



# CAD 2A3-MB

## OPERATING MANUAL

**NOTE:**

Before installing your new CAD 2A3-MBs, please read this manual carefully. This manual will inform you of the CAD 2A3-MB's specifications, proper installation procedures and operation procedures. Also included in this manual are guidelines on how to properly service and care for your new CAD 2A3-MB's.

# ***CAD-2A3-MB***

## ***MONO BLOCK AMPLIFIER***

Congratulations! You have purchased one of the most exotic audio amplifiers available. Within its power range, the CAD-2A3-MB displays the operating characteristics of a true “high-end” amplifier. Careful design, parts selection and proper circuit topologies contribute to incredible reliability and enjoyment.

For the technically minded, a review of the circuit is in order. Your new CAD-2A3-MB operates in a class A mode. The output stage 2A3 tubes are biased with a negative fixed bias voltage for low distortion and maximum output capabilities. The CAD-2A3-MB is a true triode push-pull amplifier. A properly designed triode amplifier is the most linear and yields the most musically satisfying presentation. The output power is 30 watts of triode power each channel. The output transformers on the CAD-2A3-MB are the most important component in the amplifier and have been specifically designed by Cary Audio for use in the CAD-2A3-MB. We have taken the approach in the output transformer design not to dissimilar to the single-ended amplifiers we design and produce. The primary and secondary windings on portions of the output transformer are wound in a bi-filer process with the two inductors interleaving sixteen times. The bi-filer wind (two conductors wound at the same time) will yield the closest balance and coupling of any design currently utilized in vacuum tube output transformers. The E/I laminents used are silicone impregnated hipsil steel contributing to the extremely low loss of the CAD-2A3-MB output transformer. The above process is similar to the single-ended air-gap design found on the Cary single-ended output transformers. A balanced drive signal is applied to the control grids of the 2A3 output tubes from the 6BL7 driver tube. This tube is configured in a dual differential network that operates in the following manner: The first section of the dual 6BL7 tube is direct coupled to the input pre-driver stage. The drive signal is amplified through this first section in a class A grid driven circuit with the output signal inverted 180 out of phase at the anode and then coupled to one half of the push-pull bank of 2A3's. At the same time the second half of the dual triode 6BL7 is cathode driven in a grounded grid non-inverting class A gain stage coupled to the other half of the push-pull bank of 2A3's. With this

network the balance is a perfect plus and minus dual drive signal to drive the final output 2A3's in a balanced push-pull configuration. The input pre-drive stage is a 6922 dual triode on the CAD-2A3-MB. This circuit is identical to the Cary Audio single-ended amplifiers. The 6922 drive stage is a single-ended, class A, anode current source, gain stage. The input signal is direct coupled to the grid of one section of the 6922 input tube. The anode of this section is direct couple to the cathode/grid of the second stage. This second stage takes the place of the conventional dropping/coupling resistor network found in conventional gain stages. This is called the anode current section and offers infinite resistance and the proper current/voltage to operate the gain stage. The amplified signal is then direct coupled to the 6BL7 which drives the 2A3's in the balanced configuration as described earlier.

The power supply transformer is designed to operate at a 200% continuous commercial service at the full rated 30 watt output level. The high voltage power supply section is a full wave center tap configuration (not some cheap voltage doubler as used in many competitors amps) to a PI network with a filter choke. This high voltage section feeds the final output 2A3's. Another supply is the negative DC grid bias circuit that once again is a PI network. A regulated filament supply will prevent AC ripple from capacitively being coupled to the electrodes in the 6922 and 6BL7 gain stages.

A great deal of attention during design of your new CAD-2A3-MB was concentrated on the "overload recovery" ability of the amplifier. The ability of an amplifier to instantly recover from clipping is much more important than is commonly believed. In the power war of amplifier manufactures the mentality is focused on high and then even higher power output to solve the clipping problem. When in reality the most critical aspect is how fast of a recovery an amplifier can achieve after overload. With the incredible dynamics range of live and in turn recorded music, even 2,000 watts of power is not enough. Most of the music being listen to in an average home listening room is only requiring about 3 watts of power. It is on the transients of loud low frequency program material that tremendous signal voltages will appear at the input of the amplifier. It is in this situation that the overload recovery ability of an amplifier is of critical concern. The CAD-2A3-MB extols its merits in the ability to handle transients and instantaneously recover from brief or even extended overloads. The CAD-

2A3-MB will overload symmetrically at any frequency in the audio bandpass. The CAD-2A3-MB will also yield faithful reproduction of extremely low frequencies at full output levels. Power transformer, power supply regulation and output transformer design and careful shaping of the overall frequency response curve all play a very important part in the ability of the CAD-2A3-MB to recover quickly when over loaded. If one were to monitor the high voltage rail voltage (325 VDC) of the CAD-2A3-MB during soft and also loud music passages it would be found there is no more than a volt or so change from soft to loud passages.

Another technical feature of your new CAD-2A3-MB amplifier is stability. The CAD-2A3-MB maybe operated with no load (without speaker) without damage to the amplifier, output transformer or tubes.

Get ready for years and years of enjoyable music with your new Cary Audio Design CAD-2A3-MB basic stereo amplifier.

## SPECIFICATIONS

Operating the CAD 2A3-MB amplifiers is a simple procedure since each unit is designed for long term stability in virtually any home operating situation. Therefore, if the unit is operated outside the parameters outlined in this owner's manual, damage may result. Please read this manual carefully before putting your new Cary Audio Design CAD 2A3-MB's in operation.

The following definitions are applicable to this manual. These definitions must be followed explicitly.

|  |
|--|
| <p style="text-align: center;"><b>WARNING</b><br/><b>HAZARD PRESENTS PERSONAL INJURY OR DEATH</b></p> <p style="text-align: center;"><b>Caution</b><br/><b>EQUIPMENT DAMAGE MAY OCCUR BUT NOT PERSONAL INJURY</b></p> <p style="text-align: center;"><b>Note</b><br/><b>Proper performance of the amplifier cannot be ensured if disregarded</b></p> |
|--|

### 1.2 Specifications

The following section describes the CAD 2A3-MB's basic specs. Specifications are subject to change without notice or obligation.

|                    |                              |
|--------------------|------------------------------|
| DIMENSIONS:        | 6"H x 10"W x 20"D            |
| WEIGHT:            | 40 Lbs.                      |
| CIRCUIT TYPE:      | Push-Pull in Class A         |
| POWER OUTPUT:      | 30 Watts                     |
| INPUT SENSITIVITY: | 1 volt for full output       |
| OUTPUT IMPEDANCE:  | 8 ohms (switchable to 4ohms) |
| INPUT IMPEDANCE:   | 150,00 ohms                  |

NOISE AND HUM: 80dB below rated output

FREQUENCY RESPONSE: (at one watt output): 20Hz to 20kHz + 0 - 0.75dB  
(at full power output): 20Hz to 20kHz + .5 - 0.5dB

TUBES: 1-6922 predriver, 1-6BL7 phase inverter,  
4-2A3 triode power output tubes

TRANSFORMERS: 1-EI laminated core power transformer  
1-Push-pull output transformer  
150% duty cycle on all transformers

RESISTORS: 1% metal film

CAPACITORS: polypropylene (oil filled optional)

POWER SUPPLY CAPACITORS: 4-1200 MFD @ 450VDC, 223 Joules

AC CORD: 3 conductor detachable

AC POWER REQUIREMENTS: 117 volts AC 50/60 Hz  
106 watts operate  
44 watts in stand-by  
220 volts AC 50/60 Hz  
106 watts operate  
44 watts in stand-by

WARM-UP TIME: 3 minutes

BREAK-IN PERIOD: 100 hours of music playing time

FINISH: Nickel chrome plated stainless steel with black anodized  
aluminum faceplate.

### 1.3 Front Panel Features

AC-ON SWITCH: Turns AC power on. The LED indicates filament voltage is on for warm-up.

STAND-BY SWITCH: Turns high voltage on. The LED indicates B+ high voltage is on.

### 1.4 Rear Apron Features

INPUT: Signal input connection via shielded interconnect cable

OUTPUT: The 5-way binding posts provide the output to the speaker system.  
Red=+, Black=-

**CAUTION**  
**EQUIPMENT DAMAGE MAY OCCUR WITH IMPROPER FUSES**

AC: 3 conductor detachable.

**CAUTION**  
**USE OF ANY OTHER PROTECTION FUSE CAN DAMAGE UNIT**

FUSE: AC power fuse. Never replace with any other value than 2 AMP SLOW BLOW!  
250 VOLT!

TUBE FUSE: Never replace with any other value than 1/2 AMP FAST BLOW!  
250 VOLT!

**CAUTION**  
**NEVER REMOVE/INSERT AC LINE CORD WHEN THE UNIT IS ON**

**TO INSTALL THE TUBES, REFER TO PAGE 9 OF THIS MANUAL AND READ INSTRUCTIONS CAREFULLY!**

## INSTALLATION

This section describes the unpacking and installation procedures for the CAD 2A3-MB mono-blocks.

**WARNING**  
**MAKE NO ATTEMPT TO PUT THE CAD 2A3-MB AMPLIFIER IN SERVICE WITHOUT THE BOTTOM PLATE ATTACHED - CONTACT WITH VOLTAGE IN THE CAD 2A3-MB CAN BE FATAL!!!**

### **2.2 Unpacking**

All shipping containers have been specifically designed to protect their contents and special care has been taken to prevent damage under normal shipping conditions. Mishandling should be evident upon inspection of the shipping container. If damage is found after visual inspection, take care not to destroy the evidence. If necessary, document the damage with photographs and contact the transport carrier immediately.

Carefully remove your new CAD 2A3-MB amplifier from its packing carton, and examine it closely for signs of shipping damage. It is recommended to save all original packing cartons to protect your amplifier from damage should you wish to store it or ship it for after sales service.

### **2.3 Warranty Card**

Fill out the enclosed warranty registration card and return it to Cary Audio Design, Inc. within 10 days of original purchase. Keep your original sales slip with the packing cartons should you ever need it for reference. **Failure to register warranty will limit the warranty to one year.**

### **2.4 Amplifier Placement**

In general, the location of your new CAD 2A3-MB amplifier is not critical. The best placement in your system is near the speaker system with short lengths of speaker cables. Certain precautions must be taken to ensure optimum performance. Avoid extremely hot locations such as near radiators or other heating units. Keep the top of the CAD 2A3-MB clear of books, paper or other equipment to protect against overheating.



## 2.5 Power Requirements

The CAD 2A3-MB is designed to operate from house current mains. The design voltage is 117VAC at 50/60Hz. (Foreign units 220 VAC at 50/60Hz)

## 2.6 Cables

The speaker cables from the output posts of the CAD 2A3-MB to the speaker system can be any convenient length your set-up requires. Select speaker cables of sufficient size to preserve the outstanding performance capabilities of your CAD 2A3-MB. Heavy gauge #16 wire is suitable for distances up to 10 feet; #12 for 25 feet. Most audio dealers will have proper speaker cable in stock for this purpose.

## OPERATION

Signal input connections are made via the input jack on the rear of the CAD 2A3-MB located on the opposite side to the output binding posts. The interconnect cables from the output of the preamplifier can be any convenient length your set-up requires. The choice of a high quality interconnect cable is important. Once again, your audio dealer will have the proper cables in stock for this purpose.

### 3.1 Operation

Your new CAD 2A3-MB is ready for operation after the speaker, interconnect cables and all the tubes have been installed. **See page 9 for tube positions and impedance selection.**

### 3.2 AC On Power Switch

Simply turn the AC switch to the ON position. The LED on the front panel will light. Observe that all tubes are lit (filaments). Allow the filaments to warm-up for 2 to 3 minutes then turn the standby/operate switch to the operate position. Warming up the filaments before switching to operate can extend the life of your tubes.

### 3.3 Stand-By Switch

This is the most convenient feature on the CAD 2A3-MB amplifier. This switch is located on the front of the amplifier. In the operate position, the amplifier is ready to operate. In the stand-by position (provided the front panel AC switch is in the "on" position), only the tube filaments are operating. You may wish to leave your CAD 2A3-MB amps turned on in the stand-by mode 24 hours a day. When you wish to listen to music, simply turn the stand-by switch to the operate position. Under these conditions the CAD 2A3-MB is always warmed up and ready for peak performance.

### **3.4 Break In Period**

The tubes, capacitors and output transformers take approximately 100 hours of music playing to fully settle in for peak performance. The CAD 2A3-MB may seem sterile or thin sounding right out of the box. After the first couple of hours you will notice increased depth and tighter bass. This break in period defies all engineering theory, but is true with most audio amplifiers.

### **3.5 Bias Adjustment**

Refer to page 9 for bias adjustment instructions. The bias is factory pre-set, but it is recommended to check it due to differences in A.C. line voltages from one place to another. Also check and re-adjust bias whenever replacing output tubes. The bias may be checked once every two to three months. There will be small fluctuations in bias current due to fluctuations in the A.C. line voltage. Larger fluctuations (approximately 40 MA) may indicate you have a defective output tube.

**NOTE: When using a digital or analog VOM (Volt-Ohm Meter) make sure it is set for D.C. milliamps not D.C. voltage. Improper use of the VOM can give you false readings and possibly damage the output tubes.**

**WARNING**  
**MAKE SURE AMPLIFIER IS UNPLUGGED FROM AC MAINS**  
**FOR ANY SERVICE OR CLEANING!!!**

## **SERVICE AND CARE**

### **4.1 CAD 2A3-MB Care and Cleaning**

The chassis of the CAD 2A3-MB may be cleaned with a soft rag and Windex (or a similar window cleaner). The frequency of cleaning will be governed by how many hours the CAD 2A3-MB is operated and by operating environmental cleanliness.

### **4.2 Tube Replacement**

If it becomes necessary to replace the tubes in the CAD 2A3-MB amplifier, a matched set of tubes of the same brand should be used. A new tube kit is available from Cary Audio Design, Inc. You should get 2 to 3 years from the output tubes with everyday usage and 3 to 4 years of use from the input and driver tubes.

### 4.3 Factory Service

Careful consideration has been given to the design of your CAD 2A3-MB amplifier to keep maintenance problems to a minimum. However, it is possible that some problems may arise which cannot be cured by the tube substitution. At this point we suggest that you contact our Customer Service Department, phone number 1-919-481-4494, to describe your problem in detail. Do not return the CAD 2A3-MB to the factory without a return authorization number from the Customer Service Department. Cary Audio Design, Inc. will assume no responsibility if the transportation company refuses to pay a damage claim due to your improper packing or lack of insurance should the unit be lost in shipment.

#### **WARNINGS**

**MAKE NO ATTEMPT TO PUT THE CAD 2A3-MB IN SERVICE OUTSIDE OF THE**

**CABINET. CONTACT WITH HIGH VOLTAGES FOUND IN THE UNIT CAN**

**BE FATAL!!!**

**COMPLETELY REMOVE AC POWER PLUG FROM THE WALL AND**

**ALLOW 30 MINUTES FOR THE HIGH VOLTAGE CAPACITORS TO**

**DISCHARGE THROUGH BLEEDER RESISTORS BEFORE ATTEMPTING**

**TO CHANGE TUBES OR CLEAN THE INSIDE OF THE AMPLIFIER.**

#### **CAUTIONS**

**NEVER REMOVE/INSERT AC PLUG WHEN THE UNIT IS ON OR THE AC POWER SWITCH IS IN THE "ON" POSITION.**

**OBSTRUCTION OF THE TOP PORTION OF THE CAD 2A3-MB WILL RESULT IN TUBES OVERHEATING.**

**\*\*\*OBSERVE DIRECTIONS IN THIS MANUAL\*\*\***

### CAD 2A3-MB TROUBLESHOOTING GUIDE

| SYMPTOM                                       | CAUSE   | REMEDY  |
|---|---|---|
| Hum or "Buzzing" through speakers             | -Ground loop<br><br>-Intermittent or poor connection of interconnect ground             | -Install 2-pin adapter on A.C. cord to float the ground.<br><br>-Replace interconnect   |
| "Popping" or "Spitting" noise through speaker | -Noisy Tube<br><br>-Intermittent output tube (1/2 amp fuse may blow on a regular basis) | -If noise is in one channel, swap one section of tubes at a time until the noise swaps channels. Replace noisy tube. Start with 6BL7 and 6922 tubes.<br><br>-Check bias, if high or fluctuating rapidly one of the output tubes may have an intermittent short. The defective tube may sometimes be found by lightly tapping the output tube with a pencil and observing the current meter. (The speaker should be removed from the amp while trouble shooting this type of problem.) |
| AC fuse blows                                 | -Line voltage surge   | -Replace fuse with 2 amp slow blow only!  |
| Bias is reading zero                          | -Blown 1/2 amp fuse<br><br>-Bias Plug wire broken<br><br>-Meter fuse blown              | -Replace fuse<br><br>-Replace wire<br><br>-Replace Fuse inside meter  |
|   |   | -   |

**Notes:**

## UNITED STATES LIMITED WARRANTY

Cary Audio Design, Inc. warrants to the original United States purchaser for use in the United States, that this product shall be free from defects in material (except tubes and AF output transistors) or workmanship for three (3) years from the date of the original purchase.

During the warranty period, Cary Audio Design or an authorized Cary Audio Design service facility will provide free of charge both parts (except tubes and AF output transistors) and labor necessary to correct defects in material or workmanship.

To obtain such warranty service, the original purchaser must:

- (1) Complete and send in the warranty Registration Card.
- (2) Notify Cary Audio Design as soon as possible after the discovery of a possible defect:
  - (a) The model number and serial number;
  - (b) The identity of the seller and the approximate date of purchase;
  - (c) A detailed description of the problem, including details on the electrical connection in the associated equipment and the list of such equipment.
- (3) Deliver the product to Cary Audio Designs or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and the shipping charges prepaid.

Correct maintenance, repair and use are important to obtain performance from this product. Therefore, carefully read the Instruction Manual. This warranty does not apply to any defect that Cary Audio Design in its sole discretion determines is due:

- (1) Improper maintenance or repair, including the installation of parts or accessories that does not conform to the quality and the specifications of the original parts.
- (2) Misuse, abuse, neglect or improper installation.
- (3) Accidental or incidental damage.

## WARRANTY DISCLAIMER

Except for the express warranties stated herein, Cary Audio Design disclaims all other warranties including, without limitation, all implied warranties of merchantability and fitness for a particular purpose.

## EXCLUSIVE REMEDY

Notwithstanding the foregoing, the purchaser's exclusive remedy for any breach of warranty, express or implied, is limited to the repair or replacement of the defective unit or the refund of the purchase price, at the option of Cary Audio Design. Under no circumstances is Cary Audio Design liable for incidental or consequential damages. Any implied warranties imposed by law terminate one (1) year from the date of purchase.

## FOREIGN PURCHASERS

Cary Audio Design warrants its merchandise to purchasers in the United States for use in the United States. It provides no other warranties. If you are a foreign purchaser, consult with your dealer to determine whether your dealer provides any warranty.

The foregoing constitutes Cary Audio Design's entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other claim for incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives legal rights and you may have other rights which vary from state to state.