

Bricasti Design

M11 Dual Mono D/A Converter



Combined User Guide M11/M11S2

10/2024

Conformity

EMC / EMI

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations.

Canadian Customers

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Certificate Of Conformity

Bricasti Design, 123 Fells Ave., Medford MA, USA, hereby declares on its own responsibility the following products:

M111 –Dual Channel A/D Converter

-that is covered by this certificate and marked with the CE-label conforms to the following standards:

- EN 60065 Safety requirements for mains operated electronic and related apparatus for household and general use
- EN 55103-1 Product family standard for audio, video, audiovisual and entertainment lighting control apparatus for professional use. Part 1: Emission
- EN 55103-2 Product family standard for audio, video, audiovisual and entertainment lighting control apparatus for professional use. Part 2: Immunity

With reference to the regulations in the following directives:
73/23/EEC, 89/336/EEC

October 2023
Brian S Zolner
President

Introduction

This is a preliminary edition of the M11 user guide covering theory of design and setup and use. In the future you can always find the latest version available at our web site www.bricasti.com.

Congratulations on the purchase of your new M11 Dual Mono Digital to Analog Converter. We at Bricasti Design have set out to design the world's best digital processors and to offer the finest products made for the professional and consumer audio markets.

Product Overview

The M11 digital to analog converter is a dual mono design; there are 2 completely isolated channels, a left and right, each with its own dedicated linear power supply, D/A converter, DDS clocking, and analog circuitry. This design insures that analog cross talk is virtually non existent, that the necessary power requirements for each channel are well met and isolated from each other and the digital processing is isolated, having its own power supply. With our twin DAC design, the dynamic range for each channel is optimized by using a Ladder DAC converter plus clocking is for each channel done directly at each DAC with a technique called DDS (direct digital synthesis) which takes clock induced jitter to immeasurable levels.

Build Quality

The M11 is robustly constructed of milled and CNC machined aluminum sections. There is no typical bent metal chassis and top cover found on most products. All sections of the construction, the front and rear panels, the sides and even the bottom and top plates start out as solid blocks of aluminum which are precision machined to shape, with exact tolerances for a perfect fit. These parts are then anodized and the text and markings are laser etched for a clean and enduring look.

The Sound

The intention of the M11 is to provide a state of the art, Digital to Analog converter, utilizing the best designs and materials that can be found today. The D/A converter is a very critical part of the digital audio chain, after all you have to convert it to analog to hear it, and we feel this should be a true as possible in its reconstruction of the original signal. The sound of the M11 is intended to be transparent and revealing, and fully dynamic. This in part is made possible by the lowering the jitter to extremely low levels, providing a pure digital signal chain with sample rate converters, superior digital filter design, coupled to a fast transparent analog signal path with a discreet analog output section and plenty of good clean linear power for optimum analog performance.

Many hours of listening were done to tune the M11 to an exacting sound, with all types of music, and with extensive testing done in the studio and in the home. We hope you find the M11 to be pleasing and enjoyable to hear and use in the home, or as a precision tool for high level reference monitoring for the professional.

Unpacking and Inspection

After unpacking the M11 save all packing materials in the event you ever need to ship the unit. Thoroughly inspect the M11 and packing materials for any signs of damage in shipment. Report any damage to the carrier at once.

Precautions

The Bricasti Design M11 is a rugged device with extensive electrical protection. However, reasonable precautions applicable to any piece of audio equipment should be observed.

- Always use the correct AC line voltage as set by the manufacturer. Refer to the power requirements section of the manual and adhere to any power indications on the rear or bottom of the chassis . Using the incorrect AC line voltage can cause damage to your M11, so please check this carefully before applying power.
- Do not install the M11 in an unventilated rack or directly above any heat-producing equipment like power amps, tube preamps etc. Maximum ambient operating temperature is 40 C. Exceeding the maximum ambient temperature may cause the M11 to enter thermal shutdown and stop processing sound as a safety precaution, and may cause damage to the internal processors and components.
- Care should be taken when connecting the M11 to a computer via the USB. The M11s USB subsection receives its power from the computer and it is advisable that you power the computer off before changing USB cables to prevent possible damage from inrush current from the computers 5V supply to the M11s USB section.
- To prevent fire or shock hazard, do not expose the M11 to rain or moisture.

Notices

In the interest of continued product development, Bricasti Design reserves the right to make improvements to this manual and the product it describes at any time and without notice.

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Important Safety Instructions:

Notice!

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow these instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block ventilation openings; install in accordance with manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers, pre amps) that produce heat.
- Do not defeat the safety purpose of the polarized or grounded type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade and prong are for your safety. If the provided plug does not fit in your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect power cord from being walked on or pinched.
- Use only attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Service is required when the apparatus has been damaged in any way, such as by being dropped, exposed to rain, liquid being spilled on it, or otherwise does not operate normally.

Service

- There are no user serviceable parts inside.
- All service must be performed by qualified personnel.

Warning!

- To reduce the risk of fire or electrical shock do not expose this equipment to dripping or splashing water and ensure that no objects such as vases are placed on the equipment.
- This apparatus must be earthed.
- **This equipment requires the correct AC line voltage as set by the manufacture and is not auto sensing or scaling.**
- Use a three-wire grounding-type line cord like the one supplied with this product.
- Be aware that different operating voltages require the use of different types of line cords and attachment plugs.
- Check the voltage in your area and use the correct type. See table below:

Voltage	Line plug standard
110-125V	UL817 and CSA C22.2 no 42
220-230V	CEE 7 page VII, SR section 107-2-D1/IEC 83 pg C4
240V	BS 1363 of 1984 Specification for 13A fused plugs and switched and unswitched outlet plugs

- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- To completely disconnect from AC mains, disconnect the power supply cord from the AC receptacle.
- Do not install in a confined space.
- Do not open the unit -risk of electrical shock inside.

Caution

- You are cautioned that any change or modification not expressly approved in this manual could void your authority to operate this equipment.

Design Overview

There are 4 basic sections to the M11, the digital input section, and the left and right analog sections, and the front panel:

Digital Input Section:

This is located in the center of the unit, and provides the digital inputs and has its own linear power supply. This means that the digital processing section is isolated from the analog sections, providing excellent low noise performance and eliminates digital noise from entering the analog chain via the power supplies and ground plane. This section features the Mdx processor with a dual core Analog Devices Sharc DSP that is used to run the front panel and general operations of the M11, to control and synchronize the DDS clocking on each channel, and to provide a selection of our own over sampled anti-aliasing filters.

Analog Output Sections, Left and Right:

These are identical and are each independently powered by their own linear power supply insuring clean double regulated low ripple power and isolation from any digital switching noise from the digital supply.

Each section has its own Analog Devices Ladder DAC, coupled with a dedicated DDS clocking circuit located millimeters away from the DAC, assuring extremely low jitter and minimal trace length for the clock signal. As both boards have their own clock, precise clock synchronization of the left and right boards is handled by the Sharc DSP on the main digital processing board.

The next stage, at the analog out of the converter for the gain and filter sections there is a fully differential analog design with fast high slew rate analog operational amps. This is followed by 2 transistor designed output buffer sections, balanced and unbalanced, each separately buffered and isolated. The balanced output level as shipped is set with a fixed resistor at +13.5 dbm. For custom level matching, an internal the jumper on the board can be moved to engage a precision adjustable potentiometer. This adjustment is set from the rear panel screw near the XLR connector on the M11 and M11SE. When the potentiometer feature is engaged the level is adjustable from +8 to +23 dbm and can be referenced to a fraction of a db to match any setup. This level is set as a default +10 dbm at the factory so when the jumper is engaged this will be the new level. Please contact us for detailed instructions on how to change and set these levels. The unbalanced is set to normal hi fi levels of 2V RMS (+8dbm) by precision resistor values on the board.

Trigger In/Out:

On the rear panel the M11 has a stereo connector (Tip/Ring/Sleeve) for triggering the M11 into standby mode from an external device like a preamp and for optional external remote control with the M11 remote. NOTE the tip is connected is return ground, the Ring is the input + voltage. The M11 will go into standby when it has a positive 5V or 12V DC voltage at the ring. The function of the trigger jack at the rear panel is set in the status menu. NOTE! If the function of the trigger is set to CtlTRIG, and there is no voltage present at the trigger in, the M11 will go into standby mode. If this occurs make a long press on the standby button to invert the phase of the trigger signal.

Front Panel Overview

The front panel has a large, simple, easy to read graphic display, an encoder for adjusting and selecting settings, 6 keys that are labeled for their use, and a power stand-by switch that will set the M11 in to low power mode and mute the outputs.



Rear Panel Overview

Looking at the rear you will find on the left and right side the analog output sections, each with its own balanced and unbalanced outputs, and level adjustment set screw. In the center input section are the 5 digital audio inputs, AES, SPDIF 1 and 2, Toslink, USB and optional RJ45 for networking or I2S. There is a small jack below the circuit breaker and this is for a trigger input to remotely place the M11 in standby from a pre amp or other system controller. The main power on/off switch and AC fuse are at the rear, note that the front panel and the trigger in are used to set the M11 to stand by. Full power on off is done from the rear panel.



Setup and Operation

AC power and the M11

The AC power is connected at the rear of the unit; the filtered AC inlet also has the main power on-off switch. This filtered inlet helps provide clean AC power to the M11's power supplies and as well will prevent any digital noise from the M11's digital processing section from going back out the AC inlet to contaminate the mains. Take note that because the M11 utilizes linear power supplies care should be taken to use only the power range indicated on the unit, other wise damage can occur to the power supplies and other circuits in the M11. Please note and adhere to any voltage indications on the outer box, rear panel or chassis all of which will indicate how the M11 is set at manufacture.

Note that the main AC power switch is at the rear and the front panel switch is a low power consumption stand by switch. For complete power on of you must cut power with the rear panel switch or from an external AC power on off switch that may be used to power other devices in your setup.

Quick Connecting the M11 and power up

When you first power up the M11 it will come up in AES input, you can then using the adjust knob select the desired input.

Operating the M11

There are 6 front panel keys, input, filter, status, level, display and enter

- **Input select**

When the M11 first powers on, it will default to the STATUS page display on the front panel. This will show what input is selected and the sample rate. Pressing the INPUT key will take you to input select mode. If you turn the knob you will scroll through all inputs and auto select each one with an audible click of the mute relays.

Inputs are:

- #1 AES Selects the XLR connector
- #2 SPDIF Selects the RCA connector
- #3 EIAJ Selects the Toslink connector
- #4 USB Selects the USB connector .
- #5 SPDIF 2 Selects the BNC connector
- # 6 LAN (optional)

- **Status**

The status display key has 8 levels in the menu. On first press or on power up it will display input type selected and the running sample rate. For PCM this will range from 44.1k to 384K and DSD will simply display DSD for DSD 64fs or DSD 2 for 128fs.

Temp Monitor: Displays the internal temperature at the digital processing board, there are no adjustments as this is just a monitor of internal temps.

Version: Displays the software version.

Clock Sync: This sets the function of the M11 DDS clock to a fine a very accurate tracking to a wider more forgiving one of the incoming master clock.

Trigger function: This sets the function of the trigger in jack at the rear of the M11. This is not for remote on off functions. Care must be taken when changing these parameters.

CtlREMOT: Sets the function of the trigger in for remote control from and external source, in this mode M11's IR remote will not function in this mode.

CtlTRIGI: Sets the function of M11s as a trigger IN to be triggered and out of standby from another device like a pre amp; the M11s remote will function in this mode.

CtlTRIGO: Sets the M11 to send a trigger OUT voltage to another device to trigger it on or in and out of standby; the M11s front panel IR remote will function in this mode.

If the function of the trigger is set to CtlTRIG, and there is no external voltage present, the M11 will go into standby mode. If this occurs make a long press on the standby button to invert the phase of the trigger signal or a + voltage must be applied to the trigger in SLEEVE at the rear panel. A long press on the standby will invert how the M11 reacts to a trigger signal; goes into or out of standby

Phase: The M11 is absolute phase meaning that it does not invert the phase. With this adjustment you can invert the phase of the signal as some recordings may benefit by this change or correction. Normal setting is NON inverted.

Remote ON/OFF: Disables the IR for the M11 remote.

- **Graphic Display**

This allows you to set the display intensity in 3 levels and set it to a sleep or off mode and for 5 different selections of color. Press DISPAY and use the knob to select the brightness of the display. Selecting OFF will shut the display off after a 10 sec time out, and illuminate the standby LED. Pressing any front panel key will wake up the display so you can make adjustments to the M11, and then after a short period of no use, it will go to off mode again.

- **Filter**

Pressing FILTER will take you to the filters select mode. Here you can select 2 different types of linear phase digital over sampling filters, labeled Linear 0 and 1, and 2 minimum phase filters labeled Minimum 0 and 1 Press FILTER, turn the knob to select and are loaded immediately with very little delay, so the change is very fast, allowing for quick comparisons of their effect on the sound.

- **Level**

The M11 USB includes a digital level control. For many applications this feature will allow the M11 to be used directly to the power amp, eliminating the need for an analog line pre amp, providing perfect level adjustment control for the outputs of the M11. It is a digital adjustment so it will affect both the balanced and unbalanced outputs exactly the same and insures perfect channel balance at all gain settings. Operation is simple: press Level and it will display the level in db, normally this will be set a 0db. Turn the knob and you can cut the level in one db steps. Pressing the Level key a second time will set the output to MUTE, pressing again will un-mute. Upon power up, if the M11 was left in any level state other than 0db, it will power back at the last setting. If you do not use the level adjustment and leave the setting a 0db, the unit will power on to the Status page.

- **Enter**

This sets or selects values in the other menus.

Input Renaming: Any input can be renamed from a preset list of names. Press a long press on the desired input to change and the display will flash and show “default” use the adjust knob to scroll through a list of names, to choose one, for example “CD”, press the input key again and it will set the new name. To revert to the normal name, just repeat and reselect “default”.

USB Features

On the rear panel you will find the USB 2 type interface and it is based on the latest generation of asynchronous design and supports PCM sample rates up to 384k/24 bit and DSD 256 native. For superior noise performance the interface is electrically isolated from the host computer, eliminating any grounding or power induced noise issues that could be transmitted to the M11 from the computer. No driver is needed for Macs or Linux but for PC use a driver is necessary and the latest version for windows can be acquired from our web site in downloads section.

Note that it is advisable that you power your computer off when changing USB cables or you risk possible damage to the M11s USB subsection. Do not hot plug the USB with the M11 always power off the server.

Optional Network Interface Feature

When configured with the optional network streamer, on the rear panel you will find the RJ 45 Ethernet connector. This connector is for using the M11 as a DNLA and Roon compatible network player. When The M11 is connected to a network router it will appear as a player in the media player and server that it's connected to as a device to “play to” from the server. This server can be a PC, Mac or even an android type UNpN or DNLA network player installed on your pad or phone. The M11 player is also known as a “renderer” or “streamer”. To set this up your server application must have network sharing functions enabled and there is no need to down sample and should be set to play native sample rates. The M11's player supports sample rates up to 384k PCM and DSD128 as DoP.

Specs and Performance

DSD playback and the M11

The M11 supports DSD 64, DSD 128 and DSD 256 with USB input as DoP or native format, DSD 128 on LAN, and DSD 64 as DoP on all inputs. We also implemented the ability to have DSD post noise filtering. An artifact of DSD processing is the buildup of ultrasonic noise and with DSD 64, this noise starts at 24kHz and rises to peak level at 50k and beyond. Ideally this should be removed in the digital domain before any analog stages, and we offer a few options.

Filter 0: This filter has no post filter and allows any ultrasonic noise to pass thru. There is a belief that the noise would be filtered by other things in the chain, and is in effect benign, so we created this option to let the user decide.

Filter 1: This filter starts at 32k pass band and ends at 64k stop band, so there is less attenuation of the noise, a gentler one, so a compromise filter that might allow some noise to pass.

Filter 2: This filter starts at 28k pass band and ends for full attenuation or stop band at 48k, so good attenuation of noise takes place. Technically this is a very good filter for bandwidth and noise removal.

PCM Digital Filters

There are 2 Linear Phase filters and 2 Minimum Phase Filters that can be selected for use in the M11 and they are selected via the filter menu on the front panel. These are labeled Linear 0 and 1, and Minimum 0 and 1, in the user interface. Since the M11 converters use over sampling techniques, these filters are calculated at a very high rate for very high precision filter construction.

You will find despite the close numbers of the specs, that they all have very unique and different sound characteristics, and you may find one more suitable for different kinds of music than others as well. Here is a brief description of them. Note that since both types have the identical characteristics that there is one table of characteristics for both filter types

Filter Descriptions

For filters in this chart is accurate for both Linear Phase and Minimum Phase filters.. The 2 Minimum phase filters have the same characteristics as the linear phase filters of the same number, allowing easy comparison between filter types. As an example, Linear 0 has the same basic frequency response characteristics as Minimum 0 but they are based on a different filter construction techniques and yield different results. For simplicity and as a general guide to their characteristics, the list below lists filter # but in the M11 menu they are called out as Minimum and Linear.

- Filter 0 - 20kHz bandwidth, Stop-band at Nyquist frequency with low ripple and high attenuation
- Filter 1 - Low delay filter with full attenuation at Nyquist Frequency

Filter Tables

Table of filter characteristics at 48kHz.

48kHz	Passband	Stopband	Passband ripple	Stopband attenuation	delay
Filter 0	20kHz	24kHz	.001dB	111dB	.73ms
Filter 1	19.5kHz	24kHz	.004dB	103dB	.56ms

Table of filter characteristics at 44.1kHz

44.1kHz	Passband	Stopband	Passband ripple	Stopband attenuation	delay
Filter 0	20kHz	22.05kHz	.001dB	110dB	1.43ms
Filter 1	19.5kHz	22.05kHz	.046dB	82dB	.72ms

Technical Specifications

Digital Inputs

Connectors:	XLR: AES/EBU 24 bit Single Wire BNC: SPDIF RCA: SPDIF USB: USB 2 RJ45: Local Area Network (streamer option)
Sample Rates AES, SPDIF:	44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192kHz DSD 64 as DoP
Sample Rates USB:	44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192kHz 352.8kHz, 384kHz, DSD 64fs- 256fs Native or as DoP
Sample Rates LAN:	44.1 kHz to 384kHz, DSD 64fs-128fs
Jitter:	8 psec @ 48k / 6psec @ 96k

Balanced Analog Outputs

Connectors:	XLR balanced (pin 2 hot)
Impedance:	40 ohm
Output Level Range M11:	Adjustable +8 dbm to +22 dbm, or fixed at +13.5 dbm
Output Level Range M11S2:	Internally selectable +13.5 dbm or +10 dbm
D/A Conversion:	20 bit Ladder type
Frequency Response @44.1k:	10 hz- 20 kHz +0dB, -.2 dB
Dynamic Range:	>120dB A-Weighted
THD+N @ 1k:	.0020% @ 0dbfs

Unbalanced Analog Outputs

Connectors:	RCA
Impedance:	40 ohm
Output level:	+8 dbm (2V RMS)
D/A Conversion:	20 bit Ladder type
Frequency Response @ 44.1k:	10 hz- 20 kHz -.2 dB
Dynamic Range:	>120dB A-Weighted
THD+N @ 1k:	.0020% @ 0dbfs

General Specifications

EMC

Complies with: EN 55103-1 and EN 55103-2 FCC part 15, Class B

RoHS

Complies with: EU RoHS Directive 2002/95/EC

Safety

Certified to: IEC 60065, EN 55103-2

Environment

Operating Temperature: 32 F to 105 F (0 C to 40 C)
Storage Temperature: -22 f to 167 F (-30 C to 70 C)

General

Finish: Anodized Aluminum
Dimensions: 17" x 12" x 2.5"
Weight: 15 lbs
Mains Voltage: 100, 120, 220, 240 VAC, 50 Hz – 60 Hz
Trigger In: TRS connector for 5-12V external trigger at the ring.
Power consumption: 28 Watts (6W standby)
Warranty parts and labor: 2 years

Bricasti Design