



CROWN

IQ - MC
Modules

REFERENCE MANUAL

IQ-MC8 & IQ-MC4

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This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

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- 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.
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DECLARATION OF CONFORMITY

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Equipment Type: Control System Components

Family Name: IQ Series

Model Name: IQ-MC4, IQ-MC8

EMC Standards:

EN 55103-1:1995 Electromagnetic Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 1: Emissions

EN 55103-1:1995 Magnetic Field Emissions-Annex A @ 10 cm and 1 M

EN 61000-3-3:1995 Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems Rated Current $\leq 16A$

EN 55022:1992 + A1:1995 & A2:1997 Limits and Methods of Measurement of Radio Disturbance Characteristics of ITE: Radiated, Class B Limits; Conducted, Class B

EN 55103-2:1996 Electromagnetic Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 2: Immunity

EN 61000-4-2:1995 Electrostatic Discharge Immunity (Environment E2-Criteria B, 4k V Contact, 8k V Air Discharge)

EN 61000-4-3:1996 Radiated, Radio-Frequency, Electromagnetic Immunity (Environment E2, criteria A)

EN 61000-4-4:1995 Electrical Fast Transient/Burst Immunity (Criteria B)

EN 61000-4-5:1995 Surge Immunity (Criteria B)

EN 61000-4-6:1996 Immunity to Conducted Disturbances Induced by Radio-Frequency Fields (Criteria A)

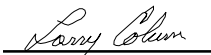
EN 61000-4-11:1994 Voltage Dips, Short Interruptions and Voltage Variation

Safety Standard:

EN 60065: 1998 Safety Requirements – Audio Video and Similar Electronic Apparatus

I certify that the product identified above conforms to the requirements of the EMI Council Directive 89/335/EEC as amended by 92/31/EEC, and the Low Voltage Directive 73/23/EES as amended by 93/68/EEC.

Signed



Larry Coburn

Title: Senior Vice President of Manufacturing

Date of issue: March 24, 2004

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Figure 1.1 IQ-MC8 Front Panel

1 Welcome

The *IQ-MC4* and *IQ-MC8* modules connect CTs 4200 and CTs 8200 amplifiers to the IQ Bus of an *IQ System*[®], allowing the amplifier to be controlled and monitored via IQ.

The IQ-MC module is an *IQ2*[™] series component. This means it supports Crown's IQ2 protocol and requires an IQ System with an IQ2-compatible IQ interface. IQ2 (universal code) enables users and third parties to develop custom software objects to control and monitor IQ2 compatible components like the IQ-MC module.

Each IQ-MC module includes an IQ address switch allowing the unit to have a unique address on the IQ Bus. It is powered by the amplifier and includes a memory backup feature that enables the amplifier to resume operation with all of its settings intact after a power outage.

We strongly recommend you read all the instructions, warnings and cautions contained within. Also, for your protection, please send in the warranty registration card today and save the bill of sale since it is your official proof of purchase.

2 Controls, Connectors & Indicators

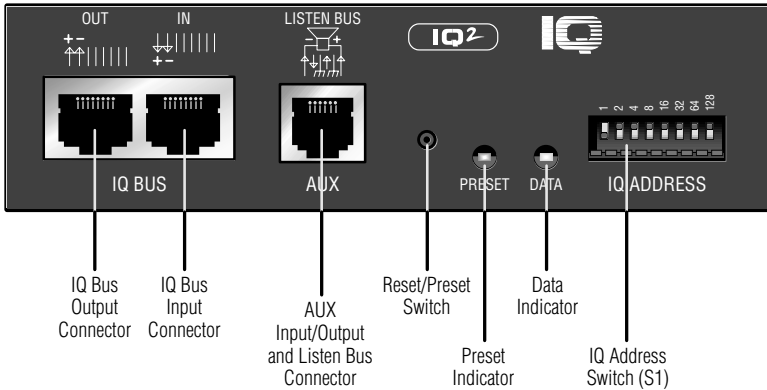


Figure 2.1 IQ-MC8 Controls, Connectors and Indicators

3 Installation

3.1 Prepare the IQ-MC Module



First, turn off and unplug the amplifier. Set the IQ address switch S1. By giving each IQ component a unique address, it can be individually controlled and monitored. Whenever the IQ System wants to send a command to just one IQ component, it first sends its address and then the command down the IQ Bus.

S1 has eight segments because it actually contains eight tiny switches inside. The word “ON” is printed on the switch along its lower left side to indicate the ON position and the switches are numbered along the bottom (Figure 3.1).

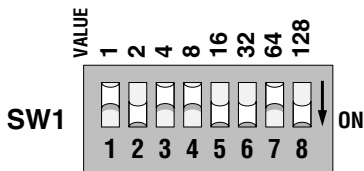


Figure 3.1 Address Switch (S1)

Each of the eight switches in S1 has a value which doubles as the switch number increases. For example switch 1 has a value of 1; switch 2 has a value of 2; switch 3 has a value of 4; switch 4 has a value of 8 and so on.

The address is determined by adding the values of all “ON” switches. In Figure 3.1, switches 1, 3, 4 and 7 are on. Simply add the values to find the address: $1+4+8+64=77$.

A convenient series of IQ address tables are included in Section 6. The tables show the switch settings for all 250 addresses.

No two IQ components of the same type which are connected to the same IQ Bus can have the same address.* Suppose, for example, an IQ System has two IQ Bus loops, 1 and 2, and this IQ-MC module is to be installed into loop 1 and given an address of 77. No other IQ-MC modules can be given the same address in loop 1. However, an IQ-MC module in loop 2 can have the same address.

Different IQ components in the same IQ Bus loop can have the same address. For example, both an IQ-USM 810 mixer/processor and an IQ-MC module can use address 77 in the same loop.

A valid IQ address is any number from 1 to 250. Do not use a number higher than 250 since they are reserved for special use. An address of “0” (zero) should only be used for “stand alone” mode. Setting the address switch to “0” disables the IQ Bus port.

* Note: All IQ PIP™ modules (IQ-PIP-USP2, IQ-PIP-MEM, IQ-PIP-SMT, etc.) are considered the same type, and so may not share the same address on the same IQ Bus.

3.2 Install the Wiring

Connect the IQ-MC module to the IQ system via the IQ Bus. The IQ components in a IQ Bus loop are wired sequentially. The loop begins and ends with the IQ interface. The output of one IQ component “loops” to the input of the next and so on as shown in Figure 3.2.

There are three different types of connectors used for IQ Bus wiring on IQ components. These include DIN connectors, screw terminal plugs, and RJ-45 connectors. The IQ-MC uses RJ-45 connectors that accept standard RJ-45 connectors that accept standard RJ-45 plugs like the one shown in Figure 3.6, allowing the use of industry-standard straight-thru type network cables. The right RJ-45 connector is used for input and the left RJ-45 connector is used for daisy output.

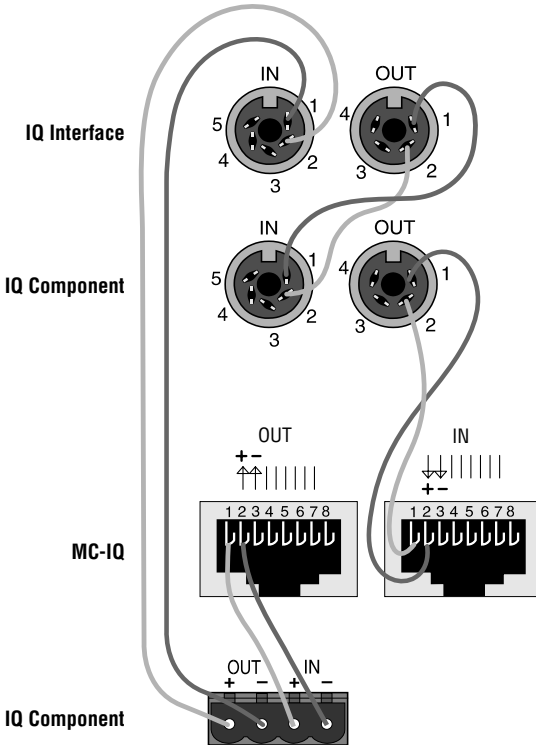


Figure 3.2 Standard IQ Bus Wiring “Loops” from the Output to the Input of each IQ Component (for Hub-Style IQ Bus wiring)

The following examples show how to connect the MC-IQ to other IQ components:

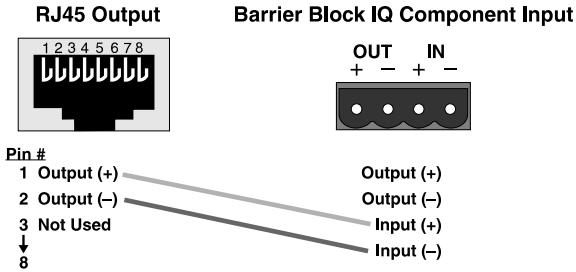


Figure 3.3 RJ-45 Output to Barrier Block Input

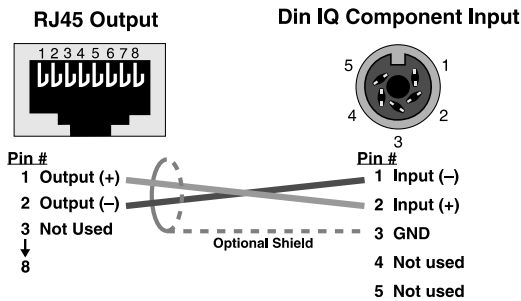


Figure 3.4 RJ-45 Output to Din Input

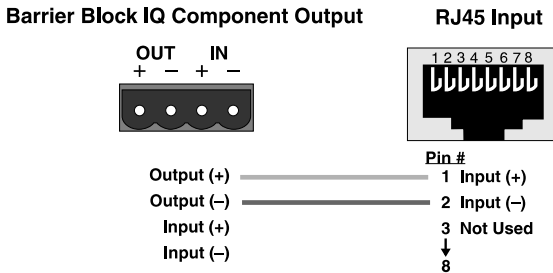


Figure 3.5 RJ-45 Input to Barrier Block Output

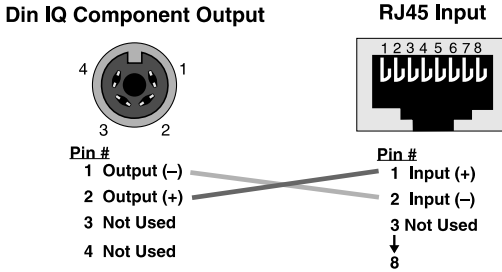


Figure 3.6 RJ-45 Input to Din Output

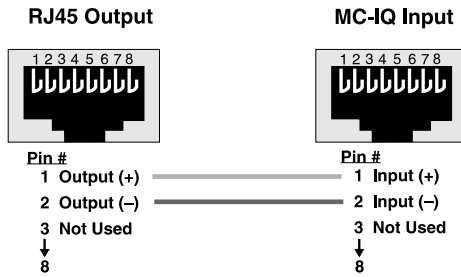


Figure 3.7 RJ-45 Output to RJ-45 Input

3.3 Adjust System Levels

Adjust attenuator levels both on the amplifier and on the IQ-MC module

control panels within your IQ software for optimum system gain.

4 Operation

With the IQ-MC option, your CTs 4200 and CTs 8200 amplifiers can be monitored and controlled from a remote location through the use of an IQ System. This module features *SmartAmp™* capabilities which will enable the amplifier to function automatically. For example, the IQ-MC module can automatically limit the audio signal, also detect and report various problems.

In addition, the IQ-MC Load Supervision feature has the ability to verify the status of the loads in real time.

The IQ-MC module uses Crown's IQ2 protocol. This makes it possible for a user to design custom graphic display modules to control and monitor the unit with IQ2-compatible IQ software. This allows even greater flexibility within Crown's IQ software via custom control pages. Plus, the IQ2 protocol provides for third-party programming for system controllers such as those from AMX and Crestron.

The following sections describe the IQ-MC features and operation. Where specified, some features are accessed via controls located on the unit itself. However, many of the features can be controlled or configured using IQ for Windows software. Commands are transmitted via an IQ interface to the specified IQ component (an IQ2-compatible interface is required). Please contact your Crown representative or Crown's Technical Support Group if you are unfamiliar with IQ software.

4.1 Hardware

4.1.1 Data Signal Presence Indicator

An amber Data Signal Presence Indicator (DATA) is provided on the IQ-MC connector panel as well as the front of the amplifier. It flashes whenever commands addressed to the IQ-MC module are received. To assist with troubleshooting, an option that forces the DATA indicator to remain lit is available through IQ software.

4.1.2 Preset Indicator

A green PRESET indicator is provided on the IQ-MC connector panel. This indicator signals the number of the currently selected preset by emitting a series of flashes which match the preset number, followed by a pause. The indicator will continuously repeat the number selected until a change is made to any setting.

4.1.3 IQ Bus Input Connector

An RJ-45 connector provides the input connection to the IQ Bus. Drop-out relays maintain loop integrity in the event power is removed from the IQ-MC module.

4.1.4 IQ Bus Daisy Output Connector

An RJ-45 connector is provided for normal daisy wiring output to the next device on the loop in the IQ Bus.

4.1.5 AUX Input/Output and Listen Bus Connector

An RJ-11 connector provides three functions. The AUX output delivers 15 VDC at 70 mA maximum output when switched on and may be con-

trolled via software or may be programmed to switch when a fail condition is present on any channel.* The high-impedance (10 K ohm) AUX input can sense logic signals and can be programmed to activate system mute or report fault conditions when a logic high is present. (See Section 5.2.2 for more information.) All amplifier channel's output can be monitored as a balanced line level signal which is sent to pins 1 and 6 of the RJ-11 connector (software selectable).

4.1.6 IQ Bus "Drop Out" Relays

"Drop out" relays are provided on the IQ Bus ports to maintain the continuity of the IQ communication loop even if the IQ-MC module loses power.

4.2 Hardware Controls

The following IQ-MC controls are accessed via hardware switches located on the unit.

4.2.1 IQ Address Switch (S1)

An 8-section DIP switch is used to set the IQ address of the unit. A valid IQ address is any number from 1 to 250. Numbers higher than 250 are reserved for special use.

An address of "0" places the unit in stand-alone mode. In this mode, the IQ bus port is disabled and the IQ-MC module will not function with IQ software.

* The AUX output uses inverse logic when it is configured to report a fail condition. Normally high, it switches low when any channel fails a test. In this way it can also indicate a power loss.

This switch is located on the rear of the amplifier. Each IQ component on a IQ Bus is given a unique IQ address so it can be independently controlled and monitored. Two or more IQ components of the same type should NEVER have the same address on the same IQ Bus loop.

4.2.2 Reset/Presets Switch

A recessed reset/preset switch, accessible from outside the IQ-MC panel, performs two functions. First, it enables the IQ-MC module to be restored to factory default settings, and second, allows the user to recall any of 10 presets. A straightened paper clip or similar small object is required to press the reset switch.

-To select one of the 10 presets, complete the following steps:

Remove all input signals. With the power on, briefly press the switch for less than two seconds to toggle through the 10 user-defined presets stored in firmware. Each press will increment the selected preset by one. After the switch is released, the DATA light will flash for a moment, then the PRESET indicator will blink to indicate the preset number selected. Restore input signals.

-To restore the unit to the factory default settings, complete the following steps:

Remove all input signals. With the power on, press the switch and hold for more than 2 seconds, or until the DATA indicator blinks twice, and all settings will be reset to factory default. When the switch is released, the DATA indicator will flash rapidly for a moment. Restore input signals.

-To clear all memory and set to factory default presets:

Remove all input signals. Press in and hold the switch while applying power to the unit. The settings will be reset to factory default, with the firmware re-writing to EEPROM memory. **Important: This action will re-write the memory and erase stored presets.** With the button held in and power applied, the DATA and PRESET indicators will both be lit. When the button is released, the DATA and PRESET indicators will alternately blink for a few moments, indicating that memory is being written, then the DATA indicator will flash for a moment. After the unit has been reset to the factory default settings.

4.3 Amplifier Control and Monitoring

The following IQ-MC module features are accessed via IQ for Windows software.

4.3.1 User Presets

The parameters for all functions can be saved as presets. A total of 10 user presets can be stored in the IQ-MC EEPROM memory. Preset names are stored on the module.

4.3.2 Clip Monitor

The Clip indicator of each channel of the amplifier can be monitored by the IQ System. The IQ-MC module can cause a warning to flash on your computer screen via IQ for Windows software indicating a Clip event. Also, it can report Clip events to its AUX port.

4.3.3 Input Signal Level Monitor

The input signal level of each channel can be monitored. This monitor fea-

ture has a range from +20 dBu to -40 dBu in 1/2-dB steps.

4.3.4 Output Signal Level Monitor

The output signal level of each channel of the amplifier can be monitored. This monitor feature has a range from 0 dB to -40 dB where 0 dB is referenced to the rated output voltage of the amplifier model.*

The IQ-MC module features scaled output level meters. By factory default, the meters are calibrated such that 0 dB equals the amplifier's rated output into 8 ohms. In 70V/100V mode, the meters default to 0 dB equals 70/100 Vrms. Auto-scaling is handled by the software.

4.3.5 Thermal Headroom Level Monitor

The Thermal Headroom level** of each channel of the amplifier can be monitored by the IQ software. This level represents the percent of available power/thermal capacity that is currently being used within the output section of the amplifier.

When the thermal headroom level reaches 100%, the amplifier cannot produce any more power and it will begin to limit the drive level to the output devices to protect them from too much stress***. The Thermal Limiter feature of the IQ-MC module can be set to engage upon a pre-selected thermal level. (See Section 4.3.14)

* This is assumed to be 70V or the rated 8-ohm output.

** Thermal Headroom on your Crown amplifier may be labeled Junction Temperature Simulation (JTS).

*** See the amplifier's *Reference* or *Owner's Manual* for more information about JTS and how it works.

4.3.6 Ready/Standby Control

Each channel's output relay can be independently turned on and off.

4.3.7 Signal Mute

The output signal of each channel can be independently muted. This function typically provides 80 dB or more of attenuation.

4.3.8 Polarity Inverter

The polarity of the input signal of each channel can be independently inverted.

4.3.9 Input Signal Attenuator

An attenuator at the input of each channel is used to control the input signal level. Each attenuator has a range from 0 dB to -80 dB in ½ dB steps. (Zero equals no attenuation.)

4.3.10 "Ghost Faders"

These indicators let you monitor the signal path gain where it may differ from manual gain set on input attenuation and output trim as the result of limiting or compression. They appear as flying faders "behind" the input attenuators.

4.3.11 Amp Information

Several useful items of information about the host amplifier are determined by the IQ-MC at start-up. These include manufacturer, model, date code, serial number, and revision level. These can be printed from the system inventory (no on-screen display is available).

4.3.12 Amp Mode

The IQ-MC module screen can show:

- The position of the Dual/Bridge mode switches
- The position of the back-panel attenuators

However, the Dual/Bridge mode of the amplifier cannot be controlled via software.

4.3.13 Error Reporting

The IQ-MC module can report six types of errors: Clip, Thermal, Fault, Load, Dual/Bridge-mode switch setting has been changed, Volume attenuator setting has been changed.

You can route error reports for each condition above to:

- Windows IQ software (system software).
- AUX OUT.
- Both software and AUX OUT.

If you choose system software notification, the IQ System will notify you of the error. If you choose AUX OUT notification, the AUX OUT signal will switch from OFF to ON when a selected error has occurred. If you prefer, error reporting can be switched off. Following is a description of each error condition:

Clip: You can choose to be informed when an excessive number of Clip events occur over a unit of time in either channel of the amplifier. When Clip error reporting is on, an alert will be generated when the number of Clip events per unit of time specified exceeds a count that you set. The Count control lets you set a number of Clip events per unit of time allowed before an error is generated. The range is 1 to 100. The Time control lets you set the unit of time in seconds during which the number of Clip error events are counted for possible error reporting. The range is 1 to 10 seconds.

Thermal: You can choose to be warned if the thermal level rises above a predetermined level. The Threshold control lets you set the thermal level above which an error message will be reported. The range is from 1 to 100%.

Fault: You can choose to be warned when an amplifier “fault” condition occurs when a channel fails.

Load: You can choose to be warned if the impedance of the load being driven by the amplifier falls out of a pre-selected range. See Section 4.5 for instructions on setting up the load supervision feature.

Dual/Bridge Switch Changed: You can choose to be warned if the Dual/Bridge Switch setting has been changed. This condition risks amplifier damage or distortion. If you see this error, manually set the Dual/Bridge Switch to the correct position.

Attenuator Setting Changed: You can choose to be informed that the back-panel attenuator setting has been changed since you set it up.

4.4 Signal Processing

4.4.1 Input Signal Compressor/Limiter

An input signal compressor/limiter is available for each channel. There are five parameters which control this feature:

On/Off: Turns this function on or off.

Threshold: Sets the threshold, in dB, above which the compressor acts. The level is measured at the input to the module and corresponds to the level shown on an input meter. The compressor is “feed-forward,” meaning that the level detection

point is located before the gain control stage. The range is from +16 dBu to -40 dBu.

Attack Time: Sets the attack time of the compressor. The attack time is defined as the time it takes the compressor to attenuate the input signal by 10 dB. The range is from 1 millisecond to 2 seconds.

Release Time: Sets the release time of the compressor. The release time is defined as the time it takes the compressor to increase the input gain by 10 dB. The range is 100 milliseconds to 30 seconds.

Compressor Ratio: Sets the compression ratio for the compressor. The range is 1, 2, 4, 8, 16, 32, ∞ to 1.*

4.4.2 Peak Voltage Limiter

This limits the peak voltage output of the amplifier. There are four parameters which control this limiter.

On/Off: Turns the limiter on or off.

Attack: Attack time is adjustable from 10 milliseconds to 100 milliseconds per 10 dB of overdrive.

Release: Release rate is adjustable from 100 milliseconds to 10 seconds per 10 dB or release.

Threshold: Absolute voltage threshold is adjustable from 12 Vpk to 255 Vpk in 1 volt steps.

4.4.3 Average Power Limiter

Limits the long-term power output from the amp. The actual output limiter threshold is determined by an absolute power threshold and the nominal load impedance setting. There are five parameters which control this limiter.

* 1:1 is the same as “off.”

On/Off: Turns the limiter on or off.

Average Power Threshold: The threshold is adjustable from 10 to 1000 watts.**

Nominal Load Impedance: The nominal load impedance is settable from 1 to 1000 ohms, and should be set to correspond to the nominal impedance rating of the load connected to the respective channel.

Attack Time: Adjustable from 1 second to 30 seconds in 1 second increments.

Release Time: Adjustable from 1 second to 30 seconds in 1 second increments.

4.5 Load Supervision

The Load Supervision feature allows real time monitoring of the load connected to each amplifier channel. When enabled, the IQ-MC continuously monitors the amplifier output voltage and current and calculates the long-term average load impedance. The measured load impedance is compared against user defined high and low limits. If either limit is exceeded, the status indicator and/or IQ System error reporting functions alert the user of the problem. There are six controls and two indicators for each channel:

On/Off: Turns the Load Supervision feature on or off.

High Limit: Sets the upper bound above which the system will report a "high" error status.

Low Limit: Sets the lower bound below which the system will report a "low" error status.

Nominal Load Impedance: Sets the expected average impedance for the connected load. This value determines the output signal level required for test. This parameter is also used by the average power limiter to determine the expected power limit threshold. See Section 4.4.3.

Calculate: This button invokes an impedance calculator. Entering output voltage and power will give the expected impedance.

Include in Standard Error Reporting: Enables error reporting so that any high/low status condition is reported via the IQ System (See Section 4.3.13).

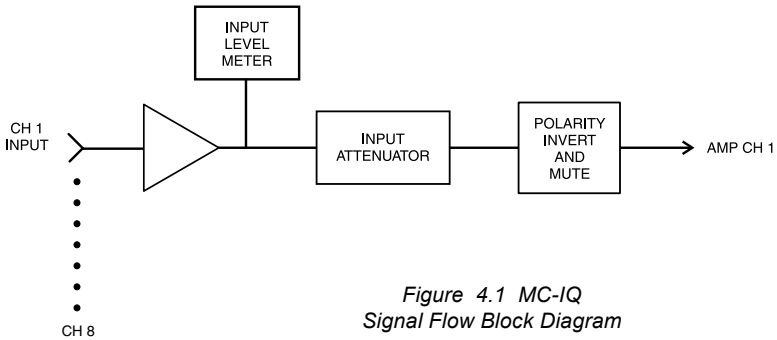
Report to AUX: Enables any high/low status condition to be reported via the IQ-MC AUX port output (See Section 4.1.5).

Test Indicator: This indicator lights when the load supervision algorithm is actually performing a load impedance calculation and test verification.

Low/Normal/High Indicator: This indicator shows the present status of the load with respect to the user defined high/low limits.

Z avg Monitor: Reports actual calculated average load impedance.

** The average power threshold should be set per the loudspeaker's "long-term" power rating (consult your speaker documentation).



*Figure 4.1 MC-IQ
Signal Flow Block Diagram*

5 IQ Audio In Depth

This section provides additional information about Crown's IQ System with special guides to aid in the installation and use of the IQ-MC module. For more information about any of these topics, contact Crown Technical Support.

5.1 A Closer Look at IQ Bus Wiring

The IQ-MC module must be connected to a IQ Bus loop having an IQ2-compatible IQ interface in order for the IQ System to control or monitor it. The IQ Bus is a serial communication loop designed to transmit IQ commands and data. As implemented in the IQ-MC, it is a 20 milliamp current loop operating at a BAUD rate of 38.4 K. The loop must be unbroken to function properly.

If the system includes an IQ-INT 3 interface, it can accept eight different

IQ Bus loops or zones. Dividing the sound system into different zones, each with its own IQ Bus loop, can have several advantages. The following list contrasts those advantages with those of a single loop.

Multiloop Advantages

- A break in communication in one loop does not affect other loops.
- Over 250 IQ components of the same type can be used in a system.
- The same IQ address can be used more than once (once per loop per model).

Single Loop Advantages

(with IQ-INT 3 interfaces)

- The IQ System can send and retrieve data faster in a single loop.
- "Real time" level display of a greater number of units is possible.

The IQ-MC module can be connected to the IQ Bus with inexpensive twisted-pair wiring (shielded or unshielded). If fiber optic wiring is required contact Crown Technical Support (see page 28).

Here are some guidelines for twisted-pair wiring:

- **Use shielded twisted-pair wire** at least 26 AWG in size when interference is a problem. The wire should be of good quality and should have low capacitance—30 picofarads/foot or less is good. The shield serves two purposes: First, it helps prevent the IQ data signal from transmitting to nearby audio wiring. Second, it helps prevent outside RF from interfering with the data signal. However, in most cases interference is not a problem and, since unshielded wire has lower capacitance, it is a better choice.
- **Minimize the total capacitance of each IQ Bus loop.** The total capacitance should be less than 30 nanofarads. Allow for approximately 60 picofarads for each IQ component in a loop. This accounts for a slight delay which occurs as data signals pass through a component.
- **Add an IQ Repeater (RPT3)** for very long loops—greater than 1,000 feet (305 m)—or when required by high-capacitance wire. Although we recommend a repeater for loops longer than 1,000 feet, it is often possible to go 2,000 feet (610 m) or more. The most significant characteristic of the wire is its capacitance. Lower capacitance allows longer loops. Unshielded wire usually has less capacitance.

- **Never use the ground wire in a mic snake line.** It may sometimes be convenient to run IQ Bus data signals to and from stage monitor amplifiers along unused wire pairs in a mic snake. Do not use the ground wire which is normally connected to pin 1 on an XLR connector or data noise will be added to the audio lines. Use only the signal lines which normally connect to pins 2 and 3 of the XLRs.*

Outside RF interference is seldom a problem for a IQ Bus loop—especially if shielded twisted-pair wire is used. However, there are extreme situations when fiber optic wiring is recommended. For example, locating a IQ Bus loop next to an AM radio transmission line may require fiber optic cabling. An extremely long IQ Bus loop distance may also require fiber optic cabling.

5.2 Using the AUX Connector

The IQ System offers tremendous flexibility and the auxiliary feature connector provides a means of tapping into it. It can be used to turn peripherals on/off, send a signal to another system component, receive a signal from another component, and send a line level audio signal of amplifier's output.

The AUX connector is an RJ-11 type. Pins 2 and 5 are used to receive a signal and pins 3 and 4 are used to send a signal.

* Because typical mic cables have high capacitance, the maximum possible Crown Bus loop distance will be less.

5.2.1 AUX Output

When the auxiliary feature is turned on by the IQ for Windows software +15 VDC is supplied across pins 3 (ground) and 4 (+). A total of 70 milliamps of current is available. The smart switch mosfet protects against shorts (see Figure 5.1).

There are many possible uses for the AUX output. For example, it can be used to turn on auxiliary cooling fans. To do this the AUX connector might be used to close a relay. The relay would then turn the fans on or off. This is shown in Figure 5.2.

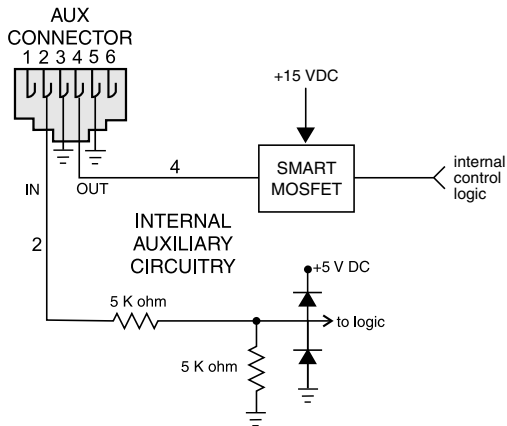


Figure 5.1 The Internal AUX Circuit

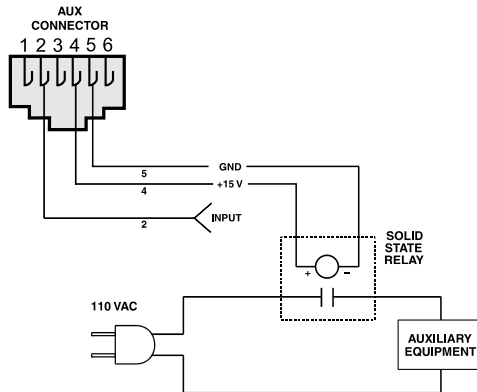


Figure 5.2 A Sample AUX Output Circuit

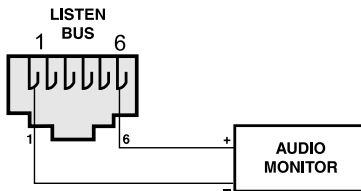
By monitoring the operating condition of amplifiers with the IQ System software, the need for additional cooling would be apparent. The same software could then be used to turn on the appropriate AUX connector. (For more information about turning the auxiliary feature on/off, consult the IQ for Windows software documentation.)

5.2.2 AUX Input

Depending on the IQ software being used, the AUX connector can be used to sense the presence of an input signal across pins 2 (+) and 5 (ground). A +5 to +15 VDC signal at the input will be interpreted as a logic "high" and will be communicated to the IQ Bus where a host computer or controller can act upon it. A signal less than +1.6 VDC is interpreted as a logic "low."*

5.3 Listen Bus

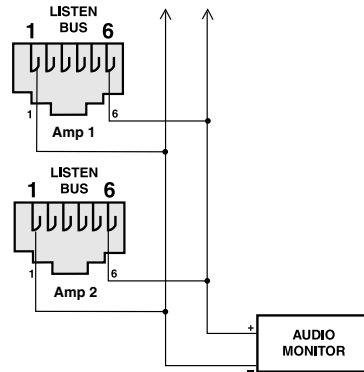
Use the diagram in Figure 5.3 to connect an audio monitoring system, such as a headphone preamp, to the **IQ-MC Listen Bus**.



*Figure 5.3
Listen Bus Connection*

* A negative signal can also be used as a logic low because the signal is internally clamped to protect the internal circuitry.

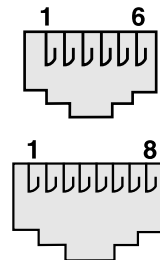
Figure 5.4 demonstrates how multiple amplifiers can be monitored using the Listen Bus. Crown's IQ for Windows software allows you to select the amplifier and channel you wish to monitor.



*Figure 5.4 Multiple-Amp
Listen Bus Configuration*

5.4 Working with RJ-11 and RJ-45 Connectors

Pin assignments for standard RJ-11 and RJ-45 connectors are indicated in Figure 5.5.



*Figure 5.5 RJ-11 & RJ-45
Pin Assignments*

When wiring RJ-11 connectors, it is good practice to follow the USOC protocol for RJ-11 connector cable. This protocol assigns wire colors as follows:

- | | |
|----------------|----------------|
| 1 white-green | 4 white-blue |
| 2 white-orange | 5 orange-white |
| 3 blue-white | 6 green-white |

When wiring RJ-45 connectors, it is good practice to follow the EIA/TIA 568B protocol for RJ-45 connector cable. This protocol assigns wire colors as follows:

- | | |
|----------------|---------------|
| 1 white-orange | 5 white-blue |
| 2 orange-white | 6 green-white |
| 3 white-green | 7 white-brown |
| 4 blue-white | 8 brown-white |

Extra care must be taken when attaching RJ-11 and RJ-45 connectors to cable. Make sure you use the appropriate crimping tool and verify that the connector is properly seated into the tool, or damage will result.

Contact Crown Technical Support for additional information about working with RJ-11 and RJ-45 connectors.

5.5 Load Supervision Applications

The IQ-MC Load Supervision feature can be used to monitor the amplifier load in real time with almost any program material. Average load impedance is calculated as a function of amplifier output voltage and current. The system requires approximately 20-30 mA of average amplifier output current for adequate supervision. This allows typically low average output power levels of less than 1/2 watt with

most loads. The maximum load impedance for reliable system performance is limited to about 50 ohms. Higher impedances can be measured but may require higher amplifier output levels for reliable operation.

Most amplifier/load systems can be configured and supervised by following these steps:

- 1 Configure your audio system using a known "good" load, then enable the Load Supervision feature.
- 2 Provide typical program material at a level high enough to light the "test" indicator.
- 3 Run the system at this level until the average impedance stabilizes. This may take seconds to minutes depending on level, duty-cycle, etc.
- 4 Set the nominal impedance at the measured value average. This optimizes the supervision algorithm for voltage and current levels versus the actual load. Note: A higher nominal setting will require higher output levels.
- 5 Set the high limit at twice average and the low limit at one-fourth nominal.*
- 6 Let the system run for extended periods using any and all typical program material.
- 7 Adjust the high/low limits, if necessary, to account for any variance in average measured impedance.
- 8 Enable error reporting, if desired.

* These limits are somewhat arbitrary but should be a good starting point.

This procedure should work well for most applications. However, some applications can be a little more difficult. Some very low-level and/or low duty-cycle signals may not adequately “test” the load. Lab and situation testing have shown output levels as small 40 dB below rated amplifier output to be enough for most low-impedance loads. Higher impedance loads such as those used in “lightly-loaded” 70V distribution lines may require signal level near 20 dB below rated output.

The “Nominal Load Impedance” control is used to optimize the system for the most accurate calculation of load impedance. It should be set to the expected nominal (or rated) impedance of the “normal” load. The high limit should be set for at least 2 times the expected nominal or actual measured load, while the low limit should be set to $\frac{1}{2}$ the expected nominal or actual measured load.

The following example calculates the SPL necessary for supervision of a typical 8-ohm system. While the resulting 80-dB SPL @ 1 meter is definitely above conversation level, it is not uncomfortable.

An “8 ohm” example:

30 mA into 8 ohms = 0.007watts

8-ohm driver sensitivity = 100dB for 1W @ 1 meter

$0.007W/1W = -20dB$

Required SPL for supervision test is $100dB - 20dB = 80dB$ SPL @ 1 meter

5.5.1 Typical Load Characteristics to Know and Understand

It is well known that the typical loudspeaker impedance is not the same for all frequencies. This variance is due to the effect of electrical properties such as the expected increase in impedance at high frequencies due to driver voice-coil inductance, or the peaks and valleys due to passive crossovers. Testing of various passive boxes has shown peaks of 100 ohms or more! Low frequency impedance variation can come from the interaction of the driver compliance with that of the box. The low frequency variations are usually wide bandwidth and may vary from 6 to 30 ohms on an 8-ohm driver.

These anomalies are easily averaged out by the IQ-MC supervision algorithm in most systems. However, there may be some extreme situations for very narrow bandwidth (i.e. single-note) signals and/or very widely varying loads that the algorithm simply cannot overcome. In these cases, widening the high and low limits will help decrease the “sensitivity” of supervision and decrease chance of “nuisance” error reports.

6 Specifications

General

Internal Controls: An 8-segment DIP switch sets the IQ address (decimal range: 1–250)*. A Reset/Preset switch, accessible with a straightened paper clip through the module's front panel, selects the next user preset if pressed for less than 2 seconds, resets settings to "factory default" if it is pressed for more than 2 seconds, or re-writes from firmware to flash memory restoring all settings to factory default if it is pressed while applying power. Jumpers select thru or processed signal for daisy output of each channel.

Connectors: IQ Bus: RJ-45 connector for input, RJ-45 connector for daisy output. AUX In/Aux Out/Listen Bus: RJ-11 connector.

Indicators: A yellow DATA indicator flashes when a valid IQ command is received from the IQ System via the IQ Bus. The DATA indicator can be forced on to facilitate rapid troubleshooting of IQ Bus wiring. A green PRESET indicator flashes to indicate the user preset number currently selected in memory. If the PRESET indicator does not flash the preset number when selected, this indicates the preset has been modified by the user.

Memory Backup: 8 Kbyte EEPROM for backup of run-time parameters, presets, and program storage. Capable of 80,000 writes minimum.

* If address "0" is selected, the MC-IQ will operate in stand-alone mode. In this mode, the Crown bus port is deactivated.

IQ Bus Data Communication

Protection: If communication is lost, the unit will continue to function with the last commands received.

Data Rate: 38.4 K BAUD.

Data Format: Serial, binary, asynchronous; 1 start bit; 1 stop bit; 8 data bits; no parity.

IQ Bus Interface Type: Optically isolated 20 milliamp serial loop.

Operation: Half duplex.

Transmission Distance: Variable from 200 to 3000 feet (61 to 914 m), depending upon wire capacitance. Typically 1000 feet (305 M) using shielded twisted-pair wire, #26 AWG or larger. Can be extended with an IQ Repeater.

Audio

Please note: The audio specifications are referenced to 0.775 V (0 dBu). Measurements were made at the output of the IQ-MC module, itself.

Maximum Input Level: +20 dBu.

Dynamic Range: >100 dB (A-weighted, 20 Hz to 20 kHz).

Frequency Response: ±0.5 dB from 20 Hz to 20 kHz.

Common Mode Rejection (CMR): 50 dB (typical).

Total Harmonic Distortion + Noise (THD+N): <0.05% (1 kHz, 0dBu).

Maximum Output Level: +20 dBu.

IQ System Data Acquisition

Multi-Channel, 14-bit Analog to Digital Converter.

Input/Output Monitor Accuracy: Typically ±1 dB.

7 IQ Address Tables

The following pages in this section contain lookup tables for every valid IQ address. The valid addresses are 1 to 250. Remember that address “0” (zero) will put the IQ-MC into a stand-alone mode where it is invisible to the IQ System and acts like a “dumb” balanced audio input. **Do not use an address number higher than 250!** Addresses above 250 are reserved for special system use.

Remember: No two IQ components of the same type which are connected to the same IQ Bus loop can have the same address.

To use the IQ address tables, simply find the address you want and set the IQ address switch of the IQ-MC module as shown.



IQ Address	IQ Address Switch								IQ Address	IQ Address Switch							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	42	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	43	ON	ON	OFF	ON	OFF	ON	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	44	OFF	OFF	ON	ON	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	45	ON	ON	ON	ON	OFF	ON	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	46	OFF	ON	ON	ON	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	47	ON	ON	ON	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	48	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	49	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	50	OFF	ON	OFF	OFF	ON	ON	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF	51	ON	ON	OFF	OFF	ON	ON	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF	52	OFF	OFF	ON	OFF	ON	ON	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF	OFF	OFF	53	ON	OFF	ON	OFF	ON	ON	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	54	OFF	ON	ON	OFF	ON	ON	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF	OFF	OFF	55	ON	ON	ON	OFF	ON	ON	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	56	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF	OFF	OFF	57	ON	ON	OFF	ON	ON	ON	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	58	OFF	ON	OFF	ON	ON	ON	OFF	OFF
17	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	59	ON	ON	OFF	ON	ON	ON	OFF	OFF
18	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF	60	OFF	OFF	ON	ON	ON	ON	OFF	OFF
19	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	61	ON	OFF	ON	ON	ON	ON	OFF	OFF
20	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	62	OFF	ON	ON	ON	ON	ON	OFF	OFF
21	ON	OFF	ON	OFF	ON	OFF	OFF	OFF	63	ON	ON	ON	ON	ON	ON	OFF	OFF
22	OFF	ON	ON	OFF	ON	OFF	OFF	OFF	64	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
23	ON	ON	ON	OFF	ON	OFF	OFF	OFF	65	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
24	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	66	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
25	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	67	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
26	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	68	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
27	ON	ON	OFF	ON	ON	OFF	OFF	OFF	69	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
28	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	70	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
29	ON	OFF	ON	ON	ON	OFF	OFF	OFF	71	ON	ON	ON	OFF	OFF	OFF	ON	OFF
30	OFF	ON	ON	ON	ON	OFF	OFF	OFF	72	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
31	ON	ON	ON	ON	ON	OFF	OFF	OFF	73	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
32	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	74	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
33	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	75	ON	ON	OFF	ON	OFF	OFF	ON	OFF
34	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	76	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
35	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	77	ON	OFF	ON	ON	OFF	OFF	ON	OFF
36	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	78	OFF	ON	ON	ON	OFF	OFF	ON	OFF
37	ON	OFF	ON	OFF	OFF	ON	OFF	OFF	79	ON	ON	ON	ON	OFF	OFF	ON	OFF
38	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	80	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
39	ON	ON	ON	OFF	OFF	ON	OFF	OFF	81	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
40	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	82	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
41	ON	OFF	OFF	ON	OFF	ON	OFF	OFF	83	ON	ON	OFF	OFF	ON	OFF	ON	OFF

Figure 7.1 IQ Address Switch (S1) Settings from 0 through 83



IQ Address	IQ Address Switch								IQ Address	IQ Address Switch							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
84	OFF	OFF	ON	OFF	ON	OFF	ON	OFF	126	OFF	ON	ON	ON	ON	ON	ON	OFF
85	ON	OFF	ON	OFF	ON	OFF	ON	OFF	127	ON	ON	ON	ON	ON	ON	ON	OFF
86	OFF	ON	ON	OFF	ON	OFF	ON	OFF	128	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
87	ON	ON	ON	OFF	ON	OFF	ON	OFF	129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
88	OFF	OFF	OFF	ON	ON	OFF	ON	OFF	130	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
89	ON	OFF	OFF	ON	ON	OFF	ON	OFF	131	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
90	OFF	ON	OFF	ON	ON	OFF	ON	OFF	132	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON
91	ON	ON	OFF	ON	ON	OFF	ON	OFF	133	ON	OFF	ON	OFF	OFF	OFF	OFF	ON
92	OFF	OFF	ON	ON	ON	OFF	ON	OFF	134	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
93	ON	OFF	ON	ON	ON	OFF	ON	OFF	135	ON	ON	ON	OFF	OFF	OFF	OFF	ON
94	OFF	ON	ON	ON	ON	OFF	ON	OFF	136	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
95	ON	ON	ON	ON	ON	OFF	ON	OFF	137	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
96	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	138	ON	ON	ON	ON	OFF	OFF	OFF	ON
97	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	139	ON	ON	OFF	ON	OFF	OFF	OFF	ON
98	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	140	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
99	ON	ON	OFF	OFF	OFF	ON	ON	OFF	141	ON	OFF	ON	ON	OFF	OFF	OFF	ON
100	OFF	OFF	ON	OFF	OFF	ON	ON	OFF	142	OFF	ON	ON	ON	OFF	OFF	OFF	ON
101	ON	OFF	ON	OFF	OFF	ON	ON	OFF	143	ON	ON	ON	ON	OFF	OFF	OFF	ON
102	OFF	ON	ON	OFF	OFF	ON	ON	OFF	144	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
103	ON	ON	ON	OFF	OFF	ON	ON	OFF	145	ON	OFF	OFF	OFF	ON	OFF	OFF	ON
104	OFF	OFF	OFF	ON	OFF	ON	ON	OFF	146	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
105	ON	OFF	OFF	ON	OFF	ON	ON	OFF	147	ON	ON	OFF	OFF	ON	OFF	OFF	ON
106	OFF	ON	OFF	ON	OFF	ON	ON	OFF	148	OFF	OFF	ON	OFF	ON	OFF	OFF	ON
107	ON	ON	OFF	ON	OFF	ON	ON	OFF	149	ON	OFF	ON	OFF	ON	OFF	OFF	ON
108	OFF	OFF	ON	ON	OFF	ON	ON	OFF	150	OFF	ON	ON	ON	OFF	ON	OFF	ON
109	ON	OFF	ON	ON	OFF	ON	ON	OFF	151	ON	ON	ON	OFF	ON	OFF	OFF	ON
110	OFF	ON	ON	ON	OFF	ON	ON	OFF	152	OFF	OFF	OFF	ON	ON	OFF	OFF	ON
111	ON	ON	ON	ON	OFF	ON	ON	OFF	153	ON	OFF	OFF	ON	ON	OFF	OFF	ON
112	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	154	OFF	ON	OFF	ON	ON	OFF	OFF	ON
113	ON	OFF	OFF	OFF	ON	ON	ON	OFF	155	ON	ON	OFF	ON	ON	OFF	OFF	ON
114	OFF	ON	OFF	OFF	ON	ON	ON	OFF	156	OFF	OFF	ON	ON	ON	OFF	OFF	ON
115	ON	ON	OFF	OFF	ON	ON	ON	OFF	157	ON	OFF	ON	ON	ON	OFF	OFF	ON
116	OFF	OFF	ON	OFF	ON	ON	ON	OFF	158	OFF	ON	ON	ON	ON	OFF	OFF	ON
117	ON	OFF	ON	OFF	ON	ON	ON	OFF	159	ON	ON	ON	ON	ON	OFF	OFF	ON
118	OFF	ON	ON	OFF	ON	ON	ON	OFF	160	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
119	ON	ON	ON	OFF	ON	ON	ON	OFF	161	ON	OFF	OFF	OFF	OFF	ON	OFF	ON
120	OFF	OFF	OFF	ON	ON	ON	ON	OFF	162	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
121	ON	OFF	OFF	ON	ON	ON	ON	OFF	163	ON	ON	OFF	OFF	OFF	ON	OFF	ON
122	OFF	ON	OFF	ON	ON	ON	ON	OFF	164	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
123	ON	ON	OFF	ON	ON	ON	ON	OFF	165	ON	OFF	ON	OFF	OFF	ON	OFF	ON
124	OFF	OFF	ON	ON	ON	ON	ON	OFF	166	OFF	ON	ON	ON	OFF	ON	OFF	ON
125	ON	OFF	ON	ON	ON	ON	ON	OFF	167	ON	ON	ON	OFF	OFF	ON	OFF	ON

Figure 7.1 IQ Address Switch (S1) Settings from 84 through 167



IQ Address	IQ Address Switch								IQ Address	IQ Address Switch							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
168	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	210	OFF	ON	OFF	OFF	ON	OFF	ON	ON
169	ON	OFF	OFF	ON	OFF	ON	OFF	ON	211	ON	ON	OFF	OFF	ON	OFF	ON	ON
170	OFF	ON	OFF	ON	OFF	ON	OFF	ON	212	OFF	OFF	ON	OFF	ON	OFF	ON	ON
171	ON	ON	OFF	ON	OFF	ON	OFF	ON	213	ON	OFF	ON	OFF	ON	OFF	ON	ON
172	OFF	OFF	ON	ON	OFF	ON	OFF	ON	214	OFF	ON	ON	OFF	ON	OFF	ON	ON
173	ON	OFF	ON	ON	OFF	ON	OFF	ON	215	ON	ON	ON	OFF	ON	OFF	ON	ON
174	OFF	ON	ON	ON	OFF	ON	OFF	ON	216	OFF	OFF	OFF	ON	ON	OFF	ON	ON
175	ON	ON	ON	ON	OFF	ON	OFF	ON	217	ON	OFF	OFF	ON	ON	OFF	ON	ON
176	OFF	OFF	OFF	OFF	ON	ON	OFF	ON	218	OFF	ON	OFF	ON	ON	OFF	ON	ON
177	ON	OFF	OFF	OFF	ON	ON	OFF	ON	219	ON	ON	OFF	ON	ON	OFF	ON	ON
178	OFF	ON	OFF	OFF	ON	ON	OFF	ON	220	OFF	OFF	ON	ON	ON	OFF	ON	ON
179	ON	ON	OFF	OFF	ON	ON	OFF	ON	221	ON	OFF	ON	ON	ON	OFF	ON	ON
180	OFF	OFF	ON	OFF	ON	ON	OFF	ON	222	OFF	ON	ON	ON	ON	OFF	ON	ON
181	ON	OFF	ON	OFF	ON	ON	OFF	ON	223	ON	ON	ON	ON	ON	OFF	ON	ON
182	OFF	ON	ON	OFF	ON	ON	OFF	ON	224	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
183	ON	ON	ON	OFF	ON	ON	OFF	ON	225	ON	OFF	OFF	OFF	OFF	ON	ON	ON
184	OFF	OFF	OFF	ON	ON	ON	OFF	ON	226	OFF	ON	OFF	OFF	OFF	ON	ON	ON
185	ON	OFF	OFF	ON	ON	ON	OFF	ON	227	ON	ON	OFF	OFF	OFF	ON	ON	ON
186	OFF	ON	OFF	ON	ON	ON	OFF	ON	228	OFF	OFF	ON	OFF	OFF	ON	ON	ON
187	ON	ON	OFF	ON	ON	ON	OFF	ON	229	ON	OFF	ON	OFF	OFF	ON	ON	ON
188	OFF	OFF	ON	ON	ON	ON	OFF	ON	230	OFF	ON	ON	OFF	OFF	ON	ON	ON
189	ON	OFF	ON	ON	ON	ON	OFF	ON	231	ON	ON	ON	OFF	OFF	ON	ON	ON
190	OFF	ON	ON	ON	ON	ON	OFF	ON	232	OFF	OFF	OFF	ON	OFF	ON	ON	ON
191	ON	ON	ON	ON	ON	ON	OFF	ON	233	ON	OFF	OFF	ON	OFF	ON	ON	ON
192	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	234	OFF	ON	OFF	ON	OFF	ON	ON	ON
193	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	235	ON	ON	OFF	ON	OFF	ON	ON	ON
194	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	236	OFF	OFF	ON	ON	OFF	ON	ON	ON
195	ON	ON	OFF	OFF	OFF	OFF	ON	ON	237	ON	OFF	ON	ON	OFF	ON	ON	ON
196	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	238	OFF	ON	ON	ON	OFF	ON	ON	ON
197	ON	OFF	ON	OFF	OFF	OFF	ON	ON	239	ON	ON	ON	ON	OFF	ON	ON	ON
198	OFF	ON	ON	OFF	OFF	OFF	ON	ON	240	OFF	OFF	OFF	OFF	ON	ON	ON	ON
199	ON	ON	ON	OFF	OFF	OFF	ON	ON	241	ON	OFF	OFF	OFF	ON	ON	ON	ON
200	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	242	OFF	ON	ON	OFF	ON	ON	ON	ON
201	ON	OFF	OFF	ON	OFF	OFF	ON	ON	243	ON	ON	OFF	OFF	ON	ON	ON	ON
202	OFF	ON	OFF	ON	OFF	OFF	ON	ON	244	OFF	OFF	ON	OFF	ON	ON	ON	ON
203	ON	ON	OFF	ON	OFF	OFF	ON	ON	245	ON	OFF	ON	OFF	ON	ON	ON	ON
204	OFF	OFF	ON	ON	OFF	OFF	ON	ON	246	OFF	ON	ON	OFF	ON	ON	ON	ON
205	ON	OFF	ON	ON	OFF	OFF	ON	ON	247	ON	ON	ON	OFF	ON	ON	ON	ON
206	OFF	ON	ON	ON	OFF	OFF	ON	ON	248	OFF	OFF	OFF	ON	ON	ON	ON	ON
207	ON	ON	ON	ON	OFF	OFF	ON	ON	249	ON	OFF	OFF	ON	ON	ON	ON	ON
208	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	250	OFF	ON	OFF	ON	ON	ON	ON	ON
209	ON	OFF	OFF	OFF	ON	OFF	ON	ON									

Figure 7.1 IQ Address Switch (S1) Settings from 168 through 250

8 Service

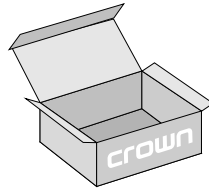
To obtain factory service, fill out the **service information page** found in the back of this manual and send it along with your proof of purchase and the defective unit to the Crown factory.

For warranty service, we will pay for ground shipping both ways in the United States. Contact Crown Factory Service or Technical Support to obtain prepaid shipping labels prior to sending the unit. Or, if you prefer, you may prepay the cost of shipping, and Crown will reimburse you. Send copies of the shipping receipts to Crown to receive reimbursement.

Your repaired unit will be returned via UPS ground. Please contact us if other arrangements are required.

Factory Service Shipping Instructions:

1. When sending a Crown product to the factory for service, be sure to fill out the service information form that follows and enclose it inside your unit's shipping pack. Do not send the service information form separately.
2. To ensure the safe transportation of your unit to the factory, ship it in an original factory packing container. If you don't have one, call or write Crown's Parts Department. With the exception of polyurethane or wooden crates, any other packing material will not be sufficient to withstand the stress of shipping. **Do not use loose, small size packing materials.**



Always use the original factory pack to transport the unit.

3. Do not ship the unit in any kind of cabinet (wood or metal). Ignoring this warning may result in extensive damage to the unit and the cabinet. Accessories are not needed—do not send the product documentation, cables and other hardware.

If you have any questions, please call or write the Crown Technical Support Group.

Crown Factory Service

1718 W. Mishawaka Rd.
Elkhart, Indiana 46517 U.S.A.

Telephone: 574-294-8200
800-342-6939 (North America,
Puerto Rico, and Virgin
Islands only)

Facsimile:
574-294-8301 (Technical
Support)
574-294-8124 (Factory
Service)

Internet:
<http://www.crownaudio.com>

UNITED STATES & CANADA



SUMMARY OF WARRANTY

Crown International, 1718 West Mishawaka Road, Elkhart, Indiana 46517-4095 U.S.A. warrants to you, the ORIGINAL PURCHASER and ANY SUBSEQUENT OWNER of each NEW Crown product, for a period of three (3) years from the date of purchase by the original purchaser (the "warranty period") that the new Crown product is free of defects in materials and workmanship. We further warrant the new Crown product regardless of the reason for failure, except as excluded in this Warranty.

ITEMS EXCLUDED FROM THIS CROWN WARRANTY

This Crown Warranty is in effect only for failure of a new Crown product which occurred within the Warranty Period. It does not cover any product which has been damaged because of any intentional misuse, accident, negligence, or loss which is covered under any of your insurance contracts. This Crown Warranty also does not extend to the new Crown product if the serial number has been defaced, altered, or removed.

WHAT THE WARRANTOR WILL DO

We will remedy any defect, regardless of the reason for failure (except as excluded), by repair, replacement, or refund. We may not elect refund unless you agree, or unless we are unable to provide replacement, and repair is not practical or cannot be timely made. If a refund is elected, then you must make the defective or malfunctioning product available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at the factory. Warranty work for some products can only be performed at our factory. We will remedy the defect and ship the product from the service center or our factory within a reasonable time after receipt of the defective product at our authorized service center or our factory. All expenses in remedying the defect, including surface shipping costs in the United States, will be borne by us. (You must bear the expense of shipping the product between any foreign country and the port of entry in the United States and all taxes, duties, and other customs fees for such foreign shipments.)

HOW TO OBTAIN WARRANTY SERVICE

You must notify us of your need for warranty service within the warranty period. All components must be shipped in a factory pack, which, if needed, may be obtained from us free of charge. Corrective action will be taken within a reasonable time of the date of receipt of the defective product by us or our authorized service center. If the repairs made by us or our authorized service center are not satisfactory, notify us or our authorized service center immediately.

DISCLAIMER OF CONSEQUENTIAL & INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN THE NEW CROWN PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

WARRANTY ALTERATIONS

No person has the authority to enlarge, amend, or modify this Crown Warranty. This Crown Warranty is not extended by the length of time which you are deprived of the use of the new Crown product. Repairs and replacement parts provided under the terms of this Crown Warranty shall carry only the unexpired portion of this Crown Warranty.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

THIS CROWN WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. No action to enforce this Crown Warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

**THIS STATEMENT OF WARRANTY SUPERSEDES ANY OTHERS
CONTAINED IN THIS MANUAL FOR CROWN PRODUCTS.**

**THREE YEAR
FULL WARRANTY**



WORLDWIDE EXCEPT USA & CANADA

SUMMARY OF WARRANTY

Crown International, 1718 West Mishawaka Road, Elkhart, Indiana 46517-4095 U.S.A. warrants to you, the ORIGINAL PURCHASER and ANY SUBSEQUENT OWNER of each NEW Crown¹ product, for a period of three (3) years from the date of purchase by the original purchaser (the "warranty period") that the new Crown product is free of defects in materials and workmanship, and we further warrant the new Crown product regardless of the reason for failure, except as excluded in this Crown Warranty.

¹ Note: If your unit bears the name "Amcron," please substitute it for the name "Crown" in this warranty.

ITEMS EXCLUDED FROM THIS CROWN WARRANTY

This Crown Warranty is in effect only for failure of a new Crown product which occurred within the Warranty Period. It does not cover any product which has been damaged because of any intentional misuse, accident, negligence, or loss which is covered under any of your insurance contracts. This Crown Warranty also does not extend to the new Crown product if the serial number has been defaced, altered, or removed.

WHAT THE WARRANTOR WILL DO

We will remedy any defect, regardless of the reason for failure (except as excluded), by repair, replacement, or refund. We may not elect refund unless you agree, or unless we are unable to provide replacement, and repair is not practical or cannot be timely made. If a refund is elected, then you must make the defective or malfunctioning product available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers. We will remedy the defect and ship the product from the service center within a reasonable time after receipt of the defective product at our authorized service center.

HOW TO OBTAIN WARRANTY SERVICE

You must notify us of your need for warranty service within the warranty period. All components must be shipped in a factory pack. Corrective action will be taken within a reasonable time of the date of receipt of the defective product by our authorized service center. If the repairs made by our authorized service center are not satisfactory, notify our authorized service center immediately.

DISCLAIMER OF CONSEQUENTIAL & INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN THE NEW CROWN PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT.

WARRANTY ALTERATIONS

No person has the authority to enlarge, amend, or modify this Crown Warranty. This Crown Warranty is not extended by the length of time which you are deprived of the use of the new Crown product. Repairs and replacement parts provided under the terms of this Crown Warranty shall carry only the unexpired portion of this Crown Warranty.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

No action to enforce this Crown Warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

THIS STATEMENT OF WARRANTY SUPERSEDES ANY OTHERS CONTAINED IN THIS MANUAL FOR CROWN PRODUCTS.

**THREE YEAR
FULL WARRANTY**

Crown Factory Service Information

Shipping Address: Crown Customer Service,
1718 W. Mishawaka Rd., Elkhart, IN U.S.A. 46517
Phone: 1-800-342-6939 or 1-574-294-8200 Fax: 1-574-294-8124

Owner's Name: _____

Shipping Address: _____

Phone Number: _____ Fax Number: _____

E-mail: _____ Model: _____

Serial Number: _____ Purchase Date: _____

NATURE OF PROBLEM

(Be sure to describe the conditions that existed when the problem occurred and what attempts were made to correct it.)

Other equipment in your system: _____

If warranty has expired, payment will be:

Cash/Check VISA MasterCard C.O.D. P.O. for Crown Dealer

Card Number: _____

Exp. Date: _____ Signature: _____

**ENCLOSE THIS PORTION WITH THE UNIT.
DO NOT MAIL SEPARATELY.**

