Amplifier / *IQ–P.I.P.*
OPERATION GUIDE

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This guide describes how to operate an amplifier using control blocks and sub-blocks. It is also possible to operate an amplifier from a graphics plate. Please refer to the *Graphics Plate Operation Guide* for additional instructions.

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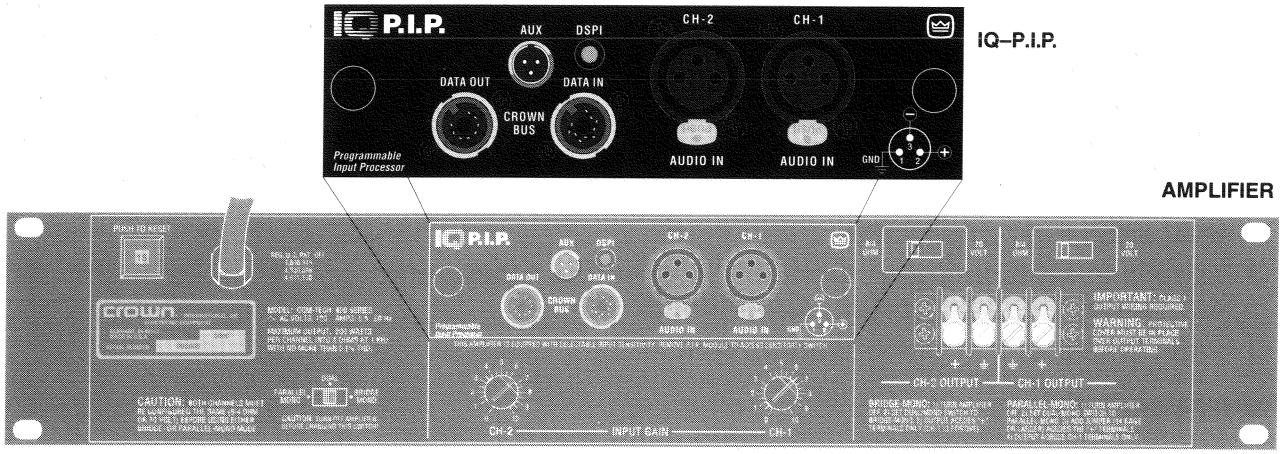
1 The *IQ–P.I.P.*

Crown amplifiers which are *P.I.P.*-compatible can be connected to an *IQ System* with an *IQ–P.I.P.* When this is done, the amplifiers can be monitored and controlled by IQ software. Please refer to the *IQ–P.I.P. Owner's Manual* for installation details.

There are three models of the *IQ–P.I.P.* available, the original *IQ–P.I.P.*, the *IQ–P.I.P.BB* with on-board battery backup and the *Smart Amp IQ–P.I.P.* with on-board *algo* automation. Both the *IQ–P.I.P.BB* and the *Smart Amp IQ–P.I.P.* include a lithium battery which can preserve software settings for up to 5 years. It is important to note that the original *IQ–P.I.P.* without the backup battery will lose all settings if it loses power. When this happens,. the attenuator settings default to 0 (zero) or no attenuation. The implications of this are explained more fully in Section 2.

To find out which model *IQ–P.I.P.* you have, first check the version sticker on the back panel. It is a *Smart Amp IQ–P.I.P.* if it is version 1.40 or later. If the version is older you will need to check to see if it has a backup battery. It is an *IQ–P.I.P.BB* if it has a battery. It is an original *IQ–P.I.P.* if it does not have a battery.

Because Crown amplifiers with *IQ–P.I.P.s* are controlled, monitored and/or automated by computer software, they can be located in out-of-the-way places. This can reduce wiring costs by locating the amplifiers closer to the loudspeakers or, in large touring applications, close the power source.



1.1 The *Smart Amp* Algo Pack (version 1.40)

The on-board intelligence of the *Smart Amp IQ–P.I.P.* is controlled by the algo pack in its microprocessor. The algo pack contains the individual *algos* which control its various automation features. Each *algo* is listed below along with a brief description.

- ***ODEP* Conservation *algo*:** Automatically reduces the gain as the thermal-dynamic headroom of the amplifier is exhausted.
- **Smooth Output Limiter *algo*:** Reduces the gain slowly to keep the average of the peak output level below a specified output level.
- **Stand By *algo*:** Conserves energy by temporarily turning off the high-voltage supplies when there has been no audio signal for a specified length of time.
- **Error Reporting *algo*:** Notifies the operator if an amplifier channel has a fault condition, prolonged distortion (*IOC* condition), and/or shorted output.

All *algos* can be individually turned on and off for each input or output channel, making them extremely versatile. This is controlled from the IQ software sub-block screen for each unit. As a group, all *algos* in the *Smart Amp* algo pack can be turned on or off with the ASA control on the amplifier control block screen.

1.2 *IQ–P.I.P.* Features

Manual software features (all *IQ–P.I.P.s*):
The manual software features are controlled in the control block screen. *Note: All controllable functions can also be monitored.*

- ❑ Increase/decrease each input attenuator in 1 dB steps over a 50 dB range.
- ❑ Independently switch each channel's high voltage supply on and off.
- ❑ Independently mute each channel (mute = full attenuation).
- ❑ Independently invert the polarity of each channel.
- ❑ Turn any auxiliary device connected to the AUX port on or off.
- ❑ Force the DSPI (Data Signal Presence Indicator) to remain on. (A troubleshooting feature for Crown Bus loop communication.)
- ❑ Monitor the audio signal level at both the amplifier input (balanced gain stage) and the amplifier output.
- ❑ Monitor the *IOC®* status to know if distortion greater than 0.05% is present.
- ❑ Monitor the percent of *ODEP®* level to see how much thermal-dynamic energy reserve is available.

Automation software features (*Smart Amp IQ–P.I.P.* only):
The automation software features are controlled in the sub-block screen.

- ❑ Reduce the gain as the thermal-dynamic reserve of the amplifier is exhausted. *Note: This is an exclusive Crown feature using Crown's patented ODEP analog computer circuitry in each P.I.P.-compatible amplifier.*
- ❑ Automatically limit the output level.
- ❑ Conserve energy by temporarily turning off the high-voltage supplies when there has been no audio signal for a specified length of time.
- ❑ Notify the operator when problems are detected.

Protection features:

- ❑ Automatic microprocessor reset if noise spikes, power dropouts or other disturbances are encountered.
- ❑ DSPI (Data Signal Presence Indicator) provides swift isolation of wiring problems, improper IQ addresses and disconnected or off-line IQ components.
- ❑ *IQ–P.I.P.BB* and *Smart Amp IQ–P.I.P.* only: Lithium battery maintains all settings for up to 5 years.

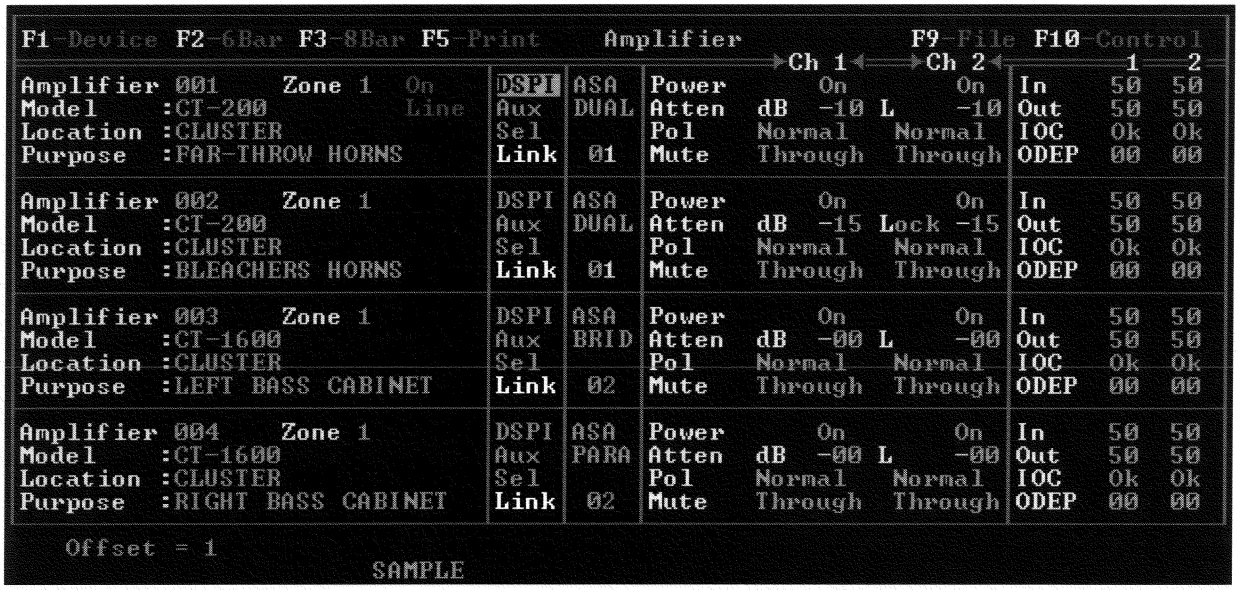
1.3 About this Operation Guide...

This *Operation Guide* describes how to use IQ software to control and monitor a Crown amplifier with an *IQ–P.I.P.* This *Operation Guide* does not discuss the hardware installation or hardware controls. Please refer to the *IQ–P.I.P. Owner's Manual* for those details. Nor does this *Operation Guide* discuss the general features of the IQ software. Please refer to the *User's Manual* for your IQ software for that information.

2 Manual Control

IMPORTANT: To control or monitor an amplifier its front panel Enable switch must be turned on. As long as it is on, the *IQ–P.I.P.* will receive the power it needs from the amplifier's low voltage supply. For normal operation, it should be left on. Use the Power controls of the IQ software (described in this section) or the Stand By *algo* (described in Section 4) to turn the high voltage supplies on and off when you want to turn the amplifier on and off.

The amplifier is manually controlled with the control block screen of the IQ software. To switch to the amplifier control block screen, press [F1] to access the Device menu then press [A]. [↑] [↓] can also be used to select the amplifier control block screen from the Device menu followed by [Enter↵] to execute the selection. A mouse (🖱) can also be used. The amplifier control block screen is shown below:



Please refer to the IQ software *User's Manual* for general instruction on how to navigate around a control block screen and how to select and change a control.

Tip: Because there are two levels of control for a *Smart Amp IQ–P.I.P.*, manual and automatic, it is possible to have two separate settings for the input attentuators. This can be a great advantage when it is necessary to have the capability to quickly switch to a second preset. One preset is created with the manual controls on the control block screen. The second preset is created with the *algo* controls on the sub-block screen. Toggling the ASA control on and off causes the amplifier to switch between the two presets. To toggle ASA on from the control block, select the ASA control and press [Spacebar]. To toggle ASA on and off from the sub-blocks, press [Ctrl]+[A].

Each amplifier control block is divided into three areas. On the left is the Information area, in the middle is the Control area and on the right is the Monitor area.



A description of each area and the features it contains follows:

2.1 Information Area

Each control block contains an information area. When a roll call is run, a control block will be automatically created for all components. In it the roll call will enter the **IQ address** and **zone** number for each component. The IQ address and zone can also be manually entered or changed by selecting either number and entering a new one. The IQ address is limited to 1-250. The zone is limited to 1-8.

Under the IQ address and zone number is a line for the **Model**, **Location**, and **Purpose**. These lines are provided for you to enter information which will help you identify which amplifier is controlled by the control block and what its function is.

The phrase "On Line" will be displayed with green letters in the upper right corner of the information area of all amplifiers which are found by the IQ software. This makes it easy to tell which control blocks are controlling active units and which are not.

2.2 Control Area

DSPI:

The DSPI or Data Signal Presence Indicator is an LED on the *IQ–P.I.P.* panel. (The *IQ–P.I.P.* plugs into the back panel of the amplifier.) It flashes whenever a data signal, addressed to it, is received. It can be forced to stay on as an aid to troubleshooting by turning the DSPI control on. If the DSPI is forced on by the IQ software and the indicator does not light on the unit, it signifies that there is a break in communication before it or the unit is defective.

Tip: Use the DSPI light to verify that all units in the system are responding to IQ commands. For example, turn all DSPI lights on before a show to verify that all equipment is operating properly.

Tip: When there is more than one amplifier in a system, use the DSPI light to quickly identify a particular one. For example, turn the DSPI light on to help a technician quickly locate a particular unit in a large equipment rack.

Aux:

The AUX port of the *IQ–P.I.P.* is turned on and off with the Aux control. When turned on, the AUX port supplies +15 VDC across pins 3 (+) and 1 (gnd) of the 3-pin AUX connector located on the back panel of the unit. This can be used to signal non-IQ devices or it can be used to turn non-IQ components on and off (with the use of a solid state relay). For example, an auxiliary rack cooling system can be turned on with the Aux feature.

Sel:

An amplifier is selected with the Sel control. This feature serves two purposes. First, it selects the amplifiers which will be shown in either of the two Display screens.

Second, it selects the amplifiers for which graphics display modules will be automatically created by the Turbo version of IQ-MSD software.

Link:
The Link control connects the controls of two or more amplifiers together so they can be controlled as a unit. There can be up to 100 different link groups (0–99). The number to the right of the Link control sets the number of the link group. The link function enables you to group amplifiers in logical ways to make them easier to control. This is very beneficial for larger amplifier installations.

The link group number is accessed by first selecting the Link control and then pressing [→] to select the group number. Any number from 0 to 99 can be entered.

While the link feature connects the controls of all units in the same group, it does not initially force all controls to the same setting. To cause all on/off controls to have the same setting simply toggle them and all identical controls in the group will be forced to the same setting.

Attenuation controls behave differently because they are numeric. Entering a number directly sets all of the similar controls in the group to the same value. But using [+] [-] to increment and decrement an Atten control causes all similar controls to change relative to their previous setting. It does not force them to be the same value.

ASA (*Smart Amp IQ–P.I.P.* only):
"ASA" means "Auto-System Algos" and the ASA control serves two purposes. First, it serves as a master control to turn all *algos* on and off. Turning ASA off, restores manual-only control. Turning ASA on restores automatic operation. To turn ASA on and off, select it and press [Spacebar] just as you would for most other on/off controls. See the tip at the beginning of Section 2 for more on this.

The second purpose of the ASA control is to serve as a door or entrance to the sub-block screen where the *algos* are configured. To bring up the sub-block screen, highlight the ASA control and press either [Enter↵] or [↓].

IMPORTANT: When the ASA control is <u>on</u>, the control area (Section 2.2) may <u>not</u> reflect the actual status of the *IQ–P.I.P.* However, the indicators in the monitor area (Section 2.3) will accurately reflect the actual status.

Dual / Mono:
The Dual/Mono software control identifies the operating mode of the amplifier. It is important to set it properly because the host computer has no way of knowing how the <u>hardware</u> Dual/Mono (or Stereo/Mono) switch is set on the amplifier. Set the Dual/Mono software control to "DUAL" if the amplifier is configured in Dual mode, "BRID" if the amplifier is configured in Bridge-Mono mode, or "PARA" if the amplifier is configured in Parallel-Mono mode.

Power:
The Power controls turn the high voltage supply of each channel on and off. Their status is displayed under the Ch1 and Ch2 headings to the right of the Power label. Select the Power control for the desired channel and toggle it on and off with [Spacebar].

Note: Crown amplifiers with P.I.P. compatibility have three power supplies, one low voltage and two high voltage supplies. The low voltage supply is turned on by the front panel Enable switch. The high voltage supplies can be controlled by the IQ System. The front panel Enable switch must be on for the IQ software to monitor or

control the amplifier and IQ–P.I.P. If the front panel Enable switch is turned off, IQ–P.I.P. modules without battery backup will lose all their settings.

Tip: The Power controls can be used for energy management. By turning the high voltage supplies of amplifiers off when they are not being used, considerable energy and money can be saved. Sometimes the savings can be great enough to pay for the *IQ System*! IQ-MSD Sys-Config software can automate this with its scheduling capability. Contact a your Crown or Amcron representative for more details.

Atten:
The Atten controls set the attenuation level for each input. They can be incremented and decremented in 1 dB steps using [+] [-]. Any number from 0 to 50 can also be entered directly. A minus sign is displayed to the left of each Atten control to show that the input level can only be attenuated, not boosted.

WARNING: The attenuator settings in the original *IQ–P.I.P.* are NOT remembered when the unit does not have power. Therefore, the *IQ–P.I.P.* will come back on at full volume after a power failure or internal shutdown. It will also come back on at full power after the Enable switch on the front of the amplifier has been turned off.

The proper way to set the maximum possible sound level of an audio system (the loudest one would ever operate the system under ANY circumstances) is with the hardware level controls on the power amplifier. This protects the audience and loudspeakers from excessive sound pressure levels. Remember, Crown cannot be held liable for damage due to overpowering a sound system.

Use the *IQ–P.I.P.BB* or *Smart Amp IQ–P.I.P.* if you need to preserve the setting when there is no power. They each have a lithium battery that lasts up to 5 years.

L:
The L control locks the two channels of a single amplifier together so that changes made to one channel are mirrored by the other. For example, turning the Mute control of Channel 1 on will automatically cause the Mute control of Channel 2 to also come on when the channels are locked. The L control is located between the Atten controls of each channel. When an amplifier's controls are locked, the word "Lock" is displayed between the Atten controls.

Note: If the channels of a "linked" amplifier are locked, all other amplifiers in the same link group will act as if they are also locked whenever changes are made to the locked amplifier. This is not true when changes are made to another amplifier in the group which does not have locked channels.

Pol:
The Pol controls are used to invert and restore the polarity. This can be a very handy feature if someone accidentally miswires the output of an amplifier, reversing the polarity of the signal driving the loudspeakers. Simply invert the polarity with the Pol controls to restore proper polarity to the loudspeakers. It can also be used to quickly check the polarity of a system.

Mute:
The Mute controls are used to turn inputs on and off. When an input is muted, its attenuator is set to maximum (–50 dB).

2.3 Monitor Area

The Monitor area is only useful when actual amplifiers are connected to the system. It can be ignored when configuring a *dataframe* while the *IQ System* is off-line or disconnected.

In:

The relative signal level of each amplifier input at the balanced gain stage is numerically displayed to the right of the "In" label. The indicator can report a range from 0 to –50 dB. *Note: A reading of 0 dB is approximately equal to +16 dBu.*

Out:

The relative signal level of each amplifier output is numerically displayed to the right of the "Out" label. The indicator can report a range from 0 to –50 dB. A reading of 0 dB is the maximum peak output level of the amplifier into an 8 ohm load. The level numbers displayed represent the dB level below the 0 dB reference.

Note: A 0 dBu input signal is required to drive the amplifier to full output when the amplifier's input sensitivity is set to 0.775 volts and the amplifier's level controls are set to maximum volume. A 0 dBu input signal will result in an input reading of approximately –16 dB by the software.

IMPORTANT: Each *IQ–P.I.P.* requires that specific scaling resistors be installed before the *P.I.P.* is installed into an amplifier. These resistors properly scale the output signals of the particular amplifier model for the correct 0 dB reference. If the wrong scaling resistors are used, the 0 dB reference will be wrong. Please consult the *IQ–P.I.P. Owner's Manual* for more details.

IOC:

The *IOC* status is displayed to the right of the *IOC* label. Crown's patented *IOC* circuit is an Input/Output Comparator which continuously monitors the audio signal path through the amplifier for any kind of distortion. It does this by comparing the shape of the input waveform to that of the output. Normally it displays "Ok" to show that distortion is less than 0.05%. If a difference of 0.05% or more is found, the *IOC* status changes from "Ok" to "IOC" to show that distortion is present. This is a powerful troubleshooting tool to locate the source of distortion.

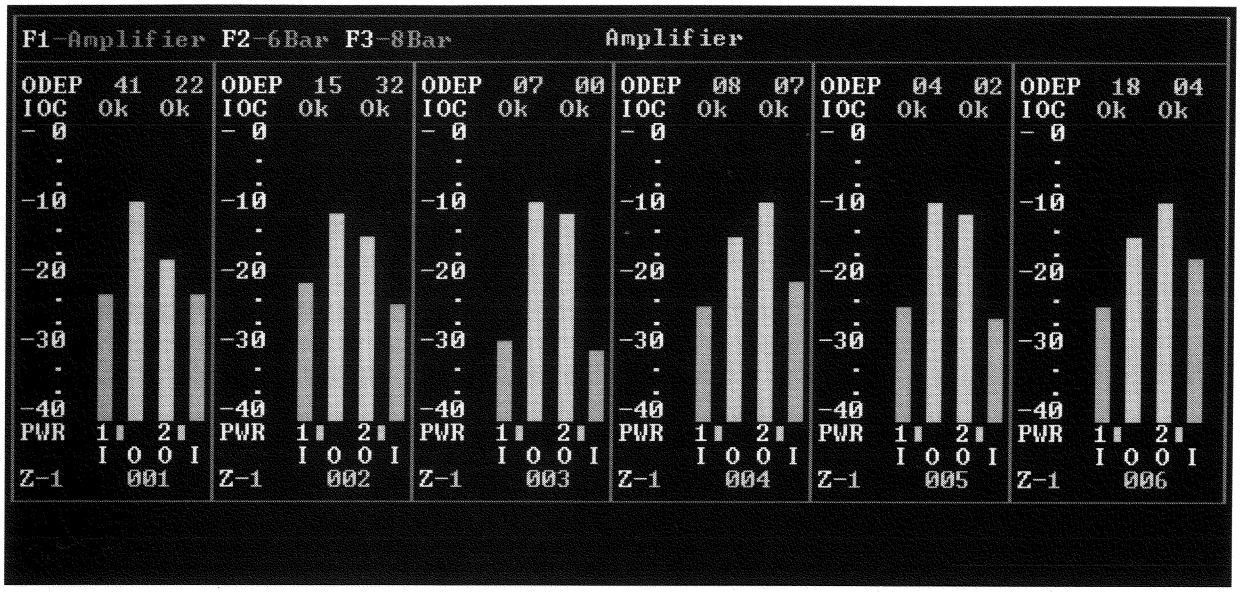
ODEP:

ODEP means Output Device Emulation Protection. The numbers to the right of the *ODEP* label display the status of the *ODEP* circuitry inside the amplifier. They display the percent of consumed thermal-dynamic energy in the amplifier at any instant. Subtract them from 100% to find the remaining thermal-dynamic energy reserve. When the *ODEP* values reach 100%, the amplifier has reached its maximum capacity for its operating environment and *ODEP* limiting will begin. This is explained more fully in the amplifier *Owner's Manuals*.

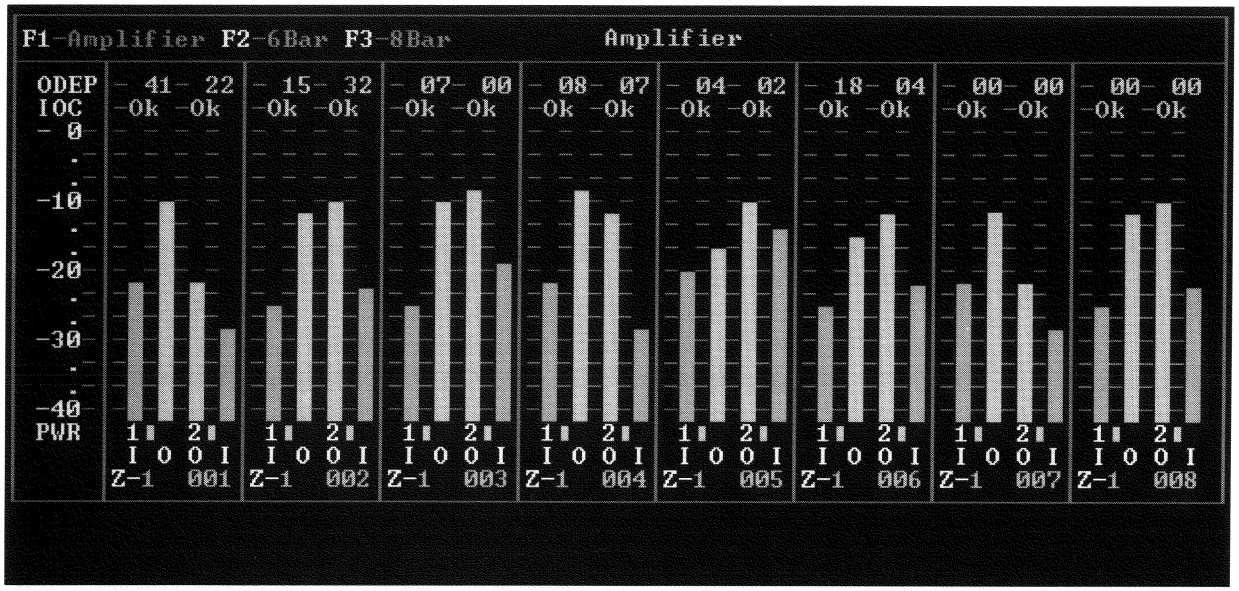
The *ODEP* status is a powerful diagnostic tool. Rising *ODEP* levels could indicate that the air filters on the front of an amplifier is beginning to clog. Or they could indicate that more cooling is required. A short on an amplifier output will also cause the *ODEP* levels to rise. The *ODEP* levels can also help you optimize the load on each amplifier—keep adding loudspeakers to the amplifier output until the *ODEP* levels rise too high.

3 Display Screens

There are two Display screens available for amplifiers. They both show the same information, *ODEP*, *IOC* and Power on/off status and bar graphs of the amplifier input and output levels. The first Display screen displays six amplifiers at one time on the screen. Press F2 to switch to this 6-Bar display.



The second Display screen squeezes eight amplifiers at a time onto the screen. Press F3 to switch to this 8-Bar display.



You can switch between the 6-Bar and 8-Bar Display screens at any time by pressing the F2 and F3.

If the Sel control is used in any of the amplifier control blocks, only amplifiers with Sel turned on will be available for display. If no Sel controls are turned on then all the amplifiers will be available in the Display screens. Use ← → to scroll from one amplifier to the next if there are too many to fit in a Display screen.

Amplifier/Zone I.D.
The Crown Bus zone number and IQ address of each amplifier is displayed at the bottom of each column.

Indicators:
The *ODEP* percentage and *IOC* status of each channel is displayed at the top of each column. They display the same information as in the control blocks.

The Power on/off status is displayed immediately below the bar graphs, near the bottom of each column. A small green light is present beside the channel number to indicate that the high voltage supply for that channel is on. There is no green indicator if the Power control for that channel is turned off.

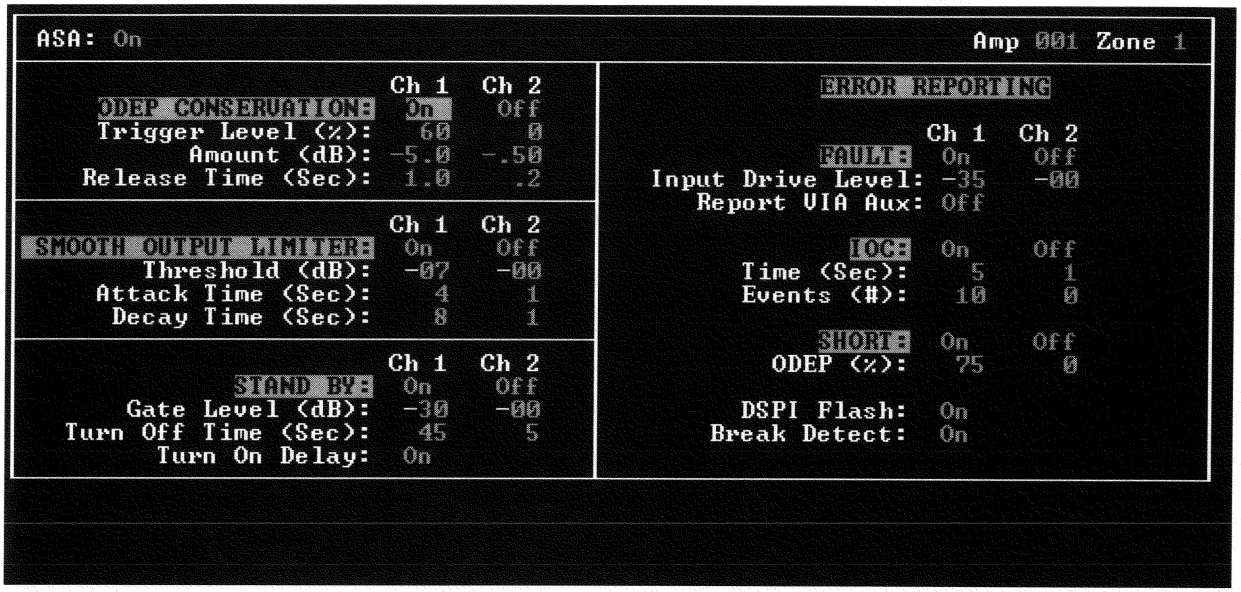
Signal Levels:
Each amplifier column displays both the input and output level of each channel. The output levels are located in the center and are labeled with the letter "O" at the bottom (beneath the channel number). The input levels flank either side of the output bars and are labeled with the letter "I" at the bottom (beneath the channel number).

The highest possible level for both the input and output bars is 0 dB. See the description of the control block Monitor area in Section 2.3 for an explanation of the 0 dB reference.

When you are ready to leave the Display screen, press either Esc or F1 and it will toggle back to the control block screen.

4 *Algo* Control (*Smart Amp IQ–P.I.P.* only)

The real power of the *Smart Amp IQ–P.I.P.* lies in its algo pack, the collection of self-running *algos* that control its behavior when the ASA control is turned on. The *algos* are configured from the sub-block screen or from a graphics plate. This operation guide describes only sub-blocks. See the *Graphics Plate Operation Guide* for further details. To switch to the sub-block screen, select the ASA control in the control block screen and press either [Enter↵] or [↓]. The amplifier sub-block screen is shown below:



4.1 *ODEP* Conservation *Algo*

ODEP means Output Device Emulation Protection. Sections 2.3 and 3 showed that the IQ software displays the actual *ODEP* percentage. This is the percent of consumed thermal-dynamic energy in the amplifier at any instant. Subtract the *ODEP* value from 100% to find the remaining thermal-dynamic energy reserve. When the *ODEP* value reaches 100%, the amplifier has reached its maximum capacity for its operating environment and *ODEP* limiting will begin. This is explained more fully in the amplifier *Owner's Manuals*.

The *ODEP* status is a powerful diagnostic tool. Rising *ODEP* levels could indicate that the air filters on the front of an amplifier is beginning to clog. Or they could indicate that more cooling is required. The *ODEP* level will also rise if too many loudspeakers are connected in parallel across the output of the amplifier or if there is a short across the amplifier output.

The *ODEP* Conservation *algo* is a very powerful tool. It enables the amplifier to automatically reduce its gain as the *ODEP* percentage rises. By gently reducing the gain before the thermal-dynamic reserve is exhausted, the amplifier can continue to operate under very severe conditions with very little (if any) noticeable change in sonic fidelity.

ODEP Conservation:

The *ODEP* Conservation *algo* is turned on and off with the *ODEP* Conservation control.

Trigger Level:
The Trigger Level control sets the point at which the *ODEP* Conservation *algo* begins to affect the gain. For example, setting the Trigger Level to 60% will cause the gain to be reduced by the amount specified by the Amount control when the *ODEP* level exceeds 60%.

Amount:
The *ODEP* Conservation *algo* reduces the gain by adding input attenuation. The Amount control determines how much attenuation (in dB) to add for every 1% that the *ODEP* level rises above the Trigger Level. For example, if the Amount is set to 0.5 dB then 0.5 dB of attenuation will be added if the *ODEP* level rises 1% above the Trigger Level. 5 dB of attenuation would be added if the *ODEP* level were to rise 10% above the Trigger Level.

Release Time:
The *ODEP* Conservation *algo* responds almost instantly when *ODEP* levels are rising above the Trigger Level but this is not the case when the levels are falling. The response to falling levels is controlled by the Release Time control. The Release Time control sets the length of time (in seconds) that the *ODEP* Conservation *algo* delays before beginning to restore the gain.

The following list shows the possible settings for each *ODEP* Conservation *algo* control.

***ODEP* Conservation:** On/Off

Trigger Level: 0% to 100% in 1% steps

Amount: –.25, –.5, –1.0, –2.0, –3.0, –4.0, –5.0 dB

Release Time: 0.2, 0.4, 0.6, 0.8, 1, 1.5, 2, 3, 4, 6, 8, 10, 12, 15, 20, 30 seconds

4.2 Smooth Output Limiter *Algo*

The Smooth Output Limiter *algo* slowly reduces the gain of the amplifier to keep the average of the peak output level below a predetermined output level. Unlike normal comp/limiters (compressor/limiters), it does not compress the audio signal or reduce its dynamic range.

Smooth Output Limiter:
The Smooth Output Limiter *algo* is turned on and off with the Smooth Output Limiter control.

Threshold:
The Threshold control sets the point at which the Smooth Output Limiter *algo* begins to affect the gain. The Threshold is the output level (in dB) above which the *algo* will reduce the gain by adding input attenuation. 0 dB equals the full rated output for the amplifier when driving an 8 ohm load. For example, setting the Threshold to –7 dB will result in the *algo* reducing the gain whenever the output level rises above –7 dB.

Attack Time:
The Attack Time control sets how quickly the Smooth Output Limiter *algo* will respond when the output level rises above the Threshold. It is designed to respond slowly (1 to 30 seconds) so it is not noticed.

Decay Time:
The Decay Time control sets how quickly the Smooth Output Limiter *algo* will respond when the output level drops below the Threshold. It is designed to respond slowly (1 to 30 seconds) so it is not noticed.

The following list shows the possible settings for each Smooth Output Limiter *algo* control.

Smooth Output Limiter: On/Off

Threshold: 0 dB to –50 dB in 1 dB steps

Attack Time: 1 second to 30 seconds in 1 second steps

Decay Time: 1 second to 30 seconds in 1 second steps

4.3 Stand By *Algo*

The Stand By *algo* is very valuable. Using it, many *IQ Systems* can pay for themselves in just a few years due to reduced energy costs. The Stand By *algo* conserves energy by temporarily turning off the high-voltage supplies of the amplifier when no audio signal is detected at the input for a predetermined length of time. It provides the biggest savings in audio systems that do not have a continuous input signal, such as a factory paging system.

Stand By:
The Stand By *algo* is turned on and off with the Stand By control.

Gate Level:
The Gate Level control sets the point at which the Stand By *algo* turns on the amplifier high-voltage supplies. The Gate Level is an input level. For example, setting the Gate Level to –30 dB will cause the high-voltage supplies to be turned off when the input level falls below –30 dB.

Turn Off Time:
The Turn Off Time control prevents the high-voltage supplies from being cycled unnecessarily. The Turn Off Time is the length of time in seconds that the Stand By *algo* will wait before turning off the high-voltage supplies when the input level has dropped below the Gate Level.

Turn On Delay:
One of the standard features of all *IQ–P.I.P.s* is a turn on delay whose duration is determined by each IQ address. The higher the IQ address, the longer the delay before the high-voltage supplies are turned on. The purpose of this turn on delay is to prevent a large number of amplifiers from turning on at the same instant and risk tripping the AC mains breakers.

However, this feature may not be desirable when using the Stand By *algo* because the high-voltage supplies need to turn on instantly when an input signal above the Gate Level is detected. The Turn On Delay control gives you control over this feature. Turn on the Turn On Delay control to disable the delay. *Note: The Turn On Delay control affects both channels.*

Tip: Experiment with the delay enabled and disabled. If you only have a few amplifiers and they each have a relatively low IQ address, the turn on delay may be short enough to cause no problem.

The following list shows the possible settings for each Stand By *algo* control.

Stand By: On/Off

Gate Level: 0 dB to –30 dB in 1 dB steps

Turn Off Time: 5 seconds to 60 seconds in 1 second steps

Turn On Delay: On/Off

4.4 Error Reporting *Algo*

One of the advanced features of the *Smart Amp IQ–P.I.P.* is its ability to alert you if something is amiss. If desired, a visual warning in the form of a pop-up message box will appear for any of the conditions described in this section.

4.4.1 Fault Reporting

An amplifier "fault" condition occurs when a channel fails. The symptoms are the presence of a normal input signal, an *IOC* condition that is "locked" on and the amplifier channel is forced into standby mode.

Input Drive Level:

It may be normal for an *IOC* error to persist if the audio input level is high. Monitoring the input signal level can help determine whether a fault condition really exists or whether the amplifier output is distorted simply because of an excessive input level.

The Input Drive Level control allows you to set the threshold below which a fault condition is presumed to exist. For example, set the Input Drive Level to –35 dB if you do not want a "fault" error message to be displayed while the input signal is greater than –35 dB even though an *IOC* error persists.

Report Via AUX (firmware v1.40 or later):

In addition to displaying a warning message when a "fault" condition occurs, the Error Reporting *algo* can also turn on the AUX port. The AUX port can be used to drive a relay that will provide another type of warning, switch in another amplifier or it can be connected to a drone input to cause IQ-controlled signal rerouting. To cause the AUX port to turn on when a "fault" condition exists, turn on the Report Via AUX control. *Note: The Report Via AUX control affects both channels.*

IMPORTANT: The AUX port will cease to function normally whenever "Report Via AUX" is turned on. This is true even when ASA is turned off. When "Report Via AUX" is turned on, it takes over control of the AUX port and does not allow anything else to control it.

4.4.2 *IOC* Reporting

Crown's patented *IOC* circuit is an Input/Output Comparator which continuously monitors the audio signal path through the amplifier for any kind of distortion. It does this by comparing the shape of the input waveform to that of the output. If a difference of only 0.05% or more is found, an *IOC* "error" signal is generated. This signal is monitored by the Error *(IOC)* Reporting *algo*.

Time:

The Time control sets the length of time (in seconds) used to determine if enough *IOC* "errors" have occurred to warrant displaying a warning message.

Events:
The Events control sets the number of *IOC* "errors" that must occur within the time specified by the Time control for a warning message to be displayed.

4.4.3 Short Reporting

A "shorted" amplifier output can quickly cause the amplifier to generate heat and activate its protection circuitry such as *ODEP*. Because amplifier loads vary considerably, the best way to monitor a Crown amplifier for a short is to monitor the *ODEP* level and compare it to a predetermined "normal" level. Only Crown amplifiers can offer this level of sophistication in error monitoring.

ODEP:
Use the *ODEP* control to set the level above which a "short" will be assumed to exist. For example, set *ODEP* to 75% if you want the "shorted" output message to be displayed whenever the *ODEP* level rises above 75%.

4.4.4 DSPI Flash Reporting

Use the DSPI Flash control to disable or enable the flashing of the Data Signal Presence Indicator whenever a command is sent to the *IQ–P.I.P.*

4.4.5 Break Detect Reporting

One of the advantages of the *Smart Amp algos* is their ability to allow an *IQ–P.I.P.* to function outside of an *IQ System*. When this is done, break detection is not desired because the *Smart Amp IQ–P.I.P.* is not connected to a Crown Bus loop. With no Crown Bus connected, the microprocessor in the *Smart Amp IQ–P.I.P.* will waste time continuously reporting a communication break. To remedy this situation, always turn off "Break Detect" reporting when the unit is used as a stand-alone device. The Break Detect control should be turned on when the unit is connected to a Crown Bus loop.

The following list shows the possible settings for each Error Reporting *algo* control.

Fault: On/Off

Input Drive Level: 0 dB to –50 dB in 1 dB steps

Report Via AUX: On/Off (see important note below)

IOC: On/Off

Time: 0 seconds to 10 seconds in 1 second steps

Events: 0 to 250 in steps of 1

Short: On/Off

ODEP: 0% to 100% in 1% steps

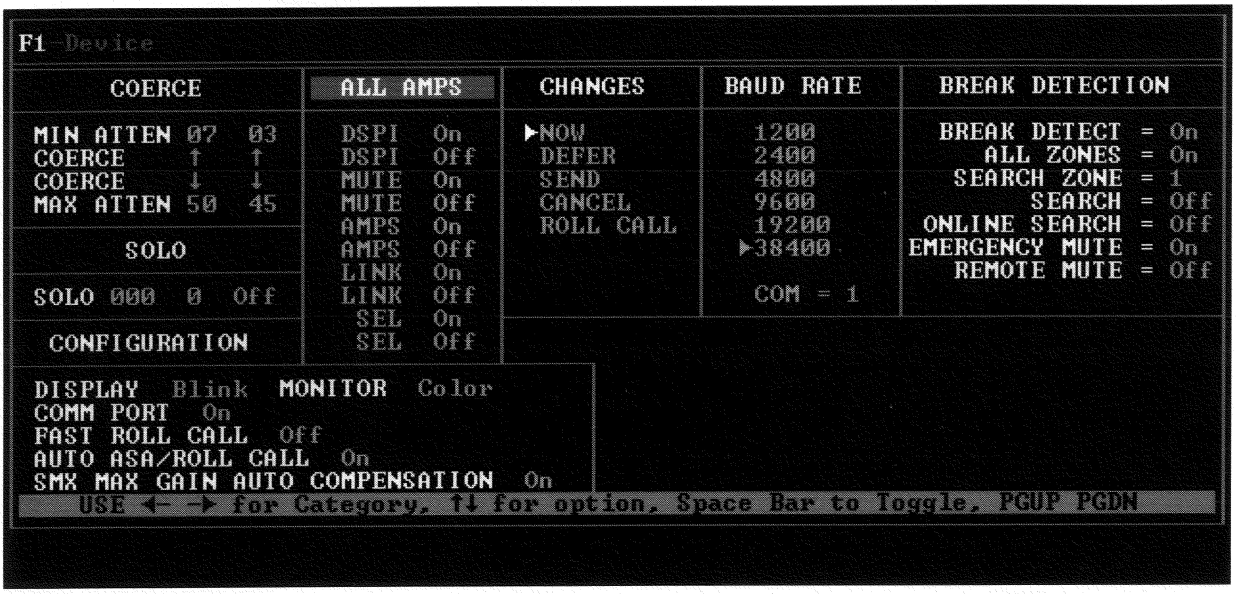
DSPI Flash: On/Off

Break Detect: On/Off

IMPORTANT (firmware v1.41 only): The AUX port will cease to function normally whenever "Report Via AUX" is turned on. This is true even when ASA is turned off. When "Report Via AUX" is turned on, it takes over control of the AUX port and does not allow anything else to control it.

5 Global All Amp Controls

The master Control screen provides controls which affect all amplifiers in the system, whether or not they are selected. To switch the IQ program to the Control screen, press F10.



The master Control screen is navigated much like the control block and sub-block screens. An instruction bar near the bottom of the screen lists the keys which are used. Each feature of the master Control screen is described next. They are grouped according to the type of function they perform.

The audio controls are listed below:

Coerce:
The coerce function is used to force all amplifier attenuation settings to be equal to either the highest or lowest setting. Each channel is coerced separately. Suppose for example, there are three amplifiers in your *IQ System*. Channel 1 of the first amplifier is set to an attenuation of 10 dB, Channel 1 of the second amplifier is set to 15 dB and Channel 1 of the third amplifier is set to 20 dB. Select the left up arrow symbol under the "Coerce" heading in the left column and press Spacebar to force the Channel 1 attenuation of all three amplifiers to have the minimum attenuation of 10 dB. Or, select the left down arrow symbol and press Spacebar to force the Channel 1 attenuation of all three amplifiers to the maximum attenuation of 20 dB. Use the right up and down arrows for Channel 2.

Note: Channel 1 and 2 are normally controlled separately unless they are locked in the control block. In this case, coercing the attenuation of one channel forces the other channel to the same value.

Solo:
The Solo feature mutes both channels of all amplifiers except the one selected. To solo an amplifier, select the **SOLO** control under the "Solo" heading in the left column of the master Control screen and enter the IQ address and zone numbers. Then select "Off" and press Spacebar to toggle Solo on and off. ***Tip:*** While in Solo

mode, you can step through the available amplifiers using [+] [-]. (This feature is not available in the control block screen.)

All Amps:
Several controls are provided under the "All Amps" heading which affect all amplifiers at the same time. The **DSPI** (Data Signal Presence Indicator) of all amplifiers can be forced on or off to aid system troubleshooting. (Any amplifier with its DSPI turned off while all others are turned on is not responding to the system and may indicate a break in communication.) All amplifiers can be muted with the **MUTE** control. The high voltage supplies of all amplifiers can be turned on and off with the **AMPS** control. All amplifiers can be linked together with the **LINK** control so that changes to one amplifier are echoed to all the other amplifiers. And all amplifiers can be selected at the same time with the **SEL** control. (This is a convenient way to select all amplifiers so they will each have a graphic display module when a new graphics plate is created.)

Note: The All Amps DSPI, MUTE and AMPS controls are deactivated when you return to the control block screen. But the LINK control will continue to function to allow the control block functions to be executed with all amplifiers linked.

Changes:
The execution of changes made with the controls under the "All Amps" column are controlled with the Now, Defer, Send and Cancel controls. Select **NOW** to cause changes made with the All Amps controls to be executed immediately when they are made. Select **DEFER** to defer the execution of changes until they are manually sent with the **SEND** control. Select **CANCEL** to cancel any active changes which were made to the All Amps controls before they are sent.