

P.I.P.-AP

*An IQ System® Programmable Input Processor
for Crown P.I.P.-compatible Power Amplifiers*

HARDWARE INSTALLATION MANUAL

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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 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.

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

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

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, and we further warrant the new Crown product regardless of the reason for failure, except as excluded in this Crown Warranty.

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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
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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.

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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.

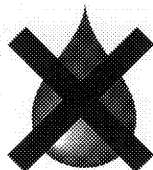
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The information furnished in this manual does not include all of the details of design, production, or variations of the equipment. Nor does it cover every possible situation which may arise during installation, operation or maintenance. If your unit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

Crown Audio Division Technical Support Group

57620 C.R. 105, Elkhart, Indiana 46517 U.S.A.

Phone: **800-342-6939** (U.S.A.) or 219-294-8200 Fax: 219-294-8301



WARNING

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

FCC COMPLIANCE NOTICE

This equipment has been tested and found to comply with the limits for a 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 Crown International could void the user's authority to operate the equipment."

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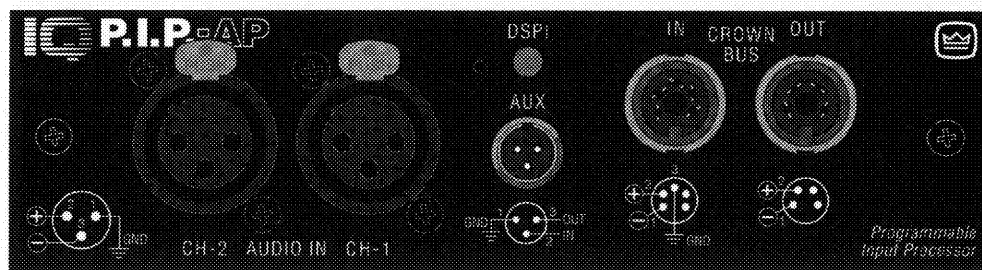


Fig. 1.1 IQ-P.I.P.-AP

1 Welcome

The *IQ-P.I.P.-AP* is a programmable input processor or *P.I.P.*® module. As a component of the *IQ System*® it connects a *P.I.P.*-compatible Crown amplifier to the Crown Bus of an *IQ System* so the amplifier can be controlled and monitored. The module is powered by the amplifier and includes its own Crown Bus drivers. A microprocessor in the module executes the commands of the *IQ System* and reports back the status of the amplifier.

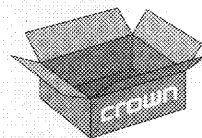
Each *IQ-P.I.P.-AP* is easy to install and includes an IQ address switch so the unit will have a unique address on the Crown Bus. Its error-tolerant design enables it to automatically reset itself if noise "spikes" or other disturbances are encountered. An input switch allows each channel to accept line-level or mic-level signals. Phantom power is also available.

This manual will help you successfully install your unit. 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.

1.1 Features

The *IQ-P.I.P.-AP* has many features:

- ☐ Control the audio signal level.
- ☐ Control the audio signal polarity.
- ☐ Control the high-voltage power supplies.
- ☐ Control the DSPI (Data Signal Presence Indicator).
- ☐ Control and monitor the AUX port.
- ☐ Monitor the audio input level. *Note: Unlike older IQ-P.I.P.s which monitored the input level at the input to the amplifier, the IQ-P.I.P.-AP monitors the input level at the input to the P.I.P. itself. In this way, the input signal is still visible even when the audio is muted.*
- ☐ Monitor the output level from the amplifier.
- ☐ Monitor the *ODEP* (Output Device Emulation Protection) level.
- ☐ Monitor the *IOC* (Input/Output Comparator).
- ☐ Microphone preamps with phantom power.
- ☐ "Drop out" relays on the Crown Bus ports maintain the continuity of the IQ communication loop even if the *IQ-P.I.P.-AP* loses power.
- ☐ Optional memory backup with EEPROM, eliminating the need for batteries.
- ☐ Reset switch, accessible from the outside, enables the module to be restored to its factory default settings.



1.2 Unpacking

The unit is shipped in a protective antistatic bag.

CAUTION: STATIC ELECTRICITY MAY DAMAGE THE UNIT. Use caution when handling the unit. Carefully ground yourself **BEFORE** touching the unit. For added safety, touch the outer metal collar of either Crown Bus connector. Avoid unnecessarily touching the components, edge connector or solder pads on the circuit boards.

Please unpack and 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 be happy to cooperate fully as needed. Save the shipping carton as evidence of damage for the shipper's inspection.

Even if the unit arrived in perfect condition, as most do, save all packing materials. **NEVER SHIP THE UNIT WITHOUT THE FACTORY PACK.**

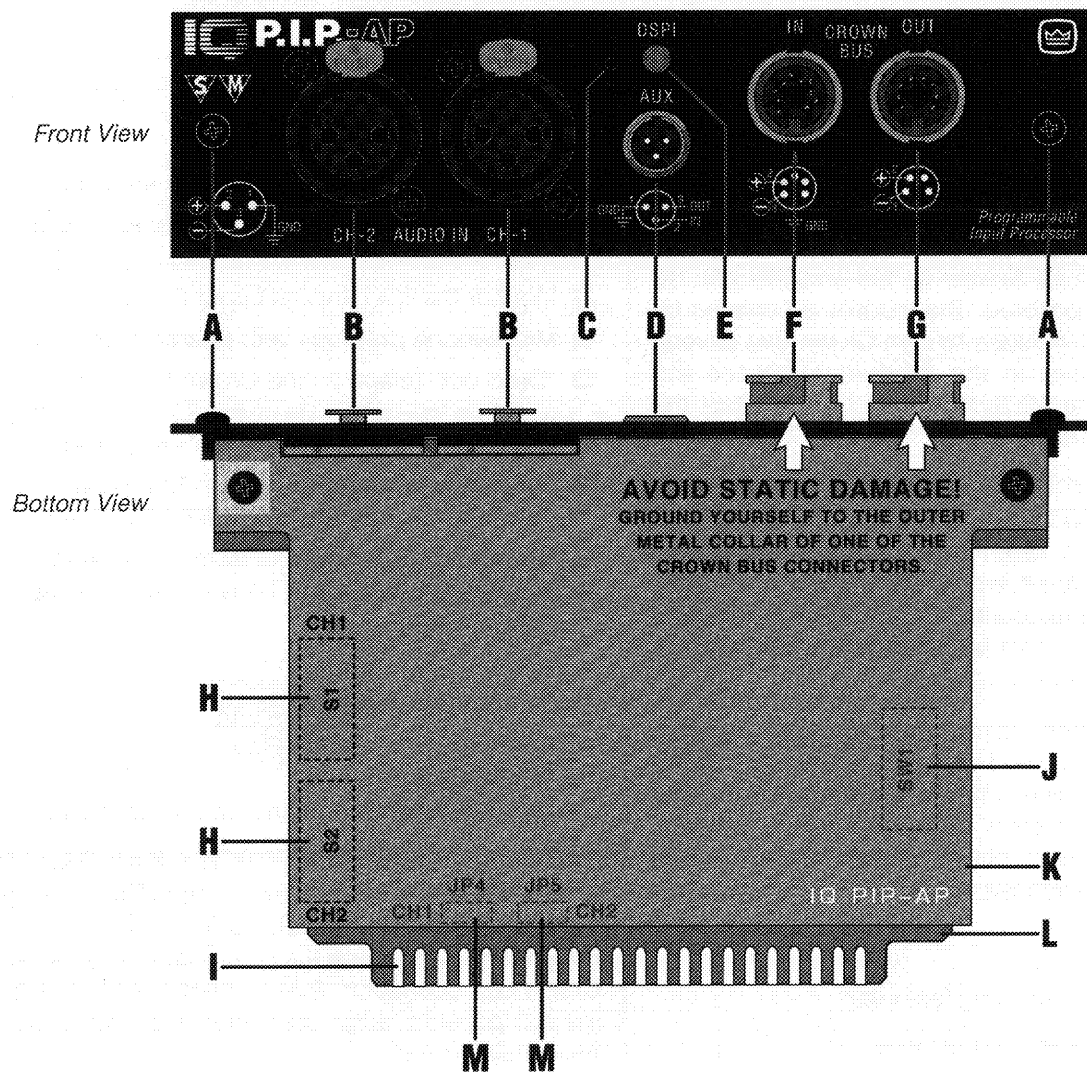


Fig. 2.1 The IQ-P.I.P.-AP Facilities

2 Facilities

A. Mounting Screws

The IQ-P.I.P.-AP is secured to the back panel of the amplifier with two phillips-head screws and star-tooth lock washers. The lock washers are required for proper ground connection.

B. Balanced Audio Inputs

A 3-pin female XLR connector is provided for balanced audio input to each channel of the amplifier. Pin 1 is ground (gnd); pin 2 is not inverted (+); and pin 3 is inverted (-). *Do not use the Ch.2 input if the amplifier is configured in either Bridge or Parallel-Mono mode.*

C. Reset Switch

A reset switch is provided to reset all settings in the P.I.P. When the switch is pressed, the input attenuators are set to 0 dB, the *algos* are turned off (*SmartAmp* models only) and all other settings are restored to the factory defaults (except the scale factors—see page 13). In this mode the unit will behave like a standard P.I.P.-FX. The reset switch can be depressed with a straightened paper clip through a small hole in the P.I.P. panel.

CAUTION: Equipment renters may want to disable the reset switch to prevent customers from resetting the limiter settings in *SmartAmp* models. Contact Crown's Technical Support Group for additional details.

D. AUX Connector

A 3-pin male mini XLR connector is provided to control auxiliary equipment. When the AUX feature is turned on, +15 VDC is provided across pin 1 (gnd) and pin 3 (+). A nominal current of 10 mA is available. The AUX connector also includes a high-impedance input that can sense both analog and logic signals. However, this input capability is reserved for future use.

E. DSPI

The DSPI is a Data Signal Presence Indicator which flashes whenever a valid IQ command has been received. The indicator can also be forced to stay on to aid rapid troubleshooting of the Crown Bus wiring.

F. Crown Bus Input Connector

A lockable 5-pin female DIN connector is provided for input connection to the Crown Bus. A mating Switchcraft 502 series connector can be ordered from Crown (part C 7776-5). Pin 1 is negative (-), pin 2 is positive (+), and pin 3 is ground (gnd). Pins 4 and 5 are not used. *Note: If shielded twisted-pair wire is used*

for the Crown Bus, the shield should be connected only to pin 3 of the input connector.

G. Crown Bus Output Connector

A lockable 4-pin female DIN connector is used for output connection to the Crown Bus. A mating Switchcraft 502 series connector can be ordered from Crown (part C 7777-3). Pin 1 is negative (-) and pin 2 is positive (+). Pins 3 and 4 are not used. *Note: If shielded twisted-pair wire is used for the Crown Bus, the shield should be connected only to pin 3 of the input connector.*

H. Input Switches (S1, S2)

An 8-section DIP switch is used to configure each input. These switches are located on the bottom circuit board. S1 configures the input of Channel 1 and S2 configures the input of Channel 2. The switches activate a microphone preamp and enable phantom power. The preamp can be turned off (0 dB gain) or set to either 20 or 40 dB of gain. (Section 3.2)

I. P.I.P. Edge Connector

The gold-plated edge connector of the top digital circuit board inserts into the P.I.P. connector inside the back of the amplifier. Use care when installing a P.I.P. module to be certain that the edge connector is properly inserted into the amplifier's P.I.P. connector.

J. IQ Address Switch (SW1)

An 8-section DIP switch is used to set the IQ address of the unit (see Section 3.1). This switch is located on the top circuit board. Each IQ component on a Crown 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 Crown Bus loop.

K. Analog Circuit Board (Bottom)

The bottom circuit board contains the analog circuitry, including the input configuration switches (S1, S2).

L. Digital Circuit Board (Top)

The top circuit board contains the digital circuitry, including the IQ address switch (SW1) and the P.I.P. edge connector.

M. Amplifier Output Pad Jumpers (JP4, JP5)

These jumpers should normally be set to the "IN" position as marked on the digital circuit board. Move them to the "OUT" position whenever the IQ-P.I.P.-AP is installed into a Macro-Tech 5000VZ amplifier.

3 Installation

Before beginning, please carefully note:

CAUTION: STATIC ELECTRICITY MAY DAMAGE THE IQ-P.I.P.-AP MODULE. Use caution when handling the unit. Carefully ground yourself **BEFORE** touching the IQ-P.I.P. module. For added safety, touch the outer metal collar of either Crown Bus connector (see Figure 2.1). This should safely discharge any static electricity through the ground plane of the module. Avoid unnecessarily touching the components, edge connector or solder pads on the circuit boards.

3.1 Setting the IQ Address (SW1)

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.

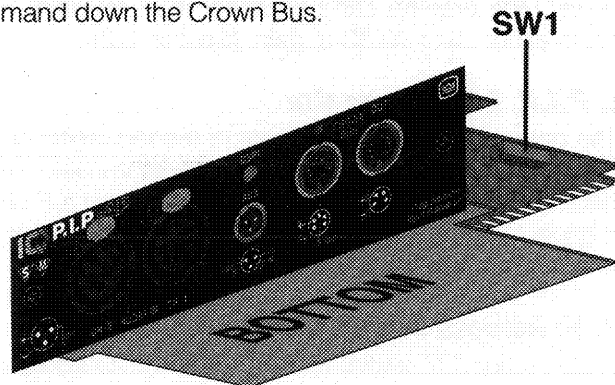


Fig. 3.1 IQ Address Switch (SW1) Location

The 8-segment DIP switch (SW1) shown above is used to set the IQ address of the IQ-P.I.P.-AP. 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 this IQ-P.I.P.-AP is to be installed into Crown Bus loop 1 and given an address of 77. No other IQ-P.I.P.-AP can be given the same address in Crown Bus loop 1. However, an IQ-P.I.P.-AP in Crown Bus loop 2 can have the same address.

Different IQ components in the same Crown Bus loop can have the same address. For example, an SMX-6 mixer with address 77 and an IQ-P.I.P.-AP with address 77 can be 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 except to put the IQ-P.I.P.-AP into a stand-alone mode where it is invisible to the IQ System and acts as a "dumb" balanced audio input.

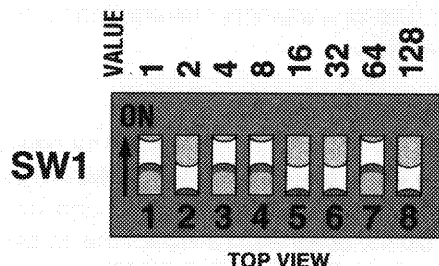


Fig. 3.2 IQ Address Switch (SW1) Values

Switch SW1 is located on the right side on the underside of the top circuit board (see Figure 3.1). It has eight segments because it actually contains eight tiny switches inside. There is an arrow printed on the switch along its left side that points to the "ON" position and the switches are numbered along the bottom (see Figure 3.2).

Each of the eight switches in SW1 has a decimal value. They are binary coded in base-2. This simply means the value of each higher switch is double that of the previous switch. 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 switches which are turned on. In the example in Figure 3.2 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 Appendix A at the end of this manual. The tables show the switch settings for all 250 addresses.

3.2 Setting the Input Switches (S1, S2)

Each input can be configured for either line-level or microphone-level signals. Phantom power is also available. Switches S1 and S2 (see Figure 3.3) are located on the left side of the lower circuit board. S1 and S2 are 8-segment DIP switches. The table in Figure 3.4 shows how to set each switch.

IMPORTANT: Notice in Figure 3.4 that two switch segments are required for each setting. Be careful to use both segments or improper operation will result.

Switch S1 configures the input to Channel 1 and switch S2 configures the input to Channel 2.

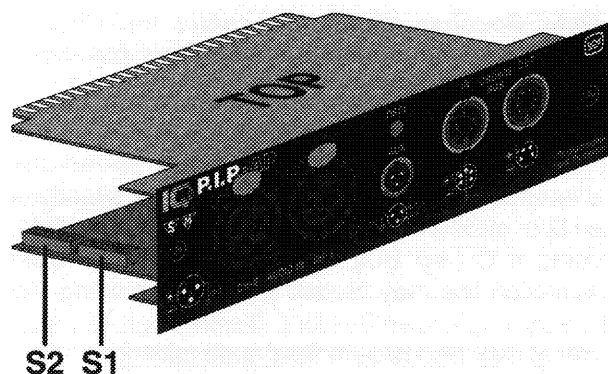


Fig. 3.3 Input Switch (S1, S2) Location

Function	Input Switch (S1, S2)							
	1	2	3	4	5	6	7	8
Phantom Power OFF	OFF	OFF						
Phantom Power ON	ON	ON						
Set Preamp to 0 dB Gain			ON	OFF	OFF	ON		
Set Preamp to 20 dB Gain			OFF	ON	ON	OFF		
Set Preamp to 40 dB Gain			OFF	OFF	OFF	OFF		

Note: DIP switch segments 7 and 8 are not used.

Fig. 3.4 Input Switch (S1, S2) Settings

CAUTION: The *IQ-P.I.P.-AP* input preamplifiers should only be used with microphone or low-level signals. Once the *P.I.P.* is installed, there will be no outward indication of the input preamplifier gain setting. The protection circuitry of the amplifier will probably be activated if the preamplifier gain is set to 40 dB and a line-level signal is connected to the input. If your amplifier appears to "cut out" when you drive it with a strong input signal, check to see if the input preamplifier gain is set too high.

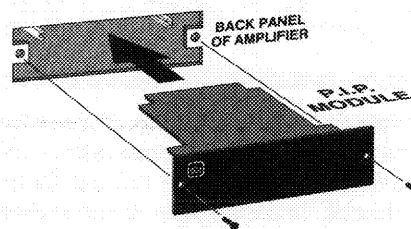
Recommendations: Attach a small label to the back of the *P.I.P.* to identify whether it has been set for microphone or line-level input signals. And keep the output levels low if you are uncertain of the preamplifier settings. Remember, Crown is not liable for damage due to overpowering other components.

3.3 Installing the *P.I.P.* in an Amplifier

Once the IQ address and input switches have been properly set, it is at last time to install the *IQ-P.I.P.-AP* into the amplifier. The procedure follows. Remember to use care when handling the unit to avoid damage from static electricity.

1. Turn down the level controls (full counterclockwise) and turn off the amplifier.
2. Unplug the power cord of the amplifier from the AC mains.

3. Remove the existing *P.I.P.* or cover panel from the amplifier back panel (two screws).
4. Set the amplifier input sensitivity switch to 0.775 V. (See the *Owner's Manual* of the amplifier.)
5. If you haven't yet done so, configure the DIP switches on the *IQ-P.I.P.-AP*. It is good practice to also label the unit so others will know what the gain settings of the input preamplifiers are.
6. If the *IQ-P.I.P.-AP* is being installed into a *Macro-Tech 5000VZ*, move the jumpers JP4 and JP5 (Figure 2.1) on the digital circuit board to the "OUT" position. They should both be set to the "IN" position for all other amplifiers.
7. Carefully ground yourself to the amplifier chassis before installing the *IQ-P.I.P.-AP*. It is a good idea to maintain ground contact between yourself and the amplifier while inserting the module into the *P.I.P.* card rails in the next step.
8. Align the edges of the *IQ-P.I.P.-AP* in the *P.I.P.* card rails and firmly push the unit in until it is seated against the mounting bracket (see Figure 3.5).

Fig. 3.5 Installing a *P.I.P.* in an Amplifier

9. Tighten the two *P.I.P.* mounting screws until the *P.I.P.* is secured to the amplifier back panel.
10. Connect the amplifier back to the AC receptacle.
11. Carefully adjust the level controls of the amplifier until the maximum desired level is achieved. **IMPORTANT:** Unless the unit has memory backup, do NOT rely upon the attenuators on the *P.I.P.* to set the maximum sound level because the attenuation settings are not remembered when there is no power.
12. Connect the *IQ-P.I.P.-AP* to the *IQ System* and use the configuration software (Section 3.5) to initialize it for the amplifier model.

3.4 Connecting to the Crown Bus

The *IQ-P.I.P.-AP* must be connected to a Crown Bus loop in order for the *IQ System* to control or monitor it. The Crown Bus is a serial communication loop designed to transmit IQ commands and data. As implemented in the *IQ-P.I.P.-AP*, 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* interface, it can

accept eight different Crown Bus loops or zones. Dividing the sound system into different zones, each with its own Crown Bus loop, can have several advantages. The list on the following page 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 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-P.I.P.-AP* can be connected to the Crown Bus with inexpensive twisted-pair wiring. If fiber optic wiring is required contact the Crown Technical Support Group. The phone numbers are listed on page 15.

Here are some guidelines for twisted-pair wiring:

- **Use shielded twisted-pair wire** at least 26 AWG in size. The wire should be of good quality and should NOT have high capacitance (30 picofarads/foot or less is good). Shielded wire is recommended for situations where interference is a problem. (West Penn 452 or an equivalent wire works well.) 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.
- If shielded wire is used, **connect the shield only to the input connector.**
- **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. The lower the capacitance, the longer the loop can be. Unshielded wire typically 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. If this is done, 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.

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

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 (greater than 10 miles) may also require fiber optic cabling.

The IQ components of each Crown Bus loop are wired in series. The output of one IQ component "loops" to the input of the next and so on as shown below.

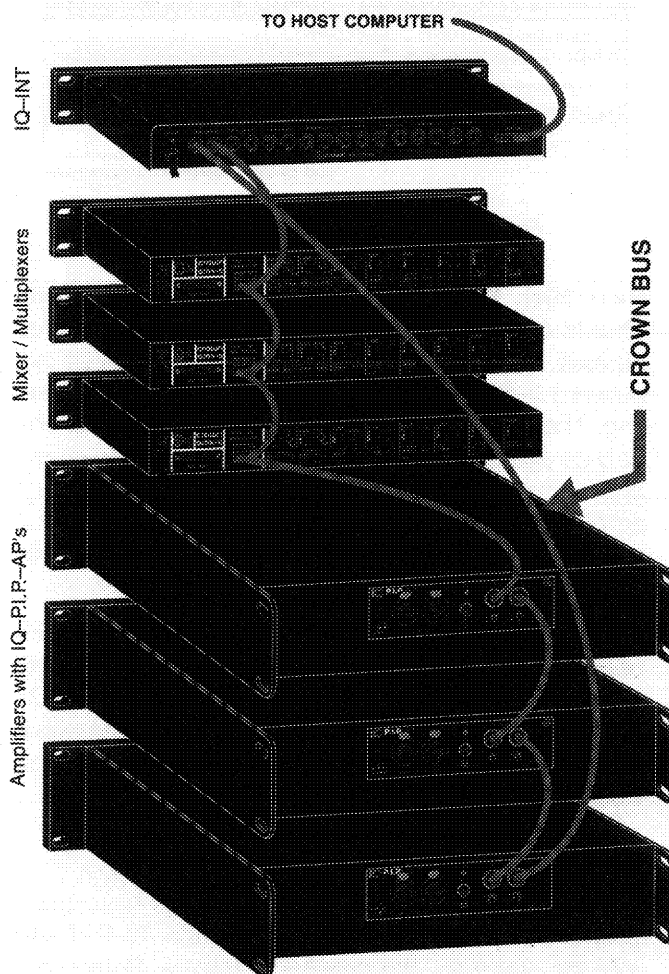


Fig. 3.6 Crown Bus Wiring "Loops" from Output to Input of Each IQ Component

Some examples of twisted pair wiring follow. Figure 3.7 shows point-to-point wiring for the Crown Bus using 4-pin output and 5-pin input DIN connectors.

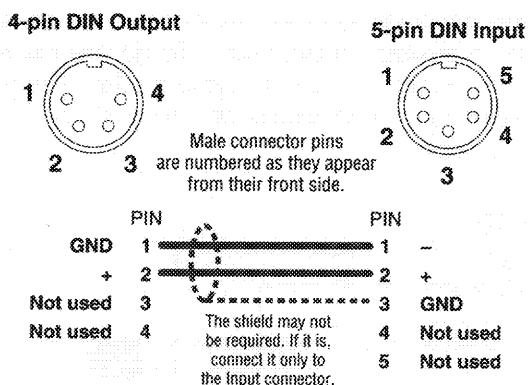


Figure 3.7 Crown Bus Wiring for DIN Input and Output

Some IQ components use a single 4-pin removable barrier block connector for both Crown Bus input and output wiring. This is shown in Figures 3.8 and 3.9.

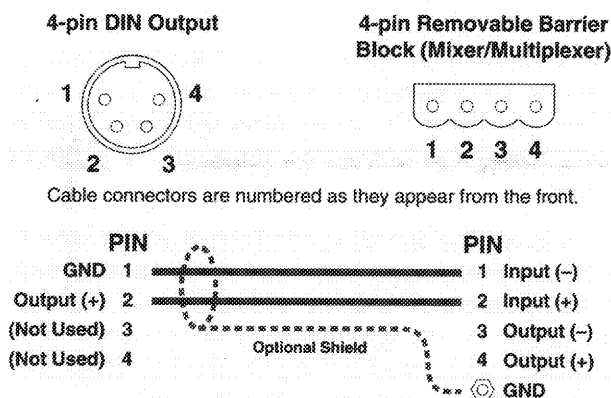


Figure 3.8 Crown Bus Wiring for Barrier Block Input

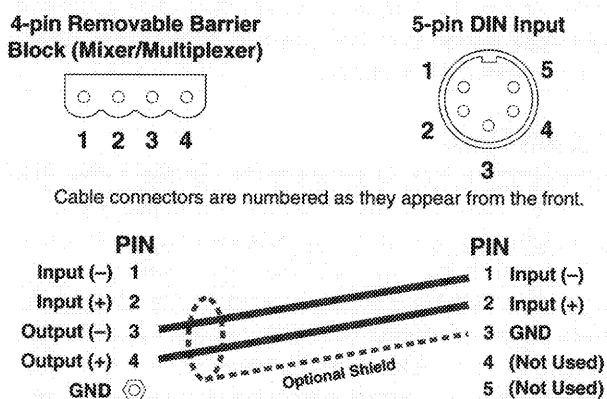


Figure 3.9 Crown Bus Wiring for Barrier Block Output

3.5 Configuring Scale Factors

It is necessary to configure software scale factors in the microprocessor of the IQ-P.I.P.-AP in order for it to properly interpret the output signal level of the amplifier model in which it is installed. This is easily done by connecting a host computer to the IQ-P.I.P.-AP via an IQ interface using the Crown Bus and running the appropriate software (please consult the software *User Guide* and the amplifier *Operation Guide* for details). The software will prompt you for the amplifier model and send the appropriate scale factors to the P.I.P.

3.6 Connecting the Audio Signal

Balanced 3-pin female XLR connectors are provided for audio connection. The audio cables should be wired in one of the following manners:

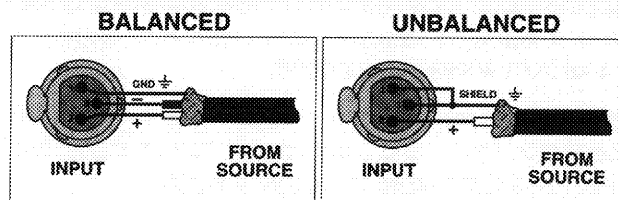


Fig. 3.10 Audio Input Wiring

We strongly recommend that balanced wiring be used if possible. Some important guidelines follow:

- Always use shielded wire. The higher the density of the shield (the outer conductor), the better. Spiral wrapped shield is not recommended.
- When using unbalanced lines, keep the cables as short as possible. Avoid lengths greater than 10 feet (3 meters).
- Do not run audio input cables together with high-level wiring such as loudspeaker wires or AC cords. (This lessens the chance of hum or noise being induced into the input cables.)
- Do not connect audio and data grounds together. For example, do not connect the audio ground to the Crown Bus ground.
- Turn the entire sound system off before changing any connections. Turn the level controls down before powering the system back up. Crown is not liable for damage incurred when any transducer or component is overdriven.

IMPORTANT: Do not feed a signal into the phone jack audio inputs on the back panel of the amplifier when an IQ-P.I.P.-AP is installed. The phone jacks are wired in parallel with the output of the P.I.P. connector inside the amplifier. Any audio signal fed into the phone jacks

could feed back into the output of the IQ-P.I.P.-AP and generate a distorted input signal. The phone jacks can be used to "daisy chain" the post-processed signal from the IQ-P.I.P.-AP to the inputs of other amplifiers.

DO NOT USE THE CHANNEL 2 INPUT if the amplifier is used in either Bridge-Mono or Parallel-Mono mode.

For additional information on audio input connection please refer to the *Owner's Manual* of the amplifier. It contains helpful information on preventing unwanted subsonic frequencies, radio frequency interference, ground loops, and feedback oscillation.

3.7 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 something on/off, send a signal to another component and receive a signal from another component.

The AUX connector is a 3-pin male mini XLR connector. Pins 1 and 3 are used to send a signal and pins 1 and 2 are used to receive a signal.

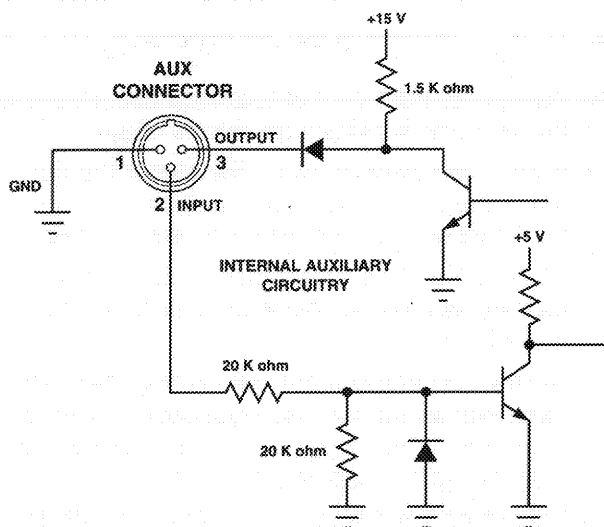


Fig. 3.11 The Internal AUX Connector Circuit

3.7.1 AUX Output

When the auxiliary feature is turned on by the IQ System software +15 VDC is supplied across pins 1 (ground) and 3 (+). A total of 10 milliamps of current is available. An internal 1.5 K ohm resistor protects against shorts.

There are many possible uses for the AUX output, lim-

ited only by imagination. For example, it can be used to turn on auxiliary cooling fans. To do this the AUX connector would be used to close a relay. The relay would then turn the fans on or off. This is shown in Figure 3.12 below.

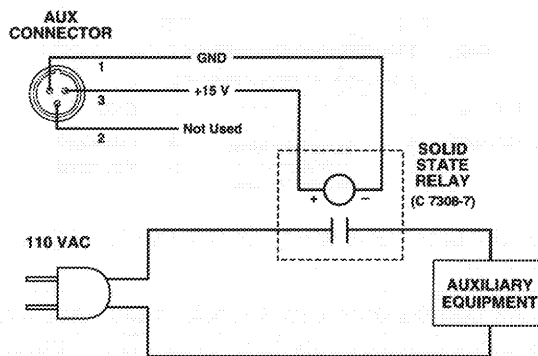


Fig. 3.12 A Sample AUX Circuit

Note: A Crown part number is provided in the above illustration for a suitable solid-state relay (C 7308-7). Contact your local Crown (or Amcron) representative or the Crown factory Parts Department (219-294-8200) to order.

By monitoring the operating condition of amplifiers with the IQ System software, the need for additional cooling will 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 software *User's Manual*.)

In addition to the preceding examples, the AUX ports of more than one IQ component can be used to send binary codes to auxiliary equipment. For example, eight AUX ports can be used to send 8-bit binary codes to external equipment.

3.7.2 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 1 (ground) and 2 (+). A 5 to 30 VDC signal at the input will be interpreted as a logic "high" and will be communicated to the Crown Bus where a host computer or drone can act upon it. A signal less than 5 VDC is interpreted as a logic "low." Note: A negative signal can also be used as a logic low because the signal is internally clamped to protect the internal circuitry.

4 Service

This unit has sophisticated circuitry which should only be serviced by a fully trained technician. This is one reason why each unit bears the following label:

CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT REMOVE COVERS. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO A QUALIFIED TECHNICIAN.

4.1 Worldwide Service

Service may be obtained from an authorized service center. (Contact your local Crown/Amcron representative or our office for a list of authorized service centers.) To obtain service, simply present the bill of sale as proof of purchase along with the defective unit to an authorized service center. They will handle the necessary paperwork and repair.

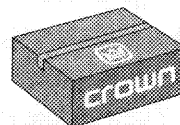
Remember to transport your unit in the original factory pack. We will pay the surface shipping costs both ways **for warranty service** to the authorized service center nearest you after receiving copies of all shipping receipts. You must bear the expense of all taxes, duties, and customs fees when transporting the unit.

4.2 North American Service

Service may be obtained in one of two ways: from an authorized service center or from the factory. You may choose either. It is important that you have your copy of the bill of sale as your proof of purchase.

4.2.1 Service at a North American Service Center

This method usually saves the most time and effort. Simply present your bill of sale along with the defective unit to an authorized service center to obtain service. They will handle the necessary paperwork and repair. Remember to transport the unit in the original factory pack. A list of authorized service centers in your area can be obtained from our Technical Support Group.



Always use the original factory pack to transport the unit.

4.2.2 Factory Service

To obtain factory service, fill out the *Service Information Card* in the back of this manual and send it along with proof of purchase and the defective unit to the Crown factory. Enclose a letter explaining the nature of the problem and what service you would like. Include your return shipping address and telephone number.

The unit must be shipped in the original factory pack. If you don't have the original shipping container, contact us for a replacement.

We will pay ground shipping costs both ways in the United States **for warranty service** after receiving copies of all shipping receipts. Shipments should be sent "UPS ground." (If the unit is under warranty, you may send it C.O.D. for the cost of freight via UPS ground.) The factory will return the unit via UPS ground. Please contact us for other arrangements.

Crown Audio Division
Tech. Support / Factory Service
57620 C.R. 105
Elkhart, IN 46517 U.S.A.

Phone: 1-219-294-8200
U.S.A.: 1-800-342-6939
Fax: 1-219-294-8301

5 Technical Information

The purpose of the *IQ-P.I.P.-AP* is to enable an *IQ System* to control and monitor a *P.I.P.*-compatible amplifier. The exact features of your unit are determined by the firmware in its microprocessor. (Please refer to the *Firmware Manual* that came with your unit.) Here is a typical list of features:

- ☐ Control the audio signal level.
- ☐ Control the audio signal polarity.
- ☐ Control the high-voltage power supplies.
- ☐ Control the DSPI (Data Signal Presence Indicator) LED.
- ☐ Control and monitor the AUX port.

In addition, most units can monitor these parameters:

- ☐ Monitor the input level to the *IQ-P.I.P.-AP*.
- ☐ Monitor the output level from the amplifier.
- ☐ Monitor the *ODEP* (Output Device Emulation Protection) level.
- ☐ Monitor the *IOC* (Input/Output Comparator).

5.1 Audio Signals

Balanced and unbalanced audio signals enter the module at the XLR connectors. From these connectors, the signals are RFI filtered and fed into a balanced to single-ended conversion stage. Additional gain and/or phantom power for a microphone are also provided in this stage. From this point, the audio signal is sent to a monitor input (discussed below) and also to a digitally controlled attenuator. Following the attenuator, the signals pass through a final output buffer stage, which also can invert the polarity of the signal when required. The audio signal is then fed through the *P.I.P.* edge card connector and into the amplifier.

5.2 Amplifier Monitoring: "Monitor Inputs"

The *IQ-P.I.P.-AP* can monitor the status of the amplifier using a number of "monitor inputs." There are two types of signals—audio and status.

The audio signals that are monitored are the input to the *P.I.P.* and the output of the amplifier. These signals enter the *P.I.P.* and are fed into a precision peak detector which insures that instantaneous signal peaks are not "missed" by the *P.I.P.* The detector outputs are then fed through a multiplexer into a logarithmic conversion circuit for dynamic range scaling. The output of this circuit is then fed into the A/D converter on the microprocessor, where the signal is converted and

sent to the host computer via the Crown Bus.

The status signals that are monitored are *ODEP* level, *IOC* status and *VCC* status. These signals enter the *P.I.P.*, pass through a buffer stage, and are fed into the A/D converter on the microprocessor. The signals are then converted and sent to the host computer via the Crown Bus.

5.3 Amplifier Control

The *IQ-P.I.P.-AP* can control the following functions: audio level, audio polarity, high-voltage power supplies, DSPI and the AUX port. These functions are controlled using ports on the microprocessor and some external support circuitry. The audio level is controlled by the microprocessor through a digitally controlled analog attenuator. The DSPI LED flashes whenever a valid *IQ* command has been received and can be forced to stay on to facilitate diagnosis of Crown Bus wiring problems.

5.4 IQ System Communications

The *IQ-P.I.P.-AP* communicates with the host computer via the Crown Bus. Connections to the Crown Bus are made via the 4 and 5-pin locking DIN connectors on the rear panel. *IQ* commands entering the *P.I.P.* are fed into an input receiver circuit that converts the 20 mA current loop signal into a standard logic signal that the microprocessor can understand. This signal is also passed directly to the Crown Bus for output where it is passed on to the remainder of the loop. Data sent in response to *IQ* commands is also sent through the Crown Bus output where it passes through the remainder of the loop and back to the host computer. A "drop out" relay is also present which makes a physical contact between the Crown Bus input and output connectors in the event of a power failure. This means that as long as the Crown Bus cables are connected to the *P.I.P.*, the Crown Bus will remain unbroken—even if power to the *P.I.P.* is lost.

5.5 Microprocessor and Reset Switch

The "brains" of the *IQ-P.I.P.-AP* are contained in the microprocessor. It interprets commands received from the Crown Bus and responds accordingly. The *IQ-P.I.P.-AP* is designed to provide an "automatic reset" in the event of a power failure, but the rear reset switch has also been added. Pressing this switch restores all *P.I.P.* settings to their factory defaults. The only exception is the initialization data which can only be changed with *IQ System* software on the host computer.

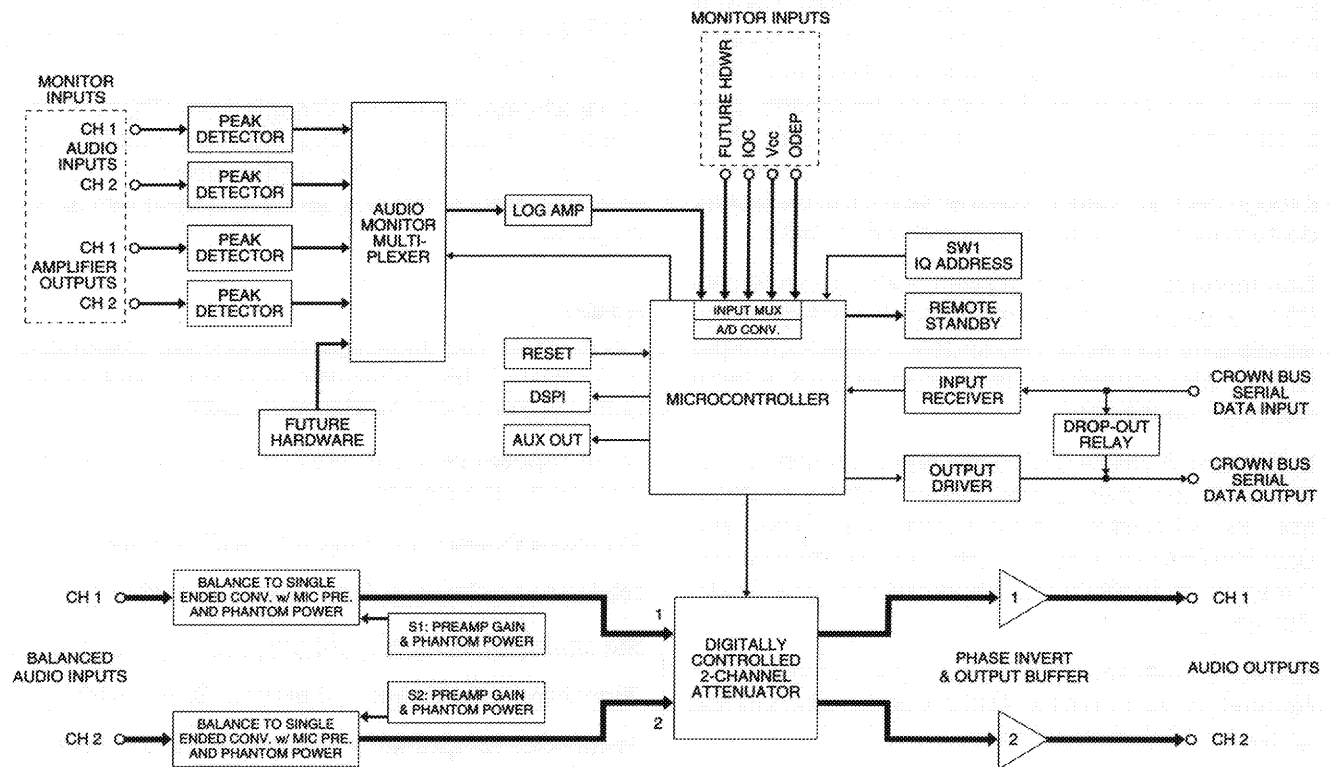


Fig. 5.1 IQ-P.I.P.-AP Circuit Block Diagram

6 Specifications

General

Internal Controls: An 8-segment DIP switch is used to set the IQ address (decimal range: 1–250). Note: If address "0" is selected, the *IQ-P.I.P.-AP* will operate in stand-alone mode. Two additional 8-segment DIP switches (one for each channel) set the preamp gain of each input and turn phantom power on and off. A Reset switch, accessible with a straightened paper clip through the *P.I.P.* panel, resets all settings to the factory defaults (except the amplifier initialization data).

Connectors: Crown Bus Input: Locking 5-pin female DIN connector. Crown Bus Output: Locking 4-pin female DIN connector. Audio Input: Balanced 3-pin female XLR connector for each channel. AUX: A 3-pin male mini connector.

Indicators: A yellow DSPI (Data Signal Presence Indicator) flashes when a valid IQ command is received from the *IQ System* via the Crown Bus. Depending upon the firmware version in your unit, the DSPI can be forced on to facilitate rapid troubleshooting of Crown Bus wiring.

Auxiliary Feature: +15 VDC is supplied across pins 1 (ground) and 3 (+) of the AUX connector when turned on by the *IQ System* software.

Power Requirements: When installed into a Crown *P.I.P.*-compatible amplifier, the unit receives ± 24 VDC.

Crown 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.

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

Operation: Half duplex.

Intelligence: 8-bit microprocessor with 12 K byte control program.

Transmission Distance: Variable from 200 to 3,000 feet (61 to 914 m), depending upon wire capacitance. Typically 1,000 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-P.I.P.-AP* module, itself.

Input Impedance: Nominally 24 K ohms balanced and 12 K ohms unbalanced.

Phantom Power: Nominally +15 VDC, 1.5 mA.

Microphone Preamp: Adds +20 or +40 dB of gain.

Maximum Input Level: +22 dBu.

Signal-to-Noise Ratio: >90 dB from 20 Hz to 20 kHz.

Frequency Response: ± 0.1 dB from 20 Hz to 20 kHz.

Crosstalk Ratio: >75 dB at 1 kHz. >65 dB at 20 kHz.

Common Mode Rejection (CMR): >70 dB at 60 Hz with +10 dBu input.

Total Harmonic Distortion (THD): <0.05% from 20 Hz to 20 kHz.

IQ System Data Acquisition

Input/Output Monitor Accuracy: Typically ± 1 dB. ± 2 dB maximum.

Appendix A

This Appendix contains lookup tables for every valid IQ address. The valid address are 1 to 250. Remember that address "0" (zero) will put the *IQ-P.I.P.-AP* 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 Crown Bus 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-P.I.P.-AP* as shown. See Section 3.1 also.

IQ Address Switch								
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
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	ON	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
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

Fig. A.1 IQ Address Switch (SW1) Settings from 0 to 125

IQ Address Switch								
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	ON	OFF	ON	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	ON	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
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	ON	OFF	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
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

Fig. A.2 IQ Address Switch (SW1) Settings from 126 to 250