

## Digitool RS-232 Command Structure

### Digitool Control Via RS232 Serial Port

Using a standard terminal emulation program connected to a Digitool via the RS232 port, a user has the ability to communicate with the unit and demonstrate the setting of parameters within the device. The ASCII listing that is generated when `-Help` is typed at the command prompt is intended for source programmers and should not be interpreted as a command listing for end-users. Indeed, some commands directly access and modify vital memory blocks so it is important to limit the application commands to those provided within this document.

### RS232 Commands

Four command strings will be presented. Each command is followed by none, one or more arguments and the entire string must be terminated with a carriage return `<enter>`. Each argument should be separated by at least one white space. Digitool will echo each character that is typed. Following the carriage return, the entire command will then be echoed. A dos-like prompt follows the echoed strings. This results in two responses and one prompt for each command that is sent. Digitool supports backspaces and the commands are not case sensitive. Though similar, the protocol is different than that which is used by the RS-485 serial port. The commands are:

#### ◆ **LOADP N <enter>**

Description: Loads and activates a preset where `-N` is the preset number. Valid values for N are 0 through 8. 0 loads the factory preset, while 1 through 8 loads a user-defined preset.

An example command string and response is given below:

```
0  Command string:
1  LOADP 1 <enter>

2  Digitool responds with:
3  LOADP 1 <enter>
4  LOADP 1 <enter>
5  >
```

#### ◆ **SET C T P V <enter >**

Description: Sets the value of a target parameter for a given channel. The arguments are:

- **C**: Channel number - Specifies an input or output channel.
- **T**: Target number - Identifies an object such as a filter or gate.
- **P**: Parameter number - Identifies a control such as gain or frequency.
- **V**: Value number - Specifies a value or pointer to a range of values.

An example command string and response is given below:

*Command string:*  
**SET 1 A 0 F4 <enter>**

*Digitool responds with:*  
**SET 1 A 0 F4 <enter>**  
**SET 1 A 0 F4 <enter>**  
>

◆ **STREAM <enter>**

Description: Initiates continuous monitor data from Digitool. Once this command is entered, Digitool begins sending monitor strings that occur once per 30ms. An example command string and response is given below:

0 *Command string:*  
1 **STREAM <enter>**  
  
2 *Digitool responds with:*  
3 **STREAM <enter>**  
4 **STREAM <enter>**  
5 >

For more information see [Monitoring Digitool Activity \(RS-232\)](#)

◆ **BAUD Rate <enter>**

Description: Sets the baud rate of the connected Digitool to one of 4 settings. The possible rates are 19200, 28800, 38400 and 57600 (default baud rate). The new baud rate will not change until after the command has been echoed and the prompt has been received from the digitool. The baud rate is non-volatile. Therefore the new rate will persist through power cycles. The rate value is given as a 5-character decimal value. An example command string and response is given below:

*Command string:*  
**BAUD 28800 <enter>**

*Digitool responds with:*  
**BAUD 28800 <enter>**  
**BAUD 28800 <enter>**  
>

Allow 200ms after the prompt is received before attempting any communications at the new baud rate. Note that the baud rate can only be modified via an RS-232 connection.

The Utility provides this functionality in the Settings Dialog box and automatically adjusts its baud rate accordingly. The utility also verifies the new baud rate by automatically testing the connection and displaying a "Digitool Found" message following the change.

## SET Command Arguments

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The arguments for the SET command are described below. Note that every parameter value in the Digitool has a unique SET command. These commands are displayed in the Status bar of the [Designer](#) window each time a parameter is modified.

### C: Channel Argument

The channel argument is abstract in that it may refer to an input or an output channel. This depends upon the Target field of the command string. Valid characters for this argument are number characters from "1" through "8". For matrix targets, the channel value always refers to an input while the matrix target identifies which output channel is affected.

### T: Target Argument

The target specifies an object such as a level control or delay for a given channel number. For example each input channel has hardware controls and then a filter followed by a gate, which is then followed by four more filters, a compressor and finally a level control. Each of these audio processes is given a sequential target number. For example, the target number for the input channel level (and mute) is "A" (hex) since the level/mute control for the input is the 10th target in the audio chain. The channel argument specifies which channel input level is being modified. All of the level targets for the inputs, matrix router and outputs are consecutive target values starting with A (hex). They are:

#### Level / Mute Targets

<u>Target Value (Hex)</u>	<u>Target Description</u>
A	Level/Mute - Input Channel
B	Route Level/Mute - Input Ch to Output 1
C	Route Level/Mute - Input Ch to Output 2
D	Route Level/Mute - Input Ch to Output 3
E	Route Level/Mute - Input Ch to Output 4
F	Route Level/Mute - Input Ch to Output 5
10	Route Level/Mute - Input Ch to Output 6
11	Route Level/Mute - Input Ch to Output 7
12	Route Level/Mute - Input Ch to Output 8
13	Level/Mute - Output Channel

#### Delay Target

<u>Target Value (Hex)</u>	<u>Target Description</u>
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**P: Parameter Argument**

There are three parameters described here for the *P* argument. They are Level, Mute and Delay. This allows us to modify the level or mute for any Level/Mute target in the audio signal chain as well as manipulate the matrix router and output delays. Thus the parameter arguments are:

Parameter Value (Hex)	Parameter Function
00	Level
1B	Mute
08	Delay-ms

**V: Value Argument**

The last argument in the command string specifies the data value. If the parameter is a level control then the *V* argument uses a lookup table described below. If the parameter is a mute control then the *V* argument is boolean (0 or 1). If the parameter is a delay control then the value is a positive hex integer in milliseconds. Each data type is described below.

**V: Level**

For level changes the *V* argument is actually an index to a set of predefined values inside the Digitool. All level settings are given in dB. To change a signal level to unity or 0 dB, you set the *V* argument to 100 (Hex). From this setting, each increment or decrement of the *V* argument changes the level by +/- 0.5 dB. Therefore FE is -1 dB and 102 (Hex) is +1 dB. The general equation to calculate *V*, given a desired dB level is:

$$V = (dB+128)*2$$

**V: Mute**

To mute a level/mute target using the mute parameter, set the *V* argument to 1. To unmute, set *V* to 0. Mute parameter allows turning a signal on and off without changing its level parameter.

**V: Delay-ms**

To change the delay of the delay-ms target for a given output channel, set the *V* argument in the command string to the value (hex) of the delay time in milliseconds.

For example:

```
SET 1 1E 8 10F2 <enter>
```

Description: Set output channel 1 delay to 4338 ms

The maximum delay time available for each channel is 5000 ms (1388h).

## Example Command Strings

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The following are example command strings that demonstrate control of inputs, matrix routings and output level changes. Note that you can copy the example command strings below (less the <enter> characters) and paste them directly into the Utility terminal command area and hit the <enter> key. You will see the results on the appropriate Digitool front panel display.

### Input Level/Mute Commands

For the following commands, verify the changes on the Digitool front panel by selecting the appropriate input box and navigating to the ChannelLevel screen. The changes will appear in the upper right hand corner of the screen.

SET 1 A 0 F4 <enter>

Description: set channel 1 input level to -6.0 dB

SET 1 A 1B 1 <enter>

Description: Mute the channel 1 input

SET 1 A 1B 0 <enter>

Description: Unmute channel 1 input

SET 1 A 0 100 <enter>

Description: set channel 1 input level to 0 dB (unity)

SET 8 A 0 D8 <enter>

Description: set channel 8 input level to -20.0 dB

SET 1 A 0 7F < enter >

Description: set channel 1 input level to -64.5 dB

SET 4 A 0 2 <enter>

Description: set channel 4 input level to -127.0 dB

### Route Commands

For the following matrix routings, use the Matrix View on the Digitool front panel to verify the changes. The only value that will show an un-routed signal is the level setting of -127 dB (i.e V = 2). Note that each route target can be muted as well as have its level set (see examples under Input Level/Mute Commands). Muted routings are not indicated on the front panel screen.

SET 2 B 0 100 <enter>

Description: Route channel 2 to Output 1

SET 2 B 0 2 <enter>

Description: Un-Route channel 2 to Output 1

SET 8 12 0 100 <enter>

Description: Route channel 8 to Output 8

SET 4 10 0 100 <enter>

Description: Route channel 4 to Output 6

### Output Level Commands

For the following commands, verify the changes on the Digitool front panel by selecting the appropriate output box in the route view. The changes will appear in the upper right hand corner of the screen.

SET 1 13 0 F4 <enter>

Description: set channel 1 output level to -6.0 dB

SET 1 13 1B 1 <enter>

Description: Mute channel 1 output

SET 1 13 1B 0 <enter>

Description: Unmute channel 1 output

SET 1 13 0 100 <enter>

Description: set channel 1 output level to 0 dB (unity)

SET 8 13 0 D8 <enter>

Description: set channel 8 output level to -20.0 dB

SET 1 13 0 7F < enter >

Description: set channel 1 output level to -64.5 dB

SET 4 13 0 2 <enter>

Description: set channel 4 output level to -127.0 dB

### Global Level Command

The global level command scales all output levels by the value specified. The global object target argument is 1F. Note that the channel argument must be 8 for this command to be valid. The changes can be seen on the main view in the bottom right

corner of the Digitool front panel.

SET 8 1F 0 F4 <enter>

Description: scale all output levels by -6.0 dB

SET 8 1F 1B 1 <enter>

Description: Mute all outputs

SET 8 1F 1B 0 <enter>

Description: Unmute all outputs

## Hardware Configuration

The Digitool RS232 connection requires the following settings:

- 19.2k, 28.8k, 38.4k or 57.6k Baud
- 8 Data bits
- No Parity
- 1 stop bit
- No control flow

Notes:

Digitool echos all characters

The command string will also be echoed following CR-LF (or just CR)

The prompt character  $\rightarrow\emptyset$  will follow the echoed command. Note that when sending a LOADP N command, communications should be suspended for about 2 or 3 seconds. A prompt in this case doesn't indicate that the Digitool is ready for another command.

## For more command string information

For an extended look at the complete command structure via RS-232, you may open the terminal window while On-Line control is active. In this mode, the terminal will display each command string as it is sent to the Digitool whenever a control is modified in the designer. Thus, the programmer has access to every command for every parameter of every target and channel in the signal chains.