Digitech

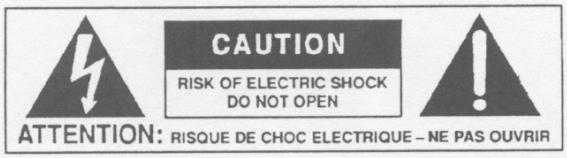
DSP 16

Effects Processor

Owner's Manual

Safety Precautions

IMPORTANT! FOR YOUR PROTECTION, PLEASE READ THE FOLLOWING:



The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrow point in a equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

THESE SYMBOLS ARE A WARNING THAT THERE ARE NO USER SERVICEABLE PARTS INSIDE THIS EQUIPMENT, AND THAT THERE ARE HAZARDOUS VOLTAGES PRESENT WITHIN THIS EQUIPMENT. DO NOT OPEN THIS EQUIPMENT. DO NOT ATTEMPT TO SERVICE THIS EQUIPMENT YOURSELF. REFER ALL SERVICING TO QUALIFIED PERSONNEL. DO NOT MAKE ANY INTERNAL ADJUSTMENTS OR ADDITIONS TO THIS EQUIPMENT AT ANY TIME. DO NOT TAMPER WITH THE INTERNAL ELECTRONIC COMPONENTS AT ANY TIME. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY VOID WARRANTY SERVICE TO THIS EQUIPMENT, AS WELL AS CAUSE A SHOCK HAZARD.

This equipment should be operated only at the voltage indicated on the rear panel. Replace fuse only with same type and rating as indicated on rear panel. Do not attempt to defeat the safety ground by using a ground lift adapter or by physically removing the ground prong from the plug.

This equipment should be situated so that its location or position does not interfere with proper ventilation. This equipment should be kept away from heat sources (such as amplifiers).

This equipment should not be used near water – for example, near a bathtub, laundry tub, in a wet basement, near a swimming pool, etc.

The power cord to this equipment should be routed so that it is not likely to be walked on or pinched by items placed upon or against it. Care should be taken as to not over load any one AC power outlet with too many appliances. The power cord should be unplugged from the outlet when the equipment is left unused for a long period of time.

Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through any openings.

The DSP 16 Effects Processor

Introduction

DigiTech's DSP 16 is a rack-mountable, stereo reverb designed for studio applications. The unit contains 128 programs featuring different reverb and delay effects with variable decay and delay times. A three-band EQ provides exact tailoring of the sound, and controls for Effect Mix, Output and Input Levels allow precision adjustment of the signal flow and mix.

Applications

The DSP 16 can be used in a variety of applications, including home and professional studios, live sound for guitar, keyboards, vocals, and other instruments, and fixed systems such as churches, halls, and meeting rooms.

Standard features include:

- ❑ 16 different digital reverb and delay effects
- ❑ 128 different programs
- ❑ MIDI changeable programs
- ❑ Multi-tap digital delay
- ❑ 3-band EQ
- ❑ Stereo input and output
- ❑ Input and output level controls
- ❑ Effect mix control
- ❑ Footswitch jack
- ❑ Signal and clip LED indicators
- ❑ 16-bit A-D
- ❑ 20 Hz to 16 kHz bandwidth
- ❑ 90 dB S/N ratio
- ❑ 0.08% THD

Contents

Quick Start

For the best performance from your DSP 16, follow the instructions below. See "Front Panel Controls" (page 3) and related sections for detailed instructions.

Install

Mount the DSP 16 in a rack with the provided screws. Rubber feet have also been affixed to the unit for free-standing use.

Add Power

Route the power cord away from audio lines to prevent interference.

Connect Cables

Connect audio cables to the rear input and output jacks. Either balanced TRS, or unbalanced TS connections may be used. See "Input and Output Connections" on page 4.

Connect Footswitch (Optional)

An optional footswitch (the FS-300), or a single button momentary footswitch can be connected to the rear panel Footswitch jack. See "Footswitch" on page 5.

Adjust Input Level

Apply power to the DSP 16. Set the mixer and/or instrument and amplifier to the loudest operation that will be used. Adjust the DSP-16 Input Level until the red Clip LED comes on occasionally.

Adjust Output Level

Set the DSP-16 Output Level to the desired volume.

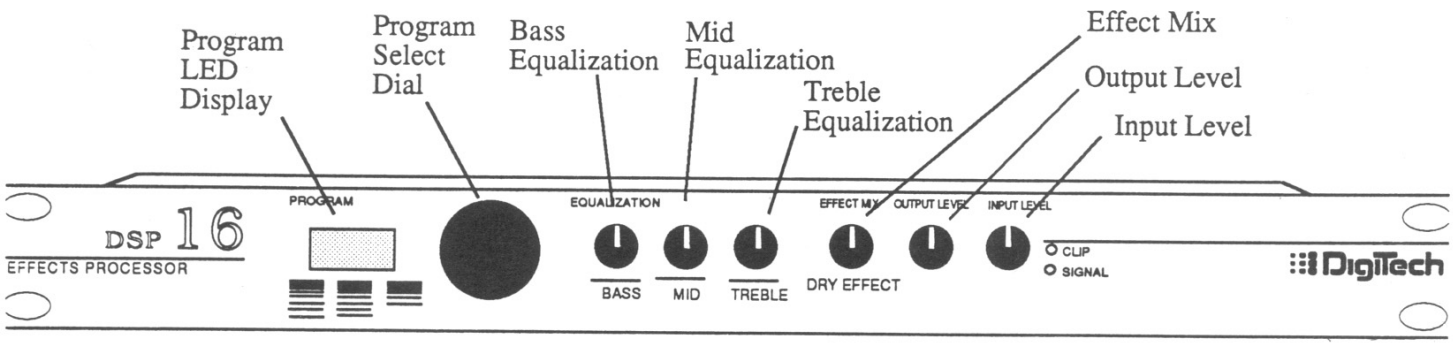
Select Program

Use the Program Select Dial to select any program from 1 through 128. Note that when the dial is turned quickly, a multiplier takes over causing the programs to scroll extremely fast.

Adjust Effect Mix

Adjust the Effect Mix to achieve the desired dry to wet output mix.

Front Panel Controls



Power

There is no on/off switch. The unit is automatically on as soon as it is plugged into power.

Program Selection

Program Number

Three digit LED display shows the selected program number

Program Select Dial

Selects Program, Bypass, and MIDI channels. Programs wrap around to 1 from Footswitch Select.

Equalization

Bass

Shelving filter. 12 dB cut/boost, with a 125Hz upper cutoff frequency.

Mid

Bandpass filter. 12 dB cut/boost across a 125 Hz to 1.5 kHz bandwidth.

Treble

Shelving filter. 12 dB cut/boost with a 1.5 kHz lower cutoff frequency.

Mix and Level Controls

Effect Mix

Adjusts the output signal ratio from dry (no effects – counter-clockwise) to wet (maximum effects – clockwise). The center position provides a 50-50 mix.

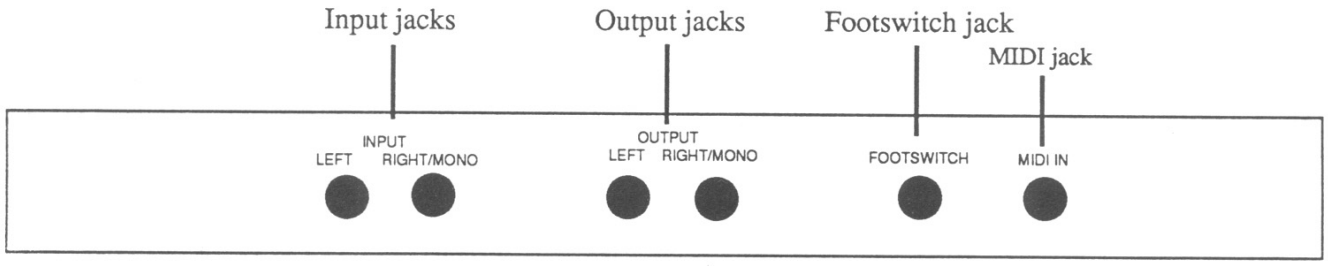
Output Level

Turn up the output level to the optimum level for the mixer or amplifier, being careful to avoid overload.

Input Level

After connecting the DSP 16 inputs and outputs (see "Input and Output Connections" on page 5), set the instrument, amp and/or mixer to loudest operation that will be used. Adjust the DSP 16 Input Level so the red Clip LED only occasionally comes on.

Rear Panel Connections



Input and Output Connections

Input jacks
Two mono 1/4-inch jacks for instrument or line signals. Use left and right jacks for stereo input. Use the RIGHT/MONO jack for mono input.

Output jacks
Two 1/4-inch jacks for stereo output to amplifier, mixer, or effects loop. Use the RIGHT/MONO jack for mono only, or a mix of both left and right for best mono sound.

Footswitch
1/4-inch jack for use with a standard single-button on/off footswitch or DigiTech FS 300 footswitch

MIDI
Standard 5-pin DIN jack. Will receive standard MIDI program change to change presets.

Effects Loops

Using Mono Send & Return
Connect the instrument to the mixer or amp input. Connect the effects send to the DSP 16 right/mono input, then from the DSP 16 right/mono output to the effects return.

Using Stereo Outputs & Inputs
Connect the instrument to the mixer or amp input. Connect the left and right effects sends to the DSP 16 left and right inputs. Then connect the DSP 16 left and right outputs to the left and right effects returns.

In-line Stereo Outputs & Inputs
Plug the instrument into the mixer or amp. Connect the mixer's left and right main outputs to the DSP 16 inputs. Then connect the DSP 16 outputs to the deck or amp main inputs.

Using Auxiliary Outputs & Inputs (Mono to Stereo)
Connect a mono mixer auxiliary output to the DSP 16 Right/Mono input. Connect both DSP 16 outputs to the mixer's input channels or auxiliary return.

Direct Connections

Mono In, Mono Out
Connect the instrument to the DSP 16 Right/Mono input. Connect the Right/Mono output to the amp mono input. For the best sound, combine both DSP 16 outputs to the amp mono input.

Mono In, Stereo Out
Connect the instrument to the DSP 16 Right/Mono input. Connect the left and right outputs to the amplifier or mixer inputs.

Stereo In, Stereo Out
Connect the instrument to both DSP 16 inputs. Connect the left and right outputs to the amps.

Stereo In, Mono Out
Connect the instrument to both DSP 16 inputs. Connect the DSP 16 Right/Mono output to the amp mono input. For best sound, combine both DSP 16 outputs to the amp mono input.

In-line Stereo Outputs & Inputs
Plug the instrument into the mixer or amp. Connect the mixer's left and right main outputs to the DSP 16 inputs. Then connect the DSP 16 outputs to the deck or amp main inputs.

Operation

Use the following procedures to optimize the performance of the DSP 16.

Adjusting Input and Output Levels

Input

After connecting the DSP 16 in the desired configuration, set the source to the loudest signal that will be used. Adjust the INPUT LEVEL so the red CLIP LED comes on occasionally. If the red LED lights too often, the signal may distort.

Output

Set the OUTPUT LEVEL for the desired overall volume from the DSP 16.

For best performance from your DSP 16, set the INPUT and OUTPUT levels for Unity Gain.

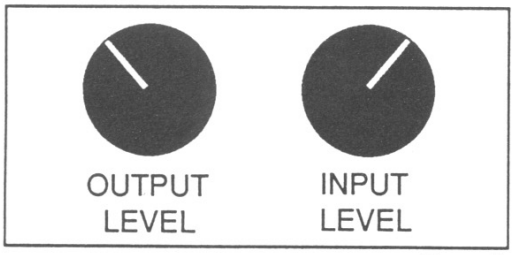


Figure 1

Unity gain is achieved when the DSP 16 input and output signals are at the same level. Set the INPUT LEVEL as previously explained, then adjust the OUTPUT LEVEL for a mirror image of the INPUT LEVEL. (See Fig. 1)

For example, if the INPUT LEVEL is set to the right of center (1 o'clock), set the OUTPUT LEVEL an equal amount to the left of center (11 o'clock).

Adjusting for Optimum Signal to Noise

In order to achieve maximum signal to noise ratio (the best sound performance with minimum noise) the input level must be set as high as possible until the red LED clip indicator begins to light occasionally.

Footswitch

The DSP 16 can be used with the DigiTech FS 300 footswitch, or a standard momentary footswitch for hands-free control. The momentary footswitch will only bypass the DSP-16.

Before plugging in either type of footswitch, the DSP-16 must first know which one is going to be used. Turn the Program Select Dial until the display reads F (1 or 3). If you are using a standard momentary footswitch, the display will need to read F 1. If you are using the DigiTech FS-300, the display should read F 3. To change settings, wait until a decimal point appears in the display and turn the Program Select Dial until the desired setting is chosen. Wait for the DSP-16 to change to Bypass before turning the Program Select Dial again. Plug the footswitch into the rear FOOTSWITCH jack.

The three FS-300 switches provide the following functions:

A: PROGRAM UP
B: PROGRAM DOWN
C: BYPASS

MIDI Control

You can select any program number in the DSP 16 via MIDI. This can be done through a MIDI foot or hand controller, or any other device which sends MIDI program change messeges.

To select MIDI channels, turn the Program Select Dial until the display reads M n. N is the MIDI channel that the DSP-16 is currently receiving on. To change MIDI channels, wait until a decimal point appears in the display and turn the Program Select Dial until the correct channel is shown. Wait for the DSP-16 to change to Bypass before turning the Program Select Dial again. The DSP-16 defaults to MIDI channel 1 each time the unit is powered down.

Troubleshooting Guide

Symptom	Probable Solution
No power	Check power cable connections
No signal	Check all connections and cables Check input level control
Harsh clipping, weak or distorted sound	Check input level control Check output level of device(s) previous in line to DSP 16 Check DSP 16 output level

Effects List

Room Reverbs
Presets 1 - 15 simulate different room size reverbs with short decay times.

Hall Reverbs
Presets 16 - 30 are Hall type reverbs which simulate larger rooms or music halls. Reverb decays and diffusions are longer than room reverbs.

Gated Reverbs
Presets 31 - 35 are reverbs that end within a determined length of time.

Reverse Reverbs
Presets 36 - 40 are the opposite of a normal decaying reverb. Instead of decaying, the reverb swells. The swelling effect is heard after the initial sound, during which the reverb builds and then cuts off.

Special Reverbs
Presets 41 - 45 are specific environmental reverb simulations. They include Tank, Parking Terrace, Afterglow, Shower, and Gym.

Delays up to 100 Milliseconds
Presets 46 - 65 are delay programs starting with delays at 10 milliseconds and increasing to 100 milliseconds in 10 millisecond increments. Each set of 10 delays has 0% regeneration and 40% regeneration.

Delays up to 1 Second
Presets 66 - 85 are delay programs similar to those of presets 46 - 65 except the delay times range from 200 milliseconds to 1 second.

Tempo Delays
Presets 86 - 95 are delay programs designed to repeat the input signal in certain tempos ranging from 40 bpm (beats per minute) to 160 bpm.

Multi-tap Delays
Presets 96 - 105 are delay programs with four individual delays repeating the incoming signal. For best results from the Multi-tap delay programs, the DSP 16 should be used in stereo because the delays are repeated in variations from center to right to left.

Multi-effect Presets
Presets 106 - 127 are programs that combine reverb and delay. Programs vary from short delay times and small rooms to long delay times and large halls.

Bypass
This program bypasses all effects. The incoming signal is sent straight to the output.

DSP 16 Preset List

Programs 1 - 15 Room Reverbs

Program No.	Room Size	Pre-delay Time
Stage/club Reverbs		
1	Small	0 ms
2	Small	30 ms
3	Small	60 ms
4	Medium	0 ms
5	Medium	30 ms
6	Medium	60 ms
7	Large	0 ms
8	Large	30 ms
9	Large	60 ms
Studio Reverbs		
10	Small	0 ms
11	Medium	30 ms
12	Large	0 ms
13	Small	30 ms
14	Medium	0 ms
15	Large	30 ms

Programs 16 - 30 Hall Reverbs

Program No.	Room Size	Pre-delay Time
16	Small	0 ms
17	Small	20 ms
18	Small	40 ms
19	Small	60 ms
20	Medium	0 ms
21	Medium	20 ms
22	Medium	40 ms
23	Medium	60ms
24	Large	0 ms
25	Large	20 ms
26	Large	40 ms
27	Large	60 ms
28	X-Large	0 ms
29	X-Large	30 ms
30	X-Large	60 ms

Programs 31 - 35 Gated Reverbs

Program No.	Decay Time
31	100 ms
32	200 ms
33	300 ms
34	400 ms
35	550 ms

Programs 36 - 40 Reverse Reverbs

Program No.	Reverb Time
36	100 ms
37	200 ms
38	300 ms
39	400 ms
40	500 ms

Programs 41 - 45 Special Reverbs

Program No.	Program Name
41	Tank
42	Parking Terrace
43	Afterglow...
44	Shower
45	Gym

Programs 46 - 65 Delays up to 100 ms

Program No.	Delay Time	Feedback
46	10 ms	0 %
47	10 ms	30 %
48	20 ms	0 %
49	20 ms	30 %
50	30 ms	0 %
51	30 ms	30 %
52	40 ms	0 %
53	40 ms	30 %
54	50 ms	0 %
55	50 ms	30 %
56	60 ms	0 %
57	60 ms	30 %
58	70 ms	0 %
59	70 ms	30 %
60	80 ms	0 %
61	80 ms	30 %
62	90 ms	0 %
63	90 ms	30 %
64	100 ms	0 %
65	100 ms	30 %

DSP 16 Preset List continued

Programs 66 - 85 Delays up to 1 Second

Program No.	Delay Time	Feedback
66	200 ms	0 %
67	200 ms	40 %
68	300 ms	0 %
69	300 ms	40 %
70	400 ms	0 %
71	400 ms	40 %
72	500 ms	0 %
73	500 ms	40 %
74	600 ms	0 %
75	600 ms	40 %
76	700 ms	0 %
77	700 ms	40 %
78	750 ms	0 %
79	750 ms	40 %
80	800 ms	0 %
81	800 ms	40 %
82	900 ms	0 %
83	900 ms	40 %
84	1 second	0 %
85	1 second	40 %

Programs 86 - 95 Tempo Delays

Program No.	BPM
86	40
87	50
88	60
89	72
90	80
91	90
92	100
93	120
94	140
95	160

Programs 96 - 105 Multi-tap Delays

Program No.	Description
96	Back and Forth
97	Wait, Back & Forth
98	Right, Center, Left
99	Galloping 16ths
100	3 Right, 1 Left
101	Right, Left, Center
102	3 Left, 1 Right
103	Right, Fast Left, Mid
104	Fast Right Left, Mid
105	In & Out

Programs 106 - 115 Multi-effects Delays/ Room Reverbs

Program No.	Delay Time	Room Size
106	250 ms	Small
107	500 ms	Small
108	750 ms	Small
109	250 ms	Medium
110	500 ms	Medium
111	750 ms	Medium
112	250 ms	Large
113	500 ms	Large
114	750 ms	Large
115	750 ms	X-Large

Programs 116 - 127 Delays/Hall Reverbs

Program No.	Delay Time	Room Size
116	250 ms	Small
117	500 ms	Small
118	750 ms	Small
119	250 ms	Medium
120	500 ms	Medium
121	750 ms	Medium
122	250 ms	Large
123	500 ms	Large
124	750 ms	Large
125	750 ms	Cathedral
126	750 ms	Arena
127	750 ms	Canyon

Program 128 Bypass

Specifications and Warranty

DSP 16 Specifications

Total Effects: 16

Effects: LARGE/MEDIUM/SMALL ROOM, HALL, GATED, REVERSE, ULTIMATE, SPECIAL FX REVERBS; STEREO, MULTI-TAP, SLAP BACK, PING PONG, TEMPO DIGITAL DELAYS, DOUBLING STEREO ECHO, MULTI-EFFECTS

Total Presets: 128 factory

Processor: 20-bit VLSI

S/N Ratio: 90 dB

Bandwidth: 20 Hz to 16 kHz

THD: Less than 0.08% at 1 kHz

LED Display: Program numbers

LED Indicators: SIGNAL, CLIP

MIDI: Program changes

Front Controls: PROGRAM selector knob; LOW, MID, HIGH 3-band EQ knobs; EFFECT MIX; OUTPUT LEVEL; INPUT LEVEL

Back Panel: INPUT LEFT and RIGHT/MONO jacks, OUTPUT LEFT and RIGHT jacks, BYPASS, MIDI IN

Size: 1.75" H x 19" W x 5.2" D

Weight: 4.5 lbs (2 kg)

Warranty

1. The warranty registration card must be mailed within ten days after purchase date to validate this warranty.

2. DigiTech warrants this product, when used solely within the U.S., to be free from defects in materials and workmanship under normal use and service.

3. DigiTech liability under this warranty is limited to repairing or replacing defective materials that show evidence of defect, provided the product is returned through the original dealer, where all parts and labor will be covered up to a period of one year. The company shall not be liable for any consequential damage as a result of the product's use in any circuit or assembly.

4. Proof-of-purchase is considered to be the burden of the consumer.

5. DigiTech reserves the right to make changes in design or make additions to or improvements upon this product without incurring any obligation to install the same on products previously manufactured.

6. The foregoing is in lieu of all other warranties, expressed or implied, and DigiTech neither assumes nor authorizes any person to assume for it any obligation or liability in connection with the sale of this product. In no event shall DigiTech nor its dealers be liable for special or consequential damages or from any delay in the performance of this warranty due to causes beyond their control.

Notice

This manual is subject to change without notice. DigiTech – DOD Electronics Corporation makes no warranty implying suitability of this equipment for merchantability or for a particular purpose. DigiTech – DOD Electronics Corporation shall not be held liable for incidental or consequential damages arising from use or performance of this equipment or manual.

WARRANTY REGISTRATION

RETURN THIS REGISTRATION CARD WITHIN 10 DAYS TO VALIDATE YOUR WARRANTY

MODEL NUMBER – SERIAL NUMBER

DEALER

MONTH DAY YEAR
DATE OF PURCHASE

DEALER'S CITY STATE

Please completely fill out this card to register your warranty.

How did you hear about this product? (check one)

☐1 Store Salesman ☐2 Friend ☐3 Teacher ☐4 Store Display
☐5 Magazine Article ☐6 Advertising ☐7 Other _____

Which of the following were important in the selection of this product? (check two)

☐1 Manufacturer's Reputation ☐2 Appearance ☐3 Price
☐4 Quality ☐5 Made in U.S.A. ☐6 Sound ☐7 Durability
☐8 Features ☐9 Other _____

Product use. (check the boxes that apply)

☐1 Guitar ☐2 Bass guitar ☐3 Keyboards ☐4 Studio
☐5 Installation ☐6 Reinforcement ☐7 Home ☐8 Performance
☐9 Broadcasting ☐10 Other _____

How many other effects do you own? ☐☐ Your age: ☐☐

List three of your favorite music or sound magazines:

1. _____ 2. _____
3. _____

Any comments about this product:

_____
_____

What new product(s) would you like to see from us?

_____

5639 South Riley Lane
Salt Lake City, Utah 84107
Telephone (801) 268-8400
FAX (801) 262-4966

International Distribution

7 Farmington Road
Amherst, Hew Hampshire 03031
U.S.A.
Telephone (603) 672-4244
FAX (603) 672-4246

Printed in U.S.A. 3/91
Manufactured in the United States of America
DSP16 V1