



Cary Audio Design  
CAD-280SA  
*V-12R*  
Vacuum Tube Stereo or  
Monobloc Power Amplifiers  
OPERATION MANUAL

**NOTE:** Before installing your new *V-12R* power amplifier, please read this manual carefully as it will inform you of the 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-280 SA (*V-12R*) stereo or mono power amplifier.

## Specifications for your new *V-12R* power amplifier.

We have updated the V-12 mono and stereo models to a RACING (R) version! The new *racing* input circuit makes the input sensitivity 1.2 volts, similar to most components currently available. Operating the power amplifier is a simple procedure. Each unit is designed for long term stability in virtually any home operating situation. Please note, 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 V-12R in operation. The following definitions are applicable. Warnings should be followed explicitly.

### **WARNING**

#### **HAZARD PRESENTS PERSONAL INJURY OR DEATH**

#### **Caution**

EQUIPMENT DAMAGE MAY OCCUR BUT NOT PERSONAL INJURY

#### **Note**

Proper performance of the amplifier cannot be ensured  
if disregarded

### **1.2 Specifications**

The CAD-280 SA V-12R or V-12R Monobloc version basic specifications:

DIMENSIONS:	9"H x 12"W x 20"D
WEIGHT:	68-lb. stereo or 85-lb. for the Monobloc version
CIRCUIT TYPE:	Push-Pull Triode or Ultra-linear Amplification in Pure Class A
POWER OUTPUT:	50 watts – Triode Mode                      100 watts – Triode (Mono) 100 watts – Ultralinear Mode              200 watts – Ultralinear (Mono)
INPUT SENSITIVITY:	1.3 volts for full output
INPUT IMPEDANCE:	150,000 ohms
NOISE AND HUM:	> 84db below rated output
FREQUENCY RESPONSE:	20Hz to 23Khz +/- 1.0 dB (at full power)
TUBES:	2- 12BZ7 Input tubes (or 12AY7, 12AX7) 2- EL-84 Current Source tubes (or 6BQ5) 12- EL-34 Output tubes (or 6550, KT-66, KT-77, KT-88, KT-90, 6L6)
POWER TRANSFORMER:	1- EI laminated, 200% duty cycle
OUTPUT TRANSFORMERS:	2-EI laminated stereo (1-EI mono) Silicon Impregnated
RESISTORS:	1.0% tolerance, precision metal film resistors
CAPACITORS:	Oil Filled
POWER SUPPLY CAPACITORS:	4 - 560 MFD @ 400 volts
AC CORD:	3 conductor shielded detachable
AC POWER REQUIREMENTS:	117/234 volts AC 50/60Hz
POWER CONSUMPTION:	420 watts in operation, 10 watts in stand-by
WARM-UP TIME:	3 minutes
BREAK-IN PERIOD:	100 hours of music playing time
FINISH:	Jaguar Carnival Red paint on chassis
FRONT PANEL:	Machined, Black Anodized aluminum

Specifications are subject to improvement without notice or obligation.

### **I.3 Front Panel Features**

POWER ON/OFF SWITCH: AC mains switch and high voltage in “ON” position  
HV LED: Indicates the high voltage supply is ON and the fuse is intact.  
BIAS L led: Indicates the Bias voltage for Left channel (Left chassis side for Mono)  
BIAS R led: Indicates the Bias voltage for Right channel (Right chassis side for Mono)  
OPERATE/STANDBY SWITCH: Turns filaments on in the “OPERATE” position.

### **I.4 Rear Apron Features**

INPUTS RCA or XLR: Signal input connection via shielded interconnect cable  
RCA/ XLR SWITCH: Switches between RCA and XLR input selection.  
SPEAKER OUTPUT: Three- 5-way binding posts provide the signal output to the speaker system. Red = +, 4 or 8 ohms, Black = -, ground  
BIAS JACK: \_” ‘phone plug’ jack for supplied cable with plug to measure the output tube bias levels. See tube bias instruction sheet later in the manual.  
BIAS POTENTIOMETER: Adjusts to achieve the bias level setting for the output tubes.  
AC: 3- conductor shielded power detachable cord to AC power mains.

<p><b>CAUTION</b> EQUIPMENT DAMAGE MAY OCCUR WITH IMPROPER RATED FUSES</p>
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POWER AC FUSE: This is an over current protection fuse for the power transformer.  
Never replace with any other fuse than 3 AMP SLOW BLOW!  
250 VOLT! (2 AMP SLOW BLOW IN 220 VAC OPERATION)

FILAMENT FUSE: This is an over current protection fuse for the filament transformer.  
Never replace with any other fuse than a 2 AMP SLOW BLOW!  
(1 AMP SLOW BLOW IN 220 VAC OPERATION.)

LEFT AND RIGHT TUBE (side) FUSE: This is a protection fuse for the output tubes.  
Never replace it with any other fuse than a 0.5 amp fast blow! 0.5A @ 250 volt rating.

<p><b>CAUTION</b> NEVER REMOVE or THE INSERT AC LINE CORD WHEN THE UNIT IS ON TO AVOID RISK OF ELECTRICAL SHOCK</p>
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### **I.5 TOP PANEL FEATURES**

TRIODE / ULTRA-LINEAR SWITCHES: Three mode switches per chassis side allow you to choose from 50 watts (100 watts mono) power in Triode mode or 100 watts (200 watts mono) power in Ultralinear mode. All mode switches should be set to the same ‘direction.’

RED LED: (‘Good Health LED’) Indicator for each individual output tube. When the LED is lit it shows that the associated output tube is working.

**WARNING!**  
**MAKE NO ATTEMPT TO PUT THE CAD-280 SA AMPLIFIER IN  
SERVICE WITHOUT THE BOTTOM PLATE ATTACHED -  
CONTACT WITH HIGH VOLTAGE INSIDE THE CHASSIS CAN BE  
FATAL!**

## **INSTALLATION**

This section describes the unpacking and installation procedures for the CAD-280 SA amplifier.

### **2.1 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 chassis damage is found after a 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 power amplifier from its packing carton, and examine it closely for signs of shipping damage. It is recommended to save all the original packing cartons to protect your amplifier from damage should you wish to store it or ship it for after-sales service.

### **2.2 Warranty Card**

Fill out the enclosed warranty registration card and return it to Cary Audio Design, Inc. within 15 days of original purchase. Keep your original sales slip from your *Cary Audio Authorized Dealer* with the packing cartons should you ever need it. *Failure to register your warranty will set the limited warranty time period to 90 days from date of purchase.* When purchased from a *Cary Audio Authorized Dealer* and properly registered, the limited warranty period is extended. See the limited statement of warranty for details.

### **2.3 Amplifier Placement**

In general, the location of your new V-12R is not critical. Certain precautions must be taken to ensure optimum performance however. Always avoid extremely hot locations such as near steam heat radiators or other heating units. Allow 10-12 inches above the amplifier for proper ventilation. Keep the top of the amplifier clear of books, paper or other equipment to protect it against overheating! **DO NOT** place your amplifier in a closed book case - overheating will damage the amplifier!

### **2.4 Power Requirements**

The CAD-280 SA is designed to operate from house current AC mains. The design voltage is 117 VAC at 50/60Hz. (Foreign units 234 VAC at 50/60Hz.)

### **2.5 Cables**

The speaker cables from the output posts of the CAD-280 SA 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 power amplifier. Heavy gauge #14 wire is suitable for distances up to 15 feet, #12 wire for up to 30 feet. Your *Authorized Cary Audio Dealer* will have proper speaker cable in stock for this purpose.

Signal input connection is made via the input jack(s) on the rear of the CAD-280 SA. The interconnect cable(s) from the output of a variable output CD player or preamplifier can be any convenient length your set-up requires. The choice of a shielded, high quality interconnect cable is important. Once again, your audio dealer will suggest and have the proper cables in stock for this purpose.

### **3.1 Operation**

Your new power amplifier is ready for operation after the speaker, interconnect cables and the vacuum tubes have been installed into their proper sockets. Refer to the tube placement sheet at the end of this manual for proper tube installation. On the amplifiers rear panel please select either the RCA or XLR input(s), according to your installation.

### **3.2 4 or 8 OHM Speaker Binding Posts**

Select the proper speaker binding post (4 or 8 ohm) for the speaker(s) in your system. The selection should be based on your current speakers' rated specifications and listening tests to confirm the correct connection.

### **3.3 Triode or Ultra-Linear Mode Switches**

Select either the "Triode" 50 (100 Mono) watts or "Ultra-Linear" 100 (200 Mono) watts output setting. Make sure all six switches are set to the same operating mode position. You can switch between the operating modes while playing music at a moderate volume level. Flipping one mode switch at a time is OK.

### **3.4 Power ON and Standby Operate Switches**

Flip the power switch to the "On" position and then flip the standby switch to the "Operate" position. Observe that all 16 vacuum tubes are lit, after a delay of 10-15 seconds. When the power tubes start to conduct, red 'Good Health' LED's on the top panel will light up next to each one. This might take 30-45 seconds delay.

### **3.5 The Break-In Period**

The tubes, capacitors and output transformers take approximately 100 hours use to settle in for peak performance. The V-12R will sound good right out of the box but it will improve within a short time. After the first 50-100 hours you will notice increased depth and tighter bass. This break-in period defies engineering theory perhaps, but we believe it is true with quality audio amplifiers.

### 3.6 Bias Measurement

The bias is factory preset. It is a good idea to measure it during the initial setup to make sure it is set to the specifications provided at the end of this manual. The AC voltage may be different from one area to the next. Follow the instructions provided. (250-275 mA is the recommended bias setting range, per side, with 220 mA being the minimum suggested bias level setting) *Make certain to set the test meter used to mA range.*

**WARNING**  
**MAKE SURE AMPLIFIER IS UNPLUGGED FROM AC MAINS BEFORE**  
**SERVICING**

### SERVICE AND CARE

#### 4.1 CAD-280 SA (V-12R) Care and Cleaning

The case and front of the amplifier may be cleaned with a soft cloth and Windex or a window cleaner. Moisten the cleaning rag; *do not get the amplifier wet.* The relative frequency of cleaning will be governed by the operating environment cleanliness. The chassis is best polished with non-abrasive car wax.

#### 4.2 Tube Replacement

If it becomes necessary to replace the tubes in the amplifier, a matched set of output tubes of the same name brand should be used. A new tube kit is available from Cary Audio. You should get a few years or more from the output tubes with everyday usage and many years of use from the smaller 12BZ7 and EL-84 tubes. Other types of output tubes may be used in the V-12R power amplifiers; 6L6, 6V6, KT-66, KT-88, 6550C, KT-90, KT-99 or EL-34 tubes are all acceptable for use in the output stage.

#### 4.3 IN FACTORY SERVICE

Careful consideration has been given to the design of your V-12R amplifier to keep maintenance problems to a minimum. However, it is possible that some problems may arise which cannot be cured by a vacuum tube substitution. At this point we suggest you contact our Customer Service Department phone number (919) 355-0010 to describe your problem in detail. DO NOT return the amplifier to the factory without a return authorization number (RMA) from the Customer Service Department. Please always use the ORIGINAL PACKING BOXES from Cary to ship your amplifier for moving or for service. Cary Audio Design, Inc. will assume no responsibility if the transportation or shipping company refuses to pay a damage claim due to your improper packing or lack of insurance should the unit be lost or damaged in shipment.

All mentions of *in factory service* are relevant for Cary Audio Design products purchased and used exclusively within the USA only. Non USA distributors of Cary Audio Design products will establish their own local warranty or after service policies. Ask your dealer about local warranty policies in your locale, if you reside outside the USA.

**WARNING!**

MAKE NO ATTEMPT TO PUT THE CAD-280 SA IN SERVICE WITH THE BOTTOM PLATE REMOVED. CONTACT WITH THE HIGH VOLTAGES FOUND INSIDE THE CHASSIS 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.

**CAUTION**

NEVER REMOVE OR 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-280 SA WILL RESULT IN TUBES OVERHEATING AND DAMAGE TO THE AMPLIFIER.

**! PLEASE OBSERVE THE SAFETY DIRECTIONS IN THIS MANUAL TO AVOID POSSIBLE ELECTRICAL SHOCK OR EQUIPMENT FAILURE DUE TO IMPROPER INSTALLATION!**

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