

Bricasti Design

## M28 Mono Block Power Amplifier



## User Guide

12/22



# 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:

#### **M28**

-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

January 2014  
Brian S Zolner  
President

## **Introduction**

This is a preliminary edition of the M28 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](http://www.bricasti.com).

Congratulations on the purchase of your new M28 power amplifier. We at Bricasti Design have set out to design the world's finest audio products made for the professional and consumer audio markets and the M28 is our first power amplifier in the product line.

## **Balanced Topology**

The M28 mono block power amplifier is a true reference design in analog power amplification, an uncompromising design offering extremely low distortion with moderately high power and a unique truly balanced topology rarely seen in the industry. When combined with our M28 DAC driving the M28 directly one can achieve a fully differential signal path, from the converter to the loudspeaker.

## **Build Quality**

The M28 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 M28 is to provide state of the art analog power amplification, utilizing the best designs and materials that can be found today. The power amplifier is a very critical part of audio chain, it has to take the incoming signal and amplify it and most important to deal with the load of the loudspeaker and control its back EMF with precise control. The sound of the M28 is intended to be transparent and revealing, and fully dynamic with no sense of limits and compression in the reproduction, on any loudspeaker.

Many hours of listening were done to tune the M2828 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 M28 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 M28 save all packing materials in the event you ever need to ship the unit. Thoroughly inspect the M28 and packing materials for any signs of damage in shipment. Report any damage to the carrier at once.

## **Precautions**

The Bricasti Design M28 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 M28, so please check this carefully before applying power.
- Do not install the M28 in an unventilated rack or directly above any heat-producing equipment. Maximum ambient operating temperature is 40 C. Exceeding the maximum ambient temperature may cause the M28 to enter thermal shutdown as a safety precaution.
- To prevent fire or shock hazard, do not expose the M28 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.

## M28 Operational Overview

### Front Panel

The front panel has 2 buttons and an LED. The larger lower button is the primary power on/off pushbutton switch, above this is a red LED power on and status indicator, and at the top a momentary stand-by switch that will set the M28 in to an idle mode with low power consumption and then to standby with full power.



### Rear Panel

At the rear there are 3 sections, at the top you will find the analog audio inputs, XLR connector for balanced and RCA connector unbalanced. In the center section are the speaker output terminals, and the lower section with the trigger in/out, RS422 port, input trim control and AC inlet connectors.



## Setup and Operation

### Important Safety Note about AC power and the M28

The AC power is connected at the rear of the unit IEC type 15A AC inlet and the mains power switch is located at the front panel. This is a filtered inlet and helps provide clean AC power to the M28's power supplies and will prevent any RF and noise from entering M28 power grid. Take note that because the M28 is a fully analog amplifier it utilizes linear power supplies and care should be taken to use only the power range indicated on the unit, otherwise damage may occur to the power supplies and other circuits in the M28. Please note and adhere to any voltage indications on the outer box, rear panel or chassis all of which will indicate how the M28 is set at manufacture. As added protection the M28s power supply will sense the AC power range and if the applied power is not within + or – 10% of the factory set voltage the M28s power supply will not allow for power up operation and will not enter into full standby mode.

## Making Connections to the M28

### Speaker Cables

Install the speaker cables first. We recommend the use of high quality speaker cables with spade or ring lugs that will fit the M28s binding posts. These are set at standard spacing to accept most connector types and accept banana type connectors as well. Note that the + terminals have a red ring and – terminal has a black ring, and the polarity is also marked on the rear panel. Use an 11mm socket or nut driver to tighten the binding post nuts securely, for a firm connection, taking care not to over tighten them.

### Interconnect Cables

We recommend the use of high quality balanced XLR cables with M28 when using the balanced input or an unbalanced RCA cable when using the unbalanced input. The M28 is a true balanced amplifier and best performance can be realized if using the M28 with a balanced source. For convenience we also provide and unbalanced RCA input, but when using the M28's unbalanced input it is recommended that a XLR shorting plug be used on the balanced input, this will correctly terminate the balanced input for best performance. This plug connects pin 1 to 3 in the XLR connector.

### AC power cord

The M28 is supplied with a high quality power AC cord tipped with a 15-amp IEC connector that meets all safety requirements. You may use different power cord with the M28 providing it meet or exceeds all safety requirements noted elsewhere in this manual.



## Power Up/Power Down

Once all your cables are connected to the M28 it is time to power up.

### Power Up Sequence

#### Stage 1 System Idle Mode:

The M28 has a dedicated front panel AC mains power switch, this is a latching push button type switch and pressing it in will connect AC power to the first stage of the power supply. This stage senses the AC inlet power voltage and if within the + 10% or -10% range of rated operation will allow for the next stage of power up.

To operate, press the switch to the inward or on position and the LED will light up and flash at a rate of about 1 per sec, the M28 is now in idle and will consume about 2W of power. You will hear the power relays click when this state is activated.

#### Stage 2 System Standby Mode:

Next, a quick press the momentary stand by button and you will hear a relay click when the button is pressed and in a few moments you will hear the relays again as the M28 enters standby. Once engaged into standby mode the LED should start to blink at 1/3 the idle rate, so a faster blinking of the LED than idle. The M28 is now fully powered up but the inputs are muted. This state can be used for pre heating the M28 before use, in this state it will consume about 60W. If in the event there is a fault found in the initial power on and idle mode then the M28 will not enter into standby.

#### Stage 3 System ON Mode:

A quick press the standby key again and the inputs will be unmuted and the M28 will be ready for play. You will now see the LED as solid and hear a click of the input relays and audio can now pass.

### Recommended Power Down Sequence

It is recommended that you first put the M28 into standby before initiating a hard power off from the large front panel AC power switch. We have taken great care in the way the M28 behaves on power down to eliminate the possibly of noise at the ouputs when power is suddenly removed but there may be a possibly that this could happen. So if possible place the M28 into standby first as this will mute all inputs and outputs and insure a clean safe power off.

### Placing the M28 Back to Standby

A quick press of the standby key from the running state will set the M28 into STANDBY mode, you will hear the relays click and the front panel LED will be flashing at the 1/3 speed. It is now safe to power off the M28 by either the front panel power switch or and external one.

### Back to Idle Mode

A long press of about 2 seconds on the standby key from either the on and running state or from standby state will place the M28 in IDLE mode. As described in the power up sequence a quick press on the button again will put the M28 back in standby, and press again to go back to run mode.

## **Additional Features of the M28**

### **Trigger In:**

On the lower section of rear panel the M15/M25 has a stereo connector (Tip/Ring/Sleeve) for triggering the amplifier into standby mode from an external device like a preamp or other external remote control. Sleeve is connected to chassis ground, the RING is the trigger + voltage, the TIP is the return. The amplifier will fully power up from stage 1 power on stage 3 mode when a positive 5V or 12V DC voltage is applied at the RING. The amp will then power down to stage one when the trigger is removed. Note this wiring is nonstandard and for use with Bricasti source products like the M20 preamp. An adaptor cable is supplied with the product for use with other manufactures products; this short adaptor cable is to be connected to the M15/25 trigger in as it's a custom wired TRS to Mono adaptor. If you need one of these please contact our service at [service@bricasti.com](mailto:service@bricasti.com)

### **RS422 Port**

On the lower section of rear panel the M28 the rear panel you will find a DB9 connector for a RS422 serial port. This is currently only used for system diagnostic monitoring and has no use for the user.

### **Trim Control**

A unique feature of the M28 is an input trim control. This can be used to lower the input sensitivity of the M28 to better match the outputs of a pre amp or more importantly the outputs our M1 DAC when using it to drive the M28 directly with no preamp. This attenuator is set by a logic controlled relay switch and is adjustable in 6 db steps. The M28 is shipped with no attenuation or the switch set full clockwise. The switch is stepped with detents; by using a small screw driver and turning the switch counterclockwise, will add more attenuation from the factory default position of no attenuation. There are 4 steps of 6 db each so a full 18db of attenuation can be applied to the input.

### **Using the M28 trim control**

This stepped analog attenuator is of great use when using the outputs of the Bricasti M1 or other DAC to directly drive the M28. In this case the M1 has a digital level attenuator and use of such an attenuator can be done with exceptional results provided there is good analog gain matching with the power amplifier and this will vary with the combination of DAC/power amp/speaker setup. This means using the digital attenuator to the minimal amount needed to have good range level control range, and least loss of low level bit resolution. In practice this means the most dynamic recordings will have the M1 doing a few db of gain reduction in the digital domain..

This makes for a simple setup with the M1 or other source, one only has to connect the balanced output of the M1 directly to the M28 and then make any fine tune the gain at the rear of the M28 to the best range. All gross amounts of attenuation are done in the analog domain and the upper level of about 20db is done at the M1 digital attenuator there by maximizing the advantages of each.

## Audio Performance

The typical audio performance specs of the M28 are outstanding:

Total Harmonic Distortion:	Less than 0.005% 20hz-20kHz at full rated power in to 8 ohm and 4 ohms.
Power:	200W into 8 ohms and 400W into 4 ohms.
Frequency response:	10hz-150kHz, within 0.5db
Gain:	27 db
Signal to Noise:	greater than 85db at full rated power
Topology:	Fully Differential
Balanced Input:	XLR connector 200k ohm impedance
Unbalanced Input:	RCA connector 100k ohm impedance

## 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: 12" wide, 14" high, 18" deep  
Weight: 80 lbs  
Shipping Weight: 100 lbs  
Mains Voltage set at factory: 100, 120, 220, 230, 240 VAC, 50 Hz – 60 Hz  
Trigger In: TRS connector for 5V external trigger.  
Power consumption: 60W standby, 2W idle  
Warranty parts and labor: 5 yrs limited

## M28 Limited Warranty

Bricasti Design warrants the M28 against manufacturing defects for 5 years from date of purchase from an authorized Bricasti Design dealer.

1. The warranty covers only new products purchased from a Bricasti Design dealer or Distributor.
2. The warranty is nontransferable, valid for the original purchaser.
3. All service must be performed by an authorized Bricasti Design Dealer or Distributor
4. For USA customers, if the product is shipped back to Bricasti Design for warranty service, the customer pays for inbound shipping costs and Bricasti Design will pay for the return shipping.
5. Customer must provide proof of purchase to be eligible for warranty service.
6. All international customers must contact their local distributor for service.

# Bricasti Design