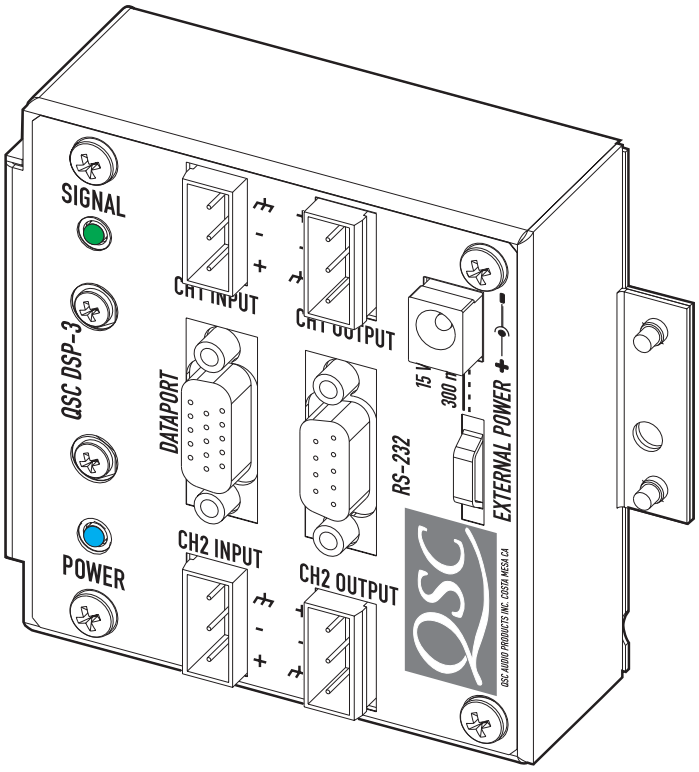
DSP-3
Digital Signal Processor
Amplifier Accessory Hardware Manual



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WARNING!

WHILE QSC HAS ENDEAVORED TO DEVELOP AND PRODUCE THE MOST DEPENDABLE AND ROBUST DIGITAL SIGNAL PROCESSOR (DSP) AUDIO PRODUCT FOR YOUR USE, DUE TO THE UNLIMITED AND POTENTIALLY DESTRUCTIVE (TO THE SOUND SYSTEM) CONFIGURATIONS THAT MAY BE APPLIED TO THE DSP BY THE USER, QSC CANNOT BE HELD RESPONSIBLE FOR DAMAGES RESULTING FROM ANY DEVIATION OR FAILURE BY THE USER TO STRICTLY FOLLOW THE RECOMMENDATIONS SET FORTH IN THE OWNER'S MANUAL FOR THE INTEGRATION OF THE DSP-3 AND SIGNAL MANAGER SOFTWARE WITH YOUR SOUND SYSTEM.

ALL RISKS ATTENDANT TO INTEGRATION OF USER-CONFIGURABLE DSP PRODUCTS WITH YOUR SOUND SYSTEM ARE ASSUMED BY YOU. WHILE QSC STRIVES TO SUPPLY THE HIGHEST QUALITY TECHNICAL SOLUTIONS FOR DIGITAL SIGNAL PROCESSING, IN NO EVENT WILL QSC OR ITS SUPPLIERS BE HELD LIABLE FOR ANY DAMAGES, CONSEQUENTIAL, INCIDENTAL, OR OTHERWISE, INCLUDING ANY CLAIMS FOR LOST PROFITS AND/OR SAVINGS RESULTING FROM ANY ATTEMPTED INTEGRATION OF THE DSP-3 AND SIGNAL MANAGER SOFTWARE WHICH DOES NOT STRICTLY ADHERE TO THE MANUAL'S RECOMMENDATIONS.

Federal Communications Commission (FCC) Information

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and the receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is conneted.

-Consult the dealeror an experiencedradio/TV technician for help.

IMPORTANT SAFETY INFORMATION: PLEASE REVIEW!

EXPLANATION OF GRAPHICAL SYMBOLS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point within an equilateral triangle is intended to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

CAUTION: To reduce the risk of electric shock, do not remove the cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

WARNING: To prevent fire or electric shock, do not expose this equipment to rain or moisture.

SAFEGUARDS

Electrical energy can perform many useful functions. This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following instructions for its installation, use and servicing.

Section 1: Introduction- Overview

The DSP-3 is a digital signal processor (*or DSP*) accessory for audio power amplifiers designed to reduce the need for external signal processing while increasing overall system reliability through distributed intelligence. It is intended primarily for QSC's CX, DCA, and Powerlight2 series amplifiers and mounts directly to the rear panel of the 2-RU, 2-channel models of these amplifiers. Pre-August, 1999 date-code of the CX, DCA and Powerlight2, and all ISA models will require use of an external power supply. Use of the DSP-3 with Powerlight models requires remote mounting, external power supply and use of a special interconnect cable (PL6.0/9.0 only). Refer to the *Appendix* for application information. The DSP-3 can also be used with amplifiers that do not have a QSC DataPort (older QSC models, non-QSC models) with a reduced feature set and "remote" mounting/external power.

The signal processing capabilities include an Input Compressor-limiter, multiple Parametric Filters, High- and Low-Pass Filters, a Shelf Filter, Muting, Attenuation, Multiple Delays, Polarity Reversal, Audio Routing and Post Crossover Audio Mixing. Analog-to-digital and digital-to-analog converters are 24 bit resolution, 48 kHz. sampling rate. Additionally, the post-DSP output signals are daisy-chainable for connection to a second amplifier. Input sensitivity is selectable and dynamic range is greater than 93 dB. Inputs and the post-DSP outputs are electronically balanced. See *Hardware Features* for complete listing.

Physically, the DSP-3 is a small module that "piggybacks" onto the back panel of the specified QSC amplifiers. It connects directly to the DataPort on the back panel and is secured with supplied hardware. When used with other amplifiers, the DSP-3 is mounted remotely on a rack-mount accessory that provides a solid physical mounting platform.

Connections include three D-sub type connections; a DB-9 connector acts as the RS-232 interface and an HD-15 through-connector provides the DataPort interface to the amplifier and other QSC DataPort products (if used). The "exposed" side has four terminal block connectors; 2 audio inputs and 2 post DSP outputs. There is also a power receptacle for using the DSP-3 with amplifiers that do not provide the required power through their DataPort, such as the ISA-series, older QSC amplifiers and non-QSC amplifiers. There are two LED's; a blue one to indicate power status and a green one to indicate the presence of an input signal to the DSP-3.

Control of the DSP-3 is accomplished with the supplied QSC Signal Manager software. Networked control using the QSControl platform is also possible (refer to QSControl documentation for details). Please refer to the software documentation (software Help file and Readme.txt file) for feature-set and operation information. This software provides an easy-to-use graphical user interface where DSP "objects" are placed onto a palette and interconnects are drawn. This interface allows for almost infinite configuration possibilities.

Connection of the DSP-3 to the host computer is made by connecting a serial cable between the DSP-3's RS-232 port and the host PC's available COM port. Once the DSP-3 has been setup as desired and the configuration saved to the DSP-3, connection to the PC is no longer required. This feature allows essentially tamper-proof amplifier DSP setup. Further changes can be implemented in the field by simply connecting a PC (i.e. laptop computer) and loading the new setup into the DSP-3.

***Note:* Powerlight 6.0 and Powerlight 9.0 amplifiers require that pin #9 be removed from the remote mounting interconnect cable. Amplifier damage may result from use of cable that has pin #9 connections present. Normal VGA computer monitor cables have pin #9 removed and are usable. Check before use!**

Section 1: Introduction- DSP-3 General Use Guidelines

IMPORTANT! Pleas read before operating the DSP-3 with your audio system.

The DSP-3 is a professional level DSP product that allows the user to produce virtually unlimited signal processor variations and configurations. Because of the infinite configuration possibilities of digital signal processing and the DSP-3, it is possible to create configurations that may result in unwanted signals or uncontrollable output

Signal Manager has no way of knowing if the DSP configuration you have designed will produce the results you intend to produce. You can create signal loops in your configuration that may oscillate and you may damage your sound system if you apply such configurations to the DSP-3. When applying an untested configuration or when designing or experimenting with the DSP-3, it is a very good idea to turn down the amplifier's physical gain controls. That way, you won't damage your speakers or create very loud sounds if you apply a configuration that doesn't do what you thought it would.

As a general rule, DO NOT CREATE SIGNAL LOOPS! Do not mix the output of a DSP object back into its own input! There is nothing useful to achieve by doing that, you will only create an oscillator that could damage you speakers. Also, USE THE SINE AND NOISE GENERATOR OBJECTS WITH GREAT CAUTION! These objects produce signals that can harm your speakers. Turn down the gain. If you don't hear a signal when you think you should, DO NOT INCREASE THE GAIN!!! If the signal isn't audible at lower levels, there is something else wrong. Turning up the gain to full exposes you and your system to the possibility that some loose connection somewhere will suddenly send a full-amplitude signal through your sound system.

Like all freely configurable signal processing tools, the DSP-3 will do what the configuration you design tells it to do, which may not be what you expect it to do, so use caution.

Section 1: Introduction- Quick Start

This quick start section is for those users who want to get up and running with the DSP-3 and Signal Manager software as quickly as possible. It is in no way a substitute for reviewing the contents of the entire hardware manual. It is intended for people familiar with the equipment discussed and should be followed up with a review of the manual and the software help file.

This is the same material covered in the Signal Manager software help file, only presented on paper so that you may "get right to it".

1 TURN THE EQUIPMENT OFF & INSTALL THE HARDWARE

If you are using the DSP-3 with.....	Then you need to.....
QSC Powerlight2, CX, DCA 2-channel, 2-RU amplifiers (or later direct-mount applications)	Mount the DSP-3 to the amplifier by plugging it into the amp's DataPort and securing it with the supplied hardware. External power may be required for older models (see Appendix).
QSC 4-channel CX & DCA amplifiers (or later models with full-featured DataPort that do not support direct mounting of the DSP-3)	Mount the DSP-3 remotely and connect a QSC DataPort cable between the amplifier's DataPort and the DSP-3's "backside" DataPort. External power may be required for older models (see top of page 2).
QSC Powerlight 6.0 or Powerlight 9.0	Mount the DSP-3 remotely and connect a **MODIFIED** QSC DataPort cable (male-to-female cable with pin #9 removed) between the amplifier's DataPort and the DSP-3's "backside" DataPort. Connect the external power supply to the DSP-3's **EXTERNAL POWER** jack.
QSC Powerlight, all except 6.0 & 9.0	Mount the DSP-3 remotely and connect a QSC DataPort cable (male-to-female) between the amplifier's DataPort and the DSP-3's "backside" DataPort. Connect the external power supply to the DSP-3's **EXTERNAL POWER** jack.
a non-DataPort amplifier (QSC USA, PLX or non-QSC models	Mount the DSP-3 remotely. Connect the DSP-3's **CHANNEL 1 OUTPUT** and **CHANNEL 2 OUTPUT** to the appropriate amplifier inputs (see p.18 for pinouts). Connect the external power supply to the DSP-3's **EXTERNAL POWER** jack.

2 CONNECT THE COMPUTER TO THE DSP-3

Use a 9-pin serial data cable to connect the DSP-3's **RS-232** connector to the computer's available COM port (the 9-pin serial port connector on the back of the PC). COM1 through COM16 are usable with the Signal Manager software. COM1 is the default port in Signal Manager; use COM1 for your connection if it is available. If not, you will need to select the appropriate COM port in the Signal Manager program *after* you install it in step 5.

3 CONNECT THE AUDIO INPUTS

If your using.....	Then you need to.....
the **CHANNEL 1 INPUT** & **CHANNEL 2 INPUT** connectors	connect your input signal source to terminal block connectors (refer to page 18) and plug the connectors into the **CHANNEL 1 INPUT** and **CHANNEL 2 INPUT** receptacles.
the **DataPort** input (QSC CM16a or related products)	connect the DataPort output from the CM16a (or other related DataPort product) to the **DataPort** input of the DSP-3. Use a QSC DataPort cable (male-to-male) for this connection. Refer to page 19.

4 TURN THE AMP GAIN DOWN, POWER UP THE AMPLIFIER & THE DSP-3

If the DSP-3 requires power from the accessory external power supply, apply power to the DSP-3 FIRST, then turn on the amplifier. The power supply must be plugged into an operational AC power receptacle. Then plug the "barrel" connector (coaxial power plug) fully into the **EXTERNAL POWER** receptacle on the DSP-3. When power is properly applied to the DSP-3, the blue **POWER** LED will be illuminated. Use a plastic wire-tie (tie-wrap) to secure the accessory power supply's cord to the DSP-3's chassis; there is a metal tab on the chassis for this purpose.

If the DSP-3 is powered by the amplifier's DataPort, the amplifier must be connected to an operational AC power receptacle. Then turn the amplifier "on" using its power switch. The blue **POWER** LED on the DSP-3 will illuminate a few seconds after the amplifier's power switch is activated. If the DSP-3's blue **POWER** LED does not illuminate, you may have an older QSC DataPort equipped amplifier that requires use of the accessory external power supply (refer to the Appendix for complete application information).

Section 1: Introduction- Quick Start

5 INSTALL THE SOFTWARE

1. Place the QSC Signal Manager CD in your computer's CD drive (typically the D:\ drive). The installation program should run automatically after several seconds; **if it does not, *then* proceed with step 2:**

2. Run D:\Setup.exe (replace D: with the drive letter designator appropriate for your system) and follow the instructions displayed.

3. When the installation is complete, you will be presented with a screen that prompts you to view the "Readme" file. Please take time to read this- it contains important up-to-date information on the software.

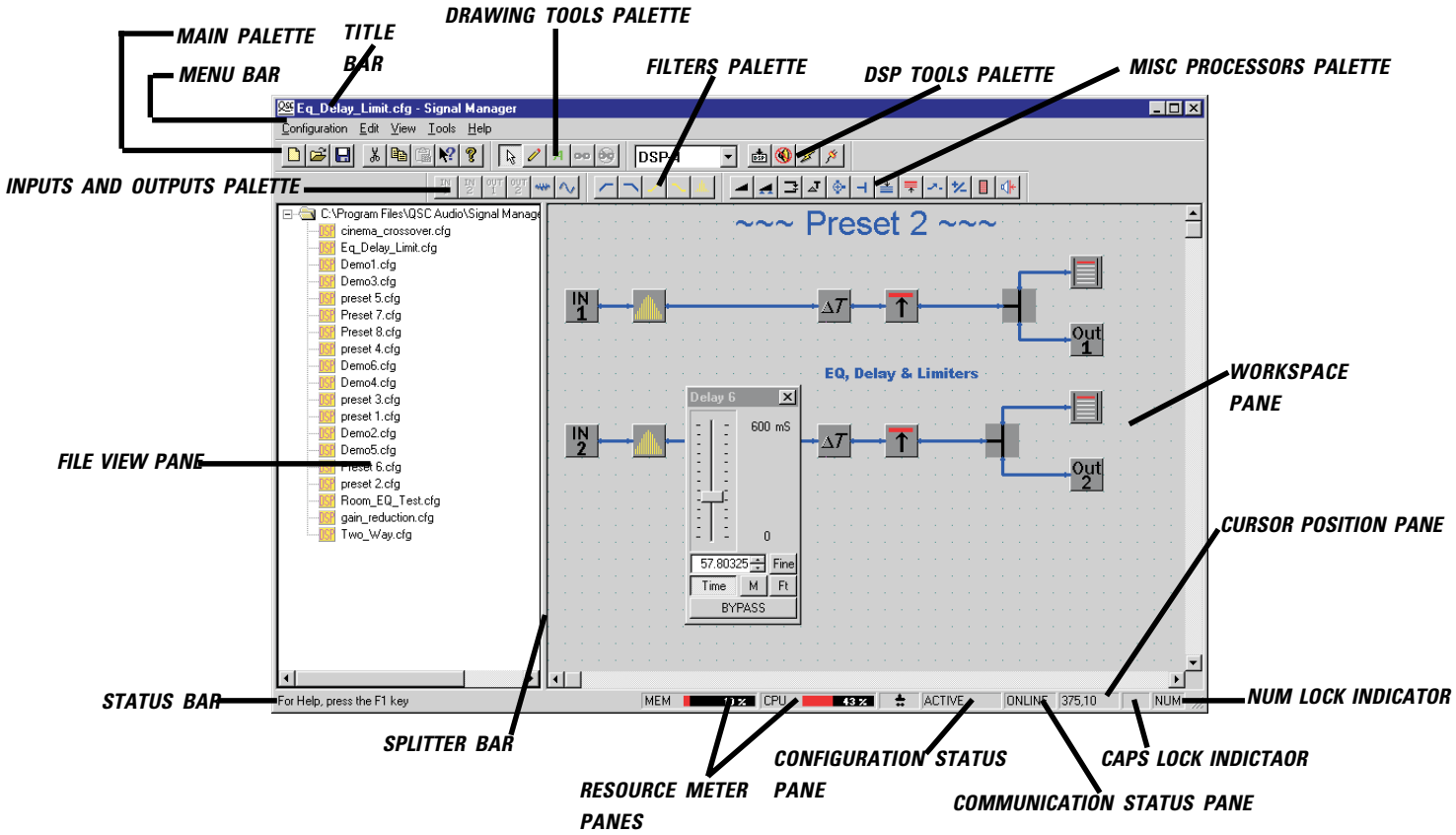
4. After installation, you will have an icon on your computer's "desk top" labeled ***Signal Manager***. Use this icon to start the application (double-click on the ***Signal Manager*** icon, this will start the program).

5. Using the Menu Bar (see below) at the top of the window, choose the "*Help*" item and read the software help section. The help system includes the contents of this hardware manual for "paperless" reference.

6. IMPORTANT! The DSP-3 is shipped with all of its presets configured to pass full-range audio signals through both channels. ***THIS MAY NOT BE APPROPRIATE FOR YOUR SETUP! Be sure to configure any necessary crossovers , filters, etc. prior to applying audio signals to the inputs. Damage to equipment may result if these recommendations are not followed.***

WHAT THE SIGNAL MANAGER APPLICATION LOOKS LIKE

This screen-shot is what a typical Signal Manager "configuration" looks like (example only):



6 ESTABLISH COMMUNICATION BETWEEN THE DSP-3 & THE COMPUTER

At this point, you should have everything "up and running". In the Signal Manager application, check the ***COMMUNICATION STATUS PANE*** (lower right corner of the Signal Manager window, see above).

If the *COMMUNICATION STATUS PANE* indicates.....	Then you need to.....
ONLINE	Do nothing! Your communication settings match the COM port you connected the DSP-3 to.
OFFLINE	Select *Tools* from the Menu Bar, select *Options*; the *Options* dialog box will open. Click on the *DSP* tab. In the *Serial Port Selection* field, click on the "down arrow" next to the port selection data window. A drop down list of COM1 through COM16 will appear. Select the COM port number that corresponds to the COM port of your computer that the DSP-3 is connected to. Click *OK* (at the bottom of the dialog box); the dialog will close. **Exit Signal Manager and restart it so that the newly selected COM port will become active.** The Communication Status pane should now indicate ONLINE if everything was connected and set up properly.

7 ENSURE THE AMPLIFIER IS TURNED DOWN AND THAT YOU HAVE SUITABLE SPEAKERS CONNECTED FOR YOUR INTENDED CONFIGURATION

For familiarization with the DSP-3 and the Signal Manager software, we recommend that you use a pair of full range speakers connected to your amplifier and that the amplifier gain be reduced to the minimum useful setting. This will allow you to configure the DSP-3 almost anyway you desire while providing audio output to verify that the DSP-3 is doing as you intend. Small, high-power rated monitor speakers are perfect for the task.

Better safe than sorry! Don't turn you amp all the way up; if communications between the computer and DSP-3 fail for any reason, unexpected output transients could damage your speakers

8 CREATE A SIMPLE DSP CONFIGURATION

■ From the Menu Bar, select *Configuration*, *New*. If there was a default configuration on the Workspace, you will be prompted to close the "current" configuration first.

■ Locate the Inputs and Outputs palette; left-click on the icon labeled IN1. Move your pointer into the upper left area of the Workspace and left-click the mouse again. The IN1 object should now be on your workspace.

■ Now select the OUT1 icon from the same palette (left click on the OUT1 icon). Move your pointer into the upper right area of the workspace, in line with the IN1 object you just placed, and left click again. The OUT1 object should appear.

■ Select the GAIN icon in the MISC PROCESSORS palette (it looks like a little wedge and is the left-most icon in this palette). Move your pointer to the workspace in between (and in line with) the IN1 and OUT1 objects; click the mouse button again. The GAIN object should appear.

■ Go to the DRAWING TOOLS palette and select the DRAW (pencil) icon. Notice that the IN1 object has a small yellow-colored "node" on its right side. This is its connection node or the point that "wires" are drawn from. Similarly, note the same yellow-colored nodes on the GAIN and OUT1 objects. Draw a "wire" from the IN1 object to the left side of the GAIN object. Draw another "wire" from the GAIN object (right side) to the OUT1 object.

The DRAW tool works by clicking on one of the nodes that you want to draw a wire between, then, while holding down the mouse button, dragging the wire to the other node. You can change the drawing mode from click-drag-release wiring to click-click wiring in the *Tools*, *Options* dialog box; select the *Drawing* tab and make any desired drawing "behavior" changes.

■ When everything is placed on the workspace and connected with "wires", go to the Menu Bar and select Configuration, then Apply to DSP (or just click on the "Apply to DSP" icon in the DSP Tools palette). This will send your configuration (and any object parameter settings) from the computer to the DSP-3. The DSP-3's outputs will be muted while the configuration is loaded. For complex configurations, this could take several seconds.

■ If you have active audio inputs connected to the DSP-3 and the amplifier's gain is sufficient, you will probably hear your audio material at this point. If not, double-click on each of the GAIN objects and increase the gain setting as required. Also in the *Tools*, *Options* dialog, the *DSP* tab has settings for input and output sensitivity for the DSP-3; these may require adjustment dependant on your particular set up.

■ The *Communication Status* pane should indicate "ONLINE" and the *Configuration Status* pane should indicate "ACTIVE". If you get an error message when applying the configuration to the DSP-3 (i.e. "Failed to connect to DSP-3") check the cable connection between the DSP-3 and the computer's COM port. Ensure that the correct COM port is selected in Signal Manager's *Tools*, *Options*, *DSP* settings dialog box.

■ Repeat the above procedure, this time using IN2, OUT2 and a GAIN object. This will give you a signal path with gain adjustment for channel 2. Be sure to "Apply to DSP". This sends your updated configuration from your computer to the DSP-3.

The last applied configuration that is "running" in the DSP-3 when it is turned off becomes the active configuration again once the power is turned back on to the DSP-3. This ensures that the system "comes up" just as it was left last time it was powered down.

If you decide to edit an existing configuration, you will need to "unlock" the configuration after opening it. Just select *Configuration* from the Menu Bar, then select *Edit*. The palettes that were "grayed out" will now appear in their normal, colored state and you will be able to edit the configuration. After your editing is complete, select *Configuration* from the Menu Bar and then *Apply to DSP*.

That's it for the "Quick Start". For more information, review this manual and the software's help file.

Section 1: Introduction- Basic Connector & Indicator Descriptions

FRONT PANEL

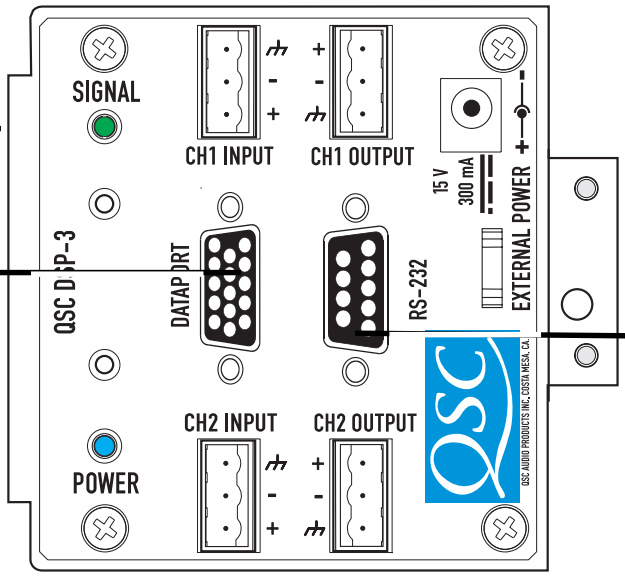
CH 1 INPUT, CH 2 INPUT- These terminal-block jacks (receptacles) are where you connect the line-level audio inputs to the DSP-3.

They are electronically balanced with an input impedance of 8.3k Ohm. If used in an unbalanced configuration, the input impedance is 3.7k Ohms.

CH 1 OUTPUT, CH2 OUTPUT-- These terminal-block jacks provides post-DSP (processed) signal from the DSP-3 for downstream devices (amplifiers, monitoring busses, daisy-chaining the processed signal to a second amplifier). In the case of non-DataPort amplifiers, these are the DSP-3 output that gets connected to your amplifier's input connector.

SIGNAL indicator- This green LED illuminates when the DSP-3 detects an input signal on either channel. Dual brightness levels indicate signal level. At -40dB, it will light dimly; at -20dB it will light brightly.

EXTERNAL POWER- 2.5mm barrel connector- Center (+), Outer(-), 15 VDC, 300mA. Use only if your amplifier does not supply the required operating voltage from its DataPort (or non-DataPort amps).



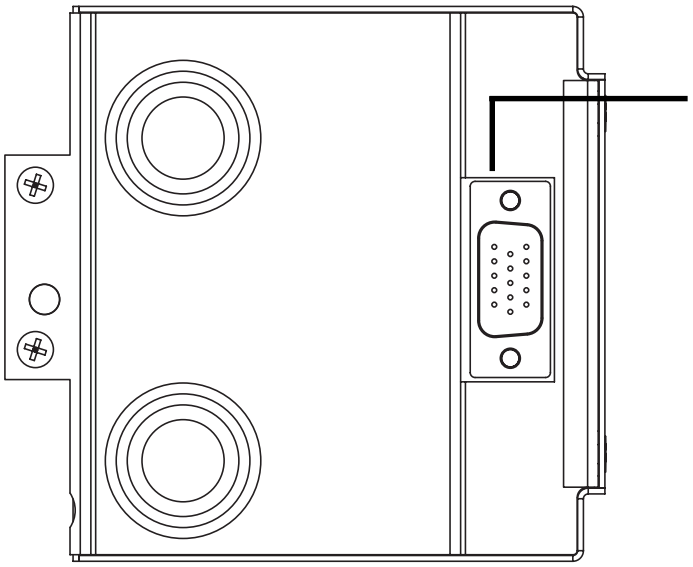
DATAPORT- This is the "input" DataPort. If the DSP-3 is used with QSC DataPort products that can supply the audio inputs or provide amplifier control & monitoring, this is where they are connected to the DSP-3.

RS-232- This DB-9 female jack is where the serial cable between the DSP-3 and the computer is plugged in.

POWER indicator- This blue LED illuminates when the DSP-3 has power properly applied.

Section 1: Introduction- Basic Connector & Indicator Descriptions

REAR PANEL



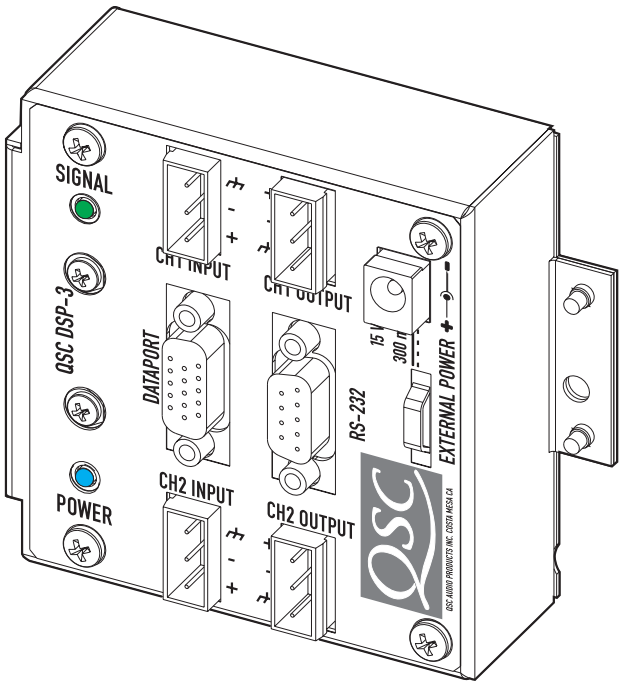
DATAPORT (unlabeled)- This is the "output" DataPort.

If the DSP-3 is directly mounted on a 2-RU QSC DataPort equipped amplifier, this connector plugs into the amplifier's DataPort connector.

If used with 3-RU QSC DataPort equipped amplifiers, the DSP-3 will need to be remotely mounted and a male-female DataPort cable used to interconnect the amp & DSP-3.

If used with a non-DataPort amp (QSC or other), this connector will not be used.

OVERALL



Section 1: Introduction- List of Functions & Features

DSP-3 Hardware Features (full set available to QSC DataPort equipped amplifiers):

High- and Low-Pass Crossover

Selectable responses: Butterworth (6,12,18 or 24 dB per octave slope)
Bessel (6,12,18 or 24 dB per octave slope)
Linkwitz-Riley (12 or 24 dB per octave slope)

Graphical response curve provided in software

Adjustable frequency & slope

Ability to bypass all EQ with a single mouse click

Ability to add or delete EQ

Assignable anywhere in signal chain

High- and Low-Pass Shelf Filter

Adjustable corner frequency

Adjustable Q factor

Adjustable gain

Graphical response curve provided in software

Ability to bypass all EQ with a single mouse click

Ability to add or delete EQ

Assignable anywhere in signal chain

Output Peak Limiter

Adjustable threshold

Adjustable attack time

Adjustable release time

Graphical response curve provided in software

Ability to quickly bypass limiter with a single mouse click

Assignable anywhere in signal chain

Multiple Delays

910 millisecond maximum (sum of all delay objects)

20.83 microsecond increments

Entry can be in seconds, feet or meters

Assignable anywhere in signal chain.

Section 1: Introduction- List of Functions & Features

Parametric EQ	Adjustable frequency
	Adjustable gain
	Adjustable Q factor
	Ability to bypass all EQ with a single mouse click
	Ability to add or delete EQ
	Graphical response curve provided in software
	Assignable anywhere in the signal chain
Signal Compressor	Adjustable attack and release times
	Adjustable Gain
	Adjustable threshold
	Adjustable compression ratio
	Graphical response curve provided in software
	Assignable anywhere in the signal chain
Signal Level Meter	Peak or rms response

Signal Attenuation **(mute or bypass)**

Mix Post Crossover Audio **(2 to 1 mixer with *mute* and *lock all channels* featured)**

Signal Splitter

External Contact Closure Sensing (pin #9 of RS-232, operates with "Switched Gain" objects in Signal Manager software)

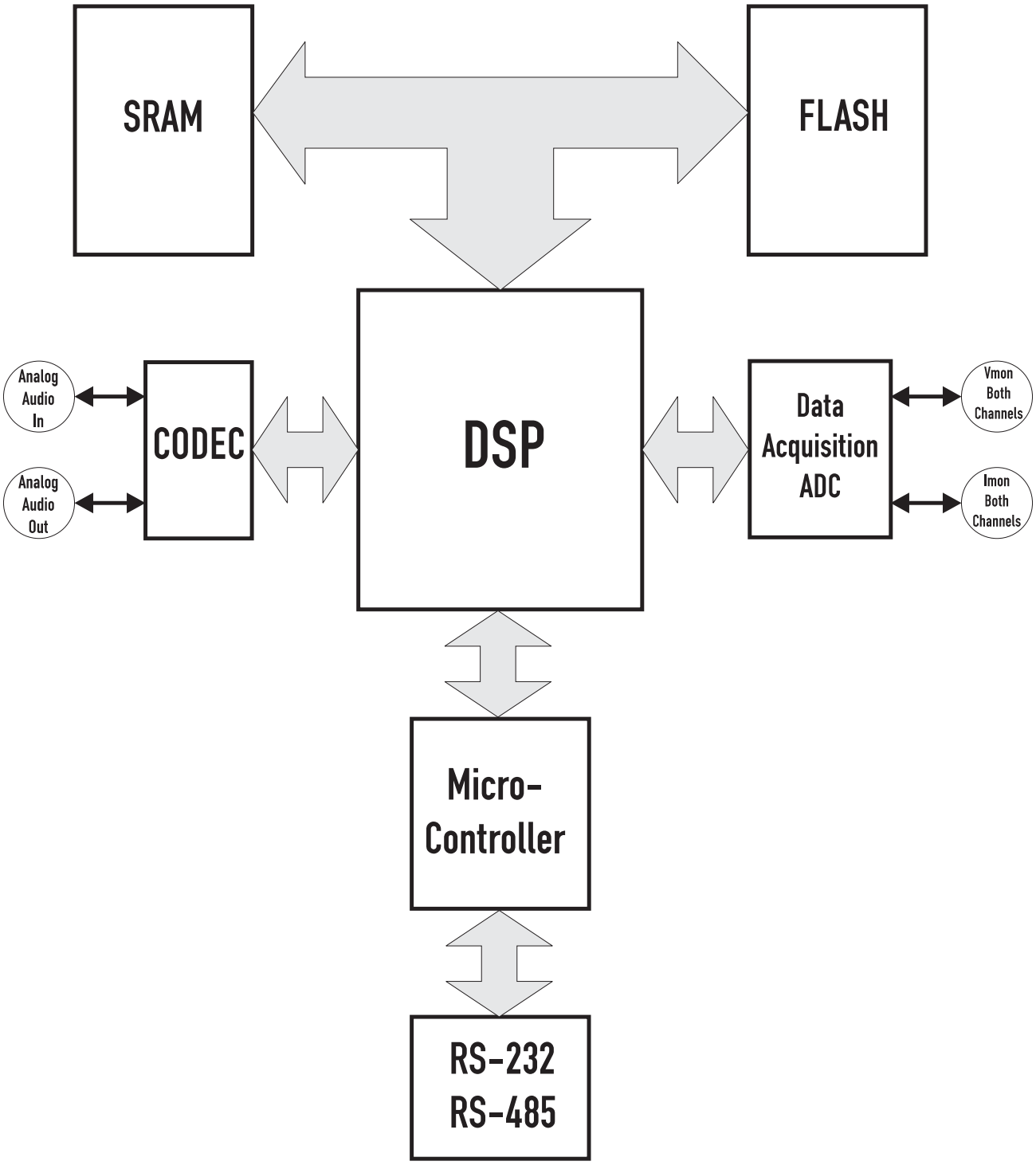
Pink & White Noise Generator

Variable Frequency Tone Generator

Clip & Protect Indication

Signal Polarity Reversal

Section 1: Introduction- Block Diagram



Section 1: Introduction- Technical Overview

This portion of the introduction provides some of the technical details of the DSP-3.

Audio Input Path

There are two audio channels each with two input connectors, a balanced 3-pin 'euro' terminal block jack and an electronically balanced DataPort input. The inputs are protected with a filter that prevents radio frequency interference. The inputs have software-selectable full scale input level sensitivity; this is the level at which the analog to digital converters reach their full scale digital value. Refer to the *Specifications* section for full details. The DataPort is scaled to clip with a full scale digital input if the DSP-3 does not change gain structure. Each CODEC input is diode protected to prevent any large signal from destroying its inputs.

Audio Output Path

The first stage the audio passes through is an inverting gain stage. The second stage is a second order Butterworth low pass filter that removes high frequency sampling artifacts. The signal is then sent out of the DSP-3 through the DataPort or the output 'Euro' connectors. The output level is selectable in software.

Power Supply

No external power supply is needed for use with the CX, DCA and PL2 two-channel, 2 RU series amplifiers produced with date-codes of August, 1999 or later. With these models, the DSP-3 is supplied power from the amplifier via the DataPort (HD-15) connection. **CX, DCA, and PL2 amps made prior to August 1999 DO NOT provide adequate power supply voltage to the module, requiring the use of the same type of external DC supply** as used with Powerlight amplifiers. The amps in question will have a serial number PRIOR to **0899**XXXXX, where the first four digits of the serial number are the MMYY datecode. Again, the modules WILL work with these amps just fine, but will require the use of our external power supply. External power is not required for all other directly-mounted-to-amplifier situations.

When used with the Powerlight series of amplifiers (or 3 RU & 4-channel amps), the DSP-3 requires use of the accessory external supply. The accessory external supply is also used when connecting to non-QSC amplifiers (or any amplifier that does not have a DataPort). External power is provided by the accessory power supply ("wall wart") via a coaxial power cord jack on the back of the DSP-3.

When using the external power source, we recommend that the DSP-3 be powered-up before the amplifier in order to insure trouble-free start-up. This will also avoid the possibility of "thumps & bumps" should the DSP-3 be powered up after the amplifier.

Data Acquisition

The DSP-3 samples the I_{MON} and V_{MON} (current and voltage monitoring from the amplifier) lines of QSC amplifiers (via the DataPort) in order to perform dynamics (limiter, compressor, etc.) processing. The four inputs (I_{MON} and V_{MON} for both channels) are continuously sampled by a four channel ADC. **When used with non-QSC amplifiers or QSC amplifiers that have no DataPort, the power limiter DSP "object" is not available as this function relies upon amplifier current and voltage feedback.** The DSP-3 will also not be able to monitor the protect or power status of the amplifier as these features require amplifier data via a DataPort connection.

Contact Closure

One contact closure input is provided. It uses pin 9 of the RS-232 DB-9 connector (not normally used for RS-232). Shorting this pin to ground with a maximum impedance of 1.3 kOhms will cause a general purpose I/O pin of the DSP to be pulled to a logic low. The current release of Signal Manager software uses this input to allow switched gain functions. Each of the Switched Gain blocks will be switched simultaneously by the single contact closure (switch). Each Switched Gain block has a two gain settings; one for open and one for closed switch conditions.

Section 2: Installation- Unpacking and Mounting

UNPACKING

There are no special unpacking precautions for the DSP-3. However, it is recommended that you keep the original packing material for reuse in the rare event that service be required for your DSP-3. If service is required and the original packing material is not available, insure that the DSP-3 is adequately protected for shipment (strong box of appropriate size , sufficient packing material).

WHAT IS INCLUDED IN THE CARTON:

Item	Description	Quantity
1-	DSP-3 Digital Signal Processor	1
2-	3-pin terminal block connector plug	4
3-	#4-40 machine screw, 1.125" long	2
4-	#8-32 machine screw, 0.312" long	1
5-	Hardware Manual (this document)	1
6-	Signal Manager Software CD disk	1

DIRECT MOUNTING THE DSP-3 TO 2-CHANNEL, 2 RU QSC DATAPORT EQUIPPED AMPLIFIERS (CX, DCA, Powerlight2)

The DSP-3 mounts directly to the rear of 2-channel, 2-RU, DataPort equipped QSC amplifiers.

1- Configure the amplifiers DIP switches (QSC amplifiers where the DSP-3 covers the configuration switches) as follows:

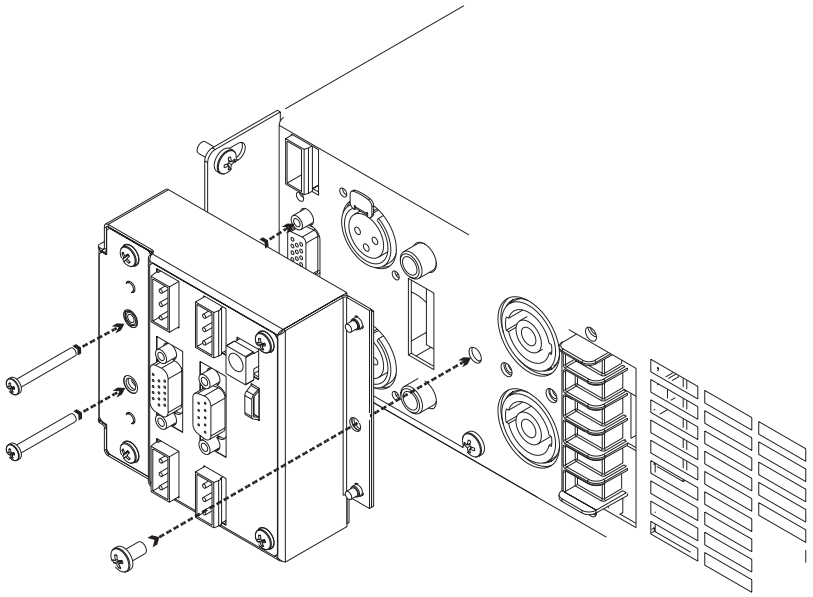
- All filters off
- Clip limiter off
- Mode set as required

2- Align the DataPort plug on the back of the DSP-3 with the DataPort jack on the back of the amplifier and gently push the DSP-3 to seat the connector.

3- Install the two #4-40 screws to secure the left side of the DSP-3 to the amplifier. These two long screws pass through the DSP-3 and thread into the inserts on the DataPort (HD15) jack. (see below). Use a #1-size phillips driver; be sure not to overtighten.

Be sure to secure the DSP-3 using all three mounting screws. The DSP-3's "backside" DataPort connector can be easily damaged if the DSP-3 is twisted and there are no supporting screws to properly secure it to the chassis.

4- Install the #8-32 screw (0.312 inch long) to secure the right side of the DSP-3 to the amplifier (see below).



Section 2: Installation- Remote mounting (4-ch., Powerlight & non QSC amp's)

REMOTE MOUNTING THE DSP-3 : 4-Channel CX and DCA , Powerlight series, and all non-QSC amplifiers

Use of the DSP-3 with the 4-channel CX and DCA and all Powerlight amplifiers requires the remote mounting of the DSP-3. Use with non-QSC amplifiers also requires remote mounting. Keep in mind that all applications that use amplifiers that do not have a DataPort (i.e. non-QSC amplifiers) some of the dynamic processing capabilities of the DSP-3 will not be available.

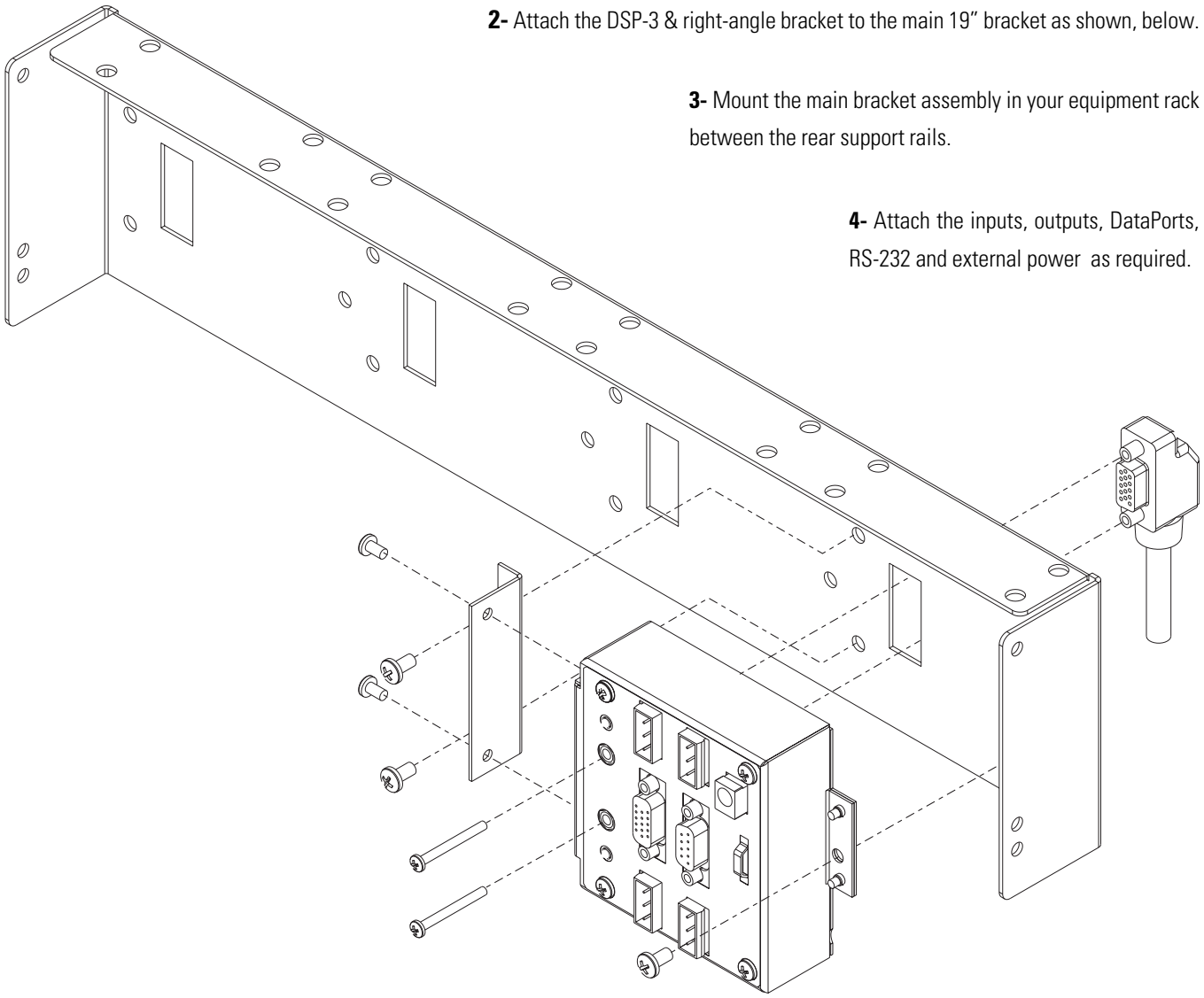
Accessory Remote Mounting Bracket- This accessory is a 19", 2-RU panel with mounting facilities for up to four DSP-3 modules. It is intended to be mounted to the rear-support rails of an equipment rack. The bracket kit comes with one large bracket (the 19", 2-RU size) and four smaller right-angle brackets that are used for securely mounting up to four DSP-3's in a 2-RU space. Adjustable rack ears are included for maximum mounting flexibility.

1- Attach the right-angle bracket to the DSP-3 module. The right-angle bracket is attached as shown, below.

2- Attach the DSP-3 & right-angle bracket to the main 19" bracket as shown, below.

3- Mount the main bracket assembly in your equipment rack between the rear support rails.

4- Attach the inputs, outputs, DataPorts, RS-232 and external power as required.



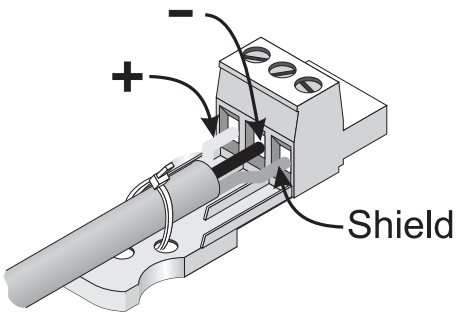
Section 2: Installation- Connections

CONNECTING AUDIO INPUTS AND OUTPUTS:

The audio inputs and outputs of the DSP-3 use 3-pin "Phoenix"-type (Euro-style) terminal block connectors. These connectors allow pre-wiring of inputs without any soldering and allow for rerouting of audio inputs by simply interchanging connector locations without the need for any tools. See Appendix for connector manufacturer's part number reference.

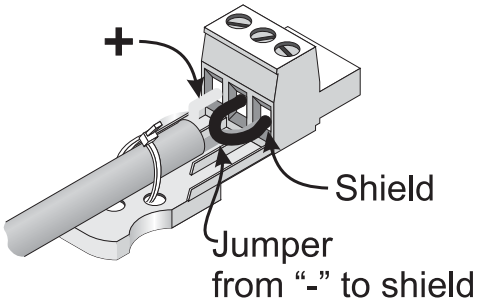
Inputs- The audio input can be from one of two sources; the front-panel DataPort **OR** the terminal-block INPUT connectors. ⚠ Do not use both sets of inputs at the same time! Use balanced connections for the lowest possible noise levels and for minimizing the possibility of hum inducing ground loops.

Outputs- The DSP-3's post-DSP (processed) audio is output to the rear-panel DataPort **AND** the terminal-block OUTPUT connectors. ⚠ The OUTPUT's can be used for daisy-chaining the processed audio to additional amplifiers, even when connected to a DataPort-equipped amplifier via the rear-panel DataPort.



Balanced connection is recommended for all inputs. The terminal block inputs on the DSP-3 are electronically balanced. Balanced input cables are recommended to minimize noise pick up and prevent ground loops.

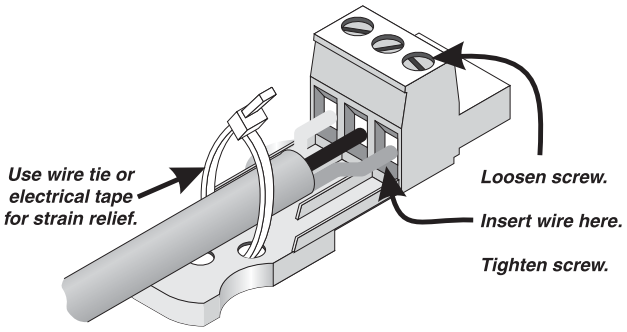
With the connector oriented as shown at the right, connect the positive (+) signal wire to the left-most



Unbalanced inputs can be used if required. If unbalanced audio sources are used, it is preferable to use an appropriate audio transformer (or other unbalanced-to-balanced "converter") to provide a balanced input to the DSP-3. If this is not possible, then it is recommended that the negative terminal and shield terminal be connected to one another with a jumper wire.

To connect your signal wire to the terminal-block plug- back the screws out a few turns to open the wire-clamp, carefully insert the conductors into the proper location, and retighten the clamping screw.

The recommended stripping length for the wires is approximately 6 to 8 mm (1/4 to 5/16 inch). When stripping the audio cable, be careful not to nick or cut the conductor strands. After each conductor has been stripped and dressed, insert it fully into the connector and tighten the retaining screw. When stranded wire is used, carefully twist the conductor strands together so that when they are inserted into the connector assembly, no loose strands short adjacent terminals.



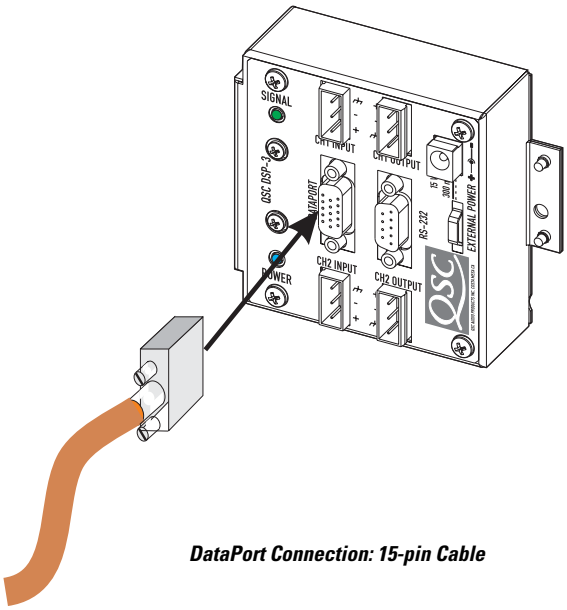
Section 2: Installation- Connections

DATAPORT Connection- This section applies to those users interfacing with the QSC DataPort products. If using the DataPort for your audio inputs, DO NOT use the terminal block inputs. If the DataPort is used only for control & monitoring of the amplifier (no audio input through the DataPort), then audio input may be via the terminal-block connectors.

The **front-panel DataPort** connection is used for connecting to QSC DataPort products. Use a ***QSC DataPort cable (male-to-male)*** similar to VGA computer monitor cables. ***Do not use computer VGA cables as they are not correctly constructed for use with the DSP-3.*** QSC DataPort cables may be obtained through your QSC distributor or by calling QSC's Technical Services Department. The plugs and jacks are the same physical size as the RS-232 connections; be careful not to get them confused.

The **rear-panel DataPort** connection from the DSP-3 to QSC amplifiers is made when mounting the DSP-3 to the rear of the amplifier. The DataPort connection from any other accessory to the DSP-3 is made by orienting the connector properly, inserting it fully into the jack and finger-tightening the retaining screws. The audio signals on the rear-panel DataPort are post-DSP (processed).

Front panel DataPort connection is ***not required*** for the operation of the DSP-3.



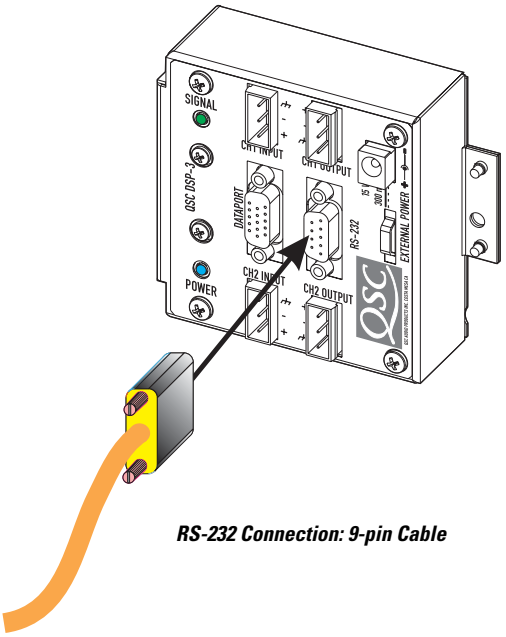
DataPort Connection: 15-pin Cable

RS-232 PORT Connection- Connection to the RS-232 port is made using a 9-pin serial data cable (male-to-female). Cable length should be 25 feet or less. Orient the DB-9 plug correctly, insert the plug fully into the RS-232 port and finger-tighten the retaining screws.

DSP-3 setup and programming takes place through the RS-232 port. Any time setup changes are required to the DSP-3, it must be connected to its host computer through the RS-232 port. If "real-time" control of the DSP-3 is required, the RS-232 port connection must be maintained as well. If "real-time" control is not required, then the DSP-3 can be setup first and then disconnected from the PC.

The RS-232 connection does not have to be maintained for the DSP-3 to operate.

Setup & programming can also be done via Ethernet network communication when using QSC's QSControl products. Refer to QSControl documentation for detailed information.



RS-232 Connection: 9-pin Cable

Section 2: Installation- Connections

DAISY-CHAINING THE DSP-3 OUTPUTS TO ADDITIONAL AMPLIFIERS

The DSP-3 provides audio output jacks for each channel. These outputs may be used for daisy-chaining the post-DSP signal to other amplifiers or for monitoring purposes. The signal on the output jacks is post-DSP. All signal processing functions done by the DSP-3 effect the signal provided to the output connectors as well. The terminal block outputs are active even when the DataPort connections are used.

To daisy-chain the DSP output, connect the output jacks of the DSP-3 to the input jacks of the next amplifier. Make sure that all interconnecting cables are balanced and connected properly.

CONNECTION TO ACCESSORY EXTERNAL DC POWER SOURCE

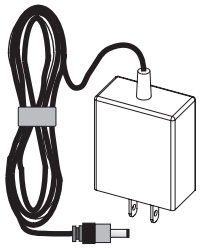
When the DSP-3 is used with QSC Powerlight amplifiers that do not provide the required +15VDC through their DataPort connection OR is used with non-DataPort amplifiers, power must be supplied to the DSP-3 from an external power supply.

QSC offers an accessory external power supply for applications where a DataPort that provides +15 VDC is not available. Contact QSC's Technical Services Department for details. Although ***not recommended***, third-party external power supplies may work with the DSP-3 provided they are of the correct voltage, voltage type (DC) , current rating and polarity. Any damage to the DSP-3 caused by connection to a non-QSC external power supply is not covered under the warranty.

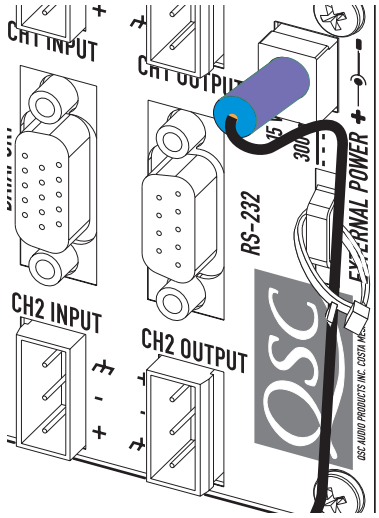
Ensure that any external power supply connected to the DSP-3 is of the proper voltage type, level and current rating.

Be certain that the connector polarity is correct as there is no industry standard!

Connection to an improper voltage source can cause immediate damage to the DSP-3!



QSC offers an accessory external power supply for applications with non-QSC amplifiers or with QSC Powerlight models that do not provide the required operating voltage.

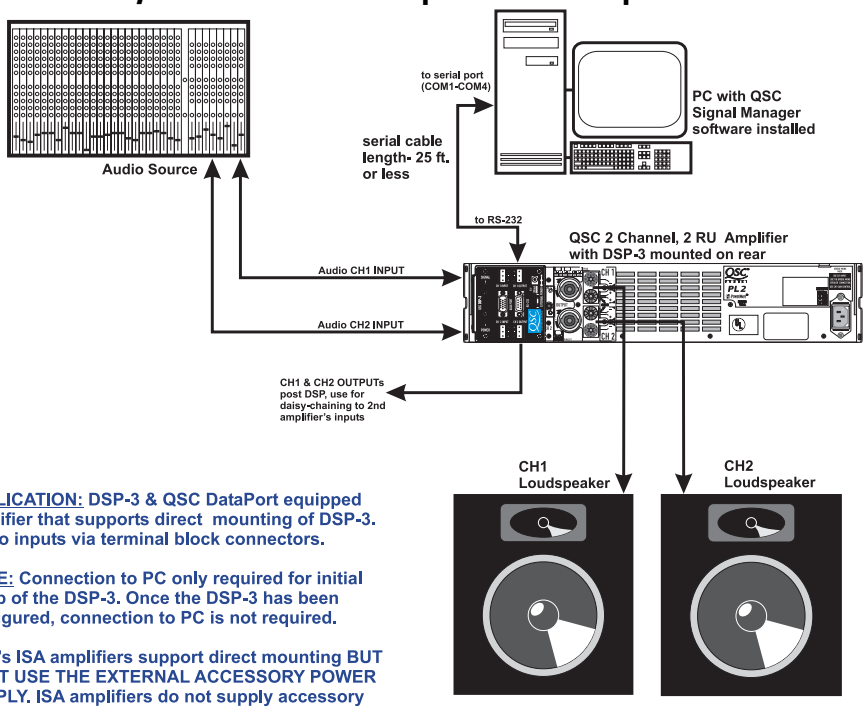


Insert the coaxial power plug into the EXTERNAL POWER jack. Ensure that the plug is firmly seated in the jack. Use the "tab" provided on the chassis for securing the power cord with a tie-wrap (wire-tie).

Section 2: Installation- Application Examples

The following examples show basic hook up information that assumes a two-channel, full range audio signal driving the load. Refer to your amplifier's hardware manual for other output configurations. All audio signals are line level.

DSP-3 Directly Mounted to QSC Amplifier. Audio Inputs via Terminal Block Inputs

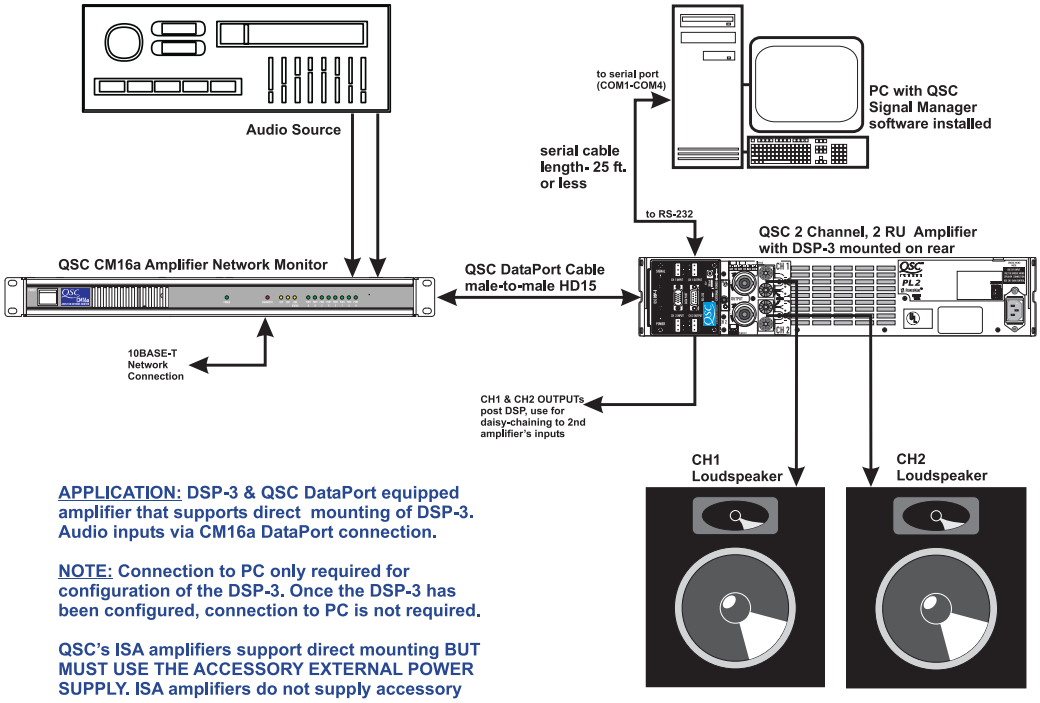


APPLICATION: DSP-3 & QSC DataPort equipped amplifier that supports direct mounting of DSP-3. Audio inputs via terminal block connectors.

NOTE: Connection to PC only required for initial setup of the DSP-3. Once the DSP-3 has been configured, connection to PC is not required.

QSC's ISA amplifiers support direct mounting BUT MUST USE THE EXTERNAL ACCESSORY POWER SUPPLY. ISA amplifiers do not supply accessory power.

DSP-3 Directly Mounted to QSC Amplifier. Networked OR Local Control. Audio Inputs via DataPort.



APPLICATION: DSP-3 & QSC DataPort equipped amplifier that supports direct mounting of DSP-3. Audio inputs via CM16a DataPort connection.

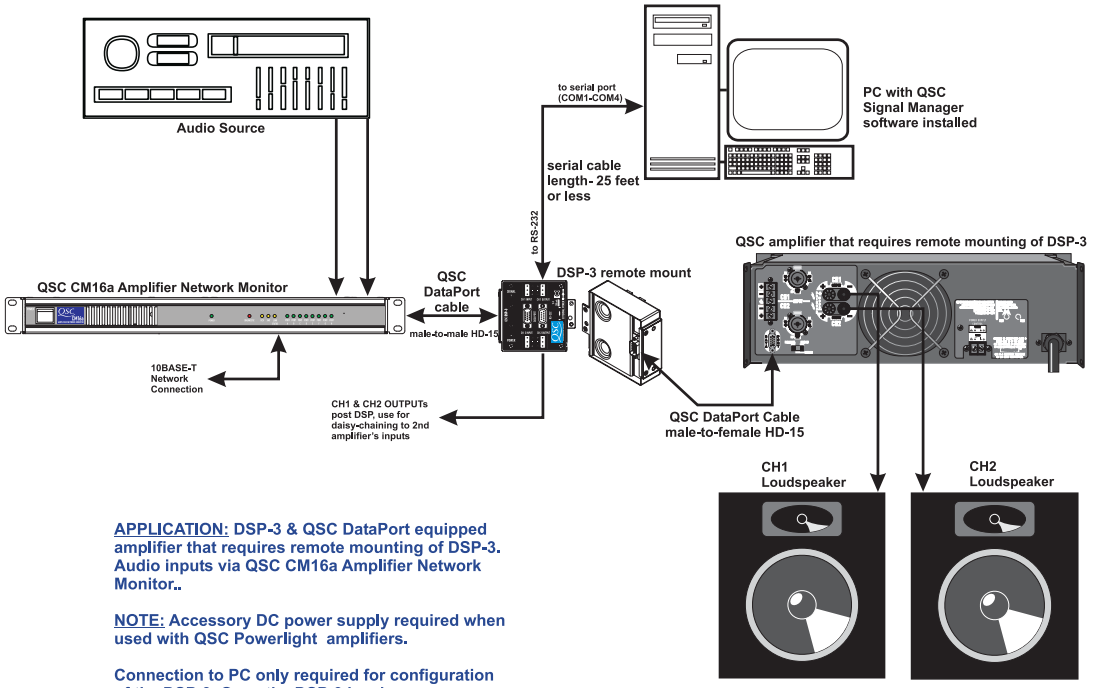
NOTE: Connection to PC only required for configuration of the DSP-3. Once the DSP-3 has been configured, connection to PC is not required.

QSC's ISA amplifiers support direct mounting BUT MUST USE THE ACCESSORY EXTERNAL POWER SUPPLY. ISA amplifiers do not supply accessory power.

NOTE: External accessory power supply may be required on older models, see page 2 for full application information.

Section 2: Installation- Application Examples

DSP-3 Remotely Mounted used with QSC DataPort Amplifier. Audio Input via Terminal Block Inputs

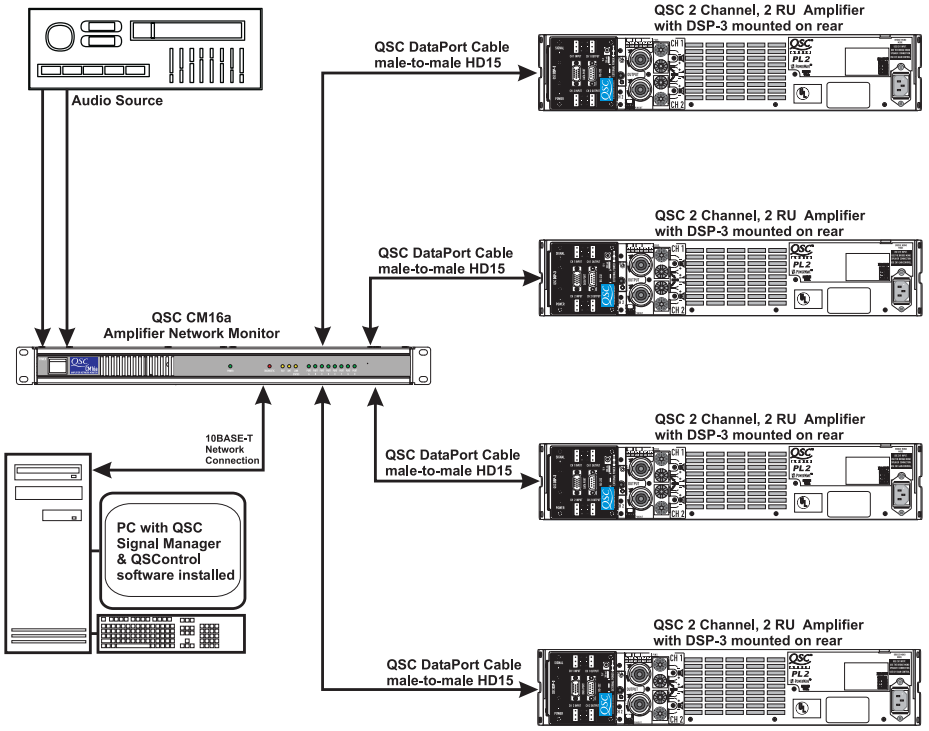


APPLICATION: DSP-3 & QSC DataPort equipped amplifier that requires remote mounting of DSP-3. Audio inputs via QSC CM16a Amplifier Network Monitor..

NOTE: Accessory DC power supply required when used with QSC Powerlight amplifiers.

Connection to PC only required for configuration of the DSP-3. Once the DSP-3 has been configured, connection to PC is not required.

DSP-3 Directly Mounted to QSC Amplifiers, Networked Control via QSControl Products



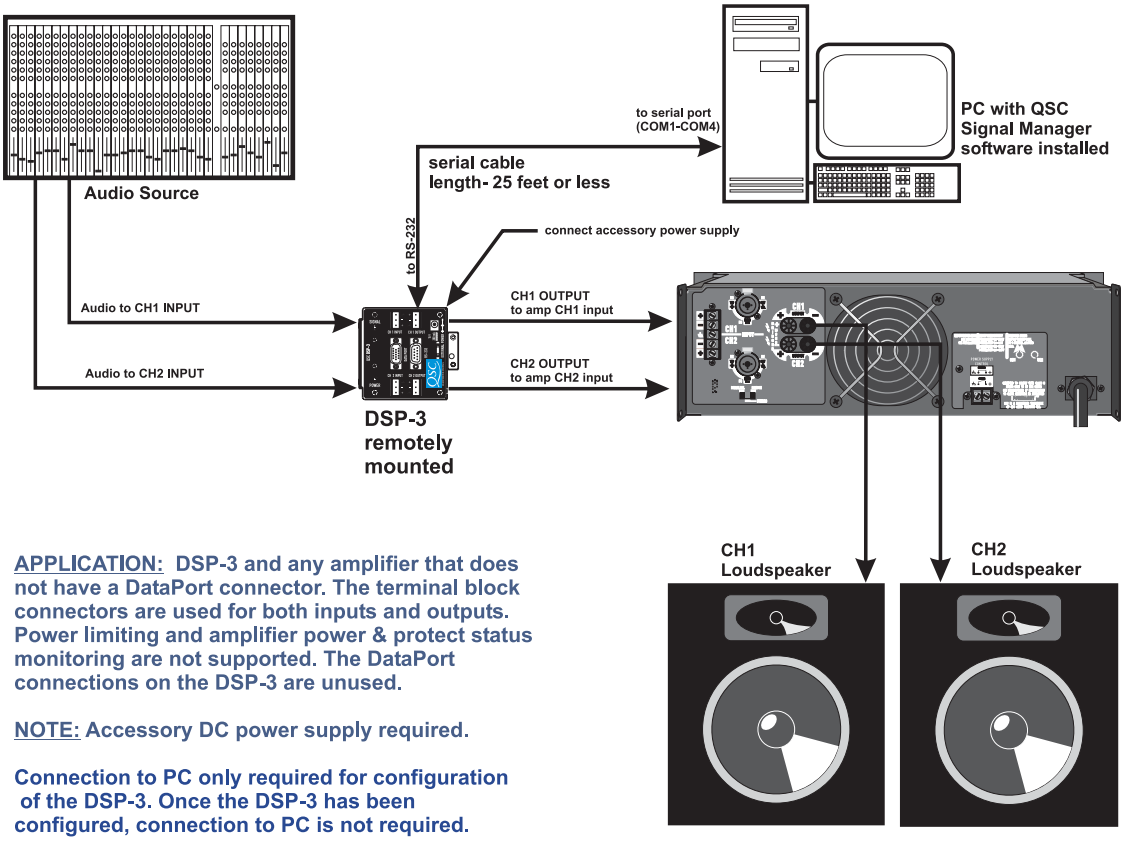
APPLICATION: Networked control of DSP-3 and remote monitoring & control of QSC DataPort equipped amplifiers using CM16a Amplifier Network Monitor.

NOTE: Up to eight 2-channel amplifiers may be connected to a CM16a

NOTE: External accessory power supply may be required on older models, see Appendix for application information.

Section 2: Installation- Application Examples

DSP-3 Remotely Mounted connected to any Non-DataPort Amplifier. Audio Input via Terminal Block Inputs



APPLICATION: DSP-3 and any amplifier that does not have a DataPort connector. The terminal block connectors are used for both inputs and outputs. Power limiting and amplifier power & protect status monitoring are not supported. The DataPort connections on the DSP-3 are unused.

NOTE: Accessory DC power supply required.

Connection to PC only required for configuration of the DSP-3. Once the DSP-3 has been configured, connection to PC is not required.

Section 3: Signal Manager Software- Software Installation

System Requirements- To use QSC Signal Manager, you need the following hardware and software:

- IBM compatible computer, 200 mHz or greater Pentium Processor
- Windows 98/2000 or Windows NT 4.0 with service pack 6a or later
- SVGA display at 800 x 600 minimum resolution, 1024 x 768 recommended
- CD-ROM drive
- 32 MB or more of RAM
- 10 MB of free hard disk space
- An available RS-232 serial communications port (COM port) capable of 38.4k baud
- A male-to-female 9-pin serial cable (to connect the DSP-3 to available COM port)

Software Installation-

1. Insert the CD labeled QSC DSP-3 Signal Manager into your CD drive (typically drive "D:"). If your computer has AUTORUN enabled, the installation utility will start automatically. **If it does not, then proceed to step 2, below. Otherwise, proceed to step 3.**

2. Run D:\Setup.exe (replace "D" with your CD drive's designation if necessary) and follow the instructions displayed.

3. When the installation is complete, you will be presented with a screen that prompts you to view the "Readme" file. Please take time to read this- it contains important information on how to use the software.

4. After installation, you will have an icon on your desk top labeled "Signal Manager". Use this icon to start the application.

Signal Manager.lnk

5. Using the main menu bar at the top of the window, choose the "Help" item and read the software help section. The help system includes the most up-to-date information for "paperless" reference. Also, visit QSC on the internet at http:/www.qscaudio.com for DSP-3 updates.

6. IMPORTANT! The DSP-3 is shipped with all of its presets configured to pass full-range audio signals through both channels. ***THIS MAY NOT BE APPROPRIATE FOR YOUR SETUP! Be sure to configure any necessary crossovers , filters, etc. prior to applying audio signals to the inputs. Damage to equipment may result if these recommendations are not followed.***

OVERALL NOTES AND WARNINGS-

• The last applied configuration that is "running" in the DSP-3 when it is turned off becomes the active configuration again once the power is turned back on to the DSP-3. This ensures that the system "comes up" just as it was left last time it was powered down.

• Do not run your amplifier "wide open" (maximum gain) while making real-time adjustments to the DSP-3's setup. The nature of the communication path between the PC and DSP-3 is inherently more complex than direct physical controls of an equivalent analog processing device. Unpredictable results may occur due to failure of the PC or the communications channel. Under such circumstances, damage to your drivers is possible if the amplifier gain is set for high power levels. Use the minimum useful gain settings while making system adjustments.

Section 3: Specifications

Signal Processing 24 bit, 48 kHz.

Frequency response	20 Hz–10 kHz ±0.3 dB (term. block inputs)
at 3dB below full	20 Hz–20 kHz ±0.7 dB (term. block inputs)
scale input voltage	20 Hz–20 kHz±0.2 dB (DataPort inputs)
Distortion	<0.01% THD+N @ +4 dBu out
Delay (throughput)	687.5 microseconds
Dynamic range	>93 dB unweighted 20 Hz–20 kHz, 1.5V, 4V and 9V sensitivity >88dB unweighted 20 Hz–20kHz, 18V sensitivity
Polarity	In-phase or inverted
Mute	>90 dB attenuation

Inputs

Program inputs	2
Connector type	"Phoenix-style" (a.k.a. "Euro-style") detachable terminal blocks
Type	Electronically balanced
Grounding	All shield terminals connected to chassis
Input sensitivity (full scale input level)	1.5, 4.0, 9.0 or 13.0 Vrms 6, 14.5, 21.5 or 24.5 dBu 3.5, 12.0, 19.0 or 22.2 dBv Units are selectable in software interface
Impedance	8.3 K Ohm balanced 3.7 K Ohm unbalanced
Common-mode rejection	>50 dB, 20 Hz–20 kHz
Crosstalk	>75 dB separation, 20 Hz–20 kHz

Outputs

Program outputs	2 (via HD-15)
Connector type	HD-15 DataPort connection
Pinout	Special, see appendix
Cable type	QSC DataPort cable
Qualified length	2 meters
Daisy-chain output	2 (1 per channel)
Connector	"Phoenix-style" (a.k.a. "Euro-style") detachable terminal blocks
Type	Electronically balanced
Grounding	Shield terminal connected to chassis
Output level (full scale)	6.0 or 4.0 Vrms 18.0 or 14.5 dBu 15.5 or 12.0 dBv
Output impedance	600 Ohms balanced

Power amplifier connectivity

Power amplifier interface

Compatibility	all QSC and non- QSC amplifiers
Full-feature set	all QSC DataPort equipped amplifiers
Connector and cable	HD-15 VGA cable, 2 meters length qualified (for longer runs, contact QSC's Technical Services Department)

Amplifiers	one 2-Ch. amplifier per DSP-3

Amplifier status monitor

Clip indicator	Senses channel clipping
Protect indicator	Senses amplifier protect status

(status monitoring not available for non-DataPort amplifiers)

RS-232 Port

Cable Type	9-pin serial cable, male-to-female
Maximum Length	25 feet (7.6 meters)

Contact closure input (sense)

Inputs	1 discrete input (pin #9 of RS-232 port)
Configuration	Single-ended input
Resistance for closure detect	<150 Ohms
Resistance for open detect	>1.9 K Ohms
TTL Compatible	
Maximum Voltage= +9vdc	

Note: Specifications are subject to change without notice.

Section 3: Specifications

General

Physical

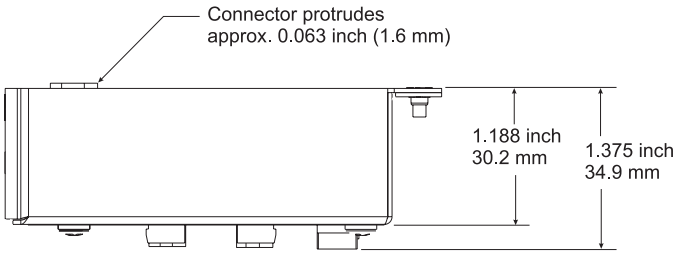
Height	3.50 inches
Width	3.75 inches
Depth	1.38 inches
Weight	0.59 lbs (0.27 kg)
Mounting	Direct mount to amplifier or remote mount
Operating temperature	0 to 50° Celsius

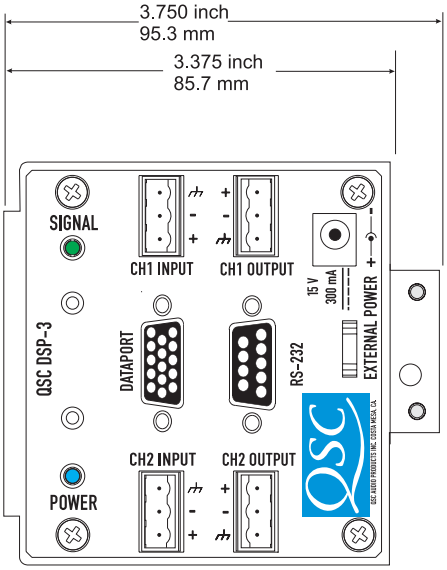
Accessory External Power Supply

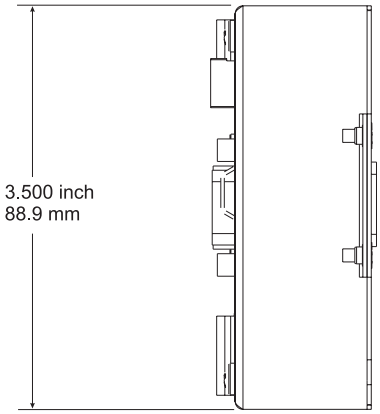
AC Input Voltage	80–240 VAC
AC Input Current	0.3 Amps rms
Frequency	50 to 60 Hz
Output Voltage	15 VDC
Output Current	300 milliamperes
Output Termination	Detachable power cord with 2.5mm barrel-type (coaxial) connector center pin is positive

Note: Specifications are subject to change without notice.

Dimensions







Section 4: Architect's and Engineer's Specifications

The Digital Signal Processor (DSP) shall provide two independent channels of DSP for signal delivery to QSC DataPort equipped power amplifiers. The processing shall be distributed with the DSP module mounted directly to the rear of the power amplifiers.

Output Peak Limiter—For each audio channel, the DSP shall provide a peak limiter that is assignable anywhere in the signal chain and can be switched on or off. The limiter shall provide the following adjustments:

Gain

Threshold

Attack time

Release time

High- and Low-Pass Crossovers—For each channel of audio, the DSP will provide high-pass and low-pass crossovers that are assignable anywhere in the audio chain. The crossovers must be capable of being switched in or out of the signal chain. The DSP shall provide the following crossover responses:

Butterworth (6,12,18,24 dB per octave slope)

Bessel (6,12,18,24 dB per octave slope)

Linkwitz-Riley (12 & 24 dB per octave slope)

High- and Low-Pass Shelf Filters—For each audio channel, the DSP shall provide high-pass and low-pass shelf filters that are assignable anywhere in the audio chain. The shelf filters must be capable of being switched in or out of the signal chain. The DSP shall provide the following shelf filter adjustments:

Variable corner frequency

Variable gain

Variable slope

Compressor-- The DSP shall provide a signal compressor that is assignable anywhere in the signal chain. It shall have adjustable threshold, attack time, release time, and compression ratio.

Contact Closure I/O—The DSP shall provide a trigger input usable for contact-closure (or other) purpose which shall be CMOS & TTL signal compatible.

Power Supply—The DSP shall be provided power through its DataPort connection to QSC amplifiers. For older amplifiers or non-QSC amplifiers, a coaxial power jack will be provided on the DSP for connection to an external power source. Power required shall be +15 VDC at 300 mA (max.).

Amplifier Interface—The DSP shall attach directly to the rear of each power amplifier. The DSP's interface to each power amplifier Data Port shall be via an HD-15 connector. This interface shall transmit two amplifier input audio signals as well as all control and monitoring signals. Special signal conditioning and grounding techniques shall be used in this interface to ensure negligible levels of noise and crosstalk. For non-DataPort amplifiers, there shall be mounting and interface options provided for operating with the DSP.

Amplifier Output Monitoring—When used with QSC DataPort amplifiers, the DSP shall provide clipping and protect status detection at the amplifier's output terminals.

Noise & Tone Generation-- The DSP shall provide pink and white noise generation capability. It shall also provide for tone generation.

Presets— The DSP shall be capable of storing at least 8 preset configurations. The control software shall provide management of these presets.

General—All audio inputs and outputs shall be balanced with a nominal input level of +4 dBu and maximum level of +21 dBu. Input connectors shall be of the "Phoenix" detachable terminal block type.

Control— The DSP shall be configurable via RS-232 or via a networked DataPort connection.

The Digital Signal Processor shall be the QSC DSP-3.

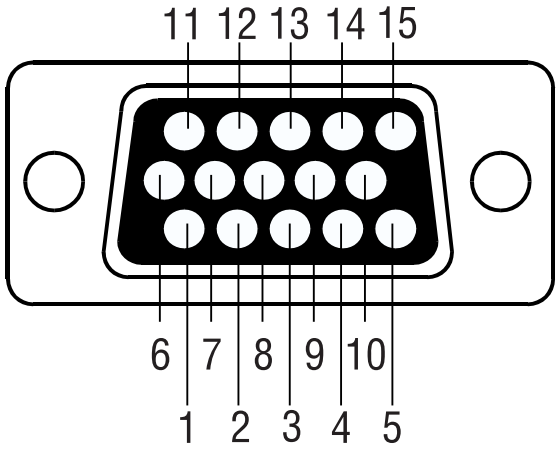
Section 5: Appendix- DataPort Pinout

DATA PORT PINOUT

The diagram below shows the pin assignments used for the HD-15 connectors on the DSP-3 and amplifier.

NOTE!

This information is shown for reference only and is subject to change without notice as the DataPort feature is specific to QSC products and not intended for interface to other manufacturer's equipment.



Pin	Signal Description
1	Ch. 1 Minus (-) Input Signal
2	AC Standby Control
3	V- MON Ch. 1 and Subcode 1
4	I- MON Ch. 1 and Subcode 2
5	Clip/Protect Ch. 1
6	Hard Ground
7	Ch. 1 Plus (+) Input Signal
8	Ch. 2 Plus (+) Input Signal
9	+15V from Amplifier
10	Data Reference Ground
11	Ch. 2 Minus (-) Input Signal
12	Amplifier IDR (Model ID)
13	V- MON Ch. 2 and Subcode 3
14	I- MON Ch. 2 and Subcode 4
15	Clip/Protect Ch. 2

Note: ***Powerlight 6.0*** ***and*** ***Powerlight 9.0*** ***amplifiers require that pin #9 be removed from the remote mounting interconnect cable.***

Amplifier damage may result from use of cable that has pin #9 connections present.

Description of Encode Signals

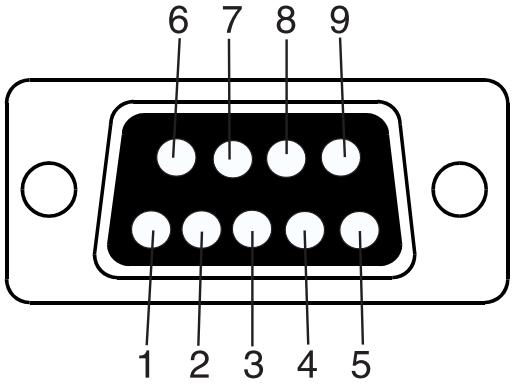
encode 1	Bridge mode & power detect
encode 2	Temperature, channel 1
encode 3	Standby mode detect
encode 4	Temperature, channel 2

Section 5: Appendix- RS-232 Port Pinout & Connector P-N's

RS-232 PINOUT: The diagram below shows the pin assignments for the RS-232 connector on the DSP-3.

Note that Pin #9 is used for Contact Closure function (normally not used in RS-232).

Pin	Signal Description
1	DCD
2	TD
3	RD
4	DTR
5	Signal GND
6	DSR
7	RTS
8	CTS
9	contact closure



TERMINAL BLOCK CONNECTOR PART NUMBER REFERENCE- The following manufacturers and part numbers are provided as a reference to users. The information here is subject to change without the knowledge of QSC.

3 pin without integral strain relief: Phoenix Contact - 17 57 02 2; Riacon - 31249103-6; On Shore Tech - EDZ950/3

3 pin WITH Strain Relief : Phoenix Contact 17 76 16 8

"Phoenix Contact" is the trademark of Phoenix Contact, Inc., Middletown, PA
"Riacon" is the trademark of RIA electronic, Inc., Eatontown, NJ
"On-Shore Technology" is the trademark of On-Shore Technology, Inc., Tempe, AZ
All other trademarks are the property of their respective owners

Section 5: Appendix- Application Information

APPLICATION INFORMATION

As design improvements are continuous, the following information is subject to change. Contact QSC for current information.

QSC's DSP-3 Module has been designed to attach directly to the DataPort connector of QSC's CX, DCA, Powerlight, and Powerlight 2 series amplifiers. When attached to CX, DCA, and Powerlight 2 amps manufactured 08/99 and later, the module receives its power through the DataPort from the amplifier. Modules connected to earlier models of those just mentioned and all Powerlight amplifiers (the "non-2's") require an external DC supply (available from QSC).

TO CLARIFY- CX, DCA, and PL2 amps made prior to August 1999 DO NOT provide adequate power supply voltage to the module, requiring the use of the same type of external DC supply as used with Powerlight amplifiers. The amps in question will have a serial number PRIOR to **0899**XXXXX, where the first four digits of the serial number are the MMYY datecode. Again, the modules WILL work with these amps just fine, but will require the use of our external power supply.

•Full feature set, Direct-mounting, No external power or special interconnect cables required for the following QSC power amplifiers with serial numbers of **0899**XXXXX and later, where the first four digits of the serial number are the MMYY datecode :

CX series: CX302 - CX1202V (all)
DCA series: DCA1222, DCA1622, DCA2422, DCA3022, DCA342
PL2 series: PL224, PL230, PL236, PL218
PL2A series: All

•Remote Mounting Required, QSC DataPort Cable required: Full feature-set, no external power required.

CX series: CX204V, CX254, CX404
DCA series: DCA1644, DCA1824

•Remote Mounting, QSC DataPort Cable and External Power required: Full feature-set.

Powerlight series: PL1.0 through PL4.0 (all)
PL6.0 and PL9.0 require modified DataPort cable between DSP-3 and amplifier.

Powerlight 6.0 and 9.0 MUST have pin #9 removed from the Amplifier-to-DSP DataPort Cable before use!

•Remote Mounting and External Power required. No DataPort Connection possible, Power Limiting not available.

ISA series: The ISA amplifiers have a "V2" DataPort that may be used for audio inputs only.
MX series: **All**
PLX series: **All**
RMX series **All**
USA series: **All**

ALL non-QSC amplifiers are can be used with the DSP-3.

Section 5: Appendix- Preset Operation Notes

SPECIAL INFORMATION CONCERNING SAVED DSP-3 CONFIGURATIONS

The computer which is used to create the DSP-3 signal flow configurations, and subsequently save them to disk, *should* be the same computer used to modify and adjust the DSP-3 settings in the future. Naturally, this might not always be the case. At the least, a copy of the DSP-3 configuration(s) should be saved to floppy disk, so the configuration files can be transferred to whatever computer(s) might be used to adjust or modify the DSP-3 module settings in the future.

The reason:

The Signal Manager software works in conjunction with the DSP-3 module to

create specific signal processing algorithms for filters, delays, limiters, and the like. The algorithms are displayed on the computer screen as "configuration files", with graphical representations of each function and parameters. The user creates a signal chain, "wiring" together blocks of functions as needed for each particular audio channel or channels.

When you build a DSP-3 configuration from scratch, or load one from disk, and perform an "Apply to DSP" operation, the information downloaded into the DSP-3 module is NOT the graphical representation of what is displayed on the screen. The downloaded information consists of the compiled algorithm coefficients of the functions, i.e. "just the math". If building a new configuration from scratch, when you apply it to the DSP-3 you will also be prompted to save it to disk as a Configuration file. The path for this Configuration file is then associated with the compiled information that is applied to the DSP-3. A previously saved (to disk) configuration file may also be applied to the DSP-3, and that particular file path is associated with the algorithms now loaded in the DSP-3.

When you connect a DSP-3 to a computer, the Signal Manager software first attempts to locate and display the configuration file that has been associated with the algorithm coefficients currently running in the DSP-3, to correlate "what you hear" with "what you see". This would allow you to further adjust a delay or a filter parameter, for instance. If the correct file is located, based on the associated path name, the graphical configuration is displayed. If the file is not found (the file has been renamed, moved, deleted, or you are not using the same computer on which the DSP-3 was originally configured) the computer will display a message asking if you would like to load the Default configuration.

Answering YES will load the Default (factory) configuration TO THE SCREEN, but will not apply it to the DSP-3. Answering NO will merely display a blank workspace to the screen with no configuration loaded. At this point, what is displayed is NOT what is currently running in the DSP-3 memory.

IF YOU PERFORM AN "APPLY TO DSP" NOW YOU WILL OVERWRITE WHATEVER IS CURRENTLY RUNNING IN THE DSP-3! This is likely NOT what you want to do. Instead, locate the desired configuration file (from an alternate path or from floppy) using the Configuration->Open menu (Ctrl-O).

When the proper configuration file is displayed on the screen, go to the *Configuration->Edit* menu (Ctrl-E), followed by an *Apply to DSP* command (Ctrl-D). This will download the currently displayed configuration back into the DSP-3 (overwriting itself), allowing synchronization of what is displayed with what is running in the DSP-3. At this point, you may adjust parameters or modify settings as usual.

QSC engineers are currently developing an improvement to this process, in which the computer would always be capable of displaying the currently running configuration, regardless of the location of the configuration file (or lack of the file).

Section 6: Maintenance, Warranty & QSC Contact Information

Cleaning

The faceplate and chassis can be cleaned with a soft cloth and nonabrasive, mild cleaning solution. Products like Simple Green and Windex work well. Do not use powders or scrubbing pads of any type as they are usually abrasive and will permanently damage the finish of your DSP-3. Dampen a soft, lint-free cloth with the cleaning solution and wipe the DSP-3 down gently. Insure that cleaning solution does not get down into the connectors. Do not spray the solution directly onto the DSP-3 as it will penetrate into the connectors.

User Maintenance

There is no user-level maintenance on the DSP-3. Contact QSC's Technical Services Department if service is required.

Warranty Information

If the DSP-3 isn't working properly, please verify that a known good 9-pin serial cable is used between the DSP-3 and the computer. If proper operation can not be restored, the DSP-3 may require service. This must be performed by qualified service personnel. To obtain the location of you nearest QSC Authorized Service Center, please contact you QSC dealer or contact QSC's Technical Services Department.

Disclaimer

QSC Audio Products, Inc. is not liable for any damage to speakers, amplifiers, or any other equipment that is caused by negligence or improper installation and/or use of the DSP-3 digital signal processor. Due to the inherent complexity of the communications between the DSP-3 and the host computer, QSC Audio Products, Inc. is not liable for any direct or indirect damage caused by computer communications failure.

Product Warranty

QSC Audio Products, Inc. ("QSC") guarantees its products to be free from defective material and / or workmanship for a period of three (3) years from date of sale, and will replace defective parts and repair malfunctioning products under this warranty when the defect occurs under normal installation and use - provided the unit is returned to our factory or one of our authorized service stations via pre-paid transportation with a copy of proof of purchase (i.e., sales receipt). This warranty provides that the examination of the return product must indicate, in our judgment, a manufacturing defect. This warranty does not extend to any product which has been subjected to misuse, neglect, accident, improper installation, or where the date code has been removed or defaced. QSC shall not be liable for incidental and/or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This limited warranty is freely transferable during the term of the warranty period.

WORLD WIDE WEB:

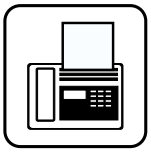
http://www.qscaudio.com

TELEPHONE NUMBERS:

Main Number (714) 754-6175

Sales Direct Line (714) 957-7100
or (800) 854-4079 toll free (U.S.A. only)

Technical Services (714) 957-7150
or (800) 772-2834 toll free (U.S.A. only)



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