Digitool HD User Guide

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Scope

This guide introduces and explains how to use the features of Digitool HD, a tool for configuring Digitool audio processing and control systems.

It is assumed that you have already installed Digitool audio processing products, as described in the individual manuals for those devices.

Contents

Chapter 1

Introduction

In This Chapter
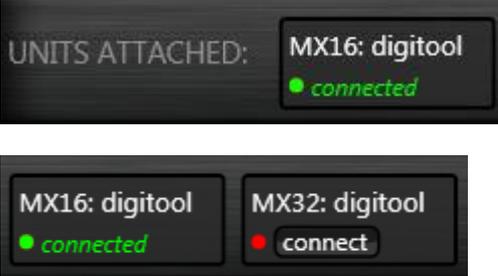
Introduction to Digitool HD

Digitool HD is a Windows application that allows you to configure one or more Digitool audio processing devices attached to the PC via USB connections.

You can set up connections between input and output connectors on the devices and configure the DSP features to control the characteristics of the audio. There is a full complement of DSP components that can be enabled on every input and output that cover most audio processing applications. Available components include filters, gates, compressors and delays.

As you make changes to settings for a Digitool hardware device in Digitool HD, the configuration on the hardware is updated immediately. The settings are stored in flash memory and will remain active even if the unit is power-cycled.

Understanding the window layout

Offline Online	Shows the status of the active Digitool audio processor. Several devices can be connected to the PC at the same time.
Audio / Utilities	Switches the display between the audio configuration view (input channels / matrix / output channels) and the utilities view (serial control / generator / priority mute etc).
Model: MX16	Used when you are creating a configuration file for download to a Digitool unit and no Digitool hardware device is attached to the PC. When a selection is made, the control surface is updated to show controls for that device.
INPUT	Used to configure the input channels. You can select the source for a channel: mic/line in or AES, and you can specify the input sensitivity, input polarity, phantom power and gain for each channel. You can also configure DSP features, including filters and gates, and view a response graph, using the *Input Proc* buttons. For more information on the DSP features of Digitool HD, see *DSP devices* (on page 23).
	Links two or more channels together. Adjusting the controls of one linked channel will change that setting on all channels linked to it.
	Clicking an output channel link button a second time creates a crossover group containing the two channels. Up to four channels can be grouped in this way.

	When you click the *Output Proc* button next to any of the channels in the crossover group, you can configure the crossover and DSP settings for all channels on the same screen. For more information, see *Using output crossover control* (on page 12).
MATRIX	Used to set up connections between input and output channels in order to route audio. The colored knob controls and mute (x) controls show where a connection has been established. When you move the mouse over the matrix, a colored line will show which input and output channels would be linked if a connection were made.
OUTPUT 0.0dB 1:Output1 0dBu + Output Proc × 0.0dB 2:Output2 0dBu + Output Proc ×	Used to configure the output channels. You can specify the output level from the matrix, input polarity and maximum output level. You can also configure DSP features, including filters and gates, and view a response graph, using the *Output Proc* buttons. For more information on the DSP features of Digitool HD, see *DSP devices* (on page 23).
UNITS ATTACHED: MX16: digitool ● connected MX16: digitool ● connected MX32: digitool ● connect	Shows when one or more Digitool devices are connected to the PC running Digitool HD. When more than one device is connected, the device you are currently configuring is shown with *connected* underneath. You can click *connect* under one of the other devices to connect to it.
LAST COMMAND	Displays a code that represents the user's last action.

<div align="right">

C h a p t e r 2

Getting started

</div>

In This Chapter

Connecting a Digitool device to your PC

In order to run Digitool HD with a Digitool audio processor, you must make a USB connection between the PC running Digitool HD and the Digitool audio processor, as shown below.

The sections in the remainder of this manual assume that the connection has been made.

Note: It is not currently possible to configure a Digitool device over a network connection.

Making an audio connection

1. Hover the mouse over the **MATRIX** part of the window until a line is displayed between the input channel you want to use and the output channel you want to use.

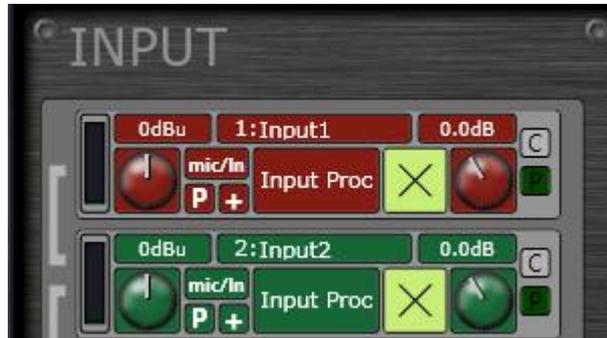   In the example below, we are making a connection between input channel 1 and output channel 2.

2. Click the ☒ (mute) button inside the selection box to change it to ☒ and open the connection.

   A level control for adjusting the mix will become available.

   Note: If you are using a Digitool hardware device with more than 8 channels, you will need to scroll the matrix display to view all the available cross points on the matrix.

Adjusting input channel settings

Each input channel can be configured using the controls under *INPUT* on the left of the window.

Setting	How to enable or adjust
Input sensitivity	Turn the ⬤ knob on the left of the input controls. The value will be displayed above the knob control. The input sensitivity control adjusts the gain of the input circuitry to prepare the analog signal for conversion to digital. The sensitivity, in dBu, is the signal level at the input that will produce a full scale digital signal. Anything greater will clip. The range is continuously adjustable and covers both mic and line level signals. The input impedance changes automatically from 10k Ohms to 2.2k Ohms when the sensitivity is adjusted below -6 dBu. **Tips:** ▪ This setting can be adjusted with an external serial control or control voltage. ▪ Holding down SHIFT when moving a knob control will increase the resolution of the control by a factor of 20. This applies to all knob controls in Digitool HD.
Input source	By default, this is set to **mic/In** (mic/line in). Click this button to change it to **AES L** (AES left channel) or **AES R** (AES right channel). **Note:** Only odd numbered channels can be set to **AES L** and even number channels to **AES R**.

	Tip: If you use the front panel of the Digitool hardware device to change an input channel to AES-L or AES-R, the other channel in the pair will automatically be set to AES-R or AES-L.
Phantom power	Click the ▣ button. The +48V phantom power can be turned on/off on each channel independently. **Note**: It is advisable to mute the input whenever you engage or disengage phantom power.
Polarity	By default, this is set to ➕ (normal polarity). Click this button to change it to ➖ (reverse polarity).
Mute	Click the ▢ (mute off) button to change it to ▣ (mute on).
Level to Matrix	Turn the 🔴 knob on the right of the input controls. The level of gain in dB will be displayed. This control is similar to the channel level control on a mixer. It controls the level of the input signal that goes to the matrix after the input processing. **Tip:** This setting can be adjusted with an external serial control or control voltage.

Input Processing - Input Proc button

Clicking this button will open a window and give access to all of the input processing controls, including filters, gates, compressor/limiter and delay. The controls are arranged in the order in which the functions are applied to the input signal.

Setting	How to enable/disable or adjust
Device type	Click a device type in the list – *LPF-12* for a filter, for example. Adjust the settings below, such as frequency, gain etc.
Bypass	Under the device name, e.g. *Filter 1*, on the right of the list, click the B button to change it to B.

Filter response graph	
The graph shows the response of the filters. The dotted line shows the phase while the solid line shows the level.	
Control	**Purpose**
Offset	Adjusts the area of the response graph that the user is viewing.
x dB/step	Increases or decreases the range of the values on the y-axis.

Adjusting output channel settings

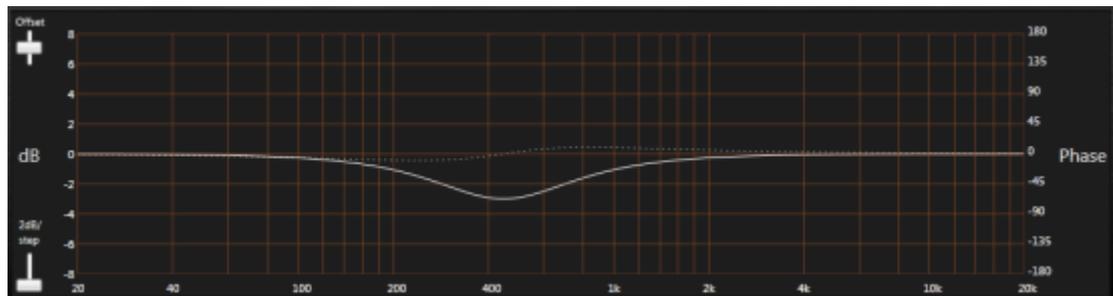Each output channel can be configured using the controls under *OUTPUT* on the right of the window.

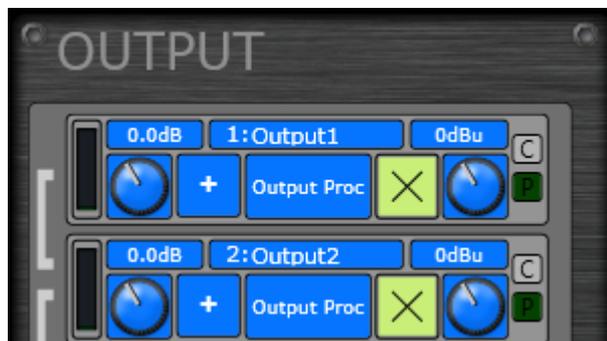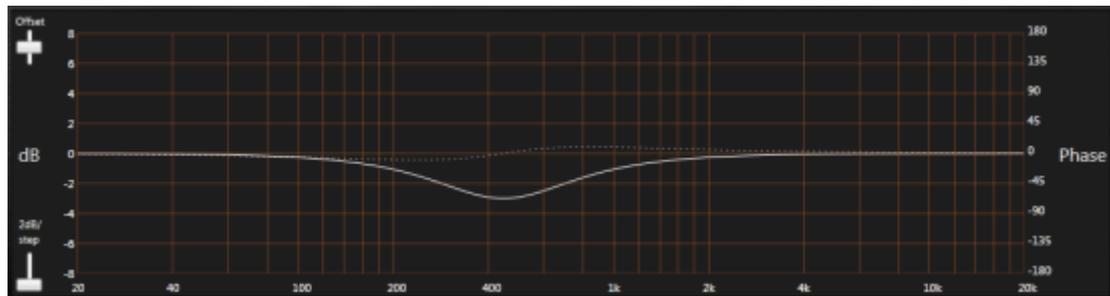| Setting	How to enable or adjust
Level from Matrix	Turn the knob on the left of the output controls. The value will be displayed above the knob control. This control is similar to the master level control on a mixer and controls the level of the signal from the matrix to the output processing block. **Tips:** ▪ This setting can be adjusted with an external serial control or control voltage. ▪ Holding down SHIFT when moving a knob control will increase the resolution of the control by a factor of 20. This applies to all knob controls in Digitool HD.
Mute	Click the (mute off) button to change it to (mute on).
Max Level	Turn the knob on the right of the output controls. The Max Level control adjusts the gain of the analog output circuitry and sets the maximum level the output signal can reach, measured in dBu. **Tip:** Holding down SHIFT when moving a knob control will increase the resolution of the control by a factor of 20. This applies to all knob controls in Digitool HD.
Output Polarity	By default, this is set to (normal polarity). Click this button to change it to (reverse polarity).

Output Processing - Output Proc button	
Clicking this button will open a window and give access to all of the output processing controls, including crossover, selectable filters, compressor/limiter and delay. The controls are arranged in the order in which the functions are applied to the output signal.	
Setting	**How to enable/disable or adjust**
Device type	Click a device type in the list – *LPF-12* for a filter, for example. Adjust the settings below, such as frequency, gain etc.

Bypass	Under the device name, e.g. *Filter 1*, on the right of the list, click the ![B] button to change it to ![B].

Filter response graph	
The graph shows the response of the filters. The dotted line shows the phase while the solid line shows the level.	
Control	**Purpose**
Offset	Adjusts the area of the response graph that the user is viewing.
x dB/step	Increases or decreases the range of the values on the y-axis.

Resetting or clearing the matrix

By default, input channels are connected to output channels in numbered sequence, that is, input channel 1 to output channel 1, input channel 2 to output channel 2, and so on. You can return the matrix to this default configuration, or clear all connections at the same time.

↠ *To reset the matrix to default settings*
 ▪ On the **Matrix** menu, click **Default**.

↠ *To clear the matrix*
 ▪ On the **Matrix** menu, click **Clear**.

Linking channels

You can link channels together, so that when you change the settings for an individual channel, the change is also made to the other channels in the group.

If, when you link the channels, any of the settings are different (for example, one channel is muted and the others are not), the settings will not be synchronized immediately. Only when you make a change to an individual setting on one of the channels, or copy and paste a setting between the channels, will it be synchronized with the other linked channels.

Note: The channel linking feature can only be used when a Digitool hardware unit is connected to the PC.

⇥ ***To link channels***

1. Click the ▯ button between the first two channels you want to link to change it to ▮.
2. Repeat step 1 for the other channels you want to add to the group.
3. Adjust the settings for any of the channels and the others will be synchronized.

Using output crossover control

You can add up to four adjacent output channels to a crossover group, and then adjust the settings from a single window. A response graph is shown with color-coded plots for each individual channel.

⇥ ***To use output crossover control***

1. Double-click the ▯ button between the first two output channels you wish to add to the

   crossover group to change the button to ▮.

   If a ▮ button is shown, only a single click is required.
2. Repeat step 1 for the other channels in the group. A maximum of four adjacent channels can be added.
3. Click an **Output Proc** button for one of the channels in the group.

A window will be displayed showing each channel in the crossover group and a response graph.

4. Adjust the settings for the individual channels.

    The response graph will be updated to show a color-coded plot for each channel.

Changing the names of the channels

By default, the input and output channels are named according to their number. For example, *4: Input4* for input channel 4. You can, however, specify a more meaningful name for easier identification.

▸▸ *To change the names of the channels*

1. Hover the mouse over a channel label.

    The label will change color and the mouse pointer will change to $\rm I$.

2. Type a new name for the channel.

Note: A maximum of eight characters can be used.

Copying and pasting settings between channels

1. Click **C** next to to the channel with the settings you want to copy.

   The **P** buttons next to the other channels will turn green.
2. Click the **P** button next to each channel where you want to copy the settings.
3. When you have finished, click **C** next to the channel settings you copied.

Working with configuration files

Configuration files store the settings you specify using the controls in Digitool HD. You can save the settings for one Digitool hardware device in each file.

Note: When you load a configuration file, if a Digitool device is connected to the PC, it will automatically start using the settings from the file. You will not be prompted to overwrite the settings stored on the unit.

⤞ *To load a configuration file*

1. On the **File** menu, click **Open**.
2. Select a Digitool HD file (.dig) from the **Open** dialog box.
3. Click **Open**.

   The configuration is loaded and replaces the current file.

⤞ *To reload the current configuration file*

▪ On the **File** menu, click **Reload**.

⤞ *To save a configuration file*

1. On the **File** menu, click **Save**.
2. If you have not already specified a file name:
   a) Select or type a Digitool file name.
   b) Click **Save**.

Note: Saving the configuration file only saves the present state of the unit and not the presets.

Chapter 3

Using more advanced features

In This Chapter

Using presets to load and save Digitool hardware settings

You can use presets to store configuration settings for quick retrieval. Once you have used Digitool HD to specify the settings you want to store, you can save them to the Digitool hardware device. Up to eight presets can be stored on an individual device.

You can access presets:
- on the Audio/Utilities page in Digitool HD.
- from the front panel of the Digitool hardware device.
- remotely via an RS-485 connection to the Digitool hardware device. This feature can be enabled or disabled for individual presets. By default, it is enabled for all presets.

Notes:
- The *ID & Security settings* on the Utilities page are not stored when you save a preset, and remain unchanged when you load a preset.
- Saving a Digitool HD configuration file does not save the presets.
- Presets are only available when Digitool HD is connected to a Digitool hardware device.
- Loading an unused preset will load factory default settings.

⇥ *To save a preset*
1. Click **Audio/Utilities**.
2. Under **Presets**, next to the preset number, type a name in the **name** box to identify the preset.
   The maximum number of characters you can specify is 6.
3. Click a numbered **Save** button to save the preset.

⇥ *To load a preset*
1. Click **Audio/Utilities**.
2. Under **Presets**, click the numbered **Load** button of the preset you want to load.
   If you select the *Factory Default* preset, the settings in Digitool HD and on the Digitool hardware device will be reset to the defaults.

⇥ *To enable or disable remote loading of a preset*
- Under **Presets**, next to **Remote Enable**, click the number of the preset to allow or disallow remote loading.

Specifying an ID for a Digitool hardware device

You can specify an ID using Digitool HD to uniquely identify a Digitool hardware device. The name is displayed on the Utilities page on the front screen.

⇥ *To specify an ID for a Digitool hardware device*
1. Click **Audio/Utilities**.
2. Under **ID and Security**, in the **ID** box, type a unique ID for the hardware device.

Allowing communications with a Digitool hardware device via a LAN

Each Digitool hardware device can receive commands transmitted via a LAN connection. In order to allow communications, you must specify network settings to uniquely identify an individual device. A device can be assigned a fixed IP address, or one can be assigned automatically using a DHCP server.

For information on controlling a Digitool hardware device via a LAN, refer to the document *Communication with Digitool via LAN* (*http://aa.peavey.com/assets/literature/additional/117731_17625.pdf*) on the Architectural Acoustics website.

Note: The device must be power cycled after you change the network settings before they take effect.

⇥ *To use a fixed IP address*
1. Click **Audio/Utilities**.
2. Under **ID & Security**, click **DHCP** to change it to **off**.
3. Specify the settings you want to use in the **TCP/IP**, **Subnet** and **Gateway** boxes.
4. Power cycle the device.

⇥ *To use DHCP to set an IP address*
1. Click **Audio/Utilities**.
2. Under **ID & Security**, click **DHCP** to change it to **on**.
3. Power cycle the device.

Setting up security

You can lock both the Digitool hardware device and Digitool HD, to prevent unauthorized access to features. There are several security options you can select to control whether settings can be changed locally (using the front panel) or remotely (using Digitool HD over a USB or Ethernet connection).

When security is enabled, a numeric password is required to gain access. The default password is 1234.

Note: When security is enabled on the Digitool hardware device, after five minutes of inactivity, the front panel will automatically lock.

Tip: We recommend you specify a different password to the default and store that password in a safe place. If you are having problems with password access, contact Support at *aatechsupport@peavey.com* (*mailto:aatechsupport@peavey.com*).

Below is a summary of the different security settings and their effect.

Lock mode	Controls disabled	Controls enabled
Off	None	All editing functions available
Local Edit Only	Front panel editing	Front panel mute controls and remote editing
Local Edit, Remote	Front panel and remote (USB and Ethernet) editing	Front panel mute buttons
Local Edit, Remote, Mute	Front panel and remote (USB and Ethernet) editing and front panel mute buttons	No features are unlocked
Local Edit, Mute	Front panel editing and mute buttons	Remote editing (USB and Ethernet)

⇥ ***To switch on security***
1. Click **Audio/Utilities**.
2. Under **ID & Security**, in the **Lock Mode** list, click a lock mode.

   The Password box and confirm button will be displayed.
3. In the **Password** box, type a numeric password for gaining access.
4. Click **confirm**.

   If you selected a remote lock mode option, you will need to enter the password to continue using Digitool HD.

Updating the firmware on a Digitool hardware device

1. Open a browser and navigate to the *products page on the Architectural Acoustics website* (*http://aa.peavey.com/products/*).
2. Scroll down to the **Signal Processors** section at the bottom of the page.
3. Click a link for the type of Digitool hardware device you are using.
4. Click **DOWNLOADS**.
5. Under **Software File**, click a link to download the firmware zip file.
6. Open the zip file and extract the *.ldr* firmware file.
7. Switch off the Digitool hardware unit.
8. Connect the unit to the PC using the USB link cable.
9. Hold down the **Edit** button on the front of the unit, and then switch it on.
10. Follow the instructions automatically displayed in Digitool HD.

Using D1V and D4S serial controllers with Digitool HD

Digitool hardware devices use ID numbers to link external serial controllers to audio controls in Digitool HD. You can use the Digitool front panel user interface or Digitool HD to configure selected ID numbers to control specific target controls on the Digitool hardware. Switches on the D1V or D4S set the controller to the corresponding ID numbers.

The D1V has a rotary encoder that sends set commands with a value. By pressing the encoder, you can select one of the 4 consecutive device ID #s for control. An LED lights to indicate the selection and the LEDs around the knob indicate its current setting.

For more information on configuring the D1V an D4S devices, refer to the *D Series User Manual* (*http://aa.peavey.com/assets/literature/manuals/117734_12794.pdf*).

Setting the switches on the D1V

The D1V has a rotary encoder that sends set commands with a value. By pressing the encoder, you can select one of the 4 consecutive device ID #s for control. An LED lights to indicate the selection and the LEDs around the knob indicate its current setting.

To prepare the D1V for installation, the switches on the rear must be set.

D1V operation
Set Switch 1 to ON
Set Switch 2 to OFF

Setting the switches on the D4S

To prepare the D4S for installation, the switches on the rear must be set.

In switch mode, each button operates independently to mute or unmute a signal, for example.

D4S switch mode
Set Switch 1 to ON
Set Switch 2 to ON

In Trigger mode, the 4 switches work together. Pressing one switch cancels the previous selection. With the Digitool hardware device, this is used to recall presets. With the Base address set for ID#s 1 to 4, presets 1 to 4 can be recalled.   Likewise, if the base address is set to 5-8, this allows recall of presets 5-8. Using two controllers together allows recall of presets 1 to 8.

D4S Trigger mode
Set Switch 1 to OFF
Set Switch 2 to ON

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Setting the EOL termination resistor

Each Digitool hardware device can supply power for up to 16 controllers and has an end of line terminator built in. You can also manually engage a terminator on the D1V or D4S controller at the far end of the line (EOL).

The terminating circuit can be activated by setting DIP switch 8 to the ON position.

Setting the base address

Switches 3 to 7 set the base address. All switches (3,4,5,6 and 7) off sets the base address to 1 for ID#s 1 to 4.

The table below shows the switch settings on the D1V and D4S to set the ID address range. A zero (0) for a switch is off and a 1 indicates on.

So, for serial IDs 17 to 20, the switches 3 to 7 would be off, off, on, off, off, respectively.

ID range	Switch 34567
1-4	00000
5-8	10000
9-12	01000
13-16	11000
17-20	00100
21-24	10100
25-28	01100
29-32	11100
33-36	00010
37-40	10010
41-44	01010
45-48	11010
49-52	00110
53-56	10110
57-60	01110
61-64	11110
65-68	00001

ID range	Switch 34567
69-72	10001
73-76	01001
77-80	11001
81-84	00101
85-88	10101
89-92	01101
93-96	11101
97-100	00011
101-104	10011
105-108	01011
109-112	11011
113-116	00111
117-120	10111
121-124	01111
Invalid	11111

DSP devices

In This Chapter

Compressor/limiter

Purpose

The compressor limiter is available in both the input and output processing sections. A useful and still natural sounding compression ratio for voice ranges from 3:1 to 6:1. The amount of actual gain reduction is displayed in the GUI. For paging applications, a lower threshold and higher ratio is recommended. Each channel has its own separate compressor/limiter that will adjust the controls of that channel.

Controls

Controls	Purpose
Threshold	Sets the threshold above which the input signal is attenuated. The threshold is set in dB below digital full scale.
Ratio	Sets the ratio between input level above the threshold and output attenuation. For example, if the ratio is set to 4:1 and the signal level is 4 dB above the threshold, the level out of the compressor will be only 1 dB above the threshold. Compression ratios of 10:1 or higher can be characterized as limiting.
Attack	Sets the time the compressor takes to attenuate the signal when the threshold is exceeded.
Release	Sets the time it takes to release the attenuation the signal after signal has dropped below the threshold.
Gain	Allows the user to increase the signal level after compression takes place. It has no affect on the amount of compression.
Bypass	The bypass control disables the Compressor/limiter function for this channel. Gray is inactive.

Crossover (output)

Purpose

The crossover module has both high-pass and low-pass filters. The response of the filters can be separately chosen along with the frequency of each.

Here the user can:
- define what filter they wish to use.
- bypass the band-pass filters.
- adjust the HPF and LPF frequency.

Controls

Controls	Purpose
High Pass Filter frequency	Adjusts the frequency of crossover's High pass filter.
Low Pass Filter frequency	Adjusts the frequency of crossover's Low pass filter.
Filters	In the list, select the filter you wish to use. For more information on filters, see *Filters* (on page 25).
Bypass	The bypass control disables the crossover function for this channel. Gray is inactive.

Filters

Filters	Description
BT-6 (butrwth-6)	First-order Butterworth filter; 6 dB/Octave slope; -3 dB at corner frequency. Butterworth filters are designed to have a flat frequency response in the passband.
BT-12 (butrwth-12)	Second-order Butterworth filter; 12 dB/Octave slope; -3 dB at corner frequency. Butterworth filters are designed to have a flat frequency response in the passband.
BT-18 (butrwth-18)	Third-order Butterworth filter; 18 dB/Octave slope; -3 dB at corner frequency. Butterworth filters are designed to have a flat frequency response in the passband.
BT-24 (butrwth-24)	Fourth-order Butterworth filter; 24 dB/Octave slope; -3 dB at corner frequency. Butterworth filters are designed to have a flat frequency response in the passband.
LR-12 (lnkwtz-12)	Second-order Linkwitz-Riley filter; 12 dB/Octave slope; -6 dB at corner frequency. Linkwitz-Riley filters are made up of cascaded Butterworth filters and combine for a flat response at the crossover frequency.
LR-24 (lnkwtz-24)	Fourth-order Linkwitz-Riley; 24 dB/Octave slope; -6 dB at corner frequency. Linkwitz-Riley filters are made up of cascaded Butterworth filters and combine for a flat response at the crossover frequency.
Bs-12 (bessel-12)	Second-order Bessel filter; 12 dB/Octave slope; -3 dB at corner frequency. A Bessel filter is a linear filter with a maximally flat group delay.

Bs-18 (bessel-18)	Third-order Bessel filter; 18 dB/Octave slope; -3 dB at corner frequency. A Bessel filter is a linear filter with a maximally flat group delay.
Bs-24 (bessel-24)	Fourth-order Bessel filter; 24 dB/Octave slope; -3 dB at corner frequency. A Bessel filter is a linear filter with a maximally flat group delay.

Delay

Purpose

The Delay processing block allows the selected input or output signal to be delayed for the specified length of time. The smallest increment is 20.8uS. For convenience, the approximate distance the delay equates to in air is displayed in both feet and meters. On the front panel, the delay can either be adjusted in mS or fractional mS steps.

Controls

Control	Purpose
Bypass	The bypass control disables the delay function for this channel. Gray is inactive.
Delay	Set the delay for the input or output signal (range 0 - 2500 milliseconds).

Filters

Purpose

The General Purpose Filter is the most common DSP process in the Digitool. There are five general purpose filters in each input processing block and seven in each output. Each filter can be independently configured for several different filter types using the drop-down box. The Level and Frequency controls are available as parameters for all filter types. The third control may be available depending upon the filter type and changes the bandwidth or Q of the filter. The control setting is always displayed as bandwidth in octaves. Refer to the table for the equivalent Q values.

Controls

Control	Purpose
Frequency	Adjusts the cut off or center frequency of the filter.
Gain	Sets the gain of the filter.
BW/Q	BW is the filter bandwidth in Octaves and Q stands for quality. An example would be if the bandwidth of PEQ is set to 2 Octaves and the filter set to full boost, the -3 dB points of the response, referenced to the center frequency, would be one octave above and one octave below the center frequency (twice the center frequency and one-half the center frequency). The bigger the bandwidth of the filter, the wider the range of frequencies affected. Q is another term that is used to describe this relationship, however the range of numbers is the inverse of bandwidth. Large Q values concentrate the filter action to a small range of frequencies.
Bypass	The bypass control disables the respective filter for this channel. Gray is inactive.

Equivalent Q for the displayed bandwidth

For consistency, all of Digitool HD's filters display in Bandwidth. Below is a table that gives the equivalent Q for the displayed bandwidth.

BW	Q	BW	Q	BW	Q
0.1	14.4	1.1	1.28	2.1	0.63
0.2	7.2	1.2	1.17	2.2	0.60
0.3	4.8	1.3	1.07	2.3	0.56
0.4	3.6	1.4	0.99	2.4	0.54
0.5	2.8	1.5	0.86	2.5	0.51
0.6	2.39	1.6	0.86	2.6	0.49
0.7	2.04	1.7	0.80	2.7	0.46
0.8	1.78	1.8	0.75	2.8	0.44
0.9	1.58	1.9	0.71	2.9	0.42
1.0	1.41	2.0	0.67	3.0	0.40

Filter types and the action of BW

PEQ	Bandwidth of the Peak/Dip filter in octaves.
HPF-12	Bandwidth of 1.9 Octave is critically damped. Lower BW sharpens the transition and creates a peak in the response at the corner frequency. Higher BW broadens the transition at the corner frequency.
LPF-12	Bandwidth of 1.9 Octave is critically damped. Lower BW sharpens the transition and creates a peak in the response at the corner frequency. Higher BW broadens the transition at the corner frequency.
HPF-6	Bandwidth does not affect the filter.
LPF-6	Bandwidth does not affect the filter.
LOSHELF	Bandwidth does not affect the filter.
HISHELF	Bandwidth does not affect the filter.
BANDPASS (bpass)	Lower BW sharpens the corners.
BANDSTOP (bstop)	Lower BW sharpens the corners.
HORN EQ	Bandwidth does not affect the filter.
ALLPASS 1	Bandwidth does not affect the filter.
ALLPASS2	Bandwidth changes the slope of the phase curve around the center frequency.

Filters

The input filters and output filters all have the same capability. The filter types that can be selected have the following functions:

PEQ	Parametric Equalization. This is a multi band variable that allows a user to control the three primary parameters.
HPF-12	Second-order high-pass filter. A High pass filter (HPF) is an electronic filter that passes low-frequency signals but attenuates signals with frequencies lower than the cutoff frequency.
LPF-12	Second-order low-pass filter. Low pass filter (LPF) is an

	electronic filter that passes low-frequency signals but attenuates signals with frequencies higher than the cutoff frequency.
ALLPASS1	First-order all-pass filter; +90 deg at corner frequency. A all-pass filter is a signal processing filter that passes all frequencies evenly, but changes the phase relationship between various frequencies.
ALLPASS2	Second-order all-pass filter; +180 deg at corner frequency. A all-pass filter is a signal processing filter that passes all frequencies evenly, but changes the phase relationship between various frequencies.
HPF-6	First-order high-pass filter. A High pass filter (HPF) is an electronic filter that passes low-frequency signals but attenuates signals with frequencies lower than the cutoff frequency.
LPF-6	First-order low-pass filter. Low pass filter (LPF) is an electronic filter that passes low-frequency signals but attenuates signals with frequencies higher than the cutoff frequency.
LOSHELF	Low-frequency shelving filter. The response of this EQ has a shelf level that is determined by the boost or cut value.
HISHELF	High-frequency shelving filter. This is the first of four shaping EQs for the input signal chain. The top encoder adjusts the Gain (boost/cut) and has a range.
BANDPASS (bpass)	A Band-pass filter passes frequencies in a certain range and attenuates any frequencies outside the range.
BANDSTOP (bstop)	A Band-Stop Filter is a filter that passes most frequencies with little attenuation, but attenuates those in a specific frequency range.
HORN EQ	The Horn EQ filter exhibits a rising response starting at the corner frequency set by the filter. The response raises at 6 dB per octave until it reaches unity gain near 20 kHz.

Gate/Automix

Purpose

The Input Gate has several modes of operation. In normal mode, it functions as an input gate which attenuates the signal when its level drops below the threshold. With the gate in this mode, the channel can also be used as a master in the priority mute system see *Priority Mute* (on page 39). In any of the automix modes, the channel becomes part of a gating automix with other channels set to the same automix control bus (1-4). As the number of open gates increases turning on more channels, a number of open mics (NOM) function is applied that attenuates all automix channels on the bus based on a 15log function (approximately 4.5 dB of attenuation per doubling of open mics).

Filter number one on each input is before the Gate in the processing chain. It can often be adjusted to improve the operation of the gate.

Controls

Controls	Purpose
Threshold	Sets the threshold below which the input signal is attenuated. The threshold is set in dB below digital full scale.
Attenuation	Sets how many dB the signal is attenuated when its level is below the threshold.
Attack	The time it takes to restore the signal to full amplitude once the threshold has been exceeded.
Release	Sets the time it takes to attenuate the signal after signal has dropped below the threshold and the hold time has elapsed.
Hold	Sets the time that must elapse after the signal drops below the threshold before attenuation is applied to the signal. If the signal goes above the threshold during the hold time, the hold timer is reset.
Bypass	The bypass control disables the Gate/Automix function for this channel. Gray is inactive.

Chapter 5

Digitool HD Utilities

In This Chapter

CV control

Purpose

The 8 CV control ID#s correspond to the 8 CV inputs on the rear of the Digitool. The CV ID's settings can be adjusted on the Audio/Utilities page.

The CV control ID is turned on and off via the on/off button.

Note: Pressing the off control will only turn off the selected CV control ID.

Controls

Controls	Purpose	
Max	If a level type control was chosen, this sets the maximum level to which the control can be adjusted. If a mute type control was chosen, this value is ignored.	
Min	If a level type control was chosen, this sets the minimum level to which the control can be adjusted. If level and mute was chosen, then the control jumps from this minimum level to muted as the control continues to be reduced. If a mute type control was chosen, this value is ignored.	
ID	Select which CV control ID you wish you use.	
Type	Select the type of CV Control	
	Level	As the voltage on the control voltage input varies, the level of the selected target control(s) varies between the minimum and maximum value set for this ID#.
	Mute	The mute function is often used as a switch function but a level control can also control the mute. It mutes and un-mutes above and below the control mid-point.
Target	Selecting a target or targets for control is a two step process. First the control target is selected which contains a variable "X" (see table below).	
X	Select the x values that correspond to the controls you wish to adjust.	
Off/On	Turn the CV Control on or off. **Note**: This only switches on/off the selected serial control ID.	

Target	Targets available	Description
Matrix Target (input group).	MTX IN X - Out 1 MTX IN X - Out 2 MTX IN X - Out 3 MTX IN X - Out 5 MTX IN X - Out 6 MTX IN X - Out 7 MTX IN X - Out 8	The matrix target input group selection has the form 'MTX in x - Out 1', 'MTX in x - Out 2'……, where x designates input channels and selecting a single number designates a single output channel. The x is a wildcard to be completed in the selection box below the target list. All matrix inputs can be selected for x.
Matrix Target (output group).	MTX IN 1 - Out X MTX IN 2 - Out X MTX IN 3 - Out X MTX IN 4 - Out X MTX IN 5 - Out X MTX IN 6 - Out X MTX IN 7 - Out X MTX IN 8 - Out X	The matrix target input group selection has the form 'MTX in x - Out 1', 'MTX in x - Out 2'……, where x designates input channels and selecting a single number designates a single output channel. The x is a wildcard to be completed in the selection box below the target list. All matrix inputs can be selected for x.
Matrix Stereo Targets (input group).	MTX STIn X Out 1,2 MTX STIn X Out 3,4 MTX STIn X Out 5,6 MTX STIn X Out 7,8	The matrix stereo target input group has the form 'MTX STin X - Out 1,2', MTX STin X - Out 3,4, where x designates odd/even input channels pairs, and 1,2 through 7,8 (15,16) designate stereo output pairs. The x is a wildcard to be completed in the selection box immediately below the target list. All matrix inputs can be selected for x. **Note:** Odd x values only route to odd output channels and even x values only route to even output channels.

Matrix Stereo Targets (output group).	MTX In 1,2 - STOut x MTX In 3,4 - STOut x MTX In 5,6 - STOut x MTX In 7,8 - STOut x	The matrix stereo target output group has the form 'MTX in 1,2 – STOut x', 'MTX in 3,4 – STOut x', where x designates odd/even output channels pairs, and 1,2 through 7,8 (15,16) designate stereo input pairs. The x is a wildcard to be completed in the selection box immediately below the target list. All matrix outputs can be selected for x. **Note**: That odd x values only receive odd input channels and even x values only receive even input channels.
Output targets.	Output X	The matrix out level target selection has the form 'Output x'. This designates the target to be one or more post-matrix mixes. The x is a wildcard to be completed in the selection box below the target list. All matrix mixes can be selected for x. The target is the level/mute control of each matrix mix output.
Input targets.	Input X	The input target selection has the form 'Input x'. This designates the target to be one or more input channels. The x is a wildcard to be completed in the selection box below the target list. All channel inputs can be selected for x. The target is the level/mute control for each channel and affects the signal before it is sent to the matrix router.

Note: In the MX 32 there are 16 inputs and outputs.

Serial Control ID

Purpose

The serial ID# links an external controller and the control it is to operate. Multiple external controllers can send messages to the same ID#. For example, you could have volume controls in several locations in the room all able to adjust the volume in that room. The D1V and D4S each have four consecutive control ID numbers. The DIP switches on those controllers set the control ID range in groups of four. You can set up 124 unique serial controls.

> **Note:** Once the Serial Control number has been selected, the control type and control target(s) need to be selected.

Controls

Control	Purpose	
Max	If a level type control was chosen, this sets the maximum level to which the control can be adjusted. If a mute type control was chosen, this value is ignored.	
Min	If a level type control was chosen, this sets the minimum level to which the control can be adjusted. If level and mute was chosen, then the control jumps from this minimum level to muted as the control continues to be reduced. If a mute type control was chosen, this value is ignored.	
ID	Select which serial control ID you wish you use.	
Type	Select the type of serial control:	
	Level	As the voltage serial control values changes,the level of the selected target control(s) varies between the minimum and maximum value set for this ID#.
	Mute	The mute function is often used as a switch function but a level control can also control the mute. It mutes and un-mutes above and below the control mid-point
	Level and Mute	The "Level and Mute" control type combines the functions of level and mute. The control works as a level control as described above until the level drops to minimum. Adjusting the level below minimum then mutes the signal.
Target Selection	Selecting a target or targets for control is a two step process. First the control target is selected which contains a variable "X" (see table below).	

X	Select the x values that correspond to the controls you wish to adjust.
Off/On	Turn the Serial Control ID off or on.
	Note: This only switches on/off the selected serial control ID.

Target	Targets available	Description
Matrix Target (input group).	MTX IN X - Out 1 MTX IN X - Out 2 MTX IN X - Out 3 MTX IN X - Out 5 MTX IN X - Out 6 MTX IN X - Out 7 MTX IN X - Out 8	The matrix target input group selection has the form 'MTX in x - Out 1', 'MTX in x - Out 2'……, where x designates input channels and selecting a single number designates a single output channel. The x is a wildcard to be completed in the selection box below the target list. All matrix inputs can be selected for x.
Matrix Target (output group).	MTX IN 1 - Out X MTX IN 2 - Out X MTX IN 3 - Out X MTX IN 4 - Out X MTX IN 5 - Out X MTX IN 6 - Out X MTX IN 7 - Out X MTX IN 8 - Out X	The matrix target input group selection has the form 'MTX in x - Out 1', 'MTX in x - Out 2'……, where x designates input channels and selecting a single number designates a single output channel. The x is a wildcard to be completed in the selection box below the target list. All matrix inputs can be selected for x.

Matrix Stereo Targets (input group).	MTX STIn X Out 1,2 MTX STIn X Out 3,4 MTX STIn X Out 5,6 MTX STIn X Out 7,8	The matrix stereo target input group has the form 'MTX STin X - Out 1,2', MTX STin X - Out 3,4, where x designates odd/even input channels pairs, and 1,2 through 7,8 (15,16) designate stereo output pairs. The x is a wildcard to be completed in the selection box immediately below the target list. All matrix inputs can be selected for x. **Note:** Odd x values only route to odd output channels and even x values only route to even output channels.
Matrix Stereo Targets (output group).	MTX In 1,2 - STOut x MTX In 3,4 - STOut x MTX In 5,6 - STOut x MTX In 7,8 - STOut x	The matrix stereo target output group has the form 'MTX in 1,2 – STOut x', 'MTX in 3,4 – STOut x', where x designates odd/even output channels pairs, and 1,2 through 7,8 (15,16) designate stereo input pairs. The x is a wildcard to be completed in the selection box immediately below the target list. All matrix outputs can be selected for x. **Note**: That odd x values only receive odd input channels and even x values only receive even input channels.
Output targets.	Output X	The matrix out level target selection has the form 'Output x'. This designates the target to be one or more post-matrix mixes. The x is a wildcard to be completed in the selection box below the target list. All matrix mixes can be selected for x. The target is the level/mute control of each matrix mix output.

Input targets.	Input X	The input target selection has the form 'Input x'. This designates the target to be one or more input channels. The x is a wildcard to be completed in the selection box below the target list. All channel inputs can be selected for x. The target is the level/mute control for each channel and affects the signal before it is sent to the matrix router.

Note: In the MX 32 there are 16 inputs and outputs.

Generator

Purpose

The signal generator in Digitool can generate a sine wave, pink noise or white noise. It has its own level control along with a frequency control for when sine wave is selected. The generator can be assigned to any combination of inputs and outputs and is applied at the beginning of their respective processing chain. The generator signal is summed with the signal normally routed to the selected input or output.

Note: The frequency control has no affect on the pink or white noise signal.

Controls

Control	Purpose
Level	Adjusts the output level of the generator.
Frequency	When the generator wave form is set to to sine, this control sets the generator frequency.
Wave	Select either Sine, White or Pink.
In/Out	Click the numbered input and output boxes to route the generator.

Priority Mute

Purpose

The priority mute system allows a channel to be chosen as a master that causes the slave channels to mute in response to signal present on the master. The operation of these buses depends on the gate in the input processing chain of the chosen master channel. When the signal on the master channel exceeds the threshold of its gate, the master channel turns on and the slave channels are muted.

The four priority mute buses can be used for announcement and paging applications.

Controls

Control	Purpose
Master	Selects which input shall be the master channel.
Slave	Selects which inputs will be slave channels.
	Note: The same input can not be selected as both a slave and priority mute channel.