



CA8000D-Series

Models CA8000D, CA8000DX, CA8000DE, CA8000DXE, CA8000DEC

Professional Amplifier

User Instruction Manual



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54-2234-01C 1802

CA8000D-Series

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Before using **Apogee CA8000D-Series Professional Amplifiers**, please view the product's documentation to familiarize yourself with the products' features and operation. Visit <http://www.apogeessound.com> and navigate to the products' dedicated page. Or enter the appropriate URL listed below:

• **Technical Specifications** (<http://www.apogeessound.com/literature/pdfs/CA8000Ds.pdf>)

NOTICE FOR DIGITAL EQUIPMENT

In order to obtain the full performance of Apogee digital devices, always download and install the latest drivers, firmware and/or software versions available online at <http://www.apogeessound.com/software/>.

IMPORTANT SAFETY INSTRUCTIONS

- Unit is not to be exposed to splashing water or objects filled with liquid.
- Unit must be plugged only into outlets which are protectively earthed.

WARNING: To Reduce the Risk of Fire or Electrical Shock, DO NOT
Expose this Apparatus to Rain or Moisture.

Always follow these basic safety precautions when installing and using the CA8000D-Series Professional Amplifier unit:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. For indoor use only.
6. Do not use this apparatus near water.
7. Clean unit with dry cloth.
8. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
9. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
10. Do not defeat the safety purpose of the polarized or grounding-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, or the third prong, are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
11. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
12. Only use attachments/accessories which have been specified by the manufacturer.
13. Unplug this apparatus during lightning storms or when not used for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

 **When removing the unit's cover, be sure all power capacitors are discharged.**

CAUTION

RISK OF ELECTRIC SHOCK DO NOT OPEN

CAUTION: TO PREVENT THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE ANY FRONT/BACK COVERS OR PANELS. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions.

TABLE OF CONTENTS

1. Introduction	1
2. Installation	2-3
2.1 Location / Assembly / Ventillation	2
2.2 AC Power Connections (Mains)	2
2.3 Signal Input Connections	2
2.4 Auxillary Ground Lug.....	3
2.5 High Pass Filter.....	3
2.6 Anticlip Limiter Circuit	3
2.7 Output Connections	12
3. Operation and Usage	4-5
3.1 Start Up.....	4
3.2 Input Attenuators	4
3.3 Indicators	4-5
4. Cleaning	5
5. Specifications, Features, and Diagrams.....	6-9
5.1 Technical Specifications	6
5.2 Unit Function List	7
5.3 Figures	8
5.4 Block Diagram.....	9
6. Warranty	10

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1. Introduction

Congratulations! You have chosen an expertly designed and manufactured professional power amplifier. The **CA8000D-Series Professional Amplifiers** from Apogee Sound offer superb sonic reproduction, exceptional reliability and rugged construction normally found only in amplifiers costing much, much more. A CA8000D-Series amp is well suited to a wide range of applications; it is equally at home when used in fixed installations or travelling under the harshest touring conditions.

In order to obtain maximum functionality, it is important to carefully read this manual before connecting and using the amplifier. If any repair or maintenance task should ever be needed, please contact Apogee Sound International. We want to be sure that your product is serviced by authorized professionals, so it will continue to meet the highest standards of quality.

With the CA8000D-Series of amplifiers, Apogee has applied an innovative new concept to the world of professional audio, that of the use of Switching Field Effect Transistors (Pat. # 89011155/4). The integration of these devices for audio applications represents a definitive step forward, eclipsing the performance of conventional amplifiers. The advantages are:

- 1) Significantly less heat production due to lower internal resistance than bipolar transistors. The lower internal resistance also translates to a more powerful and solid bass response (note: conventional FETs have an internal resistance that is four to seven times higher than switching FETs).*
- 2) Superb sonic transparency, especially in the upper frequencies, due to the extremely high speed of the MOSFET devices. This fact also reduces TIM (Transient Intermodulation Distortion) to very low levels.*
- 3) SOA Contour Following Protection*

The SOA is the Safe Operating Area of the FET output devices. A good protection system must keep the currents and voltages within the transistors well within the safe operating area, or reliability will be seriously compromised. However, determining the SOA is a complex function, as it varies with the operating temperature. For example, at 80°C it is considerably narrower than at 25°C (a typical start-up temperature). Some manufacturers use protection schemes that are conservative, compromising the performance of the components; you get fair protection, but the performance remains mediocre. Others prefer to leave "dark" areas between the safe operating area and the activation of protection, which is very risky.

By contrast, Apogee CA8000D-Series amplifiers use a unique SOA Contour Following System. This guarantees total protection of the amplifier at any output power, load, or operating temperature, as the intelligent electronic circuitry permanently watches for changes in the safety area, adapting itself to any situation.

- 4) The best damping factor of any amplifier in its class.*

In the CA8000D-Series, the typical output relays have been substituted with an electronic CROWBAR system. This device shunts-to-ground the output signal in the case of voltages that could damage the loudspeakers. By contrast, a relay introduces a mechanical contact in the path of the audio signal to the loudspeakers. This mechanical contact results in an important reduction of the amplifier's damping factor. Over time, the relay contacts are prone to wear, further reducing the amplifier's damping and general performance. Although the use of premium quality relays may minimize the problems, eliminating them altogether increases the damping factor as well as the long term reliability.

The CA8000D features an expansion slot at the rear panel which is specially designed for the integration of a DLX24i processor module.

The stereo digital processor module DLX24i can be totally configured through System Control Manager software. Its audio processing features make it a particularly versatile tool, including:

- **Parametric equalizer, multiband**
- **Crossover with variable filter slopes**
- **Remote level control**
- **Polarity inversion**
- **Signal generator**
- **Delay**

Please contact your Apogee distributor should you wish to order an amplifier equipped with a DLX24i module, as this is a factory installed item within the CA8000DX and CA8000DXE Models only.

2. Installation

2.1 Location / Assembly / Ventillation

- The CA8000D-Series amplifier is a 2 RU high (3.5") x 19" wide rack module. It is important to recognize that the amplifier is a heat source and should not be placed next to other equipment that is susceptible to heat, nor should the amplifier itself be exposed to high temperatures from other nearby equipment.
- The ventilation path should always be kept free to allow fresh air to enter the ventilation tunnel. The amplifier takes fresh air in through the rear panel, and brings it directly to the power modules, power transformer and power capacitors. The hot air is then exhausted through the front panel. The forced air cooling system avoids heat accumulation inside the unit and thus increases the lifespan of the electronic components.
- The unit is supplied with plastic washers so as to not damage the rack ears when the screws are tightened.

2.2 AC Power Connections (Mains)

The CA8000D-Series amplifier can be ordered for either 120VAC or 240VAC (50/60Hz) applications, depending on the country. The label on the unit indicates the voltage that it has been configured for.

The AC power cables should not be located near the cables carrying the audio signal, as this could induce hum into the system.

To protect the amplifier, there are five internal fuses; two situated in each power module and the fifth in the primary transformer supply. If a fuse blows, it should be replaced by one of identical characteristics. Should it blow again, please consult our Technical Service Department. **NEVER REPLACE THE FUSE WITH ANOTHER ONE OF A HIGHER VALUE!**



CAUTION: Fuse replacement requires that the cover of the amplifier be removed, exposing the user to potentially hazardous voltages inside the amplifier. All work must be performed by a qualified technician.

FUSE VALUES	CA-8000D/E
POWER MODULE (5x20mm)	T12A
AC MAIN FUSE (10x38mm)	T16A
AUXILIARY SUPPLY (5x20mm)	T250mA

2.3 Signal Input Connections

The signal input connectors are of XLR type, electronically balanced. The pin assignment is as follows:

HOT (positive signal)	>	Pin 2
COLD (inverted signal)	>	Pin 3
GROUND	>	Pin 1

(Note: when driving the amplifier from an unbalanced source, connect pin 3 to pin 1)

The "STK OUTPUT" (stacking output) connectors are in parallel with the inputs, and are normally used to supply the same input signal to a second amplifier. They can also be used as inputs in place of the XLR connectors. The stacking output connectors are of the 1/4" phone jack type, with a pin assignment as follows:

HOT (positive signal)	>	Tip
COLD (inverted signal)	>	Ring
GROUND	>	Sleeve (Body)

The amplifier's input impedance is 22K Ω (balanced) with a nominal input sensitivity of 0dBV (1 volt). The 22K impedance makes it possible to drive a group of amplifiers in parallel without loss of audio quality.

2. Installation

2.4 Auxillary Ground Lug

All CA8000D-Series amplifiers are equipped with a signal ground lug. This lug is NOT intended as a primary AC power ground, which instead should be connected to the building ground by means of the power cord.

The ground lug is electrically tied to the chassis and can be useful as a means of reducing the chassis ground impedance, thereby eliminating ground loops between devices when setting up a sound system. One common practice is to tie together all the ground lugs of all devices that share a rack or housing, then to make one point of connection between the ground wire and the signal ground. There are other methods that can be effectively utilized, depending on the type of AC power distribution and other factors. Please consult our Technical Department for more information. In all cases, we recommend the use of heavy gauge wire (#14 AWG or larger) when auxiliary ground connections are utilized.

2.5 High Pass Filter

This filter cuts off frequency components below 25 Hz. When powering small and medium format speakers, it is useful as an aid to reduce excessive cone excursion. Also, when the amplifier is powering 70v or 100v constant voltage systems, it can be used to reduce the likelihood of saturating the step-up and step-down transformers by removing excessive low frequency content. The filter may be switched ON and OFF via internal jumpers, one per channel. Technically, the filter is an 18dB/octave Butterworth with a corner frequency of 25 Hz (*see Figure 5.3*).



CAUTION: Changes to the HIGH PASS FILTER settings require that the cover of the amplifier be removed, potentially exposing the user to hazardous voltages inside the amplifier. Therefore, all configuration work must be performed by a qualified service technician

2.6 Anticlip Limiter Circuit

The CA8000D-Series amplifier employs ANTICLIP limiters as part of an active protection system designed to help increase the lifespan of the loudspeakers. The ANTICLIP circuitry constantly analyses harmonic distortion at the amplifier's output and automatically reduces the input level in order to not exceed a predetermined distortion index. CA8000D/E amplifiers are delivered with the ANTICLIP system set to a threshold of 1% THD (Total Harmonic Distortion) which we refer to as 'hard limiting'. However, this value can be switched to a 'soft limiter' that permits a max. of 5% THD. Each channel may be set to either soft or hard limiting, independently via internal jumpers (*see Figure 5.3*).



CAUTION: Changes to the ANTICLIP settings require that the cover of the amplifier be removed, potentially exposing the user to hazardous voltages inside the amplifier. Therefore, all configuration work must be performed by a qualified service technician.

2.7 Output Connections

The OUTPUT section on the rear panel features Speakon connectors.

Whenever you need to operate the amplifier in BRIDGED mode, you must set the "STEREO/BRIDGE" Switch to BRIDGE. The input signal is taken from the CHANNEL 1 connector and the signal output to the loudspeaker is on pins 1+ and 2+ of the Speakon connector "OUTPUT1".

ATTENTION: Terminals 1+, 1- and 2+, 2- must only be used in STEREO operation and terminals 1+, 2+ in BRIDGED operation. Other combinations would lead to poor output quality. Please make sure that the resulting impedance of your installation, when the amplifier is operating in BRIDGE mode, is never lower than 4 Ohm (8 Ohm recommended).

In all cases, the connection cable that joins the amplifier and the loudspeaker should be heavy gauge, high-quality wire, kept as short as possible. We advise using a wire gauge of at least #14 AWG for lengths of 50 feet. For longer runs (over 50 ft.) the wire gauge should be increased to #12 AWG or larger. Ideally, multi-stranded, oxygen-free copper cable is recommended for best results.

3. Operation and Usage

3.1 Start Up

Pushing the POWER SWITCH illuminates the LED Power Indicator and activates the start-up sequence. Initially, both red CLIP LEDs will illuminate during start-up, while the amplifier performs a diagnostic check and stabilizes all internal voltages. After approximately 10 seconds, the CLIP LEDs will turn off indicating that the amplifier is now ready for use.

In a typical audio system, it is important to start up the equipment in the following sequence to avoid transient 'pops' and 'clicks' that could damage your speakers: sound sources, mixer, equalizers, speaker processors or controllers, and finally power amplifiers. To turn them off, the sequence should be performed in an inverse pattern, i.e.: power amplifiers, speaker processors or controllers, equalizers, mixer, sound sources.

3.2 Input Attenuators

The input attenuators are high quality rotary potentiometers, located on the front panel. The attenuators are calibrated in dB with '0 dB' representing maximum level (fully clockwise), and infinity representing full attenuation (fully counter clockwise).

Inside the device's packaging you will find a plastic bag containing 2 transparent caps which protect the input attenuation settings from unwanted manipulation. These caps are transparent in order to let you visualize the current settings. Once inserted, they cannot be removed with bare fingers, a small screwdriver is required.

3.3 Indicators

The CA8000D-Series amplifier is equipped with a simple but efficient combined indicator system.

The 'CLIP' indicator functions as both a CLIP indicator and a PROTECTION indicator. When functioning as a PROTECTION indicator, the LED may illuminate for any of the following reasons:

1. When the amplifier is first switched on, indicating that the start-up sequence is initialised. The indicator will go out when the amplifier is ready for use.
2. If the amplifier output has been short circuited.
3. If DC or very low frequencies are present on the output that could damage the loudspeakers.

In any case, should the CLIP indicator remain lit, it is a sign of malfunctioning and the amplifier should be scheduled for service.

When the CLIP indicator is functioning as a CLIP indicator it will illuminate when the output level to the loudspeakers reaches -1.5dB below the actual clip point. Clipping is simply the inability of the amplifier to deliver any more output power because it has reached its design constraints, and/or because the AC mains voltage is substandard (sagging).

The CA8000D-Series CLIP indicator system takes into account the variations in the AC mains voltage, always giving a true indication even if the AC voltage varies. When working at high levels with pop and rock musical styles, it is normal for the CLIP indicators to illuminate briefly at the rhythm of the low frequencies. Occasional clipping is not particularly harmful to low frequency loudspeakers, but can rapidly destroy mid frequency and high frequency drivers. Heavy clipping should always be avoided. When an amplifier clips, it produces a waveform that approximates a square wave. When clipping, the amplifier is 'telling' the loudspeaker cone or diaphragm to move outward in an infinitely short period of time and to remain there in stasis (no movement) for the duty cycle of the wavelength. Then, the amplifier 'tells' the loudspeaker to move rearward, again in an infinitely short period of time, and remain there until the next cycle occurs. Whenever a speaker cone or diaphragm is NOT moving, all of the electrical energy applied to it is converted directly to heat instead of sound, resulting in a high likelihood of damage to the loudspeaker.

3. Operation and Usage

3.3 Indicators (cont'd)

TEMP (thermal protection indicator).

This indicator illuminates to warn that the tunnel cooling temperature has risen above 90 degrees centigrade. If this occurs, the amplifier will be temporarily shut down by the thermal monitor circuit in order to protect it from damage. The amplifier will start up automatically when the temperature descends to 75 degrees centigrade. The cause of thermally induced shutdown is typically a blocked air intake or exhaust port.

SIGNAL (signal presence indicator)

This indicator illuminates when signal is present at the amplifier input(s). It functions independently of the setting of the attenuator (level) controls. Illumination begins when the input signal exceeds -40dB.

4. Cleaning

The control panel and chassis must not be cleaned with any solvent, abrasive or petroleum derived substance or it may be damaged. When cleaning is required, use a soft cloth, slightly dampened with water and a neutral liquid soap. Be careful that no liquid gets into the amplifier. Never use sharp objects that could scratch the control panel.

Should liquid get into the amplifier, send the unit to the nearest Apogee Technical Service Center for inspection and repair.

5. Specifications, Features, & Diagrams

5.1 Technical Specifications

POWER: 20-20 kHz 1% THD

2Ω Stereo: 1420 WRMS
 4Ω Stereo: 940 WRMS
 8Ω Stereo: 550 WRMS
 8Ω Bridged: 1880 WRMS

Peak Power (2Ω/1kHz): 2.95KW

Frequency Response (-1dB): 6Hz-50 kHz

High-Pass Filter (-3dB)* : 25 Hz Butt./ 18dB/oct

THD+Noise @ 1kHz (max. Pwr.): < 0.07%

Imd. Dist. 50Hz & 7kHz, 4:1: < 0.08%

TIM 100: < 0.01%

S+N/N 20Hz-20kHz @ 1W/4Ω: > 85dB

Damping factor 1kHz @ 8Ω: > 300

Slew Rate: ± 80V/μs

Channel crosstalk @ 1kHz: > 75dB

Input Connector: < XLR3 balanced

Input CMRR/ref. (max. Pwr.): > 60dB @ 1kHz

Input Sensitivity / Impedance: 0dBV/>22kΩ

Signal Present Indicator: -40dB

Output Connectors: Speakon

Clip Indicators: -1.5dB real clip

Anticlip Limiter† : 1% & 5% (aprox.)

Power consumption (max. Out): 3115VA

(Pink Noise, 1/8 power @ 4Ω): 1426VA

(Pink Noise, 1/3 power @ 4Ω): 2160VA

Unit Dimensions: 19" W x 3-1/2" H x 18-1/2" D
 (482.6mm x 88mm x 470mm)

Weight: 50 lbs. (22.7kg)

† Internally Configured

CA8000D
 (120V~)*

CA8000DX
 (120V~ + DLX24i)*

CA8000DE
 (240V~)*

CA8000DXE
 (240V~ + DLX24i)*

CA8000DEC
 (220V~)**

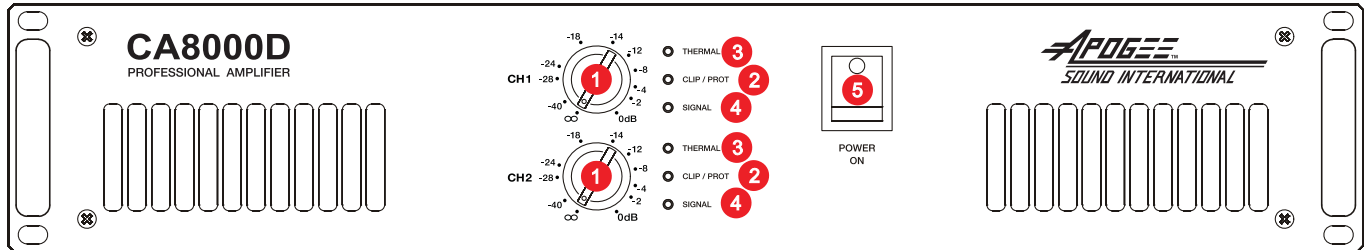
* Listed to UL Standard 60065 for US/Canada and CE compliant

** CCC certified for China

5. Specifications, Features, & Diagrams

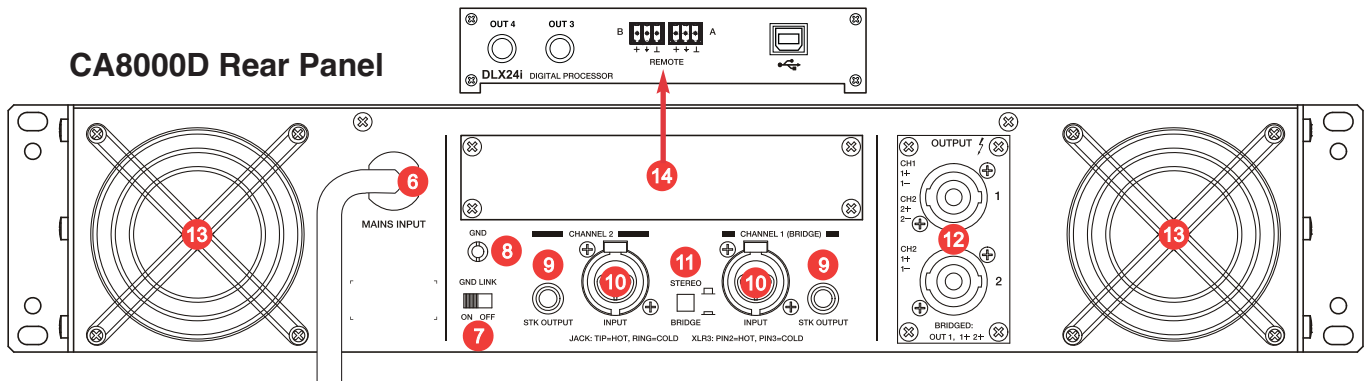
5.2 Unit Function List

CA8000D Front Panel



1. Input Attenuators with Tamper-proof Covers
2. Combined Clip and Protection Indicator: CLIP/PROT
3. Thermal Protection Indicator: THERMAL
4. Signal Present Indicator: SIGNAL
5. Illuminated Mains Switch: POWER ON

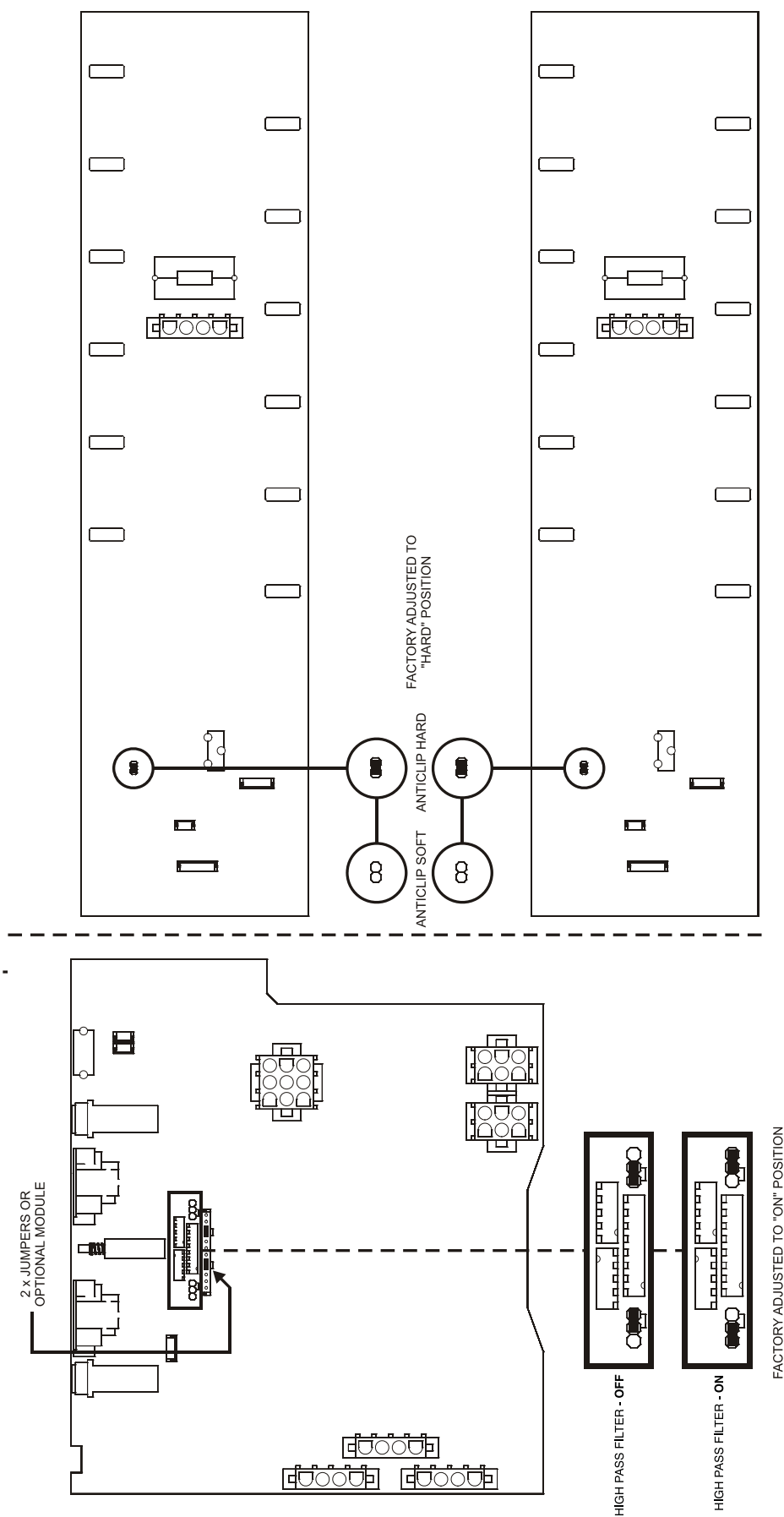
CA8000D Rear Panel



6. Mains Cable
7. Switch to disconnect chassis Earth/Signal Ground: GND LINK
8. Earth Terminal: GND
9. Output Connector to other amplifiers: INPUT
10. Input XLR Connector: CHANNEL 1/2
11. Bridge Selector Switch
12. Speakon Connectors to the loudspeakers
13. Fans
14. Reserved for DLX24i Module (supplied with “X” version Models only)

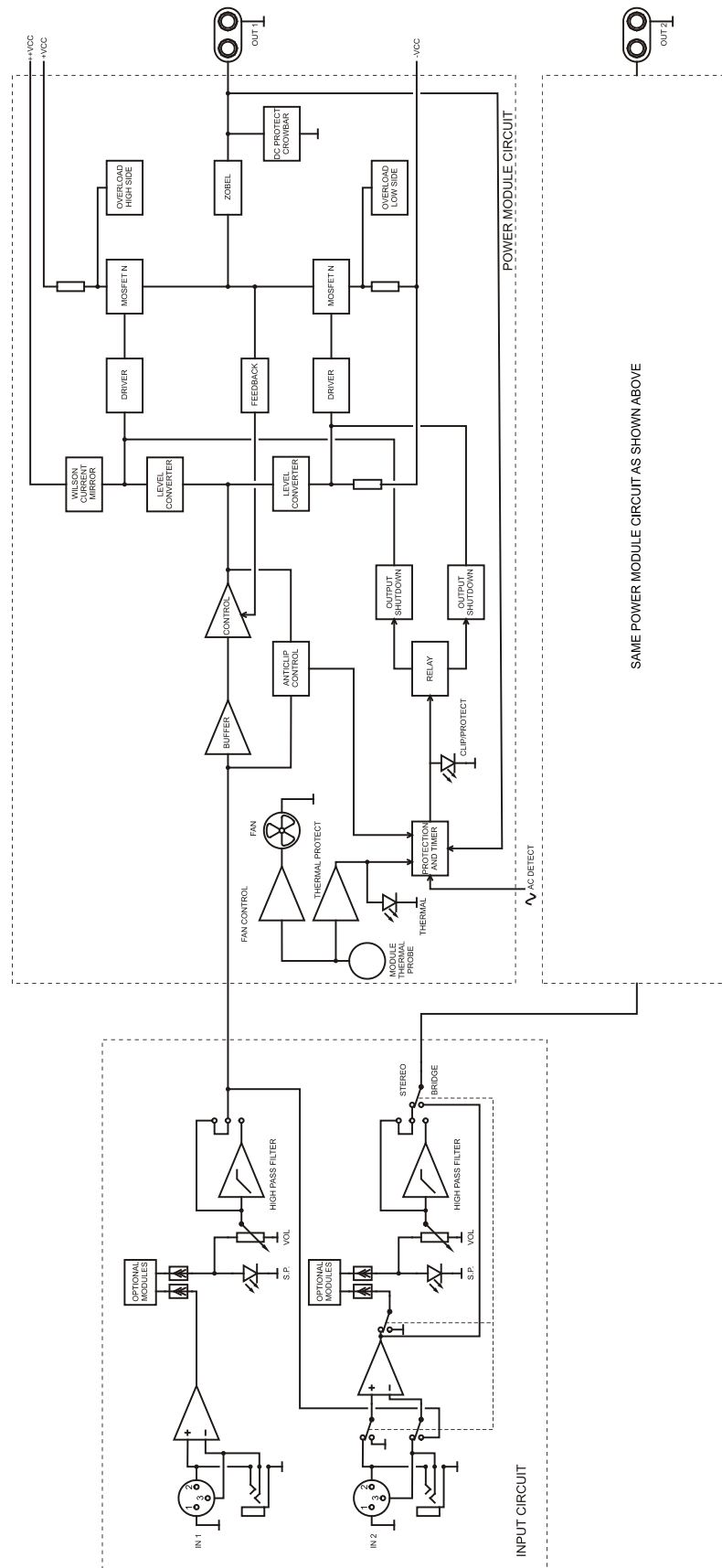
5. Specifications, Features, & Diagrams

5.3 Figures



5. Specifications, Features, & Diagrams

5.4 Block Diagram



6. Warranty; Exclusion of Certain Damages

The **Apogee CA8000D-Series Power Amplifiers** are warranted to be free from defects in material and workmanship for 3 (three) years from the date of sale to the original purchaser. Any part of the product covered by this warranty that, with normal installation and use, becomes defective (as confirmed by Bogen upon inspection) during the applicable warranty period, will be repaired or replaced by Apogee, at Apogee's option, provided the product is shipped insured and prepaid to the Apogee Factory Service Department. Repaired or replacement product will be returned to you freight prepaid. This warranty does not extend to any of our products that have been subjected to abuse, misuse, improper storage, neglect, accident, improper installation or have been modified or repaired or altered in any manner whatsoever, or where the serial number or date code has been removed or defaced.

THE FOREGOING LIMITED WARRANTY IS BOGEN'S SOLE AND EXCLUSIVE WARRANTY AND THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY. BOGEN MAKES NO OTHER WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED AND EXCLUDED TO THE MAXIMUM EXTENT ALLOWABLE BY LAW. Apogee's liability arising out of the manufacture, sale or supplying of products or their use or disposition, whether based upon warranty, contract, tort or otherwise, shall be limited to the price of the product. **IN NO EVENT SHALL BOGEN BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF DATA OR LOSS OF USE DAMAGES) ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF PRODUCTS, EVEN IF BOGEN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR LOSSES.** Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

Products that are out of warranty will also be repaired by the Apogee Factory Service Department. The parts and labor involved in these repairs are warranted for 90 days when repaired by the Apogee Factory Service Department. All shipping charges in addition to parts and labor charges will be at the owner's expense. All returns require a Return Authorization number. For most efficient warranty or repair service, please include a description of the failure.

11/2014-APG

NOTES
