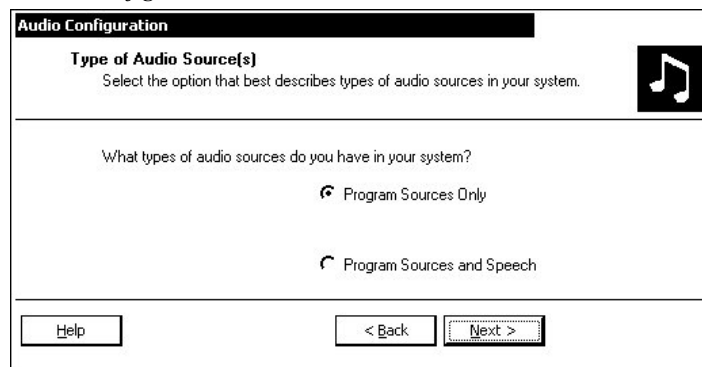
5.   Add RoomView™ if desired.

6.   Click the **Assign QuickMedia Devices and Routing** button [icon] and drag the QM-AE from the library on the right side, to the QM system on the left side.

SystemBuilder – My Crestron System
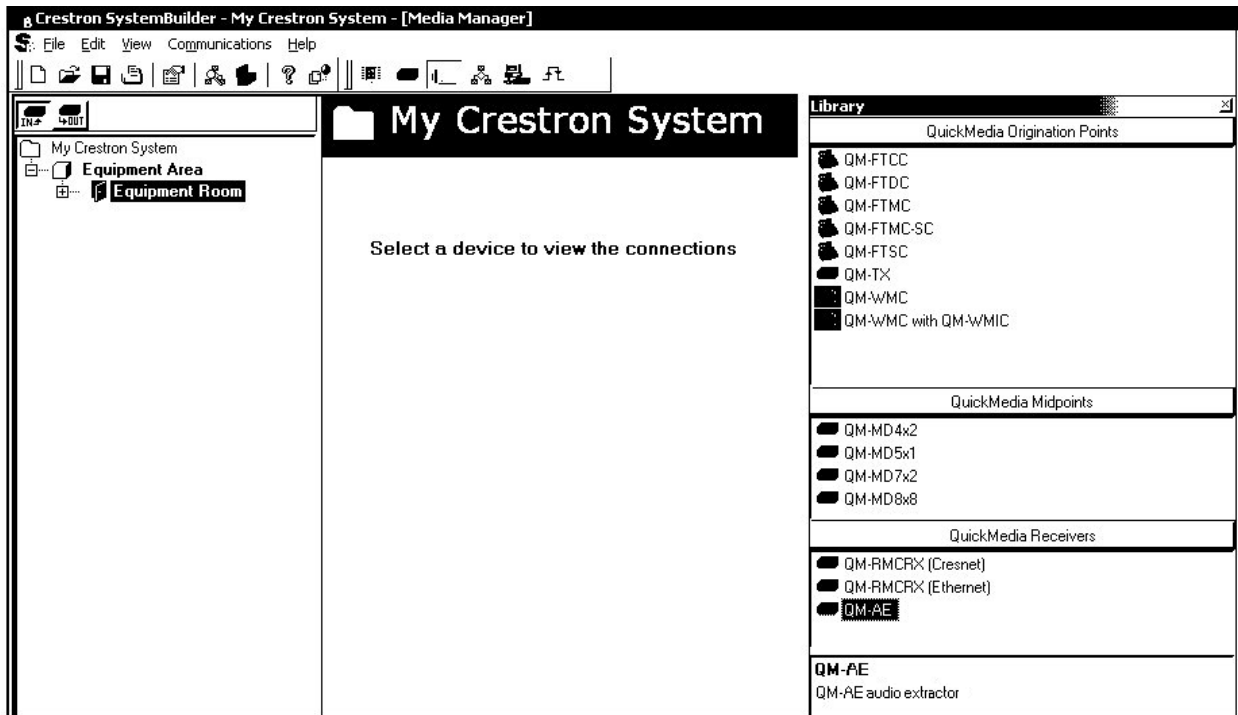
7.   Setup QM network cable routing.

8.   Build the program.

9.   Upload the program to the control processor.

10. Use the realtime view to perform the video adjustments.

Setting Net IDs in SystemBuilder

SystemBuilder provides a convenient method of selecting and assigning Net IDs to devices.

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

2.   After completing your SystemBuilder program, click the **Build and Upload** button [icon].

SystemBuilder – "Finish" Window
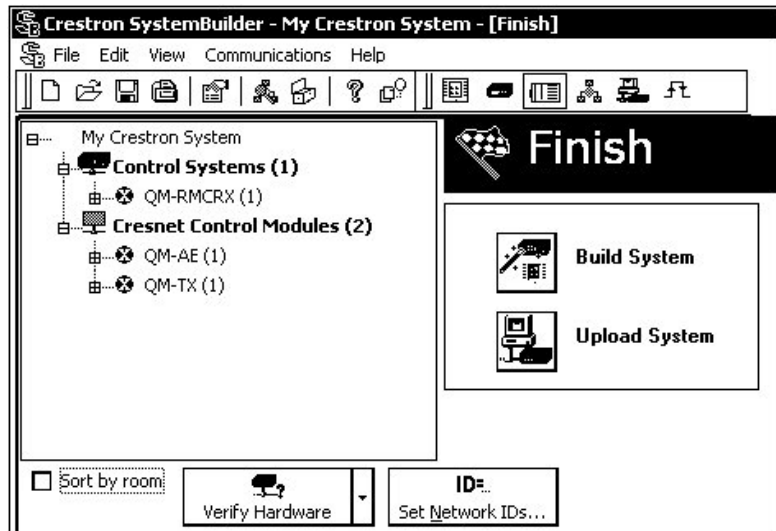
3. On the "Finish" window, click the **Set Network IDs…** button to assign the network IDs. SystemBuilder provides three methods for assigning Net IDs.

    - Drag and drop a device from the program tree on the left onto the device in the network tree on the right.

    - Right-click a device the program tree on the left and select **Setup** from the sub-menu.

    - Right-click on a device in the network tree on the right and set the Net ID directly.

SystemBuilder – "Set Network IDs" Window
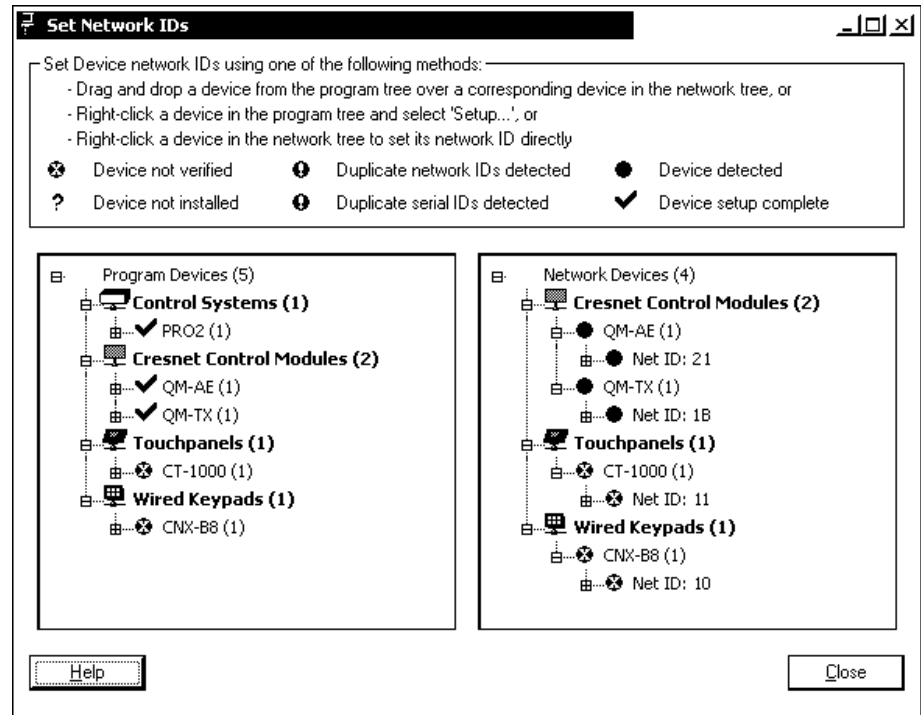
Configuring with SIMPL Windows

NOTE: The following are acceptable file extensions for programs that include a QM-AE, developed for specific control system types:

  .smw   *projectname*.smw (source file)
  .spz   *projectname*.spz (compiled file for 2-Series)
  .usp   *projectname*.usp (source code module for SIMPL+)
  .ir   *projectname*.ir   (user IR)
  .umc *projectname*.umc (user macro)
  .ush   *projectname*.ush (completed SIMPL+)

SIMPL Windows is the Crestron graphical, Windows®-based development tool for programming control systems. The SIMPL Windows interface provides two workspaces: the Configuration Manager, for configuring the control system, touchpanels, and controlled network devices; and Program Manager, for designing the logic and functionality of the control system.

In addition, you can use the powerful Crestron Toolbox utility to accomplish multiple system tasks, such as uploading the program to the control system and performing diagnostic functions.

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

NOTE: The QM-RMCRX control system is used in the following descriptions.

This section describes a sample SIMPL Windows program that includes a QM-AE.

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
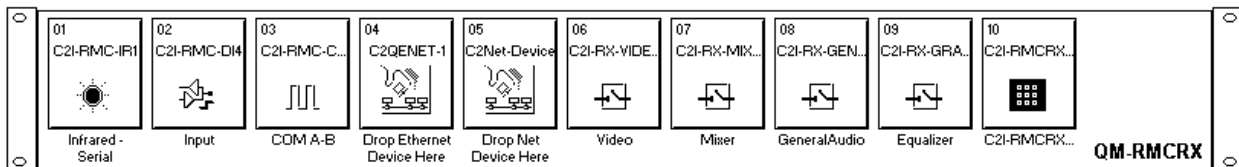
The *System Views* lower pane displays the QM-RMCRX system tree (refer to the following graphic). This tree can be expanded to display and configure the communication ports.

Expanded QM-RMCRX System Tree

```
□···▦ QM-RMCRX
    ⊞···▦ Slot 1: C2I-RMC-IR1
    ⊞···▦ Slot 2: C2I-RMC-DI4
    ⊞···▦ Slot 3: C2I-RMC-COM2-232
    ⊞···▦ Slot 4: C2QENET-1
    ⊞···▦ Slot 5: C2Net-Device
    ····▦ Slot 6: C2I-RX-VIDEO
    ····▦ Slot 7: C2I-RX-MIXER
    ····▦ Slot 8: C2I-RX-GENAUDIO
    ····▦ Slot 9: C2I-RX-GRAPHICEQ
    ····▦ Slot 10: C2I-RMCRX-FRONTPANEL
```
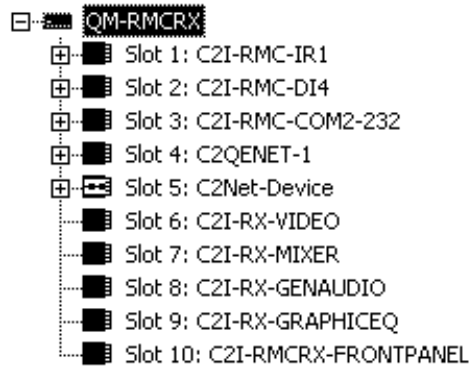
C2Net-Device Slot in Configuration Manager

To incorporate a QM-AE into the system, drag the QM-AE 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-AE in Slot 5, with a default Net ID of 21 as shown in the following illustration.

QM-AE in Slot 5 of the QM-RMCRX

```
□···▦ QM-RMCRX (With Auto Compensation)
    ⊞···▦ Slot 1: C2I-RMC-IR1
    ⊞···▦ Slot 2: C2I-RMC-DI4
    ⊞···▦ Slot 3: C2I-RMC-COM2-232
    ⊞···▦ Slot 4: C2QENET-1
    □···▦ Slot 5: C2Net-Device
        ····● ID 03: {EMPTY}
        ····● ID 04: {EMPTY}

        ····● ID 20: {EMPTY}
        ⊞···▦ ID 21: QM-AE
        ····● ID 22: {EMPTY}

        ····● ID FE: {EMPTY}
    ····▦ Slot 6: C2I-RXAC-VIDEO
    ····▦ Slot 7: C2I-RX-MIXER
    ····▦ Slot 8: C2I-RX-GENAUDIO-AUTOCOMP
    ····▦ Slot 9: C2I-RX-GRAPHICEQ
    ····▦ Slot 10: C2I-RMCRX-FRONTPANEL
```
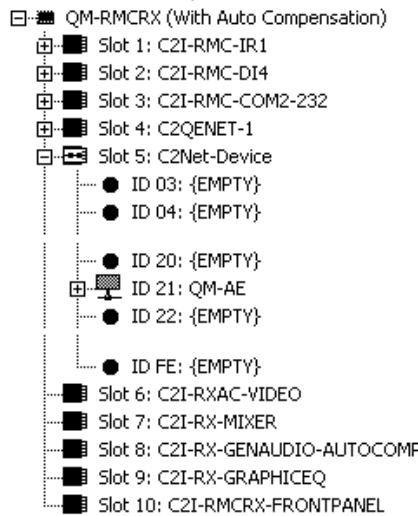
NOTE: The first QM-AE in a system is preset with a Net ID of 21 when its symbol is dragged into the upper pane of *System Views*. Additional units are assigned different Net ID numbers as they are added.

Setting the Net ID in Device Settings

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

"Device Settings" Window

```
Device Settings: Crestron QM-AE                    ×

  Device Name   Net ID   Connection Sheet   Device Info

    Net ID:  21 ▼



                    OK        Cancel       Apply
```
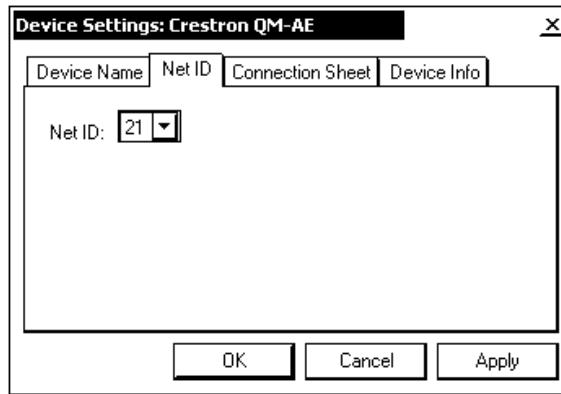
NOTE: This procedure sets the Net ID for the QM-AE in the program only. It does not automatically set the Net ID for the QM-AE itself. SIMPL Windows automatically changes Net ID values of a device added to a program if a duplicate device or a device with the same Net ID already exists in the program. 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 10.

QM-AE Symbol in Programming Manager

Programming Manager is where programmers "program" a Crestron control system by assigning signals to symbols. Click the plus sign of the QM-AE to reveal the three available slots, each with its own symbol. In Program Manager, expand the QM-AE to view the individual sub-slots, then drag the desired symbol to *Detail View*. The QM-AE sub-slots and corresponding symbols are described in the following paragraphs. Tables defining the input and output signals follow each section.

QM-AE Slots

```
Central Control Modules : QM-RMCRX (With Auto Compensation)
    Slot-01 : C2I-RMC-IR1 1 Port IR/1-Way RS-232 Card : C2I-RMC-IR1
    Slot-02 : C2I-RMC-DI4 Built-in Digital Input Card : C2I-RMC-DI4
    Slot-03 : C2I-RMC-COM2-232 Built-in 2 RS-232 Ports : C2I-RMC-COM2-232
    Slot-04 : C2ZQ-Ethernet : C2QENET-1
    Slot-05 : Cresnet : C2Net-Device
        ID-21 : QM-AE : QM-AE
            Slot-01 : C2I-AE-GENAUDIO-AUTOCOMP : C2I-AE-GENAUDIO-AUTOCOMP
            Slot-02 : C2I-RX-MIXER : C2I-RX-MIXER
            Slot-03 : C2I-RX-GRAPHICEQ : C2I-RX-GRAPHICEQ
    Slot-06 : C2I-RXAC-VIDEO : C2I-RXAC-VIDEO
    Slot-07 : C2I-RX-MIXER : C2I-RX-MIXER
    Slot-08 : C2I-RX-GENAUDIO-AUTOCOMP : C2I-RX-GENAUDIO-AUTOCOMP
    Slot-09 : C2I-RX-GRAPHICEQ : C2I-RX-GRAPHICEQ
    Slot-10 : C2I-RMC-FRONTPANEL : C2I-RMCRX-FRONTPANEL
    Logic
    Signal List
```

NOTE: Because video auto compensation travels on the audio line, it does not function when audio is split up from video as in the QM-MD4X2 or any QM switcher with audio breakaway. Audio compensation is transmitted over QM in the first packet, which consists of ten bytes. The first byte is the Transmitter ID, the next two bytes are the audio compensation, and the last eight bytes are the microphone EQ trims.

Slot 1 – C2I-AE-GENAUDIO-AUTOCOMP

The General Audio Controls module is built into slot 01 (with Auto Compensation).

The QM-AE provides four channels of digital audio as follows:

- The two channels of stereo program audio are referred to as LEFT and RIGHT.

- The two microphone channels are referred to as MIC 1 and MIC 2.

The QM-AE 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 QM-AE and a specific QM transmitter.

When auto-compensation is enabled (by setting the **<EnableAutoComp>** input high), 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 QM-AE.

NOTE: Mic tone settings apply equally to both microphones.

Detail View, General Audio – Auto Compensation

General Audio – Auto Compensation Signals

SIGNAL TYPE AND NAME	DESCRIPTION
Digital input **<EnableAutoComp>**	Enables automatic audio compensation for as long as the input is high. High/1 (level sensitive) = Enable auto-compensation Low/0 = Disable auto-compensation
Digital input **<MuteMicMixOut>**	Mutes the AUDIO SPCH channel for as long as the input is high. High/1 (level-sensitive) = Mute AUDIO SPCH Low/0 = Un-mute audio
Digital output: **<MuteMicMixOut-F>**	Indicates the mute status of the AUDIO SPCH channel. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted Low/0 = Audio is un-muted
Digital input **<MuteProgLOut>**	Mutes the AUDIO L channel for as long as the input is high. High/1 (level-sensitive) = Mute AUDIO L Low/0 = Un-mute audio
Digital output **<MuteProgLOut-F>**	Indicates the mute status of the AUDIO L channel. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted Low/0 = Audio is un-muted
Digital input **<MuteProgROut>**	Mutes the AUDIO R channel for as long as the input is high. High/1 (level-sensitive) = Mute AUDIO R Low/0 = Un-mute audio
Digital output **<MuteProgROut-F>**	Indicates the mute status of the AUDIO R channel. The feedback will remain high for as long as the output is muted. High/1 = Audio is muted Low/0 = Audio is un-muted
Digital input **<SaveCompPreset>**	This signal has NO effect if automatic audio compensation is enabled. Saves the source gain compensation defined by **<ProgComp>** to the preset given by <Preset#> when the input is held high. High/1 (level-sensitive) = Save compensation preset Low/0 = No preset save
Digital input **<RecallCompPreset>**	This signal has NO effect if automatic audio compensation is enabled. Recalls the source gain compensation preset given by **<Preset#>** when the input is held high. The source gain compensation is added to program volume and is applied equally to both the AUDIO L and R channels. High/1 (level-sensitive) = Recall compensation preset Low/0 = No preset recall
Analog input **<MicMixVol>**	Adjusts the volume level on the AUDIO SPCH channel. Valid values range from 0% (-80dB) to 100% (+20dB).
Analog output **<MicMixVol-F>**	Indicates the volume level of the AUDIO SPCH channel.
Analog inputs **<MicMixBass>** **<MicMixTreble>**	Adjusts the bass and treble on the AUDIO SPCH channel. Valid values range from 0% (-15dB) to 100% (+15dB). A value of 50% signifies a flat level corresponding to 0dB.
Analog input **<MicMixDelay>**	Sets the speech delay, in milliseconds, for the AUDIO SPCH channel. Valid analog values range from 0d (0ms) to 40d (40ms). Out of range values will clip the speech delay to the minimum or maximum value.
Analog output **<MicMixDelay-F>**	Indicates the speech delay being applied to the AUDIO SPCH channel.

Continued on the following page

General Audio – Auto Compensation Signals (continued)

SIGNAL TYPE AND NAME	DESCRIPTION
Analog input **<ProgVolL>**	Adjusts the volume level on the AUDIO L channel. Valid values range from 0% (-80dB) to 100% (+20dB).
Analog output **<ProgVolL-F>**	Indicates the volume level of the AUDIO L channel.
Analog input **<ProgVolR>**	Adjusts the volume level on the AUDIO R channel. Valid values range from 0% (-80dB) to 100% (+20dB).
Analog output **<ProgVolR-F>**	Indicates the volume level of the AUDIO R channel.
Analog inputs **<ProgBass>** **<ProgTreble>**	Adjusts the treble and bass on the AUDIO L and R channels. Valid values range from 0% (-15dB) to 100% (+15dB). The treble and bass are applied equally to both channels. A value of 50% signifies a flat level corresponding to 0dB.
Analog input **<Preset#>**	This signal has NO effect if automatic audio compensation is enabled. Sets the compensation preset number that will be recalled when **<RecallCompPreset>** is held high. Valid values range from 1d to 192d. Out of range values are ignored.
Analog input **<ProgComp>**	This signal has NO effect if automatic audio compensation is enabled. Sets the source gain compensation that will be saved to the preset given by **<Preset#>** when **<SaveCompPreset>** is held high. Valid analog values range from -100d (-10dB) to +100d (+10dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the compensation to the minimum or maximum value.
Analog input **<ProgComp-F>**	Indicates the current source gain compensation.

Slot 2 – C2I-RX-MIXER

The C2I-RX-Mixer module is built into slot 02 of the QM-AE, and receives four channels of digital audio as follows:
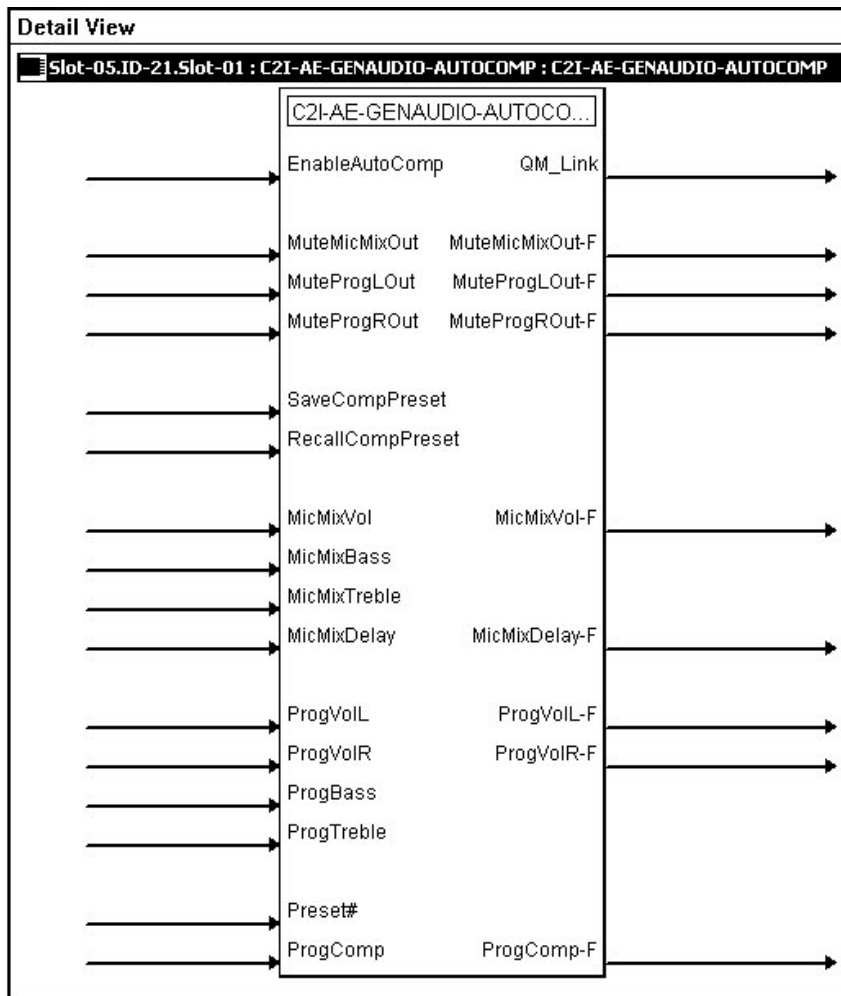
- Two channels of stereo program audio, referred to as LEFT and RIGHT.

- Two microphone channels referred to as MIC 1 and MIC 2.

The unit provides three balanced/unbalanced line level audio outputs labeled L, R, and SPCH.

The Mixer module can mix the four input channels into any output channel. In addition, an onboard four-band equalizer (160 Hz, 500 Hz, 1.2 kHz, and 3 kHz) for MIC 1 and MIC 2 applies equalization to the mic audio before mixing.

The Mixer module provides up to 5 mixer presets, where a mixer preset consists of 12 mixing levels (four mixing levels each for AUDIO L, R, and SPCH).

In addition, the Mixer module supports up to 10 mic EQ presets for MIC 1 and MIC 2, where a mic EQ preset consists of eight trim values (four trims each for MIC 1 and MIC 2).

When audio automatic compensation is enabled, the mic EQ presets are not used. Instead, the eight mic EQ values stored at the QM transmitter for the selected audio source are propagated to the QM receiver.

Detail View of the C2I-RX-MIXER Symbol

```
┌─────────────────────────────────────────────────────────────┐
│ Detail View                                                   │
├─────────────────────────────────────────────────────────────┤
│ ▣ Slot-05.ID-21.Slot-02 : C2I-RX-MIXER : C2I-RX-MIXER         │
│                                                               │
│              ┌──────────────────────────────────┐            │
│              │        C2I-RX-MIXER              │            │
│              ├──────────────────────────────────┤            │
│              │ SaveMixerPreset                  │            │
│  ───────────▶│                                  │            │
│              │ RecallMixerPreset                │            │
│  ───────────▶│                                  │            │
│              │                                  │            │
│              │ SaveMicEQPreset                  │            │
│  ───────────▶│                                  │            │
│              │ RecallMicEQPreset                │            │
│  ───────────▶│                                  │            │
│              │                                  │            │
│              │ MixerPreset#                     │            │
│  ───────────▶│                                  │            │
│              │ MicEQPreset#                     │            │
│  ───────────▶│                                  │            │
│              │                                  │            │
│              │ Mic1ToMicMixOut   Mic1ToMicMixOut_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ Mic2ToMicMixOut   Mic2ToMicMixOut_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ LeftToMicMixOut    LeftToMicMixOut_F │        │
│  ───────────▶│                                  │───────────▶│
│              │ RightToMicMixOut  RightToMicMixOut_F │        │
│  ───────────▶│                                  │───────────▶│
│              │                                  │            │
│              │ Mic1ToPgmLeft      Mic1ToPgmLeft_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ Mic2ToPgmLeft      Mic2ToPgmLeft_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ LeftInToPgmLeft    LeftInToPgmLeft_F │        │
│  ───────────▶│                                  │───────────▶│
│              │ RightInToPgmLeft  RightInToPgmLeft_F │        │
│  ───────────▶│                                  │───────────▶│
│              │                                  │            │
│              │ Mic1ToPgmRight    Mic1ToPgmRight_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ Mic2ToPgmRight    Mic2ToPgmRight_F │         │
│  ───────────▶│                                  │───────────▶│
│              │ LeftInToPgmRight  LeftInToPgmRight_F │        │
│  ───────────▶│                                  │───────────▶│
│              │ RightInToPgmRight RightInToPgmRight_F │       │
│  ───────────▶│                                  │───────────▶│
│              │ Mic1EQTrim1        Mic1EQTrim1_F  │           │
│  ───────────▶│       ⋮                 ⋮        │───────────▶│
│              │ Mic1EQTrim4        Mic1EQTrim4_F  │           │
│  ───────────▶│                                  │───────────▶│
│              │ Mic2EQTrim1        Mic2EQTrim1_F  │           │
│  ───────────▶│       ⋮                 ⋮        │───────────▶│
│              │ Mic2EQTrim4        Mic2EQTrim4_F  │           │
│  ───────────▶│                                  │───────────▶│
│              └──────────────────────────────────┘            │
└─────────────────────────────────────────────────────────────┘
```

Audio Mixer Signals

SIGNAL TYPE AND NAME	DESCRIPTION
Digital input <**SaveMixerPreset**>	Saves the twelve mixing levels (four mixing levels each for the AUDIO L, R, and SPCH output channels) to the preset given by <**MixerPreset#**> 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

Continued on the following page

Audio Mixer Signals (continued)

SIGNAL TYPE AND NAME	DESCRIPTION
Digital input <**RecallMixerPreset**>	Recalls the preset given by <**MixerPreset#**> when the input is held high. Recalling a preset adjusts twelve mixing levels (four mixing levels each for the AUDIO L, R and SPCH output channels). High/1 (level-sensitive) = Recall mixer preset Low/0 = No preset recall
Digital input <**SaveMicEQPreset**>	This signal has NO effect if automatic audio compensation is enabled. Saves the mic EQ preset defined by <**MicEQPreset#**> when the input is held high. A mic EQ preset consists of eight EQ trims—four trims each for MIC 1 and MIC 2 (at 160Hz, 500Hz, 1.2kHz, and 3kHz). High/1 (level-sensitive) = Save mic EQ preset Low/0 = No preset recall
Digital input <**RecallMicEQPreset**>	This signal has NO effect if automatic audio compensation is enabled. Recalls the mic EQ preset defined by <**MicEQPreset#**> when the input is held high. Recalling a preset applies eight EQ trims—four trims each for MIC 1 and MIC 2 (at 160Hz, 500Hz, 1.2kHz, and 3kHz). High/1 (level-sensitive) = Recall mic EQ preset Low/0 = No preset recall
Analog input <**MixerPreset#**>	Sets the mixer preset number that will save or recall the twelve mixing levels (three mixing levels each for AUDIO L, R and SPCH). Valid analog values range from 1d to 5d. Out of range values are ignored.
Analog input <**MicEQPreset#**>	This signal has NO effect if automatic audio compensation is enabled. Sets the mic mixer preset number that will save or recall the eight mic EQ trims (four trims each for MIC 1 and MIC 2). Valid analog values range from 1d to 10d. Out of range values are ignored.
Analog input <**Mic1ToMicMixOut**>	Sets the MIC 1 mixing level on the AUDIO SPCH output channel. MIC 1 is mixed with MIC 2, LEFT IN and RIGHT IN, and routed to the AUDIO SPCH channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output <**Mic1ToMicMixOut_F**>	Indicates the current mixing level being applied to MIC 1 on the AUDIO SPCH channel.
Analog input <**Mic2ToMicMixOut**>	Sets the MIC 2 mixing level on the AUDIO SPCH output channel. MIC 2 is mixed with MIC 1, LEFT IN and RIGHT IN, and routed to the AUDIO SPCH channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output <**Mic2ToMicMixOut_F**>	Indicates the current mixing level being applied to MIC 2 on the AUDIO SPCH channel.

Continued on the following page

Audio Mixer Signals (continued)

SIGNAL TYPE AND NAME	DESCRIPTION
Analog input **\<LeftToMicMixOut\>**	Sets the LEFT IN mixing level on the AUDIO SPCH output channel. LEFT IN is mixed with RIGHT IN, MIC 1 and MIC 2, and routed to the AUDIO SPCH channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **\<LeftToMicMixOut_F\>**	Indicates the current mixing level being applied to LEFT IN on the AUDIO SPCH channel.
Analog input **\<RightToMicMixOut\>**	Sets the RIGHT IN mixing level on the AUDIO SPCH channel. RIGHT IN is mixed with LEFT IN, MIC 1 and MIC 2, and routed to the AUDIO SPCH channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **\<RightToMicMixOut_F\>**	Indicates the current mixing level being applied to RIGHT IN on the AUDIO SPCH channel.
Analog input **\<Mic1ToPgmLeft\>**	Sets the MIC 1 mixing level on the AUDIO L channel. MIC 1 is mixed with MIC 2, LEFT IN and RIGHT IN, and routed to the AUDIO L output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **\<Mic1ToPgmLeft_F\>**	Indicates the current mixing level being applied to MIC 1 on the AUDIO L channel.
Analog input **\<Mic2ToPgmLeft\>**	Sets the MIC 2 mixing level on the AUDIO L channel. MIC 2 is mixed with MIC 1, LEFT IN and RIGHT IN, and routed to the AUDIO L output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **\<Mic2ToPgmLeft_F\>**	Indicates the current mixing level being applied to MIC 2 on the AUDIO L channel.

Continued on the following page

Audio Mixer Signals (continued)

SIGNAL TYPE AND NAME	DESCRIPTION
Analog input **<LeftInToPgmLeft>**	Sets the LEFT IN mixing level on the AUDIO L channel. LEFT IN is mixed with RIGHT IN, MIC 1 and MIC 2, and routed to the AUDIO L output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **<LeftInToPgmLeft_F>**	Indicates the current mixing level being applied to LEFT IN on the AUDIO L channel.
Analog input **<RightInToPgmLeft>**	Sets the RIGHT IN mixing level on the AUDIO L channel. RIGHT IN is mixed with LEFT IN, MIC 1 and MIC 2, and routed to the AUDIO L output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **<RightInToPgmLeft_F>**	Indicates the current mixing level being applied to RIGHT IN on the AUDIO L channel.
Analog input **<Mic1ToPgmRight>**	Sets the MIC 1 mixing level on the AUDIO R channel. MIC 1 is mixed with MIC 2, LEFT IN and RIGHT IN, and routed to the AUDIO R output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **<Mic1ToPgmRight_F>**	Indicates the current mixing level being applied to MIC 1 on the AUDIO R channel.
Analog input **<Mic2ToPgmRight>**	Sets the MIC 2 mixing level on the AUDIO R channel. MIC 2 is mixed with MIC 1, LEFT IN and RIGHT IN, and routed to the AUDIO R output channel. Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB). A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute. A mixing level of 0d (0dB) means that the signal will pass unaffected. Out of range values will clip the mixing level to the minimum or maximum value.
Analog output **<Mic2ToPgmRight_F>**	Indicates the current mixing level being applied to MIC 2 on the AUDIO R channel.

Audio Mixer Signals (continued)

SIGNAL TYPE AND NAME	DESCRIPTION
Analog input <**LeftInToPgmRight**>	Sets the LEFT IN mixing level on the AUDIO R channel.
	LEFT IN is mixed with RIGHT IN, MIC 1 and MIC 2, and routed to the AUDIO R output channel.
	Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB).
	A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute.
	A mixing level of 0d (0dB) means that the signal will pass unaffected.
	Out of range values will clip the mixing level to the minimum or maximum value.
Analog output <**LeftInToPgmRight_F**>	Indicates the current mixing level being applied to LEFT IN on the AUDIO R channel.
Analog input <**RightInToPgmRight**>	Sets the RIGHT IN mixing level on the AUDIO R channel.
	RIGHT IN is mixed with LEFT IN, MIC 1 and MIC 2, and routed to the AUDIO R output channel.
	Valid analog values range from -800d (-80dB) to 0d (0dB), adjustable in increments of 0.1dB (1d = 0.1dB).
	A value of -800d (-80dB) signifies the minimum mixing level and will cut the mixing level to a complete mute.
	A mixing level of 0d (0dB) means that the signal will pass unaffected.
	Out of range values will clip the mixing level to the minimum or maximum value.
Analog output <**RightInToPgmRight_F**>	Indicates the current mixing level being applied to RIGHT IN on the AUDIO R channel.
Analog inputs <**Mic1EQTrim1**> through <**Mic1EQTrim4**>	These signals have NO effect if automatic audio compensation is enabled.
	Sets the four MIC 1 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz).
	Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB).
	A trim of 0d (0dB) means that the signal will pass unaffected.
	Out of range values will clip the trim to the minimum or maximum value.
Analog outputs <**Mic1EQTrim1_F**> through <**Mic1EQTrim4_F**>	Indicates the trim being applied to each band of the MIC 1 equalizer.
Analog inputs <**Mic2EQTrim1**> through <**Mic2EQTrim4**>	These signals have NO effect if automatic audio compensation is enabled.
	Sets the four MIC 2 EQ trims (at 160Hz, 500Hz, 1.2kHz, and 3kHz).
	Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB).
	A trim of 0d (0dB) means that the signal will pass unaffected.
	Out of range values will clip the trim to the minimum or maximum value.
Analog outputs <**Mic2EQTrim1_F**> through <**Mic2EQTrim4_F**>	Indicates the trim being applied to each band of the MIC 2 equalizer.

Slot 3 – C2I-RX-GRAPHICEQ

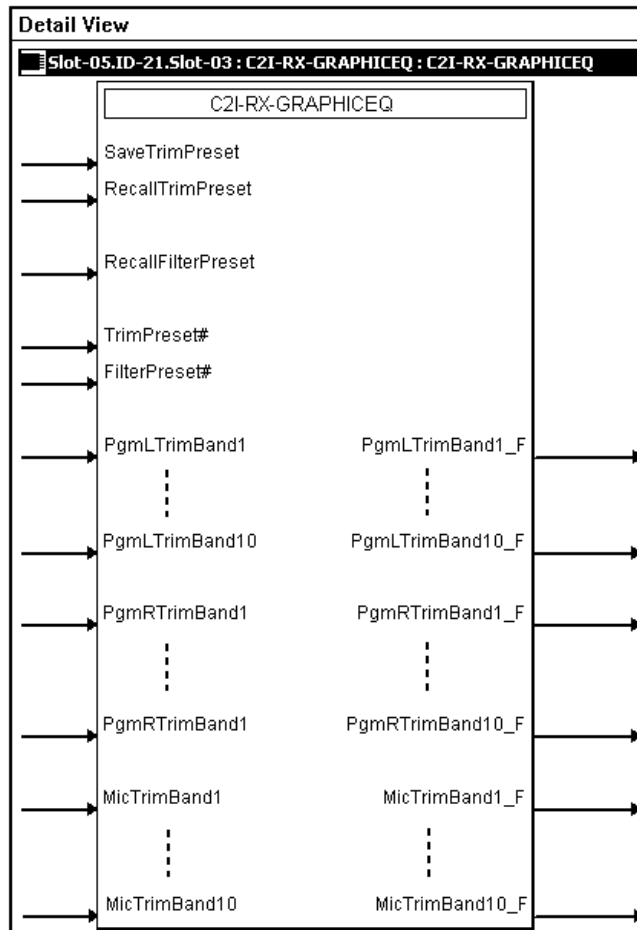The C2I-RX Graphic EQ module is built into slot 03 of the QM-AE.

The software provides graphic and parametric equalization for each of the three audio output channels: Program Left, Program Right and Speech Audio (Mic Mix Out). The graphic EQ portion can be programmed using either SIMPL Windows or SystemBuilder software.

The SystemBuilder software provides 12 filters per output, with a maximum of 10 filters available for graphic EQ. SystemBuilder provides five modes of audio equalization.

- 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

- 5 bands graphic + 7 bands parametric

- 5 bands graphic + 7 bands parametric, with speech optimization

- 12 bands parametric (0 bands graphic)

NOTE: Programming the graphic equalizer through SIMPL Windows may override the SystemBuilder software settings. For example, if the 12-band parametric equalizer mode is specified in SystemBuilder and the SIMPL Windows program selects/recalls filter preset #2, the system will allow the change. Filter presets can only be recalled from SIMPL Windows and not modified.

Detail View of Graphic Equalization Module

Graphic Equalization Signals

SIGNAL TYPE AND NAME	DESCRIPTION
Digital inputs **<SaveTrimPreset>**	Saves the 30 trim values (10 each for the AUDIO L, R and SPCH channels) to the trim preset given by **<TrimPreset#>** when the input is held high. The trims are set by the trim band analog values. High/1 (level-sensitive) = Save trim preset Low/0 = No trim preset save
Digital input **<RecallTrimPreset>**	Recalls the trim preset given by **<TrimPreset#>** when the input is held high. Recalling a preset adjusts 30 trims (10 trims each for the AUDIO L, R and SPCH channels). High/1 (level-sensitive) = Recall trim preset Low/0 = No trim preset recall
Digital input **<RecallFilterPreset>**	Recalls the filter preset given by **<FilterPreset#>** when the input is held high. (The filters are only settable using SystemBuilder software.) High/1 (level-sensitive) = Recall filter preset Low/0 = No filter preset recall
Analog input **<TrimPreset#>**	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.
Analog input **<FilterPreset#>**	Sets the filter preset number that will be recalled when **<RecallFilterPreset>** is held high. Valid analog values range from 1d to 5d. Out of range values are ignored.
Analog inputs **<PgmLTrimBand1>** through **<PgmLTrimBand10>**	Sets the 10 trim values for the AUDIO L channel. Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB). A trim of 0d (0dB) means that the signal will pass unaffected. Out of range will clip the trim to the minimum or maximum value.
Analog outputs **<PgmLTrimBand1_F>** through **<PgmLTrimBand10_F>**	Indicates the 10 trim values being applied to the AUDIO L channel.
Analog inputs **<PgmRTrimBand1>** through **<PgmRTrimBand10>**	Sets the 10 trim values for the AUDIO R channel. Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB). A trim of 0d (0dB) means that the signal will pass unaffected. Out of range will clip the trim to the minimum or maximum value.
Analog outputs **<PgmRTrimBand1_F>** through **<PgmRTrimBand10_F>**	Indicates the 10 trim values being applied to the AUDIO R channel.
Analog inputs **<MicTrimBand1>** through **<MicTrimBand10>**	Sets the 10 trim values for the AUDIO SPCH channel. Valid analog values range from -120d (-12dB) to +120d (+12dB), adjustable in increments of 0.1dB (1d = 0.1dB). A trim of 0d (0dB) means that the signal will pass unaffected. Out of range will clip the trim to the minimum or maximum value.
Analog outputs **<MicTrimBand1_F>** through **< MicTrimBand10_F>**	Indicates the 10 trim values being applied to the AUDIO SPCH channel.

The QM-AE provides 10 trim presets, where a trim preset is the set of all available (maximum of 10) trim band values for the graphic EQ filters.

The trim band inputs adjust the gains of the graphic EQ filters. The gains are adjustable within a range of -12dB to +12dB. Valid analog values range from -120 (-12dB) to +120 (+12dB). 2-Series symbols such as the Analog Scaler with I/O Limits and Analog Ramp (Bounds Limited) are capable of handling range and sign mapping.

A trim band value of 0 (0dB) means that the signal will pass unaffected. Values above and below 0 will boost or reduce the gain in increments of .1dB. That is, changing the analog value by 1 signifies a boost or attenuation of 0.1 decibels.

All save and recall inputs are level sensitive. Thus when <**SaveTrimPreset**> is driven high, the ten trim band values will be saved in the indicated <**TrimPreset#**>. Valid values for <**TrimPreset#**> range from 1 to 10.

Similarly, when <**RecallTrimPreset**> is driven high, the values stored in <**TrimPreset#**> will be recalled and immediately propagated to the outputs. Here the program left, right, and microphone trim band feedback signals may have different values than their corresponding inputs.

In addition to the 10 trim presets, the QM-AE provides five filter presets, where a filter preset is a set of 12 filters. A filter consists of the center frequency, gain, bandwidth and filter type (EQ, high/low pass, treble/bass shelf) for each of the three outputs channels. These values are only settable using DMT software.

When <**RecallFilterPreset**> goes high and remains high, the current filter values stored in <**FilterPreset#**> (as set in the SystemBuilder software) will be recalled and applied to the outputs. Valid values for <**FilterPreset#**> range from 1 to 5.

Example Programming

An example program for the QM-AE is available from the "Example Program" section of the Crestron website (http://www.crestron.com/exampleprograms).

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, projects and firmware to the system and touchpanels after their development. 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 Toolbox.

The following sections define how one would upload a SIMPL Windows program to the control system or upgrade the firmware of the QM-AE. 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 (discontinued)
>
> Keyspan USA-19QW (discontinued)

Other models, even from the same manufacturer, may not yield the same results.

NOTE: Even with these recommended models, results may vary on the computer being used.

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 respective Operations Guide for the control system. These documents are available from the Crestron website. Refer to the following figure for a typical connection diagram when uploading files.

NOTE: Connection to a QM processor requires a null modem serial cable. Connection to a 2-Series processor requires a straight through serial cable.

Typical Connection Diagram when Uploading
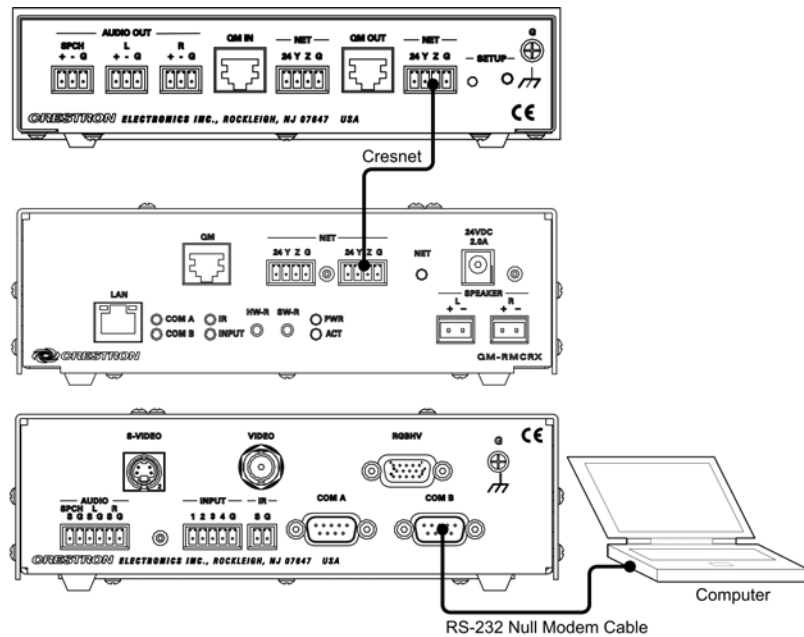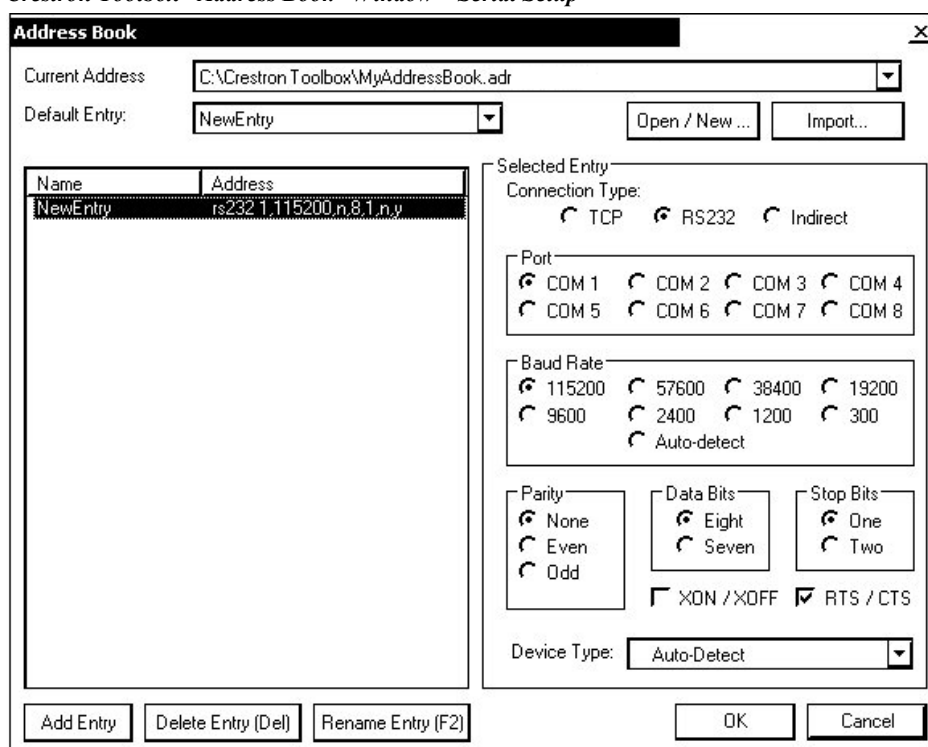

Serial Connection to the Control Processor

1. Ensure that all devices are connected to the control processor and the control processor is connected via serial cable to the PC.

2. Open Crestron Toolbox and click **Tools | Manage Address Book** to display the communications settings. Enter the new address name, and then click **RS-232** as the connection type.

The PC communication settings specified here should match the protocol that the control processor expects. The usual settings are as follows:

- Port = COM 1 through COM 8. Select the correct COM port on the PC.

- Baud rate = 115200.

- Parity = None.

- Number of data bits = 8.

- Number of stop bits = 1.

- Hardware handshaking (RTS/CTS) enabled.

- Software handshaking (XON/XOFF) not enabled.

Crestron Toolbox "Address Book" Window – Serial Setup

3. After setting the correct parameters, click **OK** to return to the Crestron Toolbox main window.

4. Click **Tools | Network Device Tree** to display the devices in the system.

TCPIP Connection to Control Processor

1. Ensure that all devices are connected to the control processor. For TCP/IP, use CAT5 straight through cables with 8-pin RJ-45 connectors to connect the LAN port on the control processor and the LAN port on the PC to the Ethernet hub. Alternatively, you can use a CAT5 crossover cable to connect the two LAN ports directly, without using a hub. The following table illustrates pinouts for straight through and crossover RJ-45 cables. Pins 4, 5, 7, and 8 are not used.

RJ-45 Straight Through Cable

FROM PIN	COLOR	SIGNAL	TO PIN	SIGNAL
1	White/Orange	Tx+	1	Tx+
2	Orange	Tx-	2	Tx-
3	White/Green	Rc+	3	Rc+
6	Green	Rc-	6	Rc-
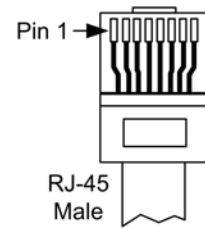
RJ-45 Crossover Cable

FROM PIN	COLOR	SIGNAL	TO PIN	SIGNAL
1	White/Orange	Rc+	3	Tx+
2	Orange	Rc-	6	Tx-
3	White/Green	Tx+	1	Rc+
6	Green	Tx-	2	Rc-

2. Once the cable connections are made, open Installer's Toolbox. Click **Tools | Manage Address book** to display the "Address Book" window and enter the new address name. Then click **TCP/IP** as the connection type. Enter the IP address or hostname of the control processor.

Installer's Toolbox "Address Book" Window – TCPIP Setup
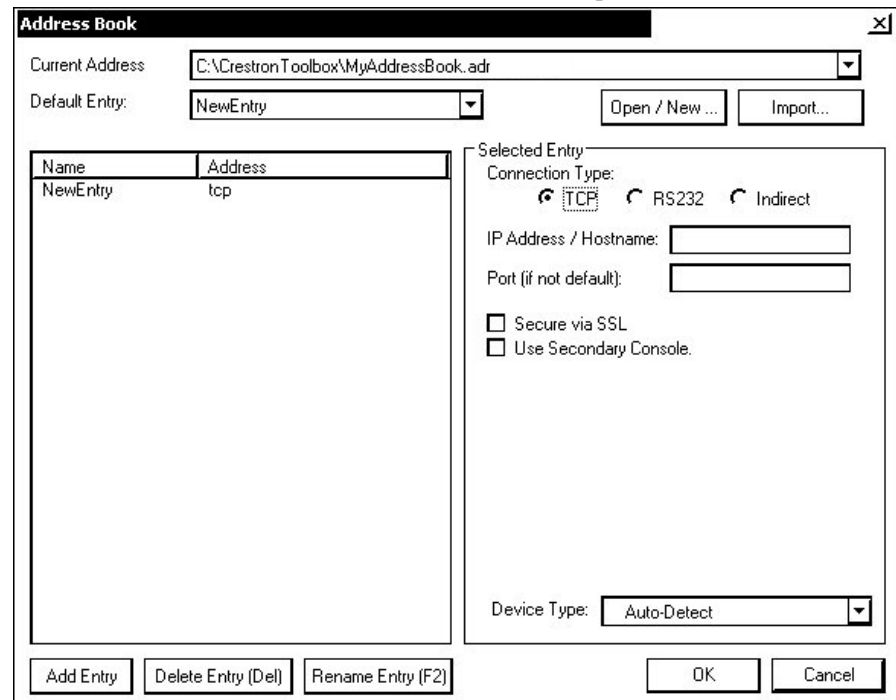
3. After setting the correct parameters, click **OK** to return to the Installer's Toolbox main window.

4. Click **Tools | Network Device Tree** to display the devices in the system.

Troubleshooting Communications

Use the following checklist if communication cannot be established with the control processor.

1. Verify that you are using the correct cables. As described previously, an RS-232 connection requires a null modem RS-232 cable. TCP/IP connection requires a CAT5 cable with 8-pin RJ-45 connectors.

2. With a serial connection, verify that the correct COM port on the PC has been selected. Some computers have more than one COM port; some may be internal (e.g., for a modem). Consult the manufacturer's documentation for further information about the COM ports on your PC.

3. Remove and reapply power to the control system.

4. If communication still cannot be established, contact Crestron customer service.

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 Crestron Toolbox.

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**.
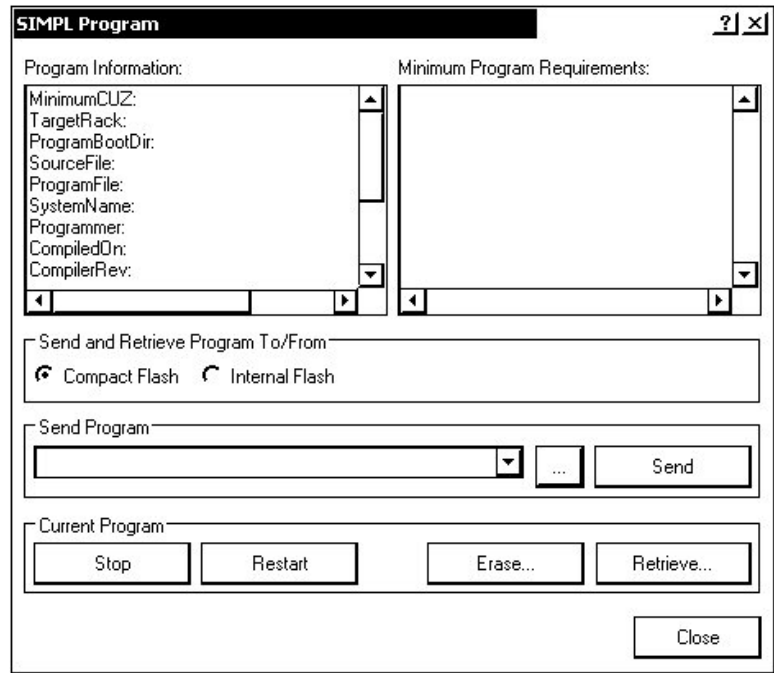
Upload via Crestron Toolbox

1. Verify that the procedure for "Communication Settings" that begins on page 34 has been performed.

2. Open Crestron Toolbox.

3. Select **Tools | System Info**.

   Crestron Toolbox – Tools | System Info
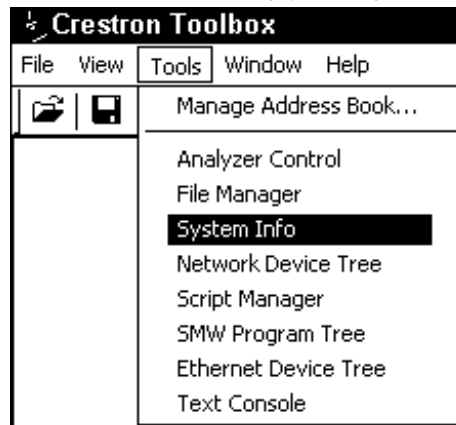
4. When the "System Info" window appears, the Functions option becomes available from the menu bar.

5. Select **Functions | SIMPL Program**.

6. The "SIMPL Program" window contains information about the currently loaded SIMPL program (if any), and permits you to stop, start, erase, retrieve, and upload a SIMPL program. This menu also permits you to upload to compact flash or internal flash.

"SIMPL Program" Window

7. Click the [...] button to browse for a new compiled (.spz) program.
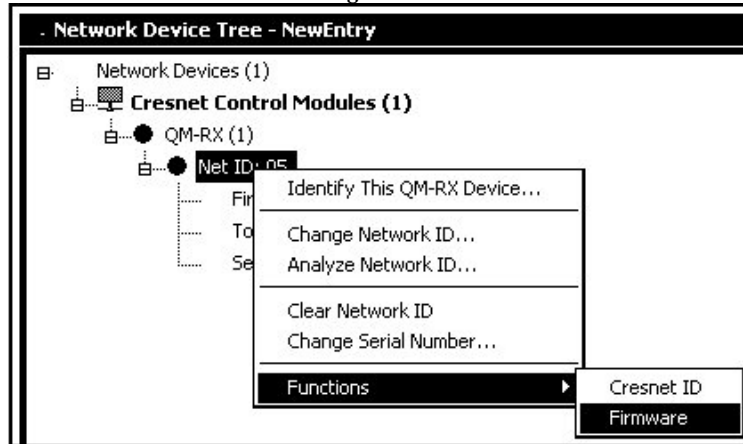
"Open" Window
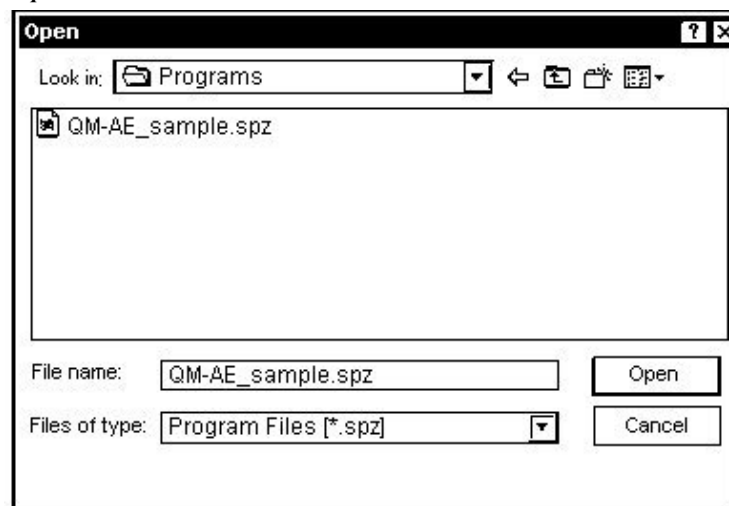
8. Select a file and click **Open.** When the SIMPL Program window re-opens click **Send**.

Firmware Upgrade via Crestron Toolbox

To take advantage of all the QM-AE features, it is important that the unit contains the latest firmware available. 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. Make sure that "Communication Settings," which begins on page 34, has been performed.

2. Open Crestron Toolbox.

3. Open the Network Device Tree (the firmware upgrade function is also available in the SMW Program Tree window).

4. Right-click on the device and select **Functions | Firmware**.

   Network Device Tree Window – Right-Click Sub Menu
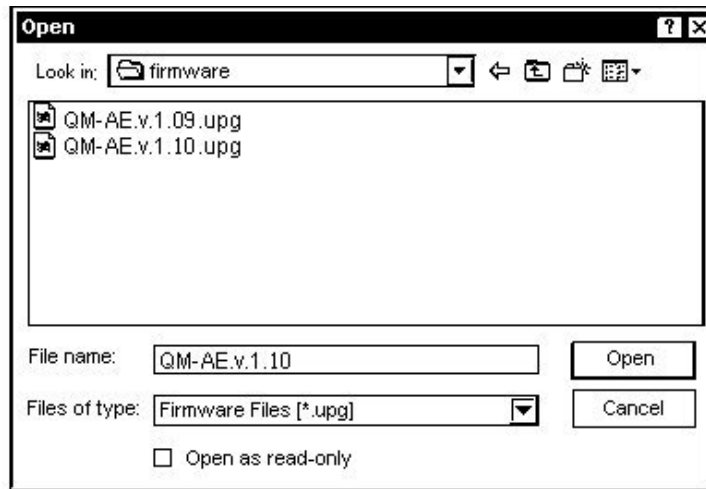

5. The "Firmware" window displays the model and current firmware version. Click **Upload New Firmware**.
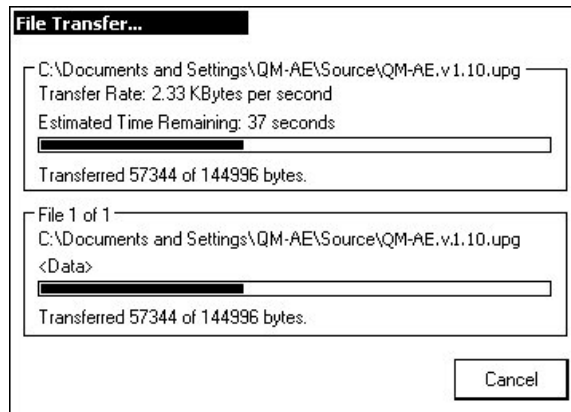
   "Firmware" Window
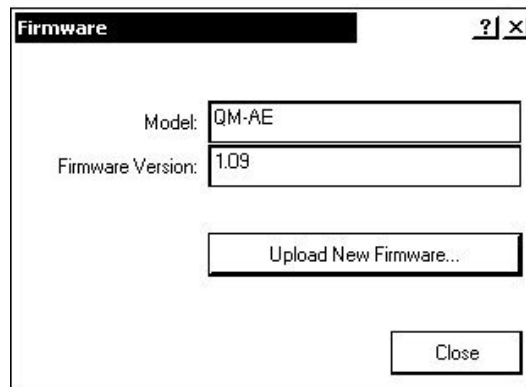
6. When the following screen appears, browse to locate the firmware (.upg) file.
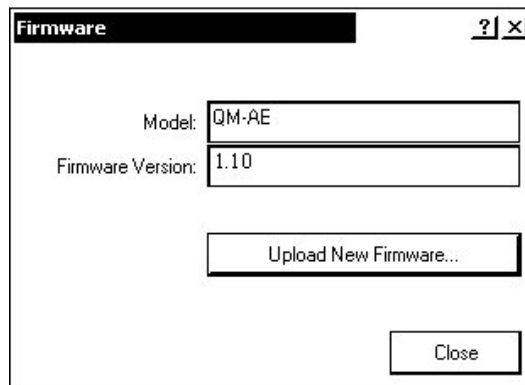

Locate Firmware in the "Open" Window

7. Click **Open** and the file transfers to the unit.

"File Transfer" Window

8. The "Firmware" window indicates the new firmware version. Click **Close** after the QM-AE automatically reboots.

"Firmware" Window with New Version

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-AE Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
The QM-AE is not receiving power.	Improper power supply.	Use only Crestron power supplies for Crestron equipment.
PWR LED does not illuminate.	The QM-AE is not receiving power.	Verify that Cresnet is properly attached.
No audio output.	The audio input or output connection is incorrect.	Verify that the balanced audio output connection is secure. Verify that the QM input connection is secure.

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-AE, 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: QuickMedia Installation and Compensation

Installation Notes

You must pass audio through from transmitters to receivers even if you are not using the audio signal. The information required for auto-compensation is transmitted along with the audio. In addition, the QM Link signal indicates that the QM cable is connected and that an audio signal is present on the cable. If a unit does not receive an audio signal, the QM Link signal will not go high, and a valid QM Link connection cannot be detected (video can still be displayed if auto compensation is not used).

Certain devices terminate and re-initialize the audio path within the unit; however, they pass on the video untouched. This creates different path lengths for the video and audio. This difference in path length creates different peak and boost levels for audio and video. When audio-breakaway is implemented, the audio and video paths are likely to be different.

Compensation

Inherently, twisted pair cables experience a loss of bandwidth and signal strength over distance. When the loss is within certain limits, the reduced signal can be restored through peak and boost compensation adjustments. The amount of required compensation is directly dependent on the length of the cable. Therefore, each device in a network requires a specific amount of compensation.

Manual Compensation

In a manual compensation system, the compensation parameters, along with microphone equalization settings, are stored in the receiver in a *preset* file. When the program switches to a new transmitter, the program recalls the compensation settings associated with the new transmitter. In large systems containing multiple transmitters and receivers, these parameters must be stored in multiple locations, creating a complex arrangement.

Auto Compensation

In a system utilizing auto compensation, the peak and boost values are stored in a *preset* file at the receiver. The transmitter stores the input compensation and microphone EQ settings. When the program switches to a new transmitter, the transmitter ID, input compensation, and microphone EQ settings are sent over the audio channel of the QM cable to the receiver. The receiver is equipped with a hunt algorithm to search for the proper peak and boost settings. Once the receiver acquires a QM Link signal, it can receive the audio signal containing the transmitter ID, input compensation, and microphone EQ settings. After receiving the transmitter ID, the receiver recalls the peak and boost preset and uses these values to properly adjust the video signal.

NOTE: If auto compensation is used in your QM system, all QM devices must use it. If it is not used in your QM system, it must not be used for any of the QM devices.

Auto Compensation with a Self-Peaking Receiver

Crestron's innovative self-peaking audio circuit eliminates the need to peak the audio signal.

Without self-peaking the same peak and boost values are applied equally to the video and audio signals. When these signals travel the same path, this arrangement is satisfactory. However, when video and audio travel to a receiver from different paths, unequal cable lengths are created. The self-peaking feature eliminates the need to hunt for peak and boost values by allowing the receiver to read the ID, input compensation and microphone EQ from the audio channel regardless of the peaking and boost values applied. Then using the transmitter ID, the receiver recalls the preset containing the proper peak and boost settings for the video, and implements the correct input compensation and microphone EQ settings.

NOTE: QM devices that do not have self-peaking include:

- QM-RMCRX

- QM-MD7x2

- QM-MD5x1

- TPMC-15-QM

- TPMC-17-QM

Switchers

The QM-MD7x2 and the QM-MD5x1 terminate and re-initialize the audio path within the unit, however, they pass on the video untouched. This creates different path lengths for the video and audio. This difference in path length creates different peak and boost levels for audio and video. In the initial QM receivers the video and audio circuits, peak/boost have the same settings for the audio and video. The initial QM receivers cannot accommodate different settings, and may experience difficulties resolving the signals.

The QM-MD8x8 and QM-MD4x2 are simply analog switches. When audio-breakaway is implemented, the audio and video paths are likely to be different. For receivers without self-peaking audio, a probable conflict exists. For receivers with self-peaking, auto compensation is still problematic when audio-breakaway is done since the transmitter ID is that of the audio source and the video source is from a different device with a different transmitter ID.

The self-peaking audio circuit resolves the problem of unequal cable lengths. Because no audio setting is required, the video can have an independent peak/boost as set by the program.

QM-AE Audio Extractor

The QM-AE is an audio-only device. The QM cable loops through the QM-AE from the input connector to the output connector. The QM-AE taps only the audio signals of the QM cable. The QM-AE is a self-peaking receiver, so peaking is not required.

Compatibility Charts

Under certain circumstances, the audio and video may be acceptably peaked even though the audio and video path lengths are different. Because the audio signal is digital, and more forgiving than the video signal, it may be possible to peak the video and have functioning audio. It is difficult to predict outcomes because it is dependent on the difference in cable lengths, the video rates, and acceptable video quality.

The following Auto Compensation and Audio Breakaway compatibility charts are arranged with transmitters listed on the left and receivers listed across the top. The QM cable exits the transmitter and the QM cable enters the receiver.

NOTE: The cable exiting the QM-AE is a loop-through and is not listed as a transmitter.

NOTE: QM wallplates and fliptop boxes are not included because the audio and video cable lengths are always equal.

KEY: ✓ = Good operation.
1. = Operation depends on video rates and if the audio and video cable lengths are closely matched.
2. = In these cases, if the audio and video (although from different sources), switch together consistently, the system will operate normally. If the audio and video switch inconsistently, operation then depends on the video rates and how closely the audio and video cable lengths match.
* = Device with self-peaking.

Auto Compensation without Audio Breakaway

		QM RECEIVERS							
		QM-RMCRX	QM-RMCRX-BA*	QM-RXA*	QM-MD7x2	QM-MD5x1	QM-AE*	QM-RX*	TPMC
QM TRANSMITTERS	QM-MD8x8	✓	✓	✓	✓	✓	✓	✓	✓
	QM-MD4x2	✓	✓	✓	✓	✓	✓	✓	✓
	QM-MD7x2	1	✓	✓	✓	✓	✓	✓	1
	QM-MD5x1	1	✓	✓	✓	✓	✓	✓	1

Auto Compensation with Audio Breakaway

		QM RECEIVERS							
		QM-RMCRX	QM-RMCRX-BA*	QM-RXA*	QM-MD7x2	QM-MD5x1	QM-AE*	QM-RX*	TPMC
QM TRANSMITTERS	QM-MD8x8	1	2	2	✓	✓	✓	2	1
	QM-MD4x2	1	2	2	✓	✓	✓	2	1
	QM-MD7x2	1	✓	✓	✓	✓	✓	✓	1
	QM-MD5x1	1	✓	✓	✓	✓	✓	✓	1

KEY: ✓ = Good operation.
    1. = Operation depends on video rates and if the audio and video cable lengths are closely matched.
    2. = In these cases, if the audio and video (although from different sources), switch together consistently, the system will operate normally. If the audio and video switch inconsistently, operation then depends on the video rates and how closely the audio and video cable lengths match.
    * = Device with self-peaking.

Manual Compensation without Audio Breakaway

		QM RECEIVERS							
		QM-RMCRX	QM-RMCRX-BA*	QM-RXA*	QM-MD7x2	QM-MD5x1	QM-AE*	QM-RX*	TPMC
QM TRANSMITTERS	QM-MD8x8	✓	✓	✓	✓	✓	✓	✓	✓
	QM-MD4x2	✓	✓	✓	✓	✓	✓	✓	✓
	QM-MD7x2	1	✓	✓	✓	✓	✓	✓	1
	QM-MD5x1	1	✓	✓	✓	✓	✓	✓	1

Manual Compensation with Audio Breakaway

		QM RECEIVERS							
		QM-RMCRX	QM-RMCRX-BA*	QM-RXA*	QM-MD7x2	QM-MD5x1	QM-AE*	QM-RX*	TPMC
QM TRANSMITTERS	QM-MD8x8	1	✓	✓	✓	✓	✓	✓	1
	QM-MD4x2	1	✓	✓	✓	✓	✓	✓	1
	QM-MD7x2	1	✓	✓	✓	✓	✓	✓	1
	QM-MD5x1	1	✓	✓	✓	✓	✓	✓	1

Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.

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. 07647, 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.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, CRESTRON makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supercedes all previous warranties.

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