IQ-MSD Turbo

USER MANUAL

Advanced IQ Software for IQ System Control and Monitoring with an MS-DOS PC Host Computer

Version 1.4

Printed on recycled paper.

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1 Introducing *IQ–MSD Turbo*

Welcome to the Crown *IQ–MSD Turbo* program—software that brings the powerful monitor and control capabilities of your IQ audio system to your PC-compatible computer. This manual will describe the use of version 1.4 of *IQ–MSD Turbo*, referred from here on simply as *Turbo*.

With *Turbo* you can monitor and control your audio system from a remote location. It works with Crown's acclaimed IQ components, sophisticated audio components that are designed to work with Crown's patented *IQ System®*. But *Turbo* does much more than just monitor or control an *IQ System*. It also allows you to design, save and reuse custom screens. We call these screens graphics plates (shown below) and they give you amazing power over the operation of your *IQ System*.

A *Turbo* graphics plate gives you the ability to control what others can and cannot see or do with your *IQ System*. And you can make them visually exciting and easy to use because you control the layout, size and color of each object on the graphics plate.

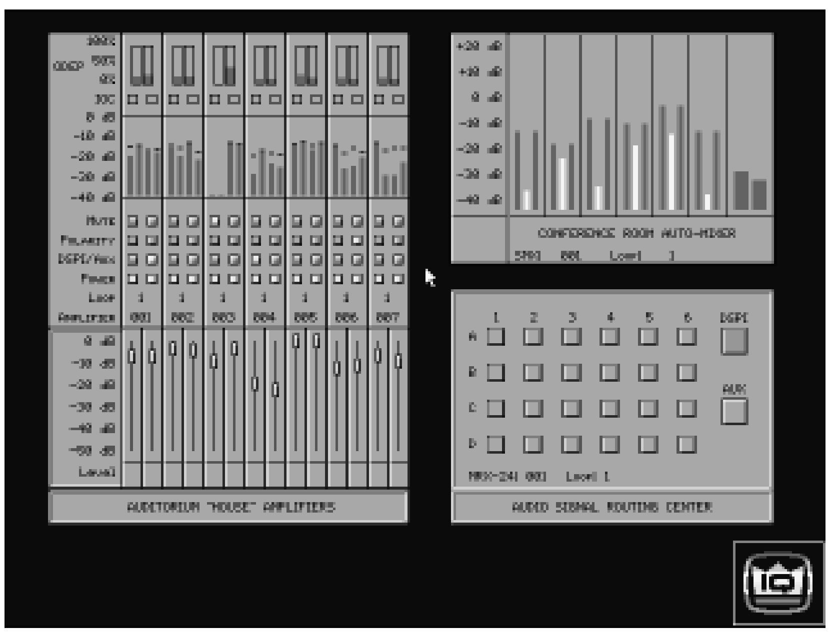

Fig. 1.1 A Sample Turbo Graphics Plate Showing Custom Objects for Seven Amplifiers, One SMX-6 Mixer and One MRX-24 Matrixer

1.1 System Requirements

- A 33 MHz Intel® 80486 PC-compatible computer (recommended: 75 MHz Pentium).
- DOS 5.0 or higher with HIMEM.SYS and EMM386.EXE loaded.
- At least 8 megabytes (MB) of random-access memory (RAM) with at least 512 kilobytes (KB) of free conventional memory and no less than 3072 KB of free extended memory.
- A hard disk with at least 5 MB of free space.
- A VGA 16-color display adapter or better.
- A mouse or other compatible pointing device (a three-button mouse and appropriate DOS driver is recommended).
- A 3½-inch floppy disk drive.
- An RS232 (COM) port that uses a 16550-compatible UART.
- An optional printer (if desired) for producing lists of system settings.

1.2 About this Manual

This User Manual is written for the *IQ System* Administrator—the individual responsible for installing and configuring the system and its software. It explains the features of *Turbo* but it does not tell you how to use them. Because the details of specific audio systems vary widely, this manual does not attempt to be an operation manual for your system. It is assumed that the *IQ System* Administrator (or whatever title you choose to use) will provide proper training to the operators in the specifics of the audio system and this software. Crown offers an **IQ School** to assist with the training and certification of *IQ System* designers, installers and administrators. Please contact us if you would like more information about our IQ training program.

Before installing *Turbo*, we recommend that you read the installation instructions. Experienced users can then skip to relevant sections later in the manual to learn about specific software features for various IQ components. The Using *Turbo* Section is intended for first-time *Turbo* users who would like an overview of the program before delving into the details.

In order to limit the scope of this manual, a few assumptions are made on the part of the user. First, the user is assumed to be knowledgeable in the use of personal computers and is familiar with principles of audio and *IQ Systems*. Second, the user is assumed to understand the requirements for his/her audio application and is able to determine the system settings to achieve the desired results.

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The typographical conventions used in this manual are listed below:

Style	Meaning
Bold	Indicates important passages which should be read. It also indicates an important keyword or keyphrase.
Bold Italics	Indicates a helpful tip.
Italics	Indicates a note. It is also used to emphasize a word or tradename.
`Typewriter`	Indicates something that should be typed exactly as shown.
1 0 ↑ ↓	(Text or symbols inside a box with rounded corners) Indicates one or more specific keys on the keyboard.
F1 F2 F3	Indicates function keys.
ALT+↑	Indicates that the first key should be depressed first and held down while the second key is pressed.
	Indicates a mouse action.

1.3 Technical Support

This software is backed by Crown's technical support system. If you need assistance that this manual does not provide, proceed as follows:

- If a problem occurs, attempt to duplicate it keystroke by keystroke in an effort to identify the point at which it occurs.
- Take note of the software version number and date. This information is displayed on the start up screen.
- Take note of the date and version number of the manual. This information is at the lower right corner of the inside title page.
- Have the details of your computer's configuration available (a printout of the AUTOEXEC.BAT and CONFIG.SYS files may be useful) and have the computer running *Turbo* when you call.

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219-294-8100 (International)

Internet: http://www.crownintl.com

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1.4 Installation

Turbo is a DOS-based program. Therefore, while *Turbo* can run under other operating systems (refer to Appendix A for information on additional operating systems such as Microsoft® Windows®), the most straightforward installation and operation is under DOS. This manual assumes that the software is being run under DOS 5.0 or 6.xx.

DOS 5.0 and 6.xx use HIMEM.SYS and EMM386.EXE to manage computer memory. So, both of these files must be in memory for *Turbo* to run correctly.

Before opening the diskette envelope and installing the program, please read the Software License printed on the envelope. By opening the envelope, you agree to all of the terms of the Software License. In summary, Crown grants a limited license to use *Turbo* on only one computer at a time. Please contact Crown if you need to simultaneously run *Turbo* on more than one computer or on a network.

1 It is considered good practice to install software from a working copy. Therefore, make a copy of each of the disks and use the working copy (backup) for the installation. Store the originals and backup in separate locations away from magnetic fields and temperature and humidity extremes.

2 *Turbo* is NOT compatible with some third party memory management software—especially if that software has DPMI services. As a result, if you are using a third party memory manager with DPMI, disable it and enable HIMEM.SYS and EMM386.EXE. Since memory managers are usually loaded by CONFIG.SYS as part of the boot routine, it will probably be necessary to modify CONFIG.SYS to accomplish this. Refer to the Appendix A for more information.

3 Boot up your computer. Many systems are set up to automatically load and execute Microsoft Windows. If this is the case with your computer, exit Windows and return to the DOS prompt. Insert *Turbo* disk 1 into your floppy drive, and switch to that drive by typing **`a:`** ENTER or **`b:`** ENTER as appropriate, depending on the floppy drive's designation in your computer.

4 After the computer displays the DOS prompt from Step 3, type **`install`** ENTER.

5 After a brief delay, you should be prompted for the name of the directory where you want *Turbo* to be installed. Press ENTER to accept the default directory (turbo) or enter the name of the directory you wish to use. The installation program creates the directory if it does not already exist. *Note: Some files may be overwritten if Turbo is installed into the same directory as an older version.*

All files are then created and copied into the directory. These files are:

TURBO14.EXE	The *Turbo* program.
TURBO13.GXL	A library file consisting of fonts, graphic images, and other associated material.
RTM.EXE	A memory manager required by *Turbo's* protected mode.
DPMI16BI.OVL	A DPMI server required for the protected mode.

TURBO14.PIF	A sample PIF file for running *Turbo* under Microsoft Windows (refer to the Appendix).
TURBO14.ICO	An icon file that can be used with Microsoft Windows.
###.OIF	Several object information files (ending with the extension OIF) are provided for various IQ2 compatible components.
###.GDM	Several graphic display module files (ending with the extension GDM) are provided for various IQ2 compatible components.
###.PCX	Several bitmap files (ending with the extension PCX) are provided to support the graphic display modules of various IQ2 compatible components.

1.5 For Experienced Users

If you are already an experienced *Turbo* user, you may be eager to begin using *Turbo* without reading further. Feel free to do so and refer to the manual as needed. To run the program, type **`turbo14`** on the DOS command line after it has been installed.

One important change to note is that [S] (the S key) is no longer used to enter a negative number— negative numbers are now indicated by preceeding the number with the minus key.

1.6 What's New in Version 1.4

- Support for new *IQ2* components like the *SLM-8* system and load monitor and new IQ *P.I.P.s* like the *IQ–P.I.P.–MEM*, *IQ–P.I.P.–SMT* and *IQ–P.I.P.–DSP*.
- New DSP Sub-block screen for IQ *P.I.P.s* with digital signal processing capability.
- A new input compressor function has been added to all *IQ2 P.I.P.s* with *SmartAmp* automation features.
- Improvements to the user interface add consistency. For example, you can use the minus key to enter a negative number into a level control.
- New graphics plate objects like the Plotter, Curve and String objects.
- Enhanced error reporting.
- Support for the PSI (Pocket Serial Interface), a new and portable IQ interface.
- Support for "System AUX", the ability for an IQ AUX port on any IQ component to trigger changes in the *IQ System* by loading the system settings in a predetermined *dataframe* file.
- The ability to automically detect the baud rate of the IQ interface.

2 Using *Turbo*

The most effective way to learn *Turbo* is to begin using it to monitor and control an active sound system. This way you can immediately observe the effects of your commands on the system. When doing this, always use caution to avoid increasing the gain too far because hearing and loudspeaker damage can result.

Turbo can also be run when the computer is not connected to an *IQ System*. This allows you to create custom graphics plates and configure system settings prior to the system's installation and permits you or your operators to become familiar with the software.

2.1 Basic Concepts

Turbo provides two methods of monitoring and controlling an *IQ System:* 1) using standard text screens or 2) using custom graphics plates that you create. Each has unique advantages. After you have used *Turbo* to configure the *IQ System*, you can then save all the system's settings and all the graphics plates to a *dataframe*® file on the computer's hard drive or a floppy disk. If your audio system is like most, you will probably need more than one configuration, one for each type of event it will serve. By saving each of these configurations to a *dataframe* file, you can create a collection of *dataframe* files that enable you to quickly reconfigure your *IQ System*. Simply "engage" the appropriate *dataframe* file whenever you want to reuse the configuration stored within it.

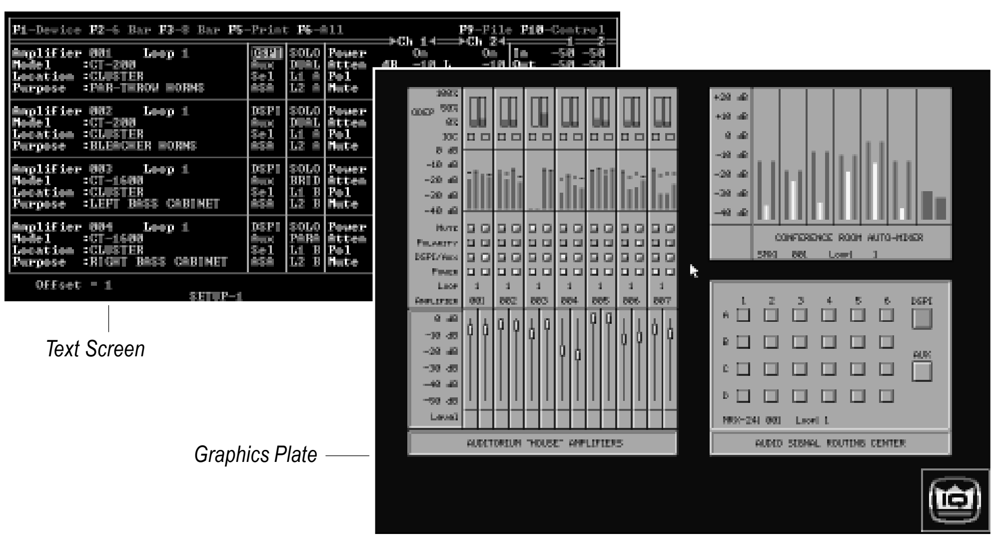

Fig. 2.1 Sample Text Screen and Graphics Plate

2.1.1 Text Screens

Several different types of text screens are available including Control Panel screens, Control Block screens, Display screens and Sub-block screens. The **Control Panel** screens contain general controls that pertain to the overall operation of *Turbo* such as serial port and baud rate settings. The main Control Panel screen is shown below in Figure 2.2 and is described in detail in Section 2.4 later in this manual.

Fig. 2.2 The Main Control Panel Screen

The remaining text screens are related to specific IQ components. They are described in detail in the Sections devoted to specific IQ components later in this manual. The **Control Block** screen is the most common text screen in *Turbo*. It is the first interactive screen you see when you first run *Turbo*. Control Block screens contain individual control blocks. Each IQ component has a single control block and most Control Block screens display four control blocks at a time as is shown below in the amplifier Control Block screen in Figure 2.3:

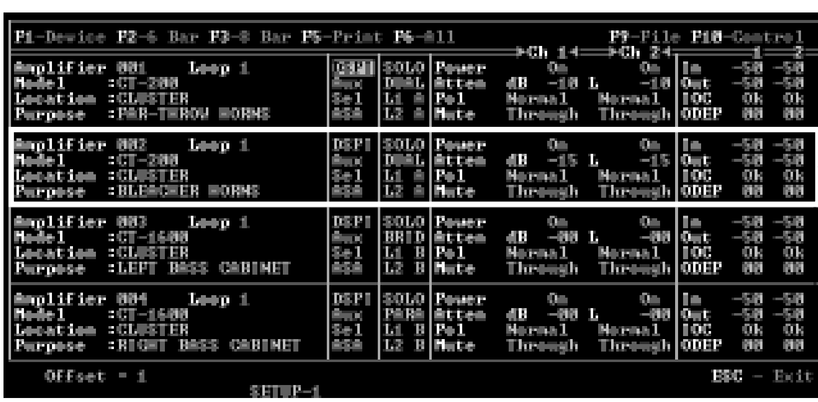

Fig. 2.3 An Amplifier Control Block Screen

Some IQ components also have one or more **Display** screens. A prominent feature of Display screens is their bar graph displays of signal levels. Amplifiers have two Display screens, a 6-bar and 8-bar Display screen. The amplifier Display screens show both the input and output audio signal levels for each input channel of the IQ *P.I.P. Note: Only Crown P.I.P.-compatible amplifiers with an IQ P.I.P. can be controlled or monitored by the IQ System.* A 6-bar amplifier Display screen is shown below in Figure 2.4:

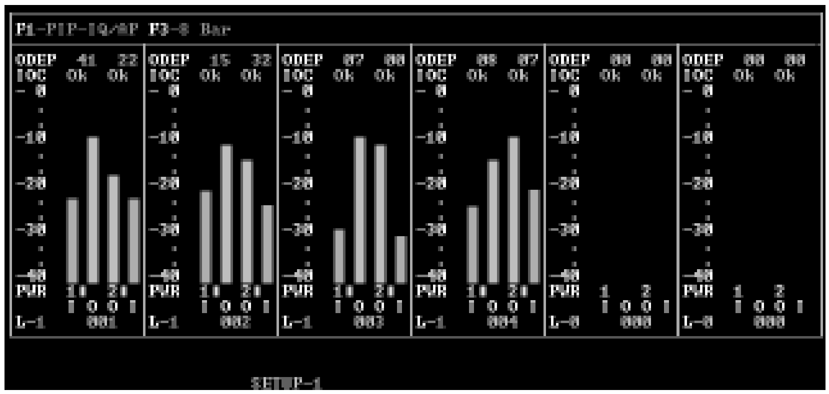

Fig. 2.4 A 6-Bar Amplifier Display Screen

Finally, some of the more advanced IQ components also have one or more **Sub-block** screens. Sub-block screens contain a collection of controls that are used to configure automatic functions like signal compression or limiting, auto standby, automatic mic mixing, etc. An amplifier Sub-block screen is shown below in Figure 2.5. Only amplifiers with IQ *P.I.P.s* having *SmartAmp*™ features have a Sub-block screen.

Fig. 2.5 An Amplifier Sub-block Screen

The biggest advantage of text screens is the ability to quickly set the parameters of many IQ components without the need for custom-designed controls.

2.1.2 Graphics Plates

A graphics plate is a graphic screen in which custom objects can be designed and stored to create attractive operator screens for your *IQ System*. It may sound scary but it is actually very easy to create a graphics plate and it gives you tremendous power over your system because you decide what controls are available and in many cases what operating range the controls have. In addition, you can cause *Turbo* to display a graphics plate rather than a text screen when the program starts up, making the program that much friendlier for your operators. A sample graphics plate which was made from a combination of preconfigured graphic display modules (GDMs) and custom objects is shown in Figure 2.6 below:

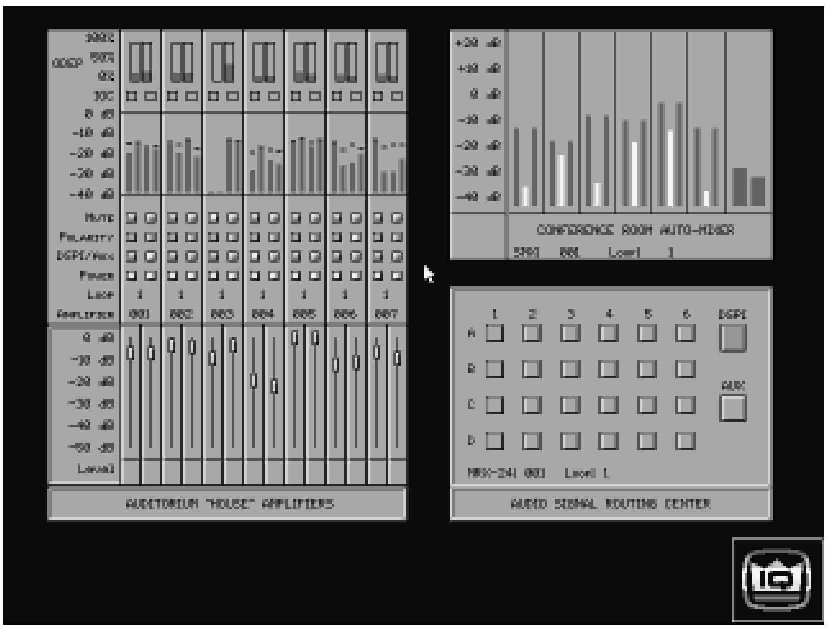

Fig. 2.6 A Sample Graphics Plate

The primary purpose of graphics plates is to provide operators with an attractive graphical interface that makes the system easy to use and control. Well designed graphics plates can be very intuitive, keeping operator training time to a minimum. You can create as many graphics plates as your computer's memory and storage space allow. And you can create buttons on them that allow the operator to jump from one graphics plate to another. You can even create graphics plates with instructions to serve as "help" screens for new operators.

The graphics plate in Figure 2.6 was created on a PC that provided only standard VGA graphics. This means that the graphics plate has a resolution of 640×480 pixels. However, if your computer has a compatible SVGA or XVGA graphics adapter, you can set *Turbo* to use a higher resolution such as 800×600 (SVGA), 1024×768 (XVGA) or even 1280×1024 pixels. This will give you much more room to create elaborate graphics plates with many controls. Section 3 later in this manual will describe graphics plates in much greater detail.

2.1.3 Perspective

Figure 2.7 might help put some of the text screens and the graphics plates in perspective. It shows the relationship between control blocks, sub-blocks and graphics plates.

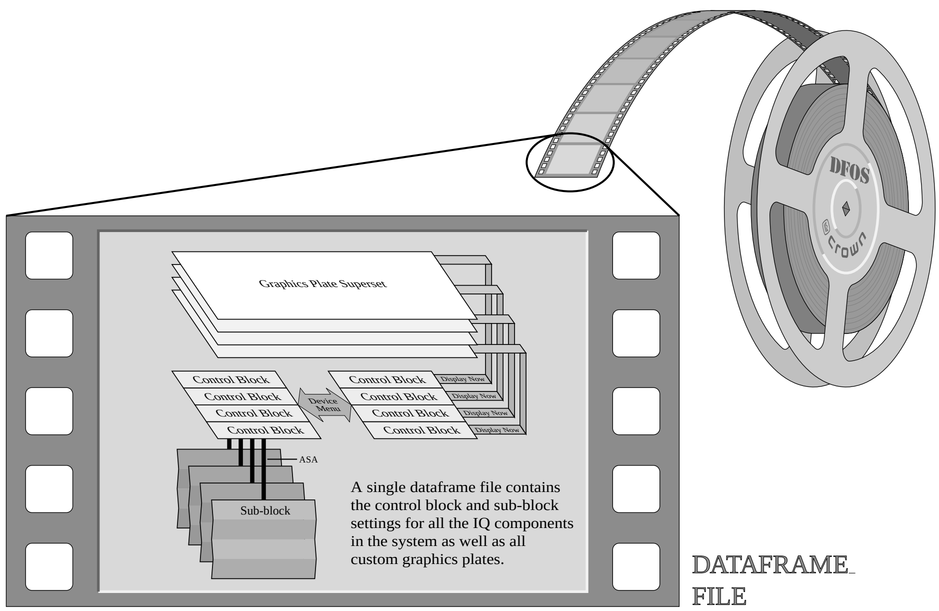

Fig. 2.7 Putting Text Screens and Graphics Plates into Perspective

Notice that the control blocks, located in the center of the frame, form the bedrock of the software. Below them are the sub-blocks which expand to cover the automation functions of those IQ components that have them. The *IQ System* can be configured entirely from the control block and sub-block text screens. At the top of the frame are the graphics plates which serve as a user interface layer. Because you can determine which controls are available on each graphics plate, you can shield operators from the complexity of the system.

When you save an *IQ System* setup to disk with the *Turbo* software, you create a *dataframe* file. A single *dataframe* file will store all the system settings and all the graphics plates you created for that setup. Figure 2.7 depicts *dataframe* files as frames in a movie film. You “engage” dataframes to change the configuration of your audio system much the same way that frames of a movie change the action in the film.

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2.2 Starting the Program

Before running *Turbo*, first get a DOS prompt on your computer and then switch to the hard drive and directory where *Turbo* is stored. For example, if *Turbo* is stored in the "turbo" directory, use the change directory (cd) command as follows: **`cd \turbo`**.

To start *Turbo*, type: **`turbo14`**. After a brief delay, the computer should display the title screen shown below in Figure 2.8.

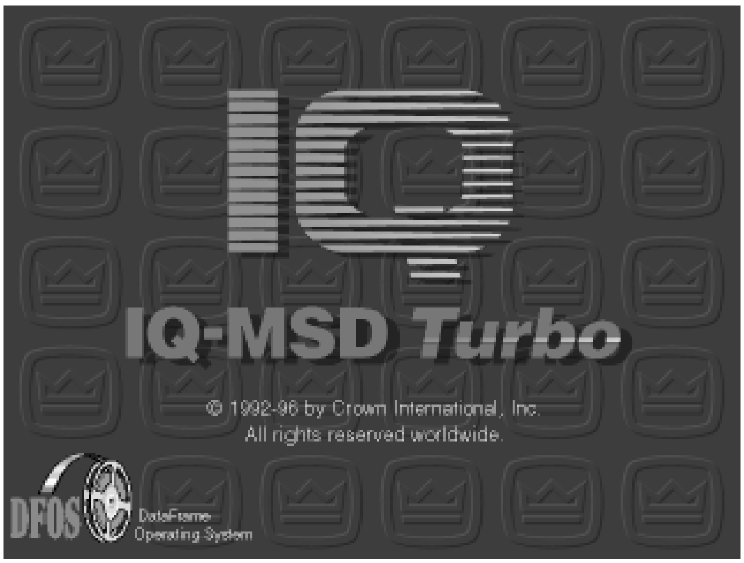

Fig. 2.8 The Turbo Title Screen

Note: Turbo may not be compatible with some terminate-and-stay-resident (TSR) programs, such as screen savers and antivirus software. We recommend that all TSRs are disabled before running Turbo.

2.2.1 Optional Command Line Parameters

Four optional command line parameters (or switches) are available to control the way *Turbo* initializes. For example, **`c:\turbo14 /d`** causes *Turbo* to omit displaying the title screen when it loads. The command line parameters are listed next:

/d	Causes *Turbo* to omit its title screen when it loads.
/f *file name*	Instructs *Turbo* to load and engage the specified *dataframe* file. For example, type **`turbo /fnormal.diq`** to run *Turbo* and engage the *dataframe* whose file name is "normal." It is not necessary to type the DIQ extension. Do NOT type a space between the "/f" and the *file name*.
/s	Directs *Turbo* to create a DPMI swap file when it loads. This swap file can enable *Turbo* to run when the computer does not have much memory. Use this switch only when low memory causes *Turbo* to run erratically.

/v	Causes *Turbo* to use a default VESA-compatible graphics driver. *Turbo* is usually able to identify the computer's graphics controller and use it for optimum graphics performance. Use this switch only if *Turbo* is unable to identify or use the graphics controller in your computer.

2.3 Establishing Communication

After the title screen has been displayed for a few seconds, it fades and the computer automatically attempts to establish communication with an IQ interface and, if an interface was found, initiate a roll call. Figures 2.9 and 2.10 show the messages that may result if *Turbo* has trouble finding or communicating with an IQ interface:

Fig. 2.9 No Interface Found Message

Fig. 2.10 Looking for Interface Message

In Figure 2.9, *Turbo* was unable to detect a CTS (Clear To Send) signal from the IQ interface. It then assumes that no interface is present or that the interface is not properly connected. In Figure 2.10, *Turbo* thinks it found an IQ interface and tries to communicate but cannot.

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It then assumes that the baud rate is not set properly and it tries to automatically detect the baud rate of the interface and configure the host computer with the same baud rate. It assumes that the interface is turned off or improperly connected if it fails to determine the baud rate.

Once communication has been established with the IQ interface, *Turbo* begins a roll call. During a roll call, *Turbo* conducts a poll to identify the Crown Bus loops present and to establish communication with all IQ components. As the roll call progresses, the screen displays the loops and devices responding to the poll.

During the roll call, *Turbo* also determines the settings of all IQ components and stores them into memory. It then enters the settings into the appropriate control blocks and, when appropriate, sub-blocks. The screen in Figure 2.11 shows the typical results of a successful roll call. Notice that the screen indicates the type of interface that was found—in this example, an IQ Interface 2. The lower section of the screen includes a tally of the number and type of devices that responded to the roll call.

Fig. 2.11 A Typical Roll Call

A roll call can be stopped at any time by pressing Q or ESC. Pressing the “Space Bar” will force the roll call to advance to the next loop.

There are several parameters (system controls) that control both communication with the IQ interface and the way a roll call works. These parameters are located on the Control Panel screen (discussed next).

2.4 Setting *Turbo's* System Parameters

The general system controls of *Turbo* are located on the Control Panel screen shown in Figure 2.12. It is often necessary to make changes to these settings the first time you run *Turbo* because the default settings may not be correct for your system's host computer. From a Control Block screen, press F10 to go to the Control Panel screen.

Fig. 2.12 Control Panel Screen

Use TAB or SHIFT+TAB to move the focus from one control to the next. (TAB advances to the next control and SHIFT+TAB returns to the previous control.) Use the "Space Bar" to change an on/off control such as the Port Active control or activate a button control like the Roll Call button. Use ← → to change the selection of an either/or control like the Display control. Many of these controls can also be set with a mouse ( ).

Serial Port: Sets the serial or com port that *Turbo* will use to communicate with an IQ interface. This is usually serial port 2 because most computers have a serial mouse connected to serial port 1. Changing the serial port number will automatically cause a new base address and interrupt to be selected.

Base Address: Sets the base address in memory where *Turbo* must access the serial port. Normally you can accept the default. If necessary, a different base address can be entered.

Interrupt: Sets the system interrupt used by the serial port. Normally you can accept the default. If necessary, a different interrupt number can be entered.

Baud Rate: Sets the first speed that *Turbo* will attempt to use to communicate with the IQ interface. However, *Turbo* has an "auto baud detect" feature and will automatically change the baud rate of the host computer if it fails to communicate with the IQ interface at the baud rate you selected. In this way, the baud rate control also serves as a baud rate indicator, showing the baud rate currently being used.

The baud rate of the host computer must match the baud rate of the IQ interface. Although some IQ interfaces can support speeds as high as 38400 baud, some serial cables and some host computers cannot go this fast. The device with the lowest maximum baud rate will set the maximum possible baud rate for your system. For example, if the serial port of your host computer can only go as high as 9600 baud, you will have to set the IQ interface to this slower speed also. (Refer to the manual that came with the IQ interface for instructions on setting its baud rate.) *Note: Turbo's auto baud detect feature enables it to set the baud rate of the host computer only—not the IQ interface.*

Port Active: Turns the serial port on or off. When turned off, *Turbo* does not communicate with the *IQ System*, enabling you to change system settings or edit or create new *dataframe* files without affecting the actual *IQ System*. You can also toggle the serial port on and off from a graphics plate by pressing ALT+P.

Display: Determines the way a control will look when it is turned on. When set to **Solid**, on/off controls will appear to be highlighted with solid bold letters. When set to **Blink**, on/off controls will blink when they are turned on.

Monitor: Should normally be set to **Color**. Use the **Mono** setting if your host computer has a monochrome monitor.

Fast Roll Call: Causes roll calls to run at the fastest possible speed. Most IQ components can respond to a fast roll call but a few of the older ones cannot (such as *MPX-6* mixers prior to version 1.3 and *IQ–P.I.P.s* prior to version 1.4). Make sure that all components in your *IQ System* can respond to a fast roll call before using it.

Auto ASA on Roll Call: This control is only relevant if a *DRN–16* drone is being used as an IQ interface. When turned on, the ASA (Auto System Activate) control on the drone is temporarily disabled during a roll call, during the uploading of system settings or when the settings in a *dataframe* are engaged. This allows the drone to focus solely on the roll call for optimal performance.

Roll Call: Causes a new roll call to be begin immediately. **Caution:** All graphics plates will be cleared.

Auto Break Detect: Causes *Turbo* to report when breaks in communication occur and to initiate a search for the location of the break. The serial connection between the host computer and the IQ interface is always monitored when Auto Break Detect is turned on. However, not all Crown Bus loops may be monitored, depending on the setting of the Auto Search All Loops control (described next).

Auto Search All Loops: This control is only relevant if Auto Break Detect is turned on. It forces *Turbo* to include all Crown Bus loops in its search for breaks in communication. If it is turned off, the auto break detect feature will only search those loops which have IQ components that are visible on the screen. For example, when a Control Block screen is displayed, only the loops represented in the visible control blocks will be included in the auto break detect search if Auto Search All Loops is turned off. The same is true of a graphics plate—only loops with components that are represented on the graphics plate will be monitored. By turning on the Auto Search All Loops switch, *Turbo* will be forced to check all loops—even the ones that are not represented on the screen.

Online Search: Enables *Turbo* to respond to a missing IQ component (one that was previously on line) by periodically attempting to reestablish communication with it and bring it back on line. After the unit is back on line, its current settings will be uploaded and its control block and sub-blocks updated. *Note: This feature does not enable Turbo to find new IQ components that do not yet have a control block. To add new components you must either run a roll call or manually create a control block for each new component.*

Search Loop #: Can be used to locate a break in a particular Crown Bus loop. To use this function, first enter the Search Loop number. Then activate the Search button (shortcut: press ALT+S). If there is a break in the loop, *Turbo* will display its approximate location.

Search: Causes *Turbo* to immediately begin searching the specified Crown Bus loop for breaks in communication. The loop is specified by the preceding Search Loop # control.

Solo Function Enabled: Activates the solo feature so the Solo controls located on individual amplifier control blocks are enabled. If this control is turned off, the amplifier Solo controls will not work. It provides a way to have global control over the solo feature.

Emergency Mute: Activates the emergency mute feature which allows an operator to quickly mute certain IQ components by rapidly pressing the "Space Bar" five or more times. The IQ components affected by the emergency mute feature are all the mixers *(MPX-6, SMX-6, AMB-5)* and amplifiers with IQ *P.I.P.s* (including *IQ2 P.I.P.s)*.

Remote Emergency Mute: Activates a feature whereby an external logic signal sensed by an AUX port of an IQ component is used to trigger an emergency mute.

Address: Specifies the Crown Bus loop, component type and IQ address of the IQ component whose AUX port input will be monitored for the remote emergency mute feature. Use the following procedure to determine the address:

1 Begin with "`L`" followed by the loop number of the IQ component.

2 Use one of the following three-letter mnemonics for the component type:

`AMP`	Amplifier with *IQ–P.I.P.–AP* (version 1.45 or later)
`MPX`	*MPX-6* mixer
`SMX`	*SMX-6* mixer
`AMB`	*AMB-5* mixer
`MRX`	*MRX-24* or *MRX-12* matrixer
`PSI`	Pocket Serial Interface
`SLM`	*SLM-8* system and load monitor

3 Specify the IQ address of the component after the component type.

Notes: Case does not matter. Commas and spaces are ignored and can be added to improve readability.

Here are a couple of examples:

```
L1 SMX5
L3, AMP 1
```

SMX Max Gain Auto Compensation: This control is only relevant when programming an analog input of a *DRN-16* drone to control the Max Gain of an *SMX-6* mixer. A better way to accomplish this is to turn on the Max Gain to Track Control Block and Control Block Override switches in the first *SMX* sub-block and then assign a drone pot to an *SMX-6* attenuator. (Please contact Crown's Technical Support Group for more information.)

System AUX: This control opens the System AUX Setup screen, a second type of Control Panel screen. The system AUX feature allows an external logic signal sensed by the AUX port of an IQ component to cause the *IQ System* settings to be either loaded (engaged) from a specified *dataframe* file or saved to a specified *dataframe* file.

The System AUX Setup screen is shown below in Figure 2.13. The keyboard shortcut to it from the main Control Panel screen is [ALT]+[A].

2

Fig. 2.13 System AUX Setup Screen

Up to 16 different AUX ports can be monitored at the same time and each one can load or save the settings from/ to a different *dataframe* file. Notice that three parameters are used to define a single System AUX function: Monitor, Action and Dataframe. Use [←] [→] [↑] [↓] to select the function you want to enter or edit ([TAB] does not work in this screen).

The **monitor** parameter identifies which AUX port is to be monitored. Use the following procedure to describe it:

1 Begin with "L" followed by the loop number of the IQ component.
2 Use one of the following three-letter mnemonics for the component type:

AMP	Amplifier with *IQ–P.I.P.–AP* (version 1.45 or later)
MPX	*MPX-6* mixer
SMX	*SMX-6* mixer
AMB	*AMB-5* mixer
MRX	*MRX-24* or *MRX-12* matrixer
DRN	*DRN-16* drone
PSI	Pocket Serial Interface
SLM	*SLM-8* system and load monitor

3 Specify the IQ address of the component after the component type.

4 For a drone, specify a drone input with "`IN`" followed by the input number (1-16).

Notes: Case does not matter. Commas and spaces are ignored and can be added to improve readability.

Here are some examples:

```
L1 SMX5
L3, AMP 1
L1, DRN 24, IN 5
```


The **action** parameter identifies what action will be taken with the specified *dataframe* file. The choices are None, Load and Save. (The action is taken when the AUX input changes from a logic low to a logic high.) After selecting the action field, use the "Space Bar" to toggle between the available choices.

The **dataframe** parameter identifies the *dataframe* file name that you want to load or save.

After you have finished with this screen, press ESC to return to the main Control Panel screen.

The following controls refer again to the main Control Panel screen (Figure 2.12).

Printer Port: Sets the destination for printed reports of the system settings. The reports can be sent to a printer via a parallel port (LPT1 or LPT2) or saved to a file. To create a report, press F5 from a Control Block screen.

File Name: Specifies the file name to be used if the Printer Port option is set to send the report to a file. The report is written as a text file that can be viewed and edited by most text editors or wordprocessing programs. *Note: There is not a default extension, so you should enter an appropriate extension (like TXT).*

Ok: Closes the main Control Panel screen and returns you to the previous Control Block screen. The keyboard shortcut to exit the Control Panel screen is either ALT+K or ESC.

All control panel settings are saved to a TURBO.INI file when you leave the Control Panel screen. *Note: Older version of Turbo saved the control panel configuration to a CROWN.DTA file. It can be deleted after a TURBO.INI file has been created.*

Help: This control opens a help box which lists a brief description of each system control on the Control Panel screen. The keyboard shortcut is either ALT+H or F1.

2.5 Using Control Blocks

Most IQ components have a control block. As its name suggests, a control block serves as a ready-made place to control an IQ component. All control blocks can be accessed from a Control Block screen. This is one of the types of text screens we referred to earlier in Section 2.1.1. Specific Control Block screens are selected with the **Device menu**. (Device is synonymous with IQ component.) To use the Device menu, press F1 from any Control Block screen. Figure 2.14 shows a typical Device menu.

2

Fig. 2.14 The Device Menu

The Device menu is quite flexible and offers several methods for making a selection:

1 Keyboard: Use the ↑ ↓ keys to highlight the desired device and press ENTER.

2 Keyboard: Press the highlighted character. Example, press S for the *SMX-6* mixer.

3 Mouse: Click ( ) on the desired device.

A sample SMX Control Block screen is shown below in Figure 2.15. Notice that four individual *SMX-6* control blocks are visible on the SMX Control Block screen.

Fig. 2.15 An SMX Control Block Screen

A Command & Title Bar is located at the top of the Control Block screen. It lists the function keys (F1 F2 F5 F9 F10) that are available from the Control Block screen and, in the center, the IQ components represented in the control blocks (SMX). At the bottom of the control block screen are two status lines which display the Offset number and the current *dataframe* file name.

The **offset number** is the number of the currently selected control block and it helps you keep track of your location in systems with many IQ components. The control blocks are numbered from top to bottom, beginning with 1 (one) at the top. Suppose, for example that your *IQ System* has ten *SMX-6* mixers. Each one will be given its own control block so your system will have 1-10 control blocks. Since only four of them can be viewed at the same time in the Control Block screen, *Turbo* will allow you to scroll through them with PG↑ PG↓. When you do this, the offset number tells you which control block has the current focus of the system. If you scroll down to the seventh control block, the offset number will be seven. In the example in Figure 2.15, the offset number is one because the first control block has the focus.

If a *dataframe* file has been engaged or saved, its name will be listed at the very bottom of the screen. In Figure 2.15, *dataframe* file SETUP-1 is listed.

Occasionally you may also see other items listed on one of the status lines. For example, some screens will list "Esc - Exit" in the far right corner to let you know that you can exit the screen by pressing the ESC key.

The control blocks of some, but not all, IQ components are also available from a graphics plate. Figure 2.16 shows a graphics plate version of the same *SMX-6* control block that is highlighted in Figure 2.15. It is accessed by double-clicking () on the GDM (graphics display module) of an IQ component.

Although both the text screen and graphics plate versions of a control block appear to have many of the same controls, the graphics plate version is slightly more limited than the text version. For instance, the graphics plate version only allows you to display one control block at a time. In addition, the ASA (Auto System Activate) control can only be turned on and off—you cannot use it to access the sub-blocks where the automation features are

Fig. 2.16 An SMX-6 Control Block from a Graphics Plate

configured. To access the automation features from a graphics plate you would need to create your own custom sub-block with the various control objects in the graphics plate Toolbox. (Sub-blocks are discussed in Section 2.6 and graphics plates are discussed in Sections 2.8, 3 and 4.)

2

2.5.1 The Parts of a Control Block

Now lets focus on just one control block and see how it is put together. Notice in Figure 2.15 that each control block forms a horizontal row on the screen, four text lines in height. Figure 2.17 shows a single control block:

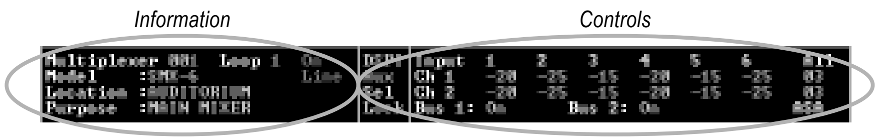


Fig. 2.17 A Closer Look at a Control Block

The left side of the control block consists of information about the IQ component it controls. The IQ address and Crown Bus loop number are listed at the top and are automatically entered as part of the roll call. They can also be manually entered, making it possible to prepare *dataframe* files while the host computer is disconnected from an *IQ System*. “On Line” is displayed in the upper right corner of the information area when an active IQ component has been detected by *Turbo*. Below the IQ address and Crown Bus loop number are three information lines where you can enter the model, location and purpose of the IQ component. Most control blocks allow you to type anything you want here. Some control blocks, like the amplifier control blocks, require you to select a model from a list.

The right side of the control block contains the controls. The controls serve a sort of dual purpose: they can be used to send a command to an IQ component and they can be used to display the current setting of an IQ component. (CTRL+U causes *Turbo* to upload and display the current settings of all IQ components in the system.) Some IQ components also have special dedicated monitoring features located in this section of the control block (such as input signal level indicators). Because the controls vary widely from one type of IQ component to the next, they will not be described in detail here. The controls and monitoring features of specific IQ components are addressed later in this manual.

2.5.2 Navigating Control Blocks & Setting Controls

A few special techniques are required to successfully use the Control Block screens. For example, the focus (cursor) is normally confined to a single control block at a time. How do you move it from one control block to another? How do you add a new control block for an off line IQ component when all visible control blocks are already being used? This section will answer these and other questions relating to the use of control blocks.

• Moving from One Control Block to Another

Keyboard: Use PG↑ or PG↓ to move up or down from one control block to the next. The Offset number at the bottom of the screen will indicate the number of the selected control block. Press “Home” HOME to move to the first control block. Press “End” END to move to the last control block.

Mouse: Click the middle mouse button ( ) and drag the mouse up and down to move through the control blocks.

• Adding a New Control Block

Keyboard: Control blocks are automatically created for all on line IQ components during a roll call. In addition, new control blocks can be manually added for off line IQ components. This is easy to do if an empty control block is visible in the Control Block screen. Use PG↑ or PG↓ to select it and then enter the IQ address and Crown Bus loop number of the off line IQ component. How do you manually add a control block if no empty ones are visible in the Control Block screen? First, press PG↓ until you reach the last control block. Then press PG↓ one more time to create one new control block. You can also press SHIFT+PG↓ to force *Turbo* to add more than one new control block.

• Selecting a Control or Text Line

Keyboard: Use ↑ ↓ ← → to position the cursor on the desired control or text line. When the line is highlighted, it is selected and ready for input.

Mouse: Move the mouse () without clicking or dragging until the cursor is on top of the desired control or text line. When the control or text line is highlighted, it is selected and ready for input.

• Setting an On/Off Control

Keyboard: Select the desired on/off control and press the "Space Bar".

Mouse: First select the desired on/off control. Then click the left mouse button ().

• Setting a Level Control

Keyboard: There are two ways to set a level control. You can enter the value directly or you can increment/decrement the value in steps (usually ½ dB steps). Begin by selecting the desired level control. Then you can enter the value directly by typing the number you want and pressing ENTER to engage the new level. (Precede negative numbers with the negative key.) Or you can press SHIFT+↑ to increment or SHIFT+↓ to decrement the level. *Note: Fractions cannot be entered directly. Use the increment/decrement method for fractions.*

Mouse: First select the desired level control. Then, press and hold SHIFT while moving the mouse () upward to increment and downward to decrement. Do not click or drag while moving the mouse.

• Setting a Range Control

Keyboard: A "range" control let's you select from a list of preset choices. For example, the dual/mono control in an amplifier control block allows the following settings to be selected: DUAL, BRID and PARA. These controls function very similarly to an on/off control. To set them, first select the control then press the "Space Bar" to advance the selection from one value to the next. The selection will advance to the first choice after passing the last one.

• Moving from a Control Block to a Sub-block

Keyboard: Select the ASA control and press ↓ or ENTER.

Mouse: With the ASA control selected, move the mouse () in a downward direction without clicking or dragging.

2.6 Using Sub-blocks

Some, but not all, IQ components have one or more sub-blocks. As their name suggests, sub-blocks are organized “under” control blocks. They allow the user to delve deeper into the controls of a IQ component. Sub-blocks contain the controls that configure the automation features of the more advanced IQ components. A single sub-block contains the controls for one function. Some Sub-block screens contain more than one sub-block. All Sub-block screens are accessed from a parent control block with the **ASA** (Auto System Activate) control.

The ASA control serves a dual purpose. First, by turning it on and off, you enable or disable all functions in the sub-blocks. Second, it is used to gain access to the Sub-block screen(s). This is accomplished by pressing ENTER or when the ASA control is selected. Mouse users can simply move the mouse down ( ) from the ASA control without clicking.

The next two illustrations show some typical Sub-block screens.

Notice in both Figure 2.18 and 2.19 that the status of the ASA control is indicated at the top of the screen (top left on the amplifier Sub-block screen and top right on the mixer Sub-block screen). Although the actual ASA control is

Fig. 2.18 An Amplifier Sub-block Screen for an IQ–P.I.P.–SMT

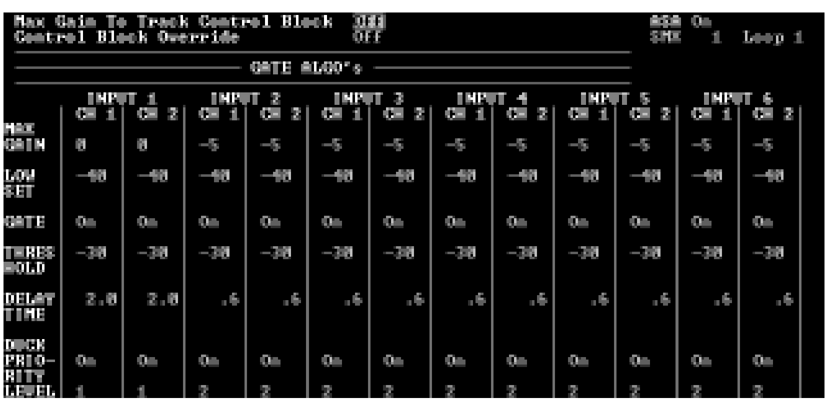


Fig. 2.19 The First of Four SMX-6 Mixer Sub-block Screens

located back in the control block, you can toggle it on and off from the Sub-block screens by pressing ALT+A. When ASA is turned on, all changes are executed by the *IQ System* as they are made. Sub-block changes are not engaged while ASA is turned off.

Sub-blocks are only available from text control blocks—there is no equivalent on a graphics plate. However, if is possible to create custom sub-blocks on a graphics plate by using the objects which are available in the Toolbox. See Section 2.8 for a discussion of the use of graphics plates.

Tip: *Before changing the settings of a sub-block, it is a good idea to save the previous settings so you can restore them, if necessary. Press F9 to save them.*

2.6.1 Navigating Sub-blocks & Setting Controls

In many ways, the sub-block controls work the same as control block controls. You set on/off, level and range controls with the same keyboard and mouse techniques. However, sub-blocks have many unique features and this section will describe them. Please refer back to Section 2.5.2 for details of common features such as how to set individual controls.

• Moving from One Sub-block or Sub-block Screen to Another

Unlike control blocks, sub-blocks place no limits on cursor or mouse movement because all the controls pertain to a single IQ component.

Keyboard: You can freely move from one sub-block to the next with the ↑ and ↓ keys or the mouse (mouse). This includes Sub-block screens for those IQ components that have more than one. Pressing ↓ when you are already at the bottom of a Sub-block screen will send you to the next control at the top of the next Sub-block screen and visa versa. Use ↑ or ↓ to move up or down from one Sub-block screen to the next. Use HOME to move to the first Sub-block screen. Use END to move to the last Sub-block screen. *Note: "Home" HOME and "End" END do not function in drone Sub-block screens.*

Mouse: Move the mouse (mouse) up and down without clicking or dragging to move up and down the sub-blocks and Sub-block screens.

• Moving Among Sub-blocks of Similar Components

Keyboard: Press CTRL+← and CTRL+→ to move sideways from the sub-block of one IQ component to the next. This can only be done between similar IQ components. For example, you can move from the sub-block of one *SMX-6* mixer to another, but not from an *SMX-6* to an *AMB-5. Note: This feature is only supported for amplifier and mixer sub-blocks. It is not supported by drone sub-blocks.*

• Locally Copying & Pasting in a Mixer Sub-block

The local copy and paste feature allows you to copy the setting of one input control to another. It is only available for mixer sub-blocks, it only works with adjacent columns and it is only available for input controls. It cannot be used for output controls like the Limit Threshold control of the *SMX-6* Output Compress/Limiter.

Keyboard: Select the desired control setting. Then, press SHIFT+← or SHIFT+→ to copy the setting horizontally across the sub-block. For example, the –5 dB Max Gain setting was copied from Input 2, Channel 1 in Figure 2.19 to the other inputs by pressing SHIFT+→.

Mouse: First select the desired control setting. Then, press and hold SHIFT and move the mouse ( ) to the left or right to copy the values horizontally across the sub-block.

2

• Globally Copying & Pasting Between IQ Components

The global copy and paste function copies all the settings of all the sub-blocks of one IQ component to the sub-blocks of another identical IQ component. This feature is only available for amplifier and mixer sub-blocks.

Keyboard: First press ALT+C to copy the sub-block settings of the present IQ component into memory. This causes "Copy" to appear in the upper right corner of the screen below the IQ address and loop number. Next, press CTRL+← or CTRL+→ to move to the Sub-block screen of the destination IQ component. (Use the IQ address and loop number in the upper right corner of the screen to locate the component.) Finally, press ALT+V to paste the settings into the sub-blocks of the destination IQ component.

• Restore Default Settings to All the Sub-blocks of an IQ Component

Keyboard: Press ALT+X to restore all sub-block settings of the selected IQ component (except drones). The settings of legacy IQ *P.I.P.s* and mixers will be changed to their minimum values. The settings of *IQ2* components will be restored to their factory default values.

• Moving from a Sub-block Back to a Control Block

Keyboard: Press ESC from any sub-block or press PG↑ from the first sub-block or press HOME then PG↑ from any sub-block. *Note: "Home" HOME does not function in drone sub-blocks.*

Mouse: Click the right mouse button ( ). You can also move the mouse in an upward direction without clicking or dragging until the control block is displayed.

Tip: *Press ALT+F1 from any sub-block to open a help window listing many of the points in this section. A sample*

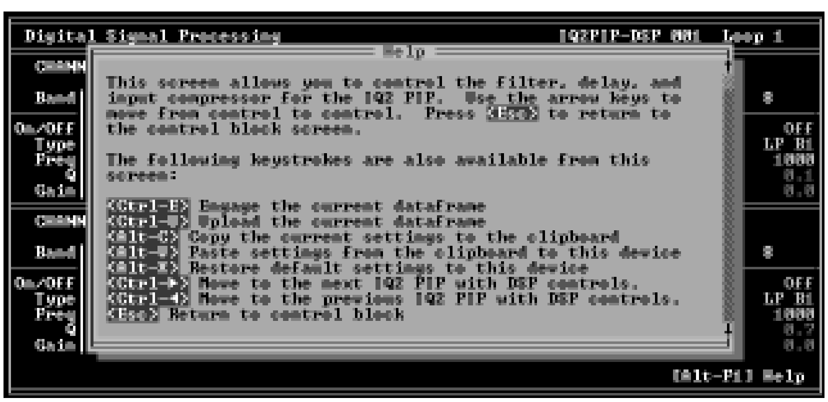


Fig. 2.20 A Sample Sub-block Help Window

help windows from an amplifier DSP sub-block is shown below:

2.7 Activating Emergency Mute

During the course of configuring any sound system, mistakes can be made. An input can be turned up too loud, resulting in runaway feedback between one or more microphones and loudspeakers. Although you can use the *IQ System* to minimize these problems, it is not immune to "operator error." This is why we added the emergency mute feature. It allows you to quickly mute many of the IQ components from any Control Block screen, Sub-block screen or graphics plate. To activate this feature, press and hold the "Space Bar" or tap it rapidly five or more times until the audio is muted. *Note: In order to use this feature, it must first be enabled on the Control Panel. Refer to Section 2.4.* The following IQ components will respond to an emergency mute: all mixers *(MPX-6, SMX-6, AMB-5)* and amplifiers with legacy IQ *P.I.P.s (IQ–P.I.P., IQ–P.I.P.–AP)*. Amplifiers with *IQ2 P.I.P.* will <u>not</u> respond.

When emergency mute has been activated, the following screen in Figure 2.21 will appear:

Fig. 2.21 The Emergency Mute Screen

The system will stay muted until it is re-engaged or until you change the controls that are used to mute (such as the amplifier All Mute controls and the mixer Input gain controls). While the emergency mute function is active you can return to the control blocks or graphics plate by pressing ESC to exit the Emergency Mute screen. Then make changes to correct the problem. All changes will take effect immediately. After the problem has been corrected, press CTRL+E to re-engage the system and the settings in all control blocks, sub-blocks and graphics plates will be resent to the *IQ System*.

If you prefer, you can also choose to load new settings from a *dataframe* file by pressing F9. If you do, you will not have to manually re-engage the system because the act of loading a *dataframe* file automatically causes the system to engage the new settings.

2

2.8 Graphics Plates

Seldom are two audio systems used in the same way. Even the same audio system will probably be operated in very different ways, depending on the nature of each event or the abilities of each operator. How would you like to have a custom control panel for your system? Better yet, how would you like to have a custom control panel for each type of event? Or a custom control panel for each operator? This section will show you how to accomplish this with graphics plates.

A graphics plate is a graphic screen in which custom objects can be designed and stored to create attractive operator screens for your *IQ System*. A wide variety of objects are available from the graphics plate Toolbox. For example, the Toolbox has bar meter and LED objects that mimic the real thing. It also has “pots” that mimic level controls and buttons that mimic a pushbutton. You use these prebuilt objects to construct control panels for your system on one or more graphics plates. Figure 2.22 shows some of these objects and the Toolbox menu.

You have complete control to decide which controls your operators can access and, in many cases, what the operating range of the controls will be. For example, you can create a “pot” for the input attenuator of Channel 1 of an IQ *P.I.P.*-equipped Crown amplifier and decide where it will be located on the screen, what its size and color will be and what its maximum and minimum settings will be. Next you can create a bar meter to monitor its input level. You decide whether or not the bar meter will have a “peak hold” feature and include a text legend.

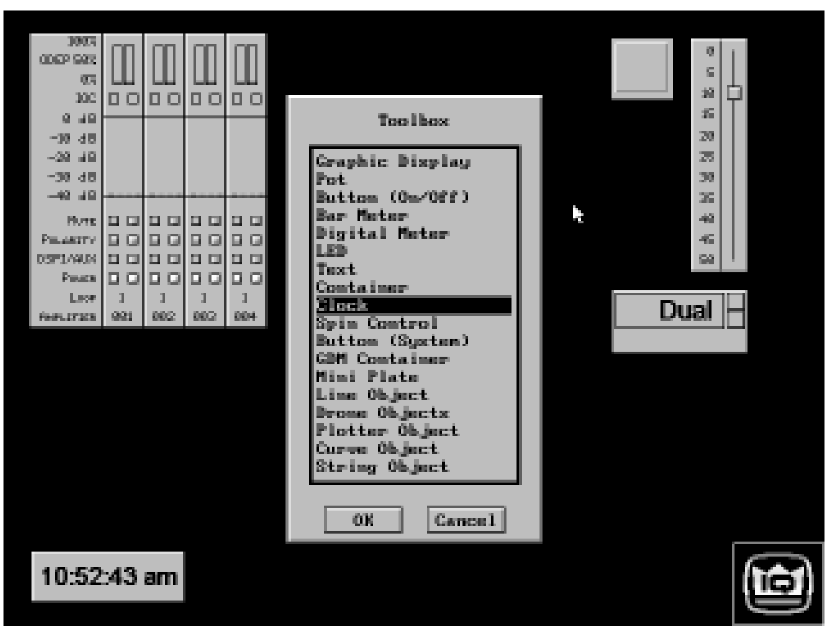


Fig. 2.22 A Graphics Plate Under Construction

2.8.1 The Graphics Plate Control Block Screen

Graphics Plates are treated like IQ components because each one has a control block. Use the Device menu (F1) to go to the graphics plate Control Block screen (shown below in Figure 2.23).

Fig. 2.23 The Graphics Plate Control Block Screen

Like most control blocks, the graphics plate control blocks are divided into two parts. On the left is the information area and on the right are the controls.

Number: The Number parameter is the first item in the information side of the control block. It provides a convenient way to differentiate one graphics plate from another. Enter any number between 1 and 999. Three blank lines are available below the Number parameter for labelling the graphics plate or for relevant notes.

Trigger: Determines whether or not the associated graphics plate will be automatically displayed when a *dataframe* file is engaged. This is a great feature for hiding the complexity of *Turbo* from your operators. All they see is the controls you give them on the graphics plate. When Trigger is turned on, the text Control Block screens will be bypassed and the graphics plate will be displayed instead. When Trigger is turned off, *Turbo* will stay in the Control Block screens after a *dataframe* file is engaged. The Trigger of only one graphics plate should be turned on at a time. If more then one is turned on, the graphics plate having the lowest Offset will be displayed. *Note: If you turn on a Trigger (or change any parameter), be sure to save the dataframe file by pressing* F9 *so the change(s) will not be lost.*

Display Now: Causes the associated graphics plate to be displayed immediately. There are two display modes: Selected and Memory. The display mode is controlled by the Display control on the last line of the control block. After the graphics plate is displayed, you can return to the text Control Block screen by pressing ESC, F1 or clicking the right mouse button ().

Control Security Lock: Locks the operation of all control objects on the graphics plate so they cannot be used to make changes to the *IQ System*. In addition, the graphics plate version of the control blocks cannot be accessed when Control Security Lock is turned on. However, this does not prevent graphic controls and objects from being edited—their size, location, color and other attributes can still be changed. This is a very handy feature when constructing a graphics plate.

Graphics Security Lock: Locks the attributes of all objects on the graphics plate so their appearance, location and function cannot be changed. This means they cannot be resized, moved or have any of their attributes changed. However, this does not prevent control objects from being used to make changes to the *IQ System*. For example, a button can still be used to turn something on and off, but the size, location or color of the button cannot be changed. Turning on both the Trigger and Graphics Security Lock controls will prevent an operator from haphazardly making changes to a graphics plate.

Display: Controls the display mode of a graphics plate. When it is set to **Selected**, the graphics plate will try to display a graphic display module (GDM) for all relevant IQ components in the system whose control block Sel (Selected) control is turned on.

Setting the Display control to **Memory** causes a graphics plate to display only those objects which were previously stored in memory (or in a *dataframe* file if it has just been engaged). More than one graphics plate can be stored into memory at the same time. To store a graphics plate into memory, first display it, then double click with the left mouse button ( ) on an unused portion of the screen. This will summon the graphics plate control block (Figure 2.24). Then click on the Store button. (This is explained in the next section.) When you exit a graphics plate that has been edited, you will also be prompted to store the updated graphics plate into memory. *Note: Storing a graphics plate into memory is only temporary—it is not permanent. The graphics plate will be lost if the host computer loses power or is turned off. Use the dataframe file to permanently store a graphics plate (press F9 from a control block). When a dataframe file is saved, all graphics plates are saved in it.*

2.8.2 Using the Graphics Plate Control Block from the Graphics Plate

In addition to the graphics plate Control Block screen, it is also possible to access the graphics plate control block from the graphics plate itself by double-clicking ( ) on an unused portion of the graphics plate. Figure 2.24 shows the graphics plate version of the graphics plate control block.

To close the graphics plate control block, click once ( ) anywhere outside of it.

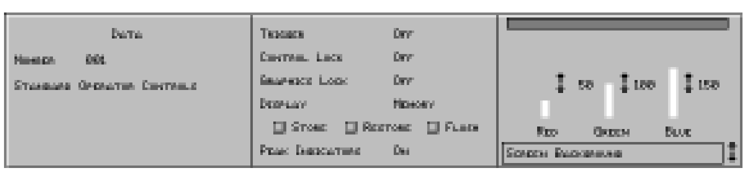


Fig. 2.24 The Graphics Plate Version of the Graphics Plate Control Block

The “Data” area on the left side is the same as the information area of the text Control Block screen version. The Number parameter and text field below it can be edited by clicking on them and entering the new text. However, the rest of the control block is very different.

The Trigger, Control Lock, Graphics Lock and Display controls are not operational in this control block. They are intended only to indicate the current settings—you must return to the Control Block screen to change them. The other controls are fully operational and are explained below.

Store: Stores the current graphics plate into memory (the volatile memory or RAM of the host computer) where the rest of the *IQ System's* settings are kept during operation. Storing a graphics plate into memory is the first step in saving it. The second step is to save all the system settings and all graphics plates in memory to the computer's hard drive in a *dataframe* file. This is done by pressing F9. **IMPORTANT:** If you made changes to a graphics plate and then exit it without storing it in memory, all of the changes will be lost.

The number of graphics plates which can be stored into memory is determined by the complexity of the graphics plates and the amount of available memory in the host computer.

Restore: Restores the graphics plate to the last version that was stored into memory. This is a handy way to undo changes that were made to a graphics plate since they were last stored.

Flush: Removes all objects except the Crown IQ logo from the graphics plate. You can think of this as a "clear" button which clears the graphics plate. *Note: Flushing a graphics plate does not remove it from memory (if it was previously stored there). If you exit the graphics plate without saving changes all of the flushed objects will reappear if you return to the graphics plate.*

Peak Indicators: This control only affects the pre-built GDMs of legacy IQ *P.I.P.s* (such as the *IQ–P.I.P.* and *IQ–P.I.P.–AP)*. It causes the signal peak to persist for a fraction of a second when an audio input signal of a legacy IQ *P.I.P.* is monitored with a pre-built GDM.

Screen Background / Variable Palette: There are two selectable colors, the background color of the graphics plate and a custom color called the "variable palette" color. The variable palette color is available as one of the color selections in the Attributes window of many objects. Click on the up/down arrows in the lower right corner of the control block to select the Screen Background or Variable Palette color. Then use the up/down arrows beside each primary color (red, green, blue) to mix a desired color.

Each primary color has a range of 0 to 255 with zero being none of the color and 255 being 100% of the color. Setting all primary colors to 255 will produce white. Setting them all to 0 (zero) will produce black. When you mix a custom color, you may want to record the level you used so you can reproduce the color again later on a different graphics plate.

2

2.9 Saving and Loading *Dataframe* Files

All of the settings of the *IQ System* can be saved and later reloaded (engaged) with *dataframe* files. To save or load a *dataframe* file, press [F9] to summon the **File menu**. As Figure 2.25 shows, there are three selections on this menu:

Fig. 2.25 The File Menu

A. Save Dataframe as _____: Saves all system settings and graphics plates as a new *dataframe* file. After pressing the [ENTER] key, enter file name in the blank space provided. The file name can be only eight characters long and is not case sensitive. Do not add an extension because ".DIQ" will be automatically appended to the end of the file name. Press [ENTER] again to create the new *dataframe* file.

B. Save Dataframe: Saves all system settings and all graphics plates to the current *dataframe* file. This selection does not prompt for a file name. The settings and graphics plates in the *dataframe* file will be replaced with the new ones. Use the first menu choice (Save Dataframe As...) and enter a new file name if you do not want to overwrite an existing *dataframe* file.

Note: Any changes made to the system settings or graphics plates must be saved before exiting Turbo or they will be lost.

C. Load Dataframe: Loads the system settings and graphics plates from an existing *dataframe* file. The settings are automatically engaged after the they have been loaded.

Once [ENTER] has been pressed, a window displaying a list of all available *dataframe* files will be displayed (see Figure 2.26). Use [↑] [↓] to make a selection then press [ENTER] again to load and engage the *dataframe* file.

Notice that this window also provides several additional features. The current path is listed at the very top of the window (in the example in Figure 2.26 the path is "E:\TURBO14*.*". To move up the directory tree, select "..\" and press [ENTER]. To move to a different drive or directory, select the drive letter (example: "[C:]") or directory name and press [ENTER]. To delete a file, select it and then press [ALT]+[D]. To sort the files by name press [ALT]+[S].

Fig. 2.26 The Dataframe File List Window

2.10 Printing the *IQ System* Settings

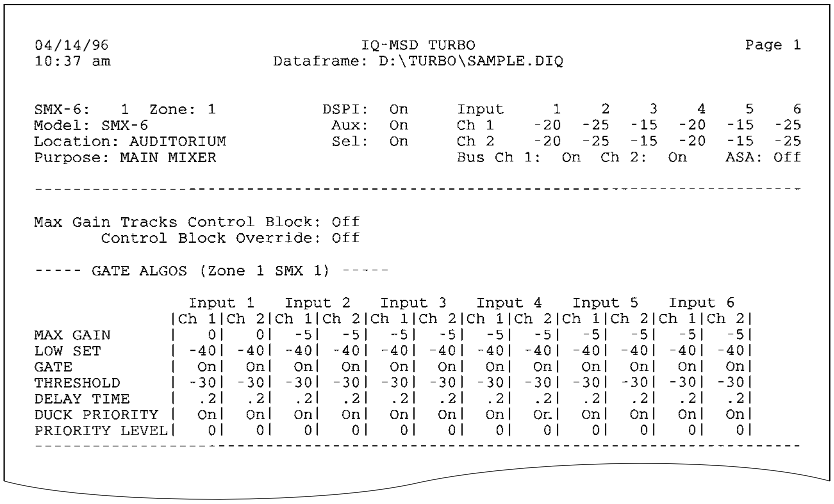
All settings of all controls of most IQ components in the system can be printed by pressing F5 or CTRL+P from any Control Block screen. The following menu (Figure 2.27) will appear so you can select the type of IQ components you want to include in the printout.

Fig. 2.27 The Print Select Components Menu

Use ↑ ↓ and the "space Bar" to select the component types to include in the printout. Press ENTER when you are ready to begin printing. The printout will be sent to the parallel port (LPT1 or LPT2) that is selected in the Control Panel screen (see Section 2.4). You can also redirect the printout to a file with the Control Panel screen.

The printout is plain ASCII text which is formatted for 80 columns with appropriate page breaks. A sample is shown in Figure 2.28.

2



```
04/14/96                         IQ-MSD TURBO                             Page 1
10:37 am                 Dataframe: D:\TURBO\SAMPLE.DIQ

SMX-6:   1  Zone: 1            DSPI:  On      Input      1    2    3    4    5    6
Model: SMX-6                    Aux:  On      Ch 1     -20  -25  -15  -20  -15  -25
Location: AUDITORIUM            Sel:  On      Ch 2     -20  -25  -15  -20  -15  -25
Purpose: MAIN MIXER                           Bus Ch 1:  On   Ch 2:  On    ASA: Off
--------------------------------------------------------------------------------

Max Gain Tracks Control Block: Off
       Control Block Override: Off

----- GATE ALGOS (Zone 1 SMX 1) -----

                 Input 1   Input 2   Input 3   Input 4   Input 5   Input 6
              |Ch 1|Ch 2|Ch 1|Ch 2|Ch 1|Ch 2|Ch 1|Ch 2|Ch 1|Ch 2|Ch 1|Ch 2|
MAX GAIN      |   0|   0|  -5|  -5|  -5|  -5|  -5|  -5|  -5|  -5|  -5|  -5|
LOW SET       | -40| -40| -40| -40| -40| -40| -40| -40| -40| -40| -40| -40|
GATE          |  On|  On|  On|  On|  On|  On|  On|  On|  On|  On|  On|  On|
THRESHOLD     | -30| -30| -30| -30| -30| -30| -30| -30| -30| -30| -30| -30|
DELAY TIME    |  .2|  .2|  .2|  .2|  .2|  .2|  .2|  .2|  .2|  .2|  .2|  .2|
DUCK PRIORITY |  On|  On|  On|  On|  On|  On|  On|  Or.|  On|  On|  On|  On|
PRIORITY LEVEL|   0|   0|   0|   0|   0|   0|   0|   0|   0|   0|   0|   0|
--------------------------------------------------------------------------------
```

Fig. 2.28 A Portion of a Sample Printout

2.11 Checking Memory

To determine the amount of available memory, press CTRL+F1. This can be used from either a text Control Block screen (Figure 2.29) or a graphics plate (Figure 2.30).

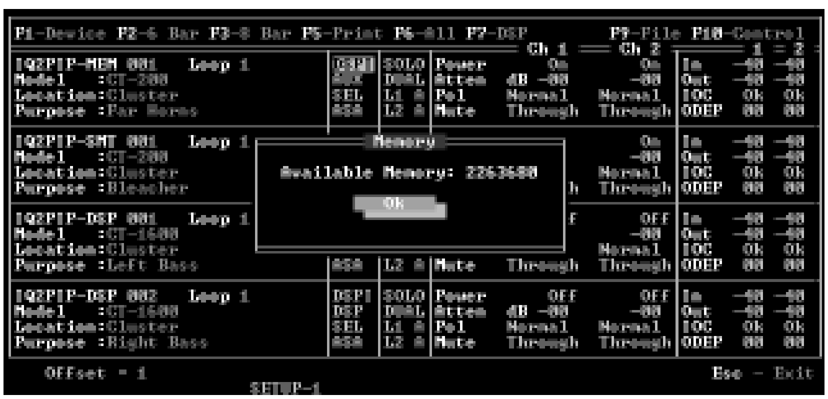


Fig. 2.29 Checking Available Memory from a Control Block Screen

Fig. 2.30 Checking Available Memory from a Graphics Plate

GRAPHICS PLATE DESIGN

3 Designing Graphics Plates

Fortunately you don't have to be an artist to create an attractive graphics plate because we have included a wide array of pre-made graphic objects which are easy to use. They are listed in the graphics plate Toolbox (see Figure 2.22). We've also included a number of pre-configured objects for many IQ components. We call them GDMs or Graphic Display Modules because they graphically display many of the monitor and control features of our IQ components. Before we delve into the details of graphics plate design, let's discuss a few general principals.

3.1 Overview

There are two things to consider before designing a graphics plate: its purpose and its intended user. You may want to write down the purpose and then list all the things that it will need to carry out that purpose. The purpose will determine which types of control and monitor objects will be required. It is important to consider the intended user or operator in order to design a graphics plate that is as friendly and easy-to-use as possible for the operator. What is the skill level of the operator? How much control should he or she be allowed to have over the system? How will the graphics plate be used under various conditions—including emergencies? These questions are important to designing a good graphics plate. Sometimes you will need to design more than one graphics plate for an operator. They can be linked with system buttons that allow the operator to jump from one graphics plate to another.

3.1.1 A Simple Example

Usually the best graphics plate designs are the simplest. Let's look at a very simple example. A doctor's office needs a graphics plate so one of its staff can control the background music level of the patient waiting room from a remote location. Channel 1 of a Crown amplifier with an *IQ–P.I.P.–MEM* module drives the loudspeakers in the waiting room.

Let's begin by answering the two questions we posed earlier:

1 Purpose: The purpose of the graphics plate will be to control the background music level in a waiting room. To accomplish this the staff member will need to monitor the output level of Channel 1 of the amplifier and control the input attenuator control on Channel 1 of the *IQ–P.I.P.–MEM*.

2 Operator: The skill level of the operator is low. They are not familiar with audio and so the graphics plate design must take this into account. In addition, the sound level should never be turned completely off because it is also used by the alarm system.

You could begin by placing a GDM for the *IQ–P.I.P.–MEM* on the graphics plate. One will be automatically placed there if the Display control on the graphics plate control block is set to Selected mode and the Sel control of the

IQ–P.I.P.–MEM (located on its control block) is turned on. Or, you can manually place a GDM on the graphics plate using the Toolbox. It would look like the one shown in Figure 3.1:

However, a standard GDM is probably not the best choice here because it gives the operator too many controls.

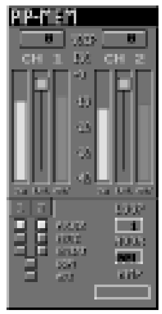


Fig. 3.1 The Graphic Display Module (GDM) for an IQ–P.I.P.–MEM

Remember in this example that our operator is an audio novice and will probably be easily intimidated by a complex looking GDM. This GDM includes controls for both Channels 1 and 2. It shows both the input and output levels, ODEP level, IOC status, provides a full-range level control for both input attenuators, includes power on/off buttons, mute buttons, polarity invert buttons, a DSPI button and an AUX button. A novice could easily get into trouble—especially if they inadvertently muted or turned off an amplifier channel which is needed for the security system when the office is closed.

The best solution for this example is a custom solution—let's build our own custom graphics plate with just those things that the operator needs. The objects we will use are shown below in Figure 3.2:

Notice that our objects are large and easy to see. Most standard GDMs are small so you can place many of them on a graphics plate. We don't have that constraint here because we need to monitor and control just one channel

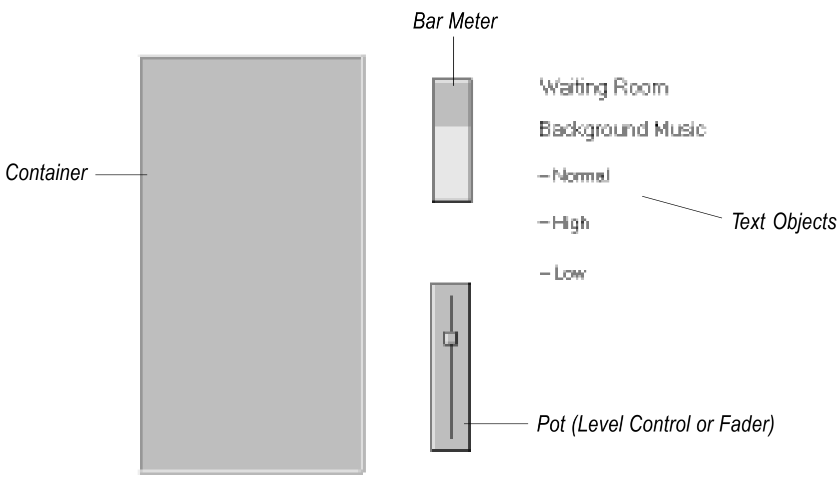


Fig. 3.2 The Objects Used for the Graphics Plate Design Example

of one amplifier. For our finished graphics plate we combined the objects as shown below in Figure 3.3:

The container object is used to visually tie the objects together in one neat package. It serves only an aesthetic function. The bar meter object is assigned to monitor the output signal from Channel 1 of the amplifier. It shows how loud the background music is in the waiting room. We used the full range (0 to –40 dB) but we turned the peak hold

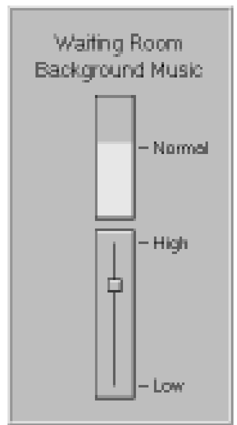


Fig. 3.3 The Combined Objects for the Graphics Plate Design Example

feature off and the labels off to keep the bar meter simple. We also added a separate text object as a label to show the normal level that is needed in the waiting room. The pot object is assigned to control the input attenuator for Channel 1. We gave it an operating range of 0 to –10 dB. With only a 10 dB operating range, it will be impossible for the operator to turn the level too low. We also turned the labels off for the pot object and we added our own High/Low labels to show the operator which way to move the control. Finally, we added the text objects at the top to clearly identify these controls as the "Waiting Room Background Music" controls.

The operating instructions for this example are simple: Adjust the level control up and down so that the signal level goes up to the "Normal" mark on the bar meter.

3.1.2 Graphics Plate Design Principles

The following principles will help you plan and design good graphics plates:

1 Determine a clear purpose of each graphics plate.

2 Consider the abilities and needs of the people who will operate the system.

3 Determine which objects will be needed.

4 Keep graphics plates simple. Avoid unnecessary complexity and clutter.

5 Use container objects and text objects to make graphics plates attractive and easy to understand.

6 Use muted, low-key colors for most objects and reserve bold or bright colors only for those things which are urgent or very important.

7 Use mini plates to provide help windows where appropriate. (Mini plates are container objects that can be made to appear and disappear at the click of a button. The objects that are placed inside them, will appear and disappear with them. See Section 4.13.)

8 If a graphics plate is too complicated, consider moving some of its objects onto a second graphics plate. (You can jump from one graphics plate to another with a system button.)

9 Consider hiding seldom used controls on one or more mini plates.

3.2 Creating a New Graphics Plate

Now that you have an overview of graphics plate design its time to delve into the details of constructing a graphics plate. Let's return to the graphics plate control block screen:

Fig. 3.4 Begin a New Graphics Plate at the Graphics Plate Control Block Screen

Here are the steps to create a new graphics plate:

1 Begin by entering a description for the graphics plate. Up to three lines can be used. "Standard Operator Controls" was entered in the example above in Figure 3.4.

2 Turn on the Control Security Lock control so that the controls you create on the graphics plate will not affect the actual *IQ System* until you are ready for them to. You can turn this control back off when you have finished creating the graphics plate. (Or you can ignore this control if the computer is not connected to an active *IQ System*.

3 Make sure that the Graphics Security Lock control is turned off or else we will not be able to add any objects or make changes to the graphics plate. You will probably want to turn on this control after the graphics plate has been designed to prevent your operators from accidentally changing it.

4 Switch the Display control to the Memory setting so that standard GDMs will <u>not</u> be automatically created when we go to the graphics plate. (See Section 4.1 if you want to use the standard GDMs.)

5 Press ALT + F3 to open the Graphics Setup window and set the resolution and color depth of the graphics plate. Each graphics plate can be set differently. The Graphics Setup window is shown in Figure 3.5 below.

Fig. 3.5 The Graphics Setup Window

The default setting is 640x480x16 (the minimum VGA standard and the setting with best performance). This means the graphics plate will have a resolution of 640x480 pixels and will display up to 16 colors. More objects can be placed on the graphics plate at higher resolutions. However the objects will appear smaller because the physical size of your computer monitor does not change. Two color depths are available: 16 color and 256 color. **Important:** Do not set the resolution or color depth higher than the host computer is capable of using. If you don't know how high your computer can go, try the lower settings first and if they work move up to the next one and so on. To test a setting, exit the Graphics Setup window by clicking ( ) on the Ok button and then go to the graphics plate by pressing the Display Now control. *Turbo* will usually display an error message if your computer cannot use the setting.

6 Using the same Graphics Setup window (ALT+F3), enter the file name of the background picture you would like to be displayed on the graphics plate. You can skip this step if you do not plan to place a picture in the background. The file must be a PCX bitmap file, preferably with 256 or less colors (8-bit or less). Some colors will not display correctly if the color depth of the picture is greater than the color depth you selected for the graphics plate in the previous step. Mismatched color palettes can also cause problems since some colors are reserved for system use. Be prepared to experiment to achieve the results you want.

A background picture can be used for many purposes. You can place a picture of your sound system layout and then locate controls in appropriate locations over the picture. You can use a picture of your facility and locate controls over the areas they affect. You can place an attractive picture of your facility as an aesthetic backdrop (see Figure 3.6). Or you can use the background picture to add to the artistic design of your graphics plate in a variety of ways.

Fig. 3.6 A Graphics Plate with a Stadium Picture in the Background

7 Click ( ) on the Display control to go to the new graphics plate. It will be empty, except for the background picture (if one is used) and the Crown IQ logo in the lower right corner of the screen.

8 Press ALT+G to open the graphics Plate Attributes window (Figure 3.7). Use the following descriptions to help you configure the attribute settings.

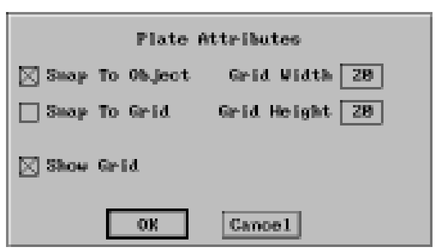


Fig. 3.7 The Graphics Plate Attributes Window

Snap to Object: Causes an object to automatically align itself with another object when it is placed in very close proximity to it (within a few pixels). This attribute must be turned on for the autosize feature discussed in Section 3.3.4 to work.

Snap to Grid: Causes objects that are moved to “snap” (jump) to a grid location defined by the Grid Width and Grid Height attributes.

Grid Width: Sets the width of the grid in pixels. (A pixel is the smallest dot of light that can be controlled on your display, considering the video resolution settings of your system's host computer.)

Grid Height: Sets the height of the grid in pixels.

Show Grid: Causes the grid to be visible. It is displayed with grey lines that are one pixel wide. An example of a grid whose width and height are both set to 20 pixels on a standard VGA screen (640 x 480 total pixels) is shown in Figure 3.8. Except for the grid and standard Crown IQ icon, the graphics plate in this example is empty.

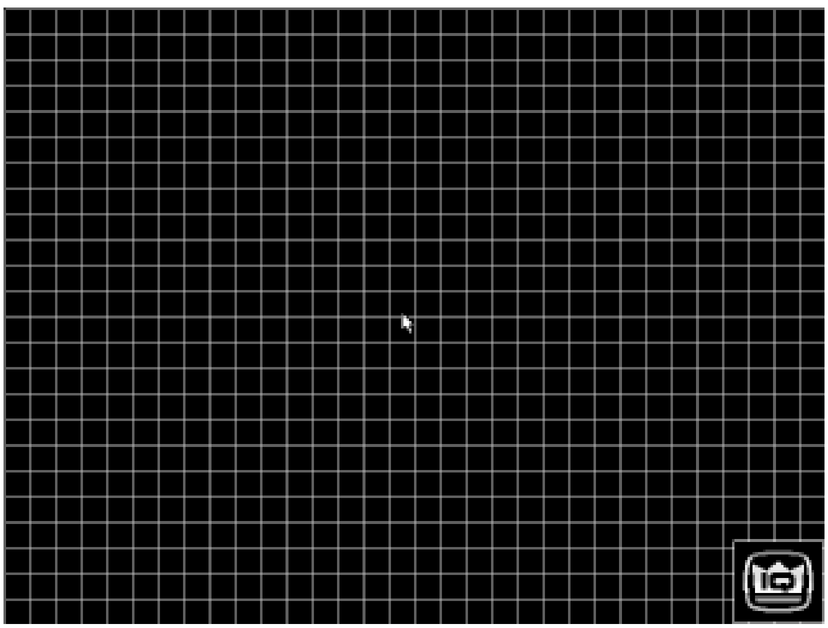


Fig. 3.8 An Empty Graphics Plate with a Visible Grid

The grid helps you align objects so they look organized and well placed on the graphics plate. The grid can be shown without turning on the Snap to Grid attribute. In this way it can be used as a visual alignment aid. The grid can then be turned off after the graphics plate has been designed.

Note: If both the Snap to Object and Snap to Grid attributes are turned on, Turbo will attempt to snap objects that are moved to the grid first, and if this fails, it will snap them to another object if one is in close proximity.

Now that we've created a new graphics plate, it is time to add the various objects that will turn it into a powerful control center for your *IQ System*. The next section will explain how to place and prepare those objects.

3.3 Adding Objects to a Graphics Plate

This section gets down to the fundamentals of constructing a graphics plate. It answers the questions, "How do I add an object to a graphics plate and how do I configure the object?" The place to start is with the Toolbox, the place from whence all objects come.

3.3.1 Toolbox

The graphics plate **Toolbox menu** (Figure 3.9) contains a list of all of the available objects. There are a total of eighteen. Some objects pertain to specific IQ components while others do not. Each one is described in detail in the Object Reference section (Section 4) later in this manual.

To open the Toolbox menu press F5 or double-click ( ) on the Crown IQ icon. You must use either the OK button or Cancel button to close it.

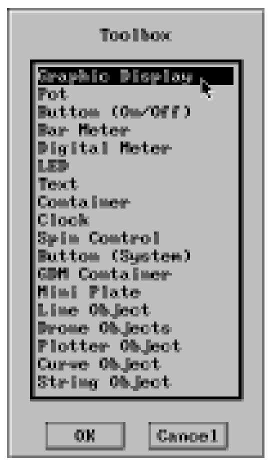


Fig. 3.9 The Graphics Plate Toolbox

Earlier we briefly discussed GDMs or Graphic Display Modules. They are preconfigured mini control panels which are available for many IQ products. In Figure 3.1 we saw the GDM for an amplifier with an *IQ–P.I.P.–MEM*. This time let's use a GDM from an amplifier with a legacy IQ *P.I.P.* as an example and learn how to select a new object from the Toolbox and set its attributes. Here are the steps:

1 Open the Toolbox menu by pressing F5.
2 Select the desired object from the Toolbox and click ( ) on the OK button. In this example, select the first object, Graphics Display (this is the GDM entry). A Select Component window will open as shown in Figure 3.10. *Note: Normally an Attributes window will open here to enable you to set the various attributes of the object. But the GDM objects are, for the most part, preconfigured so only two things are required: 1) selecting the component which will be represented by the GDM, and 2) determining whether or not the GDM will include a legend.*

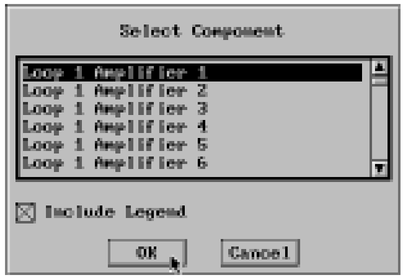


Fig. 3.10 The Select Component Window for a GDM Object

3 Set the attributes of the object and click ( ) the OK button. As mentioned in the note in Step 2 there are only two items to select, the IQ component and whether or not to include a legend. Figure 3.12 shows the GDM both with and without the legend. You can always change the attributes later by right clicking ( ) on the object to reopen its Attributes window. (And in this case, the Select Component Attributes window of this GDM also let's you set the color attributes <u>after</u> the GDM object has been created.)

4 Place the object by clicking on an unused area of the graphics plate. Notice in Figure 3.11 that the pointer changes to a question mark with an outline of the object. The outline helps you see how much space the object will occupy on the graphics plate so you will be able to place it.

Fig. 3.11 The Pointer Changes to Aid Placement of the New Object

Most objects are not allowed to overlap each other. Exceptions include the container objects which can hold other objects. The GDM object must be placed on either an empty portion of the graphics plate or on top of an empty portion of a container object.

Figure 3.12 shows what this GDM object looks like after it has been placed with the Include Legend attribute turned on and off.

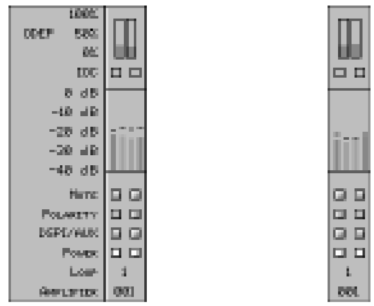


Fig. 3.12 A GDM With a Legend (Left) and Without a Legend (Right)

5 Lastly, adjust the size and location of the object. This will be discussed more fully in the sections which follow.

3.3.2 Resizing an Object

Most graphics plate objects can be resized. (Exceptions include the Crown IQ icon and text objects.) To resize an object, position the pointer over the lower right corner of the object with the mouse ( ) as shown in Figure 3.13A. The pointer will change to a cross to let you know when you are over the corner. Then drag the corner of the object by clicking the left mouse button ( ) and keeping it pressed <u>while</u> you move the mouse. An outline of the object's new size will be depicted with a dashed line as shown in Figure 3.13B. Release the mouse button and the object will be resized as shown in Figure 3.13C.

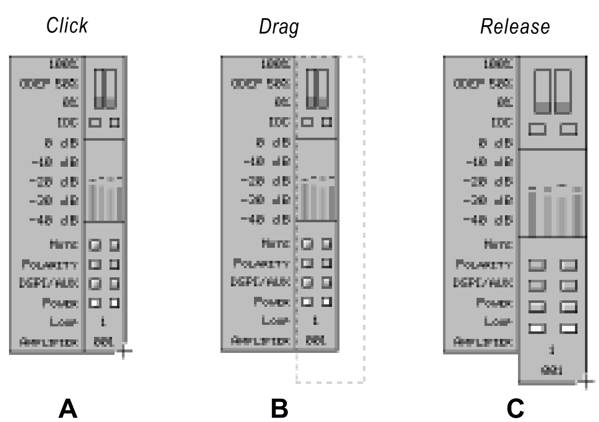


Fig. 3.13 Resizing an Object

Note: The legend panel to the left of the GDM is a separate object and must be resized separately.

To restore an object to its default size (the size it had when it was first created) click ( ) on the upper right corner as shown in Figure 3.14.

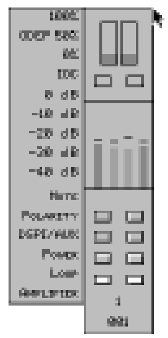


Fig. 3.14 Restoring an Object to Its Default Size

3.3.3 Moving One or More Objects

To move a single object, click ( ) anywhere along its top edge except the top right corner and drag the object to the desired location (Figure 3.15).

With the exception of text and container objects, one object cannot be placed on top of another.

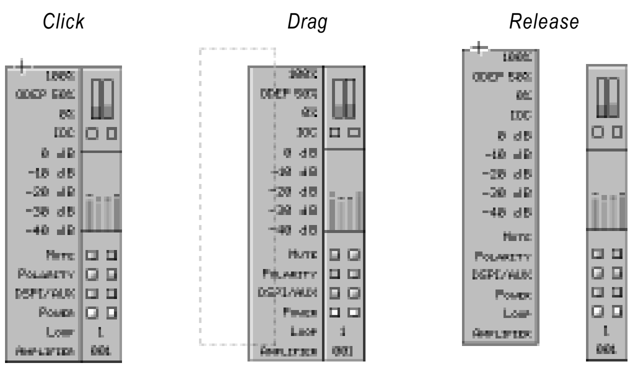


Fig. 3.15 Moving a Single Object

If the Snap to Object feature (Section 3.2) has been turned on, an object that is moved will snap into alignment when if it is placed in close proximity to another object. This can be prevented by pressing SHIFT when the mouse button is released at the end of the move.

Multiple objects can be temporarily grouped so they can be moved as a unit. To select multiple objects, lasso them by pressing SHIFT and dragging( ) the pointer until all desired objects are touched by the dotted line. Releasing the mouse button causes a box to appear around the group. In the example shown in Figure 3.16, the legend panel and left two amplifier GDMs are grouped.

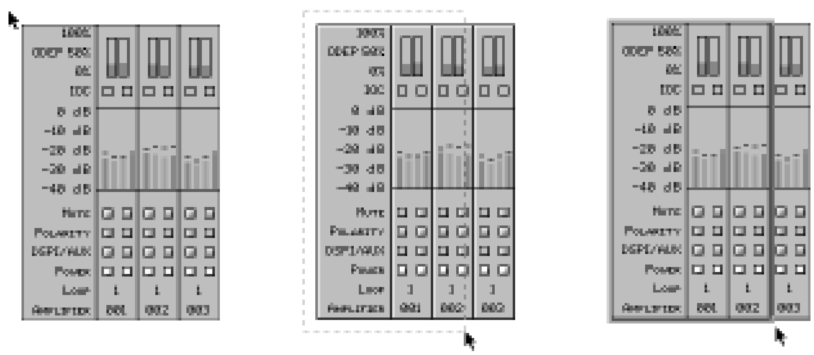


Fig. 3.16 Grouping Multiple Objects

Note: Begin the lasso on an empty part of the graphics plate to the upper left of the group.

To move a group, move the pointer to the top middle of the group until it turns into a cross-hair. Then, drag the group to the new location (Figure 3.17). Upon releasing the mouse button, the objects will be ungrouped. If all objects are not the same height, move the cross-hair to the tallest one, click and drag ( ).

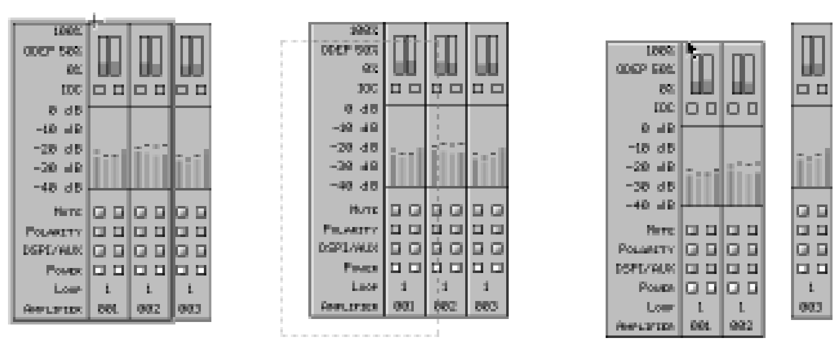


Fig. 3.17 Moving a Group of Objects

Note: Moving is the only operation that can be performed on grouped objects.

3.3.4 "Autosizing" an Object

Autosizing makes it possible to cause an object to automatically assume the size of another. To autosize an object, press CTRL and the left mouse button (CTRL+mouse) and move the object to be resized so that one of its edges is close to a parallel edge of the object whose size it is to assume. Release the mouse button first and then the CTRL key. Notice in Figure 3.18 that the smaller GDM assumes the size of the larger GDM.

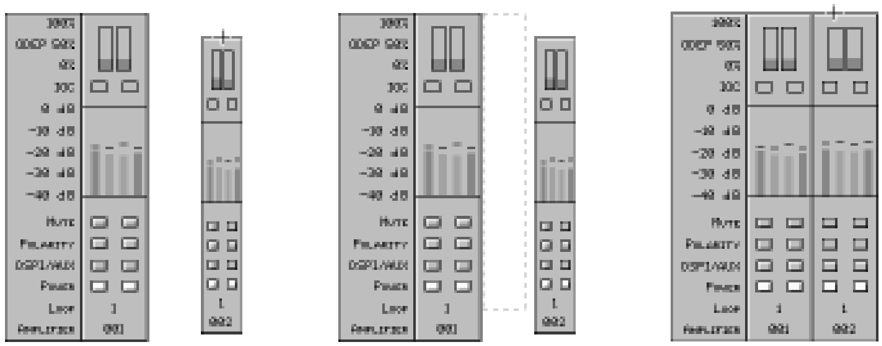


Fig. 3.18 "Autosizing" an Object

Important: The Snap to Object feature must be turned on for Autosizing to work. Press ALT+G and go to the graphics Plate Attributes window to turn on the Snap to Object feature. See Section 3.2 for more details.

3.3.5 Changing the Attributes of an Object

The attributes of any object can be changed as long as the Graphics Security Lock control is turned off. This is one of the controls on the graphics plate control block and it can only be changed from the graphics plate Control Block screen (see Section 2.8.1). You will not be able to alter the appearance or attributes of any object if this control is turned on.

The attributes are controlled from an Attributes window. To open the Attributes window of an object, right click once ( ) on the object. The GDM Attributes window of the legacy IQ *P.I.P.* from our earlier examples is shown in Figure 3.19 below:

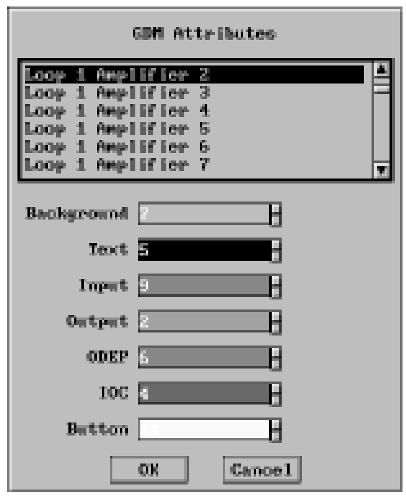


Fig. 3.19 The GDM Attributes Window for a Legacy IQ P.I.P.

This is a fairly simple Attributes window. You can select which GDM will be displayed by selecting the IQ component in the top list box and you can set the colors of the various components of the GDM at the bottom. A palette of 15 standard colors is available and are listed below:

1	Variable	6	Brown	11	Bright Cyan
2	Green	7	Grey	12	Bright Red
3	Cyan	8	Dark Grey	13	Bright Magenta
4	Red	9	Bright Blue	14	Yellow
5	Black	10	Bright Green	15	White

The variable color is a custom color that you can create by mixing various amounts of red, green and blue. It is set in the graphics plate control block (the graphics plate version) where it is referred to as the "Variable Palette" color. See Section 2.8.2 for details. There is only one variable color. Changing it affects all objects which use the variable color.

Finally, before we leave this section let's take a look a more sophisticated Attributes window like the one in Figure 3.20 for the Pot object.

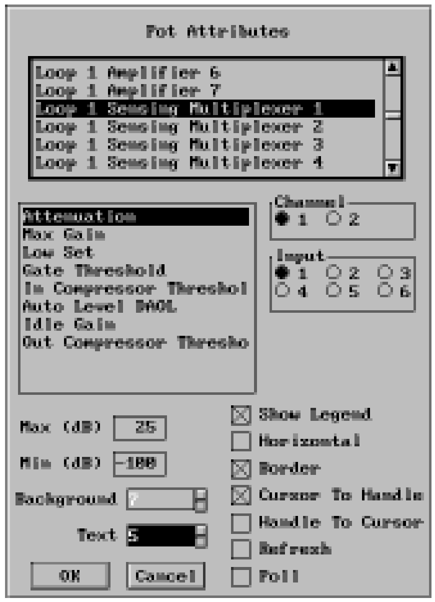


Fig. 3.20 The Pot Attributes Window

The Pot object looks a lot like a sliding fader. The name "pot" was taken from potentiometer, which is what it acts like—a level control. Notice that its Attributes window has a lot more controls than the earlier one. It allows you to set the range of the control and to select not only the IQ component it will control but also the specific function, channel and input it will control. This should whet your appetite to the kind of power and control you can have with a graphics plate. For a full description of the Pot object and all of the objects see the Object Reference section (Section 4) later in this manual.

3.3.6 Copying and Pasting an Object

After carefully configuring an object you may want to copy it. Then after it has been copied, you can open its Attributes window and assign it a new function or a different IQ component. This can be a real time saver when designing many similar controls.

It is easy to copy and paste an object on a graphics plate. Simply move the pointer over the object and press ALT+C. The object is then temporarily copied to a clipboard in the memory of the computer (displacing the previous contents of the clipboard). Next, move the pointer over an unused portion of the graphics plate or container and press ALT+V to paste the copy. The computer will beep if you try to paste the object into an area that is too small. You can continue to paste additional copies of the object by moving the pointer to other unused areas of the graphics plate or containers and pressing ALT+V again.

3.4 Deleting an Object from a Graphics Plate

How do you get rid of an object that you no longer need? You remove it by positioning the pointer over it and pressing ALT+X. When you do this, the object is not completely deleted. It is cut from the graphics plate and placed in a clipboard in the computer's memory (displacing the previous contents of the clipboard). As long as the clipboard has not changed, the object can be pasted back onto the graphics plate or container by moving the pointer to an unused portion of the graphics plate or container and pressing ALT+V. Only one object can be deleted at a time.

Important: There is no "Undo" function. This means that deleted objects cannot be restored unless they were saved as part of the graphics plate prior to deletion. If they were saved, exit the graphics plate by pressing ESC and answering No to the prompt to save changes. This prevents deleted objects from being lost. Then, return to the graphics plate with the Display control set to Memory and all previously saved objects will be restored.

Tip: *Save often and make backup copies of your dataframe files so you can return to an earlier version in case changes need to be undone.*

3.5 Adding a New IQ Component from a Graphics Plate

It may be necessary to design a graphics plate for an *IQ System* without actually being connected to the system. Or it may be necessary to design a graphics plate that includes an IQ component that is not yet installed or is not "on line" in the system. Since the missing or "off line" IQ component will not be found during a roll call, you will have to manually enter it by creating a control block for it. This can be done in the text control block screens. (Section 2.5.2 describes how to manually add a control block for a new IQ component that isn't yet on line in the system.) It can also be done from a graphics plate with the Add Component window (Figure 3.21). Press ALT+A from a graphics plate to open it.

Select the IQ component model from the list at the top of the window. Then enter the Crown Bus loop number and the unit's IQ address number. Finally, click ( ) on the OK button to create a control block for the component. The new IQ component should now be available in the component lists of all Attribute windows in the graphics plate.

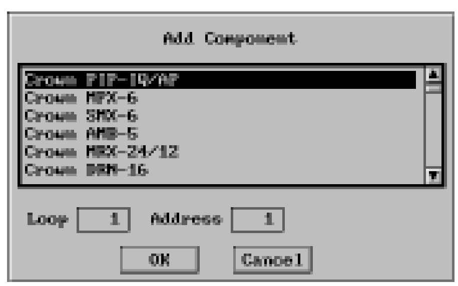


Fig. 3.21 The Add Component Window

3.6 Copying and Pasting an Entire Graphics Plate

There may be occasions when it is desirable to copy all graphics plate objects and paste them to another graphics plate. To do this, press [CTRL]+[ALT]+[C]. This copies the contents of the present graphics plate to the copy plate clipboard. A message appears to inform you that the graphics plate was successfully copied. Switch to the graphics plate where you want the copy to be pasted. Paste the graphics plate that was copied to the copy plate clipboard to the new graphics plate by pressing [CTRL]+[ALT]+[V]. All objects, including the Crown IQ logo, will be copied to the plate being displayed.

3.7 Restoring a Graphics Plate to a "New" Condition

To restore a graphics plate to a new condition, press [ALT]+[N]. This removes all objects except the Crown IQ logo. If the Display control (on the text-mode graphics plate control block) is set to Selected, a new GDM will be automatically restored for each selected IQ component just as if this were a new graphics plate. If the Display control is set to Memory, the graphics plate remains blank.

3.8 The Crown IQ Icon

The Crown IQ icon, shown in Figure 3.22, can be moved like other objects but it cannot be resized or deleted. However, it has a special function—double-clicking on it with the left mouse button ( ) summons the Toolbox. In addition, objects cannot be placed on top of the Crown IQ icon. If desired, additional Crown IQ icons can be created by pressing [ALT]+[I].

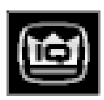


Fig. 3.22 The Crown IQ Icon

3.9 How to Create a Custom GDM

GDMs or Graphics Display Modules are a powerful class of objects because they are self-contained mini control panels for IQ components. Instead of manually adding several objects to a graphics plate every time you want to add controls for an IQ component, you can use a standard GDM. But the GDM story doesn't stop there. You do not have to use the standard GDMs—you can create your own custom GDMs, giving them just the controls and features that you want. The next time you call up a GDM for an IQ component, your custom GDM will appear in place of the standard one.

You can create a custom GDM for almost any IQ component—even older ones that do not support UCODE (Crown's *IQ2* protocol for third-party developers). Here are the steps:

1 Prepare an OIF (Object Information File) for the IQ component.

2 Exit and restart *Turbo* so it will use the OIF.

3 Create a GDM container.

4 Add objects to the GDM container to control/monitor the IQ component.

5 Save the GDM.

Let's use an amplifier with a legacy IQ *P.I.P.* for an example again. The following sections will discuss the six steps above in greater.

3.9.1 Preparing an OIF

Before a GDM can be created for an IQ component, an object information file (OIF) must exist for the IQ component. All UCODE-compatible IQ components have an OIF. Non-UCODE IQ components may or may not have an OIF. Check the directory in which *Turbo* is installed for OIFs to see if one exists for the intended IQ component. *Note: All OIFs must reside in the Turbo14 directory or Turbo will not use them.*

An OIF is a text file which can be created or edited with most text editors or word processors. Four lines are required for legacy IQ components (non-UCODE) as shown below:

```
[Component]
ID=$0F
Description=Legacy  IQ-PIP
GDMFileName=AMP.GDM
```

Note: IQ2 (UCODE) components also require a fifth version line which cannot be edited.

[Component]: The first line marks the beginning of the IQ component information section. It must be spelled exactly as shown with a beginning and closing bracket.

ID=: The second line identifies the IQ component type with an ID code. The ID codes for various IQ components are listed in the table in Figure 3.23. All ID codes begin with $ followed by two characters.

Description=: The third line lists the description that will appear in the list of IQ components in the GDM Container Attributes window (Figure 3.24). It should be no more than 30 characters in length or, depending on the characters used, it may be too long for the list.

Code	*IQ Component*
$08	Matrixer (*MRX-12* and *MRX-24)*
$0A	*SMX-6* Mixer
$0B	*AMB-5* Mixer
$0E	*MPX-6* Mixer
$0F	*IQ–P.I.P., IQ–P.I.P.–AP*
$11	*DRN-6* Drone
$13	*IQ–P.I.P.–MEM, SMT, DP, DSP*
$14	*IQ–PSI* (Pocket Serial Interface)
$17	*SLM-8* Load Monitor

Fig. 3.23 ID Codes for OIFs

GDMFileName=: The fourth line lists the file name of the GDM file. The GDM file will be created later but you should decide what to name it when you prepare the OIF. The GDM extension does not need to be included in the file name (AMP could have been used in place of AMP.GDM). We chose to use an easily recognizable name like AMP since this GDM will be used to control an amplifier via an IQ *P.I.P.*

If an OIF already exists for the IQ component, you can simply open it with a text editor, find the [Component] section and change the GDMFileName. Substitute the file name of the new GDM that you will create. Then save the changes. **Caution:** You may want to save a backup copy of the OIF before you edit it. Then you can use it again if ever need to restore the system to its original state. When you make a backup copy, either give it a different extension or move it to a different directory because *Turbo* will continue to try and use it if it sees it in the same directory with an OIF extension in its file name.

3.9.2 Exit and Restart *Turbo*

After creating the OIF, you will need to exit *Turbo* and restart it so it will incorporate the new OIF. (*Turbo* searches for OIFs during its startup procedure. It only searches the Turbo14 directory so the new OIF must be located there.) Then return to the graphics plate and continue with the next step.

3.9.3 Creating a GDM Container

Next, open the Toolbox (F5) and select the GDM Container object. The GDM Container Attributes window will appear as is shown in Figure 3.24.

If you were successful in creating an OIF, you should see the description of the IQ component listed in the window. Select it and then set the attributes listed next. *Note: At this time it is not necessary to enter a Crown Bus loop or IQ address number because this is a new GDM which we have not yet completed. Later when you call up the completed GDM for actual use, you will need to enter this information so the GDM will know which amplifier to control.*

Background: Sets the background color of the GDM Container.

Fig. 3.24 GDM Container Attributes Window

PCX File name: Sets the file name of an image that will be displayed in the background of the GDM Container. The ability to display an image in the background of the GDM Container is a very useful feature. It can display your company logo. It can have a picture of a control panel that you complete by adding control objects as described in Section 3.9.4.

Only PCX bitmap files are supported and you will have to use a third-party paint or graphics program to create the PCX file. If you use this feature, we recommend that the image have a color depth no higher than the one you are using for the graphics plate (see also Section 3.2). For example, if your graphics plate is set to use 256 colors, we recommend that the internal palette of the PCX image also have no more than 256 colors. It sometimes works best if the image has an internal palette with fewer colors. For example, use a 16-color PCX with a 256-color graphics plate. This sometimes gives *Turbo* a better chance of matching the colors correctly in your image.

If you decide to use a PCX image, you must keep a copy of the PCX file in the Turbo14 directory. The PCX file, itself, is only linked to— not embedded into the container. Whenever the GDM Container is displayed, *Turbo* searches for the PCX file so it can read it and display it in the container. If you ever decide to distribute copies of your custom GDM to others, you will need to include copies of all PCX files that are used.

Border: Determines whether or not the border of the GDM Container will be visible when a PCX picture is displayed in the container. This attribute does not affect the container when no PCX picture is used. *Note: To use the border, the Scale setting must also be turned on.*

Scale: Determines whether or not a PCX image will be scaled to fit the size of the GDM Container.

Caution: If the Scale attribute is turned on and the aspect ratio (ratio of the width to height) of the container is different from that of the PCX image, the image will be distorted to fit the container. If you want to make the container size fit the size of the image, start with the container sized bigger than the image and the Scale attribute turned off. Then link the image and after it is displayed, resize the container to fit the image while pressing SHIFT. The SHIFT key prevents the image size from changing while the container is resized.

Convert: Determines whether or not *Turbo* will attempt to match (convert) the color palette in the PCX image with the one it uses.

After configuring these attributes, you can press the OK button. Do not press the Save button—it and the Edit button will be discussed later in Section 3.9.5. After pressing the OK button, a normal-looking container will appear. Resize it to a size that is appropriate for your GDM. A sample is shown below with no PCX picture:

Objects that are placed into this GDM Container will be automatically linked to the IQ component it represents.

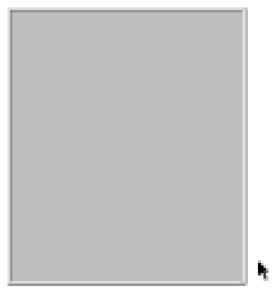


Fig. 3.25 A GDM Container

3.9.4 Adding Objects to the GDM Container

After the GDM Container has been created, it is time to add the other objects to it that will enable it to monitor and control our amplifier. For this example, we chose to create the objects shown in Figure 3.26:

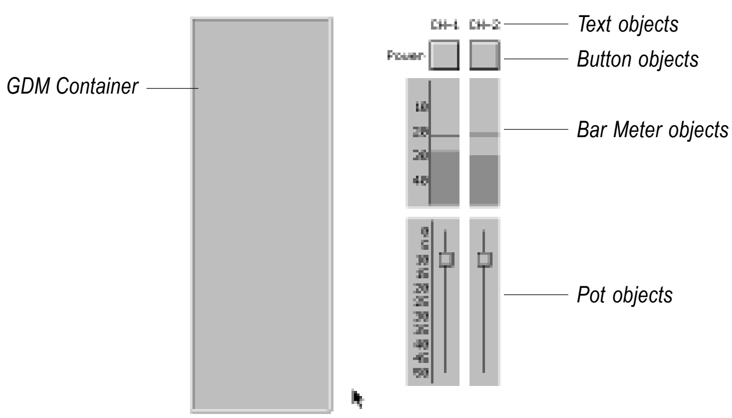


Fig. 3.26 The Unassembled Custom GDM

The objects are used as follows:

Text objects: Are used to label the channels and the power button. We chose a fairly small 5x8 bitmap font.

Button objects: Are used to turn the power off to each channel of the amplifier.

Bar Meter objects: Are used to display the output audio signal level of each channel of the amplifier. We turned off the border attribute for both and we turned on the legend attribute for only the Channel 1 Bar Meter (left).

Pot objects: Are used to control the input attenuator of each channel of the IQ *P.I.P.* We turned off the border attribute for both and we turned on the legend attribute for only the Channel 1 Pot (left).

The completed GDM is shown in Figure 3.27 after all the objects were place inside it. It offers only basic functions but it illustrates how a custom GDM can be assembled. You may want to design far more complex GDMs, complete with mini plates that pop up to reveal hidden controls, etc. With *Turbo*, you have the capability to configure your *IQ System* in a very wide variety of ways to suit its needs and the needs of your operators. See the Object Reference (Section 4) for a complete description of all the available objects.

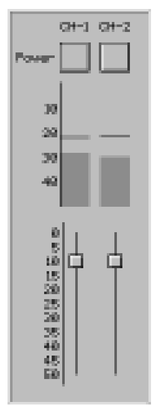


Fig. 3.27 The Assembled Custom GDM

At some point you may want to resize the new GDM. If you resize the GDM Container as described in Section 3.3.2, all of the objects inside it (except text objects with bitmap fonts) will also be resized. To prevent this, resize the container as described in Section 3.3.2 <u>but</u> press and hold down the SHIFT key when your release the mouse button and the objects inside it will not change.

3.9.5 Saving the GDM

Now that the GDM has been assembled, it must be saved. Right click ( ) on the GDM Container and let's return to the GDM Container Attributes window (Figure 3.24). Press the **Save button** and the following dialog box (Figure 3.28) will open to prompt you for the GDM file name.

Fig. 3.28 The Custom GDM Save Dialog Box

Enter the same file name you used in the OIF. You do not need to include the extension GDM because it will be automatically added.

After the GDM has been saved you will not be able to edit it. This is to prevent an operator from accidentally changing the size or location of an object in the GDM Container. To edit the GDM you will need to open its Attributes window again and press the **Edit button**. You will then be able to edit the objects in the GDM. **Important:** Don't forget to return to the GDM Container Attributes window once more at the end to save the changes.

The next time you ask for a GDM for a legacy IQ *P.I.P.* you will get your custom GDM in place of the original standard GDM. Figure 3.29 below shows several of the new GDMs side by side, each one controlling a different amplifier.

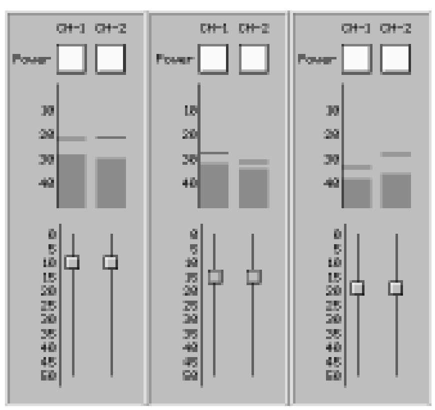


Fig. 3.29 The New GDM Replaces the Standard One That Came With Turbo

3.10 Saving a Graphics Plate

We briefly addressed storing and saving a graphics plate in Section 2.8.2. However, before leaving the subject of Designing Graphics Plates, it is appropriate to address the saving of graphics plates more thoroughly.

During the normal operation of *Turbo* the settings of all controls are stored in memory. When a new *dataframe* file is opened, the settings contained within it, including the contents and attributes of all graphics plates, replace the ones in memory. So the settings stored in memory represent the current state of the *IQ System*. (There are a few exceptions, such as when a drone makes changes to the system independently of the host computer. But those exceptions are beyond the scope of this discussion.)

When a *dataframe* file is saved, all the settings in memory are written to the file—including the contents and attributes of all graphics plates that are also stored in memory. Therefore, saving a graphics plate involves two steps: 1) Store the graphics plate into memory, and 2) Save the contents of memory to a *dataframe* file.

Turbo makes it very easy to store a graphics plate into memory because it will not let you leave the graphics plate without first offering to store unsaved changes into memory as shown below in Figure 3.30.

Selecting Yes will cause the graphics plate to be stored into memory. Selecting No will cause it not to be stored and all changes that were made since it was last stored will be lost. Selecting Cancel will cause the graphics plate to remain open.

Fig. 3.30 A Prompt to Store Changes Into Memory Before Exiting a Graphics Plate

Section 2.8.2 also showed how to manually store a graphics plate into memory at any time by opening the graphics plate control panel from the graphics plate and clicking on the Store button.

After leaving a graphics plate, it is easy to save a *dataframe* file by pressing F9 and choosing one of the save options as discussed in Section 2.9. **Remember:** If you do not save the contents of memory to a *dataframe* file, they will be lost when *Turbo* is shut down or the computer is turned off.

4 Object Reference

A wide variety of objects are available in a graphics plate. We recommend that you read this section to get an overview of the kinds of things you can do with a graphics plate. It's a great place to get ideas when you want to design a new graphics plate.

Graphics plate objects are the building blocks that are used to construct custom control screens. They are selected from the graphics plate Toolbox (shown below in Figure 4.1). This section will describe each graphics plate object in the order they are listed in the Toolbox menu.

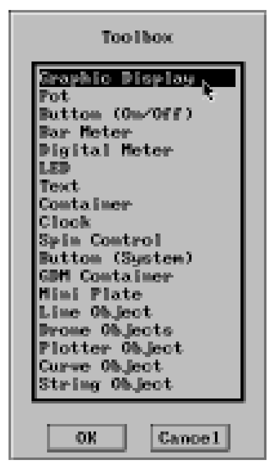


Fig. 4.1 The Graphics Plate Toolbox

4.1 Graphic Display Module (GDM)

A GDM is a mini control panel for an IQ component. It is preconfigured with a variety of different controls that let you monitor and/or control an IQ component. Several standard GDMs are provided with *Turbo* so the user can quickly control one or more IQ components from a graphics plate. In addition, custom GDMs can be created to replace the standard ones or for those IQ components that have no GDM.

To place a GDM on a graphics plate, choose **Graphic Display** from the Toolbox. The GDM Select Component window (Figure 4.2) will then open to allow you to select the type of GDM to use.

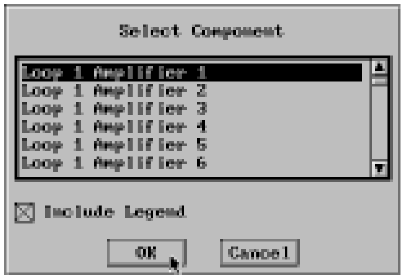


Fig. 4.2 GDM Select Component Window

Component List: Choose the IQ component from this list whose GDM you want to place on the graphics plate. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Include Legend: Some GDMs have an optional legend to label its various controls and indicators. If this check box is enabled, you can use it to control whether or not the legend will be included with the GDM.

Tip: *If you plan to place more than one copy of the same GDM side-by-side on a graphics plate, you can include the legend for the first GDM only. It will serve the other GDMs.*

OK: Press this button to accept the settings. Afterward the pointer will change to a question mark with an outline of the GDM as shown in Figure 3.11. Click ( ) on an unused portion of the graphics plate or an unused portion of a container to place the new object.

There are many different GDMs so we won't try to show them here. Each one is discussed in the sections later in this manual which concentrate on specific IQ components.

Cancel: Press this button to cancel the request to create a GDM and close the GDM Select Components window.

Note: Many GDMs provide real-time display of input or output audio signal levels. As a result, each one requires processing time from the host computer. As more GDMs are placed on the graphics plate, the response time of the monitor functions may slow.

Right click ( ) on a GDM to open its Attributes window in case any attributes need to be changed.

4.2 Pot

The Pot (Potentiometer) object is a level control that can be used to control settings such as gain, attenuation, compressor threshold and other similar variables. It looks like a slider or fader control and it is a very useful object. To place a Pot on a graphics plate, choose **Pot** from the Toolbox. The Pot Attributes window (Figure 4.3) will then open so you can configure it. Its attributes are described below.

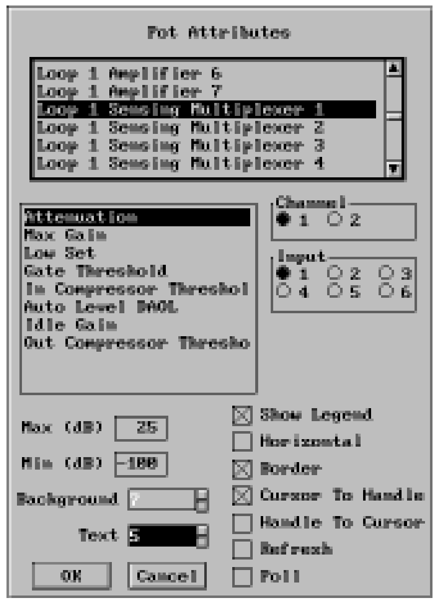


Fig. 4.3 The Pot Attributes Window

Component List: Selects the IQ component to which the Pot will be linked. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the Pot will control. The function list will change to match the IQ component selected in the component list.

Channel: Selects the channel which the Pot will affect. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the Pot will affect. This attribute will not be available for some IQ components and some functions.

Max (dB): Sets the maximum level for the Pot. In this way, you can limit the operating range of the control to prevent an operator from turning it up to high.

Min (dB): Sets the minimum level for the Pot. In this way, you can limit the operating range of the control to prevent an operator from turning it down too low.

Background: Sets the background color of the Pot. The handle and border are not affected by the background color.

Text: Sets the foreground color of the Pot's legend and inside lines. The legend is only visible if the Show Legend attribute is turned on. However, the travel line along which the Pot's control handle moves will be affected. The handle and border are not affected by the text (foreground) color.

Show Legend: Causes the legend to be displayed. The Pot legend labels the scale of the Pot. See Figure 4.4 for some example of Pots with and without legends.

Horizontal: Causes the Pot to be use a horizontal orientation instead of its normal vertical orientation. See Figure 4.4 for some samples of Pots with vertical and horizontal orientation.

Border: Causes the Pot to use a three-dimensional border that gives the Pot a raised appearance. This border is not affected by the color attributes. It is often desirable to turn off the border when the Pot is placed inside a container. This causes it to blend into the container. See Figure 4.4 for some samples of Pots with and without a border.

Cursor to Handle: Causes the cursor to snap to the handle whenever the mouse is clicked over the Pot. This can help the operator make smooth rather than abrupt adjustments.

Handle to Cursor: Causes the handle to snap to the cursor whenever ALT is pressed at the same time that the mouse is clicked or dragged (ALT+) on the travel line of the Pot handle. This provides a way to change the level in a single quick jump. Although this feature overrides the Cursor to Handle feature, it doesn't cause a conflict because the Handle to Cursor feature requires the ALT key.

Refresh: This attribute only affects Pots that are linked to *IQ2* components. If Refresh is turned on <u>and</u> the Pot has been placed inside a container object, every time the state of the Pot changes, all objects in the parent container will retrieve their state from their respective IQ components and redisplay themselves if necessary.

Poll: This attribute only affects Pots that are linked to *IQ2* components. When this attribute is turned on, the *IQ2* component will be polled continually for the current level and the Pot will be updated immediately upon any changes. When the Poll attribute is turned off (the default), the Pot is only updated when it is redrawn. This feature is very useful when one of the compressor features of an *IQ2 P.I.P.* (such as an *IQ–P.I.P.–SMT, IQ–P.I.P.–DP, IQ–P.I.P.–DSP)* is used. By polling the *IQ2* component, those changes can be immediately recognized by *Turbo* and the Pot object updated accordingly.

Four Pots are shown in Figure 4.4. Two of the Pots are vertical and two are horizontal. Each set is shown with and without a legend. The two vertical Pots have a border and the two horizontal Pots do not.

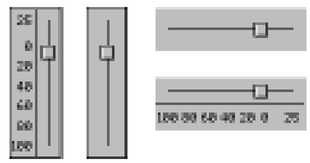


Fig. 4.4 Sample Pot Objects

Notice in Figure 4.5 that the legend is dynamic and automatically scales itself to the size of the Pot.

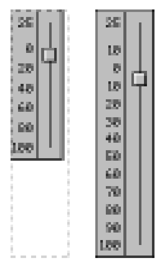


Fig. 4.5 The Legend Automatically Scales to Fit the Pot

Notice in Figure 4.6 that the pointer changes to a hand when it is clicked on the Pot, showing that any movement up or down will now change its level.

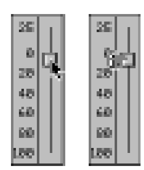


Fig. 4.6 The Pointer Changes to a Hand When the Pot Handle is Clicked or Dragged

Important: Level changes made with a Pot are immediately sent to the associated IQ component.

Several Pots can be assigned to the same function. For example, you can create three Pots to control the input attenuation of Channel 1 of the same amplifier. If you do this, you will find that changes to the level of one Pot are immediately reflected by the others.

To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.3 On/Off Button

A On/Off Button object acts like a pushbutton to turn something on or off. It is square or rectangular in shape. To place an On/Off Button on a graphics plate, choose **Button (On/Off)** from the Toolbox. The Button Attributes window (Figure 4.7) will then open so you can configure it. Its attributes are described below:

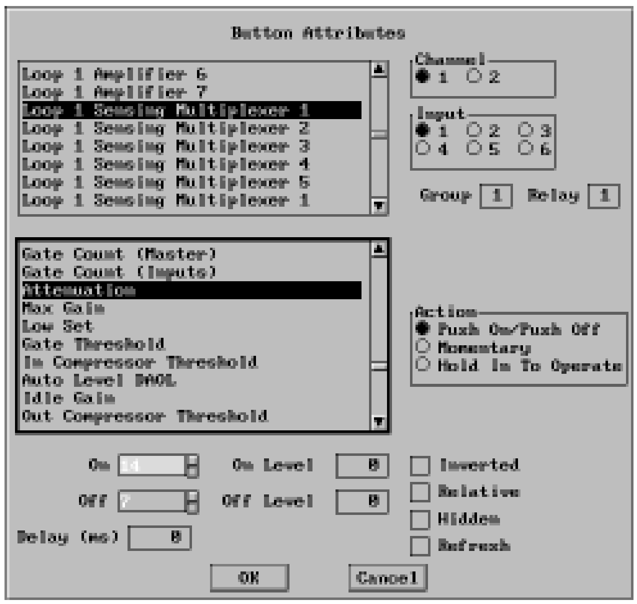


Fig. 4.7 The Button Attributes Window

Component List: Selects the IQ component to which the Button will be linked. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the Button will control. The function list will change to match the IQ component selected in the component list.

Channel: Selects the channel which the Button will affect. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the Button will affect. This attribute will not be available for some IQ components and some functions.

Group: Selects the matrix group which the Button will affect. This attribute is only available for IQ matrixers.

Relay: Selects the matrix relay which the Button will control. This attribute is only available for IQ matrixers.

Action: Sets the operating mode for the Button. As its name suggests, the **Push On/Push Off** mode causes the Button to behave like a normal two-state pushbutton that you press and release once to send the On command and then press and release again to send the Off command. The **Momentary** mode causes the Button to send the same command each time the Button is pressed. The **Hold In To Operate** mode causes the Button to send the On command when it is pressed and the Off command when it is released.

On: Sets the color when the Button is turned on.

Off: Sets the color when the Button is turned off.

Delay (ms): Causes a delay in milliseconds between the time the Button is pressed until the its command is sent and the Button color is updated. Enter a value of 0 (zero) to turn off the delay. The delay timer is reset every time the Button is pressed. The Delay attribute has no affect when the Action is set to Hold In To Operate.

Note: Buttons configured to control amplifier global all commands will control amplifiers on all Crown Bus loops. However, the same functions, when controlled from a drone, are specific to just one Crown Bus loop.

On Level: Sets the turn-on level when the Button is used to control a level function.

Off Level: Sets the turn-off level when the Button is used to control a level function.

Inverted: Swaps the on/off commands so that the Button sends the Off command when it is turned on and the On command when it is turned off.

Relative: (Drone AUX inputs only.) Causes changes made to a level function to be made relative to its present level. When this attribute is turned off, the on/off levels are absolute. This attribute is only available when the Button is used to configure an AUX input on a drone.

Hidden: Causes the button not to be displayed on the graphics plate. However, the button is fully functional. Hidden buttons can be used to create hidden hot spots. However, care should be taken using this attribute so that hidden buttons are not "lost" on the graphics plate. If this happens, press ALT+H to make all hidden buttons visible. Pressing ALT+H a second time will toggle the hidden buttons back to their hidden state.

Refresh: This attribute only affects Buttons that are linked to UCODE-compatible IQ components. If Refresh is turned on and the Button has been placed inside a container object, every time the state of the Button changes, all objects in the parent container will retrieve their state from the IQ component and redisplay themselves if necessary.

A sample On/Off Button is shown in Figure 4.8.

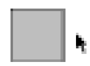


Fig. 4.8 A Sample Button

Several Buttons can be assigned to the same function. For example, you can create three Buttons to control the power on/off function of Channel 1 of the same amplifier. If you do this, you will find that changes to one Button are immediately reflected by the others.

To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.4 Bar Meter

The Bar Meter object is a bar graph that dynamically displays a level. For example, it can provide real time display of the signal levels of amplifiers with IQ *P.I.P.s* and some IQ mixers. Each Bar Meter you create takes some processing time from the host computer. This means that the more Bar Meters you create, the slower their response. To place a Bar Meter on a graphics plate, choose **Bar Meter** from the Toolbox. The Bar Meter Attributes window (Figure 4.9) will then open so you can configure it. Its attributes are described next.

Component List: Selects the IQ component to which the Bar Meter will be linked. All IQ components that

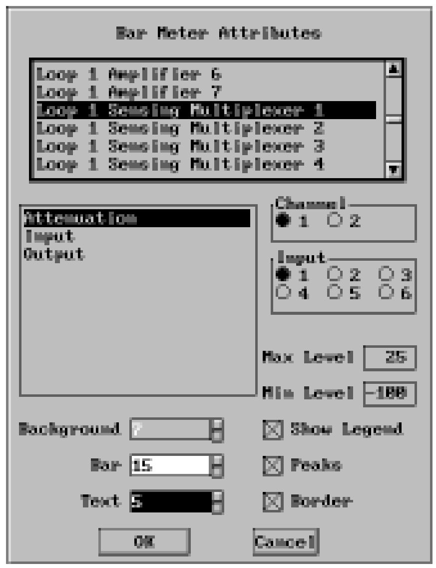


Fig. 4.9 Bar Meter Attributes Window

appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the Bar Meter will monitor. The function list will change to match the IQ component selected in the component list.

Channel: Selects the channel which the Bar Meter will monitor. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the Bar Meter will monitor. This attribute will not be available for some IQ components and some functions.

Max Level: Sets the maximum level for the Bar Meter. In this way, you can limit the display range of the object to tailor the meter to the type of signal it will monitor.

Min Level: Sets the minimum level for the Bar Meter. In this way, you can limit the monitor range of the meter to tailor the meter to the type of signal it will monitor.

Background: Sets the background color of the Bar Meter. The border is not affected by the background color.

Bar: Sets the moving bar color of the Bar Meter.

Text: Sets the foreground color of the Bar Meter's legend and inside lines. The legend is only visible if the Show Legend attribute is turned on.

Show Legend: Causes the legend to be displayed. The Bar Meter legend labels the scale of the meter. See Figure 4.10 for some example of Bar Meters with and without legends.

Peaks: Enables the peak hold feature. The peak hold feature causes the signal peaks to persist on the meter for a fraction of a second.

Border: Causes the Bar Meter to use a three-dimensional border that gives it a raised appearance. This border is not affected by the color attributes. It is often desirable to turn off the border when the Bar Meter is placed inside a container. This causes it to blend into the container. See Figure 4.10 for some samples of Bar Meters with and without a border.

Four Bar Meters are shown in Figure 4.10. Two of them have a legend and two do not. And two of the meters have a border and two do not. They all have the Peaks attribute turned on.

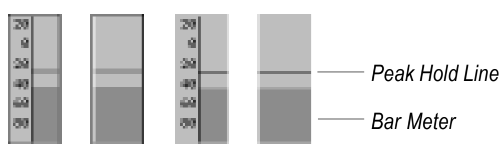


Fig. 4.10 Sample Bar Meter Objects

Notice in Figure 4.11 that the legend is dynamic and automatically scales itself to the size of the Pot.

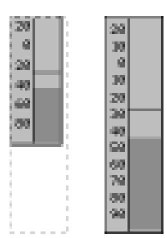


Fig. 4.11 The Legend Automatically Scales to Fit the Bar Meter

To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.5 Digital Meter

The Digital Meter object is a numerical level display. For example, it can provide real time display of the signal levels of amplifiers with IQ *P.I.P.s* and some IQ mixers. Each Digital Meter you create takes some processing time from the host computer. This means that the more Digital Meters you create, the slower their response. To place a Digital Meter on a graphics plate, choose **Digital Meter** from the Toolbox. The Digital Meter Attributes window (Figure 4.12) will then open so you can configure it. Its attributes are described next.

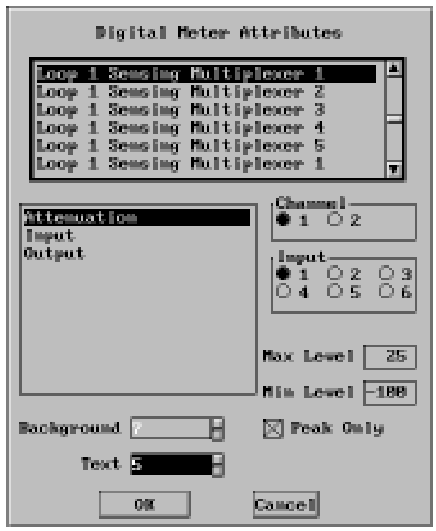


Fig. 4.12 The Digital Meter Attributes Window

Component List: Selects the IQ component to which the Digital Meter will be linked. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the Digital Meter will monitor. The function list will change to match the IQ component selected in the component list.

Channel: Selects the channel which the Digital Meter will monitor. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the Digital Meter will monitor. This attribute will not be available for some IQ components and some functions.

Max Level: Sets the maximum level for the Digital Meter. In this way, you can limit the display range of the object to tailor the meter to the type of signal it will monitor.

Min Level: Sets the minimum level for the Digital Meter. In this way, you can limit the monitor range of the meter to tailor the meter to the type of signal it will monitor.

Background: Sets the background color of the Digital Meter. The border is not affected by the background color.

Text: Sets the foreground color of the Digital Meter's text.

Peak Only: Determines whether or not the Digital Meter will respond only to a signal peak that is higher than its previous setting. This causes the meter to hold the highest level it ever received.

A sample Digital Meter is shown in Figure 4.13 below.

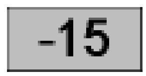


Fig. 4.13 A Sample Digital Meter

To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.6 LED

The LED (Light Emitting Diode) object serves as an indicator light. It can be used to visually signal when something is turned on or off. To place an LED on a graphics plate, choose **LED** from the Toolbox. The LED Attributes window (Figure 4.14) will then open so you can configure it. Its attributes are described next.

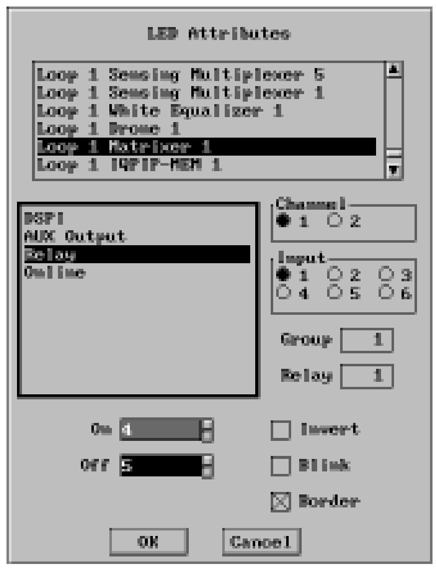


Fig. 4.14 The LED Attributes Window

Component List: Selects the IQ component to which the LED will be linked. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the LED will monitor. The function list will change to match the IQ component selected in the component list.

Channel: Selects the channel which the LED will monitor. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the LED will monitor. This attribute will not be available for some IQ components and some functions.

Group: Selects the matrix group which the LED will monitor. This attribute is only available for IQ matrixers.

Relay: Selects the matrix relay which the LED will monitor. This attribute is only available for IQ matrixers.

On: Sets the color when the function monitored by the LED is turned on.

Off: Sets the color when the function monitored by the LED is turned off.

Invert: Swaps the on/off commands so that the LED uses the On color when the function it monitors is turned off and visa versa.

Blink: Causes the LED color to blink when the function it monitors is turned on (or off if the Invert attribute is turned on).

Border: Causes the LED to use a three-dimensional border that gives it a raised appearance. This border is not affected by the color attributes. It is sometimes desirable to turn off the border when the LED is placed inside a container. This causes it to blend into the container. See Figure 4.15 for some samples of LEDs with and without a border.

Fig. 4.15 Sample LED Objects

Four sample LEDs are shown above. The two on the left are off and the two on the right are on. The smaller LEDs have not border. This illustrates a characteristic of LEDs—even if the Border attribute is turned on, the border will disappear when the LED is resized very small. When this happens, resizing the LED to a larger size will restore the border.

Tip: *You can add text to an LED that remains invisible until the LED is turned on. To do this, make the text the same color as the Off color.*

If desired, more than one LED can be linked to the same function of the same IQ component. For example, you can create four LEDs to indicate the status of the Channel 1 *IOC* circuitry of the same amplifier.

To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.7 Text

Text objects are used as labels and they are one of the few objects that can be placed on top of other objects. To place a Text object on a graphics plate, choose **Text** from the Toolbox. The Text Attributes window (Figure 4.16) will then open so you can configure it. Its attributes are described next.

Fig. 4.16 The Text Attributes Window

Font List: Selects the font to be used by the Text object. A preview of the selected font is displayed at the bottom of the Attributes window to help you make a selection. See Figure 4.17 for a sample of each font. There are two types of fonts, stroked (vector) and bitmap.

Stroked Fonts: The stroked fonts are variable in size between 5 and 60 points and are listed first in the Font List. (A "point" is a typographical unit of size equal to 1⁄72 of an inch. However, whether 72 points really equal an inch on your computer's display will be controlled by the video resolution and the size of your monitor.) Because the stroked fonts are variable in size, Text objects that use them can be resized. For example, placing a Text object with a stroked font into a container and then resizing the container will cause the Text object to be scaled along with the container. To prevent Stroked Text objects from being resized, press SHIFT when resizing the parent object. A disadvantage of stroked fonts is that they are not optimized for a specific size like bitmap fonts and so they do not look good at some sizes.

Bitmap Fonts: The bitmap fonts are fixed in size and are listed last in the Font List. A different bitmap font is required for each size. Because bitmap fonts cannot be resized, their size is selected when you choose them from the Font List. Also, placing a Text object with a bitmap font into a container and then resizing the container will have no affect on the size of the Text object. However, an advantage of bitmap fonts is that they usually look better because they have been optimized for one size.

The size of a bitmap font is included in its name and two methods are used to describe the size. Some bitmap fonts have a single number which lists the font's equivalent point size (like stroked fonts). Others list the size in pixels such as 8x12 pixels. (A pixel is the smallest dot of light that can be controlled on your display, considering the video resolution settings of your system's host computer.)

Fig. 4.17 Sample Fonts

Size: Sets the size of stroked fonts (the range is 5 to 60 points). It also displays the relative size of a bitmap font if one is selected. Several sizes of the CAM bitmap font are shown below in Figure 4.18:

Fig. 4.18 Sample Font Sizes

Color: Sets the foreground color of the font. (There is no background color attribute because the background of Text objects is transparent to allow the background of the graphics plate or other objects to show through.)

Shadow: Causes a shadow to appear behind the font and selects the color of the shadow.

Bold: Increases the weight (thickness) of the font. The Bold attribute affects both stroked and bitmap fonts.

Italics: Causes stroked fonts to take on a slanted or italicized appearance. The Italics attribute has no affect on bitmap fonts.

After a Text object has been created, only the Color, Bold, Italic, and Shadow attributes can be edited. To change these attributes right click ( ) to reopen the Text Attributes window.

To edit the text in a Text object, double-click ( ) on it with the left mouse button. When a cursor appears at the end of the text block (Figure 4.19), you can begin typing to add additional text or delete existing text by backspacing over it before entering a correction. When editing is completed, click ( ) outside the Text object to deselect it.

Fig. 4.19 Editing the Text in a Text Object

To reposition a Text object, move the cursor to the top of the text object until it changes to a cross-hair. Then, click ( ) and drag the text as shown in Figure 4.20.

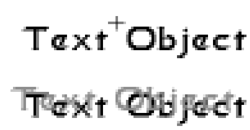


Fig. 4.20 Moving a Text Object

Text objects can be placed on top of other objects. For example, one or more Text objects can be used to label a GDM, Button object, or a container. When a Text object is placed on top of another, it links to it and moves with it. In the example shown in Figure 4.21, PANIC overlays the Button.

Fig. 4.21 A Text Object on an On/Off Button Object

Note: Text objects that are wider than the object on which they are placed are clipped to fit and, although one text object can be positioned on top of another, they are not linked.

4.8 Container

Controls can be placed directly on the background of the graphics plate. But it is often desirable to organize objects into logical groups. For example, you could group all mixer controls together and group all amplifier controls together. This makes graphics plates easier to understand and use. The Container object is useful for visually grouping other objects and adding aesthetic appeal to a graphics plate design. To place a Container on a graphics plate, choose Container from the Toolbox. The Container Attributes window (Figure 4.22) will then open so you can configure it. Its attributes are described below.

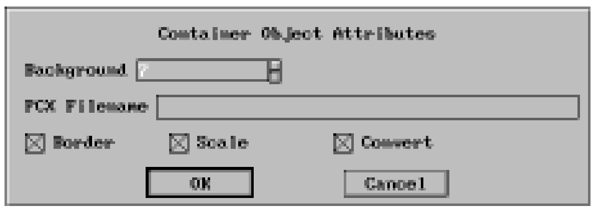


Fig. 4.22 The Container Attribute Window

Background: Sets the background color of the Container. The border highlights and shadows are not affected by the background color.

PCX File name: Sets the file name of an image that will be displayed in the background of the Container object. The ability to display an image in the background of the Container object is a very useful feature. It can display your company logo. It can have a picture of a control panel that you complete by adding other objects.

Only PCX bitmap files are supported and you will have to use a third-party paint or graphics program to create the PCX file. If you use this feature, we recommend that the image have a color depth no higher than the one you are using for the graphics plate (see Section 3.2). For example, if your graphics plate is set to use 256 colors, we recommend that the internal palette of the PCX image also have no more than 256 colors. It sometimes works best if the image has an internal palette with fewer colors. For example, use a 16-color PCX with a 256-color graphics plate. This sometimes gives *Turbo* a better chance of matching the colors correctly in your image.

If you decide to use a PCX image, you must keep a copy of the PCX file in the same directory as *Turbo*. The PCX file is only linked to— not embedded into the Container. Whenever the Container is displayed, *Turbo* searches for the PCX file so it can read it and display it in the Container. If you ever decide to distribute copies of a *dataframe* file that includes Containers with PCX images, you will need to include copies of all PCX files that are used.

Border: Determines whether or not the border of the Container object will be visible when a PCX picture is displayed in the Container. This attribute does not affect the Container when no PCX picture is used. *Note: To use the border, the Scale setting must also be turned on.*

Scale: Determines whether or not a PCX image will be scaled to fit the size of the Container object. **Caution:**

If the Scale attribute is turned on and the aspect ratio (ratio of the width to height) of the Container is different from that of the PCX image, the image will be distorted to fit the Container. If you want to make the Container size fit the size of the image, start with the Container sized bigger than the image and the Scale attribute turned off. Then link the image and after it is displayed, resize the Container to fit the image while pressing SHIFT. The SHIFT key prevents the image size from changing while the Container is resized.

Convert: Determines whether or not *Turbo* will attempt to match (convert) the color palette in the PCX image with the one it uses. It does this by dithering the existing colors to try to emulate a larger color palette.

A Container object is a box that can hold other objects. As a result, objects within it are linked to it so they move and resize along with the Container. An empty Container object is shown in Figure 4.23.

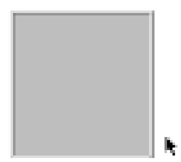


Fig. 4.23 A Sample Empty Container Object

The example in Figure 4.24 shows an *MRX-24* matrixer control panel that was created using a Container object. The Text and Button objects were placed in the Container to create the control panel. Each of the smaller Buttons was assigned to one of the *MRX-24* relays.

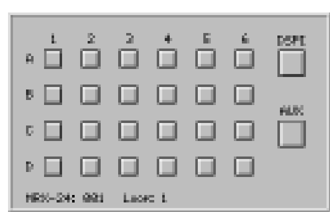


Fig. 4.24 A Sample Container Used to Create an MRX-24 Control Panel

Moving or resizing a Container causes all the objects, except for Text objects with bitmap fonts, within it to move or be proportionally resized along with it. This makes Containers useful for grouping objects.

It is possible to place a Container around existing objects without linking to them. Placing a Container on top of existing objects results in the Container moving behind the objects. The result looks as if the objects and the Container are linked but moving or resizing the Container has no affect on the objects in front of it. To correct this, click on the top edge of each object. This causes them to link to the Container behind them.

When drawing Containers that overlap, an existing Container is usually layered behind the new one, as shown in Figure 4.25.

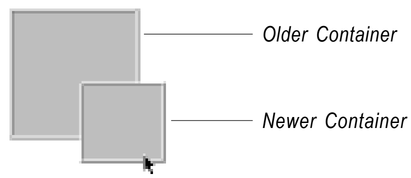


Fig. 4.25 Normally New Containers Are Layered on Top of Older Containers

It is possible to move a rear Container in front of another Container. First, move the pointer over the rear Container. Then press ALT and click ( ) on it to bring it to the front.

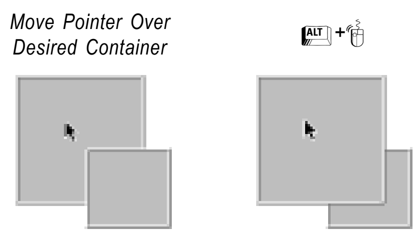


Fig. 4.26 Moving a Container to the Front of Another Container

Note: To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.9 Clock

The Clock object provides a numerical display of the time. To place a Clock on a graphics plate, choose Clock from the Toolbox. The Clock Attributes window (Figure 4.27) will then open so you can configure it. Its attributes are described below.

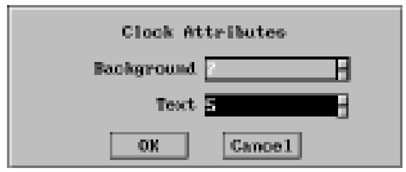


Fig. 4.27 The Clock Attributes Window

Background: Sets the background color of the Clock. The border is not affected by the background color.

Text: Sets the text foreground color of the Clock.

The time is displayed as Hours:Minutes:Seconds:AM/PM. A sample is shown in Figure 4.28.

Fig. 4.28 A Sample Clock

Note: To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.10 Spin Control

The Spin control object is used to control functions (usually multistate) that cannot be controlled by Pot or Button objects. For example, a Spin control can be used to set a compression ratio. To place a Spin control on a graphics plate, choose **Spin Control** from the Toolbox. The Spin Control Attributes window (Figure 4.29) will then open so you can configure it. Its attributes are described below.

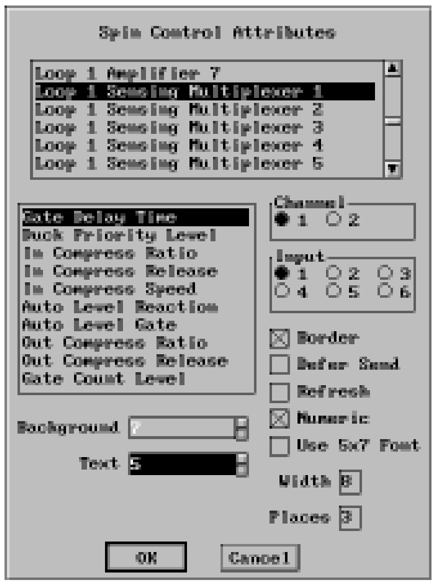


Fig. 4.29 The Spin Control Attributes Window

Component List: Selects the IQ component to which the Spin control will be linked. All IQ components that appear in the control blocks and all *IQ2* components whose UCODE (OIF file) is visible to *Turbo* will appear in this list.

Function List: Selects the specific function that the Spin control will control. The function list will change to match the IQ component selected in the component list.

Background: Sets the background color of the Spin control. The border is not affected by the background color.

Text: Sets the text foreground color of the Spin control.

Channel: Selects the channel which the Spin control will affect. This attribute will not be available for some IQ components and some functions.

Input: Selects the input which the Spin control will affect. This attribute will not be available for some IQ components and some functions.

Border: Causes the Spin control to use a three-dimensional border that gives the Spin control a raised appearance. This border is not affected by the color attributes. It is often desirable to turn off the border when the control is placed inside a container. This causes it to blend into the container.

Defer Send: Prevents changes from being sent to the linked IQ component until the Send button is pressed. The Send button is available at the bottom of the control (see Figure 4.30) only when this attribute is turned on.

Refresh: This attribute only affects Spin controls that are linked to UCODE-compatible IQ components. If Refresh is turned on and the Spin control has been placed inside a container object, every time the state of the Spin control changes, all objects in the parent container will retrieve their state from the IQ component and redisplay themselves if necessary.

Numeric: Causes the Spin control to display numerical data. This attribute is automatically selected for some functions. When the Numeric attribute is turned on, it is also possible to enter a numerical value directly into the display window when the Spin control is clicked with the center mouse button ( ). *Note: Two-button mouse users can simultaneously press both the left and right buttons in place of a center button.* Also, the longer the increment/decrement buttons are pressed, the larger the step size used to increment/decrement the value. Lastly, the Width and Places attributes are active only when the Numeric attribute is turned on.

Use 5x7 Font: Causes the Spin control to always use a compact 5x7 bitmap font. This can increase legibility when the Spin control is sized very small.

Width: Sets the maximum number of digits that are displayed when the Numeric attribute is turned on.

Places: Sets the number of digits placed to the right of the decimal point when the Numeric attribute is turned on.

Two spin controls are shown in Figure 4.30. The left one has the Defer Send attribute turned off and the right one has Defer Send attribute turned on.

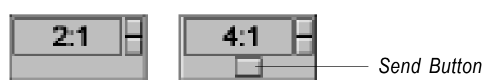


Fig. 4.30 Sample Spin Controls

Note: To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.11 System Button

System Buttons look like typical On/Off Buttons but they are used to make system changes such as loading and engaging the settings in a *dataframe* file or opening another graphics plate. To place an System Button on a graphics plate, choose **Button (System)** from the Toolbox. The System Button Attributes window (Figure 4.31) will then open so you can configure it. Its attributes are described below:

Function List: Selects the specific function that the System Button will perform. Each one is described below:

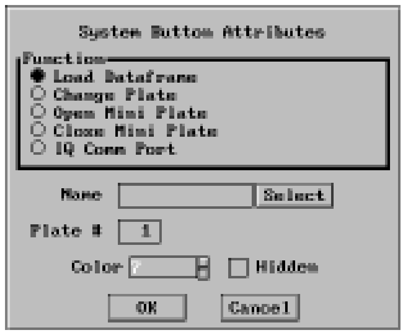


Fig. 4.31 The System Button Attributes Window

Load Dataframe: Causes the System Button to load and engage the settings in a *dataframe* file. When this function is selected, the Name attribute will be activated so you can enter the file name of the *dataframe* file.

Change Plate*:* Causes the System Button to open a different graphics plate. Using it, you can navigate from one graphics plate to another without ever returning to the graphics plate Control Block screen. When this function is selected, the Plate # attribute is activated so you can enter the number assigned to the graphics plate in its control block.

Note: The present graphics plate is automatically saved in memory when using a System Button to switch to another graphics plate. Therefore, there is no prompt to save changes.

Open Mini Plate*:* Causes the System Button to open a mini plate (see Section 4.13 for a description of mini plates). **Important:** The mini plate must already exist. If it doesn't, you should press the Cancel button and create the mini plate before creating the System Button for it. When this function is selected, both the Name attribute and Select button are activated so you can enter or select the name of the mini plate which will be linked to the System Button.

Close Mini Plate*:* Causes the System Button to close a mini plate (see Section 4.13 for a description of mini plates). When this function is selected, neither the Name or Plate # attributes are active. This is because the System Button must be placed onto the Mini Plate Container of the mini plate it is intended to close. When this is done, the System Button will automatically link to that mini plate.

***IQ Comm Port**:* Causes the System Button to control serial communication between the host computer and the IQ interface. The System Button acts like a toggle switch when this function is selected. Pressing the button once will turn off the computer's serial port. Pressing it again will turn the serial port back on. This function is useful when you need to prevent changes from being sent to the *IQ System*. ALT+P is a keyboard shortcut which can also be used to toggle the serial port on and off from a graphics plate.

Name: When the Load Dataframe function is selected, the Name attribute is the *dataframe* file name. You do not need to include the DIQ extension (for example, you can enter SETUP rather than SETUP.DIQ). The *dataframe* file must be located in the same directory as *Turbo*. If it is not, *Turbo* will not be able to locate it and will display the message shown below in Figure 4.32 when the System Button is pressed.

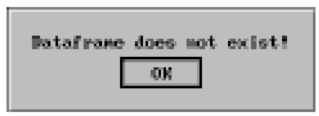


Fig. 4.32 Dataframe Files Must Be Stored in the Turbo Directory

When the Open Mini Plate function is selected, the Name attribute is the mini plate name. However, you do not have to enter the name of the mini plate in the Name field. Instead you can press the Select button and choose its name from the list. This is explained next.

Select: This attribute is only available when the Open Mini Plate function is selected. Pressing it opens the Select Mini Plate window shown in Figure 4.33 below:

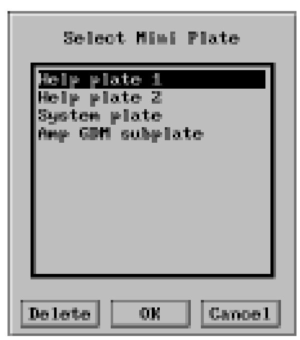


Fig. 4.33 The Select Mini Plate Window

It lists all the available mini plates—including mini plates from <u>all</u> available graphics plates. Select the one that you want to link to the System Button. After you press the OK button, the mini plate name will be entered in the Name field. You can also delete unwanted mini plates with this window with the Delete button.

Note: Mini plates are stored along with graphics plates in dataframe files.

Plate #: This attribute is only available when the Change Plate function is selected. It identifies the number of the graphics plate that will be opened when the System Button is pressed. This is the number assigned to the graphics plate in its control block in the graphics plate Control Block screen.

Color: Sets the color of the System Button. However, it does not affect the border color.

Hidden: Causes the System Button not to be displayed on the graphics plate. However, the button is fully functional. Hidden System Buttons can be used to create hidden hot spots. However, care should be taken using this attribute so that hidden buttons are not "lost" on the graphics plate. If this happens, press ALT+H to make all hidden buttons visible. Pressing ALT+H a second time will toggle the hidden buttons back to their hidden state.

A sample System Button is shown below in Figure 4.34:

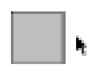


Fig. 4.34 A System Button

Note: To change the attributes of an object after it has been created, click on it with the right mouse button ( ).

4.12 GDM Container

A GDM Container is a specialized container object that is used to create a custom GDM. (See Section 3.9 for a description of custom GDMs.) To place a GDM Container on a graphics plate, choose GDM Container from the Toolbox. The GDM Container Attributes window (Figure 4.35) will then open so you can configure it. Its attributes are described below.

Fig. 4.35 The GDM Container Attributes Window

Component List: Selects the type of IQ component to which the GDM Container will be linked. Only those *IQ2* components with an OIF (Object Information File) in the same directory as *Turbo* will be included. See Section 3.9.1 for information about OIFs.

Loop: Sets the Crown Bus loop number of the IQ component that is linked to the custom GDM. This attribute should be ignored when creating a new GDM Container. It is used later after the custom GDM has been completed and is linked to an IQ component. Right clicking ( ) on a custom GDM, reopens the GDM Container Attributes window and allows you to edit the Loop attribute.

Address: Sets the IQ address number for the IQ component that is linked to the custom GDM. This attribute should be ignored when creating a new GDM Container. It is used later after the custom GDM has been completed and is linked to an IQ component. Right clicking ( ) on a custom GDM, reopens the GDM Container Attributes window and allows you to edit the Address attribute.

Background: Sets the background color of the GDM Container.

PCX File name: Sets the file name of an image that will be displayed in the background of the GDM Container. The ability to display an image in the background of the GDM Container is a very useful feature. It can display your company logo. It can have a picture of a control panel that you complete by adding objects (see Section 3.9.4).

Only PCX bitmap files are supported and you will have to use a third-party paint or graphics program to create the PCX file. If you use this feature, we recommend that the image have a color depth no higher than the one you are using for the graphics plate (see also Section 3.2). For example, if your graphics plate is set to use 256 colors, we recommend that the internal palette of the PCX image also have no more than 256 colors. It sometimes works best if the image has an internal palette with fewer colors. For example, use a 16-color PCX with a 256-color graphics plate. This sometimes gives *Turbo* a better chance of matching the colors correctly in your image.

If you decide to use a PCX image, you must keep a copy of the PCX file in the same directory as *Turbo*. The PCX file is only linked to— not embedded into the container. Whenever the GDM Container is displayed, *Turbo* searches for the PCX file so it can read it and display it in the container. If you ever decide to distribute copies of your custom GDM to others, you will need to include copies of all PCX files that are used.

Border: Determines whether or not the border of the GDM Container will be visible when a PCX picture is displayed in the container. This attribute does not affect the container when no PCX picture is used. *Note: To use the border, the Scale setting must also be turned on.*

Scale: Determines whether or not a PCX image will be scaled to fit the size of the GDM Container. **Caution:** If the Scale attribute is turned on and the aspect ratio (ratio of the width to height) of the container is different from that of the PCX image, the image will be distorted to fit the container. If you want to make the container size fit the size of the image, start with the container sized bigger than the image and the Scale attribute turned off. Then link the image and after it is displayed, resize the container to fit the image while pressing SHIFT. The SHIFT key prevents the image size from changing while the container is resized.

Convert: Determines whether or not *Turbo* will attempt to match (convert) the color palette in the PCX image with the one it uses.

Save: Causes the custom GDM, including the GDM Container and all objects in it, to be saved to a GDM file in the Turbo14 directory. It accomplishes this by first opening a dialog box to request the file name of the GDM as shown in Figure 4.36 below:

You do not need to enter the GDM extension (for example, you can enter AMP rather than AMP.GDM). After the GDM has been saved, it is available to all other graphics plates and it cannot be edited unless the Edit button is pressed as explained later.

Fig. 4.36 The Custom GDM Save Dialog Box

Important: The Save button does not need to be used until after you have placed other objects inside the GDM Container and have completed the custom GDM. Right clicking ( ) on the GDM Container later will reopen the GDM Container Attributes window so you can save the finished GDM.

Edit: Causes the custom GDM to enter “edit mode” where changes can be made to it and saved with the Save button. This button is necessary because the GDM cannot be edited after it has been saved. This prevents operators from accidentally altering the objects in a custom GDM. Right clicking ( ) on the GDM Container later will reopen the GDM Container Attributes window so you can press the Edit button.

A sample GDM Container is shown in Figure 4.37 below. It looks like a typical Container object.

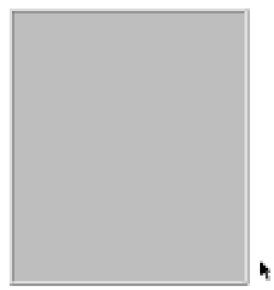


Fig. 4.37 A GDM Container

However, objects placed inside the GDM Container will be automatically linked to the same IQ component to which the GDM Container is linked.

4.13 Mini Plate

A Mini Plate Container is a specialized container object that is used to create a popup panel called a mini plate. You can use mini plates for a wide variety of purposes. They can be used to create an on-line help system. They can be used to provide hidden controls. For example, a System Button labelled “Advanced” could open a mini plate to reveal controls that you don’t want displayed on the graphics plate until needed. Mini plates are opened and closed with System Button objects and they are saved along with the graphics plates to *dataframe* files. Once a mini plate has been created, it is available to all graphics plates in the *dataframe* file. To place a Mini Plate Container on a graphics plate, choose **Mini Plate** from the Toolbox. The Mini Plate Attributes window (Figure 4.38) will then open so you can configure it. Its attributes are described below:

Background: Sets the background color of the Mini Plate Container object.

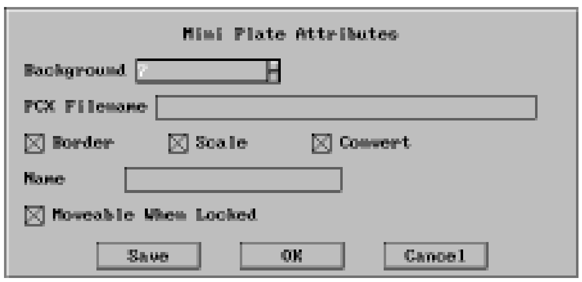


Fig. 4.38 The Mini Plate Attributes Window

PCX File name: Sets the file name of an image that will be displayed in the background of the Mini Plate Container. The ability to display an image in the background of the mini plate is a very useful feature. It can display your company logo. It can have a picture of a control panel that you complete by adding objects.

Only PCX bitmap files are supported and you will have to use a third-party paint or graphics program to create the PCX file. If you use this feature, we recommend that the image have a color depth no higher than the one you are using for the graphics plate (see also Section 3.2). For example, if your graphics plate is set to use 256 colors, we recommend that the internal palette of the PCX image also have no more than 256 colors. It sometimes works best if the image has an internal palette with fewer colors. For example, use a 16-color PCX with a 256-color graphics plate. This sometimes gives *Turbo* a better chance of matching the colors correctly in your image.

If you decide to use a PCX image, you must keep a copy of the PCX file in the same directory as *Turbo*. The PCX file, itself, is only linked to— not embedded into the container. Whenever the mini plate is displayed, *Turbo* searches for the PCX file so it can read it and display it in the container. If you ever decide to distribute copies of your custom *dataframe* file to others, you will need to include copies of all PCX files that are used.

Border: Determines whether or not the border of the Mini Plate Container will be visible when a PCX picture is displayed in the container. This attribute does not affect the container when no PCX picture is used. *Note: To use the border, the Scale setting must be turned on.*

Scale: Determines whether or not a PCX image will be scaled to fit the size of the Mini Plate Container. **Caution:** If the Scale attribute is turned on and the aspect ratio (ratio of the width to height) of the container is different from that of the PCX image, the image will be distorted to fit the container. If you want to make the container size fit the size of the image, start with the container sized bigger than the image and the Scale attribute turned off. Then link the image and after it is displayed, resize the container to fit the image while pressing SHIFT. The SHIFT key prevents the image size from changing while the container is resized.

Convert: Determines whether or not *Turbo* will attempt to match (convert) the color palette in the PCX image with the one it uses.

Name: Sets the name of the mini plate. The name can be up to 12 characters long and can include spaces. The mini plate name will appear in the Select Mini Plate window when the Open Mini Plate function is selected in the System Button Attributes window and the Select button is pressed (see Section 4.11).

Moveable When Locked: Allows a mini plate to be moved even when the Graphics Security Lock control on the graphics plate's control block is turned on. The Graphics Security Lock is normally turned on when a graphics plate has been completed to prevent an operator from inadvertently altering the appearance of the graphics plate (see Section 2.8.1). When this is done and the Moveable When Locked attribute of a mini plate is turned off, the mini plate will remain fixed in the same position it occupied when it was created (saved).

Save: Makes the mini plate, including the Mini Plate Container object and all objects placed in it, accessible to all graphics plates. To permanently save the mini plate, you will need to save it to a *dataframe* file by exiting the graphics plate and pressing F9.

A Mini Plate Container looks like any other container object as is shown in Figure 4.39 below:

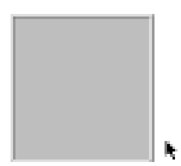


Fig. 4.39 A Mini Plate Container Object

Mini plates always display on top of other objects and they open in the same position on the graphics plate as when they were created (saved). This is why the Moveable When Locked attribute can be very valuable—enabling you to uncover objects underneath a mini plate. Mini plates can also be nested. That is, a System Button to open one mini plate can be located on another mini plate. In this way, the second mini plate is opened from the first.

Editing a mini plate is easy. Open it with a System Button and make desired changes. Then right click ( ) on the

Mini Plate Container to open the Mini Plate Attributes window and press the Save button. Finally, save the graphics plates, including all mini plates, and system settings to a *dataframe* file. This process requires one extra step if the mini plate's System Button is located on a custom GDM. The GDM must first be placed in edit mode (by pressing its Edit button in the GDM Container Attributes window) before the mini plate can be edited.

Note: When a mini plate is saved, it is available to all graphics plates in the system. Mini plates are not exclusive to just one graphics plate.

Mini plates can only be deleted with the Select Mini Plate window. To open the Select Mini Plate window, first open the System Button Attributes window by right clicking ( ) on a System Button (or selecting a System Button from the Toolbox). Next, choose the Open Mini Plate function so that the Select button is activated. Press the Select Button and the Select Mini Plate window will open as shown below in Figure 4.40:

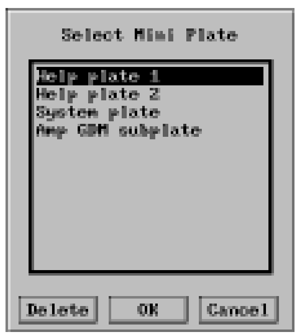


Fig. 4.40 The Select Mini Plate Window

Finally, select the desired mini plate from the list and press the Delete button (or press DEL on the keyboard).

4.14 Line

Line objects are graphics tools for use in designing a logical, attractive graphics plate. They can be used to separate parts of a container or to highlight or draw attention to an important object or text label. To place a Line on a graphics plate, choose **Line Object** from the Toolbox. The Line Attributes window (Figure 4.41) will then open so you can configure it. Its attributes are described below:

Fig. 4.41 The Line Attributes Window

Direction: Determines whether the object will be a horizontal Line or a vertical Line object.

Background: Sets the background color of the Line object.

All Lines are two pixels thick. One row of pixels is always dark grey (color 8) to match the shadow edge of the border of most objects. On horizontal Lines, the dark grey row is always on the bottom. On vertical Lines, the dark grey row is always on the right. The color of the second row of pixels is set by the Background attribute.

Two horizontal Line objects are shown in Figure 4.42. The Line on the top was placed directly on the graphics plate. It has a background color of grey (color 7). The second Line was place inside a container and was given a background color of white (color 15). This gives it a raised or three-dimensional appearance like the border of the container.

Fig. 4.42 Two Sample Line Objects

To make a Line object appear to be only one pixel thick, set the Background attribute to the same color as the color behind the Line.

4.15 Drone Objects

An IQ drone is an IQ component that can, among other things, enable an *IQ System* to function automatically without an operator or host computer. This section will focus on just a description of the drone objects since Section 8 later in this manual provides a full description of a *DRN-16* drone.

There are two types of drone objects: Drone Container objects and Drone Paralyze Button objects. To place a drone object on a graphics plate, choose **Drone Objects** from the Toolbox. The Drone Object Attributes window (Figure 4.43) will then open so you can configure it. Its attributes are described below.

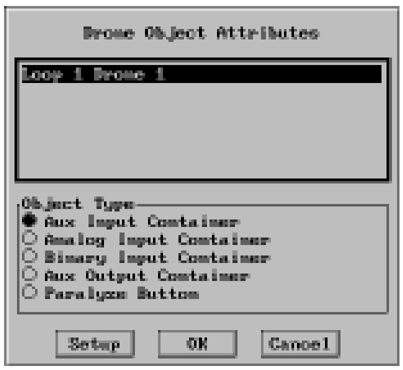


Fig. 4.43 The Drone Object Attributes Window

Drone List: Selects the drone to which the drone object will be linked.

Object Type: Selects the type of drone object to be created.

Aux Input Container: Selects a Drone Container which is linked to a single AUX input of the drone. On/Off Buttons and Drone Paralyze Buttons placed in the container will be automatically linked to the specified AUX input of the drone. To configure the Aux Input Drone Container press the Setup button. The Attributes windows shown in Figure 4.44 will open:

Fig. 4.44 The Aux Input Drone Container Attributes Window

Input: Selects a drone AUX (logic) input.

Use Analog As Aux: Causes a drone analog input to behave as an AUX (logic) input.

Background: Sets the background color of the Aux Input Drone Container.

Analog Input Container: Selects a Drone Container which is linked to a single analog input of the drone. Pot objects placed in the container will be automatically linked to the specified analog input of the drone. To configure the Analog Input Drone Container press the Setup button. The Attributes window shown in Figure 4.45 will

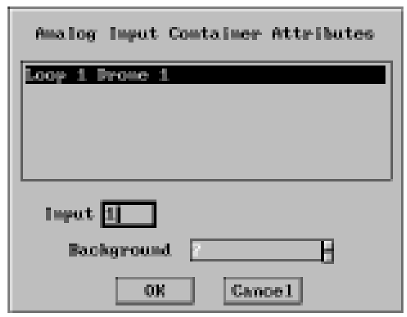


Fig. 4.45 The Analog Input Drone Container Attributes Window

open:

Input: Selects a drone analog input.

Background: Sets the background color of the Analog Input Drone Container.

Binary Input Container: Selects a Drone Container which is linked to a single drone binary input channel. On/Off Buttons placed in the container will be automatically linked to the specified binary channel of the drone. To configure the Binary Input Drone Container press the Setup button. The Attributes window shown in Figure 4.46 will open:

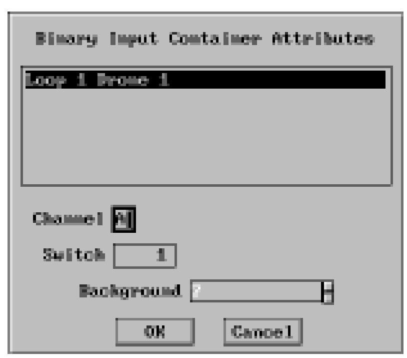


Fig. 4.46 The Binary Input Drone Container Attributes Window

Channel: Selects a drone binary input channel (A, B, C or D).

Switch: Selects a binary input decimal value. The Binary Input Drone Container will become active only when this switch value is received by the binary input.

Background: Sets the background color of the Binary Input Drone Container.

Aux Output Container: Selects a Drone Container which is linked to a single AUX output of the drone. LED objects placed in the container will be automatically linked to the specified AUX output of the drone. To configure the Aux Output Drone Container press the Setup button. The Attributes window shown in Figure 4.47 will open:

Fig. 4.47 The Aux Output Drone Container Attributes Window

Output: Selects a drone AUX output.

Background: Sets the background color of the Aux Output Drone Container.

Paralyze Button: Selects a Drone Paralyze Button which is linked to a single input of the drone when it is placed in an Aux Input Drone Container. To configure the Drone Paralyze Button press the Setup button. The Attributes window shown in Figure 4.48 will open.

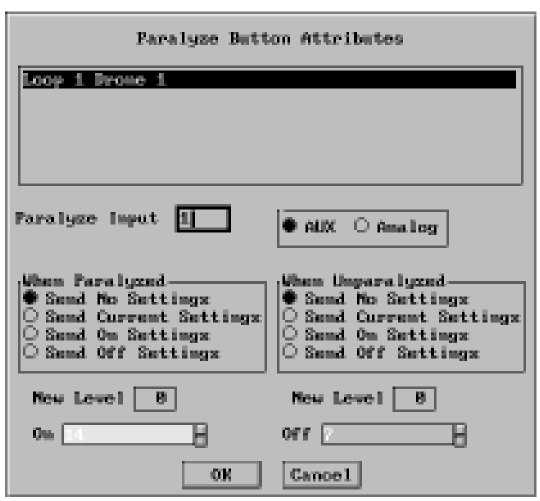


Fig. 4.48 The Paralyze Drone Button Attributes Window

Paralyze Input: Selects a drone input to which the Paralyze Button will be linked.

AUX / Analog: Selects whether the input is an AUX input or an analog input.

When Paralyzed: Selects the type of commands that will be sent (if any) when the Paralyze Button is turned on. The available commands will vary depending on whether an AUX or analog input is selected.

When Unparalyzed: Selects the type of commands that will be sent (if any) when the Paralyze Button in turned off. The available commands will vary depending on whether an AUX or analog input is selected.

New Level: Sets the separate levels that will be sent when the Paralyze Button is on and off. This attribute is only active when an analog input is selected and a Send New Level command is also selected.

On: Sets the button color when it is turned on.

Off: Sets the button color when it is turned off.

Important: To be operational, Drone Paralyze Buttons must be placed into an Aux Input Drone Container.

Setup: Opens the appropriate Attributes window for the Object Type selection (Figures 4.44 through 4.48).

Drone Container objects and Drone Paralyze Buttons look like typical containers and buttons as shown in Figure 4.49.

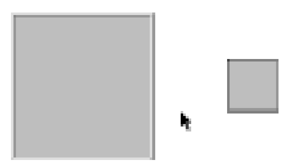


Fig. 4.49 A Drone Container (Left) and Drone Paralyze Button (Right)

4.16 Plotter

The Plotter object is a graph that displays data versus time. For example, it can be used to monitor the impedance of a load. The data is displayed as a curve by a Curve object that is placed on it (see Section 4.17). Multiple curves, each with its own color, can be displayed on each Plotter object by placing more than on Curve object on it. Annotation is taken from data stored with each Curve object and a user label is displayed along the bottom using the same color as the curve.

To place a Plotter object on a graphics plate, choose **Plotter Object** from the Toolbox. The Plotter Attributes window (Figure 4.50) will then open so you can configure it. Its attributes are described below:

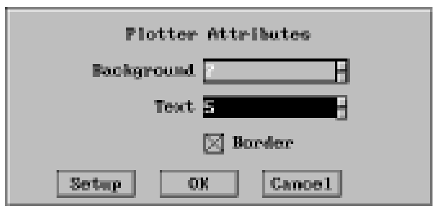


Fig. 4.50 The Plotter Attributes Window

Text: Sets the foreground color of the text for the Plotter object.

Background: Sets the background color of the Plotter object.

Border: Determines whether or not the border of the Plotter object will be visible.

Setup: The Setup button opens the Plotter Setup window shown below (Figure 4.51) so the X and Y axes of the graph can be configured.

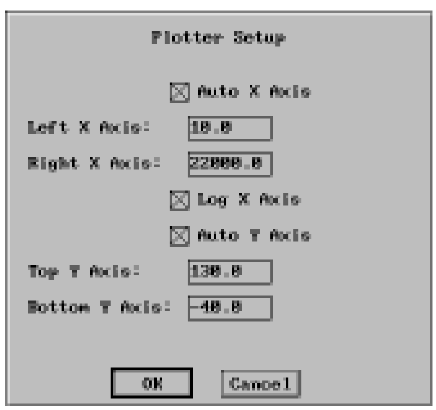


Fig. 4.51 The Plotter Setup Window

Auto X Axis: Determines whether the scaling and annotation of the X axis is determined by the range of data to be displayed.

Left X Axis: If the Auto X Axis attribute is turned off, this attribute determines the minimum X value to be plotted.

Right X Axis: If the Auto X Axis attribute is turned off, this attribute determines the maximum X value to be plotted.

Log X Axis: Determines whether the X axis should be scaled logarithmically. If this attribute is turned off, the X axis will use a linear scale.

Auto Y Axis: Determines whether the scaling and annotation of the Y axis is determined by the range of the data to be displayed.

Top Y Axis: If the Auto Y Axis attribute is turned off, this attribute determines the maximum Y value to be plotted.

Bottom Y Axis: If the Auto Y Axis attribute is turned off, this attribute determines the minimum Y value to be plotted.

The Plotter object looks like a large button as shown in Figure 4.52 below.

Fig. 4.52 A Sample Plotter Object

Figure 4.53 shows a plotter object with a single curve. The curve was added by dragging a Curve object on top of the Plotter object.

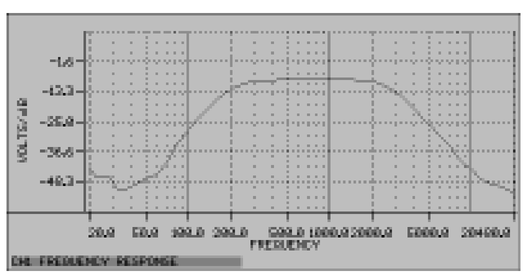


Fig. 4.53 A Plotter Object with a Curve Object

Holding and dragging the pointer over the Plotter object with the left mouse button ( ) will cause a cursor to display the exact value of each coordinate on the graph. This is shown in Figure 4.54 below:

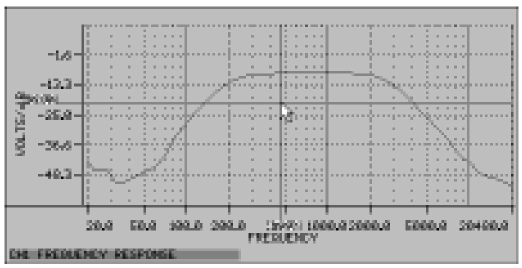


Fig. 4.54 The Plotter Cursor Displays the Value of Each Graph Coordinate

Note: A Plotter object will be automatically created whenever a Curve object is created if no other Plotter objects are present.

To remove a curve from the graph, drag its label off of the bottom of the Plotter object. This unlinks the Curve object from the Plotter object.

4.17 Curve

The Curve object represents one curve on a Plotter object (see Section 4.16). By themselves, Curve objects have no visible attributes or function. When linked to a Plotter object, they are displayed as a curve. To create a Curve object, choose **Curve Object** from the Toolbox. The Curve Attributes window (Figure 4.55) will then open so you can configure it. Its attributes are described below:

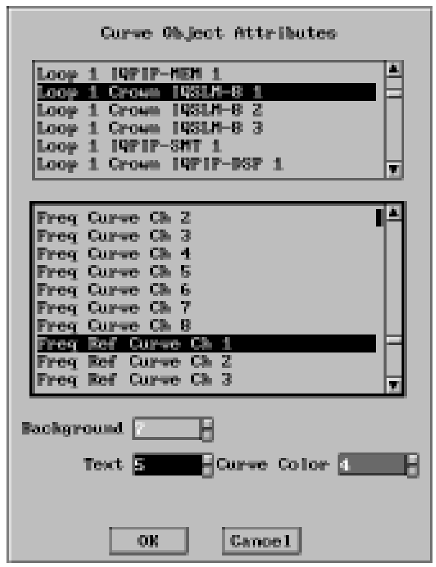


Fig. 4.55 The Curve Attributes Window

Background: Sets the background color of the Curve object if it is ever dragged onto the graphics plate. This attribute has no affect when the Curve object is displayed on a Plotter object.

Text: Sets the foreground color of the text for the Curve object when it is placed on the graphics plate. This attribute has no affect when the Curve object is placed on a Plotter object because the text will then use the same color as the Curve color.

Curve Color: Sets the color of the curve and curve label when they are displayed on a Plotter object.

If a Plotter object does not already exist, one will be automatically created when the Curve object is created. However, if a Plotter object does already exist, the new Curve object will be linked to it. (A single Plotter object can contain more than one curve.) Figures 4.56 and 4.57 show a Plotter with one curve and two curves.

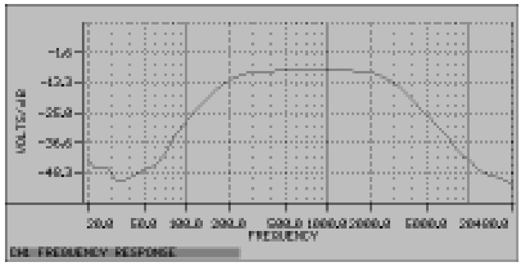


Fig. 4.56 One Curve Object on a Plotter Object

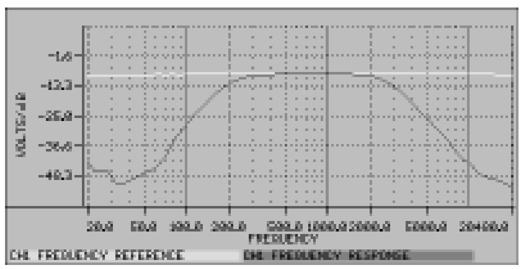


Fig. 4.57 Two Curve Objects on a Plotter Object

A Curve object can always be unlinked. This is done by dragging the label of the curve off of the Plotter object. Figure 4.58 shows what an unlinked Curve object looks like on a graphics plate.

Fig. 4.58 An Unlinked Curve Object on the Graphics Plate

4.18 String

The String object is used to control functions in UCODE-compatible components whose state is a text string. An example of this might be naming a preset. To place a String object on a graphics plate, choose **String Object** from the Toolbox. The String Attributes window (Figure 4.59) will then open so you can configure it. Its attributes are described below:

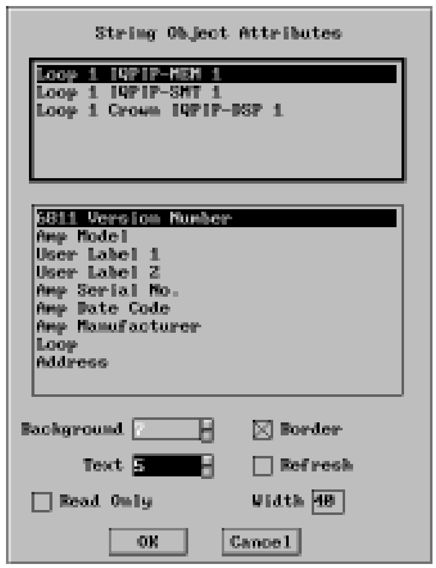


Fig. 4.59 The String Attributes Window

Component List: Selects the IQ component to which the String object will be linked. Only *IQ2* components will be included in the list if they are entered into a control block.

Function List: Selects the specific function that the String object will control. The function list will change to match the IQ component selected in the component list.

Background: Sets the background color of the String object.

Text: Sets the foreground color of the text for the String object.

Read Only: Causes the String object to display information only. The operator will not be able to change the value of the string.

Border: Determines whether or not the border of the String object will be visible.

Refresh: When the Refresh attribute is turned on and the String object has been placed inside a container object, every time the state of the String object changes, all objects in the parent container will retrieve their state from the IQ component and redisplay themselves if necessary.

Width: Sets the maximum number of characters which can be entered into the text string.

A sample String object is shown below in Figure 4.60. Its width parameter is set to 40.

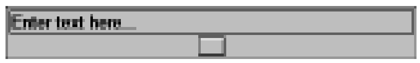


Fig. 4.60 A Sample String Object

To enter or edit a text string, click on the text string field with the center mouse button ( ). If you do not have a three-button mouse, you can hold down the left mouse button while clicking the right mouse button ( ). After you have finished entering or editing the text string, press ESC to exit the field. Press the String object button below the text string to send the text string command.

5 Monitoring & Controlling Amplifiers

P.I.P.-compatible Crown amplifiers can be monitored and controlled by an *IQ System* after an IQ *P.I.P.* (Programmable Input Processor) is installed into the amplifier. There are several models of IQ *P.I.P.s* available and they can be generally divided into two categories: "legacy" IQ-compatible *P.I.P.s* and newer *IQ2*-compatible *P.I.P.s*. Although both types are very similar and share many features, the *IQ2 P.I.P.s* include support for UCODE, a universal plug-in protocol. While both types of components have similar capabilities, there are some differences in the controls and control blocks of each IQ *P.I.P.* model. Where appropriate these differences will be identified.

To go to the amplifier Control Block screen for an *IQ2 P.I.P.* such as the *IQ–P.I.P.–MEM*, *IQ–P.I.P.–SMT* or *IQ–P.I.P.–DSP* select "IQ2 AMP/PIP" from the Device menu. To go to the amplifier Control Block screen for a legacy IQ *P.I.P.*, select "IQ AMP/PIP" from the Device menu.

Figure 5.1 shows a typical amplifier Control Block screen for *IQ2 P.I.P.s*. Notice that it is divided into three general areas, an information area on the left, an area for controls in the middle and an area for monitoring on the right.

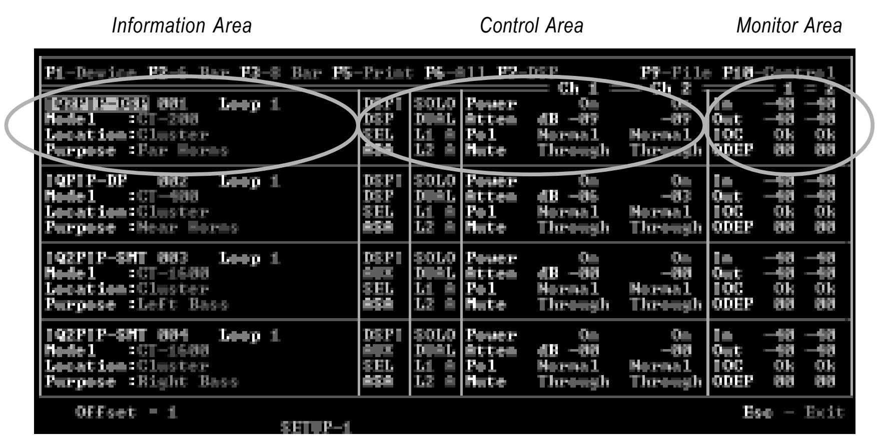
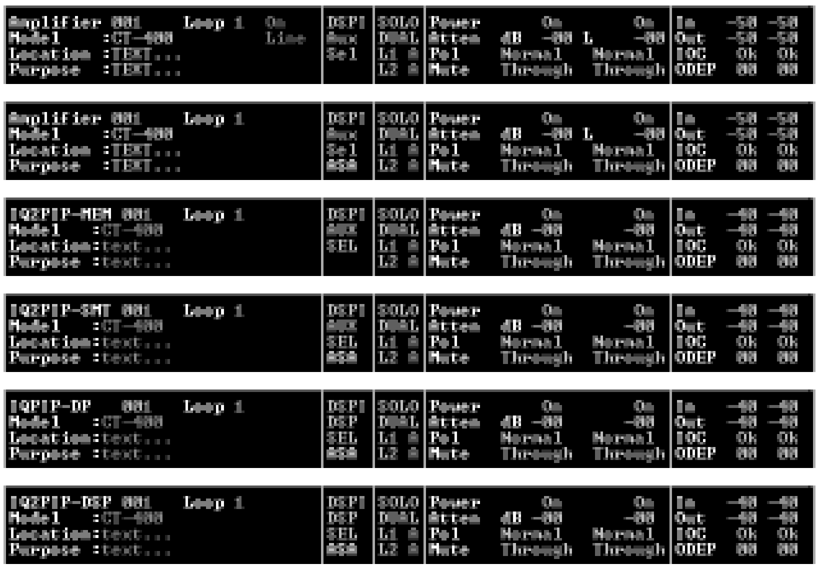


Figure 5.1 A Typical Amplifier Control Block Screen

Next we'll look at a sample control block from each IQ *P.I.P.* and describe each part as we discuss how to configure a control block.

5.1 Initializing an Amplifier Control Block

The control block for each IQ *P.I.P.* is shown below in Figure 5.2. They are all very similar.



IQ–P.I.P.

IQ–P.I.P.–AP

IQ–P.I.P.–MEM

IQ–P.I.P.–SMT

IQ–P.I.P.–DP

IQ–P.I.P.–DSP

Fig. 5.2 The Control Blocks of Each IQ P.I.P. Model

The first step in initializing an amplifier control block is to set the IQ *P.I.P.* model, IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set some of these parameters manually if you need to configure a system off-line.

IQ *P.I.P.* Model: The model can be manually configured for off-line *IQ2 P.I.P.s* only. (Legacy IQ *P.I.P.s* simply display the word “Amplifier” in place of the IQ *P.I.P.* model name.) To manually configure the model, move the cursor over the model name and press the “Space Bar or ENTER. A list of available models will appear as shown in Figure 5.3. Select the appropriate model and press the “Space Bar” again.

IQ Address & Crown Bus Loop: These two parameters can be manually entered for any model IQ *P.I.P.* The IQ address number you enter must match the physical IQ address switch setting on the IQ *P.I.P.* The Crown Bus loop number must match the physical loop to which the IQ *P.I.P.* is wired.

On Line: The phrase “On Line” will appear in the upper right corner of the information area when an IQ *P.I.P.* is actively connected to and in communication with the *IQ System*.

Model: The amplifier model must be manually selected from a list for legacy IQ *P.I.P.s.* (The model name cannot be typed in by hand.) It is automatically entered for *IQ2 P.I.P.s* that are installed into *PIP2* compatible amplifiers and manually selected from a list for *IQ2 P.I.P.s* that are installed in legacy *P.I.P.* amplifiers. To select an amplifier from

Fig. 5.3 Available IQ2 P.I.P. Models List

the list, first move the cursor to the model field and then press the “Space Bar” or ENTER. The list shown in Figure 5.4 below will appear. Select the desired amplifier from the list and press “Space Bar”or ENTER again. Once selected, the amplifier model and appropriate scale factors will be saved in the firmware of the *IQ2 P.I.P.*

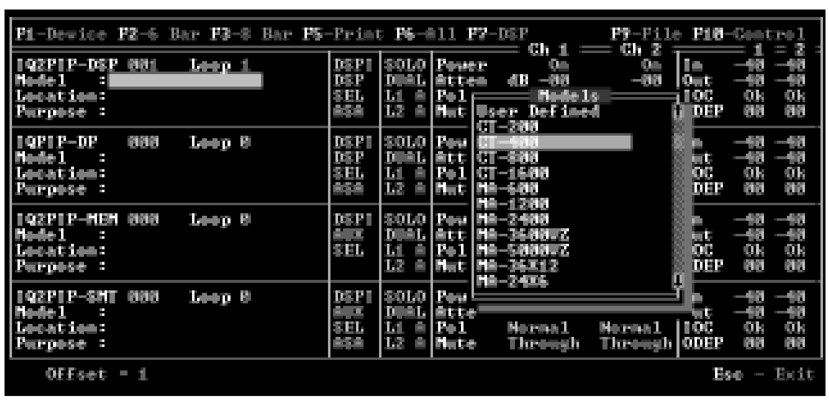


Fig. 5.4 Amplifier Model List

Custom scale factors can also be entered using the User Defined selection. Contact Crown’s Technical Support Group for additional information if you need to use this feature.

Location & Purpose: These two text lines are available for you to include relevant notes about the unit. You can enter anything here up to 19 characters per line (upper case only) for legacy IQ *P.I.P.s* and up to 12 characters per line (upper and lower case) for *IQ2 P.I.P.s*.

5.2 Monitoring an Amplifier

We will skip over the controls for now and focus on the monitor area of the amplifier control block. Several ways are provided to monitor an amplifier.

5.2.1 Monitoring from a Control Block

The most basic monitor capability is provided in the monitor area of each amplifier control block. Using control blocks you can monitor up to four amplifiers at a time because each Control Block screen displays four of them. Here are the items you can monitor:

In: A numeric readout of the relative input signal level of each amplifier channel. It is sensed at the balanced gain stage of the amplifier. The indicator can report a range from 0 to –50 dB. Legacy IQ *P.I.P.s:* A reading of 0 dB equals approximately +16 dBu. *IQ2 P.I.P.s:* A reading of 0 dB equals 0 dBu.

Out: A numeric readout of the relative signal level of each amplifier output channel. 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: The Out level must be properly scaled for each amplifier model or else it will display an incorrect level. Some older legacy IQ P.I.P.s use scaling resistors that must be configured when the P.I.P. is installed into the amplifier. Most IQ2 P.I.P.s are scaled by software with the amplifier Model setting in the information area of the control block.*

IOC: This indicator mimics the *IOC* (Input/Output Comparator) indicator LED on the front of the amplifier. As long as distortion (of any kind) does not exceed 0.05%, the indicator of each channel will read “Ok”. However, if distortion ever exceeds 0.05%, the indicator will read “IOC” to alert you that the amplifier channel is beginning to distort. See your amplifier’s *Reference Manual* for more information about *IOC*.

ODEP: A numeric readout of the Output Device Emulation Protection status of each amplifier channel. It is displayed as a percentage. Subtract the reading from 100% to find the remaining thermodynamic energy headroom. When *ODEP* displays “100,” the amplifier has reached its maximum heat dissipation capacity for its operating environment and *ODEP* limiting will begin. See your amplifier’s *Reference Manual* for more information about *ODEP*.

5.2.2 Monitoring from a Display Screen

A more graphical way to simultaneously monitor six or eight amplifiers is with the Display screens. There are two versions, a 6-Bar and an 8-Bar Display screen. The only difference between them is that the 8-Bar version uses narrower columns, allowing two more amplifiers to be displayed than the 6-Bar version. Use F2 and F3 to access them from the Control Block screen. The 6-Bar Display screen is shown in Figure 5.5 and the 8-Bar version is shown in Figure 5.6. To leave a Display screen, press ESC or F1. This returns the display to the Control Block screen.

The **Sel** (Selected) control in the control block of each amplifier determines if it will appear in the Display screen. All amplifiers will be available to the Display screens if no Sel controls are turned on. If more amplifiers have been selected than can be displayed at one time, use ← and → to scroll through them.

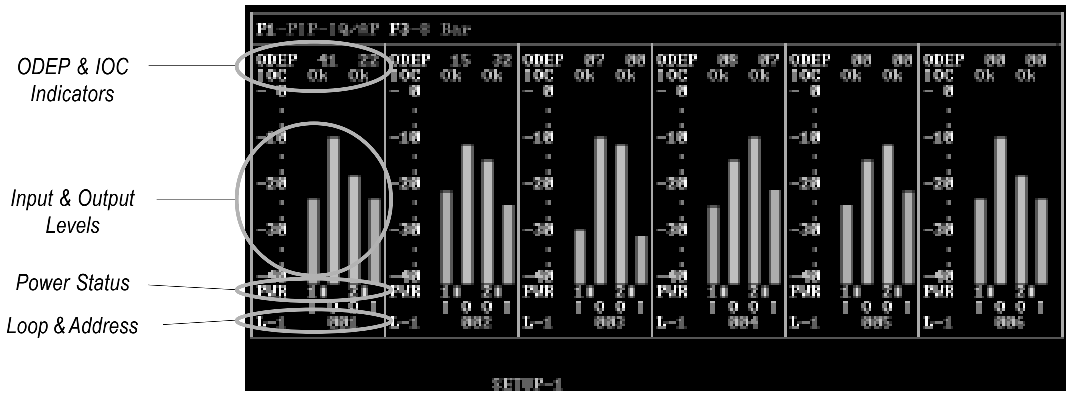


Fig. 5.5 A 6-Bar Amplifier Display Screen

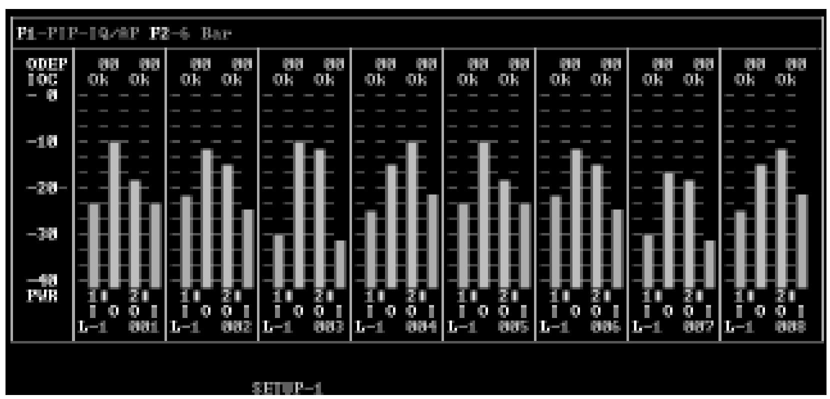


Fig. 5.6 An 8-Bar Amplifier Display Screen

***ODEP* & *IOC* Indicators:** Just like the amplifier control blocks, the amplifier Display screen show the *ODEP* level and *IOC* status. The *ODEP* level is displayed as a percent and *IOC* shows “Ok” when distortion is less than 0.05% and “IOC” when it is higher than 0.05%.

Input & Output Levels: Unlike the numeric readouts of the control blocks, the amplifier Display screens provide a bar graph representation of the input and output signal levels.

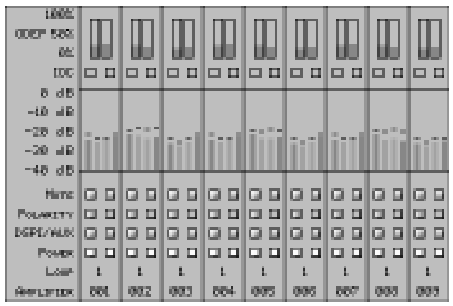
Power Status: A small green indicator next to the channel number shows that amplifier’s high voltage supplies are turned on. The channel’s high voltage supply is off when the indicator is not present.

Loop & Address: The Crown Bus loop number and IQ address of each amplifier are displayed at the bottom.

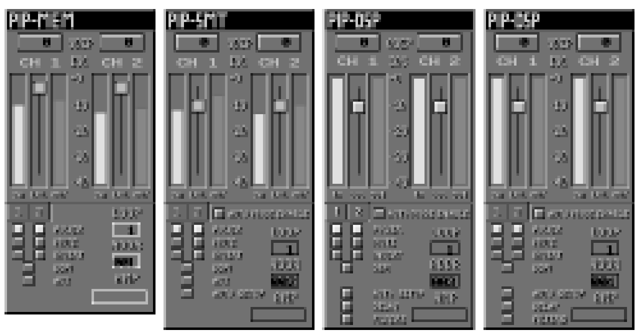
5.2.3 Monitoring from a Graphics Plate

The most graphical way to monitor an amplifier, and the way that offers the most control, is from a graphics plate. The maximum number of amplifiers that can be monitored is limited only by the design of the graphics plate and speed of the system.

Several generic amplifier GDMs (Graphic Display Modules) are shown in Figure 5.7 below:



Legacy IQ P.I.P.s



IQ2 P.I.P.s

Fig. 5.7 Monitoring Amplifiers with Graphics Plate GDMs

The GDMs contain many of the same features as an amplifier Display screen plus several controls. Notice that *ODEP* is represented at the top with a bar graph rather than a numerical readout.

The standard GDMs do not have to be used. You can create and save custom GDMs for amplifiers. Refer to Section 3.9 for more information about creating a custom GDM.

5.3 Manual Controls

All IQ *P.I.P.s* have manual controls which can be used to make real-time adjustments to one or more amplifiers. They can be accessed both from a control block and a graphics plate.

5.3.1 Manual Control from a Control Block

Most of the manual controls are located in the amplifier control blocks. A sample is shown below in Figure 5.8.

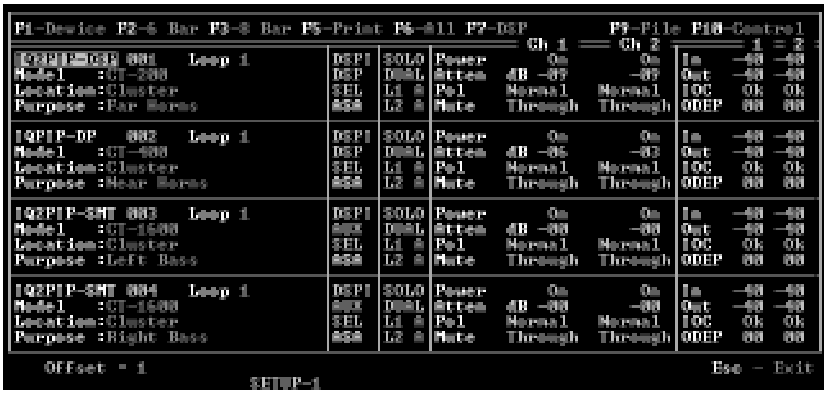


Fig. 5.8 An Amplifier Control Block Screen

All of the manual controls will be described next. However, not all controls are available for all IQ *P.I.P.s*. Refer to the control blocks in Figure 5.2 to see which controls are available for the different models.

DSPI: The Data Signal Presence Indicator is an LED that flashes whenever the IQ *P.I.P.* is polled. The DSPI control is used to force the indicator to stay on as an aid to the troubleshooting of communication on the Crown Bus. Once the DSPI control is turned on, the DPSI will remain lit continuously even if the control block for another device is selected. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received.

AUX: Toggles the IQ *P.I.P's* AUX port output on and off. *Note: IQ–P.I.P.–DP and IQ–P.I.P.–DSP models do not have an AUX port.*

DSP: The Digital Signal Processing control opens the amplifier Sub-block screen. It does <u>not</u> turn the DSPI functions on or off. See Section 5.5 for more details.

SEL: This control serves two purposes: it selects the amplifier to be included in either of the two Display screens and it identifies the amplifier to have its GDM included in a graphics plate if the graphics plate is set to the Selected mode.

ASA: The Auto System Activate control serves two purposes; it serves as a master control to turn all automated control functions on and off. Turning ASA off, restores manual control while turning it on restores automatic operation.

The ASA control also serves as an entrance to the Sub-block screen where the automated control functions are configured. To display the Sub-block screen, highlight ASA and press [ENTER] or [↓]. When ASA is on, the correct status of the IQ *P.I.P.* may not be reflected in the control block. However, the indicators in the monitor area of the control block will accurately reflect the status.

SOLO: Mutes both channels of all amplifiers except the one selected. Before this control will work, it must be enabled from the Control Panel screen. (Press [F10] to go to the Control Panel screen and turn on the Solo Function Enabled control.) To solo an amplifier, select its Solo control in its control block and turn it on. Use [PG↑] [PG↓] to move from the Solo control of one amplifier to the next.

DUAL/MONO: This parameter serves as a note to label the operating mode of the amplifier. It has no affect on the operation of the amplifier because the amplifier's Dual/Mono mode must be set in hardware. Possible settings are Dual (Stereo), Brid (Bridge-Mono) and Para (Parallel-Mono).

L1, L2: These controls assign each channel to a link group. L1 controls Channel 1 and L2 controls Channel 2. When linked, two or more amplifier channels can be controlled as a single unit. To use the link feature, first highlight the link group to the right of L1 and L2. Then tap the "Space Bar" until the desired group is selected. There are 35 possible groups (A-Z, 1-9). Finally, select the link command (L1 or L2) and press "Space Bar" to toggle it on.

While linking connects the controls of all units in the same group, it does not necessarily force them to the same setting. As long as the Plus "+" and minus "-" are used to increment or decrement the level their relative difference in level is maintained (until they reach the maximum or minimum setting). However, directly entering a level with the number keys, does force all linked channels to that exact setting.

Power: Turns the high voltage supply of each channel on and off. The control for each channel is located under the "Ch 1" and "Ch 2" headings. Select the Power control for the desired channel and toggle it on and off with the "Space Bar".

Atten: Sets the input attenuation level of each channel. The attenuation can be increased and decreased in 1 dB steps using [SHIFT]+ [↑] and [SHIFT]+[↓]. Any number from 0 to 50 can also be entered directly.

Pol: Inverts the polarity of the amplifier output channel. This can be useful if the amplifier's output was reversed as a result of miswiring or other circuit anomaly. Invert the polarity with the Pol control to change the signal polarity to the loudspeakers.

Mute: Turns an input on and off. When an input is muted, its signal is attenuated 80 dB.

5.3.2 Global Amplifier Controls

There are several manual controls that are global in nature and are controlled from a special window. To display this window from the Control Block screen press F6. A sample is shown in Figure 5.9.

As their name suggests, the “all” amplifier controls simultaneously affect all amplifiers represented by the present

Fig. 5.9 The Amplifier “All” (Global) Controls

Control Block screen. This means that all on line amplifiers with legacy IQ *P.I.P.s* are controlled by the All PIP-IQ/AP Control window (shown in Figure 5.9) which is accessed from the legacy IQ *P.I.P.* Control Block screen. And all amplifiers with *IQ2 P.I.P.s* are controlled by the All IQ2 PIP Control window (not shown) which is accessed from the *IQ2 P.I.P.* Control Block screen.

The global controls include: DSPI, Mute, Power, Link and Sel. The Now and Defer controls determine whether changes are made instantaneously or whether they are deferred until the Send button is activated. The settings of the DSPI, Mute and Power controls are restored to their previous values when the window is closed. However, the Link and Sel controls settings are remembered after the window is closed.

Note: The IQ2 P.I.P.s also include a Save As Default button that allows you to save the all global control settings as a default for future use.

5.3.3 Manual Control from a Graphics Plate

Earlier we saw that amplifier GDMs, like the ones shown in Figure 5.7, provide basic monitoring features and manual controls. Graphics plates provide for tremendous flexibility to design custom screens with custom controls. One aspect to custom controls that is very appealing is the capability to limit the range of a control on a graphics plate. Instead of providing a user with a level control having a fixed range from 0 to –50 dB, you could provide them with a level control having a range of –10 to –30 dB to prevent them from turning a level too high or too low. Depending on how you design the level control, it can still appear to have a full range of movement. See Section 3.1.1 for a description of the sample shown below in Figure 5.10.

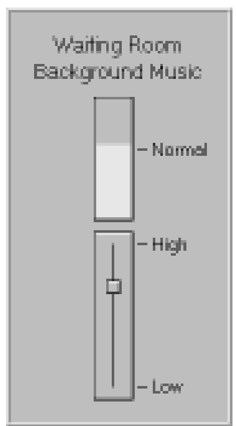


Fig. 5.10 Manual Amplifier Control with Custom Controls on a Graphics Plate

Another advantage of designing a control on a graphics plate is that you can control the size and color. For example, you can easily design a large Power on/off button that is bright green when the power is on and dull red when the power is off.

You can also choose to omit controls that you don't want a user to have. For example, you don't want the user to toggle the polarity of a channel, don't give them a control for it on the graphics plate. In a control block, users always have access to every manual control. In a graphics plate, you can limit that access.

5.4 Automated Controls

Some IQ *P.I.P.s* such as the *IQ–P.I.P.–SMT* and *IQ–P.I.P.–DSP* include features that, once configured, automatically run without further supervision from the *IQ System*. These features, as a group, are referred to as *SmartAmp* features. They can be configured from a Sub-block screen or from a graphics plate. However, this section will focus on configuring them from a sub-block because it is a bit easier. To configure the *SmartAmp* features from a graphics plate you can use a standard amplifier GDM or create a control, assign a *SmartAmp* parameter to it and then set the parameter.

To switch to the Sub-block screen, select ASA in the control block of the desired amplifier and press ENTER or ↓. (Remember, too, that the ASA control is used to enable or disable all automatic features in the sub-block. See Section 5.3.1.) A typical amplifier Sub-block screen for a legacy IQ *P.I.P. (IQ–P.I.P.–AP)* is shown in Figure 5.11 and an *IQ2 P.I.P. (IQ–P.I.P.–SMT* or *IQ–P.I.P.–DSP)* is shown in Figure 5.12.

Fig. 5.11 An Amplifier Sub-block Screen for a Legacy IQ P.I.P.

Fig. 5.12 An Amplifier Sub-block Screen for an IQ2 P.I.P.

The various *SmartAmp* functions are listed next along with their parameters.

5.4.1 *ODEP* Conservation

ODEP Conservation enables the amplifier to automatically reduce its gain as the *ODEP* percentage rises. By gradually reducing the gain before the thermodynamic headroom is exhausted, the amplifier can continue to operate under severe conditions with very little, if any, change in fidelity.

ODEP Conservation is displayed as an instantaneous percentage of amplifier's total thermodynamic headroom. Subtract the *ODEP* value from 100% to find the remaining thermodynamic headroom. When the 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 amplifier *Reference Manuals*.

***ODEP* Conservation:** Turns on/off this feature.

Trigger Level: Sets the point at which *ODEP* Conservation begins to affect the gain. For example, setting Trigger Level to 60% causes the gain to be reduced by the amount specified by the Amount control when the *ODEP* level exceeds 60%. The Trigger Level can be set from 1 to 100% in 1% steps.

Amount: The *ODEP* Conservation function reduces gain by adding input attenuation. The Amount control determines the amount of attenuation (in dB) to add for every 1% that the *ODEP* level rises above the Trigger Level. For example, if Amount is set to 0.5 dB, 0.5 dB of attenuation is added when the *ODEP* level rises 1% above the Trigger Level; 5 dB of attenuation is added when the *ODEP* level rises 10% above the Trigger Level; etc. Attenuation levels of –0.25, –0.5, –1.0, –2.0, –3.0, –4.0 and –5.0 dB can be inserted.

Release Time: While *ODEP* Conservation responds almost instantly when *ODEP* levels rise above the Trigger Level, response to falling levels is controlled by the Release Time control. Release Time sets the length of time, in seconds, that *ODEP* Conservation delays before beginning to restore amplifier gain. Release Time can be set to 0.2, 0.4, 0.6, 0.8, 1, 1.5, 2, 3, 4, 6, 8, 10, 12, 15, 20 or 30 seconds.

5.4.2 Smooth Output Limiter

The Smooth Output Limiter slowly reduces the gain of the amplifier to keep the average of the peak output level below a predetermined output level.

Smooth Output Limiter: Turns on/off this feature.

Threshold: Sets the point at which the limiter begins to affect amplifier gain. The Threshold is the output level (in dB) above which input attenuation is added to reduce gain. 0 dB equals the full rated output of the amplifier when driving an 8 ohm load. For example, setting the Threshold to –7 dB results in gain reduction whenever the output level rises above –7 dB. Threshold can be set from 0 dB to –50 dB in 1 dB steps.

Attack Time: Sets the rate at which limiter responds when the output level rises above the Threshold. Legacy IQ *P.I.P.s:* The Attack Time range is 1 to 30 seconds. *IQ2 P.I.P.s:* The Attack Time range is 0.01 to 30 seconds.

Decay Time: Controls the limiter response when the output level drops below the Threshold. Legacy IQ *P.I.P.s:* The Decay Time range is 1 to 30 seconds. *IQ2 P.I.P.s:* The Decay Time range is 0.1 to 30 seconds.

5.4.3 Stand By

The Stand By function conserves energy by turning off the amplifier high-voltage supplies when an input signal is not detected for a predetermined length of time. It provides the biggest savings in systems where audio inputs are not continuous.

Stand By: Turns on/off this feature.

Gate Level: Sets the point at which Stand By turns on the amplifier high voltage supplies. For example, setting the Gate Level to –30 dB causes the high-voltage supplies to be turned off when the input level falls below –30 dB. Gate Level is adjustable from 0 dB to –50 dB in 1 dB steps

Turn Off Time: Prevents the high-voltage supplies from being cycled unnecessarily. The Turn Off Time is the length of time, in seconds, that Stand By waits before turning off the high-voltage supplies when the input level has dropped below the Gate Level. Legacy IQ *P.I.P.s:* The range is 5 to 60 seconds. *IQ2 P.I.P.s:* The range is 0 to 255 minutes (zero is a special setting for testing the Gate Level setting).

Turn On Delay: IQ *P.I.P.'s* are equipped with a built-in turn on delay whose duration is determined by the IQ address (Delay = 10 ms × IQ address). The higher the address, the longer the delay before the amplifier's high-voltage supplies are turned on. This delay prevents a large number of amplifiers from turning on at the same time and, possibly, tripping the AC circuit breakers. It may not be desirable to use this capability when using Stand By because the high-voltage supplies must be turned on instantly when an input signal above the Gate Level is detected. Turn off the Turn On Delay control to disable the delay.

Tip: *Experiment with the delay enabled and disabled. If the system has only a few amplifiers, and each has a low IQ address, the turn on delay may be short enough to make the use of the Turn On Delay unnecessary.*

5.4.4 Error Reporting

Another *SmartAmp* feature is the ability to alert you if a fault occurs. A visual warning in the form of a pop-up message can appear for any condition described in this section.

Fault Warning

An amplifier fault condition occurs when a channel fails. The host computer reports this condition when Fault Error Report is toggled on.

Fault: (Fault Error Report) Turns on/off this feature.

Input Drive Level: (This parameter is only used with legacy *P.I.P.* amplifiers. Amplifiers with *PIP2* compatibility have a dedicated "fault" signal.) Allows the user to define the threshold for a fault indication. 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 regardless of *IOC* status. The threshold can be set from 0 dB to –50 dB in 1 dB steps.

Report VIA Aux: (Only available for the *IQ–P.I.P.–AP* and *IQ–P.I.P.–SMT*.) Error reporting not only displays an on-screen message when a fault condition occurs, it can also send a signal out the AUX port. It uses reverse logic, turning on the AUX port when everything is normal and turning it off when an "error" has occurred. In this way it can also indicate a power loss. When this feature is enabled it preempts the AUX port, allowing nothing else to control it. This occurs without regard to whether ASA and/or AUX are turned on or off. **Important:** The Report Via AUX parameter cannot be accessed from the sub-block of the *IQ–P.I.P.–SMT*. It must be controlled from a graphics plate.

Prolonged *IOC* Warning

The Input/Output Comparator continuously monitors of the amplifier for distortion. If distortion is 0.05% or more, an *IOC* error signal is generated.

IOC: (IOC Error Report) Turns on/off this feature.

Time and **Events:** Use the Events control to set the number of *IOC* errors that must occur within the time specified by the Time control for a warning message to be displayed. For example, if Time is set to 5 and Events to 10, an error message is displayed if ten *IOC* errors occur within five seconds. The total range for Time is 0 to 10 seconds in 1 second steps. Events can be set to any number between 0 and 250 in steps of 1.

Short Warning

Short: (Short Error Report) Turns on/off this feature.

ODEP: Sets the level above which a short will be assumed to exist. For example, setting *ODEP* to 75% causes an output message to be displayed whenever the *ODEP* level rises above 75. The range of this control is from 0% to 100% in 1% steps.

5.4.5 Input Compressor

This feature is only available for *IQ2 P.I.P.s*. The Input Compressor reduces the gain of the amplifier to compress the input signal, reducing its dynamic range.

Input Compressor: Turns on/off this feature.

Threshold: Sets the point at which the compressor begins to affect amplifier gain. The level is measured at the input to the *P.I.P.* and corresponds to the level shown on an input meter. The compressor is "feedforward," meaning that the level detection point is located before the gain control stage. Threshold can be set from +16 dB to –40 dB in 1 dB steps.

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

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

Ratio: Sets the compression ratio for the Input Compressor. The range is 1, 2, 4, 8, 16, 32, ∞ to 1. *Note: 1:1 is the same as "off."*

5.5 DSP Controls

Several Digital Signal Processing features are available in those IQ *P.I.P.* models with DSP capability like the *IQ–P.I.P.–DSP*. They can be configured from a special DSP Sub-block screen or from a graphics plate. However, this section will focus on controlling DSP from a DSP sub-block because it is a bit easier. To configure the DSP features from a graphics plate you would create a control, assign a DSP parameter to it and then set the parameter. **Important: The DSP functions are not disabled by the ASA control.**

To switch to the DSP Sub-block screen, press F7 from the amplifier Control Block screen. An example is shown below in Figure 5.13:

Fig. 5.13 An Amplifier DSP Sub-block Screen

5.5.1 Signal Delay

A signal delay is available for each channel.

Delay: Sets the amount of signal delay in seconds. The range is 1.25 milliseconds (0.00125 seconds) to 0.175 seconds in 22.7 microsecond steps. (The minimum delay of 1.25 milliseconds is inherent in the DSP system.)

5.5.2 Programmable Filters

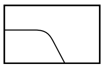
Each channel can have as many as eight different cascaded filters (the actual number depends on the mix of filters chosen and the total number of required filter cells). There are seven different filter types from which to choose.

Each channel has a total of eight “biquad” filter cells. *Note: “Biquad” refers to the double quadratic equations which mathematically describe each filter implemented in the digital signal processor.* The 1st and 2nd-order filters each require one biquad filter cell. The 3rd and 4th-order filters each require two biquad filter cells. This means that a channel can have no more than four filters if they are all 3rd or 4th-order filters. Remember that only eight filter cells are available—this limits the total number of filters that a channel can have. An error message will be reported by the IQ software if this capacity is exceeded.

A description of the filter controls is presented next:

On/Off: Turns the associated filter on and off.

Type: Sets the shape and roll-off rate (or order) of the filter. Seven filter shapes are available:

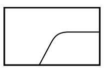


LP *Low-Pass Crossover Filter*

The low-pass filter is available in several forms:

LP B1 = 1st-order Butterworth
LP B2 = 2nd-order Butterworth
LP Be2 = 2nd-order Bessel
LP B3 = 3rd-order Butterworth
LP Be3 = 3rd-order Bessel
LP B4 = 4th-order Butterworth
LP Be4 = 4th-order Bessel
LP LR4 = 4th-order Linkwitz-Riley

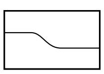
Note: 1st, 2nd, 3rd and 4th-order responses result in 6, 12, 18 and 24 dB/octave roll-offs, respectively.



HP *High-Pass Crossover Filter*

The high-pass filter is available in several forms:

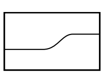
HP B1 = 1st-order Butterworth
HP B2 = 2nd-order Butterworth
HP Be2 = 2nd-order Bessel
HP B3 = 3rd-order Butterworth
HP Be3 = 3rd-order Bessel
HP B4 = 4th-order Butterworth
HP Be4 = 4th-order Bessel
HP LR4 = 4th-order Linkwitz-Riley



LOWSHLF1 *Low-Pass Shelving Equalization Filter*

This filter type is available in only one form:

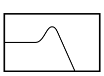
LOWSHLF1 = 1st-order



HISHLF1 *High-Pass Shelving Equalization Filter*

This filter type is available in only one form:

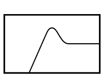
HISHLF1 = 1st-order



LP EQ2 *Low-Pass Equalization Filter*

This filter type is available in only one form:

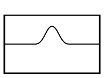
LP EQ2 = 2nd-order



HP EQ2 *High-Pass Equalization Filter*

This filter type is available in only one form:

HP EQ2 = 2nd-order



PAR EQ2 *Parametric Equalization Filter*

This filter type is available in only one form:

PAR EQ2 = 2nd-order

Freq: Sets the –3 dB corner frequency for the low-pass, high-pass, low-pass shelving and high-pass shelving filters. It sets the center frequency for the low-pass equalization, high-pass equalization and parametric equalization filters. The frequency must be entered in Hz (1 kHz equals 1000 Hz).

Q: Sets the width, slope and gain of the low-pass equalization and high-pass equalization filters. It sets only the width and slope of the parametric equalization filter. Q is not available for the remaining filter types. The range of Q is 0.1 to 30. **CAUTION: Avoid excessively high Q's.**

Gain: Sets the amount of boost or cut for the low-pass shelving equalization, high-pass shelving equalization and parametric equalization filters. The gain of the low-pass and high-pass filters is fixed at unity. The gain of the low-pass equalization and high-pass equalization filter is set with Q. The range of the Gain control is +12 dB to –24 dB.

6 Monitoring & Controlling Mixers

There are a variety of IQ mixers (also referred to as “multiplexers” because of their ability to be connected in large systems while sharing a common bus). One model, the *MPX-6*, offers only manual control. Another model, the *SMX-6*, offers fully automatic as well as manual control. Yet another model, the *AMB-5*, offers a hybrid approach, one output channel can operate automatically and one output channel requires manual control. But they all share one thing in common—they use IQ software for configuration, control and monitoring.

Each model has its own Control Block screen which is selected in the Device menu (F1). Figure 6.1 shows a single control block from each mixer Control Block screen.

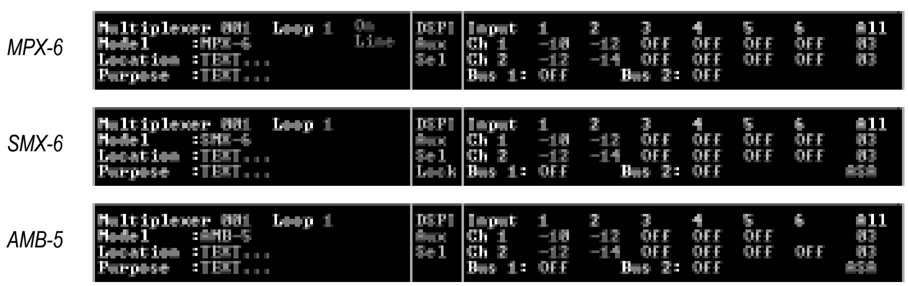


Fig. 6.1 The Control Block of Each IQ Mixer Model

Overall they are very similar. Because the *MPX-6* is only manually controlled, it has no ASA control. The *SMX-6* has a Lock control which enables you to “lock” Channel 1 and 2 together. The *AMB-5* has no level control on Input 6, Channel 2 because this input is reserved as an ambient sensing input for automatic level control.

6.1 Initializing a Mixer Control Block

The first step in initializing an amplifier control block is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the IQ mixer. The Crown Bus loop number must match the physical loop to which the IQ mixer is wired.

On Line: The phrase “On Line” will appear in the upper right corner of the information area when an IQ mixer is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. On the model line you can enter any text up to 13 characters. On the location and purpose lines you can enter any text up to 19 characters. Only uppercase characters are allowed.

6.2 Monitoring a Mixer

Two of the mixers, the *SMX-6* and *AMB-5*, have sensors on the their inputs and outputs which allow you to monitor signal levels. There are a couple of ways to monitor them which will be describe next.

6.2.1 Monitoring from a Display Screen

A quick way to monitor a single IQ mixer is to go to a Display screen by pressing from the mixer Control Block screen. A sample is shown below in Figure 6.2:

The Display screens of *SMX-6* and *AMB-5* mixers provide dynamic representation of the peak audio level of

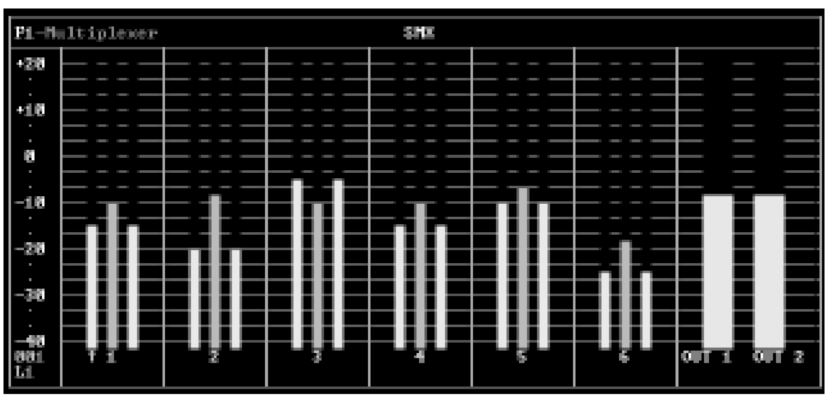


Fig. 6.2 The SMX-6 Display Screen

each input and output channel as well as the net gain setting of each input. Figure 6.3 shows just one of these input channels and labels its various parts. The parts are described next.

Address & Loop: The IQ address and Crown Bus loop number of the mixer is shown in the lower left corner of the Display screen underneath the scale.

Input Signal Level: The center bar graph in each input section represents the preprocessed input audio level. It is a multicolor bar graph which is green below +1.5 dB, yellow between +1.5 dB and +18 dB and red above +18 dB. Signals below –40 dB are not visible. The level is preprocessed similar to a prefader or cue level on a traditional mixing console.

Net Gain: To the left and right of the input level bar graph are the blue Channel 1 and 2 net gain bar graphs. If the gain is being manually controlled (ASA is off), this bar graph will represent the manual input gain setting. In this case it can also be increased and decreased from the Display screen using to increment and to decrement the level. Mouse users can drag ( ) the mouse up or down to change the gain.

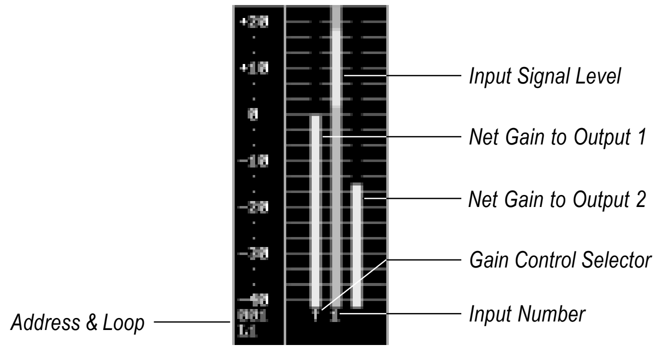


Fig. 6.3 A Single Input from an SMX-6 or AMB-5 Display Screen

However, if the levels are being dynamically controlled (ASA is on) by one or more of the automatic functions, like the compressor function, the net gain bar graph will dynamically move like a "flying fader" to show that the input gain is being automatically controlled. In this case it shows the net or final input gain setting that results after all automatic functions have been processed. Do not attempt to manually control the gain of an input while it is under automatic control.

Gain Control Selector: An arrow is used to show which input gain control is presently selected. This is the gain control that you can manually change if ASA is off. Use to change the selection or drag the mouse ( ) left or right.

Output Signal Level: At the far right of the mixer Display screen are the two yellow output level bar graphs representing the peak output of Channel 1 and 2.

Note: The differences between the SMX-6 and AMB-5 versions of the mixer Display screen are: 1) The absence of a level bar graph for the Channel 1 of Input 6 of an AMB-5 because it is reserved as an ambient sensing input. 2) All of the AMB-5 Channel 2 input levels are manually controlled like an MPX-6 mixer and therefore do not respond to any automatic functions.

Figure 6.4 shows an *MPX-6* Display screen. Because the *MPX-6* mixer has no sensing capability, it does not have any signal level bar graphs. However, it does display the manual input level settings both as bar graphs and, below them, as numeric values. They can be selected and the levels controlled from the Display screen as described earlier.

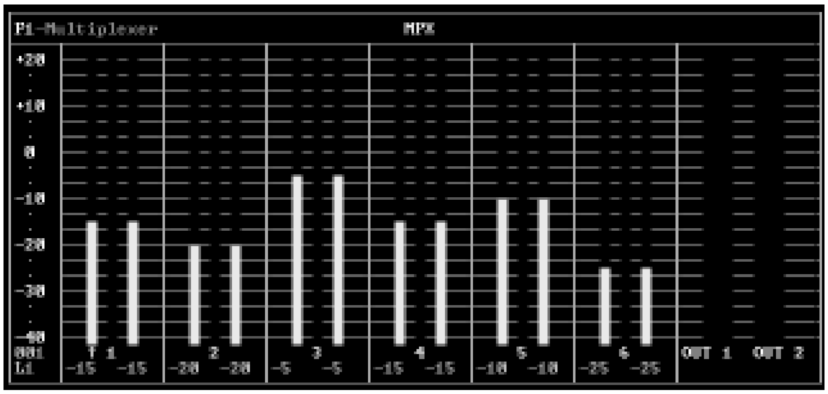


Fig. 6.4 The MPX-6 Display Screen

When you are ready to leave a mixer Display screen, press ESC, F1 or right mouse click( ).

6.2.2 Monitoring from a Graphics Plate

The most graphical way to monitor an IQ mixer, and the way that offers the most control, is from a graphics plate. And you can simultaneously monitor more than one mixer—the maximum number is limited only by the design of the graphics plate and speed of the system.

A generic mixer GDM (Graphic Display Modules) is shown in Figure 6.5 below:

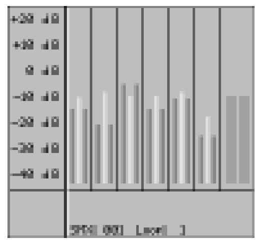


Fig. 6.5 Monitoring a Sensing IQ Mixer with a Graphics Plate GDM

The generic mixer GDM contains many of the same features as a mixer Display screen except that it has no controls. However, the generic GDM does not have to be used. You can create and save custom GDMs for IQ mixers. Refer to Section 3.9 for more information about creating a custom GDM.

6.3 Manual Controls

All IQ mixers can be manually controlled. This can be done from both a control block and from custom controls you create on a graphics plate.

6.3.1 Manual Control from a Control Block

Use the Device menu (F1) to access an IQ mixer Control Block screen. A sample *SMX-6* Control Block screen is shown below in Figure 6.6.

Fig. 6.6 An SMX-6 Control Block Screen

All of the manual controls will be describe next. However, not all controls are available for all IQ mixers. Refer to the control blocks in Figure 6.1 to see which controls are available for the different models.

DSPI: The Data Signal Presence Indicator is an LED on the front panel of the IQ mixer that flashes whenever the mixer is polled. The DSPI control is used to force the indicator to stay on as an aid to the troubleshooting of communication on the Crown Bus. Once the DSPI control is turned on, the DPSI will remain lit continuously even if the control block for another device is selected. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received.

Aux: Toggles the mixer's AUX port output on and off.

Sel: Selects the mixer so that a GDM for it is added to a graphics plate when the graphics plate is set to the Selected mode.

Lock: When turned on, the Lock control locks the Channel 1 and 2 gain controls together for each input. But before doing so, all gain controls for the mixer will be set to –100 (off) as shown in Figure 6.7.

When locked, changing the level of Input 1, Channel 1 will cause an identical setting in Input 1, Channel 2.

Fig. 6.7 Turning the SMX-6 Lock Feature On Sets All Gain Controls to –100 dB

Input: Sets the input gain for each channel. When a gain control is turned down as far as it will go (–100 dB) the input control will say “Off”. The range of the gain controls is +25 to –100 dB. The gain can be increased and decreased in ½ dB steps with SHIFT + ↑ and SHIFT + ↓ or a whole number can be entered directly (precede negative numbers with a minus sign “-”.

The input gain control has its own “emergency mute” feature. Pressing the “Space Bar” when a gain control is selected immediately mutes the gain (sets it to –100 dB). This feature is a toggle. If the control is still selected, press “Space Bar” again to toggle back to the previous setting. The previous level setting is lost if the cursor is moved to another control.

All: The level of each output channel can be increased or decreased in 3 dB increments with the All controls. To do so, select one of the controls labelled “03” under the “All” heading and press SHIFT + ↑ and SHIFT + ↓ to increment or decrement it. The output level change will be reflected by an appropriate increase or decrease of each input gain setting.

Tip: *Turn on the Lock control to control all gain controls of both channels with either All control.*

Bus: Turns on/off each channel’s switchable “bus” output. The bus outputs receive the exact same post-processed audio signal that the main outputs receive.

ASA: The Auto System Activate control serves three purposes. First it serves as a master control to turn all automated control functions on and off. Turning it off restores manual control while turning it on restores automatic operation.

Second, the ASA control serves as an entrance to the Sub-block screens where the automated control functions are configured. To display the first Sub-block screen, highlight ASA and press ENTER or ↓. When ASA is on, the correct status of the mixer may not be reflected in the control block.

Third, the ASA control can be used to tie several sensing mixers *(SMX-6s* or *AMB-5s)* together in a large *IQ*

System. For example, several *SMX-6s* could be wired with parallel inputs. Each *SMX-6* would be switched on as needed via the ASA control. A supervisor could use this capability to “listen in” or monitor events. It could be used to control recording or to provide additional feeds for overflow seating.

Note: It is usually best to turn ASA off before switching to the Sub-block screens and making changes to the parameters of the automatic functions.

Tip: *ASA can be toggled on and off from a sub-block by pressing* CTRL+A.

6.3.2 Manual Control from a Graphics Plate

Earlier we saw that mixer GDMs, like the one shown in Figure 6.5, provide basic monitoring features. Graphics plates provide for tremendous flexibility to design custom screens with custom controls and this capability can be used to design custom controls—even custom GDMs—for IQ mixers. One aspect to custom controls that is very appealing is the capability to limit the range of a control on a graphics plate. Instead of providing a user with a gain control having a fixed range from +25 to –100 dB, you could provide them with a level control having a range of –10 to –30 dB to prevent them from turning a level too high or too low. Depending on how you design the level control, it can still appear to have a full range of movement. A sample, showing how custom graphics plate objects can be used to monitor and control an *SMX-6* mixer is shown below in Figure 6.8.

Another advantage of designing a control on a graphics plate is that you can control the size and color. And you can also choose to omit controls that you don’t want a user to have. In a control block, users always have access to every manual control. In a graphics plate, you can limit that access.

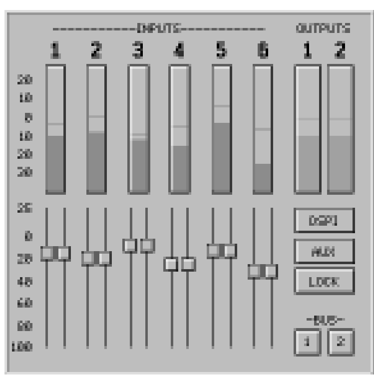


Fig. 6.8 Manual Mixer Control with Custom Controls on a Graphics Plate

6.4 Automated Controls

The real power of the IQ mixers with sensing capability *(SMX-6s* and *AMB-5s)* is their ability, once configured, to run automatically. The automatic functions are configured from a series of Sub-block screens. *Note: Because the MPX-6 has no level sensors, it has no automatic functions and therefore no sub-blocks.* To switch to the first Sub-block screen, select the ASA control in the control block of the desired mixer and press either ENTER or ↓.

The above illustration shows only the first *SMX-6* Sub-block screen. There are four *SMX-6* Sub-block screens

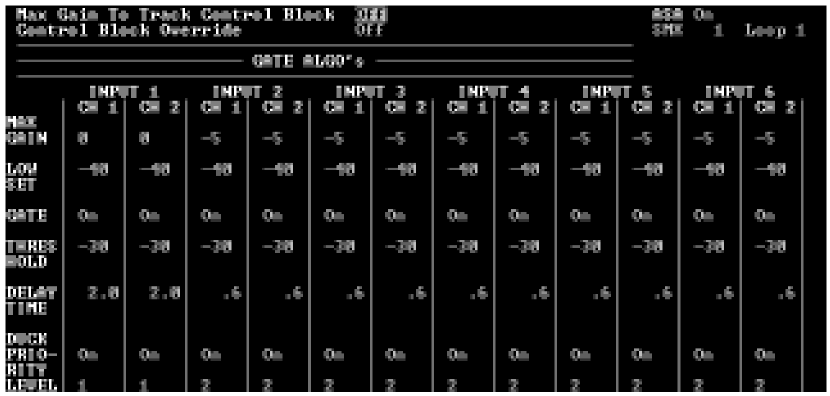


Fig. 6.9 The First SMX-6 Sub-block Screen

and five *AMB-5* Sub-block screens. Use PG↑ PG↓ to move from one Sub-block screen to the next. And use HOME END to move from the first sub-block screen to the last. We shall use *SMX-6* Sub-block screens for most of the illustrations in this section. Bear in mind, however, that only Channel 1 of *AMB-5* mixers is capable of automatic control so there are no controls for Channel 2 in the *AMB-5* sub-blocks. Figure 6.10 depicts this difference—it is the *AMB-5* version of Figure 6.9.

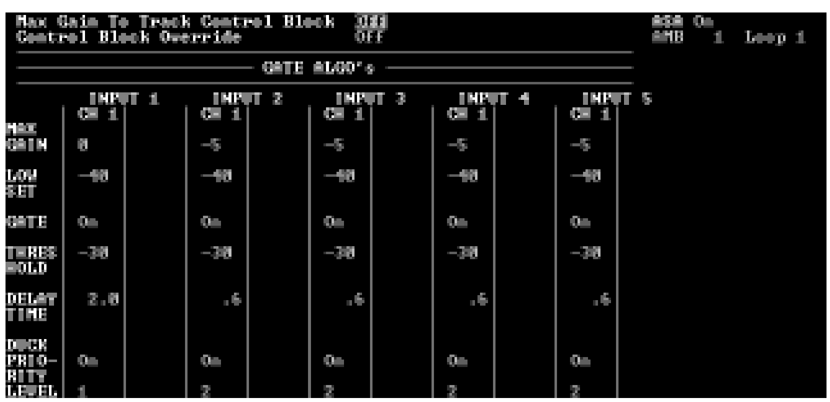


Fig. 6.10 The First AMB-5 Sub-block Screen

There are a few general items on the first Sub-block screen. After describing them, we will describe each automatic function in the order that they appear in the sub-blocks.

Max Gain To Track Control Block: Normally, the input gain controls of the control block do not affect the system while ASA is on. (However, changes made to them while ASA is on are stored and executed when ASA is turned off.) It is intended that the Max Gain controls be used to set the level of each input when ASA is on.

Turning on the Max Gain To Track Control Block control, located on the top of the first Sub-block screen, changes this operation. It causes any changes that are made to the input gain controls of the control block to be immediately mirrored by the Max Gain controls in the sub-block when ASA is on. It has no affect when ASA is off.

Tip: *Turn on the Max Gain To Track Control Block then switch back to the control block. Set the maximum level before feedback for all microphones with the control block input gain controls. The Max Gain settings will be automatically adjusted to avoid feedback.*

Control Block Override: As mentioned above, normally the input gain controls of the control block do not affect the system while ASA is on. Turning on the Control Block Override control at the top of the first Sub-block screen also changes this operation. When turned on, it enables the input gain controls of the control block to function when ASA is turned on. However, unlike the Max Gain To Track Control Block control, the Control Block Override control does not allow the Max Gain settings to be changed. This means the automatic functions in the sub-blocks can immediately restore or change the input level after it was manually adjusted. For this reason, the Control Block Override control is seldom used by itself.

The main use of the Control Block Override control is to enable a drone to control the input level of a sensing IQ mixer *(SMX-6* and *AMB-5)* when its ASA control is turned on. The Max Gain To Track Control Block control is also required for this. (See Section 8 for more information about drones.)

Before proceeding to the descriptions of each function please note the following: The word “algo” is used on several mixer Sub-block screens in the *Turbo* program. Originally, *algo* was defined as a smaller, yet self-contained, portion of the larger algorithm that defined the total operation of a sensing IQ mixer. Sounds like a mouthful? That’s why this manual will substitute the word function for the word *algo* in most places. That’s really all an algo is: a function.

6.4.1 Gate Function

(Figure 6.9) “Gating” is one of the most important functions. It shuts off inputs that are not in use. Gating is often used to prevent feedback. If several mics in a system are on at the same time, the system’s gain could become so high that it rings with transients, or breaks into feedback.

Lowering the overall gain is one way to fix this problem, but some mic levels might become too low. Gating is a better solution. A microphone is “live” only when a sound is loud enough to open its gate (for example, speaking, singing, etc.).

Max Gain: The Max Gain control sets the maximum gain for an input. The gain can not rise higher, even when the Auto level function is active. The Max Gain control also sets the “gate open” gain when only the Gate function is in use.

When ASA is on, the Max Gain settings in the sub-block override the corresponding control block gain settings. They work like the control block gain settings when most of the automatic functions are off. When ASA is off, the control block gain settings take over.

The Max Gain control has its own “emergency mute” feature. Pressing the “Space Bae” when a Max Gain control is selected immediately mutes the gain (sets it to –100 dB). This feature is a toggle. If the control is still selected, press the “Space Bar” again to toggle back to the previous setting. The previous level setting is lost if the cursor is moved to another control.

Tip: *The final gain settings are usually made by listening. If you set the gain too high, the system could break into feedback. It is possible to attenuate all channels at once using the secondary mix capability of the control blocks. First, set the control block levels far below the feedback point. Now ASA can be used to activate the control block mix which will pull all inputs below the feedback level. (The Max Gain To Track Control Block control should be turned off.) The ASA control can be toggled on and off from the Sub-block screens by pressing* CTRL+A.

Note: Toggling ASA on and off switches between the sub-block mix and the control block mix. This provides two mixes only if Max Gain To Track Control Block is not turned on.

IMPORTANT: The Max Gain control is not intended to be adjusted in “real time” while the ASA control is turned on. Instead, use the DAOL (Desired Average Output Level) control of the Auto Level function. The new level will not take affect until the Reaction Time setting of the Auto Level function has transpired.

Low Set: The Low Set gain is the “gate closed” gain. Low Set is off by default (about –100 dB). Set it higher if you want the signal to be audible even when the gate is “closed.”

Gate: The Gate function is turned on and off with the Gate control. Turning the Gate control off also turns off the Duck Priority and Gate Count functions.

Threshold: The Threshold control determines when an input gate opens. When a signal exceeds the Threshold, the gate opens causing the gain to increase from the Low Set value to the Max Gain value. When a signal drops to the Threshold or below, the gate closes and the gain drops from Max Gain to the Low Set value. *Note: If the Threshold is set too high, the gate will never open, or only open sporadically. If it’s too low,* *background noise may keep the gate open all the time.*

When a signal exceeds the Threshold, the gate opens almost instantly. The optimum Threshold setting depends on the signal. Speech varies more rapidly than music, and often needs a lower Threshold to keep the gate open. For a microphone, the Threshold can be set a few decibels above a room's ambient sound for ambience rejection, or set higher to reject incoming far-field or off-axis sounds.

Tip: *The Display screen (press F2) is very helpful when setting the Threshold controls. It displays the input signal level, making it a simple matter to select an appropriate Threshold level. For example, it is quickly apparent from the Display screen that the gate will not open if the Threshold control is set at a higher level than the input signal.*

Delay Time: The Delay Time control determines how long the gate will stay open after the incoming signal drops below the Threshold. The optimum Delay Time setting depends on how rapidly the input changes. If a speaker walks slowly from one mic to another, you will probably want to use a long Delay Time for each mic to prevent an audibly abrupt cutoff. At a conference however, when debaters compete for microphones, a shorter Delay Time would probably be more appropriate.

The following list shows the possible settings for each Gate function control. *Note: All dB settings are dBu.*

Max Gain: Off; –99½ dB to +25 dB in ½ dB steps

Low Set: Off; –99½ dB to +25 dB in ½ dB steps

Gate: On/Off

Threshold: Off; –99½ dB to +25 dB in ½ dB steps

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

6.4.2 Duck Priority Function

(Figure 6.9) "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 to their Low Set values. To activate the Duck Priority function, turn it on and set the priority level.

IMPORTANT: The Duck Priority function is dependent on the Gate function. Both the Gate function and the Duck Priority function must be on for Ducking to function.

Duck Priority: The Duck Priority function is turned on and off with this control.

Level: The Level control determines which input takes precedence. The priority can be set from 1 to 6 with 1 as the highest priority and 6 as the lowest. A separate priority level setting is provided for each channel, making it possible to give an input a different priority for each output channel. The Level setting is ignored if either the Duck Priority or Gate controls are turned off.

If only two inputs are used, there only needs to be two priority levels (perhaps 1 and 2). If you are unsure how many priority levels will be needed or what the final priorities will be, start with levels 3 and 4. The priorities above and below remain available for assignment to other inputs. If several *SMX-6* mixers will be linked in a Crown Local Net, they will be able to share Duck Priority information with other *SMX-6* mixers. If this is the case, you will also need to consider the input priorities of the other *SMX-6* mixers.

Tip: *When a signal ducks, the gain drops to the Low Set level for that input. The default value is off (–100 dB). This may sound too abrupt because it is such a large transition. To avoid this problem, pick a higher value for a more smooth transition. The Low Set control can be set so high that the ducked signal is still audible over background noise. This may be desirable when mixing a debate or conference.*

Note: The Delay Time control of the Gate function also affects the Duck Priority function. When a high-priority input falls below its gate Threshold, all ducked inputs must remain at their Low Set levels until after the Delay Time.

Duck priorities can be shared by more than one *SMX-6* if they are connected to a Crown Local Net. See Section 6.4.7 for more information.

The following list shows the possible settings for each Duck Priority function control.

Duck Priority: On/Off

Level: 1, 2, 3, 4, 5, 6

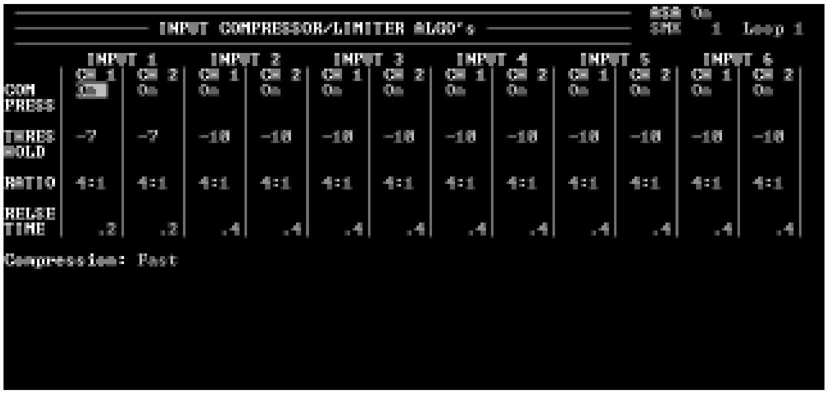


Fig. 6.11 The Second SMX-6 Sub-block Screen

6.4.3 Input Compressor/Limiter Function

(Figure 6.11) The Max Gain settings you select in the Gate function should be acceptable for consistent input levels—but sometimes the unexpected happens and an extremely loud input signal is present. The Input Compressor/Limiter function "reins in" input signals that suddenly become too loud. If the excessive loudness of the input signal is not transitory but is sustained, use the Auto level function to control it (Section 6.4.4).

Compress: The Input Compressor/Limiter function is turned on and off with this control.

Threshold: The Threshold control sets the level at which compression begins. A signal at this level or below is not affected, and a signal that goes above this level is compressed.

Ratio: The Ratio control sets the amount of compression applied for every step over the Threshold. This is commonly referred to as a "compression ratio". For example, when a 4:1 compression ratio is applied to a signal that exceeds the Threshold by 20 dB, the signal is attenuated 15 dB. When an infinite compression ratio (∞:1) is chosen, the compressor works like a limiter and prevents the level from exceeding the Threshold. *Note: A 1:1 compression ratio will not affect an incoming signal.*

Release Time: Any input level increase over the Threshold is compressed almost instantly. The Release Time function controls the time it takes for the gain to return to normal when the level drops below the Threshold. Short release times allow the compressor to respond to rapid changes in input level.

Compression (Attack Time): This feature is available for all *AMB-5s* but only for those *SMX-6s* with version 1.3 firmware or later. (To see which firmware version your *SMX-6* has, locate the white sticker above the DB-25 serial communication connector on the back panel of the unit. Units with version 1.3 firmware will be labeled "V 1.3".) The Compression control can be set either "Fast" or "Slow" to control the attack time of the Input Compressor/Limiter function.

Set the Compression control to "Fast" to cause the mixer to have the shortest attack time possible. This will be very fast—so fast that the compressor can stop extremely sudden loud transients like the sound caused by a dropped microphone. This is a good setting for rapid speech.

Set the Compression control to "Slow" for more gentle sound sources such as most music. When the "Slow" setting is used, the Release Time cannot be set any less than 0.4 seconds to avoid noticeable pumping of the Input Compressor/Limiter function.

The following list shows the possible settings for each Input Compressor/Limiter function control. *Note: All dB settings are dBu.*

Compress: On/Off

Threshold: Off; –99½ dB to +25 dB in ½ dB steps

Ratio: 1:1, 2:1, 4:1, 8:1, 16:1, 32:1, ∞:1

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

Compression: Fast/Slow

6.4.4 Auto Level Function

(Figure 6.12) Unlike the Input Compressor/Limiter function which is designed to handle sudden or transient jumps in input level, the Auto Level function is designed to control long-term changes in signal level. Using it, the average output level can be kept relatively constant over a longer time interval while transients are allowed to pass. This feature creates a more natural sound with increased dynamic range.

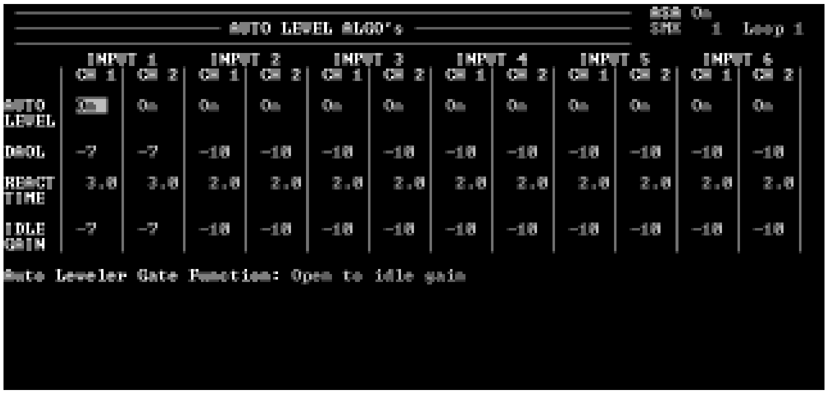


Fig. 6.12 The Third SMX-6 Sub-block Screen

Auto Level: The Auto Level function is turned on and off with this control.

DAOL: The DAOL control sets the Desired Average Output Level for the Auto Level function. If the DAOL is set to –20 dB, and the output signal level is –20 dB, nothing changes. The signal passes at the same level. But if the signal is above –20 dB, the Auto Level function will reduce the gain to bring the level down to –20 dB. And if the signal is below –20 dB, the gain is increased to increase the level up to –20 dB.

IMPORTANT: The Max Gain control is not intended to be adjusted in "real time" while the ASA control is turned on. Instead, use the DAOL control of the Auto Level function. The new level will not take affect until the Reaction Time setting of the Auto Level function has transpired.

Reaction Time: The Auto Level function continually adjusts the signal level toward the DAOL value. But it doesn't adjust the signal in one jump. Instead, the Reaction Time control sets the size of each step. For example, if the audio input signal stays at a constant level below the DAOL value, the gain would increase it to the DAOL level over the time (in seconds) specified by the Reaction Time control. In the "real world," audio signals continually change, and so does Auto Level's step size. This approach produces a very natural sounding auto level control.

A Reaction Time of 4 seconds is a good starting point for speech. Try 6–10 seconds for music. Although a 4 second Reaction Time might seem slow, remember that the Auto Level function compensates for average differences in level—such as between soft-spoken and boisterous speakers. If a sound source occasionally "blasts," you might also use the Input Compressor/Limiter function to control the transients.

Tip: *The Auto Level function never raises the gain higher than Max Gain. As you set the value of Max Gain higher, the Auto Level function will have more room to adjust the incoming signal. For inputs with an unusually wide dynamic range, set Max Gain as high as possible so the Auto Level algo can bring up the quietest passages.*

Tip: *Use a long Reaction Time when the system is used to mute background music during a page. This provides a pleasing and smooth transition back to background music after the page has been completed.*

Idle Gain: If the Gate and Auto Level functions are used together, their interaction may produce an unexpected side effect. When Max Gain is set above the DAOL of the Auto Level function, the Auto Level function could start lowering the gain every time the gate opens. If there is a great difference between the signal level and the DAOL, the shift in gain will be very noticeable. The sound would start out loud and then fade.

The Idle Gain control can compensate for this situation. Idle Gain controls the initial gain when the gate first opens. You can think of it as the “starting gain” because it overrides the Max Gain when the gate opens. 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.

IMPORTANT: The Idle Gain parameter functions only when three conditions are met. 1) The Gate function is turned on. 2) The Auto Level function is turned on. 3) The mixer has the Auto Leveler Gate Function control set to “Open to idle gain”. (The third condition is not required for *SMX-6s* with firmware prior to version 1.3.) See the Auto Leveler Gate Function control below for more information.

IMPORTANT: Never set Idle Gain higher than Max Gain. Because the Idle Gain overrides the Max Gain, it is possible to force the gain above the Max Gain setting.

Auto Leveler Gate: This feature is available for all *AMB-5s* but only for *SMX-6s* with version 1.3 firmware or later. (To see which firmware version your *SMX-6* has, locate the white sticker above the DB-25 serial communication connector on the back panel of the unit. Units with version 1.3 firmware will be labeled “V 1.3”.)

The purpose of the Auto Leveler Gate control is to help create smoother transitions when both the Gate and Auto Level functions are operating. Both of these functions must be operating for this feature to work.

The “Open to idle gain” setting is best for systems with relatively constant sound levels as with background music. When an input gate is opened, its gain is set to the Idle Gain setting. See the description of the Idle Gain control for more information.

The “Open to last position” setting is best for systems with widely varying sound levels where an Idle Gain setting is difficult to choose. When an input gate opens, the Idle Gain setting is ignored and the gain is restored to the previous level it had just prior to its closing. An example of when this setting is very useful is when speakers with very different voice levels share the same microphone.

The following list shows the possible settings for each Auto Level function control. *Note: All dB settings are dBu.*

Auto Level: On/Off

DAOL: (Desired Average Output Level) Off; –99½ dB to +25 dB in ½ dB steps

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

Idle Gain: Off; –99½ dB to +25 dB in ½ dB steps

Auto Leveler Gate Function: Open to idle gain/Open to last position

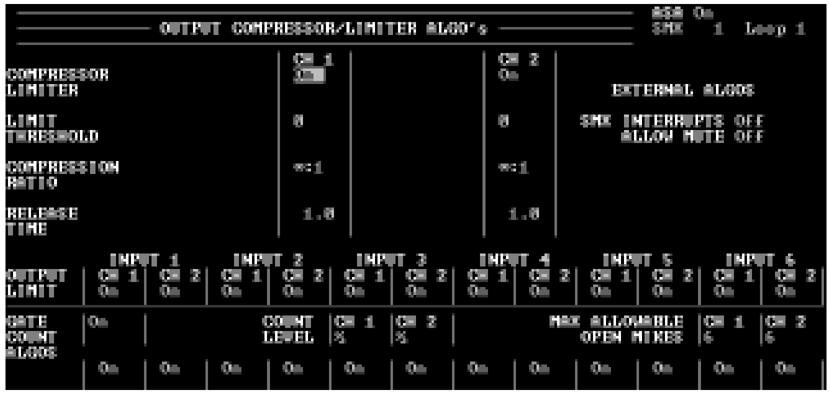


Fig. 6.13 The Fourth SMX-6 Sub-block Screen

6.4.5 Output Compressor/Limiter Function

(Figure 6.13) Even if every input is compressed, there is still a chance that the mix might become too loud. 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.

It works in a very interesting way. Instead of compressing the signal on the mixing bus, it compresses the signal at each input. Compression occurs only when the mix exceeds the Limit Threshold. It doesn't matter how loud a particular input gets, the mix which feeds each output channel must exceed the Limit Threshold before compression occurs.

The controls that configure the Output Compressor/Limiter function are very similar to those of the Input Compressor/Limiter function.

Compressor/Limiter: The Output Compressor/Limiter function is turned on and off with this control.

Limit Threshold: The Limit Threshold control sets the peak signal level above which compression occurs. If the mixer is connected to audio equipment that has a specified maximum input voltage, it is easy to limit the mixer's output to that level. If the specified input level were 0 dBu (0.775 V), the Limit Threshold could be set to 0 and the Compression Ratio set to ∞:1. In practice, this is a little harsh. A Limit Threshold of –2 dBu with a Compression Ratio of 16:1 will attenuate an incoming signal 32 dB before the output level reaches 0 dBu. When used with the Input Compressor/Limiter, the Output Compressor/Limiter provides some of the most accurate and predictable audio system protection available today.

Tip: *If you're not sure where to set the Limit Threshold, press 2 to view the bar graph display. The yellow bars above OUT 1 and OUT 2 represent the instantaneous peak output levels.*

Compression Ratio: The Compression Ratio control sets the amount of compression applied for every step over the Limit Threshold. For example, when a 4:1 compression ratio is applied to a signal that exceeds the Limit Threshold by 20 dB, the signal is attenuated 15 dB. When an infinite compression ratio (∞:1) is chosen, the compressor works like a limiter and prevents the output level from exceeding the Limit Threshold. *Note: A 1:1 compression ratio will have no effect on the signal.*

Release Time: As with the Input Compressor/Limiter, the Output Compressor/Limiter function responds almost instantly to signals above the Threshold. The Release Time control sets the time it takes for the gain to return to normal after the signal falls below the Limit Threshold.

Output Limit: The Output Limit control lets you select which inputs are compressed, and which are not. This is a highly flexible feature, and can be used in some very advanced setups. To make the Output Compressor/Limiter work like a conventional output compressor, make certain that all of the Output Limit controls are turned on. Selectively turning off an Output Limit control enables its input to push all remaining inputs down whenever it exceeds the Threshold. This is a specialized function and is offered only for those unique circumstances which require it.

Tip: *You don't have to compress all inputs. You could restrict compression to an offending input, leaving unchanged the signals that are unlikely to exceed the Limit Threshold. The Output Compressor/Limiter function allows the mixer to maintain a more natural sense of dynamics, with fewer audible side-effects.*

The following list shows the possible settings for each Output Compressor/Limiter function control. *Note: All dB settings are dBu.*

Compressor/Limiter: On/Off

Limit Threshold: Off; –99½ dB to +25 dB in ½ dB steps

Compression Ratio: 1:1, 2:1, 4:1, 8:1, 16:1, 32:1, ∞:1

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

Output Limit: On/Off

6.4.6 Gate Count Function

(Figure 6.13) The Gate Count function, working in conjunction with the Gate function, keeps track of how many gates are open at a time, and provides feedback control when a large number of mics are open. A similar feature of other manufacturers' products is called "NOM" (Number of Open Mics). When only two or three mics are open, system gain is usually too low to cause feedback. But as more mics open, the system gain can increase enough to cause feedback.

Gate Count: Immediately to the right of the Gate Count label is the master on/off control. Turn on this control to activate the Gate Count function.

IMPORTANT: The Gate Count function is dependent on the Gate function. Both the Gate function and the Gate Count function must be on for the latter to function.

Each input also has an individual on/off control for each output channel. They are located across the bottom of the screen and are used to control which inputs participate in the Gate Count function. Inputs with this control turned off are not counted.

Count Level: The Count Level control determines how much each input is attenuated as more gates open. It is entered in dB. 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". For example, if the Count Level were 3 dB and six mics were open, the attenuation would be 15 dB, or (NOM – 1) × Count Level.

Max Allowable Open Mics: Sets the maximum number of inputs that will be allowed to open at the same time. The Gate Count function will not allow additional inputs to open regardless of their priority when the maximum number has been reached.

Gate Counting can be shared between more than one *SMX-6* if they are connected to a Crown Local Net. See Section 6.4.7 for more information.

The following list shows the possible settings for each Gate Count function control.

Gate Count: On/Off

Count Level: ½ to 3 dB in ½ dB steps; 3 to 12 dB in 1 dB steps; 16 dB

Max Allowable Open Mics: 1, 2, 3, 4, 5, 6

6.4.7 External Functions *(SMX-6 Mixers Only)*

(Figures 6.13 and 6.14) External functions are unique to *SMX-6* mixers and each one must be connected to a Crown Local Net (CLN). Select the “External Algos” control and press the “Space Bar” to bring up the External Functions window shown in Figure 6.14. *Note: An “algo” is a function and this manual substitutes the word function except when referring to a control with algo in the name.*

An external function is one which is controlled, in part, by other IQ components. For example, more than one

Fig. 6.14 The External Function (Algos) Window

SMX-6 can be linked in a CLN so their Duck Priority and Gate Count functions work together. A priority 1 input in one unit will override a priority 2 input in another unit. The number of open mics can be totalled among all the *SMX-6s* in a CLN and all open inputs attenuated to prevent feedback in a large *IQ System*.

The CLN must be started in a particular order for reliable operation of the external functions. The procedure is listed below:

1. All *SMX-6s* <u>must</u> be connected to the system via the Crown Bus.
2. All ASA controls must be turned on.
3. With the CLN wiring <u>disconnected</u> and the System control of the External Functions turned off, set the Master, Ext Algos, Duck and Gate Count controls.
4. Connect the CLN serial cables as described in the *IQ Mixer Hardware Installation or Reference Manual*.
5. Select the master *SMX-6* in the External Functions window and turn the System control on. The CLN and external functions will begin to run.

After the CLN has been properly initialized, the System control can be turned on/off at any time to enable or disable CLN communication.

WARNING: You will be locked out of any further serial port communication with an *SMX-6* when you initialize the CLN. This means you cannot use an *SMX-6* as an IQ interface at the same time you plan to use it in a CLN. If you are "locked out" of an *SMX-6* and are unable to connect it to a Crown Bus, you must contact the Crown Support Group for further assistance. **All *SMX-6s* must be connected to the system via a Crown Bus loop when the CLN is initialized.**

The External Function controls are described below in the order in which they should be set. It is very important to turn the System control on last as described in the previous CLN startup procedure.

One of the first things to do is to decide which *SMX-6* will serve as the CLN master. Being the CLN master will not affect its normal operation. After the master is selected, the Duck, Gate Count and Ext *Algos* controls should be set for each *SMX-6*. To do this, first select the *SMX-6* from the list in the External Functions window then highlight each control and toggle it on or off as desired. Each time a different *SMX-6* is selected in the External Functions window, the controls will change to show the its current settings.

Master: One *SMX-6* in a CLN must be the master. With the System control off, choose one of the *SMX-6s* listed in the External Functions window and turn its Master control on.

IMPORTANT: Only one *SMX-6* should be the master. Make sure that the Master control of all other units is turned off. Neither the CLN or the *SMX-6s* will function properly if more than one unit is selected as a master.

Duck: Turn the Duck control on for all *SMX-6s* in a CLN which you want to respond to external Duck Priority function.

Gate Count: Turn the Gate Count control on for all *SMX-6s* in a CLN which you want to respond to external Gate Count function.

Ext *Algos*: The Ext *Algos* control enables the unit to work with external functions. Turn it on for all *SMX-6s* which you want to participate in the CLN. Turning Ext *Algos* off will prevent the Duck Priority and Gate Count functions from responding to external information on the CLN.

System: The System control activates the CLN. It should only be turned on for the first time after the preceding controls have been set. The CLN startup procedure gives specific instruction how to do this. Select the master *SMX-6* before turning it on.

The System control can be turned on and off at any time after the CLN has been properly initialized.

6.4.8 SMX Interrupts Function *(SMX-6 Mixers Only)*

(Figures 6.13 and 6.15) This is a rarely used function that enables an *SMX-6* mixer to generate a “pseudo” interrupt whenever an input is being overdriven (overloaded) by an input signal. A signal must be greater than +20 dB for this to occur. The remedy for such a problem is to turn down the hardware gain control of the affected input on the back panel of the *SMX-6* mixer. Only older versions of Crown’s *IQ–MSD Sys-Config* software used this feature. This function is not required by current software.

This feature comes with a price: the Channel 2 Output Compressor/Limiter function must be disabled to provide needed processing power to generate the pseudo interrupts.

SMX Interrupts: The SMX Interrupts function is turned on and off with this control. When it is turned on, a reminder (Figure 6.15) will be displayed to warn you that the Output Compressor/Limiter function will be disabled for Channel 2.

Fig. 6.15 Turning On the SMX Interrupts Function Will Disable the Output Compressor/Limiter Function for Channel 2

The controls for this function are very simple:

SMX Interrupts: On/Off

6.4.9 Mute Function *(SMX-6 Mixers Only)*

(Figures 6.13, 6.16 and 6.17) The Mute function is a specialized function for third-part developers who need to mute an *SMX-6* input from an external control system. However, this feature comes with a price—enabling it forces you to give up Gate Count function for Channel 2.

Allow Mute: The Mute function is turned on and off with this control. When it is turned on, a reminder (Figure 6.16) will be displayed to warn you that the Gate Count function will be disabled for Channel 2.

Fig. 6.16 Turning On the Mute Function Will Disable the Gate Count Function for Channel 2

A new row of Mute on/off controls will appear at the bottom of the sub-block (Figure 6.17) when the Mute function is turned on. Notice also that the Count Level control for Channel 2 is disabled to show that this function is no longer available for Channel 2 as long as the Mute feature is turned on.

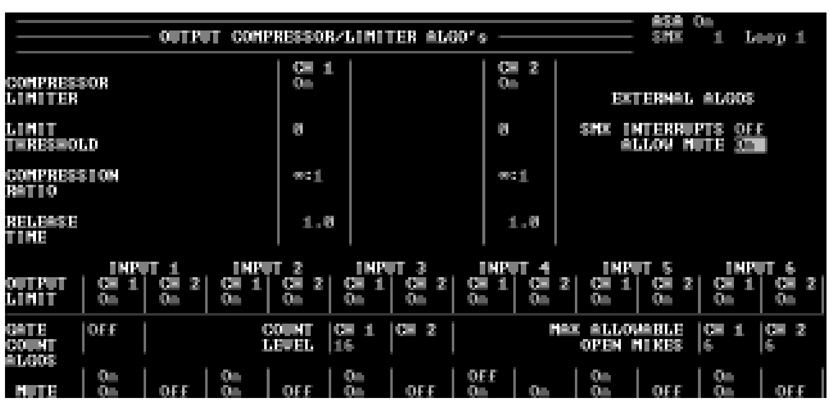


Fig. 6.17 The Mute Feature of an SMX-6

Mute: Each input is individually muted with these controls. The muting is post-processed after all other functions. This is important because of the following possible scenario: With the Gate and Duck Priority functions both turned on, it is possible for a higher priority input to open while it is muted. Of course, this will result in no sound.

The following list shows the possible settings for each Mute function control.

Allow Mute: On/Off

Mute: On/Off

Fig. 6.18 The Fifth AMB-5 Sub-block Screen

6.4.10 AMB Function *(AMB-5 Mixers Only)*

(Figure 6.18) The AMB function is unique to the *AMB-5* mixer. The AMB 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 *AMB-5* to automatically mix and control the overall loudness in an environment with background noise levels that vary. For example, it can insure that a factory paging system will never be too quiet or too loud when noisy machinery turns on and off.

The AMB function operates after all other functions have processed the audio signals. You can think of the AMB function as a “black box” which sits after all other automatic functions.

There are external factors that can greatly affect how well this functions works. The two most important ones are the location of the ambient sense microphone and the location of the loudspeakers. The ambient sense microphone must be located in a position where it can pick up the ambient noise level without also picking up unwanted sounds. The ambient sense microphone must also be located far enough away from the loudspeakers so that they do not inadvertently trigger the AMB function. It may take some experimentation to find both the optimum location for the ambient sense microphone and the optimum settings for this function.

Tip: *Unwanted sounds can often be filtered out with a band-pass filter or by using an ambient sense microphone with a selective pass band. For example, a 500–4,000 Hz band-pass filter could be added so the sense input responds only to the noise which would interfere with speech intelligibility. Also, a high-pass filter could be added so the sense input does not pick up low-frequency air conditioning noise (which can sometimes be very loud).*

Tip: *Shield the ambient sense microphone from excessive wind noise so that it does not prematurely activate the AMB function.*

WARNING: The AMB function bases its operation on the Gate function Max Gain settings for each input. **It is extremely important that the Max Gain settings be set properly to prevent excessive levels which could cause feedback.**

Several of the AMB function controls interact with each other. For this reason we recommend that they be configured in the order shown below:

1. Double-check the Gate function Max Gain settings of each input to be sure they are set properly to limit all input gains to safe levels.
2. Set the Ambient Offset Control to a desired level below the Max Gain settings.
3. Set the Threshold of the ambient sense input to an appropriate level so that the AMB function begins to operate at an appropriate time. This may require some experimentation.
4. Set the Expansion Ratio so that the dynamic range of the ambience level does not exceed the available headroom of the system.
5. Set the Attack and Decay Time controls to appropriate speeds.
6. Set the Guard Band to the desired offset below the Threshold (if desired). Normally, this can be turned off by setting it to 0 (zero).
7. Turn on the AMB function with the Ambience control.

Next, the controls are described in the order in which they are listed on the Sub-block screen.

Ambience: The AMB function is turned on and off with the Ambience control.

Attack Time: The Attack Time control determines how rapidly the AMB function will begin to increase the output level of Channel 1 above the Ambient Offset level. Slower Attack Times cause the AMB function to respond slower to increases in ambient level and prevent it from responding to sudden increases in level.

Decay Time: The Decay Time control determines how rapidly the AMB function will begin to reduce the output level of Channel 1 while the ambient sense input level is dropping. Slower Decay Times cause the AMB function to respond slower to decreases in ambient level.

Expansion Ratio: The Expansion Ratio control 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.

Most of the time the Expansion Ratio can be set to 1:1 so that the output level increases 1 dB for every increase in the ambient sense level. However, if the ambient noise level has an extremely wide dynamic range it is possible to exceed the headroom of the system. This is when you will want to use the Expansion Ratio control to reduce the dynamic range of the AMB function.

Guard Band: The Guard Band control is an offset to the Threshold control. For example, if the Guard Band is set to 3 dB, the threshold will be 3 dB below the Threshold control setting. It is provided as a tool for making temporary adjustments to the Threshold level during setup. Normally, it should be set to 0 (zero) so that the Threshold control setting accurately represents the actual threshold.

Threshold: The Threshold control determines at what ambient sound level the AMB function will begin to operate. It is the sound pressure level (SPL) of the ambient sensing input (Input 6). When the signal level of Input 6 exceeds the Threshold setting, the AMB function begins to increase the gain of Channel 1 at the rate dictated by the Expansion Ratio control.

Ambient Offset: The Ambient Offset is like a fixed insertion loss. It is the level below the Gate function Max Gain settings 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 Ratio setting. The Max Gain settings always limit the maximum possible gain which any input can receive.

Inputs whose net gain is forced below the Ambient Offset by the other functions are ignored by the AMB function. This prevents the AMB function from attempting to increase the gain of inputs whose gates have been closed.

The following list shows the possible settings for each AMB function control. *Note: All dB settings are dBu.*

Ambience: On/Off

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

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

Expansion Ratio: 1:1, 1.5:1, 2:1, 2.5:1, 3:1, 4:1, 5:1

Guard Band: 0, 1, 2, 3, 4, 5 dB

Threshold: Off; –99½ dB to +25 dB in ½ dB steps

Ambient Offset: 0 to 40 dB in ½ dB steps

7 Monitoring & Controlling Equalizers

An "equalizer" is a device that is used to adjust the sound level over relatively narrow frequency bands. For example, a ⅓ octave equalizer divides the audio band (usually 20 Hz to 20 kHz) into ⅓ octave bands and provides a level control for each band. Equalizers get their name from their most common use—making the level of all frequencies equal. Several third parties have developed digital equalizers that have been licensed to operate in an *IQ System* and be connected to a Crown Bus.

It is not the purpose of this *User Manual* to provide a detailed discussion of the features of each model; but rather to provide some general guidelines on the use of the *Turbo* to control an equalizer. The specific functions and features may vary slightly depending upon the exact model you have. Please refer to the documentation that came with your equalizer for more details, including hardware installation instructions.

Most equalizers can only be controlled from a graphics plate. There is one exception. Certain models from White Instruments can be controlled from a control block. All references to an equalizer control block refer to the White equalizers.

7.1 Initializing an Equalizer Control Block

The first step in initializing an equalizer control block (shown below in Figure 7.1) is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

Fig. 7.1 A Typical Equalizer Control Block Screen

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the equalizer. The Crown Bus loop number must match the physical loop to which the equalizer is wired.

On Line: The phrase "On Line" will appear in the upper right corner of the information area when an equalizer is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. On the model line you can enter any text up to 13 characters. On the location and purpose lines you can enter any text up to 19 characters. Only uppercase characters are allowed.

7.2 Monitoring an Equalizer

An equalizer can only be monitored from a graphics plate. A sample equalizer GDM (graphic display module) is shown below in Figure 7.2.

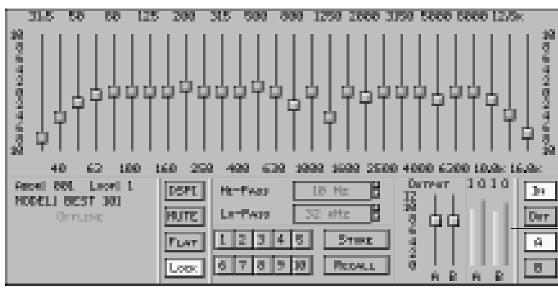


Fig. 7.2 The Input/Output Level Bar Graphs on an Equalizer GDM

Notice in the lower right corner of the GDM that an input (I) and output (O) bar graph is shown for both Channel A and B. *Note: The actual appearance of your GDM will vary depending on the manufacturer of the equalizer. Of course, you can always create your own custom GDM for an equalizer. See Section 3.9 for instructions on creating a custom GDM.*

7.3 Manual Controls

As mentioned earlier, a few equalizers can be controlled from a control block screen. However, most can only be controlled from a graphics plate. We will describe both next with a generic example. Please consult your equalizer's documentation for instructions specific to your particular model.

7.3.1 Manual Control from a Control Block

Use the Device menu (F1) to switch to the equalizer Control Block screen. The equalizer control block screen is shown below:

A description of each control follows:

Fig. 7.3 A Typical Equalizer Control Block

Ch: Selects Channel A or B. Each channel has its own level settings, enabling the equalizer to be used in a stereo system, or any system where two discrete channels of equalization are desired.

Lock: Locks Channel A and B together. Turning on the Lock control causes the changes made to one channel to also be sent to the other channel.

DSPI: The DSPI or Data Signal Presence Indicator is an LED on the unit which flashes whenever it unit is polled. The DSPI control is used to force the indicator to stay on as an aid to troubleshooting communication on the Crown Bus. Once the DSPI control is turned on, the DSPI will remain on continuously even if the control block of another device is selected. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received.

Sel: Selects the equalizer so that a GDM for it is added to a graphics plate when the graphics plate is set to the Selected mode.

Level dB: Controls the cut or boost of a single frequency band. Only five Level controls are shown at a time and their center frequency is displayed above them. In Figure 7.3, the Level controls centered at 31.5, 40, 50, 60 and 80 Hz are displayed. Use SHIFT+↑ and SHIFT+↓ to scroll sideways through all of the Level controls.

The level can be changed in ½ dB steps with SHIFT+↑ and SHIFT+↓. This is the only way to change an equalizer Level control—levels cannot be directly entered.

Low Pass: Sets the –3 dB corner frequency of a low-pass filter in kHz.

High Pass: Sets the –3 dB corner frequency of a high-pass filter in Hz.

In/Out: Switches the equalizer "in" or "out" of the audio path. Switching it to the "IN" position turns on the equalization settings and switching it to "OUT" turns off the equalization settings much like a bypass switch on a conventional equalizer.

Gain: Sets the gain of the equalizer. Because an equalizer is often used to attenuate unwanted peaks in amplitude response, it is not uncommon for the net gain of the signal to be reduced. Use the Gain control to add gain back to the signal as desired.

7.3.2 Manual Control from a Graphics Plate

The primary way to control an equalizer is from a graphics plate. Each equalizer has a GDM or graphic display module. A sample is shown below in Figure 7.4:

However, you don't have to use the GDM that came with your equalizer. You can create a custom one tailored to your specific needs. See Section 3.9 for more information about creating a custom GDM.

The controls on the equalizer GDM are very similar in function to the ones on the control block. They are described next.

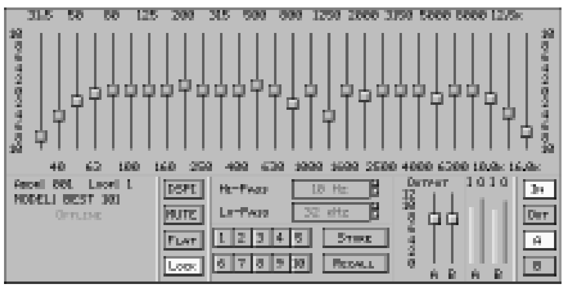


Fig. 7.4 A Sample Equalizer GDM

Level: The level control of each frequency band is located in the upper half of the GDM. They function like "sliders" on a typical equalizer. Simply use the mouse to drag ( ) a control up to increase the level or down to decrease the level at the specified center.

DSPI: The DSPI or Data Signal Presence Indicator is an LED on the unit which flashes whenever it unit is polled. The DSPI control is used to force the indicator to stay on as an aid to troubleshooting communication on the Crown Bus. Once the DSPI control is turned on, the DSPI will remain on continuously even if the control block of another device is selected. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received.

Mute: Mutes all audio going through the selected channel of the equalizer.

Flat: Quickly restores the settings of all equalizer Level controls to 0 (zero) dB.

Lock: Locks Channel A and B together. Turning on the Lock control causes the changes made to one channel to also be sent to the other channel.

High-Pass: Sets the –3 dB corner frequency of a low-pass filter in kHz.

Low-Pass: Sets the –3 dB corner frequency of a high-pass filter in Hz.

Memory, Store, Recall: Some equalizers allow you to locally store settings into internal memory inside the unit. Use the Store and Recall buttons to store the settings into one of the memories. The example on the preceding page allows up to ten different equalization curves to be stored into memory. To store the current settings into memory, first press the Store button and then press the numbered memory button. To recall an equalization curve from memory, first press the Recall button and then press the desired memory button.

Output: Sets the gain of the equalizer. Because an equalizer is often used to attenuate unwanted peaks in amplitude response, it is not uncommon for the net gain of the signal to be reduced. Use the Gain control to add gain back to the signal as desired.

I/O: A small bar graph is available to dynamically show the input (I) and output (O) level of each channel.

In/Out: The IN button switches the equalizer “into” the audio path. The OUT button switches the equalizer “out” of the audio path. The OUT button acts much like a bypass switch on a conventional equalizer.

A/B: Selects Channel A or B. Each channel has its own level settings, enabling the equalizer to be used in a stereo system, or any system where two discrete channels of equalization are desired.

8 Monitoring & Controlling Drones

An IQ drone such as the *DRN-16* can control an *IQ System* much like a host computer. But before it can control other IQ components in the system, it must be configured or “trained” to do so. This section will describe how to use *Turbo* to configure a drone.

Let’s begin with the drone Control Block screen. A sample is shown in Figure 8.1. Notice that a single drone control block occupies the entire drone Control Block screen.

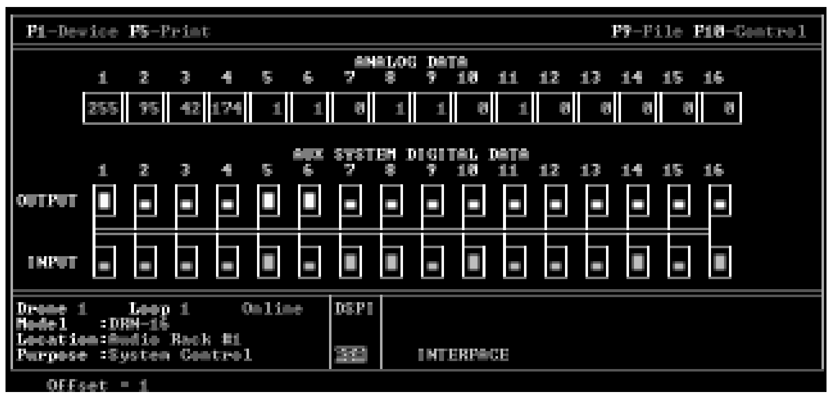


Fig. 8.1 A Drone Control Block Screen

8.1 Initializing a Drone Control Block

The first step in initializing a drone control block is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the IQ drone. The Crown Bus loop number must match the physical loop to which the drone is wired.

On Line: The phrase “On Line” will appear in the upper right corner of the information area when a drone is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. Up to 15 characters can be entered on each line.

Interface: When a drone is used as an IQ interface between a host computer and one or two Crown Bus loops, the word “Interface” will appear in the box in the lower right portion of the control block.

8.2 Monitoring a Drone

The state of each drone input and output can be monitored from either a control block or a graphics plate.

8.2.1 Monitoring from a Control Block

The indicators in the drone control block are only useful when a drone is connected to the system. The indicators can be ignored when configuring a drone that is off-line or disconnected. Please refer to Figure 8.1 during this section.

Analog Data: The relative input voltage level (AC or DC) of each analog input is displayed under the “Analog Data” section at the top of the drone control block. The analog data indicators have a range from 0 to 255. 255 represents the maximum input of 10 volts. *Note: The sensitivity of the analog inputs can be changed with resistor substitution. See the Drone Hardware Installation Manual for details.*

AUX System Digital Data: The status of both the AUX inputs and outputs are displayed under the “Aux System Digital Data” heading. The first line, labelled “Output”, shows which outputs are being driven with an output signal. When one of the 16 outputs has been turned on (either by the drone’s programming or manually), the indicator will be displayed at full height. If the output is turned off, the indicator will be displayed at half height.

The second line, labelled “Input”, shows which AUX inputs have data returning to them. If a logic high is sensed at a AUX input, the indicator will display at full height. If a logic low is detected it will display at half height.

8.2.2 Monitoring from a Graphics Plate

A drone can also be monitored from a graphics plate. However, before this can be done, you must create objects on the graphics plate for that purpose. Figure 8.2 shows a very simple example.

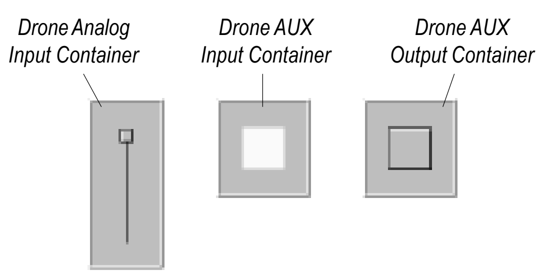


Fig. 8.2 Sample Objects Used to Monitor a Drone

In Figure 8.2, an analog input, an AUX input and an AUX output are each monitored. This is accomplished by first creating a separate drone container for each input and/or output that you want to monitor. Then an appropriate object is placed inside each container. In this example, a Pot object is placed inside the drone analog container. It serves two purposes: it shows the level of the input and it allows you to manually adjust it when the drone's ASA control is turned off. An LED object is placed inside the drone AUX input container to monitor its on/off status. An On/Off Button is placed inside the drone AUX output container. It serves two purposes: it shows whether the output is on and allows manual control when the drone's ASA control is turned off.

When an object is placed into a drone container, it is automatically linked to the single drone input which the container represents. A separate drone container is required for each input or output. See Section 4.15 for a description of each drone object.

8.3 Manually Controlling a Drone

8.3.1 Manual Control from a Control Block

The drone control block provides the highest level of supervision over a drone. From it you can turn on/off the drone's internal programming, individually control each logic output and monitor both logic and analog inputs. The control block is also the gateway into the drone sub-blocks that allow you to "train" or program a drone. Use the Device menu (F1) to access a drone Control Block screen. A drone Control Block screen is shown in Figure 8.1.

Output: Because the drone is designed primarily for automation, it seldom needs to be manually controlled from its control block. Once switches and pots have been connected to the drone's inputs and it has been taught what to do with them, it can run itself and most of the *IQ System*. However, there may be times when a logic output must be manually turned on and off from the drone control block.

To turn a logic output on or off, select the output in the "Output" line under the "AUX System Digital Data" section of the control block. The selected output will change to a light blue color. Press the "Space Bar" to toggle the output on and off. When it is on the indicator block will be full height. When it is off it will be half height. *Note: The ASA control must be turned off in order to manually change a logic output setting.*

Tip: *The AUX output settings can be saved as part of a dataframe file by pressing* F9 *if the ASA control is off.*

Tip: *To toggle ASA on and off from anywhere on the Control Block screen, press* CTRL+A*. Or you can select the ASA control and press* the "Space Bar".

ASA: The Auto System Activate control serves two purposes. First, it serves as a master control to turn all programming inside the drone on and off. Turning ASA off, restores manual-only control. Turning ASA on restores automatic operation. It should be turned off while training a drone.

Second, the ASA control serves as an entrance to the Sub-block screens where the drone is trained. To display the first Sub-block screen, highlight the ASA control and press either ENTER or ↓.

8.3.2 Manual Control from a Graphics Plate

Earlier in Section 8.2.2 we discussed how to monitor a drone from a graphics plate and we also alluded to manual control. This is because many of the same objects that are used to monitor a drone from a graphics plate are also used to manually control it when its ASA control is turned off.

The principals are fairly simple: First, create a drone container for each input or output that you want to control. See Section 4.15 for additional details. Second, place an appropriate object inside each container. The objects will be linked to the input or output represented by their container. In the example in Figure 8.2, a Pot object was placed inside a drone analog input container. It then serves both as a level monitor and a manual control.

Remember: You should not try to manually control a drone when its ASA control is on.

8.4 Control Block Shortcuts

Several keyboard shortcuts are available to make it easier to work with the drone control block and sub-blocks. They are functional only from the drone control block—not the sub-blocks.

ALT+F2	Jump to the 1st Sub-block screen (Drone Aux Input Setup)
ALT+F3	Jump to the 2nd Sub-block screen (Simplex Input Commands)
ALT+F4	Jump to the 3rd Sub-block screen (Analog Input Commands)
ALT+F6	Jump to the 4th Sub-block screen (Binary Input Commands)
ALT+F7	Jump to the 5th Sub-block screen (Aux Output Commands)
ALT+F8	Jump to the 6th Sub-block screen (Paralyze Commands)

Note: The above shortcuts allow you to jump only to the specific Sub-block screen listed. After using a shortcut, you must return to the control block before jumping to a different Sub-block screen.

CTRL+F	(also ALT+5) Flush or remove all user programming stored inside the drone.
CTRL+A	Toggle the ASA control on and off.

8.5 Training a Drone

The real power of the drone lies in its ability to be trained to control an *IQ System*. Once trained, a drone can function much like a host computer and control other IQ components in the system. Although “training” a drone is really programming it, you don’t have to know anything about programming languages. Training a drone is simply a matter of linking desired IQ commands to the appropriate drone inputs and outputs.

A drone can be trained either from its six Sub-block screens or from a graphics plate. Figure 8.3 shows the Drone Object Attributes window which is used to train a drone from a graphics plate:

A drone is trained from a graphics plate by creating a container for each input and/or output and then placing

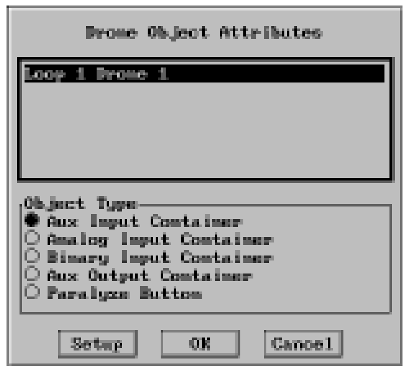


Fig. 8.3 The Drone Object Attributes Window

relevant control objects inside the containers. The control objects represent the various functions that will be acted upon when the drone input or output is activated. Objects placed inside a drone container are linked to the input or output which the container represents.

However, using the drone sub-blocks to train a drone is the most direct method because graphics plate objects need not be created. The remainder of this section will use the sub-block method. To switch to the drone Sub-block screens, select the ASA control in the Control Block screen and press either ENTER or ↓. Section 8.4 also lists the shortcuts that make it possible to jump directly to a single drone Sub-block screen. The first drone Sub-block screen is shown in Figure 8.4.

The first drone Sub-block screen allows you to configure each AUX Input. It is followed by five drone Sub-block command screens with the following titles: Simplex Input Commands, Analog Input Commands, Binary Input Commands, Aux Output Commands and Paralyze Commands.

A description of the drone Sub-block screens and their associated controls are described next.

8.5.1 AUX Input Setup

The AUX inputs can be used in one of two modes: simplex or binary. This is set in the first drone Sub-block screen, titled Drone Aux Input Setup (shown in Figure 8.4).

Fig. 8.4 The Drone Aux Input Setup Sub-block Screen

In simplex mode each input is monitored separately to see if it is on or off. The commands assigned to each input are sent as dictated by its on/off status. In binary mode the inputs are monitored as a group and their on/off states are added to create a binary code. The commands assigned to a binary code are sent only when a strobe signal is received and the on/off state of all inputs in the binary group combine to equal the code. This allows many more controls to be connected to the inputs because of the many possible combinations of on/off states. Binary mode is useful when you need to connect more controls to a drone than it has inputs or when you need to receive a digital signal.

To switch a logic input between simplex and binary, select the input with ↑ ↓ and press the "Space Bar". Notice that binary inputs are grouped together into "channels." The groups are labelled Channel A through D and a minimum of four consecutive inputs (3 binary and 1 strobe) are required to form a binary channel. The last input of every binary channel must be used as a strobe to signal when binary codes should be read by the drone. Turning on the strobe input signals that it is time to read the inputs in the binary channel. The strobe must then cycle through another on/off cycle before the channel will be read again.

Important: Each input can only be used in one mode at time. When an input has been set for binary operation, it cannot be used in simplex mode. Also, a binary input can be grouped into only one channel at a time—it cannot be used in two channels at the same time.

8.5.2 Simplex Mode Assignments

In simplex mode, a logic input is treated as a stand-alone signal. Each simplex input acts as a simple on/off switch to interface to the “hardware switches” or controls of the outside world. If all 16 AUX inputs are set to simplex mode, then up to 16 different controls can be connected to the drone, one to each input. *Note: It is also possible to use analog inputs as simplex AUX inputs. This makes it possible to have a total of 32 AUX controls. This will be explained later.* For example, an on/off switch connected to one input can be used to signal that all amplifiers need to be turned on or off. A second one can be used to turn on the Auto Level function of an *SMX-6*. A third one can be used to make system wide changes to several IQ components, etc.

To assign one or more commands to a simplex AUX input, first use [PG↑] [PG↓] to advance to the command Sub-block screen titled “Simplex Input Commands” as shown in Figure 8.5:

Fig. 8.5 The Drone Simplex Input Commands Sub-block Screen

Each drone command sub-block has four buttons: Add, Modify, Copy and Delete. Use [←] [→] to switch between the command list on the left and the buttons on the right. To select a button, use [↑] [↓] or press [ALT] and the first letter of the button (example, press [ALT]+[A] to select the Add button).

Add: Use the Add button to assign a new command to an input. For example, select Add to assign the amplifier “Power Ch 1” command (function) to a switch connected to AUX Input 1. Selecting Add summons a window to prompt you for the assignment information. This is shown in Figure 8.6.

Only one command can be assigned to an input at a time with the command window but you can assign as many commands as you want to an input by repeating the steps described next and assigning additional commands to the same input.

Fig. 8.6 Adding a Command Assignment to a Simplex AUX Input

To make a command assignment, begin at the top with the input number. Each parameter is described next. Use TAB to select them.

Input #: The drone AUX input number.

Use Analog As AUX: Tells the drone to use an analog input in place of an AUX input. (Analog inputs can be used as AUX inputs, making it possible to have as many as 32 "AUX" inputs.) If an analog input is used, it will be numbered after the AUX inputs. In the example above, analog Input #1 would be listed as AUX Input #17.

Components: The Components list is used to select the IQ component that will be controlled by the drone input. All a component needs to be included in the list is a control block—it does <u>not</u> have to be on-line to appear in the list. By including off-line components it is possible to preconfigure a drone before it is connected to an actual *IQ System*.

Available Functions: The Available Functions list is used to select the command that will be sent to the selected IQ component when the drone input is turned on or off. (See the Momentary and Inverted parameters also.)

Note: It is possible to assign more than one command to the <u>same</u> drone input. In this way, the flip of a single switch can send a number of different commands to one or more IQ components. ***Important: Commands are executed in the order that they are added to an input.*** *Carefully plan the order that you want the commands to be executed <u>before</u> adding them to an input or else you may have to delete and reenter them later.*

The following commands are available for each IQ component:

Amplifier IQ *P.I.P.* with<u>out</u> *SmartAmp* features:
DSPI—force Data Signal Presence Indicator to stay on
AUX Out—turn on/off AUX port output
Power—turn on/off the high voltage supply of each channel
Polarity—invert/restore the audio signal polarity of each channel
Mute—mute the audio signal by setting the input attenuator to –50 dB

Attenuation—set the input attenuation level of each channel
All Power—turn on/off the high voltage supplies of ALL amplifiers in one zone
All Mute—mute/unmute the input of ALL amplifiers in one zone
All DSPI—force the DSPI lights of ALL relevant amplifiers to stay on in one zone

Amplifier IQ *P.I.P.* with *SmartAmp* features (includes all the above commands plus):

ASA—turn on/off all automation functions
ODEP Conservation—enable automatic gain reduction as *ODEP* level rises
Smooth Output Limiter—enable "smooth" output limiting
Smooth Output Limiter Threshold—set the point when smooth limiting begins
Stand By—enable standby mode when no signal present
Stand By Gate Level—set the point when the high voltage supplies turn on
Stand By Turn Off Delay—disable turn-on delay while using standby mode
Fault Error Reporting—show an alert message if a fault occurs
Fault Error Input Drive Level—set the minimum drive level for a fault
Report Fault Via AUX—turn on AUX port if a fault occurs
IOC Error Reporting—show an alert message if an *IOC* error persists
Short Error Reporting—show an alert message if a short is detected
DSPI Flash—this control is reserved for future use
Break Detect—disable break detect when not connected to an *IQ System*

MPX-6 Mixer:

DSPI—force Data Signal Presence Indicator to stay on
AUX—turn on/off AUX port output
Bus—turn on/off the audio Bus output of each channel
Attenuation—set the attenuation level of each input and channel

SMX-6 Mixer (includes all *MPX-6* commands plus):

ASA—turn on/off all automation functions
Max Gain Tracks Control Block—makes Max Gain of each input equal to the control block gain settings
Control Block Override—this control is reserved for future use
Max Gain—set the maximum gain for an input and channel
Low Set—set the "closed gate" gain for an input and channel
Gate *Algo*—turn on/off the Gate function
Gate Threshold—set the point when an input gate "opens"
Duck Priority—turn on/off the Duck Priority function
Input Compression—turn on/off the Input Compressor/Limiter function
Input Compression Threshold—set the point when input compression begins
Auto Level—turn on/off the Auto Level function
Auto Level DAOL—set the Desired Average Output Level of each input and channel
Idle Gain—set the initial level for the Auto Level function when a gate "opens"
Output Compression—turn on/off the Output Compressor/Limiter function
Output Compression Threshold—set the point when compression begins
Output Limiter—select which inputs and channels are compressed
Gate Count Master—turn on/off the Gate Count function
Gate Count—turn on/off gate counting for each input
Lock (Attenuation)—locks output Channel 1 and 2 so that attenuation changes to one also affect the other
Lock (Max Gain)—locks output Channel 1 and 2 so that changes to the Max Gain setting of one also affect the other

Lock (Auto Level Threshold)—locks output Channel 1 and 2 so that changes to the Auto Level threshold of one also affect the other

AMB-5 Mixer (includes all *MPX-6* commands plus):

ASA—turn on/off all automation functions
Max Gain Tracks Control Block—makes Max Gain of each input equal to the control block gain settings
Control Block Override—this control is reserved for future use
Max Gain—set the maximum gain for an input of Channel 1
Low Set—set the "closed gate" gain for an input of Channel 1
Gate *Algo*—turn on/off the Gate function
Gate Threshold—set the point when an input gate "opens"
Duck Priority—turn on/off the Duck Priority function
Input Compression—turn on/off the Input Compressor/Limiter function
Input Compression Threshold—set the point when input compression begins
Auto Level—turn on/off the Auto Level function
Auto Level DAOL—set the Desired Average Output Level of each input of Channel 1
Idle Gain—set the initial level for the Auto Level function when a gate "opens"
Output Compression—turn on/off the Output Compressor/Limiter function
Output Compression Threshold—set the point when compression begins
Output Limiter—select which inputs of Channel 1 are compressed
Gate Count Master—turn on/off the Gate Count function
Gate Count—turn on/off gate counting for each input
Ambience—turn on/off the AMB function
Ambience Threshold—set the point when the AMB function will begin to operate

Equalizer:

DSPI—force Data Signal Presence Indicator to stay on
Mute—mute the audio signal
In/Out—switches the equalizer "in" and "out" of the signal path
Store—store equalizer settings into one of ten presets per channel (A or B)
Recall—recall any stored preset
Output Gain—set the output gain
Filter—set the level of each equalizer filter

MRX-24, 24S, 12, 12S:

DSPI—force Data Signal Presence Indicator to stay on
AUX—turn on/off AUX port output
Relay—turn on/off each relay

Momentary: Use this setting if a momentary-style switch (commonly a spring-loaded push-button which makes momentary contact when depressed and released) is connected to the drone input.

When turned on, the Momentary parameter causes the associated command to be sent when the switch is closed and no command to be sent when it the switch is opened. This means that any "off" command (or "on" command if the Inverted command is also turned on) will <u>not</u> be sent when the switch is opened.

Inverted: Reverses the "on" and "off" commands. The "on" commands will be sent when the switch is "off" and the "off" commands will be sent when the switch is "on."

Relative: (Only available when a level function is selected.) Causes level functions to add or subtract from existing levels rather than replacing them. When the Relative parameter is turned on, only the On Level is used. When an input is “on”, the level for the associated function will go up or down the number of dB specified by the On Level. When an input is “off”, the level for the associated function will go down the same number of dB.

On/Off Level: (Only available when a level function is selected.) The values entered are the levels the function will use when the input is “on” and “off”, respectively.

Modify: Use the Modify button to change the selected assignment. Begin by selecting the command assignment you want to modify. This is done by pressing TAB until the input command list is highlighted as shown in Figure 8.7 and using the ↑ ↓ or left mouse click ( )to select the desired command assignment from the list.

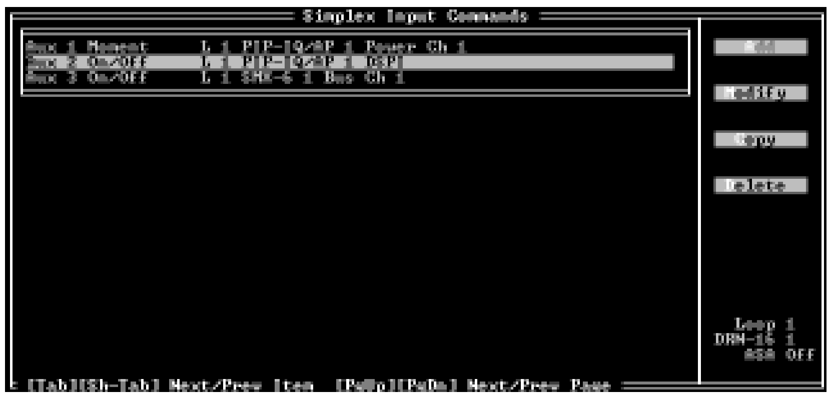


Fig. 8.7 Selecting an Existing Drone Command Assignment

Next, press the Modify button to summon the command assignment window (Figure 8.6). Make any changes you want and then press the OK button.

Copy: Use the Copy button to duplicate the selected assignment. It can make repetitious command assignments much easier to enter. The command assignment window will appear so you can make changes before the copied command assignment is accepted.

Delete: Use the Delete button to remove the selected assignment. Begin by selecting the input assignment you want to delete. Then press the Delete button.

8.5.3 Binary Mode Assignments

The difference between simplex and binary modes was introduced at the beginning of Section 8.5.1. Let's briefly review: Binary inputs are grouped and their on/off states added to create a binary code so that many possible signals can be received with just a few inputs. It is possible to have up to four different binary groups (called channels) and each input can be in only one group at a time. The groups are labelled Channel A through D and a minimum of four consecutive inputs (3 binary and 1 strobe) are required to form a binary channel. The last input of every binary channel must be used as a strobe. Turning on the strobe input tells the drone it is time to read the inputs in the binary channel. The strobe must then cycle through another off/on cycle before the channel will be read again. The decimal value of each input in a binary channel is listed below.

Input	Decimal Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128
9	256
10	512
11	1024
12	2048
13	4096
14	8192
15	16384

Please note: *Although it is physically possible to have up to 32,768 different binary codes (32,678 different binary input combinations), the maximum number of binary codes that can actually be used in a system is determined by the memory management system in the drone. At the time of this writing, systems have been installed which use over 800 binary codes. Please contact our Technical Support Group (800-342-6939 or 219-294-8200) if you require over 800 binary codes in your system.*

Note: Only 15 inputs are listed above because the strobe input is <u>not</u> assigned a value. This limits the total number of inputs that will be used to compute a binary code to 15 even if all 16 inputs are grouped into a single binary channel.

The decimal values always begin with the lowest input number in a binary channel and increase toward the highest number in the channel. For example, if inputs 5–9 are grouped into binary Channel A then Input 5 has a value of 1, Input 6 has a value of 2, Input 7 has a value of 4, Input 8 has a value of 8 and Input 9 will be the strobe.

Fortunately you don't need to understand binary math to assign a command to a binary code because *Turbo* uses familiar decimal numbers for binary codes. You are probably already familiar with this because the IQ address switch on each IQ component also creates a binary code and yet decimal numbers are used for IQ addresses. To determine the decimal value of a binary code, simply add up the decimal values of all the inputs in the binary channel that are turned on. In the preceding example, *Turbo* will read a value of 2 for the binary channel if only Input 6 is turned on. If Inputs 5, 6, 7 and 8 are all on at the same time, the binary code would be 1+2+4+8 or 15.

There are a maximum of 32,768 possible combinations if all 16 logic inputs are grouped into a single binary channel. In this case the highest possible binary code would be 32,767. That means that 32,767 different controls could be connected to a drone at one time! However, other factors limit the total (see the preceding note).

Note: Although analog inputs can double as simplex logic inputs (see Section 8.5.2), they <u>*cannot*</u> *be used as binary logic inputs.*

To assign one or more commands to the binary code of a channel, first use PG↑ PG↓ to advance to the command Sub-block screen titled "Binary Input Commands." Then select the Add button. The window in Figure 8.8 will appear:

Fig. 8.8 Adding a Command Assignment to a Binary AUX Input

Only one command can be assigned to an input at a time with the command window but you can assign as many commands as you want to an input by repeating the steps described next and assigning additional commands to the same input.

Begin by entering the Channel letter (A, B, C or D) and Switch number at the top. Remember that binary mode allows the use of many more switches than there are inputs. The switch number is the same as the binary code number, representing the sum of the values of all the binary inputs that are turned "on" by the switch.

Next, select the IQ component and function. Finally, set the Momentary, Inverted and Level parameters. (These parameters are described in Section 8.5.2.)

8.5.4 Analog Input Assignments

The analog inputs enable the drone to respond to level controls. A wide variety of commands can be assigned to an analog input just like an AUX input.

Note: If desired, analog inputs can be used as simplex AUX inputs. This is controlled by the "Use Analog as Aux" command in the AUX Input Commands Sub-block screen. See Section 8.5.2 for more details.

The Analog Input Commands Sub-block screen is located between the AUX Input Commands Sub-block screen and Binary Input Commands Sub-block screen. It is used to assign commands to any of the 16 analog inputs.

To assign one or more commands to an analog input, first use PG↑ PG↓ to advance to the command Sub-block screen titled "Analog Input Commands." Then select the Add button. The window in Figure 8.9 will appear:

Only one command can be assigned to an input at a time with the command window but you can assign as many commands as you want to an input by repeating the steps described next and assigning additional commands to the same input.

Fig. 8.9 Adding a Command Assignment to an Analog Input

Input #: The drone analog input number.

Components: The Components list is used to select the IQ component that will be controlled by the drone input. All a component needs to be included in the list is a control block—it does not have to be on-line to appear in the list. By including off-line components it is possible to preconfigure a drone before it is connected to an actual *IQ System*.

Available Functions: The Available Functions list is used to select the command that will be sent to the selected IQ component when the drone input is adjusted.

Note: It is possible to assign more than one command to the same drone input. In this way, a single potentiometer can control a number of different levels of one or more IQ components. ***Important: Commands are executed in the order that they are added to an input.*** *Carefully plan the order that you want the commands to be executed before adding them to an input or else you may have* *to delete and reenter them later.*

The following "analog" commands are available for each IQ component:

Amplifier IQ *P.I.P.* without *SmartAmp* features:
- Attenuation—set the input attenuation level of each channel

Amplifier IQ *P.I.P.* with *SmartAmp* features (includes all the above commands plus):
- Smooth Output Limiter Threshold—set the point when smooth limiting begins
- Stand By Gate Level—set the point when the high voltage supplies turn on
- Fault Error Input Drive Level—set the minimum drive level for a fault

MPX-6 Mixer:
- Attenuation—set the attenuation level of each input and channel

SMX-6 Mixer (includes all *MPX-6* commands plus):
- Max Gain—set the maximum gain for an input and channel
- Low Set—set the "closed gate" gain for an input and channel
- Gate Threshold—set the point when an input gate "opens"
- Input Compression Threshold—set the point when input compression begins
- Auto Level DAOL—set the Desired Average Output Level of each input and channel
- Idle Gain—set the initial level for the Auto Level function when a gate "opens"
- Output Compression Threshold—set the point when compression begins

AMB-5 Mixer (includes all *MPX-6* commands plus):
- Max Gain—set the maximum gain for an input of Channel 1
- Low Set—set the "closed gate" gain for an input of Channel 1
- Gate Threshold—set the point when an input gate "opens"
- Input Compression Threshold—set the point when input compression begins
- Auto Level DAOL—set the Desired Average Output Level of each input of Channel 1
- Idle Gain—set the initial level for the Auto Level function when a gate "opens"
- Output Compression Threshold—set the point when compression begins
- Ambience Threshold—set the point when the AMB function will begin to operate

Equalizer:
- Output Gain—set the output gain
- Filter—set the level of each equalizer filter

Max/Min Level: The Max and Min Levels set the range for a level control. The Max Level is the level used by the selected command when the input is turned up to its highest setting. The Min Level is the level used by the selected command when the control at the input is turned down to its lowest setting.

8.5.5 AUX Output Assignments

AUX outputs are provided to signal other components in the system—including non-IQ components. They can also be used to provide monitoring capability to a custom control panel. For example, an AUX output can be used to drive a “power” LED to indicate on a remote control panel that an amplifier is turned on. A wide variety of things can be monitored by the drone and used to turn an AUX output on or off.

The Aux Output Commands Sub-block screen is located between the Binary Input Commands Sub-block screen and Paralyze Commands Sub-block screen. It is used to assign monitor functions to any of the 16 AUX outputs.

To assign one or more commands to a logic output, first use PG↑ PG↓ to advance to the command Sub-block screen titled “AUX Output Commands.” Then select the Add button. The window in Figure 8.10 will appear:

Only one monitor function can be assigned to an output at a time with the command window but you can assign as many functions as you want to an output by repeating the steps described next and assigning additional commands to the same input.

Fig. 8.10 Adding a Command Assignment to an AUX Output

Output #: The drone AUX output number.

Components: The Components list is used to select the IQ component that will be monitored by the drone output. All a component needs to be included in the list is a control block—it does <u>not</u> have to be on-line to appear in the list. By including off-line components it is possible to preconfigure a drone before it is connected to an actual *IQ System*.

Available Functions: The Available Functions list is used to select the function of the selected IQ component that will be monitored with the drone output. After you have finished linking a function from the list to the selected output it is possible to go back and (using the Add button again) to assign additional functions to the same output. In this way, more than one monitor function can cause the same output to turn on (or off).

The following monitor functions are available for each IQ component:

Amplifier IQ *P.I.P.* without *SmartAmp* features:
- DSPI—monitor the on/off state of the Data Signal Presence Indicator
- AUX Out—monitor the on/off state of the AUX port output
- Power—monitor the on/off state of the high voltage supply of each channel
- Mute—monitor whether or not the audio signal has been muted
- Polarity—monitor whether or not the polarity of the audio signal of each channel has been inverted

Amplifier IQ *P.I.P.* with *SmartAmp* features (includes all the above commands plus):
- *IOC*—monitor whether or not an *IOC* error occurs
- ASA—monitor the on/off state of the ASA control

MPX-6 Mixer:
- DSPI—monitor the on/off state of the Data Signal Presence Indicator
- AUX—monitor the on/off state of the AUX port output
- Bus—monitor the on/off state of the audio Bus output of each channel

SMX-6 & ***AMB-5*** Mixers (includes all *MPX-6* commands plus):
- ASA—monitor the on/off state of the ASA control

MRX-24, 24S, 12, 12S:
- DSPI—monitor the on/off state of the Data Signal Presence Indicator
- AUX—monitor the on/off state of the AUX port output
- Relay—monitor the on/off state of each relay

DRN-16:
- AUX Input—monitor the on/off state of each logic input

Inverted: The Inverted command causes the logic output to switch “on” when the function being monitored is “off” rather than “on.”

8.5.6 Paralyze Setup

When the drone responds to an input it is sometimes necessary to temporarily ignore other inputs. When inputs are ignored, their operation is said to be "paralyzed." Only AUX inputs can trigger a paralyze command.

The Paralyze Commands Sub-block screen is the last command screen. Use PG↓ to advance to it. Then select the Add button. The window in Figure 8.11 will appear:

Fig. 8.11 Adding a Paralyze Command Assignment to an AUX Input

Only one paralyze assignment can be made at a time with the command window but you can make as many paralyze assignments as you want by repeating the steps described next.

Begin by entering the desired AUX input number in the upper left of the command dialog box. This is the AUX input that will cause other inputs to be paralyzed whenever it is "on." Next, enter the paralyze input number and specify whether it is an AUX or analog input. This is the input that will be paralyzed when the first input is "on." *Note: More than one input can be paralyzed at a time by assigning additional paralyze commands to the same controlling input.*

In the example depicted above, AUX Input 1 will be paralyzed when AUX Input 9 is turned "on." This means that any commands assigned to Input 1 will be ignored until after Input 9 goes "off." When Input 9 goes "off", the commands assigned to Input 1 will be sent (depending upon its on/off state at that time).

If an analog input is selected as the paralyze input instead of an AUX input, the paralyze window will display different commands. An example is shown in Figure 8.12.

When Paralyzed: You can determine what actions, if any, will be taken when an input is first paralyzed. The choices vary depending upon the type of input selected (AUX or Analog).

Fig. 8.12 Adding a Paralyze Command Assignment to an Analog Input

AUX Input: You can prevent any commands from being sent by selecting Send No Settings or you can force the current settings to be sent by selecting Send Current Settings. This latter choice will cause the "on" settings to be sent if the input happens to be "on" and the "off" settings to be sent if it happens to be "off." You can also force the "on" or "off" settings to be sent regardless of the on/off state of the input by selecting Send On Settings or Send Off Settings.

Analog Input: You can prevent any levels from being changed by selecting Send No Levels or you can force the current level settings to be sent by selecting Send Current Levels. You can also send a new level by selecting Send New Level. A line will appear below the Send New Level command to prompt you for a desired level. Press TAB to move to it and enter the new level.

When Unparalyzed: You can determine what actions, will be taken when an input is first unparalyzed. The choices vary depending upon the type of input selected (AUX or Analog).

AUX Input: You can prevent any commands from being sent by selecting Send No Settings or you can force the current settings to be sent by selecting Send Current Settings. This latter choice will cause the "on" settings to be sent if the input happens to be "on" and the "off" settings to be sent if it happens to be "off." You can also force the "on" or "off" settings to be sent regardless of the on/off state of the input by selecting Send On Settings or Send Off Settings.

Analog Input: You can prevent any levels from being changed by selecting Send No Levels or you can force the current level settings to be sent by selecting Send Current Levels. You can also send a new level by selecting Send New Level. A line will appear below the Send New Level command to prompt you for a desired level. Press TAB to move to it and enter the new level.

8.6 Linking Multiple Drones

Sometimes an *IQ System* requires more than one drone. A special "transponder" mode makes this possible by allowing multiple drones to be linked together in a single system. *Note: This mode requires version 1.1 drones. Contact Crown's technical support group if more information is needed.*

To use the transponder mode, you must first enable the Transponder switch in the drone control block. This is done by modifying the TURBO.INI file which is located in the same directory as *Turbo*. Open TURBO.INI with a text editor (like the Windows Notepad program) and add the following lines to the end of the file.

```
[DroneU]
Enabled=True
```

After modifying TURBO.INI file, run *Turbo* and go to the drone Control Block screen. The Transponder switch should now be visible in the lower portion of the control block as shown below in Figure 8.13:

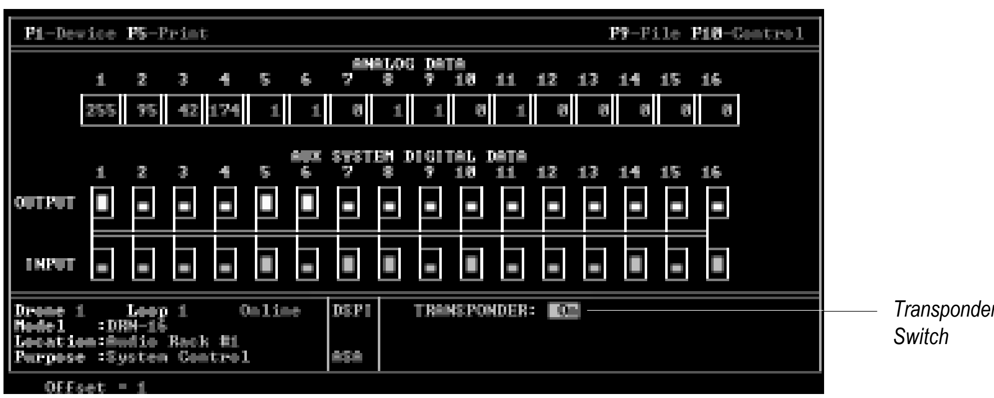


Fig. 8.13 The Drone Control Block with the Transponder Switch Enabled

Next, turn on the Transponder switches of each drone in the system. Finally, perform a roll call and all of the IQ components attached to the drones will be recognized.

In transponder mode, each drone will control a single Crown Bus loop. Each of these Crown Bus loops will use the IQ address of the drone as its loop number. For example, if an *SMX-6* mixer with an IQ address of 7 is connected to the Crown Bus loop of a drone with IQ address 3. The IQ mixer would be controlled and monitored as mixer 7 in Loop 3. In transponder mode, all drones appear to be connected to Crown Bus loop 251. In the preceding example, the drone would be monitored and configured as drone 3 in Loop 251.

Important: Special wiring must be used for transponder mode. Contact Crown's Technical Support Group if more information is needed.

IQ MATRIXER CONTROL

9 Monitoring & Controlling Matrixers

There are a variety of IQ matrixers. One model, the *MRX-24*, offers 24 pairs of low-current relay contacts which can be used to switch microphone, audio line-level, digital and DC control signals. Another model, the *MRX-12*, offers 12 single high-current relay contacts which can be used to switch loudspeaker lines, motors, lighting and power supplies. Both of these models also have slave versions *(MRX-24S* and *MRX-12S)* which add to the number of relays, thereby expanding the possible size of a matrix.

All matrixer models share a common Control Block screen as shown in Figure 9.1 below:

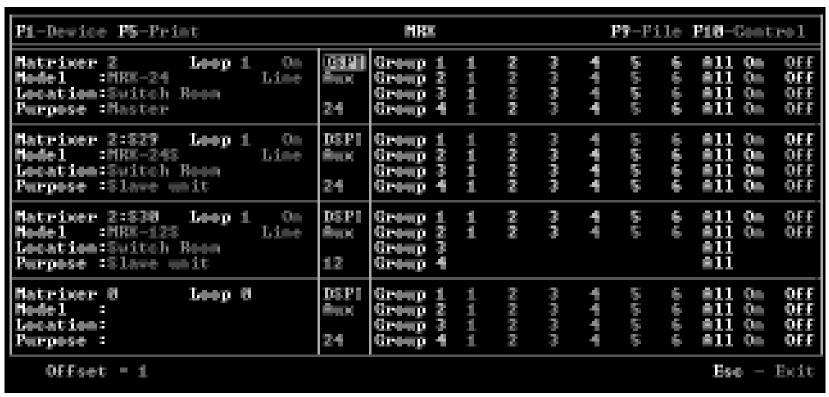


Fig. 9.1 The Matrixer Control Block Screen

9.1 Initializing a Matrixer Control Block

The first step in initializing a matrixer control block is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the matrixer. The Crown Bus loop number must match the physical loop to which the matrixer is wired. *Note: Slave matrixers will have two numbers listed in the IQ address space. The first number is the IQ address of the master unit followed by ":S" and the slave address number. Each slave matrixer must have a unique number.*

On Line: The phrase "On Line" will appear in the upper right corner of the information area when a matrixer is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. Up to 11 characters can be entered on each line.

24/12: The 24/12 parameter, located at the bottom of the center column of each matrixer control block, is used to identify the matrixer model. This parameter must be manually set since all matrixers appear alike to the *IQ System*. It has only two settings, "24" and "12". Use the "Space Bar" to toggle it from one setting to the other. Use "24" for *MRX-24* and *MRX-24S* models. Use "12" for *MRX-12* and *MRX-12S* models.

9.2 Using a Control Block to Monitor & Control a Matrixer

The simplest way to monitor or control a matrixer is from its control block. The matrixer controls within it serve the dual purpose of both showing their on/off state and allowing the user to control their state. Section 9.1 described how to initialize a matrixer control block. This section will describe each of the matrixer controls in it. (Please refer to Figure 9.1.)

DSPI: (Master matrixers only.) The Data Signal Presence Indicator is an LED on the front panel of all matrixers. However, the DSPI control is only available for master matrixers.

The DSPI on master matrixers functions like other IQ components—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. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received by the master matrixer.

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 matrixer 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: (Master matrixers only.) Toggles the master matrixer's AUX port output on and off.

The AUX port also has the ability to sense the presence of an external signal. When a logic "high" is detected at the AUX connector, an asterisk (*) will appear beside it.

Relay On/Off Controls: Each individual relay can be turned on and off from the control block by highlighting its number and toggling it with the "Space Bar". *MRX-24* and *MRX-24S* models each have 24 relays. *MRX-12* and *MRX-12S* models each have 12 relays. Depending on the model, either four or two groups with six relays each are displayed.

Note: The groups of six relays correspond to the way the relays are physically grouped on MRX-24 and MRX-24S models. They are arbitrary and can be ignored for MRX-12 and MRX-12S models which have no physical groups.

All On/Off: Global "All" on/off controls are provided to turn each *MRX-24* or *MRX-24S* group of six relays on and off as a unit, thereby turning off the group's bus. However, since *MRX-12* and *MRX-12S* matrixers do not have physical groups, the All On/Off controls serve to simply turn on/off the first six and second six relays.

9.3 Using a Graphics Plate to Monitor & Control a Matrixer

A matrixer can be monitored and controlled from a graphics but there are no ready-made GDMs (graphic display modules) for matrixers. This means that you must manually create objects on the graphics plate for that purpose. Figure 9.2 shows a very simple example.

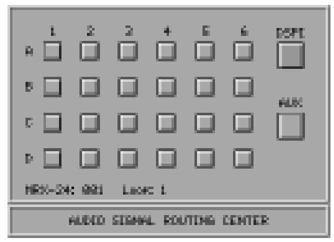


Fig. 9.2 Monitoring & Controlling a Matrixer from a Graphics Plate

In the above example a simple Container object was created and then an On/Off Button object for each relay of a *MRX-24*. The groups were labelled A-D rather than 1-4 to avoid confusion with the relay numbers. A button was also included for the DSPI and AUX controls. Finally, a second container and label were included at the bottom to label the control panel.

If desired, you can create a custom GDM for a matrixer. It would be available to your graphics plates any time you needed it. See Section 3.9 for additional information.

POCKET SERIAL INTERFACE

10 Monitoring & Controlling a PSI

The Pocket Serial Interface (PSI) is a portable, battery-powered IQ interface. It also contains a DSPI and a standard IQ AUX port which can be monitored and controlled by the *IQ System*. Its AUX port output makes it very handy for controlling remote non-IQ devices. And the sensing capability of the AUX port input can be used to sense an external signal. The PSI Control Block screen is shown below in Figure 10.1:

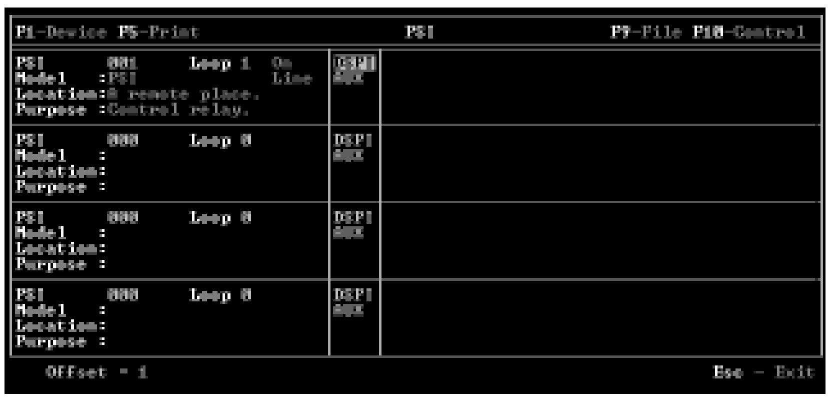


Fig. 10.1 The PSI Control Block Screen

10.1 Initializing a PSI Control Block

The first step in initializing a PSI control block is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the PSI. The Crown Bus loop number must match the physical loop to which the PSI is wired.

On Line: The phrase “On Line” will appear in the upper right corner of the information area when a PSI is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. Up to 15 characters can be entered on each line.

10.2 Using a Control Block to Monitor & Control a PSI

The simplest way to monitor or control a PSI is from its control block. There are only two controls (please refer to Figure 10.1):

DSPI: The Data Signal Presence Indicator is an LED on the side of the PSI. 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. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received by the PSI.

Aux: Toggles the PSI's AUX port output on and off. The AUX port also has the ability to sense the presence of an external signal. When a logic "high" is detected at the AUX connector, an asterisk (*) will appear beside it.

10.3 Using a Graphics Plate to Monitor & Control a PSI

A PSI can be monitored and controlled from a graphics but there are no ready-made GDMs (graphic display modules) for a pocket serial interface. This means that you must manually create objects on the graphics plate for that purpose. Figure 10.2 shows a very simple example.

Fig. 10.2 Monitoring & Controlling a PSI from a Graphics Plate

In the above example a simple Container object was created and then an On/Off Button object was placed in it for the DSPI control and the AUX port output control. Finally, a Text object was added above each button to label them.

11 Configuring & Monitoring System & Load Monitors

An IQ System & Load Monitor such as the *SLM-8* provides an *IQ System* with the capability to monitor the impedance response of loudspeakers or most any amplifier load and the ability to measure the frequency response of any line-level or high-level audio output in the system. Once configured, this powerful diagnostic ability can also operate in a stand-alone mode via the indicators on the front panel of the *SLM-8*. (See the *SLM-8 Reference Manual* for more details.)

11.1 Initializing an *SLM-8* Control Block

The first step in initializing an *SLM-8* control block (shown below in Figure 11.1) is to set the IQ address and Crown Bus loop number. This is normally done automatically during a roll call. However, you can set them manually if you need to configure a system off-line.

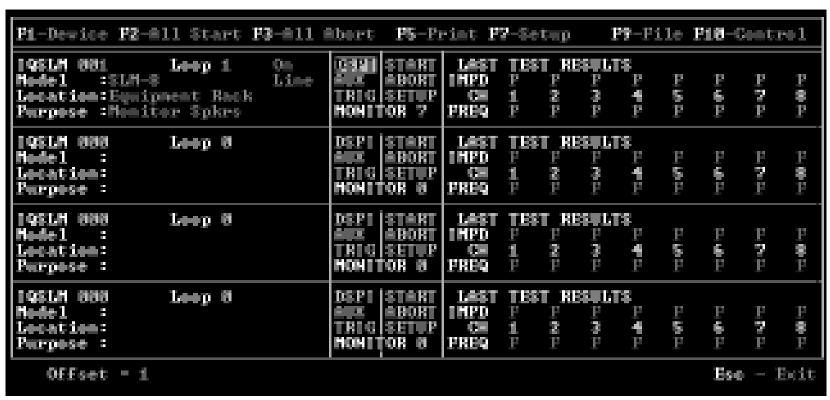


Fig. 11.1 An SLM-8 Control Block Screen

IQ Address & Crown Bus Loop: The IQ address number you enter must match the physical IQ address switch setting on the *SLM-8*. The Crown Bus loop number must match the physical loop to which the *SLM-8* is wired.

On Line: The phrase “On Line” will appear in the upper right corner of the information area when an *SLM-8* is actively connected to and in communication with the *IQ System*.

Model, Location & Purpose: These three text lines are available for you to include relevant notes about the unit. Up to 15 characters can be entered on each line.

11.2 Monitoring an *SLM-8*

There are several ways to monitor a load or a system output with an *SLM-8*. This section will explore each one.

11.2.1 Monitoring from a Control Block

Once an *SLM-8* has been configured, the pass (P) or fail (F) status of each of its eight channels can be measured in the right half of each control block (see Figure 11.1). Notice that each channel is independently monitored for impedance and frequency. The P/F indicators in the control block function identically to the Pass/Fail LEDs on the front panel of the *SLM-8*.

11.2.2 Monitoring from a Curve Screen

It is also possible to view the response from the *SLM-8* Curve screen. To do so, switch to the *SLM-8* Setup Sub-block screen by pressing F7 or selecting the Setup command in the center of the control block and pressing the "Space BAr" or Left-clicking the mouse(). The Setup Sub-block screen shown in Figure 11.2 will appear:

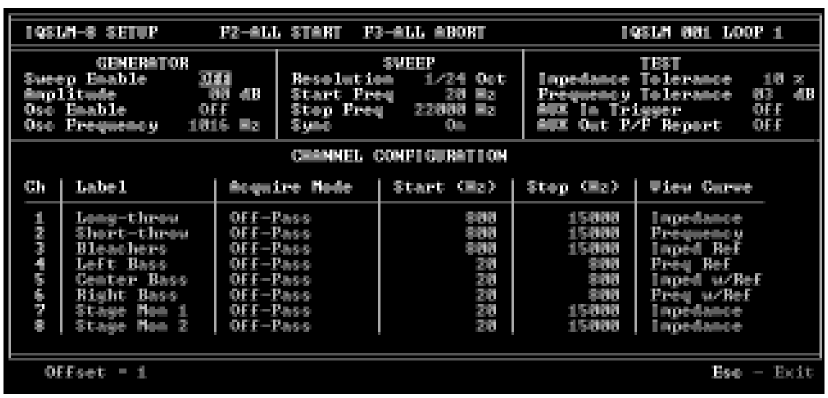


Fig. 11.2 The SLM-8 Setup Sub-block Screen

Next, select the desired channel under the View Curve column in the lower right portion of the sub-block. Then press the "Space Bar" to toggle through the possible views and select one. They include: Impedance curve, Frequency curve, Impedance Reference curve, Frequency Reference curve, Impedance and Impedance Reference curve, Frequency and Frequency Reference curve. Finally, press ENTER to switch to the Curve screen and view the selected curve for the selected channel. A sample is shown in Figure 11.3.

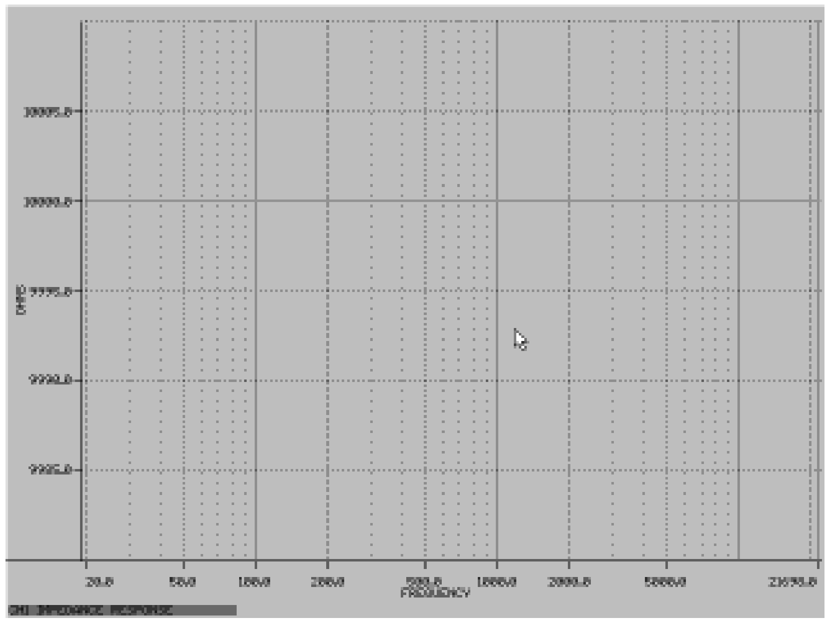


Fig. 11.3 A Sample Impedance Curve

Press [ESC] to exit the curve screen and return to the Sub-block screen. *Note: Only one channel can be viewed at a time.*

11.2.3 Monitoring from a Graphics Plate

The most flexible way to monitor an *SLM-8* is from a graphics plate where you can use a Plotter and one or more Curve objects to create a custom graph. A sample is shown below in Figure 11.4.

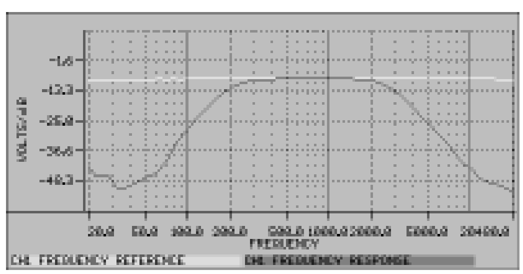


Fig. 11.4 A Sample Graphics Plate Plotter Object with Two Curves

More than one curve can be used with a single Plotter object as is shown in Figure 11.4 and more than one channel can be viewed in a single Plotter object. And a graphics plate can contain more than one Plotter object. (See Section 4.16 and 4.17 for instructions on using Plotter and Curve objects on a graphics plate.)

11.2.4 Using a Monitor Speaker

Finally, an *SLM-8* channel can be monitored from a monitor speaker. The Monitor setting in the middle of the control block is used to select the channel to be monitored. The audio from the selected channel is then made available at the fused monitor output on the back of the *SLM-8*. See the *SLM-8 Reference Manual* for wiring instructions.

11.3 Configuring an *SLM-8*

An *SLM-8* is configured from its setup sub-block. From the control block, press F7 or select the Setup command and press the "Space Bar" or Left-clicking the mouose ( ). The Setup Sub-block screen shown in Figure 11.5 will appear:

Fig. 11.5 The SLM-8 Setup Sub-block Screen

Each control and parameter is explained next:

Generator

The test signal generator of the *SLM-8*, required for impedance and frequency testing, is configured with the following controls:

Sweep Enable: Enables or disables the generator.

Amplitude: Sets the output level of the generator. Its range is –40 dBu to +10 dBu in ½ dB steps.

Osc Enable: Immediately turns on or off the signal generator when a test is not being performed. When turned on with this control, the generator will output a fixed sine wave at the frequency specified by the Osc Frequency parameter.

Osc Frequency: Sets the frequency in hertz for the above function. It does not affect the generator when a test is in progress.

Sweep

The sweep parameters define the operation of the generator during a normal test sweep. *Note: If all SLM-8s have the same generator settings, a single generator can be used for all of them.*

Resolution: Sets the frequency step size of the test sweeps. It can be set to 1/24, 1/12, 1/6, 1/3, 1/2, 2/3 and 1 octave steps. Less resolution (higher numbers) will result in faster sweeps with less detail if the Sync parameter is turned off. Higher resolution (smaller fractions) will result in slower sweeps with more detail. If multiple units are synchronized, their Resolution settings must match.

Start Freq: Sets the frequency at which the generator will start the test sweeps. Although you can set this parameter in 1 Hz steps, the actual starting frequency will be equal to the closest octave setting as determined by the previous Resolution parameter. The lowest possible setting is 20 Hz and the Start Freq setting should always be lower than the Stop Freq setting. If multiple units are synchronized, their Start Freq settings must match.

Stop Freq: Sets the frequency at which the generator will stop the test sweeps. Although you can set this parameter in 1 Hz steps, the actual stopping frequency will be equal to the closest octave setting as determined by the previous Resolution parameter. The highest possible setting is 22000 Hz (22 kHz) and the Stop Freq setting should always be higher than the Start Freq setting. If multiple units are synchronized, their Stop Freq settings must match.

Sync: Turn on this control if multiple units are being synchronized together. Turn it off if this is not the case. When turned on, it forces the test start frequency, duration and stop frequency to be the equivalent of an eight-channel test regardless of the number of channels actually being used. When turned off, the duration of a test is determined by the number of channels being used in the one unit. *Note: The previous sweep parameters must be set the same for all units when Sync is turned on.*

Test

The following parameters configure other aspects of a test:

Impedance Tolerance: Sets the criteria by which impedance test data is evaluated to determine if the load should pass or fail a test. It simply compares the impedance test data to the reference impedance data to see how much they differ. If the difference is greater than the Impedance Tolerance setting, the load has failed the test. The range is ±1 to ±100%.

Frequency Tolerance: Sets the criteria by which frequency test data is evaluated to determine if the output should pass or fail a test. It simply compares the frequency magnitude test data to the reference frequency magnitude data to see how much they differ. If the difference is greater than the Frequency Tolerance setting, the output has failed the test. The range is ±1 to ±25 dB.

AUX In Trigger: Turn on this control for stand-alone operation. When turned on, positive voltage (logic high) across the AUX port input will trigger a test. This enables the *SLM-8* to function without an *IQ System* after it has been configured. With the LED indicators on the front panel it is easy to see the pass/fail status of any channel.

AUX Out P/F Report: Turn on this control if you want to use the AUX port output to signal whenever one or more channels fails an impedance or frequency test. The *SLM-8* uses reverse logic for this feature. It turns on the AUX output when all channels have passed all tests and it turns off the AUX output when one or more channels fails a test. In this way the AUX output can also signal a power loss.

Channel Configuration

The following parameters configure the individual settings of each channel.

Label: Sets a text string that identifies the channel. A label can be up to 20 characters in length and is stored in the memory of the *SLM-8* where it is backed up in case of power failure.

Acquire Mode: Determines which test(s) will be performed on the channel. The possible settings are:

Off-Pass: Do not test but report a "passed" status.

Off-Report: Do not test but continue to report the previous test results.

Impedance: Test the impedance response only.

Frequency: Test the frequency magnitude response only.

Imp/Freq: Test both the impedance and frequency magnitude response.

Reference: Measure the reference impedance response and reference frequency magnitude response.

Start (Hz): Sets both the beginning frequency of a test and the beginning frequency of the returning data.

Stop (Hz): Sets both the ending frequency of a test and the ending frequency of the returning data.

View Curve: Serves as both a parameter and a control. As a parameter it sets the contents the Curve screen (by pressing the "Space Bar"). As a control is changes the display to the Curve screen (by pressing ENTER). The possible settings are:

Impedance: Display only the impedance response from the most recent test on the Curve screen.

Frequency: Display only the frequency magnitude response from the most recent test on the Curve screen.

Imped Ref: Display only the reference impedance response on the Curve screen.

Freq Ref: Display only the reference frequency magnitude response on the Curve screen.

Imped w/Ref: Display both the impedance response from the most recent test and the reference impedance response on the Curve screen.

Freq w/Ref: Display both the frequency magnitude response from the most recent test and the reference frequency magnitude response on the Curve screen.

11.4 Manual Controls

A few *SLM-8* functions can be manually controlled from the control block and setup sub-block. Please refer to Figures 11.1 and 11.2.

All Start: (Available from both the control block and setup sub-block.) Pressing F2 causes all *SLM-8s* to immediately initiate a test.

All Abort: (Available from both the control block and setup sub-block.) Pressing F3 causes all *SLM-8s* to immediately stop all tests in progress.

DSPI: The Data Signal Presence Indicator is an LED on the front panel of the *SLM-8* (labelled “DATA”) that flashes whenever the unit is polled. The DSPI control is used to force the indicator to stay on as an aid to the troubleshooting of communication on the Crown Bus. Once the DSPI control is turned on, the Data indicator will remain lit continuously even if the control block for another device is selected. Turning off the DSPI control restores the indicator to its normal function of blinking when a valid IQ command is received.

Aux: Toggles the unit’s AUX port output on and off.

The AUX port also has the ability to sense the presence of an external signal. When a logic “high” is detected at the AUX connector, an asterisk (*) will appear beside it.

Trig: When the Trig control is turned on and it is saved in a *dataframe* file, *Turbo* will automatically initiate a test for the *SLM-8* when the *dataframe* file is loaded and engaged.

Start: Immediately initiates a test in the selected *SLM-8*.

Abort: Immediately stops a test in progress in the selected *SLM-8*.

Setup: Switches to the *SLM-8* Setup Sub-block screen.

Monitor: Sets the channel whose audio signal will appear at the fused monitor output on the back panel of the *SLM-8*. Whenever the Monitor setting is changed, *Turbo* first turns off the monitor outputs on all *SLM-8s* in the system. Then it turns on the selected monitor channel for the selected unit. This enables multiple *SLM-8s* to be connected to the same monitor loudspeaker.

11.5 Exporting Data from an *SLM-8*

It is possible to export data from an *SLM-8* to a file so it can be imported into other programs. Only DIF files are supported. They can be imported by popular spreadsheet programs like Microsoft Excel and used to create custom tables and graphs. To export data, first switch to the Setup Sub-block screen. Second, select the channel you want to export under the View Curve column. Third, select the curve(s) you want to export with the View Curve setting. Finally, press ALT+F and a window will open to prompt you for a file name as shown below in Figure 11.6:

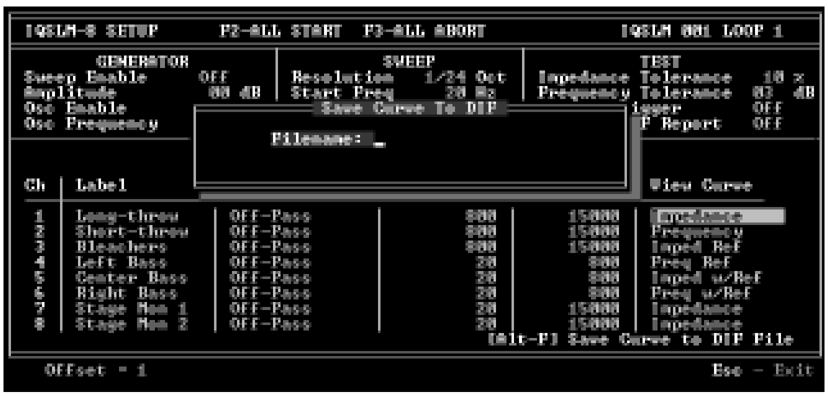


Fig. 11.6 Exporting Data to a DIF File

You do not need to add a file name extension because “DIF” will be automatically appended to the end of the file name.

Glossary of Terms

Algo An algorithm is a set of procedures or formulas that determines the function or behavior of an object. An *algo* is the smallest functional part of an algorithm. Think of *algos* as the building blocks of algorithms—that is, *algos* combine to form a complete algorithm. (Where appropriate this manual substitutes the word "function" for *algo*.)

AMB-5 *(IQ–AMB-5)* An ambient sensing IQ mixer with 5 normal mic/line inputs and one sense input. It can automatically adjust its output level in response to the ambient sound level.

Ambience Background noise or sound.

Ambient Offset The level below the Gate function Max Gain settings to which the Channel 1 gain will be set until the ambience level exceeds the Threshold setting. Think of it as an insertion loss.

ASA The Auto System Activate control located in the control blocks of various IQ components toggles the operation of all automatic functions on and off. The ASA control is also used to access the sub-block screens where the automatic functions are configured.

Attack Time The attack time is the speed at which an Input Compressor/Limiter function begins to compress or limit a signal that is above the Threshold setting. It is labelled "Compression" and can be set to either "fast" or "slow".

Atten An IQ *P.I.P.* control that sets the amount of attenuation at each amplifier input. The attenuator controls decrease the signal level coming into the IQ *P.I.P.* only—they cannot add gain to the incoming signal.

Attributes The parameters of a graphic object, such as its color, function, etc.

Auto Level The Auto Level function is available for the *SMX-6* and *AMB-5* mixers. Unlike the Input Compressor/Limiter function that is designed to handle sudden or transient jumps in input level, the Auto Level function is designed to control long-term changes in signal level. It helps maintain a more consistent output signal level while allowing transient peaks to pass.

Aux Most IQ components have an AUX port so non-IQ components can be signalled or turned on and off. When turned on, +10 VDC is provided at the output of the AUX port. The AUX port circuitry is also capable of sensing an input signal.

Bar Meter A graphic object that dynamically displays a level (such as an audio input level) with a moving vertical bar graph. All bar meters have an optional peak hold indicator attribute.

Baud Rate A unit of measure of the transmission speed of a communication system equal to one bit per second. *Turbo* supports a transmission speed up to 38,400 baud between the IQ interface and the host computer. The transmission speed of a Crown Bus loop wired with twisted-pair wiring is 38,400 baud.

Break Detection A feature that automatically reports when breaks occur in Crown Bus loops. It also attempts to identify the location of a break.

Bus All mixers have a switchable "bus" audio output for each channel. They receive the same post-processed audio signal that the main audio outputs receive. The bus outputs are isolated with relays and are independently buffered with separate output drivers, enabling them to be tied together into a large monitoring or paging "bus."

Button A graphic object that acts like a push-button to control an on/off or toggle function (such as turning an amplifier channel on and off). Special System Buttons are also available to make system-wide changes, change graphics plates or open and close mini plates.

Click Press and release a mouse button once ( )—usually the left mouse button.

CLN The Crown Local Net is a specialized RS422 communication loop. It provides local communication between IQ components apart from the Crown Bus. It can be used to share information, such as input gating, between several *SMX-6* mixers.

Coerce The coerce function is used to force all amplifier attenuation settings in the system to either the highest (coerce up) or lowest (coerce down) setting.

COM 1, COM 2 RS232 serial communication ports in a PC are referred to as "COM" ports. Most PCs have two, COM 1 and COM 2.

Component, IQ System An electronic component controlled by a microcomputer for the purpose of performing a specific task in an *IQ System*.

Compressor A function that reduces an audio signal when it rises above a Threshold setting. Both the *SMX-6* and *AMB-5* include Input and Output Compressor/Limiter functions. The compression Ratio control sets the amount of compression that will be applied for every step over the Threshold. See Limiter, Ratio and Threshold also.

Container A graphic box that is used to visually group two or more graphic objects together. It is used for purely aesthetic purpose and it is the only graphic object that can be placed behind other objects in a graphics plate. Special containers (GDM and Drone Containers) also link their contents to a particular function.

Control Block A specialized portion on the screen that directly controls one specific type of IQ component. Control blocks include controls (and sometimes indicators) that allow manual control of an IQ component. Some control blocks can also be displayed on a graphics plate. See Device Menu also.

Control Block Override A sub-block control of an *SMX-6* or *AMB-5* mixer that places them in a kind of "semiautomatic" function mode where levels can be temporarily increased or decreased manually from the control blocks while the automatic functions are operating. When used in conjunction with the Max Gain To Track Control Block control, it allows a drone to control the input level even when ASA is on.

Control Panel Screen A screen of controls that configure the serial communication parameters between the host computer and the IQ interface. It also contains break detection and emergency mute controls. It is accessed by pressing F10

Control Security Lock A control that prevents the control objects on a graphics plate from being altering the system settings with one exception—the graphics plate, itself, can still be edited. This means the position, size and attributes of the controls can still be changed.

Count Level The Count Level setting determines how many dB the Gate Count function will attenuate each input as more gates are opened.

Crown Bus A serial communication loop designed to transmit IQ commands and data to IQ components. As a standard it sets only the communication protocol and is independent of the wiring system used. Most IQ components can be connected to the Crown Bus with inexpensive twisted-pair wire.

Curve Object An object that links an *SLM-8* test curve to a plotter object for display on a graphics plate.

DAOL The Desired Average Output Level of the Auto Level function of an *SMX-6* or *AMB-5* mixer.

Dataframe A file, stored on disk, which contains the settings and parameters of an *IQ System*, including the configuration of each IQ component, control blocks, sub-blocks and graphics plates.

Decay Time An AMB function parameter that determines how rapidly the output level will be reduced when the ambient sense input level is dropping (while it is still above the Threshold setting).

Delay Time A Gate function parameter that determines how long a gate will stay open after an incoming signal drops below the Threshold.

Device A Crown IQ component (see Component, *IQ System*).

Device Menu A menu that is used to select the Control Block screen of an IQ component. It is accessed by pressing F1

Digital Meter A graphic object that dynamically displays a level (such as an audio input level) with a numerical readout.

Display A control that determines what will be displayed when switching to a graphics plate. If Display is set to “Selected”, a GDM will be automatically displayed for each selected IQ component that has one. If Display is set to “Memory”, the last version of the selected graphics plate which was stored in memory will be displayed.

Display Now A control that causes *Turbo* to switch from the graphics plate Control Block screen to the selected graphics plate.

Display Screen A text-mode screen that graphically displays input and output levels and, in the case of amplifiers, provides *IOC* and *ODEP* indicators. Many display screens can be accessed by pressing F2

Distributed Intelligence Many IQ components, like sensing IQ mixers and drones, have the ability to run themselves because of their on-board function “intelligence”. This enables the supervision of an *IQ System* to be distributed to local components rather than being centrally controlled from only one point. This makes *IQ Systems* less expensive and more fail-safe.

Double-Click Press and release a mouse button twice ( ) in rapid succession—usually the left mouse button.

Download To transfer system settings from the host computer to the IQ components in a system.

Drag Press and hold a mouse button ( )—usually the left mouse button—while moving the mouse.

DRN-16, Drone *(IQ–DRN-16)* An IQ drone card that plugs into a Crown card cage enabling an unmanned audio system to function automatically or, if human control is desired, be controlled from a remote location. It can also serve as an IQ interface for up to two Crown Bus loops.

DSPI The Data Signal Presence Indicator is an LED (light emitting diode) on each IQ component that flashes whenever it receives a data signal addressed to it. It can be forced to stay on as a troubleshooting aid to find breaks in communication. *Note: On some IQ components the DSPI is labelled "DATA."*

Duck The Duck Priority function is used to prioritize inputs. Inputs with a lower priority will be automatically attenuated (ducked) when a higher priority input is used. Together, the Gate and Duck Priority functions provide sophisticated automatic mixing capability.

Duck Priority Level Sets the duck priority level for an input. The highest priority is 1. The lowest is 6. See Duck also.

Emergency Mute A feature that quickly silences all IQ components. It is very helpful for panic situations when the audio must be turned off quickly. It must be enabled in the Control Panel screen.

Engage Activating the system settings by downloading them to the *IQ System*. The system settings are automatically engaged when a *dataframe* file is opened.

Equalizer A device containing a series of filters that enable an audio signal to be adjusted to a desired magnitude response shape. Often a "flat" or equal-level response is desired.

Exit Close the IQ program. **IMPORTANT:** Exiting the IQ program does not automatically save the current system settings to a *dataframe* file. They must be saved beforehand by pressing F9.

Expansion Ratio An AMB function parameter that determines how much the output Channel 1 gain will increase for every increase in ambient signal level over the Threshold setting. For example, a ratio of 4:1 will raise the output gain 1 dB for every 4 dB that the ambient signal increases above the Threshold.

External *Algos* An external *algo* (function) is one that is controlled, in part, by other IQ components. This feature is available for the *SMX-6* mixers and is used to link the Duck Priority and Gate Count functions of several *SMX-6* mixers together.

Feed-Forward Compressor A compressor that monitors the input level and adds attenuation downstream whenever a preset threshold is exceeded. (As opposed to a common feedback compressor that monitors the output level and attenuates the input level.)

File Name The name given to a file that is stored on a diskette or hard drive. MS-DOS limits the file name to being no more than 8 characters with a 3-character extension. The IQ program will automatically provide the extension DIQ.

Font A particular style, size and weight of a typeface.

Function Keys The keys labeled F1 through F2 that are located either across the top of the keyboard or down the left side.

Gain A measure of the increase or decrease of an audio signal level. Specifically, this is known as the voltage gain. It is usually expressed in dB (decibels). To increase the gain just 3 dB requires that the voltage of the signal be doubled.

Gate A logic term that refers to a circuit that opens and closes (or turns on and off). The Gate function used in the *SMX-6* and *AMB-5* turns the mic/line inputs on and off. Each input turns on when the audio signal rises above a Threshold setting. When the signal falls below the Threshold, a preset attenuation (defined by the Low Set control) is applied.

Gate Count An *SMX-6* and *AMB-5* function that adds a preset attenuation to each selected input when the number of open inputs increases. The feature is often used to prevent unwanted feedback.

GDM, Graphic Display Module, Graphic Display A graphic object which is pre-configured to display (and sometimes control) many of the key features of an IQ component. Most IQ components have a GDM and custom ones can be created by the user for most IQ components, replacing the ones supplied by Crown.

Graphics Plate Like a photographic plate, a graphics plate contains images. In this case the images are the control and indicator objects that are created with the tool box. Graphics plates have control blocks and are treated similar to other IQ components in that they are listed in the Device menu.

Graphics Plate Base Color The background of a graphic plate can be set to a custom color with the graphics plate control block.

Graphics Security Lock Once a graphics plate is finished, it can be protected from editing by turning on this control. When the graphics security lock is on, the control objects can still be used to change the system settings but the controls, themselves, cannot be moved, resized or their attributes altered.

Group A group of six relays that connect to the same bus in a *MRX-24* and *MRX-24S* matrixer. Depending on how the relays are wired, the groups can be combined to form either a 6x4, 4x6, 12x2, 2x12, 24x1 or 1x24 matrix.

Guard Band An AMB function setting that offsets the Threshold control. For example, a 3 dB guard band will move the actual threshold 3 dB below the Threshold control setting.

Hardware The physical electronic component(s) of a computerized system. The computer itself is hardware. An amplifier is hardware.

Host Computer A computer (IBM PC compatible or Apple Macintosh) that is connected to an *IQ System* via an IQ interface and runs the IQ program (software).

Idle Gain An Auto Level parameter that sets the initial gain used when an input is first turned on by the Gate function. It overrides the Max Gain control so that the Auto Level function will not cause sudden shifts in gain when an input is first turned on.

IOC An Input/Output Comparator that continuously monitors the audio signal path through a Crown amplifier for any kind of distortion to provide dynamic *proof of performance*. It does this by comparing the shape of the input waveform to that of the output. The amplifier is okay when *IOC* is not on (displays "Ok"). If distortion equals or exceeds 0.05%, it displays "IOC".

IQ Address Each IQ component in a Crown Bus loop must have a unique address. No two IQ components of the same model that are connected to the same Crown Bus loop can have the same address. A valid IQ address is any number from 1 to 250.

IQ–CAG A circuit card cage that mounts into a standard 19-inch (48.3 cm) equipment rack. It is used to house such IQ components as matrixers, drones and their LPS power supplies.

IQ Component A hardware or software device which serves a particular function in an *IQ System*. For example, mixers, *IQ–P.I.P.s*, matrixers and graphics plates are all considered IQ components.

IQ–INT, IQ–INT II An IQ interface that can simultaneously connect 8 different Crown Bus loops to a single host computer.

IQ–MSD A computer program (software) for controlling and monitoring an *IQ System*. It runs on a PC-compatible computer.

IQ–MSD *Sys-Config* A computer program (software) for controlling, monitoring, scheduling and securing an *IQ System*. It runs on a PC-compatible computer, provides all of the features of *IQ–MSD Turbo* plus multiple security levels, automatic scheduling capability and the ability to create custom stand-alone IQ programs that are tailored to an individual operator.

IQ–MSD *Turbo* A computer program (software) for controlling and monitoring an *IQ System*. It runs on a PC-compatible computer and supports higher communication baud rates as well as color VGA graphics with customizable graphics plates.

IQ *P.I.P.* Programmable input processors that connect a Crown *P.I.P.*-compatible amplifier to an *IQ System* so it can be controlled and monitored by the system. Several different models are available with varying features from basic manual controls to advanced automatic functions and DSP functions.

IQ–PSI An IQ Pocket Serial Interface that can connect one Crown Bus loop to a single host computer. (The *IQ–PSI* also provides a AUX port.)

IQ System A computerized system that uses the IQ command protocol developed by Crown to control and monitor the various functions of your audio system.

LED A graphic object that serves as an on/off indicator and functions like a typical indicator lamp or LED (Light Emitting Diode).

Limiter A function that prevents an audio signal from rising above a Threshold setting. The Input and Output Compressor/Limiter functions will behave like limiters when their Ratio controls are set to ∞:1. See Compressor and Ratio also.

Line Object A line-drawing tool used for aesthetic design of a graphics plate.

Link An IQ *P.I.P.* "multi-link" control that connects the controls of two or more amplifiers together so they can be controlled as a unit. Changing a control of one linked amplifier will cause similar changes to be immediately made to the other amplifiers in the same link group. There are up to 100 different link channels, allowing many independent link groups to be created.

Load To read a *dataframe* file from a hard disk or diskette. Normally, a *dataframe* is also engaged immediately after it is loaded into the host computer's memory.

L An IQ *P.I.P.* control that Locks the two channels of a single amplifier together so that changes to one channel will be immediately mirrored by the other channel.

Low Set A Gate function parameter that determines the gain setting when an input gate is closed.

Matrixer An IQ-controlled routing matrix for audio, digital and DC signals. Several models are available. They require an IQ–CAG card cage and IQ–LPS power supply.

Max Gain A Gate function parameter that sets the maximum possible gain for an input.

Max Gain To Track Control Block A sub-block control of an *SMX-6* or *AMB-5* mixer that causes the Max Gain parameters of the Gate function to be set equal to the input gain settings in the control block. It is used in conjunction with the Control Block Override control.

Mini Plate A specialized Container object that serves as a popup panel on a graphics plate to display controls, messages or help. See container also.

Mixer, IQ Mixer An IQ-controlled audio mixer with 5-6 mic/line inputs and 2 output channels. In addition to main outputs, each output channel also has an IQ-controlled switchable bus output, giving mixers the ability to connect to large paging buses without being loaded down. Some models also include advanced functions for fully automated operation. See *AMB-5*, *MPX-6* and *SMX-6* also.

MPX-6 *(IQ–MPX-6)* A mixer with 6 mic/line inputs and two separate output channels. It provides basic IQ-controlled mixing and signal routing capabilities.

MRX-24*, *MRX-24S*, *MRX-12*, *MRX-12S *(IQ–MRX-##)* Matrixers with IQ-controlled relays for routing mic, line, loudspeaker, digital and DC signals. Master and slave (S) models are available. The *MRX-24* and *MRX-24S* have 24 pairs of low-current double-pole, single-throw (DPST) relays grouped into four 6x1 matrices.

The *MRX-12* and *MRX-12S* have 12 single high-current single-pole, single-throw (SPST) relays.

Mute An IQ *P.I.P.* control that turns the input of each channel on or off. The "off" position sets the input attenuators to their maximum value (–50 dB).

ODEP An indicator in the amplifier (IQ *P.I.P.*) control blocks that shows the status of the Output Device Emulation Protection circuitry for each channel. It displays the percent of thermal-dynamic energy reserve that is presently being used by the amplifier. If 100% has been consumed, *ODEP* limiting will begin to protect the amplifier.

Offset The Offset, listed at the bottom of the Control Block screens, indicates the position of the control block where the cursor is presently located. Its position is referenced from the top or first control block. For example, the first control block is Offset 1, the second control block is Offset 2, the third control block is Offset 3, and so on.

On Line An IQ component is said to be "on line" when it is in communication with an *IQ System*. Most IQ components communicate with the system via the Crown Bus.

Open to Idle Gain Setting the Auto Leveler Gate Function of the Auto Level function to the "Open to Idle Gain" causes the function to set the gain to the Idle Gain setting when the gate first opens.

Open to Last Position Setting the Auto Leveler Gate Function of the Auto Level function to the "Open to Last Position" causes the function to ignore the Idle Gain setting when a gate first opens. Instead, the gain is set to its last level just before the gate closed.

Peak Hold An option of the bar meters and graphic display modules that causes the peak levels displayed by the level meters to persist long enough (with a thin line) to be easily observed.

P.I.P. A Programmable Input Processor is a module that plugs into the back of a Crown *P.I.P.*-compatible amplifier. Many *P.I.P.s* are available to provide a variety of features such as sophisticated error-driven compressors, crossover networks, voice-over paging, constant-directivity horn equalization, digital signal processing, *IQ System* connection, and much more.

Plotter Object A specialized container object that is used to display curves from an *SLM-8* on a graphics plate. See Curve object also.

Pol An IQ *P.I.P.* control that can be used to invert the polarity of the audio signal.

Pot A graphic object that acts like a level control or potentiometer. For example, it can be used to control the input attenuator of a Crown amplifier equipped with an IQ *P.I.P.* or the gain control of an *SMX-6*.

Power An IQ *P.I.P.* control that turns on and off the high voltage power supply of each channel.

Q A number that describes the damping or, conversely, the resonance of a system. It is often used to describe the ratio of a filter's center frequency to its bandwidth.

Ratio The Ratio or Compression Ratio parameters are used in both the Input Compressor/Limiter and Output Compressor/Limiter functions. They set the amount of compression that will be applied for every step over the Threshold. For example, a ratio of 4:1 will cause 15 dB of compression to be applied to a signal that is 20 dB over the Threshold. An infinite compression Ratio (∞:1) will cause the function to behave like a limiter. See Compressor, Limiter and Threshold also.

Reaction Time An Auto Level function parameter that determines how quickly the gain will be adjusted so the average signal level matches the Threshold setting.

Release Time An Input Compressor/Limiter parameter that sets the amount of time it takes for the gain to return to normal when the input level drops below the Threshold setting.

Roll Call The IQ program performs a roll call to establish communication with all IQ components in an *IQ System* and to upload all system settings.

RS232 A serial communication standard supported by most PCs. It uses unbalanced signal wiring and should not be used for distances over 50 feet (15.2 m).

RS422 A serial communication standard supported by Macintosh computers. It uses balanced signal wiring and can be used for distances up to 2,000 feet (610 m).

Sel A Select control, found in most control blocks, that is used to select one or more IQ components. The GDMs of selected IQ components are automatically displayed on a graphics plate when the graphics plate Display control is set to "Selected". This avoids the tedium of manually placing GDMs onto a graphics plate. In the amplifier control blocks, Sel also selects which amplifiers will be displayed in the Display Screen. See Display Screen also.

SLM-8 *(IQ–SLM-8)* A system and load monitor with eight channels that can monitor the impedance response of a load (such as a loudspeaker) and the frequency magnitude response of any line-level or high-level output. Although it requires a host computer to be configured, it can also function in a stand-alone mode.

SMX-6 *(IQ–SMX-6)* A sensing mixer with 6 mic/line inputs and two separate output channels. With its automatic functions, it can serve as a programmable automatic mic mixer.

Software The programs that run in the "memory" (RAM) of a computer or processor. The IQ-MSD program is software.

Solo A feature that enables all amplifiers to be turned off except one. This is a very handy setup and troubleshooting feature.

Spin Control A graphic object that is often used to control multistate parameters that cannot be controlled by a Pot or Button object (such as the Delay Time parameter of an *SMX-6* Gate function). It has a text/numerical readout and an increment and decrement button to make selections.

String Object A graphics plate object that is used to control functions in UCODE-compatible IQ components whose state is a text string.

Sub-block A set of parameters that operate the automatic functions or that otherwise configure an IQ component. For example, the automatic mixing capability of an IQ sensing mixer is controlled from a sub-block. See ASA also.

T-Board A backplane circuit board that connects external system wiring and power to the edge connector of an IQ matrixer or drone. Together, the T-board and its mating IQ component circuit board form the shape of a “T”. T-boards are designed to be removed for easy bench-top wiring.

Text (Object) A graphic object that serves as a text label on a graphics plate. Text objects can be placed on top of other objects like buttons and containers to label them. A wide variety of typefaces and fonts are available.

Threshold A control that determines when something will begin to happen. Threshold controls are used in many functions. For example, an input signal above the Gate function Threshold will cause the gate to open. Or, an input signal above the Input Compressor/Limiter function Threshold will cause compression to begin.

Toggle To switch from one state to another with the same keystroke or mouse action. For example, the “Space Bar” is used often to toggle various controls on and off in the control block and sub-blocks.

Toolbox A palette from which the various graphic objects are selected when creating a graphics plate.

Trigger A control which is used to cause specific actions or events to automatically take place when system settings are engaged. For example, the trigger control in the graphics control block determines if *Turbo* will automatically load and display a graphics plate when the *dataframe* file is opened and engaged.

TSR A Terminate and Stay Resident program such as a screen saver or antivirus program. Such programs should not be run at the same time as *Turbo* because most of them are incompatible with it.

Typeface A character or symbol set of a unique design. Typefaces come in different styles, sizes and weights (called fonts).

Upload To transfer the settings from the IQ components in a system to the host computer.

UART The Universal Asynchronous Receiver Transmitter. It is a chip that serves as a serial communication interface in most PC computers. 16550-compatible UARTs are required for use with *Turbo*.

UCODE A universal code protocol that allows Crown IQ components and third-party IQ components to communicate with an *IQ System* and be controlled and/or monitored by IQ software.

Variable Color A custom color attribute for graphic objects that can be mixed by the user.

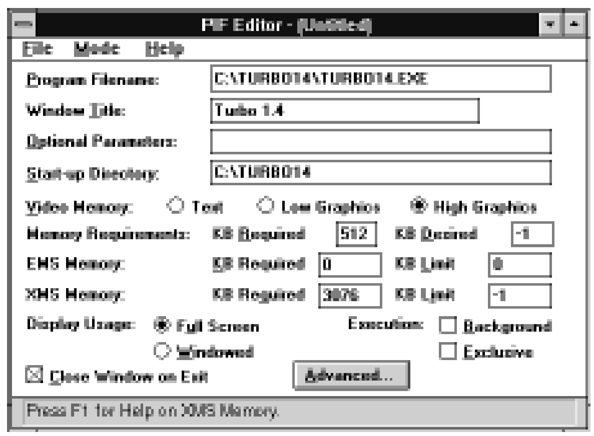
Appendix A: Using *Turbo* with Microsoft Windows

Turbo is a DOS-based program. In many cases it can also be run full-screen under Microsoft Windows—however we make no guarantees about this and we do not promise to support *Turbo* in the Windows environment. This appendix will describe some of the settings which may help you run *Turbo* under Windows 3.1, 3.11 and 95.

A.1 Windows 3.1 and 3.11

When running under Windows 3.1 or 3.11 it is best to start *Turbo* with a PIF (Program Information File). You can create one with Window's PIF Editor. The memory and other parameters should be configured as shown in the example in Figure A.1.

PIF Editor Main Window



PIF Editor Advanced Window

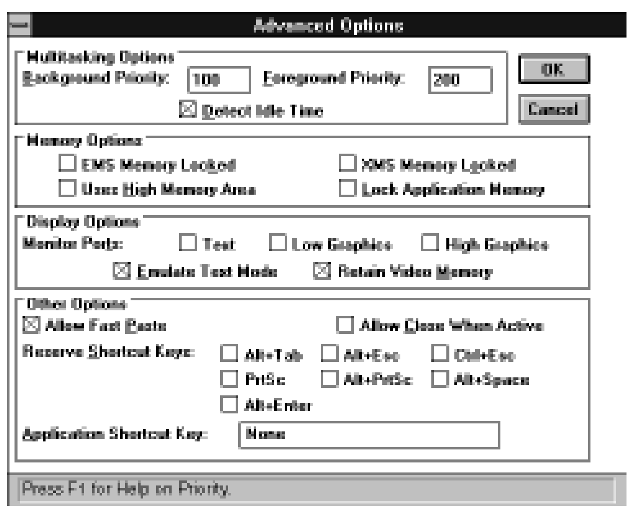


Fig. A.1 The PIF Editor's Main Window (Top) and Advanced Window (Bottom)

Note: The example in Figure A.1 assumes that the Turbo was installed to a subdirectory named Turbo14 on hard drive C. Please consult your Windows documentation on running and using the PIF Editor.

Turbo may not run reliably in the background so the Background Execution box in the main window of the PIF Editor should not be checked. Checking the Exclusive Execution box may improve performance by a small amount.

In the advanced window of the PIF Editor, change the Background Priority to 100, the Foreground Priority to 200 and make sure the Detect Idle Time box is checked. None of the items in the Memory Options section should be checked. In the Display Options section, do not check any of the Monitor Port boxes but do check the Emulate Text Mode and Retain Video Memory boxes.

IMPORTANT: If you switch back to Windows while the *Turbo* is running, some communication from the *IQ System* may be lost. For this reason, we do not recommend that you attempt to switch the focus from *Turbo* to Windows or other programs during periods of critical operation for the *IQ System*.

If you must regularly run *Turbo* under Windows, you may want to obtain a better communications driver such as TurboCom/2. TurboCom/2 was specifically designed to improve the reliability of serial communications of DOS programs running under Windows. At the time of this printing it was available for $29.95 (U.S. dollars) plus shipping and handling charges from Pacific CommWare, 180 Beacon Hill Lane, Ashland, Oregon 97520-9701 U.S.A. Their telephone number is 503-482-2744.

A.2 Windows 95

When running Windows 95 *Turbo* must be run from the MS-DOS mode. Here are the steps:

1. Right click ( ) on the desktop and select New>Shortcut. For the command line, specify the full path name of the program or runtime, or use the Browse button to select the program.

   Press the Next button and enter an appropriate name for the shortcut. This is the name that will appear under the icon on the desktop. Press Next again and select an icon. Press Finish.
2. Right click ( ) on the newly created icon and select Properties. Select the Program Tab. Make sure that both the Cmd line and Working entries are correct. Press the Advanced button. Check the box that says MS-DOS mode. Press OK to close this window and then press OK to close the Properties window.
3. Double click ( ) on the new icon to run the program. You should first close all running programs before executing the MS-DOS mode program.

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