



DSP7000

Family Operating Manual

(covering the DSP7000[™] and DSP7500[™] and
featuring the DSP4000B+[™])

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IMPORTANT SAFETY INFORMATION

- ❑ Before powering up the unit, check that the voltage selector on the back panel is set correctly.
- ❑ Do not remove any covers or panels from the unit when the power is connected.
- ❑ No operator access to the internals of the unit is permitted - servicing must be performed by qualified personnel only.
- ❑ The unit must **not** be operated with a damaged or ungrounded power cord.
- ❑ Suitable ventilation must be provided for the unit at all times. In particular, the rear and side vents must **not** be obstructed.

HOW TO USE THIS MANUAL – READ THIS FIRST

This manual covers the DSP7000 family, which currently includes the DSP7000 and DSP7500, as well as the DSP4000B+. In the text, all of these models will be referred to jointly as DSP7000. Any aspects which do not refer to all members of the family will be made clear in the text. Any references specific to the DSP7000 also apply to the DSP4000B+.

Each model in the family has a different set of Factory Presets – a list of these for the relevant machine will be found in the Manual's binder.

The first and second chapters of this manual are the most important ones. The first is the **Overview and Quickstart** chapter. In it you will find essential information regarding the front panel, the back panel, and the general structure of the DSP7000. After these preliminaries are out of the way, you'll start using the DSP7000 and learning the basic methodologies that you will employ whenever you use the DSP7000.

The **Overview and Quickstart** chapter is not meant to be complete. It's meant to get you up and running fast, circumventing thornier issues in favor of speed. If you would like to know more about a particular topic discussed in this chapter, look to the abundant references contained therein. They'll point you to "chunkier" discussions in the remainder of the manual.

Ideally, we would have you read through the **Overview and Quickstart** guide with the DSP7000 in front of you, following the examples. After you finish the **Quickstart** guide, we'd have you play with the DSP7000 for awhile. Once the initial "new box euphoria" wore off a bit, we'd have you sit down and read the **Operation** chapter. A true appreciation and mastery of the DSP7000 cannot be obtained without reading the manual! We'd have you consult the appendices only when you need specific, technical information. Finally, when you need to find information days, weeks, months, and years down the road, we'd have you use the comprehensive **Table of Contents** and **Index**.

The *DSP7000* Family Operating Manual

OVERVIEW AND QUICKSTART

THE BIG PICTURE

The members of the Eventide DSP7000 family are programmable, multipurpose, 24-bit/96kHz digital audio signal processors with UltraShifter™ capability and are the stereo, single-processor companion product range to the Eventide's Orville. That's a lot of adjectives! They are the successors to a long, proud line of digital signal processors that stretches back to a time when most audio manufacturers didn't know digital audio from Morse code.

We've loaded the DSP7000 with features that put it in a class by itself. The variety and depth of its programs are truly amazing, from lush reverbs, to choruses, to flanges, to delays, to pitch shifters, to dynamics, to EQs, to filters, to distortions, to synthesizers, to samplers, to ring modulators, and to everything in-between. The DSP7000 can do it all. And if that's not enough, the DSP7500 boasts nearly three minutes of sample time *in addition* to the 40 seconds of delay time!

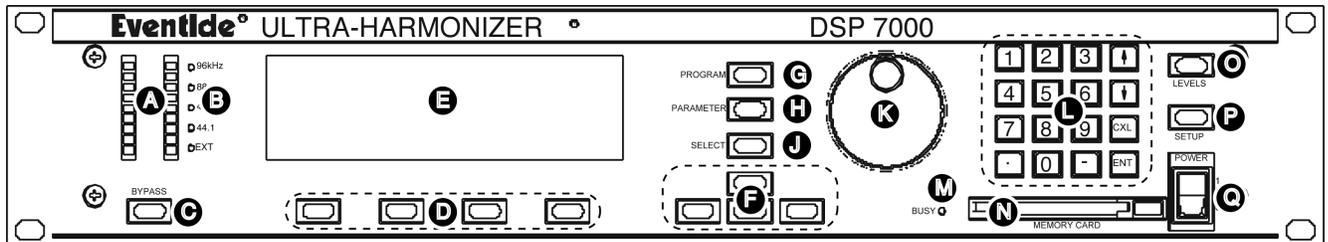
And for the user who is interested in making his or her *own* programs (if the huge number of factory programs aren't enough!), the DSP7000 family continues the "modular programming paradigm" that made the DSP4000 famous. Programs are composed of individual building blocks, or "modules," that allow the user to create original programs. Inspiration and creativity are given no bounds. . .

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KNOBS, KEYS, AND JACKS

If this is your first time learning the DSP7000, don't be put off by some of the rather in-depth descriptions that will follow; they exist for your future reference (*once you understand the DSP7000 and need a quick bit of information*). For now, concentrate on what the various knobs and jacks are *called*. Their use will be explained progressively throughout the rest of this manual.

The Front Panel



A) Level Meters

These measure the signals at the analog inputs, the digital inputs, the input and output of the processor, the analog outputs, and the digital outputs. The highest LED indicates a clipped signal, and every LED below that falls off at -3dB per decrement, with the exception of the bottom one, which indicates the presence of any signal.

→ See *The Level Meters* on page 27.

B) System sampling rate and external sync indicator.

The top four LEDs display the system sampling rate of the DSP7000: 96 kHz, 88.2 kHz, 48 kHz, or 44.1 kHz. When solidly lit, they indicate that the system sampling rate is exact ($\pm 0.05\%$). When blinking, they indicate that the system sampling rate is between one of the fixed rates (*the LED corresponding to the nearest sampling rate blinks*). The bottom LED, EXT, reflects the current external sync status (*it blinks if there's a problem*).

→ See *Understanding The "System Sampling Rate And External Sync Indicator" When Using The Internal Clock* on page 32.

→ See *Understanding The "System Sampling Rate And External Sync Indicator" When Using The External Clock* on page 34.

C) BYPASS

Press this key to bypass or, depending on how you have your DSP7000 set up, mute the machine.

→ See *Bypassing and Muting* on page 35.

D) SOFT KEYS

These four keys select the menus or events described on the bottom line of the display.

→ See *Understanding the Display and SOFT KEYS* on page 13.

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E) The display

The display tells you what's going on. The top line displays the currently running program and the display area you're working in. The bottom line is dedicated to the four SOFT KEYS directly below the display. The middle section of the display changes depending on what you're doing!

M-I-D-E Solo		pitches		
pitch1:	10 cnts	pitch5:	6 cnts	
pitch2:	-10 cnts	pitch6:	-6 cnts	
pitch3:	-8 cnts	pitch7:	-4 cnts	
pitch4:	8 cnts	pitch8:	4 cnts	
← pitches		delays	levels	→ pans

→ See *Understanding the Display and SOFT KEYS* on page 13.

F) CURSOR keys

Press these keys to move the cursor on the display.

→ See *Using the Cursor Keys, the SELECT Key, the NUMERIC KEYPAD, and the KNOB* on page 15.

G) PROGRAM

Press this key briefly to access program functions such as loading, saving, deleting, etc.

→ See *Program Load, Save, Delete, Etc.* on page 53.

Press and hold this key for one second to access the Setup Storage area where "setup configurations" are loaded and saved.

→ See *Storing and Loading Setups* on page 62.

H) PARAMETER

Press this key briefly to access parameters for the program that is running.

Press and hold this key for one second to access the Patch Editor.

→ See the separate Programmer's Manual for Patch Editor information.

J) SELECT

Press this key briefly to select something highlighted by the cursor.

Press and hold this key for one second to set up a remote control for whatever parameter is highlighted on the display.

→ See *Remote Controlling Parameters* on page 50.

→ To change the "one second hold time," alter the "key hold" parameter on the [misc] menu page in the SETUP area (you may have to press the SETUP key several times to find it).

K) The KNOB

Spin the KNOB to change the value of whatever parameter is highlighted.

→ See *Using the Cursor Keys, the SELECT Key, the NUMERIC KEYPAD, and the KNOB* on page 15.

L) The NUMERIC KEYPAD

Use the numbers, decimal point, and minus sign to enter numeric values or to enter numeric text in a text field. Use the CXL key to "cancel" the last entered digit (*like a backspace key on a computer*). Use the INC/DEC keys to increment or decrement a parameter's value. Use the ENT key after you've entered a numeric value.

→ See *Using the Cursor Keys, the SELECT Key, the NUMERIC KEYPAD, and the KNOB* on page 15.

M) BUSY LED

If a Memory Card is in place, this LED illuminates when data is being written to the card. Don't remove the Memory Card if this LED is lit! If no Memory Card is in place, this illuminates when data is present at the MIDI In port or at the serial port. Use the latter feature to troubleshoot communication problems between the DSP7000 and the rest of the world.

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N) Memory Card slot

Insert a Memory Card here to add new programs or to save your own. Press the release to the right of the slot to remove the card (*but not when the busy LED is lit*).

→ See *Memory Cards* on page 25.

O) LEVELS

Pressing this key accesses menus for metering and levels.

→ See *Controlling Levels* on page 27.

P) SETUP

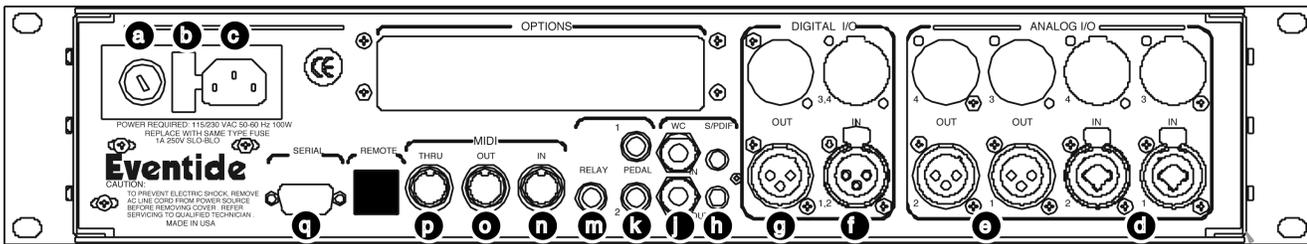
Pressing this key accesses menus for digital configuration, MIDI configuration, service utilities, data dump utilities, and program advance options.

Q) POWER

Flip this switch to bring the DSP7000 to life! When the power is off the unit is bypassed, i.e., each audio input is connected to its corresponding audio output.

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The Back Panel



a) AC Voltage Selector

Line up the dot with the triangle so that your preferred voltage is *up*. It is **absolutely essential** that you select the voltage corresponding to your local AC power!

b) Fuse Holder

A 1-Amp Slow Blow fuse. Always replace it with the correct value.

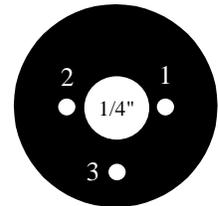
c) AC Port

Connect an IEC standard 3-prong AC power cord here. The center post is chassis ground.

d) Analog Audio Inputs

The DSP7000's analog inputs accept either unbalanced 1/4" connectors or balanced XLR connectors. The DSP7000's XLR input connectors are female. Pin #1 is ground. Pin #2 is +phase (hot) and Pin #3 is -phase.

To "unbalance" the XLR jack, use both pins #1 **and** #3 as ground and use Pin #2 as "hot." ***If either pins #2 or #3 are unconnected, you will get more noise and hum than signal!***

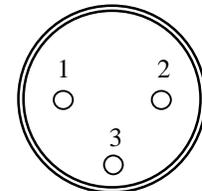


These may be used as both line and guitar inputs, depending on the input level setting.

e) Analog Audio Outputs

The DSP7000's XLR analog audio output jacks are male. Pin #1 is ground. Pin #2 is +phase (hot) and Pin #3 is -phase.

To "unbalance" the jack, use pins #1 **and** #3 as ground and use Pin #2 as "hot." ***If either pins #2 or #3 are unconnected, you will get more distortion than signal!***



→ See *Controlling the Level of the Analog and Digital Inputs* on page 28.

Do not connect these outputs to a phantom powered microphone input –damage may be caused to either the 7000 or to the phantom power supply. The peak output level from the DSP7000 will probably be too high for a low-level microphone input.

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AES/EBU Digital Audio Input/Output (Professional)

Use these connectors to connect professional digital audio gear to the DSP7000. These cables are differential with a shielded twisted pair. Eventide recommends the use of purpose-manufactured Digital Audio cables, which have low capacitance and a controlled impedance, for carrying AES signals.

Ordinary microphone cables will usually work at 48kHz, but are likely to reduce range and add jitter and possible distortion to the signal. It is unlikely that microphone cable will prove satisfactory for 96kHz operation.

f) AES/EBU input jack

If the parameter DIG IN on the **audio** menu page in the SETUP area is set to AES/EBU, then digital inputs are accepted at this jack.

20>20 Audio Sweep	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: AES/EBU	bypass: relay
◀ audio	service midi mod con ▶

g) AES/EBU output jack

If the parameter DIG OUT on the **audio** menu page in the SETUP area is set to AES/EBU, then both the AES/EBU and S/P DIF outputs will use the “professional” digital format.

20>20 Audio Sweep	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: S/P DIF	dstatus: unlocked
DIG OUT: AES/EBU	bypass: relay
◀ audio	service midi mod con ▶

S/P DIF Digital Audio Input/Output (Consumer)

S/P DIF is a consumer digital audio standard, with two audio channels encoded into a single connector. Use these connectors to hook up the DSP7000 to CD players, DAT recorders, and other audio gear using this format. The connectors are two-conductor RCA jacks. Your plug should have the shield connected to the sleeve with the single shielded conductor connected at the tip.

Eventide recommends the use of professional quality cables made of RG-59/U coaxial cable. Ordinary “hi-fi” type leads will probably prove inadequate, especially at the higher sample rates.

h) S/P DIF input/output jacks

If the parameter DIG IN on the **audio** menu page in the SETUP area is set to S/P DIF, then digital inputs are accepted at the S/P DIF input jack. If the parameter DIG OUT on the **audio** menu page in the SETUP area is set to S/P DIF, then both the AES/EBU and S/P DIF outputs will use the “consumer” digital format.

→ See *S/P DIF & AES/EBU* on page 30.

20>20 Audio Sweep	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: S/P DIF	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
◀ audio	service midi mod con ▶

j) WordClock In and Out

Use these jacks to sync the DSP7000 to wordclock or to output wordclock. → See *Using an External Clock* on page 33.

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k) Foot Pedal jacks 1 and 2

Stereo 1/4" connectors. The sleeve is ground reference, the ring is +5 volts (source), and the tip is an analog signal from 0 to 5 volts. Connect either foot switches, foot pedals, or control voltage sources to these inputs to modulate parameters or to trigger events (including remote program loads).

→ See *Foot Pedals 1 and 2* on page 36.

m) Relay Jack

Two relays are connected to this Stereo 1/4" connector. They can be controlled from suitable programs, allowing the DSP7000 to drive real-world equipment, and can switch up to 1.0A at 30V dc. Relay #1 is connected between ring and sleeve, while Relay # 2 is connected between ring and tip. All of these connections are electrically isolated from the DSP7000. See the separate Programming Manual for information on controlling the relays.

MIDI is used for instrument to instrument digital communications. The DSP7000 sends and receives Eventide system exclusive messages that allow a MIDI sequencer to remote control the DSP7000, among other things. In addition, the DSP7000 may respond to standard MIDI messages and may output standard MIDI messages. The DSP7000 has three MIDI ports:

n) In

The DSP7000 accepts (and processes) MIDI messages received at the MIDI In port. The connector is "7 pin" and can provide power to a suitable pedal board, provided you supply power at the "Remote Power In" socket described below. It can also send MIDI messages from this connector to a suitably equipped system. This means, for example, that a pedal board can be connected to the DSP7000 by means of a single cable that supplies power as well as a communication path. A normal "5 pin" MIDI cable can be used as a standard MIDI input.

o) Out

The DSP7000 sends MIDI messages to other devices via the Out port. *MIDI messages are also sent out the serial port if they are "enabled."*

p) Thru

Any MIDI information received at the MIDI In port is echoed directly to the MIDI Thru port regardless of the DSP7000's configuration (*as long as the DSP7000 is powered up*).

With the Memory Card removed, the BUSY LED on the front panel illuminates whenever a MIDI message is received at the MIDI In port. Note: If the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port not receiving the command to be ignored until the command is complete.

→ See *MIDI Setup* on page 37.

q) Serial Port

An IBM PC type RS232 connector that looks like a modem or printer to a connected computer. Connect a "9 pin" serial cable to this port to transfer information to and from a personal computer (do not use the "null modem" type of cable designed for file transfer between two computers - it will not work). *With the Memory Card removed, the BUSY LED on the front panel illuminates whenever a message is received at the serial port. Note: If the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port not receiving the command to be ignored until the command is complete.*

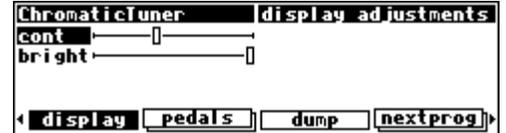
→ See *Setting Up the Serial Port* on page 64.

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GETTING AROUND AND ALTERING PARAMETERS

Adjusting the Brightness and Contrast of the Display

Before we begin to describe the DSP7000's interface, we ought to make sure you can see the display! Adjust the contrast of the display by pressing the SETUP key, then the SETUP key again, and then the leftmost SOFT KEY. Turn the KNOB to adjust contrast or press the DOWN CURSOR key and turn the KNOB to adjust brightness.



The "Areas" of the DSP7000

The DSP7000's interface is divided into several functional "areas." You access each area by pressing its key. You'll know which area you're in because the LED next to its key will be illuminated. The areas are:

PROGRAM

Press the PROGRAM key to access this area. Inside you'll find utilities for loading programs, saving programs, deleting programs, comparing a tweaked program with the saved version, and creating banks ("manila folders" for organizing programs). Press the PROGRAM key to access additional SOFT KEYS.

→ See *Program Load, Save, Delete, Etc.* on page 53.



SETUP Storage

Press and hold down the PROGRAM key for one second to access this area. The LED next to the PROGRAM key blinks. Inside you'll find utilities for loading, saving, or deleting "setups."

→ See *Storing and Loading Setups* on page 62.

→ To change the "hold time," see *Miscellaneous Setup Options* on page 63.



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PARAMETER

Press the PARAMETER key to access this area. Here you'll find the parameters for the currently loaded programs. Continue pressing the PARAMETER key to access additional SOFT KEYS (if available).

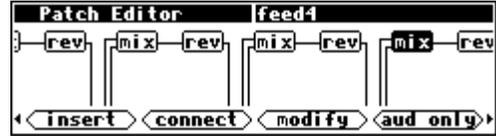
→ See *Parameters* on page 60.



The PARAMETER key also gives access to the built-in Patch Editor. Press and hold down the PARAMETER key for one second to access this area. The LED next to the PARAMETER key blinks. The Patch Editor allows you to create your own effects from scratch or to customize programs that already exist.

→ See the separate Programmer's Manual for more information on the Patch Editor.

→ To change the "hold time," see *Miscellaneous Setup Options* on page 63.



LEVELS

Press the LEVELS key to access this area. Inside you'll find level and Level Meter parameters.

→ See *Controlling Levels* on page 27.

Backward Garden 3	Main Levels
OUT 1 Wet/Dry 100%	analog 1: 0.0 dB
OUT 2 Wet/Dry 100%	analog 2: 0.0 dB
OUT 1 Level 0.0dB	digital 1: 0.0 dB
OUT 2 Level 0.0dB	digital 2: 0.0 dB
main	meter
inputs	

SETUP

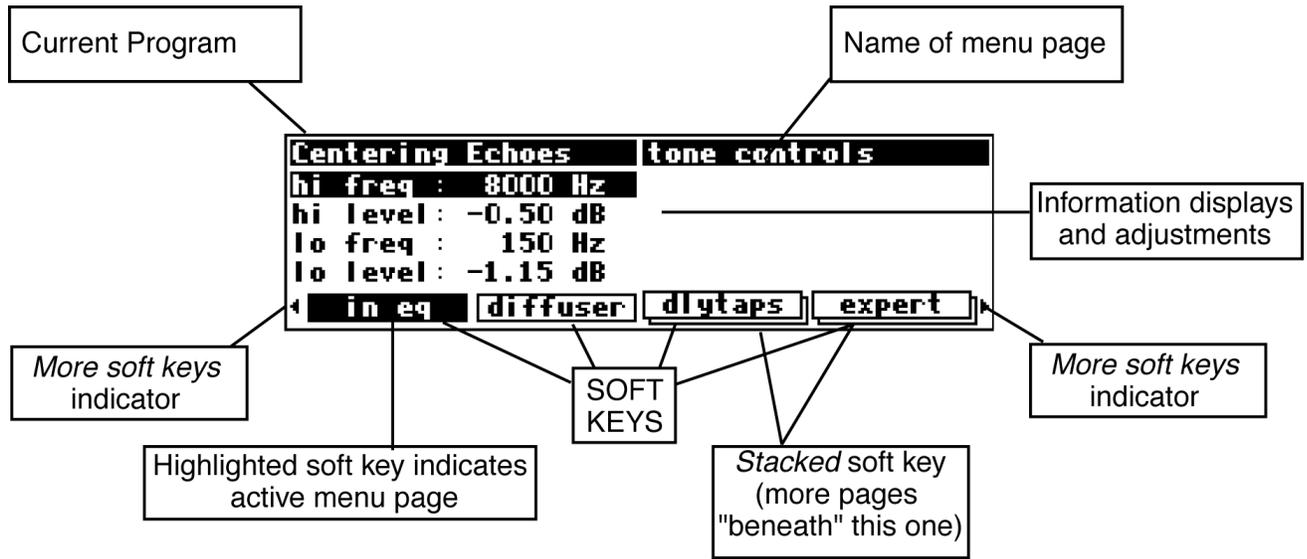
Press the SETUP key to access this global, "catch-all" area. Inside you'll find digital setup controls, global MIDI setup, global "external" setup, display contrast/brightness, the pedal jacks' setup, dump data utilities, next/previous program advance, and miscellaneous service utilities. Press the SETUP key more than once to access additional SOFT KEYS.

Backward Garden 3	audio configuration
Source: internal	Speed: normal
Sample rate: 44.1kHz (actual: 44100)	
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: AES/EBU	bypass: relay
audio	service
midi	mod con

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Understanding the Display and SOFT KEYS

Every “area” in the DSP7000 makes use of the display, so understanding the display is critical. A generic screen of the sort typically found in the PARAMETER area is shown below. It exemplifies various aspects of the display that remain constant no matter what area of the DSP7000 you’re in.



The upper left-hand corner of the display always shows the name of the program currently running. In the example shown above, we’re running the program “Centering Echoes.” The upper right-hand corner of the display always describes the menu page you’re looking at. In the example shown above, we’re looking at the “tone controls” menu page.

Situated along the bottom of the display are the so-called “SOFT KEYS.” The four physical keys located below the display select menu pages or events corresponding to these SOFT KEYS. (They’re called “soft” because their function changes depending on context.) The “More soft keys” indicators are the little arrows next to the SOFT KEYS shown above. They indicate that if you press the “area” key you used to access the current display *again*, you will access *more* SOFT KEYS. The arrows are meant to imply that more pages exist in a nether-world beyond the display. . .

For example, press the SETUP key to see the “More soft keys” indicators.



Press the SETUP key again to get more SOFT KEYS.



Press the SETUP key twice more to return to the original set of SOFT KEYS.

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A “Stacked” SOFT KEY (such as pedals in the screen above) indicates that if you repeatedly press the “stacked” SOFT KEY, you will access more menus. The graphic is meant to imply that there are more pages lying “below” the “top” one.

For example, press the SETUP key. Press the stacked SOFT KEY `mi di`.



Press it again to get a second menu page.



Press it again to get a third menu page.



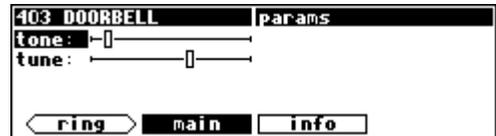
Press it twice more to return to the original menu page.

Pressing a SOFT KEY repeatedly that is *not* stacked puts the DSP7000 into “self-destruct” mode. Just kidding. It has no effect.

When you press a SOFT KEY, it becomes highlighted. The middle section of the screen is a menu page corresponding to that highlighted SOFT KEY. Use the cursor keys to “move around” on the menu page. Use the KNOB, the NUMERIC KEYPAD, and the SELECT key to change and enter values.

→ See *Using the Cursor Keys, the SELECT Key, the NUMERIC KEYPAD, and the KNOB* on page 15.

Before moving on, we ought to say that not all SOFT KEYS are menu pages. Some SOFT KEYS are “triggers.” A “trigger” is a key that *triggers* an event, get it? You’ll always know the difference between menu page SOFT KEYS and trigger SOFT KEYS because *menu* page SOFT KEYS are rectangular, whereas *trigger* SOFT KEYS are hexagonal. On this screen `mai n` and `i nfo` are menu pages, and `<ring>` is a trigger.



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Using the Cursor Keys, the SELECT Key, the NUMERIC KEYPAD, and the KNOB

We use the CURSOR keys, the KNOB, the SELECT key, and the NUMERIC KEYPAD to navigate and manipulate the menu pages found in the PARAMETER, Patch Editor, LEVELS, and SETUP areas. We'll discuss their use in the PROGRAM and SETUP Storage areas in a bit.

Use of the cursor keys is straightforward. The LEFT and RIGHT CURSOR keys move the cursor left and right, respectively. If you move the cursor "past the edge of the screen," it will "wrap" around to the other side. The UP and DOWN CURSOR keys move the cursor up and down, respectively. Again, the top and bottom "wrap" around.

Use the KNOB, NUMERIC KEYPAD, or the INC/DEC keys to alter the value of a numeric parameter. For example, spin the KNOB on this screen to change the value of *Mix* or enter a new value directly with the NUMERIC KEYPAD (pressing ENT when you're done).

Stereoi zingPhaser		Phaser Params	
Mix :	50 %	Shape:	Triangle
Rate :	0.40 Hz		
Depth :	80 %		
Fback :	40 %		
Phase		Info	

To get to a screen like this one, first press the PROGRAM key. Scroll through the banks (using the LEFT or RIGHT CURSOR keys and the KNOB) to "PHASERS." Scroll through the programs in that bank to "Stereoi zingPhaser." Load it and press the PARAMETER key.

Use the KNOB or the INC/DEC keys to alter the value of a text parameter. For example, spin the KNOB or press the INC key to change *Shape* from *Sine* to *Triangle* on this screen.

Stereoi zingPhaser		Phaser Params	
Mix :	50 %	Shape:	Sine
Rate :	0.40 Hz		
Depth :	80 %		
Fback :	40 %		
Phase		Info	

Numeric parameters and text parameters cover 99% of the parameters you'll see in the DSP7000, but there are a few more esoteric parameters you'll encounter. One such oddball is the "trigger" parameter. "Triggers" trigger things to happen. You place the cursor over a trigger parameter, and trigger it by pressing SELECT. Other oddballs include "Taps" and "Graphics."

Enoesque 1		pitch parameters	
shift:	-12 cents	<input checked="" type="checkbox"/>	Hair Trigger
delay:	100.00 ms		
feedback:	20 %		
pitch mix:	40 %		
pitch		reverb expert chorus	

→ See *Taps* on page 60.

→ See *Graphics and Curves* on page 61.

Ganged Parameters

In some cases there are multiple, related parameters that are usually adjusted together. To make such "mass adjustments" easy, a feature exists that *gangs* parameters together. The main menu page in the LEVELS area contains a good example of ganged parameters. The purpose of this menu page is to assign signal levels and wet/dry ratios. Such assignments are typically made in stereo gangs. So, both parameters are initially ganged together. Spin the KNOB and both values change.

White Noise		Main Levels	
OUT 1 Wet/Dry	100%	analog 1:	0.0 dB
OUT 2 Wet/Dry	100%	analog 2:	0.0 dB
OUT 1 Level	0.0dB	digital 1:	0.0 dB
OUT 2 Level	0.0dB	digital 2:	0.0 dB
main		meter inputs	

Now, let's say you only want to change OUT 1. Press the DOWN CURSOR key to "ungang" the pair. Now spin the KNOB; only the value for OUT 1 changes.

White Noise		Main Levels	
OUT 1 Wet/Dry	88%	analog 1:	0.0 dB
OUT 2 Wet/Dry	100%	analog 2:	0.0 dB
OUT 1 Level	0.0dB	digital 1:	0.0 dB
OUT 2 Level	0.0dB	digital 2:	0.0 dB
main		meter inputs	

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Pressing the DOWN CURSOR key again allows you to adjust OUT 2, while pressing the UP CURSOR key re-gangs the parameters. Gangs are much easier to use than to describe, so take a minute and play with the gangs on this menu page. You will find gangs sprinkled liberally throughout the DSP7000 as their presence facilitates many tasks.

Using the Cursor Keys and the KNOB in the PROGRAM Area

Now, let's investigate the use of the cursor keys and the KNOB in the PROGRAM area (*they work just the same in the Setup Storage area*). Things are only a little bit different here than in the other areas. The box on the display with the word "banks" in it is called the "bank field." The box below the banks field with the word "programs" in it is called the "programs field." In the PROGRAM area, the UP and DOWN CURSOR keys scroll through programs and the KNOB scrolls through banks when the cursor is in the "bank field" (banks are "manila folders" for programs. *See Banks on page 53*). The SELECT key, the <load> SOFT KEY, and the ENT key all load the program shown in the display with the triangle next to its number (*you may need to press the PROGRAM key again to find the <load> SOFT KEY*). For example:

Evil Distortion		program
banks	5	Delays (17)
programs	▶ 10	2 Delays f
	11	4 Bpndelays f
	12	4 Delays f
◀ load		save update delete ▶

Press either the LEFT CURSOR key when the cursor is in the programs field (as on the above screen) to position the cursor over the bank field (as shown to the right).

Evil Distortion		program
banks	5	Delays (17)
programs	▶ 10	2 Delays f
	11	4 Bpndelays f
	12	4 Delays f
◀ load		save update delete ▶

With the cursor in the bank field, spin the KNOB to scroll through banks.

Evil Distortion		program
banks	10	Film Atmospheres (3)
programs	▶ 10	BeyondTheStars f
	11	Singularity f
	12	Stratospherics f
◀ load		save update delete ▶

Press the UP or DOWN CURSOR key to scroll through programs. Spinning the KNOB also scrolls through programs, provided the cursor is in the "programs field."

Evil Distortion		program
banks	10	Film Atmospheres (3)
programs	▶ 10	BeyondTheStars f
	11	Singularity f
	12	Stratospherics f
◀ load		save update delete ▶

Press the SELECT key, the <load> SOFT KEY, or the ENT key on the numeric keypad to load the program shown in the display with a triangle next to its number. On the screen to the right, "Si ngul ari ty" has the triangle next to its number.

Evil Distortion		program
banks	10	Film Atmospheres (3)
programs	▶ 10	BeyondTheStars f
	11	Singularity f
	12	Stratospherics f
◀ load		save update delete ▶

Pressing SELECT, <load> SOFT KEY, or ENT would load it and result in this screen. Notice that the upper left-hand corner of the display reflects the fact that "Si ngul ari ty" is now the currently running program.

Singularity		program
banks	10	Film Atmospheres (3)
programs	▶ 10	BeyondTheStars f
	11	Singularity f
	12	Stratospherics f
◀ load		save update delete ▶

The moral of the story? Use the LEFT CURSOR key to position the cursor in the "banks field," then use the KNOB to scroll to the bank from which you want to load a program. Then use the UP and DOWN CURSOR keys to scroll through programs to the particular program you want to load. When you get there, press the SELECT key, the <load> SOFT KEY, or the ENT key.

→ To learn how to remotely load programs, read *Loading a Program Remotely* on page 55.

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Entering or Changing Text

In some menus, it will be necessary to enter or change text. For example, you will often change text when saving a new program. The method by which this is done is straightforward, albeit a bit tedious. *To play along go to the PROGRAM area and press the <save> SOFT KEY. (You may have to press the PROGRAM key a second time to see it.) Press the UP CURSOR key twice, so that the box next to "name" is highlighted and press the SELECT key. To escape from this "pop-up" menu, highlight the "cancel" box and press the SELECT key.*

Here's how it works: Select the item that has the text you want to add or change (with the cursor keys) and press the SELECT key. Now the LEFT and RIGHT CURSOR keys move you through the text string and the CXL key acts as a backspace key, deleting characters as it moves back. Turn the KNOB to scroll through alphanumeric characters. When you arrive at the character you want, stop scrolling and move the cursor past that character. Begin scrolling again for the next character. When you are finished entering your text, press the SELECT key or the ENT key to make it "stick." The list of alphanumeric characters in order is:



;/?><,;`~|_ = + - } { [[') (* & ^ % \$ # @ ! z y x w v u t s r q p o n m l k j i h g f e d c b a space
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9 . - %

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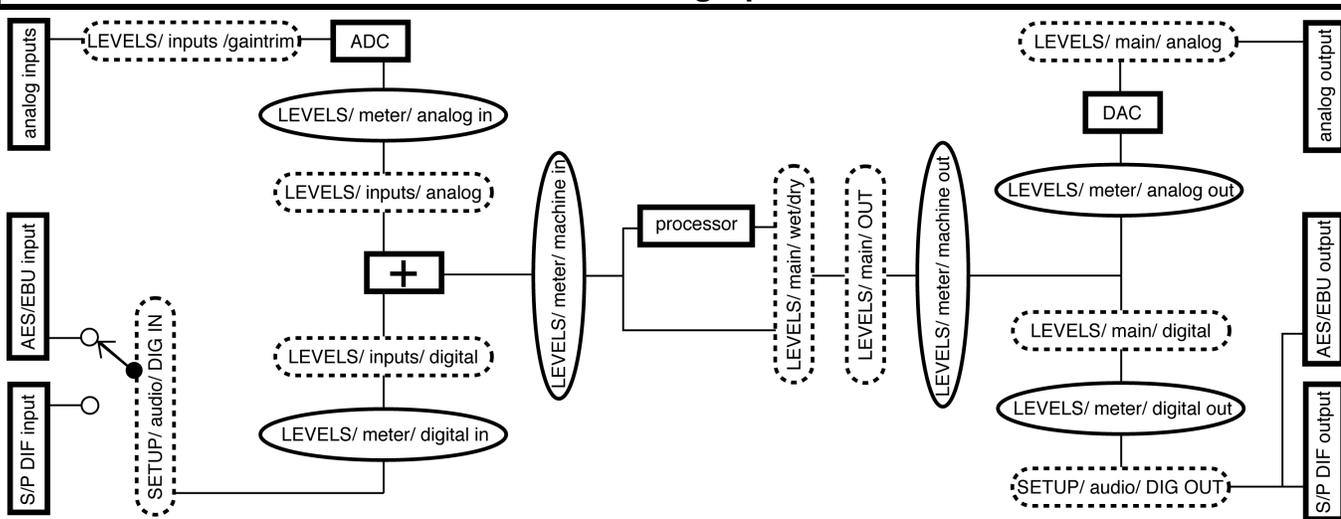
QUICKSTART OR “NEARLY INSTANT GRATIFICATION”

All right, all right! Areas, displays, SOFT KEYS, parameter this, scroll that. . . BUT WHAT CAN IT DO? Let’s cut to the chase and get you up and running! Besides, if you play with the box a good deal before moving on to the finer points of operation, those finer points will stick better to the ol’ gray matter. . .

Here are the steps we will take:

1. First, we’ll connect the DSP7000 to the rest of your gear.
2. On page 20 we’ll set the input levels so that things don’t distort.
3. On page 21 we’ll learn how to “mute” the DSP7000 in the event of feedback.
4. On page 22 we’ll run programs and “tweak” their parameters.
5. Finally, on page 23 we’ll learn how to save the programs you’ve “tweaked” for future use.

Hooking Up



The diagram above shows the signal flow through the DSP7000 and is discussed in detail on page 27. But before we concentrate on what happens *inside* the DSP7000, we ought to get it hooked up to the rest of your studio. As was stated in the overview, we have two analog inputs, two analog outputs, two digital inputs, and two digital outputs all at our disposal all the time. The analog and digital inputs are summed before processing, and the output of the processor is always available at both the analog and digital outputs.

→ See *The Back Panel* on page 8 for information on the jack types and their specifications.

Hook up the analog inputs to suitable output sources, such as an analog mixer’s effect sends or the outputs of a preamplifier. The connections may be made with either balanced XLR connectors or unbalanced 1/4” connectors. You can plug a guitar into the 1/4” jacks, but you will need to turn up the input gain.

→ See *Setting Input Levels* on page 20.

Hook up the balanced analog outputs to suitable input recipients, such as an analog mixer or an amplifier.

Hook up the digital inputs to suitable output sources, such as a DAW (digital audio workstation) or a keyboard with digital outputs. The source of your digital signal must come from the same device (because a single cable carries two channels) and is taken from either the AES/EBU input jack or the S/P DIF input jack (see below to learn how to switch between the two).

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Hook up the digital outputs to a suitable input recipient, such as a DAW, a sampler, or a DAT machine. While the DSP7000's output will be present at both the AES/EBU jack and the S/P DIF jack, the digital format at both will either be "pro" or "consumer" at both jacks (see below to learn how to switch between the two).

Note: You don't have to hook up all of the inputs and outputs! You can, for instance, feed the DSP7000 with analog inputs and output digitally, or vice versa.

To make sure we aren't stopped before we start, go to the **audio** menu page in the SETUP area (you may have to press the SETUP key a few times to find it). If you *aren't* using the digital inputs, set the Source parameter to internal and the sample rate parameter to 48 kHz as shown to the right (using the CURSOR keys and the KNOB).

```
Mar With PhaserGuns audio configuration
Source: internal Speed: normal
Sample rate: 48 kHz (actual: 48000)
DIG IN: AES/EBU dstatus: unlocked
DIG OUT: AES/EBU bypass: relay
audio service midi mod con
```

If you *are* using the digital inputs, set the Source parameter to external. The DSP7000 will derive its sampling rate from the digital inputs and dstatus will read locked if all is well.

```
Mar With PhaserGuns audio configuration
Source: external Speed: normal
Sample rate: AES/EBU (actual: 48000)
DIG IN: AES/EBU dstatus: locked
DIG OUT: AES/EBU bypass: relay
audio service midi mod con
```

The digital inputs are "taken" from *either* the AES/EBU input jack or the S/P DIF input jack. Select one or the other with the parameter DIG IN on the left side of the menu page.

```
Mar With PhaserGuns audio configuration
Source: external Speed: normal
Sample rate: S/P DIF (actual: 48000)
DIG IN: S/P DIF dstatus: unlocked
DIG OUT: AES/EBU bypass: relay
audio service midi mod con
```

Digital outputs are "sent" to *both* the AES/EBU output jack and the S/P DIF output jack. Select the correct format (either "pro - AES/EBU" or "consumer - S/P DIF") with the parameter DOUT.

```
Bigger Is Wider audio configuration
Source: external Speed: normal
Sample rate: S/P DIF (actual: 48000)
DIG IN: S/P DIF dstatus: locked
DIG OUT: S/P DIF bypass: relay
audio service midi mod con
```

→ To read about the digital setup in more detail, see *Digital Setup* on page 30.

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Setting Input Levels

As we're sure you know, getting a high, but not distorted, signal at every point in a signal path is essential. The Level Meters help us to achieve this goal. In the LEVELS area go to the `meter` menu page to reach this screen. Adjust `Source` (with the KNOB or the INC/DEC keys) to read either `analog in` or `digital in` depending on which input levels you would like to view. The Level Meters now reflect either the analog or the digital inputs.

```
Mar With PhaserGuns | meter setup
Source: analog in
decay time: 0.30 sec
peak hold: 1.0 sec
[main] [meter] [inputs]
```

In this cursory introduction, we'll only fiddle with the levels at the inputs but, rest assured, you can change levels anywhere in the signal path.

→ See:

- *Controlling the Level of the Analog and Digital Inputs* on page 28.
- *Wet/Dry Ratios and Output Levels* on page 29.
- *Controlling the Level of the Analog and Digital Outputs* on page 29.

Of course, it's always best to optimize levels at their source (leaving the DSP7000's boost/cut at 0dB). But if you can't, then go to the `inputs` menu page in the LEVELS area. There you can boost/cut the analog inputs by +30dB/-90dB *before the analog-to-digital converter* with the `gaintrim` parameter.

```
Bigger Is Wider | Input Levels
analog 1: 0.0 dB | gaintrim 1: 14.0 dB
analog 2: 0.0 dB | gaintrim 2: 14.0 dB
digital 1: 0.0 dB
digital 2: 0.0 dB | dstatus: unlocked
[main] [meter] [inputs]
```

Use the `analog` parameter to cut the analog inputs by 0dB/-100dB *after the analog-to-digital converter*.

```
Bigger Is Wider | Input Levels
analog 1: -1.5 dB | gaintrim 1: 0.0 dB
analog 2: -1.5 dB | gaintrim 2: 0.0 dB
digital 1: 0.0 dB
digital 2: 0.0 dB | dstatus: unlocked
[main] [meter] [inputs]
```

Use the `digital` parameter to cut the digital inputs by 0dB/-100dB.

```
Bigger Is Wider | Input Levels
analog 1: -1.5 dB | gaintrim 1: 0.0 dB
analog 2: -1.5 dB | gaintrim 2: 0.0 dB
digital 1: -7.0 dB
digital 2: -7.0 dB | dstatus: unlocked
[main] [meter] [inputs]
```

Assuming you set the `Source` of the Level Meters to `analog in` or `digital in` on the `meter` menu page in the LEVELS area, the meters reflect the input levels (after `gaintrim` is applied, but *before* analog or digital cuts are made). You want the loudest portions of the signal to approach, but not reach, the red "clip" LED at the top of the Level Meters. If you do clip a signal, you won't hurt the DSP7000, but you will hurt your chances for career advancement - a clipped signal typically sounds nasty. (*Note: because the DSP7000 is a "0dB insertion loss" box, it is possible, though very unlikely, to have undistorted signals at both the analog and digital inputs that become distorted when summed. If this is an issue (e.g., with heavily compressed material), set both the analog and digital parameters to -3dB.*)

→ For more information on setting input levels see *Controlling the Level of the Analog and Digital Inputs* on page 28.

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Effecting Things

"The effect on your affect of the DSP7000's effects will affect your popularity positively."

-Anonymous

"Panic" Muting

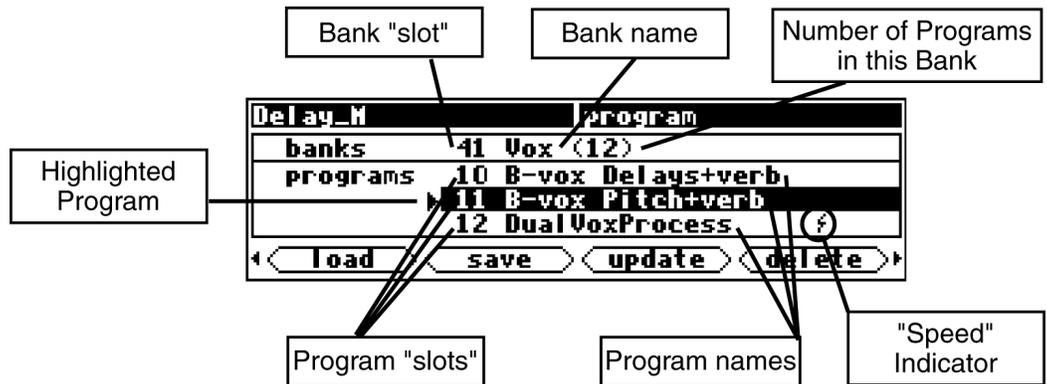
In a moment you'll be loading and playing with programs, but before you do let it be said that the DSP7000 can produce LOUD sounds with very little warning in *some* of the programs in *some* situations. It would be nice to have a "panic" key to press in such a situation. Let's arrange things so that pressing the **BYPASS** key mutes all of the DSP7000's outputs. Go to the **audio** menu in the SETUP area. Change the value of the bypass parameter to **mute** as shown above. Now press the **BYPASS** key. The yellow led next to it will light - you've muted the DSP7000. To unmute, simply press the **BYPASS** key again.

Mar With PhaserGuns	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: S/P DIF	dstatus: unlocked
DIG OUT: AES/EBU	bypass: mute
audio	service
midi	mod con

→ For more information see *Bypassing and Muting* on page 35.

Loading Programs

Now, all we need to do is load a program into the DSP7000. To do that, enter the PROGRAM area. You'll see a box that says "banks" and a box that says "programs." Banks are "manila folders" for programs; many



programs with a common theme are saved in a single bank. There can be as many as 100 bank "slots" in the internal memory of the DSP7000, and each bank contains 128 program "slots."

The number of program "slots" that can actually "contain" programs is limited to the amount of storage space available.

→ See *The "Size" of a Program and Its Ramifications for Storage* on page 54.

The "Speed" Indicator (slightly like a lightning symbol) indicates that this program can be loaded and run in *high speed* mode, for use at 88.2kHz and 96kHz sampling rates.

→ See *Sampling Rates* on page 30 for more information on speed modes.

Use the LEFT CURSOR key to place the cursor in the "banks field" and use the KNOB to scroll through banks. Use the UP and DOWN CURSOR keys to scroll through programs. Use the **SELECT** key, the <load> SOFT KEY, or the **ENT** key to load the highlighted program.

→ For the finer nuances of PROGRAM area navigation read *Using the Cursor Keys and the KNOB in the PROGRAM Area* on page 16.

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Let's load a program, shall we?



Pressing the **SELECT** key on the screen above would load the program "Bigger is Wider." Notice that the upper left-hand corner of the display reflects the fact that "Bigger is Wider" is now loaded on the screen to the right.

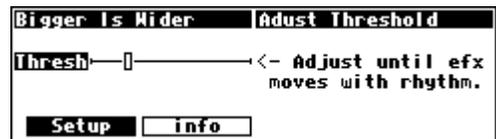


Parameters

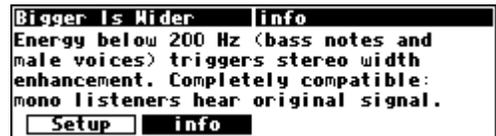
Simply loading programs probably won't prove satisfying for too long; you'll want to mess with the parameters on the programs you load. This is accomplished in the PARAMETER area. Very little can be said generally about what you'll find in the PARAMETER area because every program in the DSP7000 is a unique "algorithm." Each unique algorithm (i.e., program) calls for its own unique parameters.

→ To learn more about the "algorithmic" nature of the DSP7000's programs, read the separate Programmer's Manual.

That said, you will *usually* find an **info** or **about** menu page in the PARAMETER area. In it, you will find general information about what the program does along with any notes concerning special parameters or "nonobvious things."



Many, but by no means all, of the programs in the DSP7000 currently support an "expert mode" feature. The expert mode parameter controlling this feature is found on the **misc** menu page in the SETUP area (you may have to press the **SETUP** key a few times to find it). A setting of 0 *hides* all but the most relevant menu pages in the PARAMETER area. Conversely, a setting of 9 *reveals* all of the available menu pages in the PARAMETER area. Settings between 0 and 9 reveal an increasing number of menu pages in the PARAMETER area.



Leave expert mode at 9 if you like lots of parameters to tinker with, at 0 if you find lots of parameters annoying, or somewhere in-between if your tastes fall somewhere in-between.

→ See *Miscellaneous Setup Options* on page 63 for information on the other parameters on this screen.

It should also be mentioned that any parameter on any menu page can be "remote controlled" via MIDI or the rear foot pedal jacks. Telling you how to do this entails discussing voluminous topics such as setting up MIDI globals, setting up foot pedal globals, and navigating a "remote control" menu page. Such a discussion wouldn't be in keeping with the concept of this **Quickstart** section.

→ If this really piques your interest, go ahead and read:

- *Setting Up the External Controllers* on page 36.
- *External Modulation and Trigger Menu Pages* on page 39.
- *Remote Controlling Parameters* on page 50.



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"Tweaking" and Saving "Tweaks"

Different sets of parameter values for a single program are said to be different "tweaks" of that program. As you play with the parameters on the preset programs, you are "tweaking" those preset programs. For instance, let's say you want a program that mimics the frequency response of your neighbor's television as heard through *your* wall. You want to "tweak" the parameters of a filter program in order to get the correct frequency response.

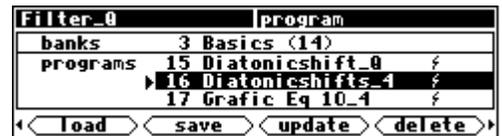
First, load a basic filter program such as "stereo filter" from the "Basics" bank (not shown here).



Do some long calculations involving transmission coefficients and dispersion laws to arrive at the proper filter cutoff frequency and resonance. Enter them.



To avoid going through all of the arduous math the *next* time you want to mimic the frequency response of your neighbor's television, you should save your tweaks as a new program. Press the PROGRAM key to enter the program area.



Press the <save> SOFT KEY. You'll see a pop-up menu with a few options.

- The "bank" line allows you to select the bank in which you will save the program.
- The "program number" line allows you to change which number "slot" you save the program in. Your choices will be all those numbers between 0 and 127 that do not already have a program assigned to them (including the presets!).



By placing the cursor over the "name" line and pressing the SELECT key, you can change the name of the program. Once you've picked a bank, a program number, and a name, place the cursor over the "save" line and press SELECT to go ahead with the save (place the cursor over "cancel" and press SELECT to abort).

→ See *Banks* on page 53.

→ To learn how to enter text, see *Entering or Changing Text* on page 17.

If you were to change the "bank" to "PX-Communication," the "program number" to "36," and the "name" to "Irritating TV," the screen would look like this.



After selecting *save*, the screen changes to confirm that the program is now saved in the correct bank and in the correct program "slot." *Now you can load your tweak and feel edgy and irritated even when the neighbors are on vacation!*



→ To read about using Memory Cards, see *Memory Cards* on page 25.

→ To update a program you have already saved, see *Updating a Program* on page 57.

→ To link programs from different banks (for ease of loading in, say, a live situation), see *"Linking" Programs* on page 58.

→ To compare your tweaks with the saved version of a program, see *Comparing a Currently Loaded Program With The Original (Saved) Version* on page 59.

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Wrap Up

So, there you have it. The procedure we followed in this **Quickstart** section is more or less the procedure you will follow whenever you use the DSP7000. First, you'll get an input level, then you'll load a program, then you'll tweak the parameters to "customize" your effect, and then you'll save your tweak for later use. Doing this much will give you an appreciation of the horsepower under the hood of the DSP7000. But *only* doing this much *won't* give you an appreciation of the amazing versatility of the DSP7000:

- In addition to altering levels at the inputs, you can alter and monitor levels at any point in the signal path.
→ See *Controlling Levels* on page 27.
- Programs and "setups" can be saved to and loaded from removable Memory Cards, as well as internal memory.
→ See *Memory Cards* on page 25.
- In addition to loading programs from the front panel, programs can be loaded remotely via MIDI program change messages or external "triggers."
→ See *Loading a Program Remotely* on page 55.
- The digital inputs and outputs have comprehensive sample rate and sync parameters to complement any digital installation.
→ See *Digital Setup* on page 30.
- Any parameter in the DSP7000 can be "remote controlled" via MIDI or the rear panel foot pedal jacks 1 and 2.
→ See *Setting Up the External Controllers* on page 36, *External Modulation and Trigger Menu Pages* on page 39, and *Remote Controlling Parameters* on page 50.
- Existing programs can be altered or entirely new programs can be created in the Patch Editor.
→ See the separate *Programmer's Manual*.

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OPERATION

Mounting and Handling

Normally, the DSP7000 will be rack mounted in a standard 19 inch rack. If the rack will be taken on the road, the DSP7000 should be supported at the rear. It is advisable to keep the rack well ventilated and in a dry, dust-free environment so that heat and moisture won't cause degradation of performance. Contrary to some reports, we have found that soda/beer splashed liberally about the front panel does *not* enhance the reliability of the DSP7000. Since the DSP7000 has few internal connectors, it should hold up well under "road conditions."

Memory Cards

All functions that work on internal user memory also work on Memory Cards. A standard Memory Card is 512 kilobytes, although the DSP7000 will support cards up to 4 megabytes. (Note: Memory Cards must be "PCMCIA type 1 or 2 static RAM card" - the DSP7000 does not support "Flash" cards.) A Memory Card will maintain memory for many minutes with the battery removed, but will not maintain memory if the battery goes dead. A conservative estimate puts the lifetime of a battery at a year. . . Like gambling on the stock market, bet only what you can afford to lose. . .

You can also use the Vsig program (see separate Programming Manual) to save edited presets to disk on a remote computer. This gives you a valuable safety copy.

Eventide and other suppliers can provide rechargeable cards that do not need battery changes. These need to be occasionally placed in the slot of a powered-up system to top up their batteries. Normal use of the card will usually keep the battery charged.

Insert a Memory Card by pushing it into its slot until it "locks" into place. The Memory Card Release will "lengthen," and the display will briefly read Checki ng "Memory Card". . . or Checki ng "GTR Li - brary". . . or (generally) Checki ng "what-ever-the-name-of-thi s-card-i s". . . .

Remove a Memory Card by pressing the Memory Card Release - but don't remove a Memory Card when the BUSY LED is lit! A program that was loaded from a Memory Card continues to run even if the Memory Card is subsequently removed. The Memory Card only needs to be in place during PROGRAM and Setup Storage area functions such as <load>, <save>, <update>, <del ete>, etc.

The BUSY LED is used to indicate that a Memory Card is being written to. However, if there is no Memory Card in place, the BUSY LED indicates data at the MIDI In port or the serial port. You may want to use this latter feature during a session that requires periodic use of a Memory Card. Simply insert the Memory Card when you need to load something from it or save something to it. Remove it when you are done loading or saving and the BUSY LED will be available for "data indication" or "midi chasing."

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When a Memory Card is inserted, the DSP7000 may report that the card is not formatted and offer to format it. If the Memory Card has already been formatted and the format question is presented, then there is a problem. Try removing and reinserting the card. Try blowing on the business end of the card like an old Atari 2600 game (no spittle!). Formatting will erase all programs and banks on the card! A bank with the name "Memory Card" will be created on the card when you format it. Use the <bank> SOFT KEY to create new banks on the Memory Card.

→ To manually format a Memory Card, see *Fixing Memory Card Problems* on page 70.

→ To learn how to create a new bank, see *Creating a New Bank or Renaming an Old Bank* on page 54.

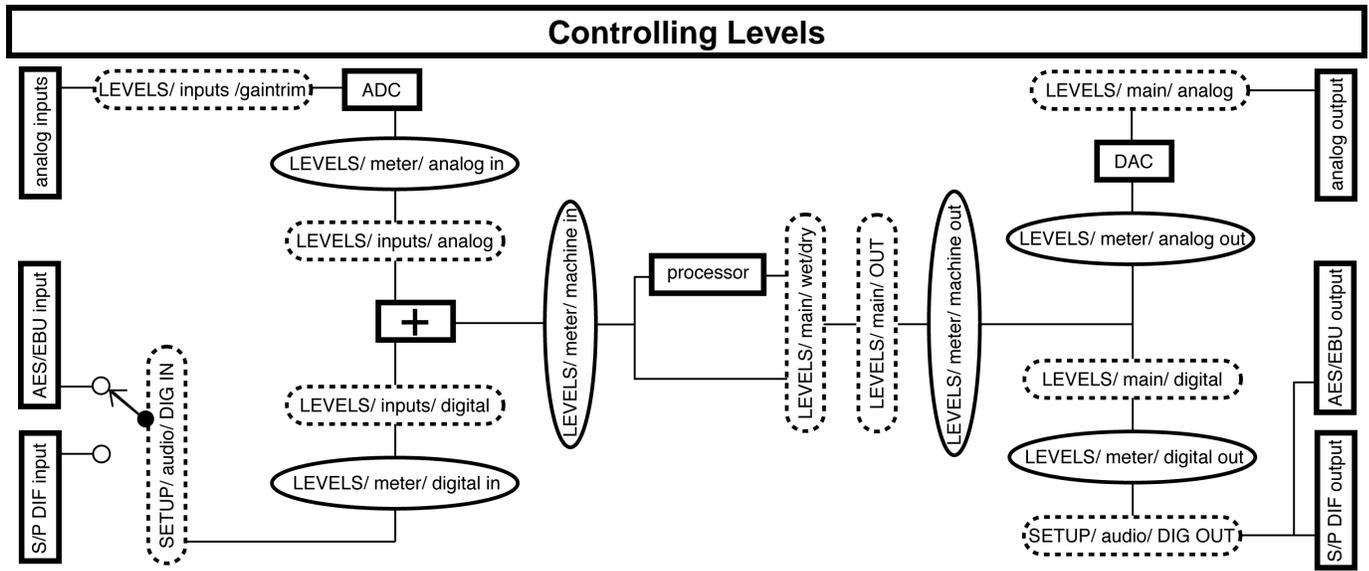
→ To find out how much memory is free on a memory card, see *The "Size" of a Program and Its Ramifications for Storage* on page 54.

Note: Like fine china, Memory Cards are fragile:

- Treat them with respect.
- Don't lie to them.
- Don't store them on your dashboard or in your toaster.
- Avoid shocking them with static electricity (or any kind of electricity for that matter).

→ For information about Memory Card problems and how to fix them, see *Fixing Memory Card Problems* on page 69.

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The DSP7000's signal flow is diagrammed above. Bold boxes represent physical structures inside and outside the DSP7000, for example, the analog inputs. Dashed boxes represent parameters that impact signal flow or gain structure. For example, "Levels/ main/ analog" represents the analog parameter on the **main** menu page in the LEVELS area as shown to the right. Ovals represent points in the signal flow that can be viewed with the level meters.

Bass Balls	Main Levels
OUT 1 Wet/Dry 100%	analog 1: 0.0 dB
OUT 2 Wet/Dry 100%	analog 2: 0.0 dB
OUT 1 Level 0.0dB	digital 1: 0.0 dB
OUT 2 Level 0.0dB	digital 2: 0.0 dB
<input type="button" value="main"/> <input type="button" value="meter"/> <input type="button" value="inputs"/>	

As you can see, the analog and digital inputs are summed or mixed before entering the processor. Further, the AES/EBU and the S/P DIF inputs cannot be used at the same time. The rest is fairly straightforward and will be discussed in detail in the following sections.

The Level Meters

Once you understand the Level Meters, you can adjust levels along the signal path. There are two meters to the left of the display, one for the left channel and one for the right channel. By altering the Source parameter on the **meter** menu page in the LEVELS area, you can change the point in the signal path that the meters measure. Your choices are:

Oscillator 1k 0 VU	meter setup
Source: analog in	
decay time: 0.30 sec	
peak hold: 1.0 sec	
<input type="button" value="main"/> <input type="button" value="meter"/> <input type="button" value="inputs"/>	

- analog in measure the level at the analog inputs *after* the gain trim (LEVELS / **inputs** / gain trim).
- digital in measure the level at the digital inputs *before* the input cut (LEVELS / **inputs** / digital).
- machine in measure the level at the inputs to the DSP7000's processor.
- machine out measure the level at the outputs to the DSP7000's processor.
- analog out measure the level at the analog outputs *before* output cuts are applied.
- digital out measure the level at the digital outputs *after* output cuts are applied.

The parameter decay time determines how long the meters take

Oscillator 1k 0 VU	meter setup
Source: digital out	
decay time: 0.30 sec	
peak hold: 1.0 sec	
<input type="button" value="main"/> <input type="button" value="meter"/> <input type="button" value="inputs"/>	

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to go from full “deflection” to zero measuring an impulse. The parameter `peak hold` determines how long the meters hold their highest reading.

The top-most LED on each meter indicates that the signal is clipping. The LED below the top-most one indicates that the signal is just below clipping (-0.06dB). Each LED below the second falls off at -3dB per decrement, with the exception of the bottom one, which lights if the signal is above -40dB.

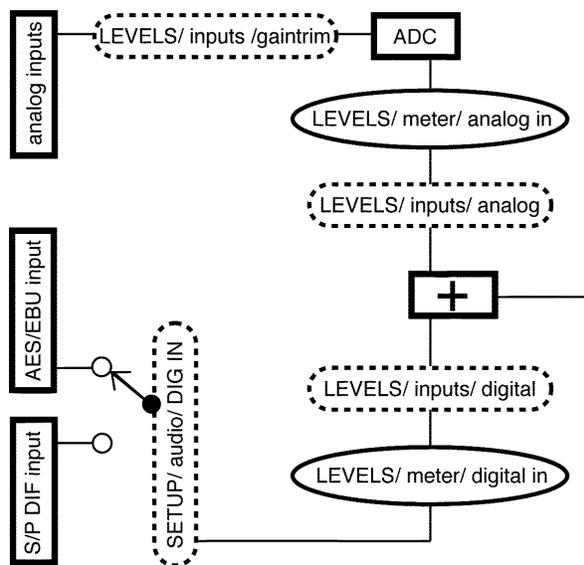
You can use the Level Meters to verify that your internal gain structure is in good shape. You generally want to keep levels near, but not touching, the red clip LED. To achieve this, it’s always better to boost or cut an *output*. Only if a signal level cannot be optimized by an output boost/cut should you resort to altering an input level!

Controlling the Level of the Analog and Digital Inputs

Signals come into the DSP7000 from the outside world via the analog and digital inputs. Adjust the boost/cut of each of these inputs on the `inputs` menu page in the LEVELS area. Such boost/cuts will often be made in “gangs,” however, you can boost/cut any of the inputs independently of the others by pressing the DOWN CURSOR key. Notice that the analog input has two parameters for gain adjustment: one *before* the analog to digital converter (ADC) and one *after* the ADC. Use the `gaintrim` parameter to get a good analog level into the ADC, and use the `analog` parameter to adjust the loudness of the analog signal relative to the digital signal (assuming that you’re using both the analog and digital inputs).

To monitor the input levels, go to the `meter` menu page in the LEVELS area. Change `Source` to either `analog in` or `digital in` depending on which you want to monitor.

Again, the analog levels shown on the Level Meters are *after* the `gaintrim` found on the `inputs` menu page.



```
Oscillator 1k 0 VU | Input Levels
analog 1: -1.5 dB | gaintrim 1: 0.0 dB
analog 2: -1.5 dB | gaintrim 2: 0.0 dB
digital 1: 0.0 dB
digital 2: 0.0 dB | dstatus: unlocked
main | meter | inputs
```

This means that it is possible to *overdrive* an input to the DSP7000, decrease that overdriven level with the `inputs` / `gaintrim` parameter, and *show no clipping* on the Level Meters! To avoid such a situation, it is advisable to boost/cut the signals coming into the DSP7000 at their source. Doing so also results in a better gain structure! The moral? Use the `gaintrim` parameter on the `inputs` page only as a last resort.

```
Oscillator 1k 0 VU | meter setup
Source: digital in
decay time: 0.30 sec
peak hold: 1.0 sec
main | meter | inputs
```

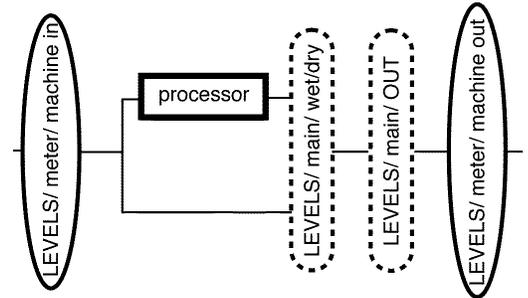
→ Note: All of the parameters discussed in this section can be “remote controlled” via MIDI or the foot pedal jacks. To learn how, read:

- *Setting Up the External Controllers* on page 36.
- *External Modulation and Trigger Menu Pages* on page 39.
- *Remote Controlling Parameters* on page 50.

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Wet/Dry Ratios and Output Levels For the DSP7000's Processor

To change the wet to dry ratio for each “channel” of the processor, go to the **mai n** menu page in the LEVELS area. A setting of 0% (“dry”) places the unaffected, summed analog and digital inputs at the outputs (the bottom “fork” in the diagram). A setting of 100% (“wet”) places a completely effected signal at the outputs (the top “fork” in the diagram). Settings between 0% and 100% have a greater or lesser degree of unaffected signal at the output. This parameter is typically left at 100% in most studio situations, while guitarists and their ilk will vary it to achieve a proper wet/dry mix.



The signal level after the Wet/Dry fork can be cut from 0 to 100 dB with the OUT Level parameter.

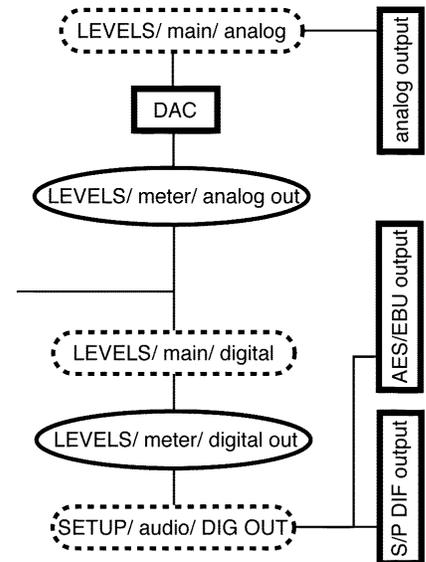
stereo filter		Main Levels	
OUT 1 Wet/Dry	48%	analog 1:	0.0 dB
OUT 2 Wet/Dry	48%	analog 2:	0.0 dB
OUT 1 Level	0.0dB	digital 1:	0.0 dB
OUT 2 Level	0.0dB	digital 2:	0.0 dB
main		meter	
		inputs	

→ Note: All of the parameters discussed in this section can be “remote controlled” via MIDI or the foot pedal jacks. To learn how, read:

- *Setting Up the External Controllers* on page 36.
- *External Modulation and Trigger Menu Pages* on page 39.
- *Remote Controlling Parameters* on page 50.

Controlling the Level of the Analog and Digital Outputs

You can control the level of the analog outputs and the digital outputs. These adjustments are made to match the DSP7000's output levels to other equipment and would not normally be used as level controls. You should leave these levels set at 0dB where possible in order to get the best possible audio performance out of your DSP7000.



The right side of the **mai n** menu page in the LEVELS area controls the analog and digital output levels. Adjust the analog parameter to adjust the analog outputs from -90 to +3 dB. Be aware that this gain/cut is applied after the output metering and DAC. Adjust the digital parameter to cut the digital outputs from 0 to -100 dB.

Bass Balls		Main Levels	
OUT 1 Wet/Dry	100%	analog 1:	0.0 dB
OUT 2 Wet/Dry	100%	analog 2:	0.0 dB
OUT 1 Level	0.0dB	digital 1:	0.0 dB
OUT 2 Level	0.0dB	digital 2:	0.0 dB
main		meter	
		inputs	

→ Note: Both of these parameters can be “remote controlled” via MIDI or the foot pedal jacks. To learn how, read:

- *Setting Up the External Controllers* on page 36.
- *External Modulation and Trigger Menu Pages* on page 39.
- *Remote Controlling Parameters* on page 50.

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DIGITAL SETUP

Digital Setup Overview

Before we look at the DSP7000's digital setup in detail, let's take in the "big picture."

All of the DSP7000's analog to digital conversion and digital to analog conversion is 24 bit.

The DSP7000 sports two digital inputs and two digital outputs. Unlike the analog inputs and outputs, the digital inputs and outputs must be received or sent in pairs (because a single cable carries two channels). The digital input can come from either the S/P DIF or the AES/EBU jack, but not both. Digital output is seen at both the S/P DIF and AES/EBU outputs, but the format at both jacks is either "consumer" or "pro," but not both.

The DSP7000 assumes that signals at the digital inputs are 24 bit. No harm occurs if the input is in fact less than 24 bit; subsequent processing will fill the lower bits.

The *system sampling rate* is derived from either an internal clock or an external clock. The internal clock rates supplied by the DSP7000 include 44.1kHz, 48kHz, 88.2kHz, 96kHz, and the rate of an optional user-supplied crystal (*note that 32kHz and 44.059kHz are not supplied*). The external clock is taken from the selected digital inputs and can range from ~30kHz to ~50kHz and from ~54kHz to ~99kHz. The digital outputs are at the *system sampling rate*, and all analog to digital and digital to analog conversion is done at the *system sampling rate*.

S/P DIF & AES/EBU

The digital inputs are received at either the AES/EBU input jack or the S/P DIF input jack. To select between the two, use the DIG IN parameter on the `audi o` menu page in the SETUP area. *For the time being, ignore the other parameters on this menu page.*

Bass Balls	audio configuration
Source: external	Speed: normal
Sample rate: S/P DIF	(actual: 48000)
DIG IN: S/P DIF	dstatus: locked
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

The digital outputs are seen at *both* the AES/EBU output jack and the S/P DIF output jack. However, the signal at both jacks can only be one *format*: "consumer" (S/P DIF) or "pro" (AES/EBU). To select between the two formats, use the DIG OUT parameter on the `audi o` menu page in the SETUP area. Put another way, you can connect a cable to the AES/EBU jack, set DIG OUT to S/P DIF, and still get signal. However, that signal will be in "consumer" format.

Bass Balls	audio configuration
Source: external	Speed: normal
Sample rate: S/P DIF	(actual: 48000)
DIG IN: S/P DIF	dstatus: locked
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

Note: The digital inputs need not be assigned to the same protocol as the digital outputs, as is shown to the right. In other words, the digital inputs can be received at the AES/EBU input jack and sent to the digital outputs in "consumer" (S/P DIF) format. Or *vice versa*.

Bass Balls	audio configuration
Source: external	Speed: normal
Sample rate: AES/EBU	(actual: 48000)
DIG IN: AES/EBU	dstatus: locked
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

Sampling Rates

The DSP7000 can operate over a range of sampling rates from 32kHz to 100kHz. Because the higher sampling rates demand more of the signal processing resources, some large presets will not operate at the higher rates. To allow for this, the DSP7000

Smear	program
banks	62 TapTempo (22)
programs	10 Electronic f
	11 SmartReverseDelays
	13 SmartTapChain#3 f
load	save update delete

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has two "speeds," a bit like gear ratios on a car. In the normal (lower) speed range, every preset can run, but only sampling rates between 32kHz and 50kHz may be used. In the high speed range, some presets cannot run (those which do not have the lightning symbol beside their name on the program screen such as SmartReverseDelays), but the whole sampling rate range may be used.

It is recommended that you keep the DSP7000 in the normal speed range unless you need to use the higher sampling rates. To change the speed mode, go to the **audio** menu page in the SETUP area.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
◀ audio service midi mod con ▶	

Using the Internal Clock

When you use the "internal" clock, the *system sampling rate* will correspond with the internal clock's sampling rate. The *system sampling rate* is the sampling rate used for all internal processing. If you're using the digital inputs while the *system sampling rate* is set to internal, you must ensure that the clock of the machine being input to the DSP7000 is synced to the DSP7000's digital output. If the machine being input to the DSP7000 is *not* synced to the DSP7000's output, dstatus is likely to read (slipping). That means the two machines are not in sync and that ugly clicks and pops will be added to the audio. In such a situation you'd be better off setting Source to external.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: AES/EBU	dstatus: (slipping)
DIG OUT: S/P DIF	bypass: relay
◀ audio service midi mod con ▶	

→ See *The Status Of The Digital I/Os When Using The Internal Clock* on page 32.

Selecting The Internal Clock's Rate

To select the internal clock, set the Source parameter on the **audio** menu page in the SETUP area to internal.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
◀ audio service midi mod con ▶	

Select the internal clock's rate with the sample rate parameter on the same menu page. Your choices are:

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 44.1kHz	(actual: 44100)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
◀ audio service midi mod con ▶	

44.1 kHz The rate of standard compact disks. The "44.1 kHz sample rate indicator" is illuminated. The highest reproducible audio frequency is ~20kHz.

48 kHz The "professional" rate. The "48 kHz sample rate indicator" is illuminated. The highest reproducible audio frequency is ~22kHz.

In high speed mode, you can also choose:

88.2 kHz Twice the rate of standard compact disks. This raises the highest possible reproducible audio frequency to ~40 kHz. The cost of these "20k +" overtones is a reduction in the size of the programs the DSP7000 can run. Some programs will be "unloadable" when 88.2 kHz is selected.

96 kHz The new "professional rate" (maybe). This raises the highest possible reproducible audio frequency to ~44 kHz. The cost of these "20k +" overtones is a reduction in the size of the programs the DSP7000 can run.

Smear	audio configuration
Source: internal	Speed: high
Sample rate: 96 kHz	(actual: 97000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
◀ audio service midi mod con ▶	

Some programs will be "unloadable" when 96 kHz is selected.

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The *actual* value of the system sampling rate can be read on the right-hand side of the screen in the field that reads: "(actual : xxxxx)". Of course, if you select one of the fixed rates (44.1 kHz, 48 kHz, 88.2 kHz, or 96 kHz), the *actual* rate should be the same as the rate you select. This parameter is actually more useful when using an external clock source.

→ See *Miscellaneous Setup Options* on page 63 for other sync options.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual : 48000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

The Status Of The Digital I/Os When Using The Internal Clock

When the internal clock is selected, the sampling rate of the signal at the digital input must be equal to the internal clock's rate to avoid clicks and pops. The *dstatus* parameter on the `audio` menu page in the SETUP area displays the status of the digital input.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual : 48000)
DIG IN: AES/EBU	dstatus: unlocked
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

The status of the digital inputs will be:

slipping signal is present, but its sampling rate does not correspond with the internal clock's rate. A digital input that is **slipping** will probably suffer from clicks or distortion. The greater the difference between the internal clock's rate and the digital input's rate, the greater the distortion. Some slipping may be acceptable for monitoring or other noncritical applications.

Smear	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual : 48000)
DIG IN: AES/EBU	dstatus: (slipping)
DIG OUT: S/P DIF	bypass: relay
audio	service midi mod con

OK signal is present, and its sampling rate is locked to the internal clock rate. Everything's groovy. *If a signal's sampling rate is very near (but not exactly) the internal clock rate, its status will read OK with brief interjections of slipping. This is normal and may well not produce measurable distortion.*

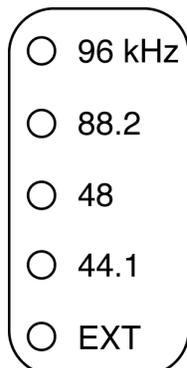
unlocked no signal is present, the signal's sampling rate is very unstable, or something is dreadfully wrong with the signal.

Understanding The "System Sampling Rate And External Sync Indicator" When Using The Internal Clock

The "System Sampling Rate and External Sync Indicator" is the box of five LEDs immediately to the left of the display. The top four LEDs indicate the status of the system sampling rate:

- **Solidly lit:** When one of the top four LEDs is solidly lit, the system sampling rate is exact ($\pm 0.05\%$) (the LED corresponding to the system sampling rate will illuminate).
- **Blinking:** When one of the top four LEDs is blinking, the system sampling rate is between one of the fixed rates (the LED corresponding to the nearest sampling rate will blink).

Of course, if you select one of the fixed rates (44.1 kHz, 48 kHz, 88.2 kHz, or 96 kHz), the LED corresponding to your selection should light solidly.



The bottom LED, EXT, should not light while using the internal clock.

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Using an External Clock

When you use the “external” clock, the *system sampling rate* will be that of the external digital signal. The system sampling rate is the sampling rate used for all internal processing (including the ADC and DAC). The external clock’s sampling rate is derived from the digital input. Note: If the digital input is “unlocked” (not connected to a valid digital source), the external clock will be **invalid**. If the external clock is invalid, the system sampling rate will revert to the last valid *internal* clock rate.

Selecting The External Clock

The external clock is usually derived from the digital input, either the S/P DIF input or the AES/EBU input depending on the parameter DIG IN. To set the system sampling rate to the external clock’s rate, set the Source parameter on the `audi o` menu page in the SETUP area to `external`. The system sampling rate will now be the sampling rate of the digital input assuming the digital input is valid.

```
Smear          audio configuration
Source:  external  Speed: normal
Sample rate: S/P DIF (actual: 47999 )
DIG IN:  S/P DIF   dstatus: locked
DIG OUT:  S/P DIF   bypass:  relay
└ audio  service  midi  mod con
```

Although they are rarely used, if your hardware configuration supports it, an external Word Clock input, a TTL level clock, or a user supplied crystal may also be used as the external clock source. You will have to enable these features on the `mi sc` menu page in the SETUP area (*you may need to press the SETUP key a few times to find it*) before you can select these options on the `audi o` menu page.

```
Stereo 3D CircleDiy misc setup
key hold:  1.0 sec# favorites: 8
expert mode: 0
wordclock: yes
extra sync: yes
└ misc
```

Changing the `wordclock` parameter on the `mi sc` menu page in the SETUP area to `yes` (as shown above) will allow you to change the `Sample rate` parameter on the `audi o` menu page in the SETUP area to `WORDCLK` (as shown to the right).

```
Stereo 3D CircleDiy audio configuration
Source:  external  Speed: normal
Sample rate: WORDCLK (actual: 48000 )
DIG IN:  S/P DIF   dstatus: locked
DIG OUT:  S/P DIF   bypass:  relay
└ audio  service  midi  mod con
```

Changing the `extra sync` parameter on the `mi sc` menu page in the SETUP area to `yes` (as shown two screens above) will allow you to change the `Sample rate` parameter on the `audi o` menu page in the SETUP area to `external` or `user xtl`, *provided that you have an external TTL level clock or user-supplied crystal installed.*

→ See *Connecting user-supplied crystals and external clocks* on page 68 for more information.

The rate of the external clock is displayed in the `(actual: xxxxx)` field. In the example shown to the right, the *actual* frequency of the external signal is 47999 Hz. External sampling rates can range from ~30kHz to ~50kHz in normal speed mode, and from ~30kHz to 53kHz and 61kHz to ~99kHz in high speed mode.

→ See *Sampling Rates* on page 30 for information on speed modes.

```
Smear          audio configuration
Source:  external  Speed: normal
Sample rate: S/P DIF (actual: 47999 )
DIG IN:  S/P DIF   dstatus: locked
DIG OUT:  S/P DIF   bypass:  relay
└ audio  service  midi  mod con
```

The Status Of The Digital I/Os When Using The External Clock

When the external clock is selected, the sampling rate of the signal at the digital input must be equal to the internal clock’s rate to avoid clicks and pops. The `dstatus` parameter on the `audi o` menu page in the SETUP area displays the status of the digital input.

```
Stereo 3D CircleDiy audio configuration
Source:  external  Speed: normal
Sample rate: AES/EBU (actual: 48000 )
DIG IN:  AES/EBU   dstatus: locked
DIG OUT:  AES/EBU   bypass:  relay
└ audio  service  midi  mod con
```

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The status of the digital inputs (dstatus on the `audio` menu page in the SETUP area) will be:

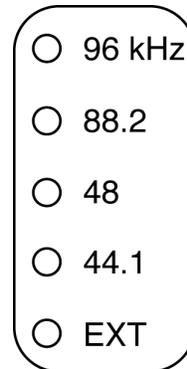
- slipping signal is present, but very unstable. A digital input that is slipping will probably suffer from clicks or distortion. Some slipping may be acceptable for monitoring or other noncritical applications.
- OK signal is present and stable. Everything's groovy. *If a signal's sampling rate is not completely stable, its status will read OK with brief interjections of slipping. This is normal and may well not produce measurable distortion.*
- unlocked no signal is present, the signal's sampling rate is very unstable, or something is dreadfully wrong with the signal.

The sampling rate at the digital outputs will be the same as the sampling rate of the digital inputs (which is the system sampling rate in *external*). A/D and D/A conversion will be done at the sampling rate of the digital inputs (which is the system sampling rate in *external*).

Understanding The "System Sampling Rate And External Sync Indicator" When Using The External Clock

The "System Sampling Rate and External Sync Indicator" is the box of five LEDs immediately to the left of the display. The top four LEDs indicate the status of the system sampling rate:

- **Solidly lit:** When one of the top four LEDs is solidly lit, the system sampling rate is exact ($\pm 0.05\%$) (*the LED corresponding to the system sampling rate will illuminate*).
- **Blinking:** When one of the top four LEDs is blinking, the system sampling rate is between one of the fixed rates (*the LED corresponding to the nearest sampling rate will blink*).



Use the "(actual: xxxxx)" field on the `audio` menu page in the SETUP area to see the *actual* sampling rate.



The bottom LED, EXT, has three possible states:

- **Solidly lit:** When the bottom LED is solidly lit, digital inputs are locked and all is right with the world.
- **Blinking regularly:** When the bottom LED is blinking regularly, digital inputs are *not locked*. Because digital inputs are not locked, the external clock is invalid. Because the external clock is invalid, the system sampling rate will revert to the last valid *internal* clock rate.
- **Blinking irregularly:** When the bottom LED is blinking irregularly, the digital inputs are slipping, i.e., are very unstable.

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BYPASSING AND MUTING

Sometimes you'll find it necessary to bypass the DSP7000. A few bypassing options exist on the **audio** page in the SETUP area.

Bigger Is Wider	audio configuration
Source: internal	Speed: normal
Sample rate: 48 kHz	(actual: 48000)
DIG IN: S/P DIF	dstatus: unlocked
DIG OUT: AES/EBU	bypass: mute
◀ audio	service midi mod con ▶

rl y bypass “Hardwires” each input to its corresponding output, i.e., analog input 1 is connected to analog output 1, digital input 2 is connected to digital output 2, etc. Shows red led when active.

Note: Because the 1/4" analog inputs have no corresponding 1/4" analog outputs, rly bypass effectively mutes those analog inputs that are mated with 1/4" plugs.

el ectroni c Makes each output of the DSP7000's internal processor the same as its corresponding input. Thus, level changes and gaintrims are still in effect. Shows red led when active.

mut e Mutes all the outputs. Shows yellow led when active.

Put the DSP7000 into bypass mode by pressing the **BYPASS** key. One of the leds next to it will light and the DSP7000 will be in the bypass mode you selected on the **audio** page in the SETUP area. Press the **BYPASS** key again to exit bypass mode.

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EXTERNAL CONTROLLERS

External controllers are inputs to the DSP7000 that allow the modulation of parameters from a source outside the DSP7000. These include the foot pedal jacks 1 and 2, the relay jack, and MIDI. In addition to modulating parameters such as delay times, pitch shift, LFO rate, etc., in programs, the external controllers can be used to modulate “box” level parameters such as input levels, Wet/Dry mix, and even screen contrast.

→ See:

- *Setting Up the External Controllers* on page 36.
- *External Modulation and Trigger Menu Pages* on page 39.
- *Remote Controlling Parameters* on page 50.

In addition, external controllers can be used to advance through programs.

→ See *Loading a Program Remotely* on page 55.

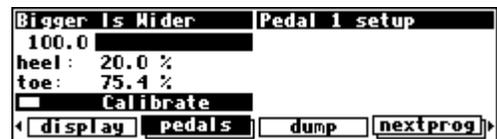
Here we will discuss the “global” setup of these external controllers.

Setting Up the External Controllers

Foot Pedals 1 and 2

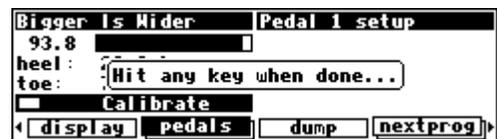
Each foot pedal jack accepts a *stereo* (“tip-ring-sleeve”) 1/4” connector. Between the ring and sleeve is a fixed 5 volts provided by the DSP7000. The foot pedal that is hooked up to the jack and returned between the tip and the sleeve alters that voltage. The

`pedal s` menu page in the SETUP area allows you to calibrate the foot pedal jacks for the particular foot pedals you are using. The “top” menu page calibrates jack 1, and the “bottom” menu page calibrates jack 2 (just press the `pedal s` SOFT KEY to toggle between the two). The horizontal bar graph at the top of the menu page represents the current foot pedal position relative to the calibration.



To calibrate your pedal, highlight the `Calibrate` parameter with the cursor and press the SELECT key. Rock your foot pedal through its full range of motion, from full minimum (“heel”) to full maximum (“toe”), and then press any key. The `heel` and `toe` parameters will jump to reflect their new, calibrated values.

You’re done. Now when you use that foot pedal to modulate parameters, the minimum foot pedal position will correspond to no modulation and the maximum foot pedal position will correspond to maximum modulation. If you want the opposite to occur (*maximum foot pedal position corresponding with no modulation and minimum foot pedal position corresponding with maximum modulation*), simply calibrate the pedal as discussed above and then *swap* the `heel` and `toe` values.



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MIDI Setup

In the DSP7000, MIDI can be used:

- with programs that explicitly call for MIDI signals. For example, some programs in the DSP7000 act like synthesizers that a MIDI keyboard can play.
- with programs that explicitly call for some sort of “external” controller. For example, the program “External Detune” calls for an external signal to adjust the amount of detune that is applied to an audio signal. You can direct a MIDI controller to do the adjusting.
- to remote control *any* parameter in the DSP7000 (including input and output levels).
- to change programs via MIDI program change messages.
→ See *Loading A Program Via A MIDI Program Change Message* on page 55.
- to advance to the next program or select the previous program.
→ See *Triggering the Next or Previous Program To Load* on page 56.
- to load programs in sequence.
→ See *Triggering the Next or Previous Program To Load* on page 56.
- to “dump” information from one DSP7000 to another or to an external storage device.
→ See *Dumping Data and Receiving Data Dumps* on page 65.
- to control one DSP7000 with another.
→ See *Controlling One DSP7000 from Another DSP7000* on page 66.
- to record parameter changes on a MIDI sequencer for subsequent playback.
→ See *Sequencing With MIDI* on page 67.

There are several MIDI “global” parameters that bear on how all of the above uses of MIDI function. These parameters are found on the `mi di` menu page in the SETUP area (you may have to press the `SETUP` key a few times to find it). The `mi di` menu page is “stacked”; the “top” menu page is shown to the right. Let’s look at each parameter in turn, shall we?

```
Stereo 3D CircleDiy global configure
MIDI: enabled system exclusive: on
serial: enabled device ID: 1
program load: on
sequence out: off
audio service midi mod con
```

MIDI	If set to disabled, all received MIDI commands are ignored. However, MIDI <i>output</i> messages, including parameter changes, program load, bank change, and the various dump commands, are still enabled. Set this parameter to enabled if you want to <i>receive</i> MIDI messages.
serial	Enables or disables the serial port. If set to enabled, MIDI commands can be received at or sent from the serial port. → See <i>Setting Up the Serial Port</i> on page 64.
program load	This determines whether the DSP7000 will accept and obey MIDI program change messages.
sequence out	If set to on, then every time a parameter is changed or a program is loaded, a corresponding message is sent out the MIDI port as a system exclusive message. By recording parameter changes to a MIDI sequencer, you can automate your mixdowns. Simply play back the recorded MIDI sequence at the DSP7000’s MIDI input, and you will see the changes you recorded “played” by the sequencer (<i>assuming MIDI is enabled and system exclusive is on</i>). However, if you manage to configure the MIDI connections between your various pieces of equipment such that the “system exclusive, sequence out” MIDI messages of the DSP7000 loop back into the DSP7000 without delay, digital demons will unleash a raging fury inside your helpless DSP7000. So,

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make sure that doesn't happen! If you aren't actively using the sequence out feature, it's wise to leave it off.

→ See *Sequencing With MIDI* on page 67.

system exclusive If set to on, then any system exclusive message that is received by the DSP7000 will be accepted and dutifully obeyed. If set to off, then all system exclusive messages will be ignored. This switch does not prevent the DSP7000 from *sending* system exclusive messages, however. *You can use this parameter in conjunction with sequence out by leaving sequence out on and system exclusive off while recording a sequence, and sequence out off and system exclusive on while playing the sequence back. This eliminates the possibility of those digital demons dancing their mean dance in the DSP7000!*

device ID All system exclusive messages to and from *this* DSP7000 will have *this* device ID. If you're using more than one DSP7000, you can set each one's device ID to a different value. This would let them share a common MIDI chain, while allowing system exclusive messages to be sent to a *specific* DSP7000. Normally, the device ID is left at 1, the factory default. You can control one DSP7000 from another by matching their device IDs.

→ See *Controlling One DSP7000 from Another DSP7000* on page 66.

Press the **mi di** SOFT KEY again to reveal the "second" menu page.



MIDI This is just the same as the MIDI parameter found on the "top" menu page. It's duplicated here for your comfort and convenience.

base channel Selects one of 16 MIDI channels to be the base channel from which MIDI channel numbers will be calculated elsewhere in the DSP7000.

omni mode If this is on, then a MIDI message on *any* channel is accepted and dutifully obeyed by *every* MIDI message recipient in the DSP7000. This keeps things simple in simple setups. If this is off, then every MIDI recipient in the DSP7000 specifies which MIDI channel (offset from the base channel) it will accept messages on.

note mode The DSP7000 allows selection of mono and poly mode. Poly means one channel has all the notes (keyboards). Mono means each channel plays only one note, but you have multiple channels (MIDI guitars, wind controllers).

pressure If this parameter is set to channel, then the last changed MIDI aftertouch message on a given channel affects all the notes played on that channel. If it's set to key, then a MIDI aftertouch message on a given channel affects only the note with which it is associated.

pitch bend When using a MIDI keyboard to play a synthesizer program in the DSP7000, this parameter controls how many semitones a maximum MIDI pitchbend message shifts the original pitch.

sysex speed The lower the value of this parameter, the slower the DSP7000 will transmit MIDI messages. This can be useful if the device being sent to is "unhappy" with faster rates.

That's it for MIDI globals. If you press the **mi di** SOFT KEY one more time, you'll see parameters pertaining to the serial port's setup. If you press it again, you'll see MIDI group setup.

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→ See *Setting Up the Serial Port* on page 64.

→ See *MIDI Groups* on page 50.

With the Memory Card removed, the BUSY LED on the front panel illuminates whenever a message is received at the MIDI In port. If the serial port is "enabled," messages sent out the MIDI Out port are also sent out the serial port. Note: If the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port not receiving the command to be ignored until the command is complete.

External Modulation and Trigger Menu Pages

Many aspects of the DSP7000's operation can be controlled by "external" signals. These "external" signals include MIDI signals and signals at the rear panel foot pedal jacks 1 & 2 (*see External Controllers on page 36 to set these controllers up*). The various external modulation and trigger menu pages you will encounter are all variations on a common theme. Although the length of this section might lead you to think otherwise, all you're really doing on these menu pages is selecting the external controller that will modulate or trigger a parameter. If the external controller you select involves MIDI, then you will also have to deal with MIDI channels and (possibly) MIDI control numbers. This adds length to our discussion, but it shouldn't add complexity.

In most cases we're doing one more thing: we're *scaling* the external controller to suit the range of modulation we would like. Again, the concept is simple, but we'll have to get a little wordy in the process of describing it. Apologies. . .

For the sake of providing an example, we're going to externally modulate the `Di gi tal 1` parameter found on the `i n p u t s` menu page in the LEVELS area. Remember, press the DOWN CURSOR key to "ungang" parameters.



With the cursor highlighting `Di gi tal 1` on the `i n p u t s` menu page in the LEVELS area, press and hold the `S E L E C T` key until the external modulation menu page shown to the right appears. The "SELECT key trick" is how you "remote control" any parameter in the DSP7000 and is discussed in depth on page 50. For now, we have a convenient method for getting you to an external modulation menu page. You will also find "explicit" external modulation menu pages in the PARAMETER area (ones that don't require you to press SELECT to see them!).



→ See *Remote Controlling Parameters* on page 50 if you're really curious.

Before we do anything else, change the scale parameter to -100.0% (that's negative!). *Don't ask questions, just do it! You'll understand in due time!*



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“Manually” Selecting an External Controller For Modulation

The first parameter, `mode`, selects the actual external controller that will do the modulating. Our choices are:

- `off` No external modulation at all.
- `hi gh` This isn't really a *modulator* (it doesn't evolve through time). It pins the parameter at its highest modulation value.
- `mi d` This isn't really a *modulator* (it doesn't evolve through time). It pins the parameter at its middle modulation value.
- `l ow` This isn't really a *modulator* (it doesn't evolve through time). It pins the parameter at its lowest modulation value.
- `mod 1 through 4` These are “placeholders” that are assigned to *actual* external modulators on the `mod` `con` menu page in the SETUP area. Until you understand the concept of “redirection” discussed below, don't pay any attention to these.
→ You can read about redirection in *The Concept Behind “Redirection” - Mods 1-4 and Trigs 1 & 2* on page 47.
- `trigs 1 & 2` These are “placeholders” that are assigned to *actual* external controllers on the `mod` `con` menu page in the SETUP area. Until you understand the concept of “redirection” discussed below, don't pay any attention to these.
→ You can read about redirection in *The Concept Behind “Redirection” - Mods 1-4 and Trigs 1 & 2* on page 47.
- `pedal 1 & 2` The input from the pedals at the rear panel foot pedal jacks 1 & 2. These jacks are setup on the `pedal s` menu page in the SETUP area.
→ See *Foot Pedals 1 and 2* on page 36 to “set them up.”
- `tip 1 & 2, ring 1 & 2, and tip & ring 1 & 2`

When a pedal input is used as a switch input, it can operate in one of two modes, supporting either 2 switches or 3 switches. If *any* controller references “tip&ring” for a given socket, that socket will be in “3 switch” mode, otherwise it will be in “2 switch” mode.

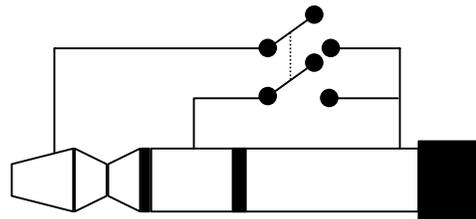
In “2 switch” mode:

- “tip” is high when a switch connected between tip and sleeve is closed.
- “ring” is high when a switch connected between ring and sleeve is closed.

To give an added control input, a third switch may be connected so as to connect both tip and ring to sleeve. This will require a 2 pole switch. (Refer to Drawing.) Alternatively, the same results may be obtained by pressing the 2 switches simultaneously to simulate the third switch.

In “3 switch” mode:

- “tip” is high when a switch connected between tip and sleeve is closed and the third switch is open.
- “ring” is high when a switch connected between ring and sleeve is closed and the third switch is open.
- “tip&ring” is high when the third switch is closed.



- `mod wheel` MIDI control message 1 - typically assigned to the mod wheel on a MIDI keyboard.
- `breath con` MIDI control message 2 - typically assigned to the breath controller on a MIDI keyboard.

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foot con	MIDI control message 4 - typically assigned to the foot controller on a MIDI keyboard.
damper	Triggers when a damper control message (MIDI control message 64) is received with damper = 1.
portamento	Triggers when a portamento control message (MIDI control message 65) is received with portamento = 1.
sostenuto	Triggers when a sostenuto control message (MIDI control message 66) is received with sostenuto = 1.
soft	Triggers when a soft control message (MIDI control message 67) is received with soft = 1.
hold 2	Triggers when a "hold 2" control message (MIDI control message 69) is received with "hold 2" = 1.
volume	MIDI control message 7 - typically assigned to volume changes.
balance	MIDI control message 8 - typically assigned to balance.
pan	MIDI control message 10 - typically assigned to panning.
expression	MIDI control message 11 - typically assigned to the expression controller on a MIDI keyboard.
general 1 through 8	MIDI control messages 16 through 23.
MIDI single	Allows selection of any MIDI control number with coarse quantization. Input range is 0 to 127. A third parameter appears, con, which selects the controller number to be used.
MIDI double	Allows selection of any MIDI control number with very fine quantization. Input range is 0 to 16383. A third parameter appears, con, which selects the controller number to be used. <i>Your choices for con are 0 to 31. The MIDI control number con will pass the "coarse" value for the modulation and the MIDI control number con + 32 will pass the "fine" value for the modulation.</i>
chan pressure	MIDI channel pressure message.
pitch wheel	MIDI pitch bend message.
note on	MIDI keyboard note number. Middle C on an 88 note keyboard gives a value of "60."
MIDI program	Triggers when a MIDI program change message is received.



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MIDI Clock

Modulates as a function of the BPM (beats per minute) of a MIDI clock signal. The value of this external controller is:

$$(\text{input BPM}) / 480 = \text{value}$$

so 120BPM yields a value of *0.25*, 96BPM yields a value of *0.2*, and so on. This MIDI message is channel-independent.

MIDI start

Triggers when a MIDI start command is received. This MIDI command is channel-independent.

MIDI stop

Triggers when a MIDI stop command is received. This MIDI command is channel-independent.

External Controller Selection

For all of the above MIDI messages, except for those involving "MIDI clock," if *omni* is set to *on* on the `[mi di]` menu page in the SETUP area, then the MIDI message will be accepted on any channel. Although you can highlight the *channel* parameter here, you cannot change it from *omni*. You must go to the `[mi di]` menu page in the SETUP area to change it.



If *omni* is set to *off* on the `[mi di]` menu page in the SETUP area, then the second parameter on the screen, *channel*, selects which MIDI channel the MIDI message will be accepted on (relative to the *base channel* found on the `[mi di]` menu page in the SETUP area). If the value of *base + x* is greater than 16, the result "wraps" around. For example, if *base channel* were set to 10, and *channel* were set to *base + 12*, the *actual* MIDI channel used would be



$$10 + 12 = 22$$

$$22 - 16 = \underline{6}$$

SIX!

*It's worth noting that MIDI commands are often sent on a MIDI connection only if the command being sent differs from the last command sent. Between the occasional command messages are data messages. A data message pertains to the last sent command message. These are known as "Running Status." You could send a MIDI command message to the DSP7000 with the MIDI parameter on the `[mi di]` menu page in the SETUP area set to *disabled*. If you then change the MIDI parameter to *enabled*, you must re-send the MIDI command message before the MIDI data messages will be accepted. Try sending a different MIDI command to get things started, or try cycling power on your MIDI source.*

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"Automatically" Selecting a MIDI External Controller

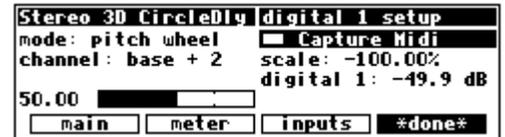
As opposed to "manually" selecting a MIDI controller, along with its proper channel and control number, a feature exists that "captures" the first MIDI message sent to the DSP7000 and uses it as the external controller. This works on both external modulation and external trigger menu pages.

On the upper right-hand side of the screen, you will find a function called `Capture Mi di`. Highlighting this parameter and pressing the `SELECT` key puts the DSP7000 in "Capture" mode. The mode parameter reads "CAPTURE."



The next type of MIDI message received by the DSP7000 will be used for the mode parameter, and the MIDI channel that it is received on will be used for the channel parameter. Of course, if you are in omni mode, the channel parameter will remain omni regardless of what channel the message is received on. To exit "Capture" mode without "capturing" just press the `SELECT` key again.

For example, if on the screen above (set to "Capture" mode) we send a pitch bend message on channel 3, the screen to the right results. The mode is set to `pitch wheel`, and the channel is set to `base + 2`. (Our base channel in this example is 1, so $1 + 2 = 3$. The base channel is selected on the "second" `mi di` menu page in the SETUP area.)



At this point, we have discussed all of the parameters that are relevant to *selecting* an external controller for modulation and triggering. If the external controller you would like to use *doesn't* involve MIDI, simply select it with the mode parameter. If the external controller you would like to use *does* involve MIDI, you have a choice. You can explicitly enter it with the mode parameter, selecting the proper channel and, if you've chosen `MIDI double` or `MIDI single`, selecting the `con number`. Alternatively, you can use the `Capture Mi di` feature, sending the MIDI signal you would like to modulate or trigger with from your MIDI source and letting the DSP7000 figure out the mode, channel, and `con`.

Note: To aid in troubleshooting, you can use the BUSY LED as a "MIDI chaser." With the Memory Card removed, any MIDI signals sent to the DSP7000 at the MIDI In port cause the BUSY LED to flash. If you're trying to send MIDI messages to the DSP7000, but the BUSY LED isn't flashing when you do (and the Memory Card is removed), you know something is wrong with the connections outside the DSP7000!

Scaling the External Controller

The remaining parameters on the external modulation menu page pertain to *scaling* the selected external controller to suit the range of modulation desired.

The horizontal bar graph on the bottom of the left-hand side of the screen displays the current value of the controller you selected in mode on a scale of approximately 1 to 100. Use this bar graph to visually confirm that the external controller you have selected is actually "finding its way" to this menu page. If you manipulate your external controller and this bar graph doesn't change, something is wrong! To see how this works, if you select "mode: `pitch wheel`," jiggle the pitch wheel on your keyboard and then leave it alone, you will see the screen shown above. The bar graph reads 50.00, halfway between full minimum and full maximum.



If you pull the pitch wheel all the way down, you'll get the screen to the right. The bar graph reads 0.00, full minimum.



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If you crank the pitch wheel all the way up, you'll get the screen to the right. The bar graph reads 100.00, full maximum.



The next parameter we come to is `scale`. After all this discussion we may have forgotten that what we're actually doing is *modulating a parameter*, but that *is* what we're doing. And parameters come in all shapes and sizes (like people). For example, we must be able to modulate a delay time from 5 milliseconds to 25 milliseconds with a full rock of the foot pedal just as we must be able to modulate a pitch shift from 0 cents to -4800 cents with a full rock of the foot pedal. The `scale` parameter allows us to do just that (*we had you change scale when modulating Digital 1 so that the external controller could actually modulate it!*).

With `scale` set to 100%, the external controller's range corresponds to the full range of the parameter's values (*different types of parameters will have different "full ranges"*). With various settings of `scale`, the parameter being modulated, and the external controller doing the modulation, it is possible to "pin" the parameter being modulated at its minimum or maximum values. Adjust `scale` or the value of the parameter being modulated to remedy this situation (*see the examples below*). Note: It is also possible to set `scale` to a negative value. Doing so allows the value of the parameter being modulated to *decrease* while the external controller is *increasing*.

The final parameter on the external modulation menu page is just a duplicate of the parameter we're modulating. Its value reflects the applied external modulation, so you can see the result of all your futzing as you futz (*the external modulation's value will be ADDED to the parameter's value*). Additionally, you can adjust the value of the parameter while you futz (we'll see why you'd want to in the examples that follow). *If you modulate a gang of four or more parameters, they will not be shown on the external modulation menu page because there isn't enough room to fit them all!*

There are two ways that you can obtain your desired range of modulation. The first involves educated guesses and the second involves math. First, we'll give an example using the "educated guess" method. *We're going to ditch the Digital 1 parameter we've been modulating thus far. To avoid future headaches, change the mode to off and then press the [*done*] SOFT KEY.*

Load a simple delay program from the "Delays" bank if you would like to follow along. We're going to modulate the delay time in this simple program. Highlight a "del ay" parameter in the PARAMETER area.



Press and hold the SELECT key until the menu page shown to the right appears (*again, we're "remote controlling" this parameter*).



Let's say we want to modulate it with the external controller "mod wheel on MIDI channel 3." We could either directly adjust the mode and channel parameters, or we could use the Capture Mi di feature to select it.



Let's also say that we want the del ay to vary from **100.0 ms** to **300.0 ms**. With the mod wheel at 0 as shown above, we change del ay to 100 ms.



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With scale set to 100.0%, we find we overshoot our desired value of **300.0 ms** when we advance the mod wheel. (*100% scale will take it to its maximum value, in this case 32000.*)



Next, we try 10.0% for scale and find we *still* overshoot big-time when we advance the mod wheel.



After a few more trials, we zero in on 0.63% for scale and hit our target. To escape from this page, press the SOFT KEY.



If you'd like to set the "scale" value in a mathematically precise way, here's the equation to know:

$$(\text{max-parameter-value} - \text{min-parameter-value}) / \text{full-range} = \text{scale}$$

where **max-parameter-value** is the maximum parameter value you would like, **min-parameter-value** is the minimum parameter value you would like, **full-range** is the "distance" between the possible minimum and maximum parameter values, and **scale** is the value of the parameter scale (divided by 100). An example is in order, no?

Let's repeat the above example in a more precise manner.

Let's also say that we want the delay to vary from **100.0 ms** to **300.0 ms**. **100.0 ms** is the **min-parameter-value** and **300.0 ms** is the **max-parameter-value**. With the mod wheel at 0 as shown above, we change delay to 0 ms (its lowest value) and leave scale at 100.0% in order to find out the **full-range** of this parameter.



With scale set to 100.0%, we advance the mod wheel. We can see that the **full-range** of this parameter is 31751 ms.



Now, with the mod wheel at 0 on the bar graph, we can change delay to 100.0 ms.



Recall our equation:

$$(\text{max-parameter-value} - \text{min-parameter-value}) / \text{full-range} = \text{scale}$$

Plug in our values:

$$(300.0 - 100.0) / 31751 = 0.006299$$

In other words, we need to set scale to 0.6299%. Notice that the display then reads 0.63%. Although you don't always see all of the digits you type in the DSP7000, it still stores six significant digits!



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That completes our review of the external modulation menu page. After having investigated all of the parameters on this menu page, we should mention that you will find “stripped down” versions of it scattered throughout the DSP7000.

For example, the program “External Correct” in the “Fix Tools” bank explicitly calls for an external controller. Because the minimum and maximum values have been determined by the program’s designer, that option is absent from the menu page. All that remains is to choose an external controller, and that is done in the same manner as discussed above.



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The Concept Behind "Redirection" - Mods 1-4 and Trigs 1 & 2

"Redirection" allows a program developer to use an external controller in his or her program, while allowing you to assign which *actual* external controller is used. An external controller "placeholder" is used in the program, and you fill in a specific external controller for that "placeholder." Redirection also allows you to select a "placeholder" on an external modulation or trigger menu page. If you select the same "placeholder" on several external modulation or trigger menu pages, you can change the *actual* external controller that fills that "placeholder" by making *one* change. If redirection didn't exist, you would need to go to each and every one of those external modulation or trigger menu pages and change the *actual* external controller manually. *Wow! That's pretty abstract. If it doesn't make sense yet, read this section and then re-read this paragraph.*

There are four external *modulation* "placeholders": *mod 1*, *mod 2*, *mod 3*, and *mod 4*.

There are two external *trigger* "placeholders": *trig 1* and *trig 2*.

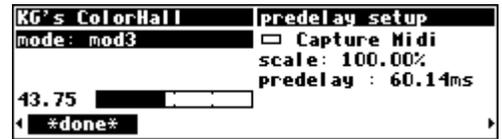
These "placeholders" are selected as the *mode* on external modulation or trigger menu pages littered throughout the DSP7000. For example, *mod 3* can be assigned here. . .



And here. . .



And here. . .



And here. . .

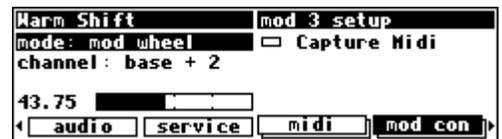


And here. . .



And anywhere. . . You see that a single "placeholder" can modulate or trigger many different parameters.

A single "placeholder" is "filled" by an *actual* external controller at *one* place: the `mod con` menu page in the SETUP area. A single "placeholder" is "filled" by *only one actual* external controller. In the example screen shown to the right, the *actual* external controller `mod wheel` has been selected to "fill" the "placeholder" `mod 3`. Now all of the "and here. . ." example screens shown above would *actually* be modulated by the `mod wheel`!



The `mod con` menu page is "stacked." Press the `mod con` SOFT



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KEY repeatedly to cycle through menu pages for *mod 1, mod 2, mod 3, mod 4, trig 1, and trig 2*. These menu pages behave just like those discussed in *External Modulation and Trigger Menu Pages* on page 39, except that there is no *scale* parameter. This makes sense because a single “placeholder” can be selected to externally control a multitude of parameters. “Scaling” is done on the external modulation or trigger menu pages littered throughout the DSP7000 that have as their mode the “placeholder.”

So, “redirection” allows you to configure your external modulation and trigger menu pages to suit the particulars of your studio/rack setup. Let’s say you frequently use a foot pedal, the pitch wheel, the mod wheel, and MIDI controller 10 (pan) to do external modulations, and MIDI note on and MIDI start to do external triggers. Instead of explicitly assigning all of these external controllers on external modulation and trigger menu pages in the programs that you save, you could instead assign *mod 1, mod 2, mod 3, mod 4, trig 1, and trig 2*. Then go to the **mod con** menu page in the SETUP area and assign the foot pedal to *mod 1*, the pitch wheel to *mod 2*, the mod wheel to *mod 3*, MIDI controller 10 to *mod 4*, MIDI note on to *trig 1*, and MIDI start to *trig 2*.

Here are the benefits: If you take the DSP7000 on the road and need to use different external controllers, you don’t have to re-edit all of the programs you use. Instead, just reassign the “placeholders.” If you take the DSP7000 to a foreign studio with a different set of “convenient” external controllers, you don’t have to re-edit all of the programs you use. Instead, just reassign the “placeholders.” If you get a new sequencer that has different “convenient” controllers than the ones you’ve been using, you don’t have to re-edit all of the programs you use. Instead. . . All right. You get the idea.

Let’s run through an example to make sure we’re clear about what’s going on here.

Let’s highlight **Di g i t a l 1** on the **i n p u t s** menu page in the LEVELS area. Remember to press the DOWN CURSOR key to “ungang” parameters.



Press and hold the **SELECT** key for one second. The menu page to the right appears.

→ To change the “one second hold time,” see *Miscellaneous Setup Options* on page 63.



Set the mode to *mod 3* and *scale* to -100.0%. Then press the ***done*** soft key.



Next, let’s highlight **OUT 1 Wet/Dry** on the **mai n** menu page in the LEVELS area. Remember to press the DOWN CURSOR key to “ungang” parameters.



Press and hold the **SELECT** key for one second. The menu page to the right appears.

→ To change the “one second hold time,” see *Miscellaneous Setup Options* on page 63.



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Set the mode to mod 3 and scale to -100.0%. Then press the ***done*** soft key.

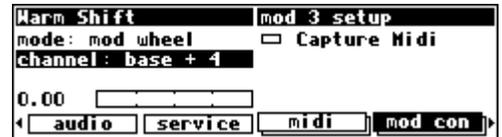


At this point, we've assigned the "placeholder" *mod 3* to modulate both Digital 1 and OUT 1 Wet/Dry. Now, let's "fill in" this "placeholder" with an actual external controller.

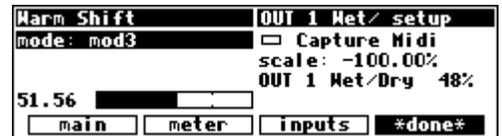
Go to the **mod con** menu page in the SETUP area. Press the **mod con** SOFT KEY repeatedly until you see "mod 3 setup" in the upper right-hand corner.



You can set mode to anything you like; we're going to set it to mod wheel on channel base + 4 (*the omni parameter on the [midi] menu page in the SETUP area needs to be set to off in order to assign a specific channel*).



Now, when you move the mod wheel on MIDI channel "base + 4," both Digital 1 and OUT 1 Wet/Dry are modulated! (*Select the MIDI base channel on the [midi] menu page in the SETUP area.*)



The very first time you switch the DSP7000 on, you will find that mods1-4 are set to high - this is so that any programs which use one of these as a volume control input are not silenced. It is recommended, for the same reason, that, if you change these settings and then want to remove the change, you set them back to high, rather than to off.

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Remote Controlling Parameters

Parameters can be remote controlled via MIDI or the rear panel foot pedal jacks. To remote control a parameter, first highlight it with the cursor. In our example, we're going to remote control the parameter `del ay` in the program "mono del ay" (found in the "Del ays" bank).



With the cursor in place, press and hold the **SELECT** key until the screen changes to the "remote control" menu page. After pressing and holding the **SELECT** key on the parameter `del ay` above, we arrive at the external modulation menu page shown to the right.



This is the same menu page we discussed *ad nauseam* in *External Modulation and Trigger Menu Pages* on page 39. We won't rehash it here.

→ To change the "hold time," see *Miscellaneous Setup Options* on page 63.

We can exit this screen by pressing the ***done*** SOFT KEY. You may notice that the DSP7000 flashes, "Control will be lost if preset is not saved" if the parameter you are remote controlling belongs to a program (as opposed to a "global" parameter such as an input level). This means that you must



<save> or <update> the program to ensure that your remote control will still be there the *next* time you load the program. Of course, if you don't care if the remote control is there the next time you load the program, then don't worry about it!

→ See *Saving a Program* on page 56, and *Updating a Program* on page 57.

Assuming that the `mode` on the above menu page was set to something other than `off` when you exited, `del ay` will be underlined. This indicates that it is remote controlled.



The underline blinks to add an element of fun and excitement to the DSP7000's display and to cheer you up when you're feeling glum. You can return to the remote control menu page by highlighting `del ay` and holding the **SELECT** key again. If you change the `mode` to `off` on the "remote control" menu page, `del ay` will no longer be underlined and nothing will blink.

MIDI Groups

The use of "MIDI groups" allows an alternative way to control the DSP7000 from MIDI, with the minimum of setting up. A MIDI group is a numbered sequence of MIDI controllers, for example 70,71,72...77. When the DSP7000 has been told to respond to this group, these controllers will correspond to the parameters on the DSP7000's screen. This allows a multi-controller such as the Peavey PC1600 to control the DSP7000 with very little configuration required.

For example, referring to the parameter screen at the right, the MIDI group from 70-77 would give you the following results:

70	predel ay	74	hi decay
71	decay time	75	hi freq
72	room size	76	lo decay
73	di ffusi on	77	lo freq



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Each parameter would be controlled over its full range - for example, in this preset `lo freq` has a minimum value of 10 (Hz) and a maximum value of 1000 (Hz). This means that the minimum MIDI value (0) would give you 10 (Hz) and the maximum MIDI value (127) would give you 1000 (Hz).

In this example, using a MIDI *single* controller, the resolution will be limited to the 128 steps offered by MIDI, meaning that the minimum change possible is $(1000-10)/128$ or about 8Hz. MIDI *double* controllers (numbered 0 to 31) will give better resolution.

If you then changed to a different screen, say `main` under LEVELS, the following would apply:

70	OUT 1 Wet/Dry	74	anal og 1
71	OUT 2 Wet/Dry	75	anal og 2
72	OUT 1 Level	76	di gi tal 1
73	OUT 2 Level	77	di gi tal 2

Delay_M	Main Levels
OUT 1 Wet/Dry 100%	anal og 1: -32.0 dB
OUT 2 Wet/Dry 100%	anal og 2: -32.0 dB
OUT 1 Level 0.0dB	digital 1: 0.0 dB
OUT 2 Level 0.0dB	digital 2: 0.0 dB
<code>main</code>	<code>meter</code> <code>inputs</code>

The MIDI group will continue to control whichever screen is displayed. This looks useful - how do we set up such a MIDI group? Move on to the next page

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Configuring the MIDI Group

The last page in the `mi di` menu page 'stack' in the SETUP area controls the MIDI group. This operates just like any of the DSP7000's other controller screens, with some added features:

- The parameters on this screen cannot be controlled by way of the MIDI group. There's a reason for this ...
- The controller number `con` is the first controller number in the group. This is most usefully set up by MIDI capture. See page 43 for more on MIDI capture.
- The group `size` is the number of controllers in the group. For example, in the screen at the right, the group is from 70 to 77. This is a useful location for the group, as these controllers are unassigned by the MIDI specification and not generally used.
- The `active con` displays the number from 1 to group `size` of any member in the group that changes. This is useful as a way of checking that the group is set up correctly and is acting on received MIDI signals.
- If `operation` is normal, the external controller will directly control the parameters on the current screen. This sounds right, but can cause problems when moving from screen to screen. For example, suppose you are using a fader-based controller like the Peavey 1600 and you push the fader all the way up to control, say, a vibrato depth. Then you switch to another screen where the same fader controls the master output level. The minute you touch the fader, the level will go way up and the floor will be covered with bits of loudspeaker. This can be prevented by setting `operation` to `sticky`.
- If `operation` is `sticky`, each member in the group can only be changed by moving the controller through its current position - the value will then *stick*, and respond to further movements of the controller. Looking at the top right of the screen, you will see a small thermometer. The arrow shows the direction to move the controller to pass through the current value, while the vertical bar is the position of the current value. Once the current value has been reached, the thermometer will disappear and you will have full control.
- If `operation` is `2-way`, the DSP7000 will operate in `normal` mode, but will also send MIDI signals out on the same controller channels which can be used to update the external controller. This would mainly be used with a device featuring LED encoders or motor-driven faders to display the effect of changes made at the 7000, for example, when screens are changed.



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PROGRAM LOAD, SAVE, DELETE, ETC.

“...the DSP7000 is like a jungle gym for sine waves...”
-Anonymous

Programs are the “algorithms” used by the DSP to process signals. Programs are stored in the DSP7000 much like files are stored on your computer’s hard drive. Instead of using a hard drive, however, the DSP7000 uses RAM memory, either internally or on a card. (A battery preserves the memory when the DSP7000 is powered down.) The load times are much faster and the unit is more durable and quiet than it would be if a hard drive were used. When you want to use one of the DSP7000’s programs, you “load” it.

You can save a program that is running in two ways:

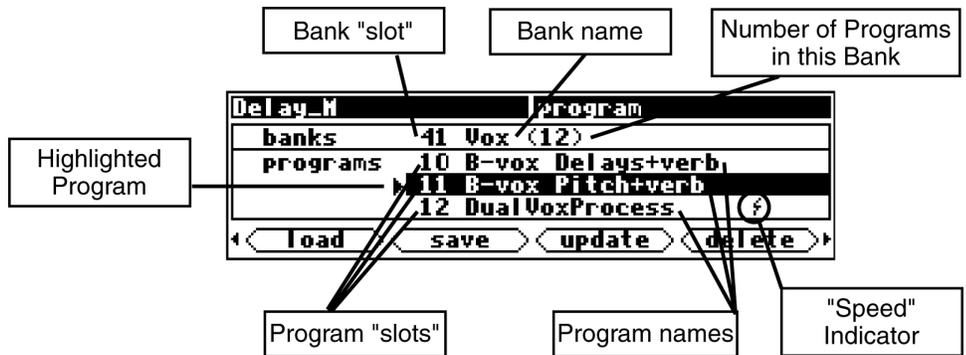
The first is to simply <save> it - you won’t overwrite the old version of the program.

The second way to save a program is to <update> it - you will overwrite the old version of the program.

Of course, you can delete a program from memory if you wish (you will quickly find out that you cannot delete the presets that came with the DSP7000).

Banks

A “bank” is like a manila folder for programs. Instead of just giving you a pile of programs from which to load, the DSP7000’s memory is divided into *banks*. There can be as many as 100 banks in internal memory and 100 banks on a given Memory Card. Each bank has 128 “slots” in



which to store programs. Programs with a common theme are usually stored in a single bank. For instance, you will find a bank of “Delays,” a bank of “Reverb Rooms,” and a bank of “Remix Tools.” To scroll through the available banks, use the LEFT and RIGHT CURSOR keys to place the cursor in the banks field, then spin the KNOB.

To access banks on a Memory Card, simply scroll past all of the internal banks. Alternatively, you can type the “minus” key on the NUMERIC KEYPAD and then the number of the Memory Card bank you want (pressing ENT when you’re done). Notice that a “C” appears in the “banks” field to indicate that the displayed bank is on the Memory Card.

→ See *Memory Cards* on page 25.



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Creating a New Bank or Renaming an Old Bank

As far as the DSP7000 is concerned, there are always 100 internal banks and 100 Memory Card banks. However, you can't save to banks that have never been named. This means that "creating" a bank amounts to naming one that has never been named before.

To name a bank, press the <bank> SOFT KEY in the PROGRAM

area (if you don't see this SOFT KEY, press the PROGRAM key again). Doing so will call up the screen shown on the right. The second line, "bank number," allows you to select the bank "slot" you want to name. If the slot you select has been named at some time in the past or currently has a name, you will be *renaming* it. If the slot you select has never been named before, you will essentially be *creating* a new bank in that slot. The third line, "name," allows you to modify an existing name or enter a new one. The fourth line, "place," determines whether you're naming a bank in internal memory or on the Memory Card. When you are satisfied with the bank number, name, and place, highlight the box next to "save" and press the SELECT key to confirm. If you get cold feet, you can place the cursor over "cancel" and press the SELECT key to abort. You can rename the factory banks if it amuses you, but not the factory programs!

→ See *Entering or Changing Text* on page 17.

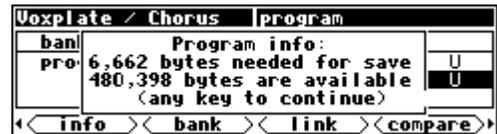


The "Size" of a Program and Its Ramifications for Storage

Finite things overrun the world we inhabit. There is a limit to the space available in the DSP7000 for the storage of programs. Not everything is perfect. Roughly 500 kilobytes of space is available for storing *your* programs internally. A program typically requires between 1 kilobyte and 16 kilobytes of space, so that in the worst case you can store 30 programs in internal memory. A more realistic number might be 100. If that's not enough for you, don't despair! You can save programs on Memory Cards that can contain as much as 4,000 kilobytes of space! And if you fill up one Memory Card, you can always get another.

→ See *Memory Cards* on page 25.

To find out how "large" a program is and how much free space remains either internally or on the Memory Card, press the <info> SOFT KEY in the PROGRAM area. On the screen to the right, the program "Voxplate / Chorus" requires 6,662 bytes of storage space (a "kilobyte" is 1024 bytes). If the bank selected on the screen before you pressed the <info> SOFT KEY was an *internal* bank, then the available space displayed is the available internal space. Similarly, if the bank on the screen before you pressed the <info> SOFT KEY was a *Memory Card* bank, then the available space displayed is the available space on that Memory Card.



Loading Programs

Programs are loaded by first selecting a program to load in the PROGRAM area. You select a program to load by scrolling through banks with the LEFT and RIGHT CURSOR keys in conjunction with the KNOB and then scrolling through programs with the UP and DOWN CURSOR keys. When the program you want to load is highlighted, press the SELECT key, the <load> SOFT KEY, or the ENT key.

→ This is described in excruciating detail in *Using the Cursor Keys and the KNOB in the PROGRAM Area* on page 16.



! NOTE ! Some larger programs, those not marked with a lightning flash, will be unavailable for loading when the system is in high speed mode. In the screen on the right, the line through "BeyondTheStars" indicates the unavailability, the "F!" (for Fast!) tells you why.

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→ See: *Sampling Rates* on page 30 for more information on speed modes.

The last few programs to be loaded are also saved as *links* in the "Favorites Bank," bank 0. This means that you can quickly revisit the programs that you are currently using, without having to look through all the banks to find them again. These *links* are created automatically by the DSP7000, with the most recent programs at the top, and cannot be modified. You can, of course, permanently save your own links or programs in this bank.



AMS DMX Guitar	program
banks	0 Favorites (6)
programs	10 DSP7000 Banks f
	11 AMS DMX Guitar fL
	12 Voxplate / Chorus L

◀ Load ▶ save ▶ update ▶ delete ▶

→ See: *"Linking" Programs* on page 58 for more information on *links*.

Miscellaneous Setup Options on page 63 to change the number of "favorites" displayed.

Loading a Program Remotely

There are two ways to load programs remotely. The first is via a MIDI program change message, and the second is by triggering the DSP7000 to load the next or previous program in the current bank. Let's discuss them in turn, shall we?

Loading A Program Via A MIDI Program Change Message

The DSP7000 will change programs within the current bank upon receiving a MIDI Program Change message. A MIDI Program Change message can be sent by a MIDI keyboard, a MIDI sequencer, or a MIDI foot pedal. Using a MIDI foot pedal on stage makes loading programs a breeze.

The current bank referred to above is the one displayed in the PROGRAM area.

In order for this feature to work, the parameter MIDI on the mi di menu page in the SETUP area must be set to enabled, and the parameter program load on the same menu page must be set to on.

The program that is loaded will be the one whose number is sent in the Program Change message. If the number is not that of a program in the current bank, no program will be loaded.

Note: To aid in troubleshooting, you can use the BUSY LED as a "MIDI chaser." With the Memory Card removed, any MIDI signals sent to the DSP7000 at the MIDI In port cause the BUSY LED to flash. If you're trying to send MIDI Program Change messages to the DSP7000, but the BUSY LED isn't flashing when you do (and the Memory Card is removed!), you know something is wrong with the connections outside the DSP7000!

Changing Banks Via A MIDI Controller Message

To be able to load any given program using a MIDI Program Change message as described above, you may need to change the current bank. This can be done using MIDI Controller #0, which is normally unused. Some MIDI devices may not be able to use MIDI Controller #0, in which case there is a SYSEX (System Exclusive) message that can be used. For information on SYSEX messages, see the Programming Manual.

In order for this feature to work, the parameter MIDI on the mi di menu page in the SETUP area must be set to enabled.

If the current bank is on a Memory Card, the new bank will be selected on the Memory Card, otherwise the new bank will be selected from one of the Internal Banks. If the bank number contained in the MIDI Controller #0 message does not exist, no action will be taken.



AMS DMX Guitar	program
banks	10 Film Atmospheres (3)
programs	10 BeyondTheStars F!
	11 Singularity f
	12 Stratospherics f

◀ Load ▶ save ▶ update ▶ delete ▶

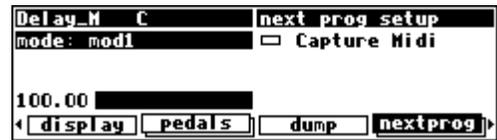
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Triggering the Next or Previous Program To Load

The DSP7000 can also advance to the next program (from the one that is currently loaded) or return to the previous program (from the one that is currently loaded) upon receipt of a “trigger” signal.

On the `nextprog` menu page in the SETUP area, you’ll find an external trigger menu page. The “top” menu page selects a trigger to load the next program, and the “bottom” menu page selects a trigger to load the previous program (press the `nextprog` SOFT KEY to toggle between the two).

→ See *External Modulation and Trigger Menu Pages* on page 39.



The “next” or “previous” program is constrained to the same bank as the currently loaded program. If the currently loaded program is the “highest” program in the bank, a “next” program trigger will load the lowest program in the bank. Similarly, if the currently loaded program is the “lowest” program in the bank, a “previous” program trigger will load the highest program in the bank.

Saving a Program

If you’ve tweaked a program or created your own program, you’ll probably want to store it for future use. If you’ve tweaked a program and don’t want to overwrite the original version, you should use the `<save>` SOFT KEY in the PROGRAM area. Similarly, if you’ve created your own program, there *is* no original version, and again you should use the `<save>` SOFT KEY in the PROGRAM area.

→ If you do want to overwrite the original version of a saved program, use the `<update>` SOFT KEY discussed below.

Pressing the `<save>` SOFT KEY results in the screen shown on the right. The second line of the display, “bank,” allows you to select the bank in which you will save the program. If a Memory Card is in place, the banks on the Memory Card will be accessible as well. The third line, “program number,” allows you to select which “slot” the program will be saved in. The available choices will be all those numbers between 0 and 127 that do not already have a stored program associated with them (so you can’t accidentally overwrite a program with the `<save>` command). The fourth line, “name,” allows you to name the program. Once you’re satisfied with the bank, program number, and name, place the cursor over the “save” line and press the SELECT key to go ahead with the save. If you chicken out, simply place the cursor over “cancel” and press the SELECT key to abort.



Once you have saved the program, it will appear on the PROGRAM screen with a 'U' (for User) at the right-hand side of the screen to help you distinguish your saved programs from factory programs.

→ see *Entering or Changing Text* on page 17.

Copying Programs

To copy a program, simply load it and then `<save>` it where you would like the program copied to. You can copy a program from one place in internal memory to another, from one place on a Memory Card to another, from internal memory to a Memory Card, or from a Memory Card to internal memory.

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Updating a Program

Updating is just like saving, except that updating overwrites the previous version of the program. Pressing the <update> SOFT KEY calls the “pop-up” menu shown to the right. You cannot change the bank or the program “slot” number. This makes sense because you are *necessarily* overwriting the stored version of the program. You do have the option of altering the name, however.



It's worth noting that you cannot update any of the factory presets! If you try, you'll get the message shown to the right. If you want to save a tweaked version of a factory preset, use the <save> SOFT KEY.



Renaming A Program

To rename a program, simply load it and then press the <update> SOFT KEY in the PROGRAM area. Before going ahead with the update, you are given the chance to rename the program. You can't rename the factory presets because you can't <update> them!



Deleting a Program

Because there is a finite amount of storage space in the DSP7000 or on a given Memory Card, you may want to delete some of your stored programs to free up “room” from time to time. To delete a program, go to the PROGRAM area and place the cursor over the program you would like to delete. The program you wish to delete does not need to be loaded.

On the screen to the right, if we were to press the <delete> SOFT KEY, we would be deleting the program “Delay_M C.” (It doesn't matter that it's not currently loaded!)



Actually pressing the <delete> SOFT KEY would result in the screen to the right. Your only choices are to “delete” by placing the cursor over “delete” and pressing the SELECT key, or to abandon the operation by placing the cursor over “cancel” and pressing the SELECT key.



Factory presets are distinguished from your saved presets by the lack of a 'U' at the right-hand side of the screen. You can't delete any of the factory presets. Go ahead, try. . .



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"Linking" Programs

(Allowing Programs that are *Actually* Saved in Multiple Banks to *Appear* as Though They are Saved in the *Same* Bank.) Saving programs in an orderly fashion in a single bank can facilitate many tasks. One such task would be the loading of programs on stage. Who wants to go scrolling hither, thither, and yon, searching among hundreds of programs for the solo effect that has to happen **NOW**? In such a situation, you'd like to save all of the programs you'll use in the show in one bank in the order they'll be used. But, if all of the programs you'll use in the show are already saved elsewhere in the DSP7000, won't *re-saving* them to the "Live bank" waste a lot of precious storage space? Yes, Watson, it would, but we can circumvent that problem by *Linking* programs to the "Live bank."

→ You can read about remotely loading programs in *Loading a Program Remotely* on page 55.

A *link* requires a paltry 38 bytes of storage space (recall that the smallest of programs require around 1000 bytes !). In reality, the link tells the DSP7000 where the program of interest is *actually* saved, but as far as you're concerned, the link *is* the program of interest.

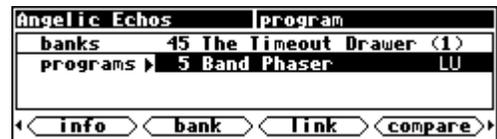
To link a program, first go to the PROGRAM area. Select the bank where you would like a link to show up. In our example, we'll place a link in the bank called "The Timeout Drawer."



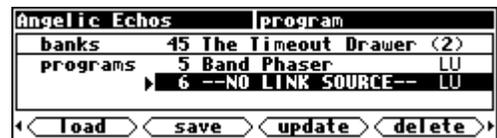
Press the <link> SOFT KEY to reveal the "pop-up" menu shown on the right. Find the program you want to link to with the second and third lines, "bank" and "program." Select the "slot" you would like the link to appear in with "program number." In our example, we're linking to the program "Band Phaser" that is located in the "Phasers" bank. The link itself will be found in "slot" number 5 in the bank called "The Timeout Drawer." Place the cursor over "link" and press SELECT to confirm, or place the cursor over "cancel" and press SELECT to abort.



Unlike ordinary program names, an "L" follows a link name to let you know that it is, in fact, a link. You can delete a link just as you would delete an ordinary program, and doing so will have no effect on the "linked" program. If you load a program through a link and later chose to <update> that program, the *actual linked program is updated!*



If a link is made to a program that is later deleted, the file name will no longer be shown. Instead, the phrase -- NO LINK SOURCE -- is displayed. Additionally, if a link is made to a program on a Memory Card, the file name will not be shown while the card is removed. Instead, the phrase -- NO LINK SOURCE -- will again be displayed. Reinserting the Memory Card will restore the link. If you create a link in an internal memory bank to a program on a card and then happen to insert a *different card* that has a program in the same bank and slot number, the link on internal memory then will refer to the program on the different card. Since this is probably not your intention, we recommend either taking care to put links only on the card that contains the program to which they refer, or to use different bank numbers on different cards.



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Comparing a Currently Loaded Program With The Original (Saved) Version

Are you a pathological tweaker? Yeah, I know the story, first you started tweaking only at large social gatherings - when the whole band was in the control room tweaking away. But then it became a little more serious: you started tweaking in the evenings after the band had gone home. Now you even tweak in the mornings! When confronted you say, "I just need to adjust the threshold *one more time*. Then I'll stop. I swear!" You're only kidding yourself...

To keep you honest, the DSP7000 comes with a "compare" feature. It allows you to compare your tweaks with the original, saved program. You can then determine if your tweaks are helping or, God forbid, hurting the situation.

Press the PROGRAM key a few times until you see the <compare> SOFT KEY. Then press it. Notice that the cursor does not need to be highlighting the program you wish to compare (i.e., the program that is loaded - Angelic Echos).

Angelic Echos		program
banks	41	Vox (12)
programs	▶ 10	B-vox Delay+verb
	11	B-vox Pitch+verb
	12	DualVoxProcess f
◀ info		▶ bank ▶ link ▶ compare ▶

Once you've pressed the <compare> SOFT KEY, the DSP7000 will be running the original, saved version of the program. Notice that the upper left-hand side of the display reads "ORIGINAL-PROGRAM"

ORIGINAL-PROGRAM		program
banks	38	Shifters Unusual (23)
programs	0	Angelic Echos U
	▶ 10	Angelic Echos
	11	Chim-Chiminee
◀ info		▶ bank ▶ link ▶ compare ▶

To return to your tweaked version, simply press <compare> again. You may have noticed that the first time you compare, the DSP7000 displays the message: "Any changes to original will be lost if not <save>d." This is a warning. You can, if the spirit moves you, make changes to parameters in the ORIGINAL-PROGRAM. However, when you press <compare> again to return to the tweaked version, those changes will be lost. If you want to avoid losing those changes, you must <save> the ORIGINAL-PROGRAM before pressing <compare> again. But the Eventide Department of Sociology suggests a better solution:

"Scientific studies reveal that the primary reason DSP7000 users feel compelled to change parameters on the ORIGINAL-PROGRAM is because their 'tweaked' version was heading down the wrong path. If you compare your tweaked version to the original and find that the original is better, simply reload the program before you resume your tweaking. That way, the <compare> function will still be open to you!" -EDS

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PARAMETERS

*"I can't tell you what a parameter is, but I'll know it when I see it."
-US Supreme Court*

The PARAMETER area is special in that the menus change to reflect the options available in the currently running program. The number of menu pages and their content vary from program to program. Consequently, very little can be said about parameters generally. But that's not much of a liability; parameters are easy to understand as you encounter them.

Angelic Echos		delay params	
level :	0 db	depth :	2.0 ms
delay1 :	500 ms	rate :	0.01 hz
delay2 :	500 ms	hicut :	3997 hz
fback :	80 %		
delay		pitch	
verb		info	

Many, but not all, of the programs in the DSP7000 support an "expert mode" feature. The expert mode parameter controlling this feature is found on the `misc` menu page in the SETUP area (you may have to press the SETUP key a few times to find it). A setting of 0 *hides* all but the most relevant menu pages in the PARAMETER area. Conversely, a setting of 9 *reveals* all of the available menu pages in the PARAMETER area. Settings between 0 and 9 reveal a proportionate amount of menu pages in the PARAMETER area.

Angelic Echos		misc setup	
key hold :	1.0 sec#	favorites :	8
expert mode :	0		
wordclock :	no		
extra sync :	yes		
misc			

Leave expert mode at 9 if you like lots of parameters to tinker with, at 0 if you find lots of parameters annoying, or somewhere in-between if your tastes fall somewhere in-between.

While most parameter types are self-explanatory, there are a few special types that deserve specific mention:

Taps

Several programs use a tapped delay line. For a particular "tap," the UP and DOWN CURSOR keys select among three parameters:

- `dl y` adjusts the delay position of a particular tap (the number of milliseconds before the tap)
- `l v l` adjusts the level of a particular tap
- `pan` adjusts the stereo pan position of a particular tap

Multitap Delay		multitap parameters	
tap:	0		
dlc:	10.14		
lvl:	-39.0		
pan:	-1.00		
multitap		info	

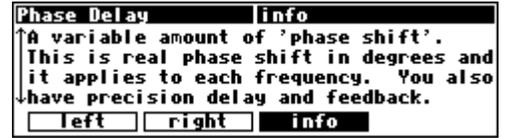
Use the LEFT and RIGHT CURSOR keys to select the particular tap for which you're adjusting parameters. The graphic to the right of the parameters represents the delay position and level of every tap in the bunch.

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Textblocks

All right, maybe a “textblock” isn’t really a *parameter*, but you’ll find it hiding among parameters, so we might as well discuss it here. You’ll typically find these creatures on an `info` menu page in the PARAMETER area. As the name suggests, this is just a block of text that you can read for your own enlightenment. If all of the text fits on the screen, that’s the end of the story. If, however, all of the text *doesn’t* fit on the screen, you’ll see a double-headed arrow to the left of the text.

Turning the KNOB scrolls the text so you can read the rest.



Graphics and Curves

Several programs use an interface reminiscent of an analog graphic equalizer. Two parameters are used, an x value and a y value. The x value is the horizontal position of the currently selected graphical point, and the y value is the vertical position of the currently selected graphical point. In our example to the right, the x value is 12500 Hz, and the y value is 0.0 dB. With the cursor in the y field (as shown above), the LEFT and RIGHT CURSOR keys change the x value, while the KNOB and NUMERIC KEYPAD change the y value. With the cursor in the x field, the LEFT and RIGHT CURSOR keys, the KNOB, and the NUMERIC KEYPAD all change the x value. Use the UP and DOWN CURSOR keys to move between the graphic interface and other parameters on the screen.



For example, pressing the LEFT CURSOR key several times on the screen above would change the x value and result in the screen to the right.



Spinning the KNOB on the screen above would change the y value and result in the screen to the right.



Pressing the DOWN CURSOR key on the screen above would move the cursor from the graphic interface to the mast parameter.



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Storing and Loading Setups

As you will have deduced from reading the foregoing text, there are many adjustments you can make to the DSP7000. Wouldn't it be nice if you could save them somewhere, both to get back to the same state at a later date, or to make another DSP7000 behave the same as yours? You can!

Access the Setup Storage area by *holding down* the **PROGRAM** key for one second. The LED next to the PROGRAM key will begin to blink and the upper right-hand portion of the screen will read "setup."



Here we find four SOFT KEYS which in general behave as they do in the PROGRAM area, except that there are only two "banks" (Internal and Card).

- <load> loads saved setup configurations
- <save> saves setup configurations *without* overwriting the last setup configuration that was loaded
- <update> saves setup configurations by overwriting the last setup configuration that was loaded
- <delete> deletes stored setup configurations from memory

→ See *Loading Programs* on page 54, *Saving a Program* on page 56, *Updating a Program* on page 57, and *Deleting a Program* on page 57 for more details.

→ To change the "one second hold time," see *Miscellaneous Setup Options* on page 63.

There is one difference between *saving a setup* and *saving a program*. It is possible to choose whether, when the setup is reloaded, it will automatically load the programs that were loaded when it was saved. This brings the machine state as close as possible to that when it was saved. To do this, set *with programs* to yes.



A few things to be aware of:

- The programs are not saved as part of the setup, so they must still exist on the machine.
- After loading a setup, a small number of noncritical settings, such as screen brightness, will not be restored until the system is restarted.

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Miscellaneous Setup Options

The `misc` menu page in the SETUP area contains a number of assorted setup options that are unrelated to the other pages.

Key hold is the time for which a key must be held down to trigger Key Hold functions, such as:

Setup Storage on page 11

Remote Controlling Parameters on page 50

```
Angelic Echos  misc setup
key hold:      1.0 sec# favorites: 8
expert mode: 0
wordclock:    no
extra sync:   yes
misc
```

Expert mode allows more or less information to be displayed on certain programs, as well as hiding some warning messages, depending on its setting. For more information, see page 22.

wordclock and extra sync involve external synchronization and are discussed in "Selecting The External Clock" on page 33.

favorites allows the user to control the number of "most recently used" programs shown as links in the "Favorites Bank." The default value of 8 is usually a good setting. If it is set to zero, none will be shown - this will make sure that nobody knows which programs you've been using....

→ See *Loading Programs* on page 54 for more information.

APPENDIX A -UTILITIES

TRANSMITTING AND RECEIVING DATA

Setting Up the Serial Port

The serial port can be used to transmit data between the DSP7000 and a computer or between the DSP7000 and another DSP7000. It is an IBM PC type RS232 connector, which looks like a modem or printer to a connected computer. You can set up the serial port's parameters on the "third" `mi di` menu page in the SETUP area. Repeatedly press the `mi di` SOFT KEY until you see the menu page shown to the right.

```
Low Res Digital serial setup
serial: enabled parity: none
baud rate: 38400
data bits: 8
stop bits: 2
audio service midi mod con
```

The first parameter, `serial`, determines whether the serial port is `enabled` or `disabled`. If set to `disabled`, messages will neither be sent out the serial port nor accepted at the serial port. The second parameter, `baud rate`, determines the speed at which messages will be sent out the serial port *and* the speed at which the DSP7000 expects to receive messages at the serial port. Similarly, `data bits`, `stop bits`, and `parity` all describe aspects of the messages sent out the serial port *and* aspects of the messages that the DSP7000 expects to receive at the serial port.

For things to work properly, these last four parameters must be set to the same values on both the DSP7000 and the machine connected to the serial port. Higher baud rates result in faster transmission times, but most machines have a ceiling above which errors occur. So, set the baud rate to the highest value you can on both the DSP7000 and the machine connected to its serial port that results in error-free transmissions.

The `data bits` are normally set at 8, the `stop bits` are normally set at 2, and the `parity` is normally set at none. You should only need to stray from these values if the device the DSP7000 is communicating with is constrained to some other values. If that is the case, change the values on the DSP7000 to match the other device.

To aid in troubleshooting, the BUSY LED will illuminate when data is transferred at the serial port, provided no memory card is in place. *If the serial port is "enabled," messages sent out the MIDI Out port are also sent out the serial port. Note: If both the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port not receiving the command to be ignored until the command is complete.*

The pin-out for the serial port is:

1 DCD	
2 RXD	6 DSR
3 TXD	7 RTS
4 DTR	8 CTS
5 gnd	9 nc

For most applications, only pins 2,3, and 5 need be connected.

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Dumping Data and Receiving Data Dumps

You can “dump” data from the DSP7000 for external storage or for use in another DSP7000. To dump, go to the `dump` menu page in the SETUP area. The dumped data will be system exclusive and will be sent out the MIDI Out port and the serial port. None of the MIDI parameters on the `mi di` menu page in the SETUP area has any bearing on dumps except for the device ID. The device ID is used as part of the system exclusive messages in the dump. While the dump is occurring, a running display of the number of bytes sent is presented for those keeping score at home. You can reload the dumped information into the DSP7000 by presenting it at the MIDI In port or the serial port (*provided system exclusive is set to on and MIDI is set to enabled on the [mi di] menu page in the SETUP area*). Let’s look at the five “types” of dumps.



- `dump program` This function dumps the currently running program. If received at the MIDI In port or at the serial port, the DSP7000 will load the received program.
- `dump setup` This function dumps the state of the DSP7000, covering all of the parameters covered in the SETUP area.
- `dump files` This function dumps all *setups* and *programs* stored in internal memory. *Note: The factory presets are not dumped by this function.* If received at the MIDI In port or at the serial port, the DSP7000 will erase all of your saved setups and saved programs and replace them with the received setups and programs. *Note: The current setup and the currently running program will not be altered.*
- `dump card` This function dumps all setups and programs stored on the Memory Card. If received at the MIDI In port or at the serial port, the DSP7000 will erase your Memory Card and replace its contents with the received setups and programs. If there is no Memory Card in place or if the Memory Card is too small, the incoming data is ignored.
- `dump internal` This function dumps the contents of the internal memory. This is the same as using `dump files`, `dump setup`, and `dump program`. It dumps all the setups and programs stored in internal memory, along with the current setup and the current program. If received at the MIDI In port or at the serial port, the DSP7000 will replace all of its setups and programs, load the new program, stop all operations and start as if from power-up, using the new setup and programs.

If the device to which you sent the dump has the ability to send it back again (such as a sequencer), you can use this as a way to “back up” your DSP7000.

WARNING: If, for any reason, this dump gets corrupted in some way and you send it back to the DSP7000, you will lose all the information you are trying to back up, as well as the DSP7000's contents. If you do a “backup” in this way, especially to a computer, it would be a good idea to do it twice, to two separate files, and then to compare the files. If they are identical, it’s a good indication that the data sent from the DSP7000 has been recorded accurately.

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Controlling One DSP7000 from Another DSP7000

The DSP7000 can send system exclusive messages detailing all changes to its parameters, both effects-program specific and SETUP values. The DSP7000 is designed so that a sequencer can receive and then play back these values to the same DSP7000, but we can also use this feature to slave one DSP7000 to another.

To slave one DSP7000 to another:

- set the parameter `sequence out` found on the `mi di` menu page in the SETUP area to `off` on the “slave.”
- On the same menu page, set the parameter `sequence out` to `on` on the “master.”
- On the same menu page, set the parameter `MIDI` to `enabled` on both units.
- On the same menu page, set `system exclusive` to `on` for both units.
- On the same menu page, set `device ID` to a common value for both units.
- Connect either the MIDI Out port of the “master” to the MIDI In port of the “slave” or connect their serial ports. (Using the serial ports will require a special *null modem* cable, with pin 2 of each end connected to pin 3 at the other, and vice versa.)

Now, changes made on the “master” are echoed on the “slave.” Be sure to leave `sequence out` to `off` on the “slave” or MIDI “feedback” will lock up the DSP7000s in a very bad sort of way.



Sending A Program From One DSP7000 to Another

To send a program from one DSP7000 to another, turn `sequence out` to `off` on the `mi di` menu page in the SETUP area on both DSP7000s. On the same menu page, change the `device ID` of each of the DSP7000s so that they agree. Then connect their serial ports or connect the MIDI Out port of the “sender” to the MIDI In port of the “receiver.” Make sure the program you would like to send is running on the “sender.”

→ To read about using the serial ports, see *Setting Up the Serial Port* on page 64.

On the “sender,” highlight `dump program` on the `dump` menu page in the SETUP area and press the SELECT key. The program will be loaded on the “receiver.” Before doing anything else, you should change the `device ID` of one of the DSP7000s so that it is no longer the same as the `device ID` of the other. Failure to do so *could* cause problems later if `sequence out` gets set to `on` on both the DSP7000s!



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Sequencing With MIDI

Most MIDI sequencers will receive system exclusive messages and store them for later playback on the originating instrument. The DSP7000 fully supports this. Instead of sending keyboard presses and knob turns, the DSP7000 sends “parameter change messages.” When a sequencer sends a “parameter change message” back to the DSP7000, the corresponding parameter is adjusted. This is true whether the display is showing the parameter or not. Further, you can operate the front panel of the DSP7000 as you normally would *while* it’s receiving “parameter change messages” from a sequencer.

To actually sequence, set `sequence out` (on the `mi di` menu page in the SETUP area) to on. Every time a parameter is changed, a corresponding message is sent out the MIDI Out port and the serial port as a system exclusive message. By recording parameter changes to a MIDI sequencer, you can automate your mixdowns.



Simply play back the recorded MIDI sequence at the DSP7000’s MIDI In, and you will see the changes you recorded “played” by the sequencer (*assuming MIDI is enabled, system exclusive is on, the program that was loaded when the sequence was recorded is loaded during playback, and the device ID set during recording is set during playback*). However, if you manage to configure the MIDI connections between your various pieces of equipment such that the “system exclusive, sequence out” MIDI messages of the DSP7000 loop back into the DSP7000 without delay, digital demons will unleash a raging fury inside your helpless DSP7000. So, make sure that doesn’t happen! If you aren’t actively using the `sequence out` feature, it’s wise to leave it off. *By leaving sequence out on and system exclusive off while recording a sequence, and sequence out off and system exclusive on while playing the sequence back, you can eliminate the possibility of those digital demons dancing their mean dance in the DSP7000! However, doing this would render the “echo” feature discussed below useless.*

All adjustments made to the DSP7000 while the parameter `sequence out` is set to on are sent out the MIDI Out port and the serial port (not including Patch Editor commands). This includes any changes received at the MIDI In port. If the MIDI sequencer is sending data to the DSP7000 and receiving data from the DSP7000 *at the same time*, it will receive an “echo” of the commands it sends to the DSP7000. This means that if you change something on the DSP7000 while sequencing (and echoing), then your changes will also be sent with the echo information to the sequencer. This might be useful for editing or touching-up a sequence.

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CONNECTING USER-SUPPLIED CRYSTALS AND EXTERNAL CLOCKS

External Clock

An external TTL level clock at 256 times the desired sample rate may be used as a synchronization source. It should be connected to J402 on the DSP7000's motherboard. This signal should have low jitter and well-controlled edges for proper operation. Its use is not recommended for sample rates above 50kHz.

See *Using an External Clock* on page 33 for information on using External Clocks.

Since this socket connects directly to the DSP7000's internals, incorrect usage may damage the DSP7000's circuitry and is NOT covered by the Warranty.

- **Pin Connections**

- (1) Clock
- (2) Gnd
- (3) 5v at 100mA maximum

User-supplied Crystal Oscillators

A user-supplied crystal oscillator may be installed to give sample rates beyond those offered by the DSP7000, such as 32kHz or 44.056kHz. This oscillator should be installed in the socket at location Y401 on the DSP7000's motherboard. The oscillator should run at 256 times the desired sample rate and should be similar to the "Fox" 1100E type used elsewhere on the motherboard. (Fox Electronics, Florida, tel: 813 693 1554.)

See *Miscellaneous Setup Options* on page 63 to enable the use of User-supplied Crystal Oscillators.

Since this socket connects directly to the DSP7000's internals, incorrect usage may damage the DSP7000's circuitry and is NOT covered by the Warranty.

- **Pin Connections** (based on 14 pin DIP socket)

- (1) no connection
- (7) Ground
- (8) output
- (14) 5v at 100mA maximum

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SERVICE AND START-UP OPTIONS

Fixing Internal Memory Problems

The DSP7000 uses solid-state memory circuits to store programs and setup information. These circuits use a long-life battery to keep them alive while the DSP7000 is turned off. Whenever the computer in the DSP7000 updates that memory, it performs an operation called a “checksum” and stores the result. A checksum is a calculation whose result characterizes what is stored in memory. A second run of the checksum calculation should result in the same characterization, *if the memory hasn't changed*. When the DSP7000 is turned on, it runs a checksum calculation on the memory and compares the result against the stored result. If there is a discrepancy, the DSP7000 reports an error.

In the unlikely event that an “internal memory checksum error” occurs, there may be a critical problem with what is stored in memory. The service function `fix internal` on the `service` menu page in the SETUP area will remove the checksum error by forcing the new checksum result to be saved. This will not get rid of the corruption in the data, however.



After pressing the SELECT key on the above menu page, you will arrive at the menu page shown to the right. If you want to go ahead with the procedure, press the <yes> SOFT KEY. Otherwise, press the <no> SOFT KEY.



Now, you can assume that the “checksum error” was no big deal, get a cup of coffee, and go back to work (not advised) OR you can assume something nasty is going on and take immediate action (advised). Assuming you take the latter (smart) course of action, the first thing you'll want to do is to save all of your important programs and setups to a card (see *Copying Programs* on page 56) or to an external storage device (see *Dumping Data and Receiving Data Dumps* on page 65).

Then return to the `service` menu page in the SETUP area.

Highlight `format internal` and press the SELECT key. You'll arrive at the screen shown to the right. Pressing the <yes> SOFT KEY will delete everything *you* have stored in the DSP7000, returning it to the state in which it left the factory. Pressing the <no> SOFT KEY will abort the mission.



Internal memory “checksum errors” should occur infrequently, if ever. Should they occur more frequently than “infrequently,” contact Eventide, as something is definitely amiss.

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Fixing Memory Card Problems

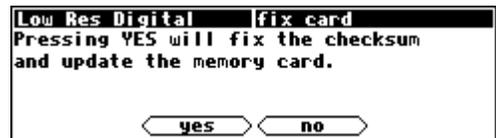
If a Memory Card “checksum error” occurs, your Memory Card has been corrupted in some way. It is possible that there is no loss of data. Memory Cards can be corrupted by static electricity, shock, a loose battery, older siblings, a weak battery, incorrect insertion into the DSP7000, use in some other computer, or myriad other causes. As a result, a Memory Card “checksum error” should not *immediately* send your heart into your mouth (although an internal checksum error probably should). Regardless of whether you are concerned about a Memory Card “checksum error” or not, you should “fix” the checksum.



Go to the service menu page in the SETUP area.



Highlight fix card and press the SELECT key. Press the <yes> SOFT KEY to force the new checksum result to be saved. If data is in fact corrupted, this will not fix it. Press the <no> SOFT KEY to abort.



If you are worried about the contents of the Memory Card, you should either dump the contents of the Memory Card to an external storage device (see *Dumping Data and Receiving Data Dumps* on page 65) OR copy all valuable internal programs and setups to a different Memory Card, copy the faulty Memory Card's programs and setups to internal memory and then to another Memory Card (see *Copying Programs* on page 56). Finally, return to the service menu page in the SETUP area.



Highlight format card and press the SELECT key. Pressing the <yes> SOFT KEY will erase the contents of the Memory Card and reformat it. Press the <no> SOFT KEY to abort.



You might also put a label on the card (using adhesive tape, indelible marker, etc.) indicating that a problem occurred along with the date. Keep track of this kind of problem and make multiple backup copies. Have you been introduced to Mr. Murphy? He's got this law that says. . .

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Changing the Internal Battery

A small button-type battery is mounted internally and powers the DSP7000's memory when the power is off. This should last about five years before it needs to be changed, longer if the DSP7000 is left powered up much of the time. The number of hours for which the unit has been operating, powered and unpowered, can be found under SETUP/service/information.

This battery should be replaced by a **qualified technician only** since it must be replaced when the DSP7000 is powered up in order to preserve the internal memory contents. Contact your Eventide Service Center to have this battery replaced.

IMPORTANT SAFETY NOTICE FOR LITHIUM BATTERY:

- ❑ Danger of explosion if battery is incorrectly replaced.
- ❑ Replace only with same or equivalent type recommended by manufacturer.
- ❑ Dispose of battery according to manufacturer's instructions.

Clear Setup

At the factory, all of the adjustable parameters in the DSP7000 are set to nominal values called "factory defaults." To return these parameters to their "factory defaults," go to the `service` menu page in the SETUP area. Highlight `clear setup` and press the SELECT key. Pressing the `<yes>` SOFT KEY will replace current parameter values with the "factory defaults." *Unless you saved your setup before pressing <yes>, it will disintegrate into digital dust (see Storing and Loading Setups on page 62).* Press the `<no>` SOFT KEY to abort. The parameters affected include:



- everything in the LEVELS area.
- everything in the SETUP area.

If the DSP7000 ever gets "buggy," try using `clear setup` before you do anything more "drastic." It is usually wise to perform a `clear setup` after installing a new version of software.

Software Version and Accessories

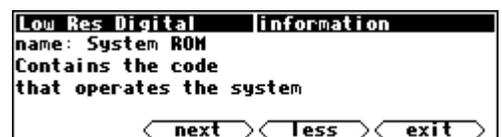
The DSP7000 has expansion and upgrade capabilities. "Information" menu pages allow you to keep track of what options are inside your DSP7000 without having to open the box. To access the "information" menu pages, go to the `service` menu page in the SETUP area.



Highlight `information` and press the SELECT key to get a screen that looks something like the screen to the right.



The `<more>` SOFT KEY reveals additional information pertaining to the current page. The `<less>` SOFT KEY returns from the additional information.



The `<next>` SOFT KEY advances to the next menu page, `<last>`



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returns to the previous menu page, and <exit> returns to the ser-
vice menu page in the SETUP area.

One important piece of information to be found in this area is your DSP7000's *Electronic Serial Number*, which is the first 8 digits of the Hardware ID number on the screen to the right. You may be asked for this by a dealer or an Eventide representative. The Time/Date figures are not currently used, so their values are unimportant.



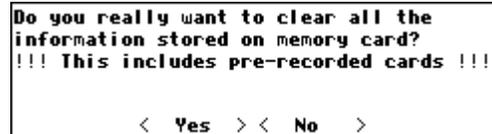
Start-Up Options

There are several "secret keys" that can be depressed during startup to perform special functions. These keys should be pressed and held down during the second "start-up screen" - the one with the "DSP7000" in large text. You can release the key once the appropriate "special screen" appears.

Special Key

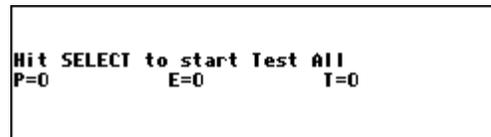
Function

- Erase the Memory Card. Press the <Yes> SOFT KEY to go ahead or <No> to abort.

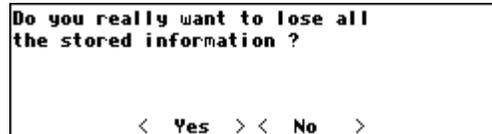


CXL Bypass start self tests. The DSP7000 will skip from "Powering On..." directly to "Initializing." When the "Initializing..." message appears, you can let go of the CXL key. This facility is a timesaver to allow the DSP7000 to power up more quickly.

5 Run factory self test programs (**do not play with these, as some can erase internal setup and programs !!!**). See separately available service manual for more details on these tests.



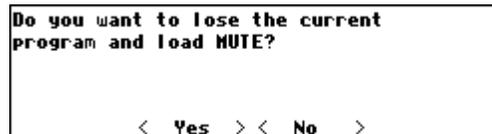
8 Clear internal programs and setup. This key does the same thing as format internal on the service menu page in the SETUP area.



The purpose of this special key is to initialize the unit at the factory, or to fix a memory problem that might prevent the unit from working correctly. Press the <Yes> SOFT KEY to go ahead or <No> to abort. The need for this operation should be quite rare. If problems arise that require its use more than once, the factory should be contacted.

PROGRAM

Loads "Mute" instead of the current program. Press the <Yes> SOFT KEY to go ahead or <No> to abort. This function is used in the rare event that the last-run program caused the unit to lock up.



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ELECTRICAL SPECIFICATIONS

Sample Rates

96kHz, 88.2kHz, 48kHz, 44.1kHz or external.

Frequency Response

<i>Sample Rate</i>	<i>44.1kHz</i>	<i>48kHz</i>	<i>88.2kHz</i>	<i>96kHz</i>
+0/-0.1dB	20Hz-20Khz	20Hz-22kHz	20Hz-41kHz	20Hz-44kHz
+0/-3.0dB	5Hz-21Khz	5Hz-23kHz	5Hz-42kHz	5Hz-46kHz

Digital Inputs/Outputs

Stereo AES and S/P DIF at 44.1-96kHz. AES relay bypass at power down.

Analog Input (XLR Balanced Inputs)

Impedance 20kOhm, bridging
Full Scale Input Level 26dBu
Dynamic Range >105dB
Signal to Noise Ratio >105dB, A-weighted
THD+N <0.0025% @ 1Khz, -3dBFS
Crosstalk <-100db @ 20 Hz to 20kHz, -1dBFS

Analog Output

Impedance <50Ohm
Full Scale Output Level 26dBu
Dynamic Range >105dB
Signal to Noise Ratio >105dB, A-weighted
THD+N <0.0025% @ 1Khz, -3dBFS
Crosstalk <-100db, 20 Hz to 20kHz, -1dBFS

Remote Control Inputs

Up to 2 foot pedals (or 0-5V control inputs), or 6 footswitches, or combination.

Remote Control Outputs

2 isolated relay closures, rated at 1A 30VDC.

MIDI Connections

5 pin DIN output and thru.
7 pin DIN input with output capability.

Memory Card Interface

68 pin PCMCIA 2.0/JEIDA 4.0. Supports type 1 and 2 SRAM cards up to 4MB for data storage.

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Factory Preset Capabilities (at 48k sampling)

Pitch shifting:	up to 4 voices
Compressor/limiter:	up to 4 instances
Equalization:	up to 128 bands parametric single input, 64 bands at 2 channels
Sampling with time compression:	up to 174 seconds mono (DSP7500 only)
Digital delay:	up to 87 seconds mono (in addition to any installed sampler)

Power

100 watts 100-125V, 220-240V, AC 50/60Hz

Size

Inches: 3.5h x 19w x 12.5d

Cm: 8.9h x 48.3w x 31.7d

Weight:

12 pounds (5.5 Kg) net

17 pounds (8Kg) shipping weight

All specifications are subject to change or improvement at any time without notice or obligation.

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WARRANTY INFORMATION

DSP7000 and DSP7500

LIMITED WARRANTY

The above-identified Eventide unit covered by this warranty is built to exacting quality standards and should give years of trouble-free service. If you are experiencing problems which are not cleared up or explained as normal in the manual, your recourse is this warranty.

What the warranty does and does not cover

Eventide Inc. warrants the above-identified unit to be free from defects in workmanship and material under normal operation and service for a period of one year from the date of purchase, as detailed below. At our discretion within the warranty period, we may elect to repair or replace the defective unit. This means that if the unit fails under normal operation because of such defect, we will repair the defective unit at no charge for parts or labor. We also assume a limited responsibility for shipping charges, as detailed below.

The warranty does not extend beyond repair or replacement as stated herein and in no event will we be responsible for consequential or incidental damages caused by any defect, and such damages are specifically excluded from this warranty. Our sole obligation is to repair or replace the defective unit as described herein.

The warranty DOES NOT COVER any damage to the unit regardless of the cause of that damage. The unit is a complex piece of equipment that does not react well to being dropped, bounced, crushed, soaked or exposed to excessively high temperatures, voltages, electrostatic or electromagnetic fields. If the unit is damaged for these or similar causes, and the unit is deemed to be economically repairable, we will repair it and charge our normal rates.

The warranty DOES NOT COVER shipping damage, either to or from Eventide. If you receive a new unit from us in damaged condition, notify us and the carrier; we will arrange to file an insurance claim and either repair or exchange the unit.

If you receive a new unit from a dealer in damaged condition, notify the dealer and the carrier.

If we receive the unit from you with apparent shipping damage, we will notify you and the carrier. In this case, you must arrange to collect on any insurance held by you or your carrier. We will await your instructions as to how to proceed with the unit, but we will charge you for all repairs on damaged units.

Who is covered under the warranty

The warranty applies to the original purchaser of a new unit from Eventide or an Authorized Eventide Dealer. Demo units are also covered by this warranty under slightly different circumstances (see below). Units that are used, or have been used as part of a rental program, are not covered under any circumstances.

It is your responsibility to prove or to be able to prove that you have purchased the unit under circumstances which effect the warranty. A copy of your purchase invoice is normally necessary and sufficient for this.

If you have any questions about who is an Authorized Eventide Dealer, call us.

Units with the serial number plate defaced or removed will not be serviced or covered by this warranty.

When the warranty becomes effective

The one-year warranty period begins on the day the unit is purchased from an Authorized Eventide Dealer or, if the unit is drop-shipped from Eventide, on the day shipped, plus a reasonable allowance for shipping delays. This applies whether or not you return your warranty registration form.

When we receive a unit, this is how we determine whether it is under warranty:

1. If the unit was shipped from our factory within the past calendar year, we assume that it is under warranty unless there is evidence to the contrary, such as its having been sold as used or rented, etc..
2. If the unit was shipped from our factory more than a calendar year ago, we assume it is not under warranty unless:
 - a) There is a warranty registration form on file showing that it has been purchased within the past year under appropriate conditions.
 - b) You send a copy of your purchase invoice indicating warranty status along with the unit.
3. If the unit was used as a demo, the warranty runs from the date that it was received by the dealer. The original purchaser gets the unexpired portion of that warranty.

When you send a unit for repair, you should indicate whether or not you believe it to be under warranty. If you do not say the unit is under warranty, we will charge you for the repair and we will not refund unless the charge was caused by an error on our part. If you believe the unit to be under warranty and you do say it is but we disagree, you will not incur any charges until the dispute is resolved.

Reading the above, you can see that it is to your advantage to send in the warranty registration form when you purchase the unit. If we know who you are, we can send you updates and notifications, and advise you of our new products. It will also enable you to receive pre-shipment of certain parts.

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Who performs warranty work

The only company authorized to perform work under this warranty is Eventide Inc., Little Ferry, New Jersey. While you are free to give personal authorization to anyone else (or to work on it yourself), we will not honor claims for payment for parts or labor from you or from third parties.

However, we and our dealers do try to be helpful in various ways:

1. Our dealers will assist, usually without charge during the warranty period, in:
 - a) determining whether there is a problem requiring return to the factory, and
 - b) alleviating user error or interconnection problems that may be preventing the unit from operating to its full capability.
2. We are available for telephone consultation if the dealer is unable to assist.
3. If a part is found to be defective during the warranty period and you wish to replace it yourself, we will normally ship the part immediately at no charge, provided your warranty registration form is on file. We reserve the right to request that the defective part be returned to us.

Shipping within the 50 United States

You are responsible for getting the unit to our door at no cost to us. We cannot accept collect or COD shipments.

We will return the unit to you prepaid, at our expense, using an expeditious shipping method, normally United Parcel Service. In areas not served by UPS we will ship by US Mail.

If you are in a hurry and want us to use a premium shipping method (such as air express, next day air, etc.), be sure you tell us and agree to pay shipping charges collect. If you specify a method that does not permit collect or COD charges, remit sufficient funds to prepay shipping.

Shipping outside the 50 United States

If you purchased the unit from a dealer in your country, consult with the dealer before returning the unit.

If you wish to return the unit to us, please note the following:

1. The unit must be prepaid to our door. This means that you are responsible for all shipping charges, including customs brokerage and duties. When a unit is shipped to us it must be cleared through United States Customs by an authorized broker. You must make arrangements for this to be done. Normally, your freight forwarder has a branch in the United States which can handle this transaction. We can arrange to clear incoming shipments for you. If you want our assistance, you must notify us before shipping the unit for repair, giving full details of the shipment, and including a minimum of \$250.00 in US funds to cover the administrative and brokerage expenses. Any balance will be applied to the repair charges or refunded. If a balance is due to us, we will request a further prepayment.
2. All shipments will be returned to you collect. If this is impossible because of shipping regulations or money is due us, we will request prepayment from you for the appropriate amount.
3. All funds must be in \$US. Payment may be made by check drawn on any bank in the US, or by telegraphic funds transfer to our bank. If you send US currency, be sure that it is sent by a method you can trace, such as registered mail. If you wish to pay by Letter of Credit, be sure that it affords sufficient time for work to be performed and the L/C negotiated, and that it is free from restrictive conditions and documentation requirements.
4. We reserve the right to substitute freight carriers. Although we will attempt to honor your request for a specific carrier, it is frequently necessary to select a substitute because of difficulties in communication or scheduling.

This warranty gives you specific legal rights and you may also have other rights which vary from location to location.

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