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GAMBIT
DAC1
OPERATING MANUAL

Software Version: OS: 3.1
DSP: 2.1

INTRODUCTION

Congratulations on purchasing the Weiss Gambit Series DAC1 D/A Converter !

The DAC1 is a stereo 24 bit / 96khz D/A converter designed with the aim of keeping an absolutely uncompromised audio signal path. Much detail and thought was spent on the digital input as well as the analogue output stage. Both have in common the purest possible approach in audio design, aspiring for nothing less than excellence. This is coupled with an ergonomic design that gives the user immediate access to all necessary functions, while keeping an uncluttered and thus easy-to-use front panel. This combination makes a truly professional D/A converter catering for the highest expectations.

Features

* Inputs:

There are three digital inputs on XLR connectors, and one on Toslink (optical). The accepted sampling frequencies are 44.1, 48, 88.2 and 96kHz. For 88.2kHz and 96kHz sampling frequencies, signals on a single connector are used. Each XLR input is actively routed to a corresponding XLR digital output, allowing monitoring at multiple stages in a digital studio setup.

* Synchronization:

Several signal reclocking schemes are combined for extremely high jitter attenuation, making the DAC1 virtually immune to jitter frequencies in the range from fractions of a Hertz up to tens of kHz.

* Converters:

The correlation technique (using two converters per channel) which was already successfully employed in the ADC1 A/D Converter gives the DAC1 an edge over other D/A converters with equal wordlength and sampling rate specifications, resulting in improved SNR and THD.

* Outputs:

The discrete Class A outputs have a virtually zero Ohm output impedance, but can still drive complex loads without stability problems. Output levels can be set between -infinity and +27dBu. The outputs are symmetrical, but do not have any sound degrading servo mechanisms built in. For asymmetrical operation only pin 2 of the XLR connector plus ground on pin 1 are used, pin 3 must be left open.

* Remote Control:

By hooking up an analog potentiometer or fader to the remote connector, the output level can be remote controlled. A stereo potentiometer or fader allows to control the two channels independently. This level control happens in the digital domain and is dithered in order to avoid any sound degrading quantization effects. The input source selection can also be remote controlled. Four input selection pushbuttons and associated status LEDs are brought to the remote connector.

Frontpanel Elements

* Four switches for input selection

* Four LEDs for sampling frequency display (44.1 / 48 / 88.2 / 96)

* Three LEDs for input wordlength display (1..16, 17..20, 21..24 bits)

* One Emphasis LED

* Two 18 turn trim potentiometers for fine trimming the output level

Backpanel Elements

* Three digital inputs on XLR

* One digital input on Toslink

* Three digital outputs on XLR, buffered from XLR inputs

* One switch for monitor source selection on DO3

* Two analog outputs on XLR

* Output level range switch (high / low)

* Remote connector with the following signals:

  - Power supply to external faders

  - Tapers from two external faders

  - Four input selection switches

  - Four LEDs for input selection switches

OPERATION

Input Source Selection

The input source pushbuttons correspond to the three XLR and the single Toslink input connectors.

If a valid AES/EBU or S/PDIF formatted signal is present at the selected input, its sampling rate, wordlength and emphasis status are indicated via the status LEDs.

The wordlength LEDs are blank if the input signal is muted.

If the sampling rate is valid, the analog outputs are activated. Blank sampling rate LEDs indicate that the format or sampling rate at the input are not valid. In that case the analog outputs are muted.

For the three XLR inputs a corresponding XLR output is available. These outputs are buffered clones of the input signals. The purpose is to loop in the DAC1 at various points in the signal chain for monitoring.

For the third output (DO3) the source can be selected to be either Input 3 (DI3) or the currently selected input. This allows to use the DAC1 as a monitor switch.

Synchronization

The DAC1 is always slaved to the selected input. Because the jitter reduction circuitry in the DAC1 is of the highest possible quality, sepaarate external or internal synchronization is not necessary.

For applications in surround setups with more than one DAC1 unit operating in parallel, we will offer a software version which assures a determined, constant delay from input to output. In the current software version this is not the case, i.e. the delay from input to output can vary.

The states of all buttons are stored in non-volatile memory, i.e. the setup is retained when powering the unit off.

Output Level and Output Connection

The output level is set via the "high / low" switch on the backpanel and via the trim potentiometers on the frontpanel. For output levels between +15dBu and +27 dBu balanced (or +9dBu and +21dBu unbalanced) set the switch to "high". For all other levels set it to "low". These output level figures are reached for 0dBFS at the input of the DAC1.

After that, adjust the trim potentiometers to match the output level required.

Note that the output amplifiers of the DAC1 are powerful class A type discrete circuits. This means that the power dissipation is quite high, so it is absolutely normal for the DAC1 unit to heat up.

Important: For unbalanced operation of the DAC1 connect pin 1 (ground) and pin 2 (hot) of the output connectors to your amplifier. Pin 3 must be left open!

Remote Control Connector

A self-made remote control can be hooked up to the remote control connector. Following is the description of how such a circuitry should look like. The pin numbers refer to the 15 pin remote connector pin numbers.

The remote level control changes the level in the digital domain, i.e. it is independent of the other level control facilities of the DAC1. Because of the 24 bit digital resolution of the DAC1, controlling the level in the digital domain is not critical for the sonic quality or the signal to noise ratio. This level remote can be used as a monitor room level control.

The input source switches and lamps work in parallel to the frontpanel controls of the DAC1.

Level control:

Connect one or two faders or potentiometers with a linear characteristic and an impedance between 1kOhm and 10kOhm as follows:

ground to pin 7

taper CH1 to pin 14

taper CH2 to pin 15

hot end to pin 8

If a single fader or potentiometer is used then connect its taper to both pin 14 and 15.

Input source selection:

Connect four momentary switches as follows:

one side of all switches to pins 1,2 (ground) the other sides for:

Input 1 to pin 10

Input 2 to pin 3

Input 3 to pin 11

Input 4 to pin 4

The maximum voltage across the switch is 5V, the maximum current is 5mA.

Input source indication lamps:

Connect either an ordinary light bulb or an LED. Depending on the required voltage a series resistor might be necessary. The DAC1 internal circuit consists of a switching transistor which connects the lamp output to +5V via a 10 Ohm resistor. The other side of the lamp goes to ground.

E.g. you might use a 6V lamp rated at 100mA without any additional resistor. If in doubt then just try, you can't break anything.

For LEDs an additional 100 Ohm series resistor is recommended.

Connect as follows:

Anode Input 1 to pin 5

Anode Input 2 to pin 12

Anode Input 3 to pin 6

Anode Input 4 to pin 13

All cathodes to pins 1,2 (ground)

TECHNICAL DATA

Three AES/EBU Inputs

Input fs range:	44.1kHz +- 80ppm
	48.0kHz +- 80ppm
	88.2kHz +- 80ppm
	96.0kHz +- 80ppm
Maximum Input Wordlength:	24 Bits
Channel Status Data:	Input accepts professional or consumer format.
Connector:	XLR female
Impedance:	110 Ohm

Three AES/EBU Outputs

Clones of the corresponding input, actively buffered. DO3 can be switched between DI3 and selected input.

Connector:	XLR male

One Toslink Optical Input

Connector:	Standard plastic fiber Toslink type

Two Analog Outputs

Symmetrical, not earth free, no servo circuit.

Connector:	XLR male, pin1 ground, pin 2 hot, pin 3 return

For asymmetrical use connect pin 1 to ground, use pin 2 as hot and leave pin 3 unconnected! Do not connect pin 2 or pin 3 to ground!

Remote Connector

15 pin DSUB connector pinout:

1	ground
2	ground
3	key # 2 (switch to ground, selects input # 2)
4	key # 4 (switch to ground, selects input # 4)
5	LED # 1 (anode of LED for key # 1, cathode at ground)
6	LED # 3 (anode of LED for key # 3, cathode at ground)
7	ground
8	+5V supply for external fader (connect fader between +5V and ground)
9	n.c.
10	key # 1 (switch to ground, selects input # 1)
11	key # 3 (switch to ground, selects input # 3)
12	LED # 2 (anode of LED for key # 2, cathode at ground)
13	LED # 4 (anode of LED for key # 4, cathode at ground)
14	fader channel 1 taper
15	fader channel 2 taper

Power

Mains Voltage:	110 / 220 Volts with voltage selector
Fuse rating:	500 mA slow blow
Power Consumption:	80VA max.

Measurements

Measurements taken at the following conditions (unless otherwise noticed):
+27dBu output level, 44.1kHz sampling frequency (fs), 22kHz measurement bandwidth

Frequency Response:	@ fs = 44.1kHz: DC ... > 20kHz +- 0.05dB @ fs = 48.0kHz: DC ... > 20kHz +- 0.05dB @ fs = 88.2kHz: DC ... > 40kHz +- 0.5dB @ fs = 96.0kHz: DC ... > 40kHz +- 0.5dB
Dynamic Range:	115dB unweighted, 118dB A-weighted
THD+N @ 1kHz:	-107 dBr @ -3 dBFs input (0dBr = +27dBu) -105 dBr @ 0 dBFs input (0dBr = +27dBu)
SNR @ -40dBFS input:	114dBr unweighted (0dBr = +27dBu) 117dBr A - weighted (0dBr = +27dBu)
Linearity:	from 0 to -100dBFs input level: < +-1dB deviation from ideal from -100 to -130dBFs input level: < +-1.5dB deviation from ideal
Crosstalk:	< -130dB, 0..20kHz
Output Level Range:	range switch "high", balanced: +27dBu ... -∞dBu range switch "low", balanced: +15dBu ... -∞dBu range switch "high", unbalanced: +21dBu ... -∞dBu range switch "low", unbalanced: +9dBu ... -∞dBu
Output impedance:	0.2 Ohm, outputs are short circuit proof