IQAMB-5/IQSMX-6

REFERENCE MANUAL

IQ Mixer/Multiplexers with Automatic Signal Processing

Printed on recycled paper.

THREE YEAR FULL WARRANTY

WORLDWIDE

SUMMARY OF WARRANTY

The Crown Audio Division of Crown International, Inc., 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[1] 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 not later than ninety (90) days after expiration of 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 AND 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.

9/90

Telephone: 219-294-8200. Facsimile: 219-294-8301

NORTH AMERICA

SUMMARY OF WARRANTY

The Crown Audio Division of Crown International, Inc., 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. 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 not later than ninety (90) days after expiration of 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 AND 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.

Telephone: 219-294-8200. Facsimile: 219-294-8301 9/90

Important Safety Instructions

1) Read these instructions.

2) Keep these instructions.

3) Heed all warnings.

4) Follow all instructions.

5) Do not use this apparatus near water.

6) Clean only with a dry cloth.

7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.

9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10) Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11) Only use attachments/accessories specified by the manufacturer.

12) Use only with a cart, stand, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13) Unplug this apparatus during lightning storms or when unused for long periods of time.

14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

The information furnished in this manual does not include all of the details of design, production, or variations of the equipment. Nor does it cover every possible situation which may arise during installation, operation or maintenance. If you need special assistance beyond the scope of this manual, please contact our Technical Support Group.

Crown Audio Technical Support Group
Plant 2 SW, 1718 W. Mishawaka Rd., Elkhart, Indiana 46517 U.S.A.
Phone: **800-342-6939** (North America, Puerto Rico and Virgin Islands) or 219-294-8200
Fax: 219-294-8301   Fax Back (North America only): 800-294-4094 or 219-293-9200
Fax Back (International): 219-294-8100 Internet: http://www.crownintl.com email: iqsupport@crownintl.com

WARNING
TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE!

PLEASE NOTE

The following universal symbols may appear on your product and/or in various sections of this manual. Wherever they appear, they are to be interpreted as follows:

Lightning Bolt Symbol:

This symbol is used to alert the user to the presence of dangerous voltages and the possible risk of electric shock.

Exclamation Mark Symbol:

This symbol is used to alert the user to refer to the instruction manual for important operating or maintenance instructions.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for Class A Digital Device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: For a system to comply with FCC rules, all components in the system must be in compliance. Please consult the instruction manuals of all components in an IQ System for FCC compliance.

Quick Install Procedure

This procedure is provided for those who are already familiar with Crown's *IQ System*® and who would like to install the mixer/multiplexer in the shortest time possible. Less experienced installers or those wishing a full explanation of the installation procedure are encouraged to go to Section 3 where the full installation procedure is described.

Prepare the mixer/multiplexer:

1 Set the IQ address switch (Figure 3.3) on the mixer/multiplexer to an unused IQ address.

3 If the mixer/multiplexer is to be used as a system interface, set the baud rate and parity switches.

Mounting:

4 Mount the unit into a standard 19-inch (48.3-cm) equipment rack or cabinet, or it can be stacked.

Install the wiring:

5 Connect the mixer/multiplexer to the IQ System via the Crown Bus, or directly to the host computer if the mixer/multiplexer is to be used as the system interface (see Section 3.1 if more information is needed).

6 Turn off all amplifiers or other equipment that will either feed or be connected to the unit.

7 Connect the audio wiring to the mixer/multiplexer inputs and outputs.

8 Connect any circuits to be used with the AUX connector to the unit.

9 Connect the unit to the AC receptacle.

Prepare the audio system:

10 Set all equalizers, filters, delays and any other processing equipment the will be in the signal chain before or after the mixer/multiplexer.

11 Set and verify all level and gain settings on all amplifiers or other equipment that will either feed or be connected to the unit.

Configure the mixer/multiplexer:

12 Set input selector switches for Mic, Line, or Phantom, depending upon input signal to be fed to the input.

13 Set gain levels on the back of the unit.

14 Use IQ software to set up the mixer/multiplexer software-controlled features.

CONTENTS

Illustrations

Figure 1.1 The IQ–AMB-5 and IQ–SMX-6

1 Welcome

Thank you for purchasing a *Crown*® IQ mixer/multiplexer. IQ mixer/multiplexers are intelligent mixers with special signal routing capabilities. Their intelligence stems from a powerful onboard microprocessor which enables them to be controlled by a Crown *IQ System*®. Each input and output can be individually controlled and, with their *distributed intelligence*™ capability, continue to operate even when an IQ System is not connected.

In addition to two main outputs (one for each channel), each model has a second set of "bus" outputs which are switched on and off by a relay. This enables many mixer/multiplexers to be connected to a common audio bus without loading it down. They are designed to work as stand-alone units in a small audio system, or as modules in a large audio system.

Two models are available to serve different needs. The *IQ–SMX-6*™ model operates as a 6x2 mixer. The *IQ–AMB-5*™ can operate as a 5x1 mixer. Multiple units can be connected together to form larger mixers. For example, two IQ–SMX-6 mixers can be connected together to form a single 12x2 mixer.

The IQ–SMX-6 provides basic mixing capabilities, as well as automatic signal processing. A sensing circuit is located at the beginning of each input to sense the input signal level ahead of any signal processing. Similar sensors, along with its onboard intelligence, enable the IQ–SMX-6 to perform many versatile functions like automatic mixing, compression, and automatic level control.

The IQ–AMB-5 has the same functions as an IQ–SMX-6 plus it has the ability to sense ambient sound level and automatically adjust its output level accordingly. In this way it serves as the ultimate automatic level controller. Input 6 is dedicated as the sensing input, leaving 5 inputs to function normally as a 5x2 mixer. Unlike the IQ–SMX-6, signal processing is only available for Channel 1. Channel 2 functions as a manual mixer.

This manual will help you successfully install your unit. Please read all the instructions, warnings and cautions contained within it. Also, for your protection, please send in the warranty registration card today. And save the bill of sale—it is your official proof of purchase.
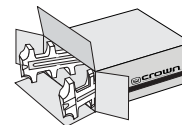
1.1 Unpacking
Please inspect the unit for any damage that may have occurred during transit. If damage is found, notify the transportation company immediately. Only you, the consignee, may initiate a claim with the carrier for shipping damage. Crown will cooperate fully as needed. Save the shipping carton as evidence of damage for the shipper's inspection.

Please save all packing materials. **NEVER SHIP THE UNIT WITHOUT THE FACTORY PACK.**

2 Controls, Connectors & Indicators
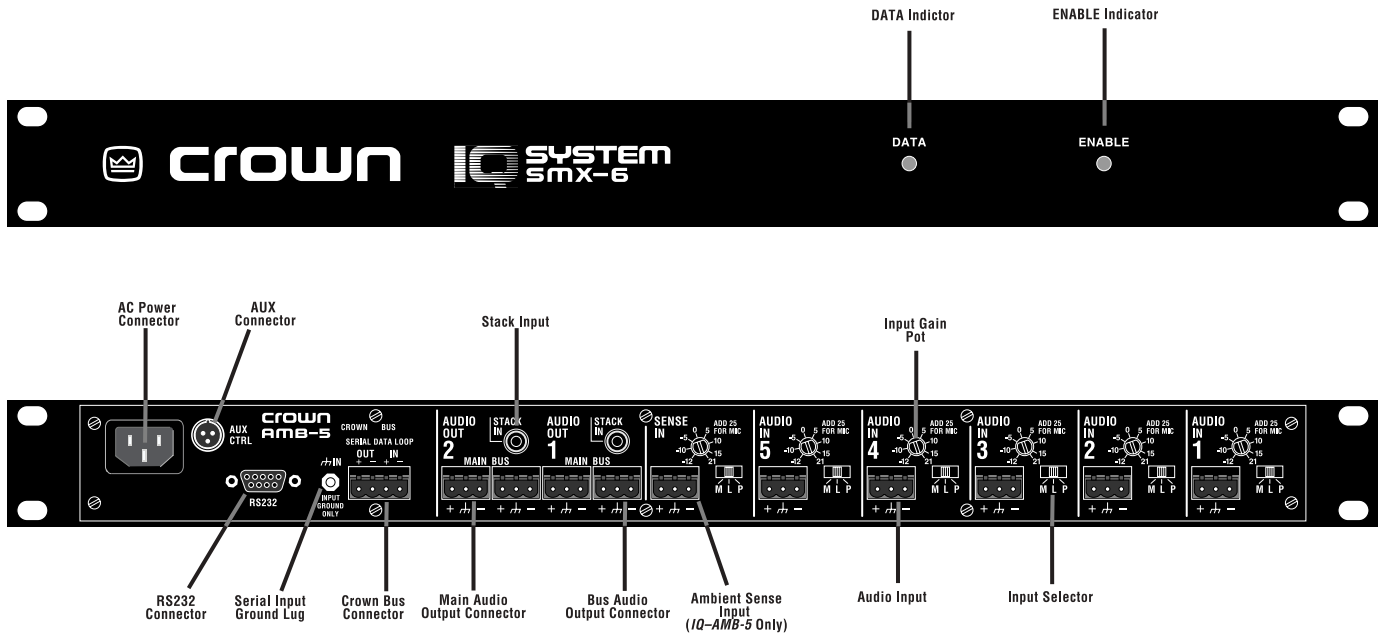
Figure 2.1 IQ Mixer / Multiplexer Controls, Connectors & Indicators
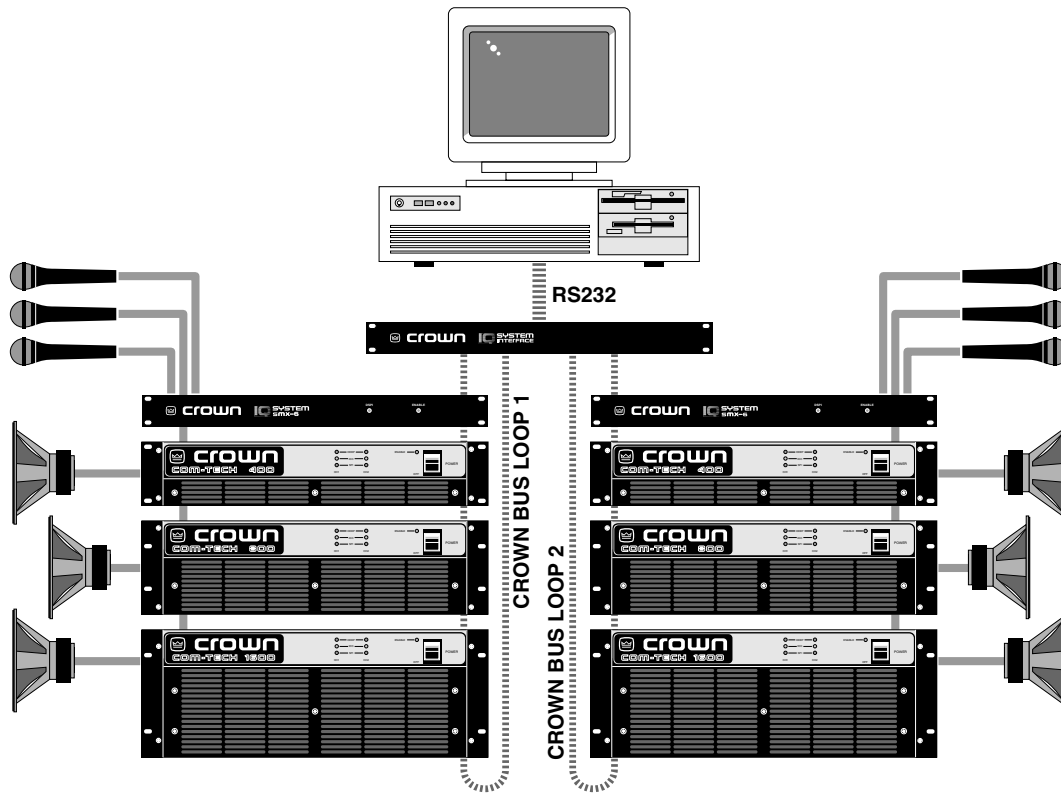
Figure 3.1 An IQ System with a Host Computer and Two Mixer/Multiplexers

3 Hardware Installation

The installation of an IQ mixer/multiplexer consists of two major parts: installing the hardware and configuring the software. This manual deals only with hardware installation. Refer to the appropriate software documentation for instructions in setting up and operating your IQ software.

Provide adequate cooling if the unit will be used in a hot environment. **It is good practice to allow one empty rack space (1.75 inches or 4.4 cm.) between each unit if more than four units will be stacked in a cabinet.** Each empty rack space should be sealed with a blank rack panel.

The hardware installation is divided into 4 steps: 1) connecting to a host computer 2) connecting to the Crown Bus 3) connecting the audio inputs and outputs and 4) connecting auxiliary devices

3.1 Connecting to a Host Computer (Step 1)

An IQ host computer is an IBM® PC-compatible computer which is used is used to configure or control/monitor part or all of an IQ System. Depending upon the design of your IQ System, it may or may not require a host computer during normal operation.

How the mixer/multiplexer will be used will determine whether or not it will need to be connected directly to a host computer. If the unit will be connected to the Crown Bus it will <u>not</u> need to be connected directly to a host computer. The following circumstances require connection to a host computer:

- If a Crown Bus will not be used, the mixer/multiplexer will need to be connected to a host computer so the software inside the unit can be configured. Afterward, if manual control is not required, the host computer can be disconnected.

- If the mixer/multiplexer must be configured before it is installed into an IQ System, it must be connected directly to a host computer for configuration. The onboard memory of the unit will maintain its software configuration without it being plugged into an AC source.

- If the mixer/multiplexer will be used as an IQ interface for other IQ–AMB-5 or IQ–SMX-6 mixers, it will need to be connected directly to a host computer.

One of the advantages of connecting directly to a host computer is that a separate IQ interface (IQ–INT-II) is not required. If you plan to configure the unit while it is connected to the Crown Bus, skip ahead to Section 3.2.

RS232 is commonly used with IBM PCs and compatibles, and is the communication standard supported by the mixer/multiplexer when used as an interface. Because it uses unbalanced signal wiring, it cannot be used for distances over 50 feet (15.2 m).

The following illustration shows how to wire the serial cable:

PC (RS232)   **SMX-6 (RS232)**

Cable connectors are numbered as they appear from the front.

	PIN	PIN	
Not used	1,4,6,9		
ReceiveData (RXD)	2	3	**Transmit Data (TXD)**
Transmit Data (TXD)	3	2	**Receive Data (RXD)**
Signal Ground (GND)	5	5	**Signal Ground (GND)**
Request to Send (RTS)	7	8	**Clear to Send (CTS)**
Clear to Send (CTS)	8	7	**Request to Send (RTS)**

Figure 3.2 RS232 Cable Wiring

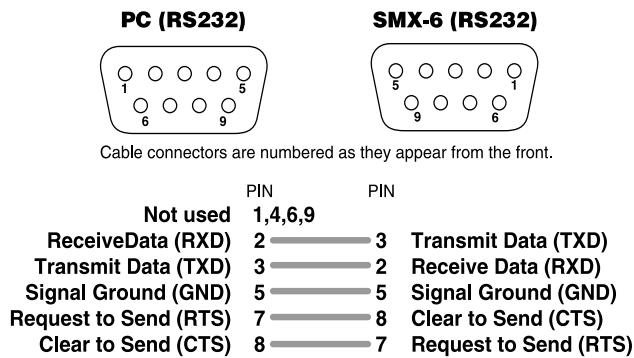**Important: Do not use twisted pair wire for RS232 because it increases crosstalk. Instead, use an untwisted cable or ribbon cable.**

Setting the communication parameters for RS232 serial communication is accomplished using the six-segment baud rate and parity DIP switch shown in Figure 3.3. The first four switches select the baud rate and the last two set the parity. Use the fastest baud rate possible. The highest baud rate supported by the unit is 19.2 K baud. Parity checking is not supported and should be OFF. The odd/even parity bit setting doesn't matter when parity is switched OFF. The unit has been factory set to 1 stop bit and 8 data bits.

The communication parameters of the host computer are set by the IQ software. Please refer to the IQ software documentation for information about setting up communication parameters.

Here are some important guidelines when configuring serial communication:

- Use the same communication parameters at each end. The unit and the computer must be set for the same baud rate and parity checking.

- Use the highest baud rate possible. IQ mixer/multiplexers can be set as high as 19.2 K baud.

- If the host computer fails to communicate with the unit and the communication standard and parameters are set correctly, try reducing the baud rate of both the unit and the computer.

- If communication problems persist, check the serial cable for improper wiring or possible shorted or broken wires.

- For further assistance contact the Crown Technical Support Group (see Section 8 for contact information.)

3.2 Connecting to the Crown Bus (Step 2)

The Crown Bus is a serial communication loop designed to transmit IQ commands and data. As a communication standard, it is independent of the wiring system used. This flexibility is a great strength, enabling a Crown Bus loop to be wired with either fiber optic cabling or with inexpensive twisted-pair wire, whichever the installation requires. A single *IQ System* can have more than one Crown Bus loop. To function properly, a Crown Bus loop must be unbroken.

3.2.1 Set the IQ Address Switch

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 Crown Bus.

The IQ Address switch has eight segments because it actually contains eight tiny switches inside. The switch is shown in Figure 3.3.

Each of the eight segments in the IQ Address switch have a value which doubles as the number increases. For example segment 1 has a value of 1; segment 2 has a value of 2; segment 3 has a value of 4; segment 4 has a value of 8 and so on.

The address is determined by adding the values of all "ON" segments. In Figure 3.3, segments 2, 5, 6, and 7 are on. Simply add the values to find the address: 2+16+32+64=114.

A convenient series of IQ address tables are included in Section 7. The tables show the switch settings for all 250 addresses.

No two IQ components of the same type which are connected to the same Crown Bus can have the same address. Suppose, for example, an IQ System has two

Crown Bus loops, 1 and 2, and an IQ–SMX-6 is to be installed into loop 1 and given an address of 114. No other IQ–SMX-6 can be given the same address in loop 1. However, an IQ–SMX-6 in loop 2 can have the same address.

Different IQ components in the same Crown Bus loop can have the same address. For example, both an IQ–SMX-6 and an IQ–AMB-5 can use address 114 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 never be used.

3.2.2 Connect the mixer/multiplexer to the IQ System via the Crown Bus

The IQ components in a Crown 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 3.10.

There are three different types of connectors used for Crown Bus wiring on IQ components. These include DIN connectors, RJ-45 connectors, and removable barrier strip plugs. IQ mixer/multiplexers use four terminal removable barrier strip connectors that accept plugs like the one shown in Figure 3.4.
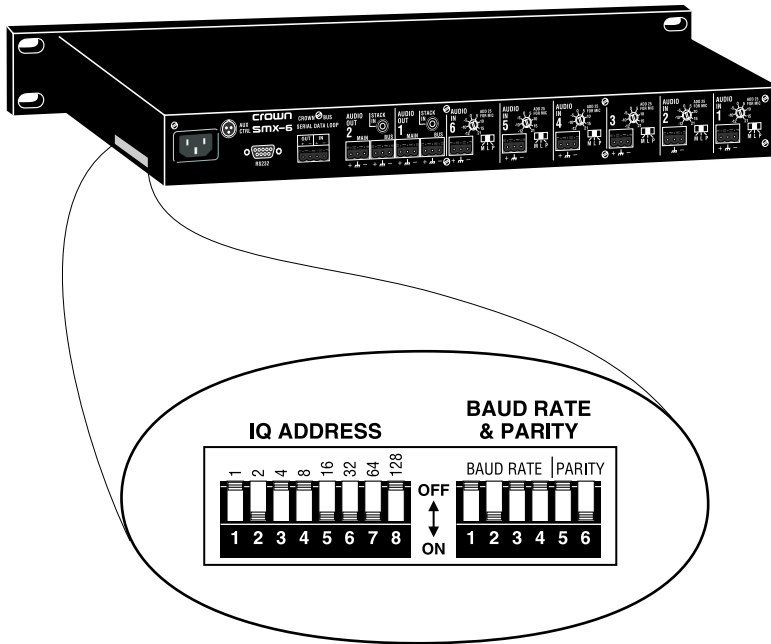
BAUD RATE & PARITY SETTINGS

		1	2	3	4	5	6
BAUD RATE	19200	↓	↓	↓	↓		
	9600	↓	↓	↓	↑		
	4800	↑	↓	↓	↑		
	2400	↑	↑	↑	↓		
	1200	↑	↑	↓	↑		
	300	↑	↓	↑	↑		
	150	↓	↑	↑	↑		
PARITY	ON					↓	
	OFF					↑	
	ODD						↓
	EVEN						↑

Figure 3.3 Selecting the IQ Address and Communication Parameters
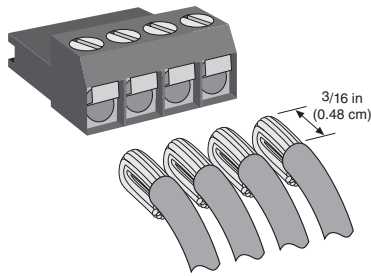
Figure 3.4 Four-Terminal Removable Barrier Block Plug

The following examples show how to connect the mixer/multiplexer to other IQ components on the Crown Bus:
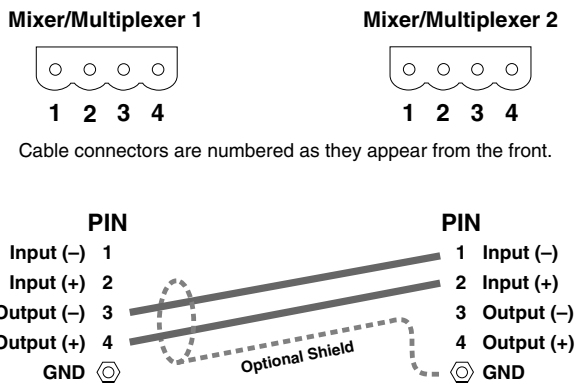
Figure 3.5 Crown Bus Wiring for Removable Barrier Blocks
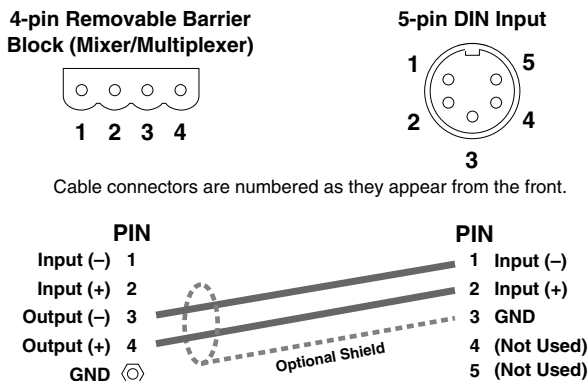
Figure 3.6 Crown Bus Wiring for 5-pin DIN Input
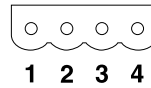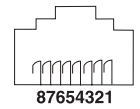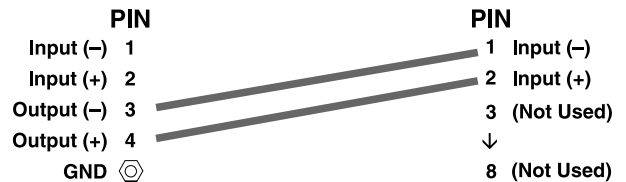
Figure 3.7 Crown Bus Wiring for RJ-45 Input
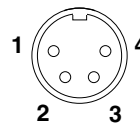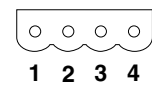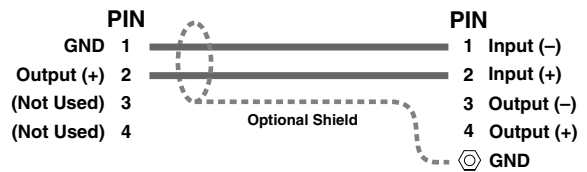
Figure 3.8 Crown Bus Wiring for 4-pin DIN Output
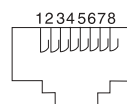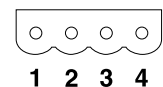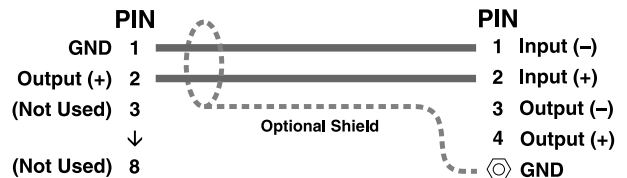
Figure 3.9 Crown Bus Wiring for RJ-45 Output

3.3 Connect the Audio Wiring (Step 3)

IQ mixer/multiplexers have 6 mic/line inputs and 2 stack inputs (Input 6 of the IQ–AMB-5 is dedicated for ambient sensing). Two audio channels feed two main and two auxiliary bus outputs. Three-terminal removable barrier block connectors are provided for the mic/line inputs and main and bus outputs. RCA-type phono jacks are provided for the stack inputs. See Section 5.1 for information on the operation of the mixer/multiplexer inputs and outputs.

3.4 Connect Auxiliary Devices (Step 4)

Connect any external circuits you plan to use to control the AUX input and/or monitor the AUX output of the mixer/multiplexer. See section 5.2 for information on the operation of the AUX input and output and for examples of wiring circuits to the AUX connector.
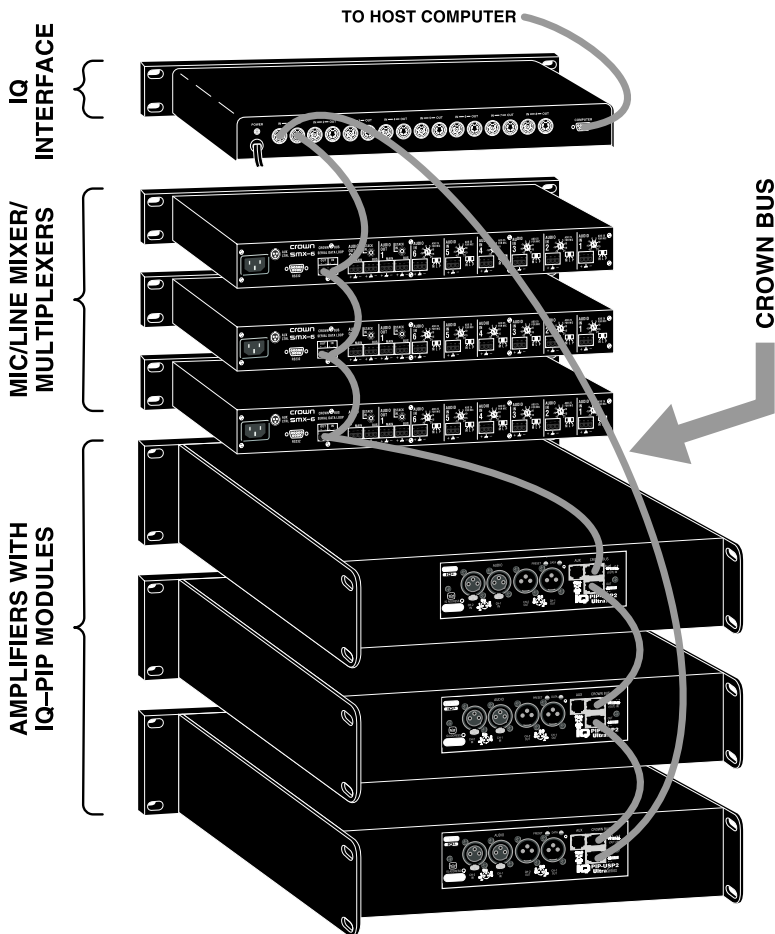
Important: Provide adequate cooling if the unit will be used in a hot environment. **It is good practice to allow one empty rack space (1.75 inches or 4.4 centimeters) between each unit if <u>more than four</u> units will be stacked in a cabinet.** Each empty rack space should be sealed with a blank rack panel to facilitate proper air flow inside the cabinet.

Figure 3.10 Crown Bus Wiring "Loop"from Output to Input of Each IQ Component

4 Operation

The IQ–AMB-5 and IQ–SMX-6 sensing mixer/multiplexers are IQ components that can be controlled and monitored from a remote location via an IQ System. In addition to basic mixing functions, the IQ–AMB-5 and IQ–SMX-6 sensing mixer/multiplexers offer advanced signal processing and have the capability of mixing audio signals automatically. The IQ–SMX-6 is a 6x2 automatic mixer, with computer controlled input switching and routing capabilities. The IQ–AMB-5 features many of the same automatic functions as the IQ–SMX-6, with the added ability to sense and compensate for ambient noise levels. The IQ–AMB-5 operates as a 5x1 automatic mixer with the sixth input reserved for ambient level sensing. In addition, it operates as a passive 6x1 mixer that is output independently to channel 2, ideal for monitoring purposes. Both models can be integrated with other like units to form larger composite mixers.

The following sections describe the IQ–AMB-5 and IQ–SMX-6 features and their operation. Where specified, some features are accessed via controls located on the unit itself; however, most of the features are configured and controlled using IQ software. Please contact your Crown representative or Crown's Technical Support Group if you are unfamiliar with IQ software.

4.1 Hardware

4.1.1 IQ Address Switch
A 8-segment DIP switch is used to set the IQ address of the unit. The unit must be given a unique IQ address so it can be independently controlled and monitored by the system. It must also be set properly if an IQ–SMX-6 is to be used in a Crown Local Net. Two or more IQ components should NEVER have the same address on the same Crown Bus loop. See section 3.2.1 for more information about setting the IQ address. **Important: The IQ address should only be set with the power cord disconnected from the AC supply.**

4.1.2 Baud Rate and Parity Switch
A 6-section DIP switch is used to set the baud rate and parity for RS232 serial communication. This is only necessary when the unit is to serve as system interface. **Important: The baud rate should only be set with the power cord disconnected from the AC supply.**

4.1.3 Enable Indicator
The front panel Enable indicator lights up to show that the unit is plugged in and AC power is being supplied.

4.1.4 DATA Indicator
The front panel DATA indicator lights up to show that digital information is being received by the internal processor from an external source (Crown Bus or serial computer port). A DATA indicator also appears in IQ software, and can be forced to remain lit as a helpful diagnostic tool.

4.1.5 Main Audio Inputs
Three-terminal removable barrier block connectors are provided for the audio inputs. Each input has a three-position M/L/P selector switch for mic level, line level, or mic level with +44 VDC phantom power. Select the left position (M) for microphone signal levels up to +7 dBu (o dBu = 0.775 volts). Select the center position (L) for line level signals up to +32 dBu. Select the right position (P) to provide 44 VDC to mics requiring phantom power.

4.1.6 Sense Input (IQ–AMB-5 only)
The IQ–AMB-5 has a Sense input in place of one of the Main inputs. This input is identical in all respects to a Main input, except for the internal routing of the audio after the gain stages. The Sense input does not enter the output channel 1 mix, although it can enter the output channel 2 mix (as a sixth main input). The sense input is used to "sense" ambient noise levels through a connected microphone. The IQ–AMB-5 uses this signal to automatically adjust other input levels to compensate for changes in ambient noise level.

4.1.7 Main Audio Outputs
a 3-pin removable barrier block plug is used to connect to the main output of each channel. These outputs can also be connected to the stack inputs of other mixer/multiplexers to make a larger mixer.

4.1.8 Bus Outputs
A 3-pin removable barrier block plug is used to connect to the bus audio output of each channel. The bus outputs are isolated switchable outputs that can be turned on when needed by the IQ System. This allows many multiplexers to be tied together on the same bus without loading down the outputs.

4.1.9 Stack Audio Inputs
Two unbalanced stack inputs are provided (one per

output channel) via RCA pin jacks. Each input enters the mix of the respective output channel at unity gain, and without manual or computer input control. These stack inputs allow you to multiply the number of audio inputs by stacking 2, 3, or more units to build a larger mixer. See section 5.1.4 for more information about forming larger mixers.

4.1.10 Crown Bus Connector
A 4-pin removable barrier block connector is provided for digital communication via the Crown Bus serial data loop to other IQ components. A ground lug is provided to connect an optional shield for the Crown Bus input.

4.1.11 Crown Bus Ground Connector
This chassis ground stud is provided to connect an optional shield for the Crown Bus cable. Only the shield of the input cable should be connected. Shielded wire will reduce the total distance a Crown Bus loop can be run, but shielding may be necessary to reduce interference with certain kinds of audio cables. See section 5.5 for more information about wiring the Crown Bus.

4.1.12 RS232 Serial Computer Port
A 9-pin DB9 serial computer port is provided for direct communication with a computer. The mixer/multiplexer is capable of serving as a system interface for up to 20 IQ mixer/multiplexers.

4.1.13 Sensing AUX Port
A TB-3M type "mini-XLR" connector is provided for AUX input and output. This port may be used to provide a control signal or sense a control signal. Pin 1 is ground reference. Pin 2 is a sensing input. A signal between +5 to +30 VDC is sensed as a logic high. Because the circuit floats, the input line must be tied to ground or a control voltage source to be used. Pin 3 is output under processor control. When on, it provides 10 VDC at 16 ma, and when off, it is effectively an open circuit (high impedance). Section 6.2 describes example applications for the AUX port.

4.2 Computerized Control and Monitoring
The following features are controlled and monitored via IQ software.

4.2.1 Manual/Auto Mode
This feature switches the mixer/multiplexer between Manual and Automatic modes. When in Manual mode, you may make changes from software that

affect VCA gain in real time. Gain may also be manipulated in real time from alternate third-party control systems or devices. In manual mode, once VCA gains are set via the PC (or control device) the processor maintains those settings until it receives an instruction to change.

4.2.2 Input Level Monitors
Audio level monitors are provided for each input. The level is sensed between the preamp and VCA's, with a range of –40 to +25 dBu.

4.2.3 Output Level Monitors
Audio level monitors are provided for each output. The level is sensed at each output mix bus with a range of –40 to +25 dBu.

4.2.4 Bus Output Relays
Audio bus outputs can be switched on and off with software controlled isolation relays.

4.2.5 VCA Gain Controls
Each input may be routed to either or both outputs by VCAs under processor control. The processor may, in turn, be set up to control VCAs using on board automatic intelligence or may be controlled in real time manually from software. The VCAs offer a control range of –100 to +25 dB.

Automatic Mixing Features
The following features make up the Automatic Mixing Feature Set, and are only functional when the mixer/multiplexer is in Auto mode. All features are common to the IQ–AMB-5 and IQ–SMX-6 unless otherwise stated.

4.2.6 Gate
The gate feature shuts off or attenuates inputs when not in use. This feature is particularly useful to prevent feedback caused by too many open microphone channels. There are four parameters which control this feature:

• **Max Gain control:** used to set the maximum gain for an input to one of the two outputs when Auto is turned on. The Max Gain setting has different effects when different Auto functions are active. For example, when the Gate function is activated the Max Gain will be the "gate open" level. When then Input Compressor/Limiter function is activated, it acts as the "limit," the upper gain achieved when no compression is taking place.* Control range is from –100 to

+25 dB in $1/2$-dB steps.

- **Gate Threshold:** the input level above which the gate will "open" and below which the gate will "close." Control range is from –100 to +25 dB in $1/2$-dB steps.

- **Low Set:** the gain setting that will be used when the gate is "closed." Control range is from –100 to +25 dB in $1/2$-dB steps.

- **Delay:** determines how long the gate will stay open after the incoming signal drops below the Threshold. Control range is from 0.2 to 30 seconds.

4.2.7 Duck Priority

"Ducking" is the attenuation of an input when another input with a higher priority is activated by the Gate function. When the higher priority gate opens, all inputs with lower priorities drop or "duck" to their Low Set values. Up to six levels of priority can be established between input channels. With the IQ–SMX-6, each output channel can have a different priority structure. There are two different parameters which control this feature:

- **Duck Priority On/Off:** turns this feature on or off.

- **Duck Priority Level:** a setting from 1 to 6 where 1 is highest priority and 6 is lowest priority. Each VCA is set independently.

4.2.8 Input Compressor

The input compressor/limiter function "reins in" input signals that suddenly become too loud. The compressor is a feed-forward type, which performs the compression after the level sensor. This allows it to work more smoothly than conventional-type compressors. There are parameters which control this feature:

- **Compressor/Limiter On/Off:** This control turns the function on or off for the indicated input/output channel.

- **Max Gain:** the gain setting when no compression is taking place. Control range is from –100 to +25 in $1/2$-dB steps.

- **Threshold:** the input level above which compression begins. A signal at this level or below is not affected. Control range is from –100 to +25 in $1/2$-dB steps.

* There is only one Max Gain that is shared among all of the Auto functions that use it. This means that if you change the Max Gain on one page of the Auto functions, the Max Gain is changed for all pages.

- **Compression Ratio:** the amount of compression that is applied for every step over the Threshold. Choices are 1:1, 2:1, 4:1, 8:1, 16:1, 32:1, infinity:1.

- **Release Time:** determines how long it takes for the gain to return to normal once the level drops below the Threshold. Control range is from 0.2, to 30 seconds.

- **Slow Compression (IQ–SMX-6 only):** This control applies to all input channels. When Slow Compression is set to off, the compressor is set to the fastest attack time possible. This will be very fast—so fast the compressor can stop extremely sudden transients like the sound caused by a dropped microphone. This is a good setting for rapid speech. You can turn the Slow Compression on for more gentle sound sources such as most music.

4.2.9 Auto Level

Auto Level is designed to control long-term changes in signal level. With Auto Level on, the average output level can be kept relatively constant over a longer time interval while transients are allowed to pass. Auto Level creates a more natural sound with increased dynamic range. There are five different parameters which control this feature:

- **Auto Level On/Off:** This control turns the function on or off for the indicated input/output channel.

- **Max Gain:** the upper limit for input gain. This level serves as a gain "ceiling" when the Auto Level function is attempting to raise the gain on a low-level signal. Control range is from –100 to +25 in $1/2$-dB steps

- **Auto Level control:** sets the desired average output level. This level can best be understood as a "target" level. If the output signal level is above this level, the gain will be reduced to attempt to hit this target. Likewise, if the output signal is lower than this level, the gain will be increased. In no case will the gain level be set to greater than Max Gain. Control range is from –100 to +25 in $1/2$-dB steps.

- **Idle Gain:** controls the initial gain when the gate first opens. Idle Gain can be thought of as the "starting gain" because it overrides the Max Gain when the gate opens, and can compensate for undesirable side-effects caused by Max Gain being set above the Auto Level value. Start with Idle Gain equal to Max Gain.

If the level audibly drops each time the gate opens, try a lower value for Idle Gain. Idle gain should <u>never</u> be set to a value greater than <u>Max</u> Gain. Control range is from –100 to +25 in $^1/_2$-dB steps.

- **Reaction Time:** the time in seconds to adjust gain 10 dB toward the necessary gain structure to obtain the desired average output level. Control range is from 0.2, to 30 seconds.

- **Auto Level Gate Function:** a global setting that may be set to "Open To Idle Gain" or "Open To Last Position." When set to "Open To Idle Gain" an input will initially gate on to the Idle Gain setting and the auto level feature will take over from that point. When set to "Open To Last Position" the auto level feature remembers the gain of the VCA at the time the input last gated off so that gain goes back to that level the next time the gate opens.

4.2.10 Output Compressor

The Output Compressor/Limiter function keeps the output from exceeding a predetermined level. It's especially valuable when used as an output limiter for the protection of amplifiers, loudspeakers and other audio equipment. Compression of the signal at each input occurs only when the mix exceeds the limit threshold. There are six parameters which control this feature:

- **Compressor:** a master ON/OFF switch for each output that enables or disables output compression for that output.

- **Limiter:** an ON/OFF switch for each VCA that configures which inputs may participate in output compression.

- **Limit Threshold:** used to set the peak signal level above which compression occurs. Control range is from –100 to +25 in $^1/_2$ dB steps.

- **Compression Ratio:** controls the amount of compression that is applied for every step over the Threshold. Choices are 1:1, 2:1, 4:1, 8:1, 16:1, 32:1, infinity:1.

- **Release Time:** determines how long it takes for the gain to return to normal when the level drops below the Threshold. Control range is from 0.2 to 30 seconds.

- **Max Gain:** the gain setting of the input when no compression is active. Control range is from –100 to +25 in $^1/_2$-dB steps.

4.2.11 Gate Count

The Gate Count function keeps track of how many gates are open at a time, and provides feedback control when a large number of inputs are open. The Gate function must be on for the Gate Count to operate. There are four parameters which control this feature:

Gate Count Master: a master ON/OFF switch for each output that enables or disables gate counting for that output.

Gate Count: an ON/OFF switch for each VCA that configures which inputs may participate in the gate count.

Gate Count Level: determines how much each input is attenuated as more gates open. When only one mic in a count group is active, there is no added attenuation. Each additional open mic increases the attenuation by the "Count Level." Control range is from 0.5 to 16 dB.

Max Gain: the gain setting that will be used when the gate is "open," and no further attenuation is indicated. Control range is from –100 to +25 in $^1/_2$-dB steps.

4.2.12 Ambience (IQ–AMB-5 only)

The Ambience function monitors the ambient sense input (Input 6) and automatically adjusts the mix output level of Channel 1 up or down accordingly. This enables the IQ–AMB-5 to automatically mix and control the overall loudness in an environment with background noise levels that vary. Functionally, the ambience function operates after all other functions have processed the audio signals. There are six parameters which control this feature:

Ambience: an On/Off switch that enables of disables the Ambience feature

- **Attack Time:** determines how rapidly the Ambience function will begin to increase the output level of Channel 1 above the Ambient offset level once the level of Input 6 exceeds the Threshold. Control range is from 0.2 to 30 seconds.

- **Decay Time:** determines how rapidly the Ambience function will begin to reduce the output level of Channel 1 while the ambient sense input level is dropping. Control range is from 0.2 to 30 seconds.

- **Expansion Ratio:** determines how much the gain of output Channel 1 will increase for every

increase in the ambient signal level above the Threshold setting. A 4:1 Expansion Ratio setting will raise the output gain 1 dB for every 4 dB that the ambient signal increases. Choices are 1:1, 1.5:1, 2:1, 2.5:1, 3:1, 4:1, and 5:1.

- **Threshold:** determines at what ambient sound level the Ambience function will begin to operate. It is the sound pressure level of the ambient sensing input (Input 6). When the signal level of Input 6 exceeds the Threshold setting, the Ambience function begins to increase the gain of Channel 1 at a rate dictated by the Expansion Ratio control. Control range is from −100 to +25 dB in $1/_2$-dB steps.

- **Ambient Offset:** the level below Max Gain to which the Channel 1 gain will be set until the ambience level exceeds the Threshold setting. As the ambience level increases above the Threshold setting, the Channel 1 gain will be increased above the Ambient Offset according to the Expansion Ration setting. The Max Gain setting always limits the maximum possible gain which any input can receive. Control range is from 0 to +40 dB in $1/_2$-dB steps.

4.3 Crown Local Net (IQ–SMX-6 only)

The Crown Local Net (CLN) allows multiple IQ–SMX-6 units to be linked so that their Duck Priority and Gate Count functions work together. For example, a duck priority 1 in one unit will override a priority 2 in another unit. Likewise on the gate count side, the number of open mics can be totaled among all the IQ–SMX-6 units in a CLN and all open inputs attenuated to prevent feedback in a large system. Use of this feature requires that the serial port of each IQ–SMX-6 be dedicated to CLN use, meaning that if the IQ–SMX-6 is to be used with CLN, it <u>cannot</u> be used as a system interface. Successful setup of a CLN requires that the setup be performed in a particular sequence of steps. Please refer to the IQ software documentation for setup procedures. There are five parameters which control this feature:

- **System On/Off:** activates the Crown Local Net. **This control should only be turned on for the first time after all of the following parameters have been set.** Please refer to the IQ software documentation for setup procedures.

- **Master On/Off:** selects the master IQ–SMX-6 as required by the start-up procedure. <u>Only one</u> IQ–SMX-6 should be the master. Neither

the Crown Local Net nor the IQ–SMX-6 units will function properly if more than one unit is selected as a master.

- **External Functions On/Off:** setting this control to ON allows the IQ–SMX-6 to participate in the Crown Local Net.

- **Duck On/Off:** setting this control to ON allows the IQ–SMX-6 to respond to external Duck Priority functions.

- **Gate Count On/Off:** setting this control to ON allows the IQ–SMX-6 to respond to external Gate Count functions.

5 Technical Information

Following is a technical description of the operation of the IQ–AMB-5 and IQ–SMX-6 mixer/multiplexers. Refer to the block diagrams on the following pages for illustration of signal flow.

5.1 Audio

5.1.1 Input Section

Each audio input signal first passes through a balanced filter designed to eliminate RF interference. The RF filters are a balanced network of chokes, ferrite beads and capacitors that attenuate both common-mode and differential-mode signals above 500 kHz. Optional input isolation transformers can also be added by the factory.

The signal then enters the input switching circuit. This circuit can insert a 25 dB pad for line level signals or apply phantom power to the input terminals (44 volts through two 6810 ohm resistors). The signal is filtered again to eliminate lower-frequency RF energy such as interference from the AM broadcast band. The signal then goes to the preamp stage.

Each of the six input preamplifier stages is a balanced circuit providing from 13 to 46 dB of voltage gain. The preamp consists of a pair of low-noise transistors, followed by a high performance op-amp. The transistors, in effect, convert the input voltage to a current while maintaining reasonably high input impedance. Their transconductance (output current divided by input voltage) depends on the setting of the gain control. The op-amp then converts the current back to a voltage to drive subsequent circuits.

5.1.2 VCA Sections

Each preamplifier output drives two VCAs which then

drive the two current-summing mix buses. The stack inputs also feed into the mix buses. The VCA's derive their control voltages from a multiplexer circuit driven from the microprocessor. The microprocessor uses onboard *algos* or commands from a host computer to control the VCAs. Levels can be set in 1/2 dB increments from 25 dB gain to 100 dB attenuation (which is considered "off").

5.1.3 Output Section

The two mix buses are sent to the corresponding main output and auxiliary bus output stages. All output stages are active, balanced and can drive 1200 ohms to +26 dBu or 600 ohms to +20 dBu. The auxiliary bus output stages have internal relay contact which can connect or disconnect the signal to the auxiliary bus output connector. These contacts are controlled by the host computer and thus allow programmed signal routing. Optional output isolation transformers can also be added by the factory.

5.1.4 Level Sense Circuits

The output of each input preamp and each mix amp is monitored by a corresponding level detector. Each level detector tracks the peak level of the signal and releases with a time constant of about 85 ms. The eight levels are sent to a multiplexer and the A/D converter.

5.2 Control and Interface Section

The host computer communicates with the unit microprocessor either through an outboard IQ interface (like the IQ–INT-II) via the Crown Bus, or directly through the RS232 port. Each unit acts only on commands with an address matching its own.

5.2.1 Crown Bus Interface

The serial loop (Crown Bus) connections on the unit are made with an opto-isolated 4-pin removable barrier block connector and a ground stud for the optional connection of shielded wire. To prevent ground loops, only the input cable's shield should be connected. These connections conform to IQ System standards, which allow the host computer to control numerous IQ components with the same computer program.

5.2.2 RS232 Interface

Depending on selected options, the DB9 connector can be used to communicate directly with the host computer for setup or control of a Crown Bus loop, or (IQ–SMX-6 only) for connection to an RS232 Crown Local Net.

5.2.3 D/A Converter

To set channel gain levels, a digital-to-analog converter continuously converts all gain settings to control voltages. An analog de-multiplexer sends the appropriate control voltages to each of the twelve VCAs.

5.2.4 Log Amp and A/D Converter

The A/D converter scans through an eight-channel multiplexer to read the input and output signal levels. When a channel is selected, the signal is sent through a logarithmic amplifier for increased dynamic range. This analog voltage is then converted to a binary number that the microprocessor can read. The processor can then mathematically increase detector time constraints, perform averaging or other response functions.

5.3 Auxiliary Port

Auxiliary devices such as supplemental cooling fans can be remotely controlled via the AUX output on the unit. When the auxiliary control feature is turned on by the host computer, 10 VDC is supplied across pin 3 and pin 1 (ground) of the male 3-pin AUX connector. This port can control solid state relays, and since it has a current-limit resistor (16 mA max.), it can directly drive an LED or opto-coupler.

The AUX input function is used by applying a 5-30 VDC signal to pin 2 (with pin 1 as ground). A high or low signal here will be communicated to the host computer. A logic low can be less than 0 volts (negative); the signal is internally clamped for circuit protection.
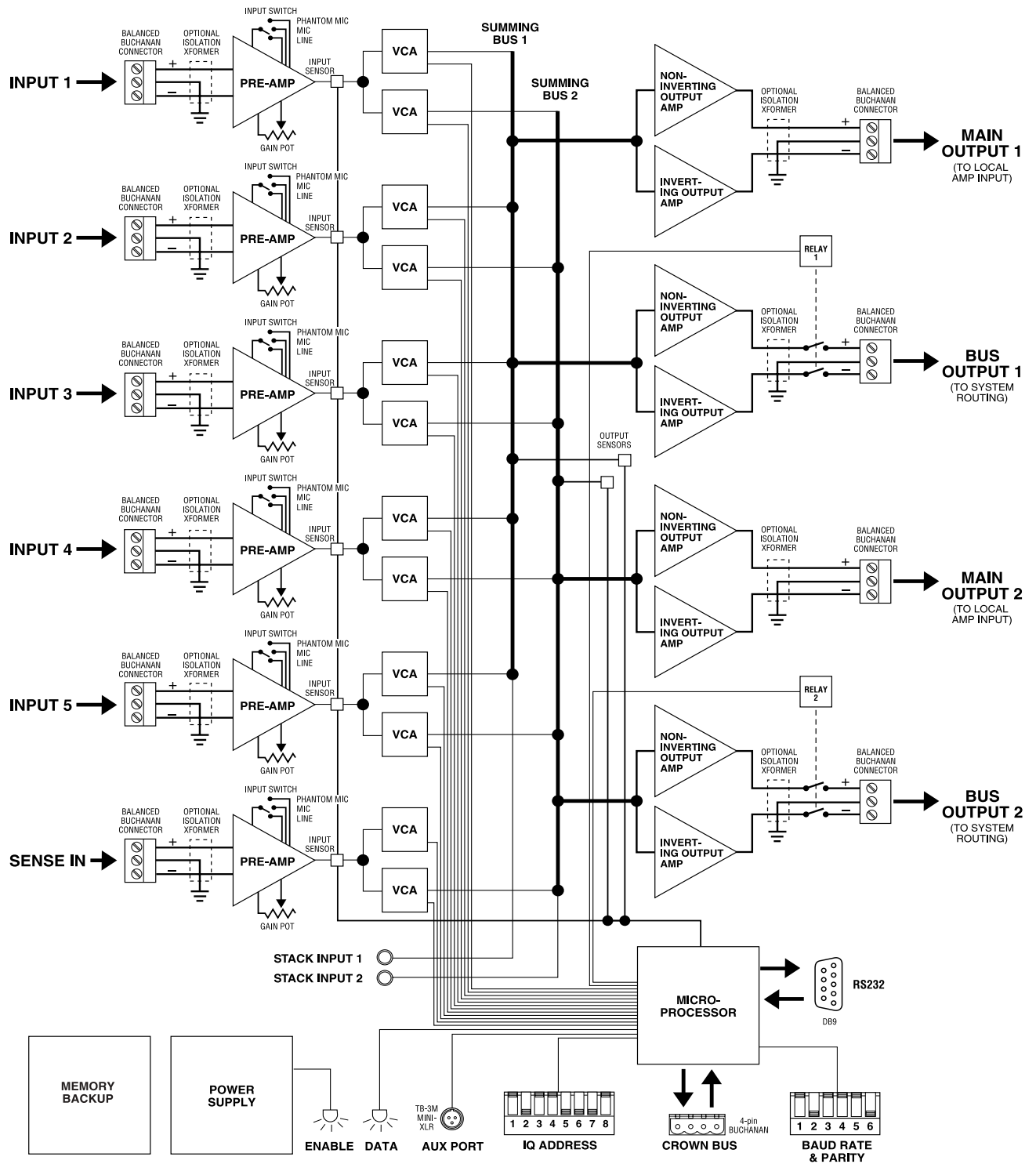
Figure 5.1 IQ–AMB-5 Block Diagram
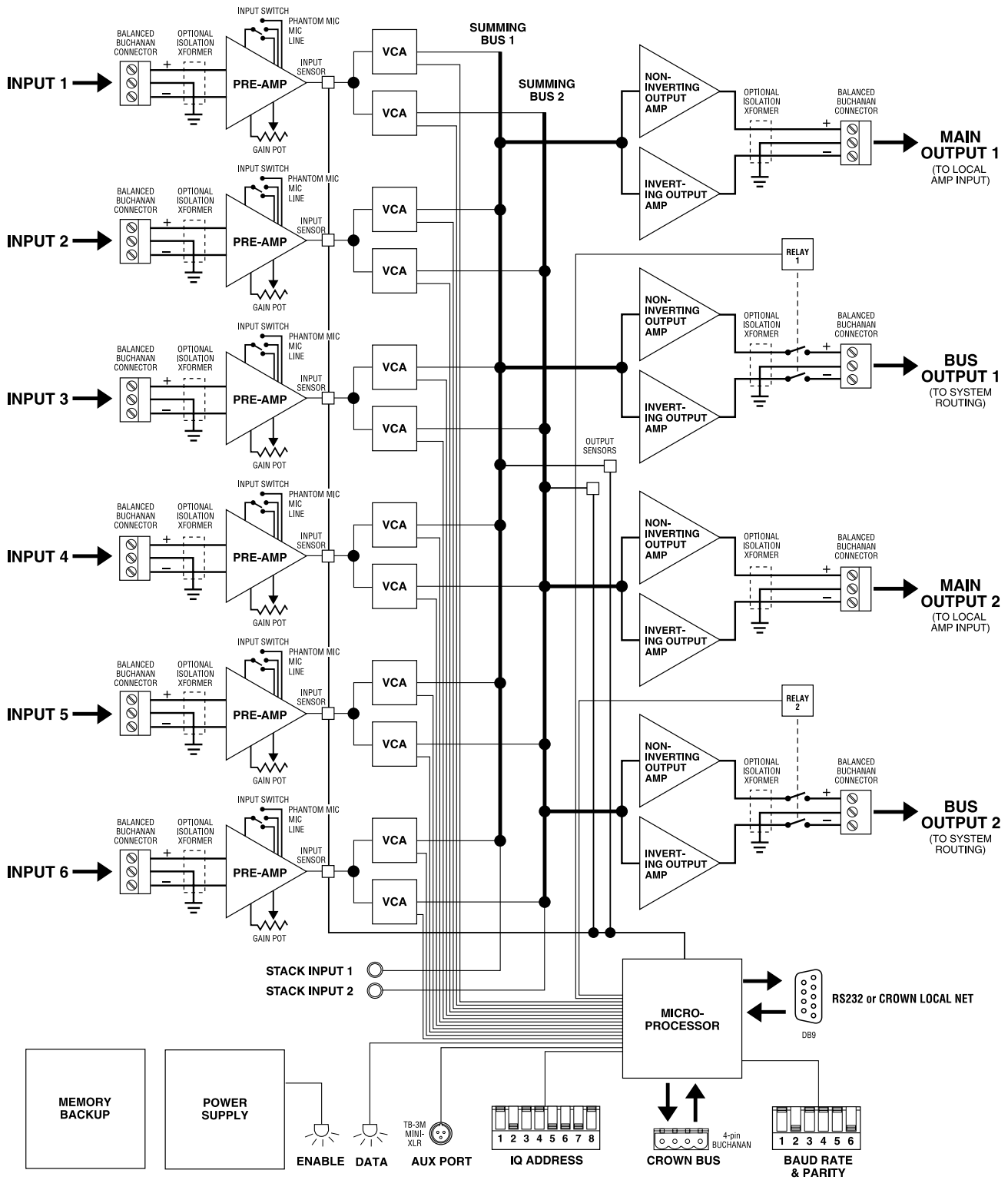
Figure 5.2 IQ–SMX-6 Block Diagram

6 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–AMB-5/IQ–SMX-6. For more information about any of these topics, contact the Crown Technical Support Group.

6.1 A Closer Look at Audio Signal Wiring

6.1.1 Input

Three-terminal removable barrier block connectors are provided for the audio inputs. Each input has an input selector switch. Slide it to the left (M) for microphone signal levels up to +7 dBu (0 dBu = 0.775 volts). Select the center position (L) for line level signals up to +32 dBu. Slide it to the right (P) to provide 44 VDC to mics requiring phantom power.

Figure 6.1 An Audio Input Section

Each input has a screwdriver-set, calibrated gain control to compensate for different input source levels. The slot on the control shaft points to the gain setting. The settings are labelled for line-level input. Add 25 dB to the scale if the inputs are switched for microphone level signals.

Use a screwdriver to adjust the gain pot so that the input signal level plus gain equals roughly 0 dBu. You will need to know, or estimate, the level of the input

source. Setting the source signal level to approximately 0 dBu will provide 20 dBu of headroom in the input preamp. Some recommended settings are given in Figure 6.2.

Figures 6.3-4 show the normal wiring for balanced and unbalanced inputs. It is also possible to parallel the inputs of multiple units to increase the number of mixer outputs. For example, the inputs of two 6x2 IQ–SMX-6s can be paralleled to create a 6x4 mixer. This technique is described in Section 6.1.5.
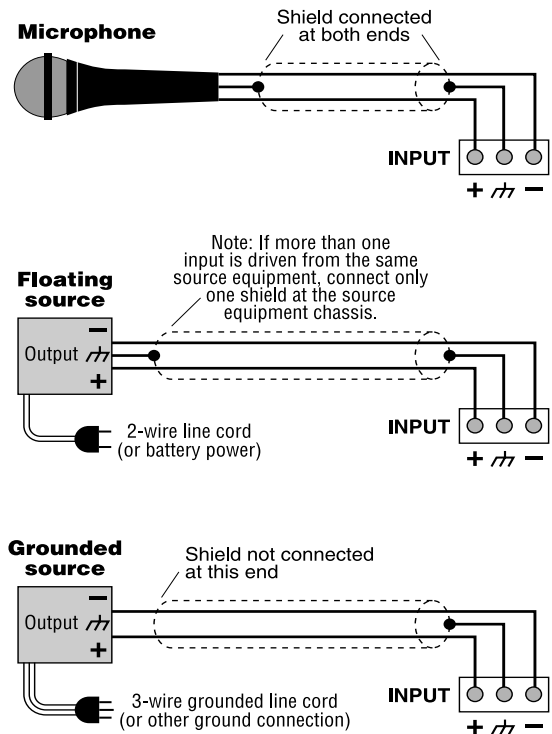
Figure 6.3 Balanced Audio Input Wiring

	Pro Audio equipment	Semi-pro or consumer equipment	Dynamic mic, speech	Condenser mic, speech	Hot condenser mic, speech	Dynamic mic, music	Hot condensor mic, music	Close-miked dynamic mic, bass/drums	Close-miked dynamic mic, kick drum, guitar amp
dBm/dBV	+4 dBm	−10 dBV	−75 dBV	−65 dBV	−45 dBV	−55 dBV	−25 dBV	−15 dBV	−5 dBV
dBu	+4 dBu	−8 dBu	−73 dBu	−83 dBu	−43 dBu	−53 dBu	−23 dBu	−13 dBu	−3 dBu
Suggested Setting	−4 (L)	+8 (L)	+21 (M)	+11 (M)	+18 (P)	+21 (M)	−2 (P)	−12 (M)	−12 (M) or +3 (L)

0 dBm = 0.775 VRMS with a 600 ohm load, 0 dBV = 1 VRMS, 0 dBu = 0.775 VRMS

Fig. 6.2 Suggested Audio Input Gain Control Settings

Balanced sources should be wired as shown in Figure 6.3. Notice that the shield is not connected to the chassis ground of the source if the source is also connected to the AC ground (that is, it has a grounded AC plug). This prevents unwanted ground loops.
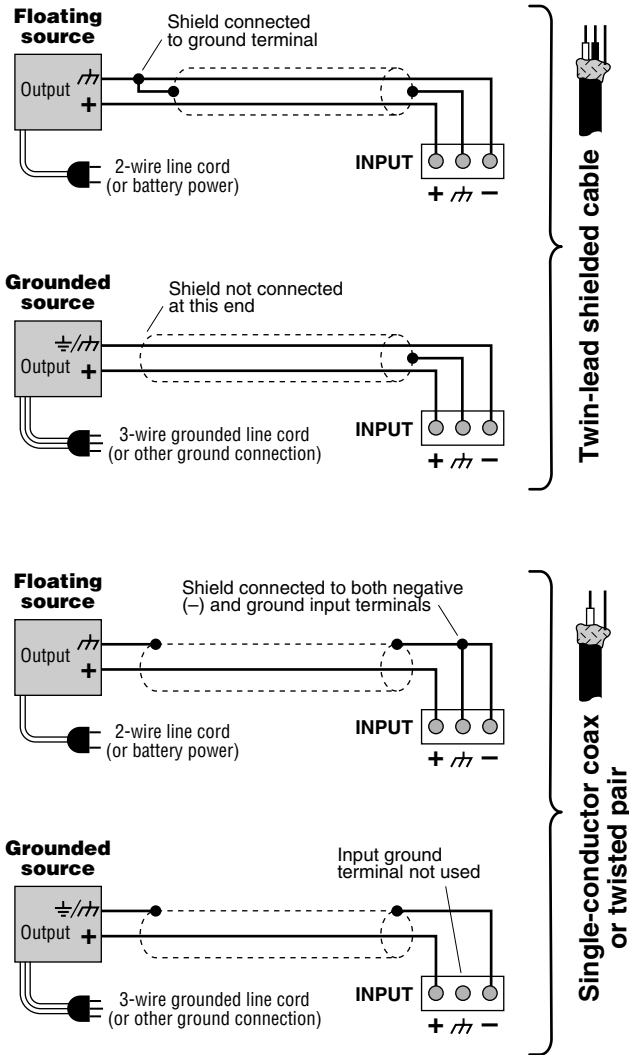
Figure 6.4 Unbalanced Audio Input Wiring

Unbalanced sources should be wired as shown in Figure 6.4. The examples in Figure 6.4 are grouped according to whether twin-lead shielded wire or single-conductor coax (and twisted pair) wire is used.

6.1.2 IQ–AMB-5 Ambient Sensing Input
In addition to its automatic mixing capabilities, the IQ–AMB-5 also has the ability to adjust the output level of Channel 1 to the ambient sound level. (Remember, Channel 2 functions manually only). It does this with its sensing input (input 6). For instance, with an IQ–AMB-

5 the paging level at a train station can be automatically adjusted so pages can be heard over the roar of an incoming train and yet quieted to an appropriate level during periods of softer ambient sound levels.

The sensing input section of the back panel is shown in Figure 6.5 below. It has the same features as the other mic/line inputs: input gain control and input level switch.
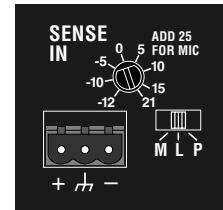
Figure 6.5 Sensing Input Section

The most common use of the sensing input is to connect a microphone (such as a Crown *PZM*®) and locate the microphone so that it can accurately receive the ambient sound level. Great care must be taken in the placement of the ambient sensing microphone so that it is not too close to the loudspeakers being driven by the system.

It is also possible to connect more than one ambient sensing microphone to the sense input. This can be accomplished by taking advantage of the manual mixing function of Channel 2. Simply connect each ambient sensing microphone to one of the five regular inputs of the IQ–AMB-5 and use the IQ software to assign each of them to Channel 2 only. Switch the sense input to the line-level position (L) and connect the main audio output of Channel 2 to it. Use the IQ software to control the level of the ambient sensing microphones. The microphones which are located in more critical areas can be set to a higher level so they will trigger the level controller first.

Be sure the microphone has adequate sensitivity for the spectral content of the ambient sound. For example, a microphone with a bandwidth designed solely for speech reinforcement may not have adequate low-frequency sensitivity to pick up the low-frequency noise of machinery in a factory.

6.1.3 Output
Three-terminal removable barrier block connectors are provided for audio output (Figure 3.15). Both "main" and "bus" outputs are provided for each of the two mixer channels. They are balanced and can drive 1200 ohms or more to +26 dBu or 600 ohms to +20 dBu.

Each bus output can drive any number of inputs within this impedance range.
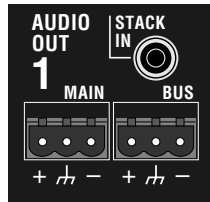
Figure 6.6 Audio Output Section

The main audio outputs are provided for connection with other audio equipment such as power amplifiers. They can also be "stacked" with the outputs of other mixer/multiplexers to increase the number of mixer inputs For example, two 6x2 IQ–SMX-6s can be stacked to create a 12x2 mixer. This is described in Section 6.1.4

The bus outputs are turned on or off by relays and function like the AUX "send" outputs on a conventional mixing console. They are switched on or off by the IQ System. This special design allows many bus outputs to be connected to a common audio bus in a multiple-zone network (like a large airport paging system). Because the bus outputs are controlled by the IQ System, they can be kept off until they are actually used, preventing too many of them from being on at the same time and loading down a common audio bus network.

The versatile bus outputs can be used for any audio system where switchable outputs are desired, such as switchable recording outputs.

Figure 6.7 Balanced Audio Output Connections

Both main and bus outputs are wired the same way. Balanced output wiring is shown in Figure 6.7.

Notice that the shield is not connected to the output ground terminal if the load is connected to AC ground. This prevents unwanted ground loops. Unbalanced output wiring is shown next.
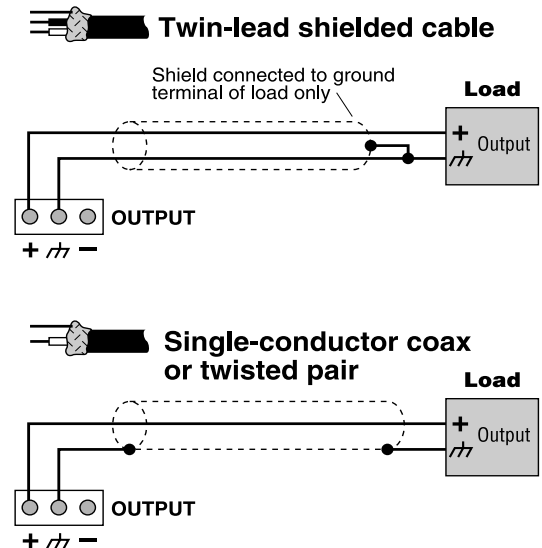
Figure 6.8 Unbalanced Audio Output Connections

6.1.4 Stack Inputs
the "stack in" jacks (Figure 6.6) enable the audio inputs to be increased by stacking 2, 3 or more mixer/multiplexers to create a 12x2, 18x2 or wider mixer. Use 2-conductor shielded cable to route the signal from the main output of one unit to the stack input (RCA phono jack) of the second unit. Use the outputs of the last unit in the stack for connection to amplifiers or other external audio equipment.*
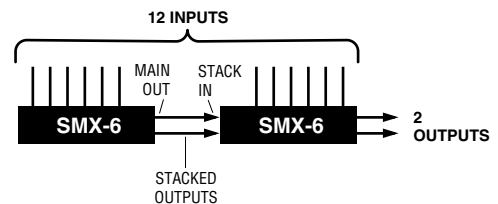
Figure 6.9 A 12x2 Mixer Using 2 Mixer/Multiplexers

Stacking mixer/multiplexers can create an almost unlimited number of inputs; however, there will still only be two main and two auxiliary bus outputs for connection to other equipment. See Section 6.1.5 to find output how to increase the number of outputs.

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* The level of each signal on the stacked ouput bus is controlled by the unit having the signal as an input.

The correct way to wire stacked units is shown below:
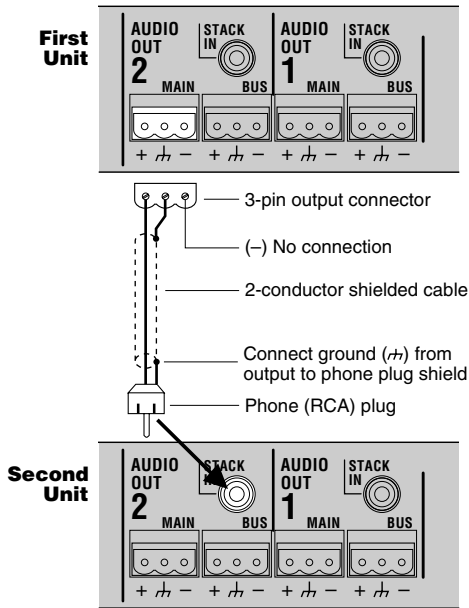
Figure 6.10 Stacking the Outputs of Multiple Units

6.1.5 Paralleling inputs

When using more than one unit, the inputs may be wired in parallel to increase the number of outputs that a source can drive. This is shown in Figures 6.11-12. For example, the audio signal in Figure 6.12 which feeds Input 1 is available to the outputs of both units, creating a 6x4 mixer.
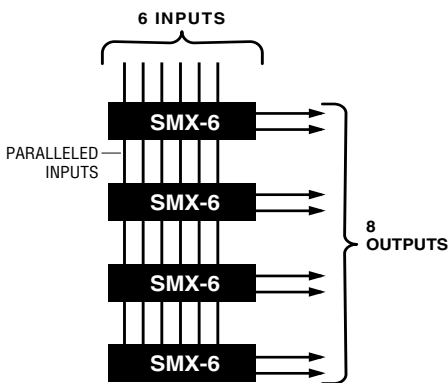
Figure 6.11 A 6x8 Mixer Using 4 Mixer/Multiplexers

Important: If the source is a microphone which requires phantom power (P), select it only at the first input. Switch all other parallel inputs to mic (M).*

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* When mixer inputs are paralleled, the total input impedance will drop by 1/N where N is the number of inputs to be connected. Depending on the signal source, this may place a limit on the number of possible outputs.
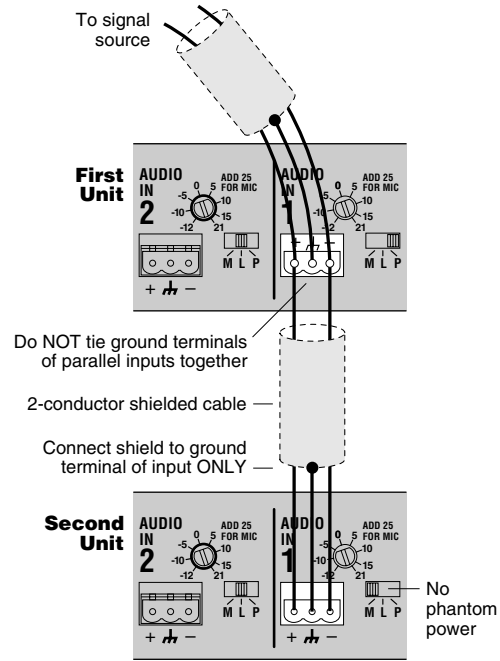
Figure 6.12 Paralleling the Inputs of Multiple Units

By using several units and a combination of parallel inputs and stacked outputs, larger mixing configurations (12x8, 24x4, etc.) can be created as shown below:
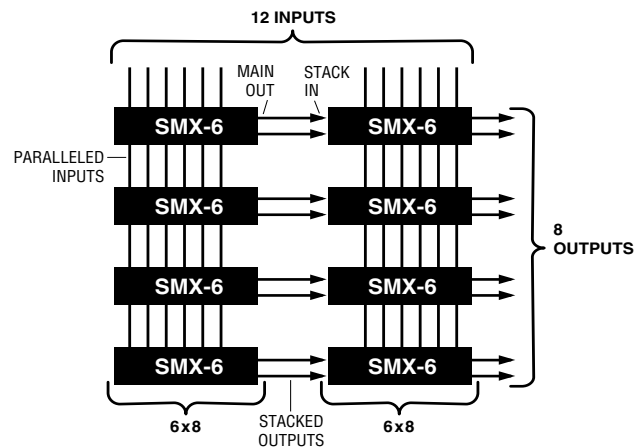
Figure 6.13 A 12x8 Mixer Using 8 Mixer/Multiplexers

6.2 Using the AUX Port

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 6.14.

The solid state relay shown (Crown part number D 7308-7) can be ordered from the Crown Parts Department.

The Aux port uses a male 3-pin mini XLR connector which is located above the DB9 connector (Figure 2.1). Use a Switchcraft® TA3F cable connector or equivalent to make the connection.
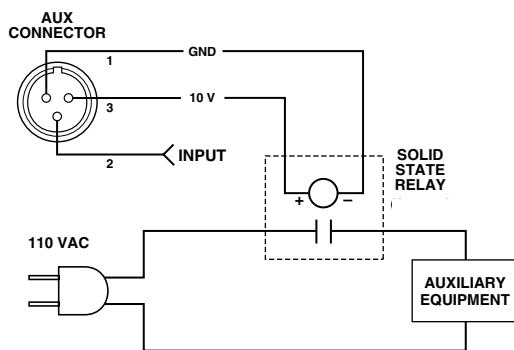
Figure 6.14 Sample Auxiliary System Wiring

When the Aux port is turned on by the *IQ System* it provides 10 VDC across pins 3 (+) and 1 (ground). An internal 1.5 K ohm resistor limits the current to a maximum of 16 mA. This is shown below in Figure 6.15.
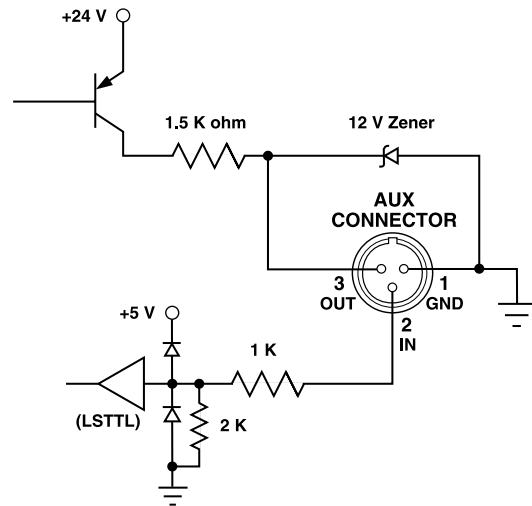
Figure 6.15 Internal Auxiliary Circuit

Notice in Figure 6.15 that the AUX connector can be used to sense the presence of an input signal across pins 2 (+) and 1 (ground). It is a high impedance input and includes a pull-down resistor.

6.3 The Mixer/Multiplexer as a 1-Loop IQ Interface

The mixer/multiplexer can serve a an IQ interface between a host computer and a single Crown Bus loop for other IQ–AMB-5/IQ–SMX-6 units only. This can eliminate the need for an external IQ Interface (*IQ-INTII*) in a small system. The mixer/multiplexer connects directly to the host computer via the DB9 serial connector. Switches accessed through the side of the chassis are used to select the parity and baud rate. See Section 3.2 for specific instructions on wiring and switch settings.

While 250 IQ components of each type can be controlled on a single Crown Bus loop, it is recommended that no more than 20 units be connected to an mixer/multiplexer. This is because of the tremendous timing demands on their microprocessors. More than 20 IQ components may cause timing problems.

6.4 Crown Local Net (IQ–SMX-6 only)

Crown Local Net (CLN) is available only for an IQ–SMX-6. It enables multiple IQ–SMX-6s to be interconnected via a CLN. This is an RS232 communication loop designed for local communication between IQ components apart from the Crown Bus. IQ–SMX-6s can use this option to communicate the total number of open mics in the system as well as their individual ducking priorities. In this way, one IQ–SMX-6 will know how many mics are being used by other IQ–SMX-6s and can take appropriate action to prevent feedback or implement priority switching (ducking) of mics.*

6.4.1 Wiring the Crown Local Net

A Crown Local Net is a serial loop (Figure 6.16). With two exceptions, a Crown Local Net loop is wired the same as standard RS232 wiring, except the Crown Local Net does not use handshaking therefore pins 7 and 8 (RTS/CTS) are not used.

Figure 6.17 shows the wiring for a 3-unit Crown Local Net. If more units are desired, simply add another unit and follow the same pattern for wiring.**

Figure 6.16 A Crown Local Net RS232 Serial Loop

Important: The Crown Local Net must make a complete loop. If the last unit in a group is not connected to the first unit, the system will not function.

Important: The Crown Local Net depends on proper IQ address assignments, even if the system will not be installed with a Crown Bus loop. Each unit in a Crown Local Net must have a different IQ address. See Section 3.2 for details.

As more diverse IQ communications are needed, the Crown Local Net will be available to move information directly between IQ components without affecting the performance of a host computer.

Pin 2   Serial In
Pin 3   Serial Out
Pin 5   GND (Optional)
(All other pins are not used.)
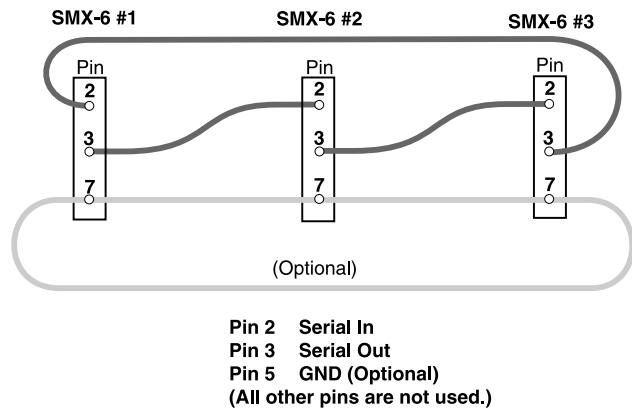
Figure 6.17 Crown Local Net Wiring

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* Because Loop IQ Interface and CLN use the same DB9 connector, they cannot be used at the same time. This means that IQ–SMX-6s to be used in a CLN will need to be connected to a Crown Bus via an external IQ interface for setup.

** Pin 5 should not be used as a ground if the units are already properly grounded. The wire used for RS232 communication is usually unsuitable for use as a ground.

6.5 A Closer Look at Crown Bus Wiring

The Crown Bus is a serial communication loop designed to transmit IQ commands and data. As implemented in the IQ mixer/multiplexer, it is a 20 mA current loop operating at a baud rate of 38.4 K.

The Crown Bus connection can use inexpensive twisted-pair wiring (shielded or unshielded) and it must be unbroken. If fiber optic cabling is required, contact the Crown Technical Support Group (see Section 8 for contact information)

Here are some guidelines for twisted-pair wiring:

- **When interference is a problem, use shielded twisted-pair wire** at least 26 AWG in size. The wire should be of good quality and should have low capacitance—30 pF/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 a Crown Bus loop.** The total capacitance should be less than 30 nF. Allow approximately 60 pF for each IQ component in a loop. This accounts for a slight signal degradation which occurs as data signals pass through a component.

- **Add an IQ Repeater** for very long loops—greater than 1,000 feet (305 m)—or when required by high-capacitance wire. Although we recommend adding 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 Crown 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 Crown 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 Crown Bus loop next to an AM radio transmission line may require fiber optic cabling. An extremely long Crown Bus loop distance may also require fiber optic cabling.

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

7 IQ Address Tables

This section contains lookup tables for every valid IQ address. The valid addresses are 1 to 250. **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 Crown 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 mixer/multiplexer as described in Section 3.2.1.

IQ Address	1	2	3	4	5	6	7	8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
17	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
18	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
19	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
20	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
21	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
22	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
23	ON	ON	ON	OFF	ON	OFF	OFF	OFF
24	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
25	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
26	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
27	ON	ON	OFF	ON	ON	OFF	OFF	OFF
28	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
29	ON	OFF	ON	ON	ON	OFF	OFF	OFF
30	OFF	ON	ON	ON	ON	OFF	OFF	OFF
31	ON	ON	ON	ON	ON	OFF	OFF	OFF
32	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
33	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
34	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
35	ON	ON	OFF	OFF	OFF	ON	OFF	OFF
36	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
37	ON	OFF	ON	OFF	OFF	ON	OFF	OFF
38	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
39	ON	ON	ON	OFF	OFF	ON	OFF	OFF
40	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF
41	ON	OFF	OFF	ON	OFF	ON	OFF	OFF

IQ Address	1	2	3	4	5	6	7	8
42	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
43	ON	ON	OFF	ON	OFF	ON	OFF	OFF
44	OFF	OFF	ON	ON	OFF	ON	OFF	OFF
45	ON	OFF	ON	ON	OFF	ON	OFF	OFF
46	OFF	ON	ON	ON	OFF	ON	OFF	OFF
47	ON	ON	ON	ON	OFF	ON	OFF	OFF
48	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
49	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
50	OFF	ON	OFF	OFF	ON	ON	OFF	OFF
51	ON	ON	OFF	OFF	ON	ON	OFF	OFF
52	OFF	OFF	ON	OFF	ON	ON	OFF	OFF
53	ON	OFF	ON	OFF	ON	ON	OFF	OFF
54	OFF	ON	ON	OFF	ON	ON	OFF	OFF
55	ON	ON	ON	OFF	ON	ON	OFF	OFF
56	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
57	ON	OFF	OFF	ON	ON	ON	OFF	OFF
58	OFF	ON	OFF	ON	ON	ON	OFF	OFF
59	ON	ON	OFF	ON	ON	ON	OFF	OFF
60	OFF	OFF	ON	ON	ON	ON	OFF	OFF
61	ON	OFF	ON	ON	ON	ON	OFF	OFF
62	OFF	ON	ON	ON	ON	ON	OFF	OFF
63	ON	ON	ON	ON	ON	ON	OFF	OFF
64	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
65	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
66	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
67	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
68	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
69	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
70	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
71	ON	ON	ON	OFF	OFF	OFF	ON	OFF
72	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
73	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
74	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
75	ON	ON	OFF	ON	OFF	OFF	ON	OFF
76	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
77	ON	OFF	ON	ON	OFF	OFF	ON	OFF
78	OFF	ON	ON	ON	OFF	OFF	ON	OFF
79	ON	ON	ON	ON	OFF	OFF	ON	OFF
80	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
81	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
82	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
83	ON	ON	OFF	OFF	ON	OFF	ON	OFF

IQ Address	1	2	3	4	5	6	7	8
84	OFF	OFF	ON	OFF	ON	OFF	ON	OFF
85	ON	OFF	ON	OFF	ON	OFF	ON	OFF
86	OFF	ON	ON	OFF	ON	OFF	ON	OFF
87	ON	ON	ON	OFF	ON	OFF	ON	OFF
88	OFF	OFF	OFF	ON	ON	OFF	ON	OFF
89	ON	OFF	OFF	ON	ON	OFF	ON	OFF
90	OFF	ON	OFF	ON	ON	OFF	ON	OFF
91	ON	ON	OFF	ON	ON	OFF	ON	OFF
92	OFF	OFF	ON	ON	ON	OFF	ON	OFF
93	ON	OFF	ON	ON	ON	OFF	ON	OFF
94	OFF	ON	ON	ON	ON	OFF	ON	OFF
95	ON	ON	ON	ON	ON	OFF	ON	OFF
96	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
97	ON	OFF	OFF	OFF	OFF	ON	ON	OFF
98	OFF	ON	OFF	OFF	OFF	ON	ON	OFF
99	ON	ON	OFF	OFF	OFF	ON	ON	OFF
100	OFF	OFF	ON	OFF	OFF	ON	ON	OFF
101	ON	OFF	ON	OFF	OFF	ON	ON	OFF
102	OFF	ON	ON	OFF	OFF	ON	ON	OFF
103	ON	ON	ON	OFF	OFF	ON	ON	OFF
104	OFF	OFF	OFF	ON	OFF	ON	ON	OFF
105	ON	OFF	OFF	ON	OFF	ON	ON	OFF
106	OFF	ON	OFF	ON	OFF	ON	ON	OFF
107	ON	ON	OFF	ON	OFF	ON	ON	OFF
108	OFF	OFF	ON	ON	OFF	ON	ON	OFF
109	ON	OFF	ON	ON	OFF	ON	ON	OFF
110	OFF	ON	ON	ON	OFF	ON	ON	OFF
111	ON	ON	ON	ON	OFF	ON	ON	OFF
112	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
113	ON	OFF	OFF	OFF	ON	ON	ON	OFF
114	OFF	ON	OFF	OFF	ON	ON	ON	OFF
115	ON	ON	OFF	OFF	ON	ON	ON	OFF
116	OFF	OFF	ON	OFF	ON	ON	ON	OFF
117	ON	OFF	ON	OFF	ON	ON	ON	OFF
118	OFF	ON	ON	OFF	ON	ON	ON	OFF
119	ON	ON	ON	OFF	ON	ON	ON	OFF
120	OFF	OFF	OFF	ON	ON	ON	ON	OFF
121	ON	OFF	OFF	ON	ON	ON	ON	OFF
122	OFF	ON	OFF	ON	ON	ON	ON	OFF
123	ON	ON	OFF	ON	ON	ON	ON	OFF
124	OFF	OFF	ON	ON	ON	ON	ON	OFF
125	ON	OFF	ON	ON	ON	ON	ON	OFF

Figure 7.1 IQ Address Switch Settings from 0 to 125

IQ Address	1	2	3	4	5	6	7	8
126	OFF	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON	OFF
128	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
130	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
131	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
132	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON
133	ON	OFF	ON	OFF	OFF	OFF	OFF	ON
134	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
135	ON	ON	ON	OFF	OFF	OFF	OFF	ON
136	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
137	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
138	OFF	ON	OFF	ON	OFF	OFF	OFF	ON
139	ON	ON	OFF	ON	OFF	OFF	OFF	ON
140	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
141	ON	OFF	ON	ON	OFF	OFF	OFF	ON
142	OFF	ON	ON	ON	OFF	OFF	OFF	ON
143	ON	ON	ON	ON	OFF	OFF	OFF	ON
144	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
145	ON	OFF	OFF	OFF	ON	OFF	OFF	ON
146	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
147	ON	ON	OFF	OFF	ON	OFF	OFF	ON
148	OFF	OFF	ON	OFF	ON	OFF	OFF	ON
149	ON	OFF	ON	OFF	ON	OFF	OFF	ON
150	OFF	ON	ON	OFF	ON	OFF	OFF	ON
151	ON	ON	ON	OFF	ON	OFF	OFF	ON
152	OFF	OFF	OFF	ON	ON	OFF	OFF	ON
153	ON	OFF	OFF	ON	ON	OFF	OFF	ON
154	OFF	ON	OFF	ON	ON	OFF	OFF	ON
155	ON	ON	OFF	ON	ON	OFF	OFF	ON
156	OFF	OFF	ON	ON	ON	OFF	OFF	ON
157	ON	OFF	ON	ON	ON	OFF	OFF	ON
158	OFF	ON	ON	ON	ON	OFF	OFF	ON
159	ON	ON	ON	ON	ON	OFF	OFF	ON
160	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
161	ON	OFF	OFF	OFF	OFF	ON	OFF	ON
162	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
163	ON	ON	OFF	OFF	OFF	ON	OFF	ON
164	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
165	ON	OFF	ON	OFF	OFF	ON	OFF	ON
166	OFF	ON	ON	OFF	OFF	ON	OFF	ON
167	ON	ON	ON	OFF	OFF	ON	OFF	ON

IQ Address	1	2	3	4	5	6	7	8
168	OFF	OFF	OFF	ON	OFF	ON	OFF	ON
169	ON	OFF	OFF	ON	OFF	ON	OFF	ON
170	OFF	ON	OFF	ON	OFF	ON	OFF	ON
171	ON	ON	OFF	ON	OFF	ON	OFF	ON
172	OFF	OFF	ON	ON	OFF	ON	OFF	ON
173	ON	OFF	ON	ON	OFF	ON	OFF	ON
174	OFF	ON	ON	ON	OFF	ON	OFF	ON
175	ON	ON	ON	ON	OFF	ON	OFF	ON
176	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
177	ON	OFF	OFF	OFF	ON	ON	OFF	ON
178	OFF	ON	OFF	OFF	ON	ON	OFF	ON
179	ON	ON	OFF	OFF	ON	ON	OFF	ON
180	OFF	OFF	ON	OFF	ON	ON	OFF	ON
181	ON	OFF	ON	OFF	ON	ON	OFF	ON
182	OFF	ON	ON	OFF	ON	ON	OFF	ON
183	ON	ON	ON	OFF	ON	ON	OFF	ON
184	OFF	OFF	OFF	ON	ON	ON	OFF	ON
185	ON	OFF	OFF	ON	ON	ON	OFF	ON
186	OFF	ON	OFF	ON	ON	ON	OFF	ON
187	ON	ON	OFF	ON	ON	ON	OFF	ON
188	OFF	OFF	ON	ON	ON	ON	OFF	ON
189	ON	OFF	ON	ON	ON	ON	OFF	ON
190	OFF	ON	ON	ON	ON	ON	OFF	ON
191	ON	ON	ON	ON	ON	ON	OFF	ON
192	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
193	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
194	OFF	ON	OFF	OFF	OFF	OFF	ON	ON
195	ON	ON	OFF	OFF	OFF	OFF	ON	ON
196	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
197	ON	OFF	ON	OFF	OFF	OFF	ON	ON
198	OFF	ON	ON	OFF	OFF	OFF	ON	ON
199	ON	ON	ON	OFF	OFF	OFF	ON	ON
200	OFF	OFF	OFF	ON	OFF	OFF	ON	ON
201	ON	OFF	OFF	ON	OFF	OFF	ON	ON
202	OFF	ON	OFF	ON	OFF	OFF	ON	ON
203	ON	ON	OFF	ON	OFF	OFF	ON	ON
204	OFF	OFF	ON	ON	OFF	OFF	ON	ON
205	ON	OFF	ON	ON	OFF	OFF	ON	ON
206	OFF	ON	ON	ON	OFF	OFF	ON	ON
207	ON	ON	ON	ON	OFF	OFF	ON	ON
208	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
209	ON	OFF	OFF	OFF	ON	OFF	ON	ON

IQ Address	1	2	3	4	5	6	7	8
210	OFF	ON	OFF	OFF	ON	OFF	ON	ON
211	ON	ON	OFF	OFF	ON	OFF	ON	ON
212	OFF	OFF	ON	OFF	ON	OFF	ON	ON
213	ON	OFF	ON	OFF	ON	OFF	ON	ON
214	OFF	ON	ON	OFF	ON	OFF	ON	ON
215	ON	ON	ON	OFF	ON	OFF	ON	ON
216	OFF	OFF	OFF	ON	ON	OFF	ON	ON
217	ON	OFF	OFF	ON	ON	OFF	ON	ON
218	OFF	ON	OFF	ON	ON	OFF	ON	ON
219	ON	ON	OFF	ON	ON	OFF	ON	ON
220	OFF	OFF	ON	ON	ON	OFF	ON	ON
221	ON	OFF	ON	ON	ON	OFF	ON	ON
222	OFF	ON	ON	ON	ON	OFF	ON	ON
223	ON	ON	ON	ON	ON	OFF	ON	ON
224	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
225	ON	OFF	OFF	OFF	OFF	ON	ON	ON
226	OFF	ON	OFF	OFF	OFF	ON	ON	ON
227	ON	ON	OFF	OFF	OFF	ON	ON	ON
228	OFF	OFF	ON	OFF	OFF	ON	ON	ON
229	ON	OFF	ON	OFF	OFF	ON	ON	ON
230	OFF	ON	ON	OFF	OFF	ON	ON	ON
231	ON	ON	ON	OFF	OFF	ON	ON	ON
232	OFF	OFF	OFF	ON	OFF	ON	ON	ON
233	ON	OFF	OFF	ON	OFF	ON	ON	ON
234	OFF	ON	OFF	ON	OFF	ON	ON	ON
235	ON	ON	OFF	ON	OFF	ON	ON	ON
236	OFF	OFF	ON	ON	OFF	ON	ON	ON
237	ON	OFF	ON	ON	OFF	ON	ON	ON
238	OFF	ON	ON	ON	OFF	ON	ON	ON
239	ON	ON	ON	ON	OFF	ON	ON	ON
240	OFF	OFF	OFF	OFF	ON	ON	ON	ON
241	ON	OFF	OFF	OFF	ON	ON	ON	ON
242	OFF	ON	OFF	OFF	ON	ON	ON	ON
243	ON	ON	OFF	OFF	ON	ON	ON	ON
244	OFF	OFF	ON	OFF	ON	ON	ON	ON
245	ON	OFF	ON	OFF	ON	ON	ON	ON
246	OFF	ON	ON	OFF	ON	ON	ON	ON
247	ON	ON	ON	OFF	ON	ON	ON	ON
248	OFF	OFF	OFF	ON	ON	ON	ON	ON
249	ON	OFF	OFF	ON	ON	ON	ON	ON
250	OFF	ON	OFF	ON	ON	ON	ON	ON

Figure 7.2 IQ Address Switch Settings from 126 to 250

8 Factory 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 <u>not</u> 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.**
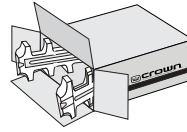
Always use the original factory pack to transport the unit.

3. Do <u>not</u> 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 Audio Customer Service

Technical Support / Factory Service
Plant 2 SW, 1718 W. Mishawaka Rd., Elkhart, Indiana 46517 U.S.A.

Telephone:	219-294-8200
	800-342-6939 (North America, Puerto Rico, and Virgin Islands only)
Fax:	219-294-8124 (Factory Service)
	219-294-8301 (Tech Support)
Fax Back:	219-293-9200 (North America only)
	800-294-4094 (North America only)
	219-294-8100 (International)
Internet:	http://www.crownintl.com
Email:	iqsupport@crownintl.com

Crown Factory Service Information

Shipping Address: Crown International, Inc., Factory Service, Plant 2 SW, 1718 W. Mishawaka Rd., Elkhart, IN 46517
Phone: 1-800-342-6939 or 1-219-294-8200   Fax: 1-219-294-8124

Owner's Name: _____

Shipping Address: _____

Phone Number: _____ **Fax Number:** _____

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.)

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Other equipment in your system: _____

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If warranty has expired, payment will be: ❏ **Cash/Check** ❏ **VISA** ❏ **MasterCard** ❏ **C.O.D.**

Card Number:_____ **Exp. Date:**_____ **Signature:**_____

ENCLOSE THIS PORTION WITH THE UNIT. DO <u>NOT</u> MAIL SEPARATELY.

Detach and send with unit.