

Power Over Ethernet (PoE) Series Audio Amplifiers

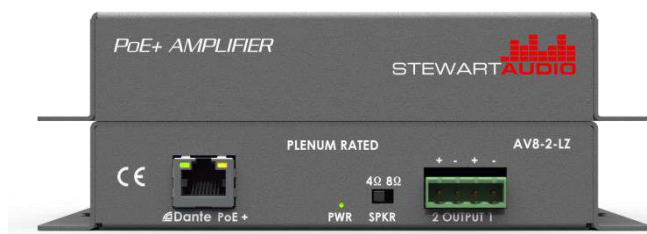
User Manual

AV8-2-LZ-D – 2 Channel, 16W Dante, PoE+ Amplifier

AV20-2-LZ-D – 2 Channel, 40W Dante, PoE++ Amplifier

CVA16-1-CV-D – Single Channel, 40W Dante, PoE+ Amplifier

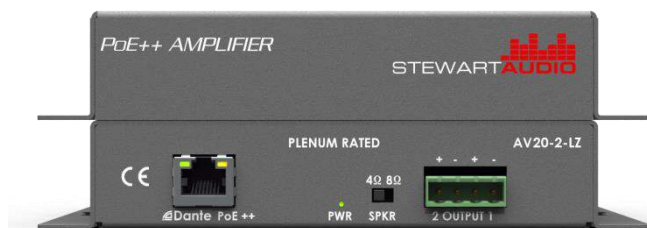
CVA40-1-CV-D – Single Channel, 40W Dante, PoE++ Amplifier



AV8-2-LZ-D



CVA16-1-CV-D



AV20-2-LZ-D



CVA40-1-CV-D

1. Important safety instructions

1. Please read carefully prior to product installation or operation.
2. Read these instructions.
3. Keep these instructions.
4. Heed all warnings.
5. Follow all instructions.
6. Do not use this apparatus near water.
7. Clean only with dry cloth.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

2. Approvals

This equipment has been tested and found to be compliant with the limits for Class A Digital device pursuant to part 15 of the FCC rules. It has also been tested to the requirements of UL Standard 2043 and is plenum rated.

3. Warnings

3.1. Explanation of warning symbols



3.1.1. The lightning bolt within arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to person.



3.1.2. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instruction in the literature accompanying the appliance.

3.2. Warnings

WARNING: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT EXPOSE THIS AMPLIFIER TO RAIN OR MOISTURE.

3.3. User responsibility

3.3.1. Speaker output hazard

Power amplifiers are capable of producing hazardous output voltages, especially constant voltage amplifiers. To avoid electrical shock, do not touch any exposed speaker wiring while the amplifier is operating. External wiring connected to the speaker terminals shall be installed by a qualified person. Do not connect or disconnect speaker wires while the mains power is on. Do not connect speaker wires together or to ground as this may result in permanent damage to your amplifier.

3.3.2. Radio interference

This product has been tested and complies with the EMC directive, and with FCC part 15 Class A. If this product is not used in accordance with these operating instructions, it may cause interference with to other equipment, such as radio and television receivers.

3.3.3. Speaker damage

Loudspeakers may be damaged or destroyed if overpowered. Always check the loudspeaker's continuous and peak power ratings to prevent such an occurrence. Do not rely solely on the amplifier's volume control to reduce output power to a level safe for the loudspeakers.

3.3.4. Maintenance

Clean regularly with a soft cloth to remove dust and debris.

4. Table of Contents

1. Important safety instructions	<u>2</u>
2. Approvals	<u>2</u>
3. Warnings	<u>2</u>
3.1. Explanation of warning symbols	<u>2</u>
3.2. Warnings	<u>2</u>
3.3. User responsibility	<u>2</u>
5. Welcome	<u>5</u>
5.1. Features	<u>5</u>
5.2. Unpacking and visual inspection	<u>5</u>
5.3. Installation and setup	<u>5</u>
6. Rear panel Connections and Indicators	<u>6</u>
7. Specifications	<u>9</u>
8. Troubleshooting	<u>10</u>
8.1. Considerations when using PoE+ amplifiers	<u>11</u>
9. Warranty and repair information	<u>12</u>
9.1. Warranty summary	<u>12</u>
9.2. Eligibility requirements	<u>12</u>
9.3. Non-warranty repairs	<u>12</u>
10. Return procedure	<u>13</u>
10.1. Shipment instructions	<u>13</u>
10.2. Packaging instructions	<u>13</u>

5. Welcome

Congratulations on the purchase of your new Stewart Audio PoE Series audio amplifier. These amplifiers have been designed and built to provide you with years of high-quality audio performance and trouble-free operation. If after reading this operation manual you have questions concerning amplifier installation and operation, please contact your Authorized Stewart Audio dealer, or you may contact us directly.

5.1. Features

All Stewart Audio PoE amplifiers offer Dante™ low-latency audio transport over category cable. They also comply with the AES67 standard. The AV8-2-LZ-D and CVA16-1-CV-LZ-D amplifiers are PoE+-powered in accordance with the 802.3at standard. Both the DC power (30W port power) and the audio data are delivered over a single category 5e/6 cable. The AV20-2-LZ-D and the CVA40-1-CV-D amplifiers are PoE++ powered in accordance with the 802.3bt standard. They require a 60W PoE port to achieve rated output power. The only other required connections to these amplifiers are to the loudspeakers. The AV8-2-LZ-D and AV20-2-LZ-D are a low impedance amplifier delivering a maximum of $16W_{RMS}$ / $40W_{RMS}$ total from the two channels (typically $8W_{RMS}$ / $20W_{RMS}$ per channel) across the 20-20kHz frequency spectrum into 4Ω or 8Ω loudspeakers. The CVA16-CV-D and CVA40-1-CV-D are single-channel amplifiers delivering up to $16W_{RMS}$ / $40W_{RMS}$ of audio power into high impedance speakers, over the 100Hz to 20kHz frequency spectrum.

5.2. Unpacking and visual inspection

Every Stewart Audio product is carefully tested and inspected before leaving the factory and should arrive in perfect condition. If any damage is discovered, please notify the shipping carrier immediately. Save the packing materials for the carrier's inspection and for any future shipping.

5.3. Installation and setup

5.3.1. Cooling and ventilation

Due to the high efficiency of these PoE amplifiers, the heat generated is minimal, allowing for installation in virtually space. They are convection cooled with on fans. These amplifiers are plenum rated and have been tested to the requirements of UL Standard 2043.

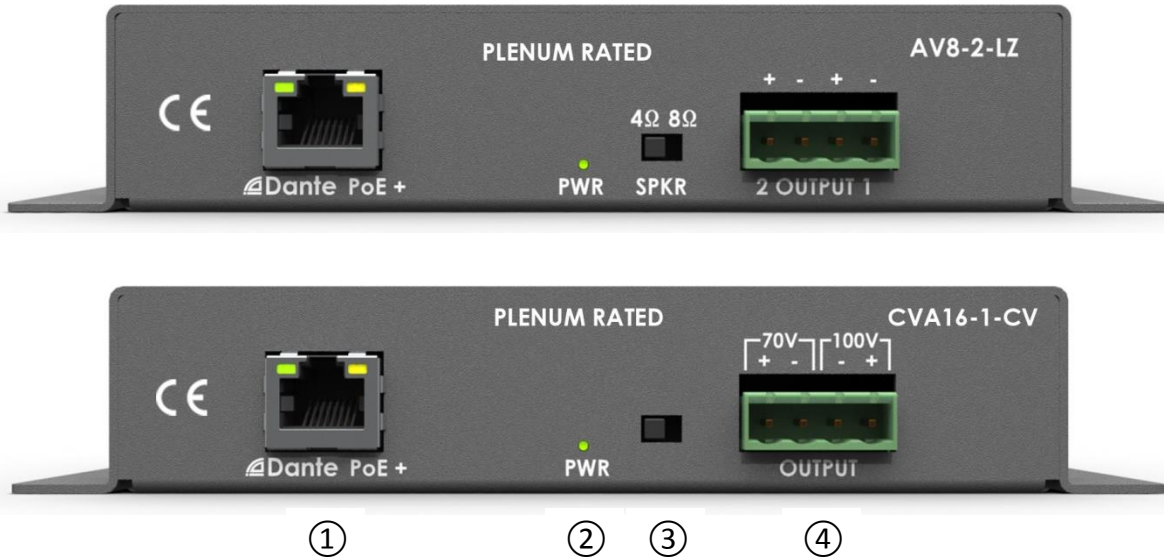
5.3.2. Power source

The AV8-2-LZ-D and the CVA16-1-CV-D amplifiers are powered by an 802.3at compliant PoE+ switch or mid-span injector (30W port power). The AV20-2-LZ-D and the CVA40-1-CV-D amplifiers are powered by an 802.3bt compliant PoE++ switch or mid-span injector (60W port power). The Powered Device IC (PD) internal to the amplifier negotiates power requirements with the Power Sending Equipment (PSE) in the switch or mid-span injector. These amplifiers can be powered by switches or mid-span injectors that do not use a PSE IC for negotiation and monitoring (so called *passive* PoE injectors and switches), however, Stewart Audio recommends applying power to the injector *after* the category cable is connected, and removing power to the injector *before* unplugging the category cable.

In accordance with the 802.3 standard, these amplifiers will operate when connected to a lower-rated switch or mid-span injector (for example, an 802.3af PSE with a 15.4W port power). However, the power available at the Ethernet port will be lower. If the input level; to the amplifier is not reduced, excessive power draw may force the PSE to remove DC power from the port and renegotiate the powered connection.

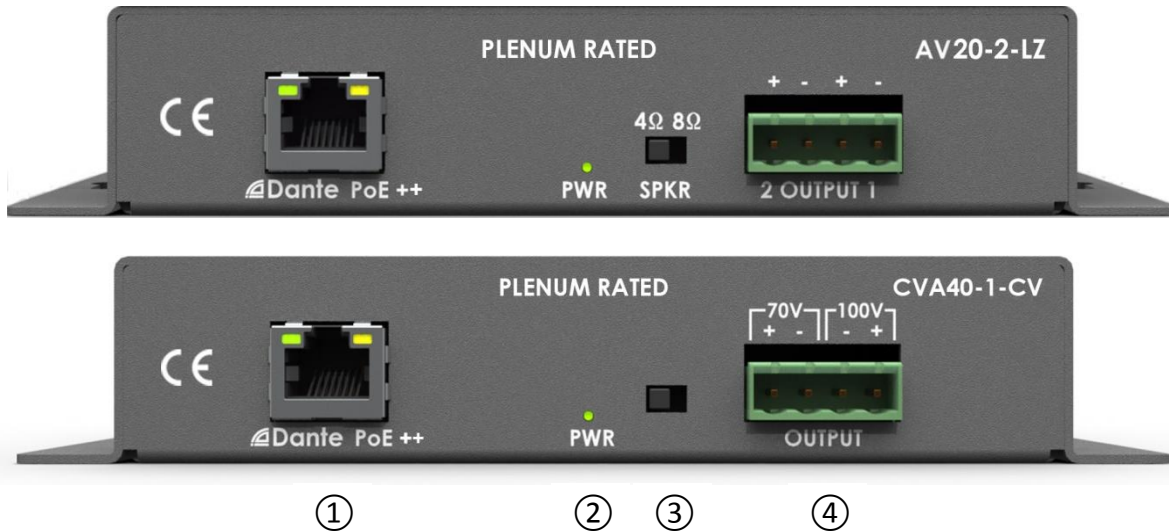
6. Rear Panel Connections and Indicators

AV8-2-LZ-D and CVA16-1-CV-D models:



1. **Dante™ Audio and DC Power Input** – Connect a Cat5e/6 cable between this RJ-45 jack and a PoE+ port (30W port power) on the 100/1000BaseT network switch. If using a mid-span PoE+ injector, connect this port to the **Power+ Data** port on the injector and connect the **Data** port of the injector to the 100/1000BaseT switch.

AV8-2-LZ-D and CVA16-1-CV-D models:



1. **Dante™ Audio and DC Power Input** – Connect a Cat5e/6 cable between this RJ-45 jack and a PoE++ port (60W port power) on the 100/1000BaseT network switch. If using a mid-span PoE+ injector, connect this port to the **Power+ Data** port on the injector and connect the **Data** port of the injector to the 100/1000BaseT switch.

All models:

2. **Power LED** – This LED illuminates when power is present
3. **4Ω/8Ω Switch (low impedance model only)** – Position this switch to match the impedance of your loudspeakers. If this switch is positioned improperly, the amplifier may not deliver full output power, or the PSE may remove power from the amplifier port and renegotiate the connection.
4. **Output Connector** – Connect loudspeakers using the 5mm Euro-style terminal blocks provided. Strip the loudspeaker leads ¼” and insert into the connector, observing proper polarity. With a small flat-blade screwdriver, tighten the screw until the leads are securely in place. Inspect carefully for possible shorts or broken wires.

Use 4Ω or 8Ω speakers for the low impedance models (AV8-2-LZ-D and AV20-2-LZ-D) and position the switch ③ to match the loudspeaker impedance.¹ Because the audio power is limited by the PoE standard, use high sensitivity and SPL loudspeakers for best performance. Stewart Audio recommends using high-quality, heavy-gauge speaker wire. Use the following as a guide to select the appropriate wire gauge.

Distance	Wire Gauge
Up to 25 ft (7.6m)	16 AWG
26-40 ft (8-12m)	14 AWG
41-60 ft. (8.5-18m)	12 AWG

Use high impedance speakers for the constant voltage models (CVA16-1-CV-D and CVA40-1-CV-D). Because the current flow in constant voltage systems and speakers is much lower than in 4/8Ω systems, higher gauge (thinner diameter) wire can be used. Connect the loudspeaker wires to either the 70V or 100V pair of terminals, observing proper polarity. Care should be used when working around the speaker terminals. Although not officially recognized as a shock hazard in the UL60065 Safety Requirements, touching these terminals can be quite unpleasant and should be avoided. Use the following as a guide to select the appropriate wire gauge.

Distance	Wire Gauge
Up to 500 ft (<150m)	22 AWG
500-1000 ft (150-300m)	20 AWG
Over 1000 ft. (300+m)	18 AWG

The sum of the tapped wattage for all high impedance loudspeakers must not exceed 16W for the CVA16-1-CV-D and 40W for the CVA40-1-CV-D. The constant voltage amplifier models are equipped with an internal 100Hz corner frequency highpass filter to minimize the possibility of saturating the transformer in the high impedance loudspeakers.

¹ Low impedance models can deliver up to 16W_{rms} for the AV8-2-LZ-D, and up to 32W_{rms} for the AV20-2-LZ-D into a **single** 4Ω speaker by connecting the speaker to either output and positioning the switch to the 8Ω position. The amplifiers will not drive an 8Ω speaker above 8W_{rms} / 20W_{rms}. Connecting two 4Ω speakers with the switch set to 8Ω may result in a power disruption at the PoE port.



Caution: The DC voltage on the speaker output connectors is approximately 12VDC. Do not connect any speaker output to ground. Do not connect speakers across speaker outputs. (Bridge mode is not supported.)



NOTE: Class 2 wiring must be used on the speaker terminals to comply with UL requirements.



CAUTION: The speaker terminals represent a shock hazard as they carry 70.7V and 100V when driven with an audio signal. Disconnect the amplifier from the AC power source when working on these terminals

7. Specifications

Max. Output Power (all channels driven)	
AV8-2-LZ-D	<ul style="list-style-type: none"> ▪ $8W_{RMS} \times 2 @ 4/8\Omega$ ▪ $16W_{RMS} \times 1 @ 4\Omega^1$
AV20-2-LZ-D	<ul style="list-style-type: none"> ▪ $20W_{RMS} \times 2 @ 4/8\Omega$ ▪ $32W_{RMS} \times 1 @ 4\Omega^1$
CVA16-1-CV-D	<ul style="list-style-type: none"> ▪ $16W_{RMS} \times 1 @ 70.7V/100V$ (selectable)
CVA40-1-CV-D	<ul style="list-style-type: none"> ▪ $40W_{RMS} \times 1 @ 70.7V/100V$ (selectable)
Frequency Response	
AV8-2-LZ-D ($\pm 1dB$)	<ul style="list-style-type: none"> ▪ 20Hz – 20kHz, 4/8 Ω, ▪ 100Hz – 20kHz, 70.7V/100V
AV20-2-LZ-D ($\pm 1dB$)	
CVA16-1-CV-D (+0dB, -3dB)	
CVA40-1-CV-D (+0dB, -3dB)	
THD + N @ full frequency and power	<ul style="list-style-type: none"> ▪ <0.3%
THD + N @ 1kHz and full power	<ul style="list-style-type: none"> ▪ <0.05%
Signal to Noise Ratio	
AV8-2-LZ-D and AV20-2-LZ-D	<ul style="list-style-type: none"> ▪ >90dB
CVA16-1-CV-D and CVA40-1-CV-D	<ul style="list-style-type: none"> ▪ >88dB
Channel-to-Channel Separation (Crosstalk)	<ul style="list-style-type: none"> ▪ >85dB
Noise floor	
AV8-2-LZ-D and AV20-2-LZ-D	<ul style="list-style-type: none"> ▪ -110dBV
CVA16-1-CV-D and CVA40-1-CV-D	<ul style="list-style-type: none"> ▪ -95dBV
Amplifier Class	<ul style="list-style-type: none"> ▪ D
Input Connector (Dante™ Audio and DC)	<ul style="list-style-type: none"> ▪ RJ-45
Output Connector	<ul style="list-style-type: none"> ▪ 5mm Euroblock
LED Indicator	<ul style="list-style-type: none"> ▪ Power
Construction	<ul style="list-style-type: none"> ▪ Aluminum
Cooling	<ul style="list-style-type: none"> ▪ Convection (no fan)
Dimensions	<ul style="list-style-type: none"> ▪ 1.2" H x 6.70" W x 4.31" D (31 x 170 x 110mm)
Weight	
AV8-2-LZ-D and AV20-2-LZ-D	<ul style="list-style-type: none"> ▪ 0.6 lb (0.3kg)
CVA16-1-CV-D and CVA40-1-CV-D	<ul style="list-style-type: none"> ▪ 1 lb (0.45kg)
Warranty	<ul style="list-style-type: none"> ▪ 3 years

¹ Low impedance models can deliver up to $16/32W_{rms}$ into a **single** 4Ω speaker by connecting the speaker to either output and positioning the switch to the 8Ω position. The amplifier will not drive an 8Ω speaker above $8/20W_{rms}$. Connecting two 4Ω speakers with the switch set to 8Ω may result in a power disruption at the PoE+ port.

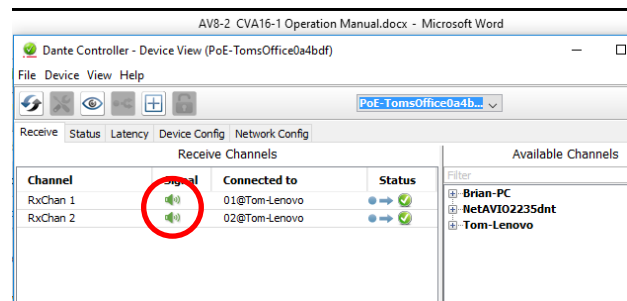
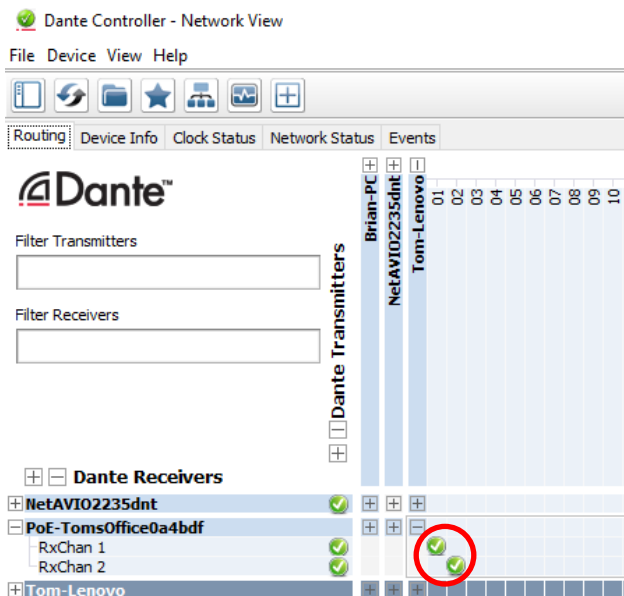
8. Troubleshooting

The Power LED and the LEDs on the RJ-45 jack are not illuminated

- Verify the integrity of the Cat5e/6 cable and that there are no broken wires.
- Verify that the Cat5e/6 cable is connected to a PoE powered switch or mid-span injector.
- Verify that the Cat5e/6 cable is connected to a PoE powered port on the switch. On certain PoE switch models only some of the ports are powered.
- Verify that the PoE switch has power available. If the total available power is already allocated, the port connected to the amplifier may not be powered.

The Power LED and the LEDs on the RJ-45 jack are illuminated, but there is no sound

- Verify that a Dante™ transmitter is routed to the amplifier and that there is audio coming from the transmitter. A green checkmark at the intersection of the transmitter and PoE amplifier receiver in the Network View screen indicates that a Dante™ subscription has been established. In the Device View screen for the PoE amplifier, the speaker symbol should be green, not gray. See the Dante Help for more detailed information.



The amplifier cycles on and off over a several second period

- Check speaker connection for loose connections, broken wires or shorts, or a loudspeaker connection to ground.
- Verify that the amplifier is connected to the appropriate PoE+ or PoE++ switch or mid-span injector (802.3at – 30W port power or 802.3bt – 60W port power) for the amplifier model.
- Verify that the 4Ω/8Ω switch is in the proper position to match the loudspeaker impedance.
- Verify that the total tapped wattage of all loudspeakers is less than 16W for the CVA16-1-CV-D model, and less than 40W for the CVA40-1-CV-D model.
- Reduce the Dante™ transmitter signal level or add a limiter to reduce audio peaks.

8.1. Considerations When Using PoE+ Amplifiers

All PoE powered devices (PD's) have limited power available to them from the switch or mid-span injector (PSE or Power Sourcing Equipment). More specifically, the current through the category cable is limited because the twisted pair conductor diameter is so small. The current a Class D audio amplifier draws from its power supply increases as the audio output power increases. If too much audio power is drawn into the speakers, the PSE will do the job it is designed to do and shut down DC power from the port, and thus to the amplifier (PD). This is done for safety reasons and to avoid potential damage to the category cable. Stewart Audio has configured our low impedance models with a 2-position switch which limits the output power of the amplifier to avoid shutting down the PoE+ supply. With the constant voltage PoE models, the user must ensure that the total tapped power for all speakers connected to the output does not exceed 16W/40W.

While the 802.3at and bt standards specify minimum and maximum voltages, maximum current, and minimum and maximum power available per port, not all manufacturers adhere strictly to the standard. Stewart Audio has tested our PoE amplifiers with PoE switches and mid-span injectors from several manufacturers. Some PoE equipment delivers more power than others. When selecting PoE Power Sending Equipment, whether a switch or a mid-span injector, make certain it is standard-compliant. Also note the following switch recommendations from Audinate (developers of the Dante™ transport protocol).

All Ethernet switches are capable of working with Dante. However, please be aware that there are some features on some kinds of switches that will allow you to build larger and more reliable Dante networks.

While Gigabit switches are recommended, 100Mbps switches may be used in limited scenarios.

- For channel counts of 32 or more, Gigabit switches are essential. QoS is required when using Dante in networks that have 100Mbps devices. QoS is also recommended for Gigabit switches on networks that share data with services other than Dante.
- For lower channel count (<32) applications, a 100Mbps switch may be used as long as it supports proper QoS, and QoS is active. The use of 100Mbps switches without QoS is not recommended or supported.

Dante makes use of standard Voice over IP (VoIP) Quality of Service (QoS) switch features, to prioritize clock sync and audio traffic over other network traffic. VoIP QoS features are available in a variety of inexpensive and enterprise Ethernet switches. Any switches with the following features should be appropriate for use with Dante:

- Gigabit ports for inter-switch connections
- Quality of Service (QoS) with 4 queues
- Diffserv (DSCP) QoS, with strict priority
- A managed switch is also recommended, to provide detailed information about the operation of each network link: port speed, error counters, bandwidth used, etc.

If you find that the PoE power shuts down during loud audio sections, reduce the input signal level or place a signal processing limiter ahead of the amplifier in the Dante™ chain to prevent overdriving the amplifier and shutting down the PSE power. If excessive power (for the particular switch or injector used) is drawn and the supply shuts down, it will automatically restart in 5-7 seconds with no damage to either the amplifier or the switch/injector. However, this is an indication that the signal level to the amplifier should be reduced or limited.

Stewart Audio recommends the use of 802.3-compliant switches and mid-span injectors. There are a number of products on the market that merely place a DC voltage on the category cable. They do not conform to the standards. With these *passive* PoE switches and injectors, there is no negotiation

between the PSE (Power Sourcing Equipment) and powered device (PD) for available power, nor do they monitor the power drawn and shut down if an overload or open circuit condition occurs. These passive injectors and switches can be used with Stewart Audio PoE amplifiers, however safe operation is not assured under these conditions.

One final note: According to the 802.11 standard, an 802.3at (PoE+) PD (powered device) can be connected with to an 802.3af (PoE) PSE. Stewart Audio PoE+ amplifiers adhere to the standard, so it is possible to run these PoE+ amplifiers from PoE PSE's. But since the PoE PSE can only deliver 15.4W maximum per port (vs. 30W for the PoE+), the amplifier cannot deliver the full specified audio power without causing the PSE power to shut down power to the port and renegotiate the powered connection. The same is true for the PoE++ amplifiers. They will operate with a PoE or PoE+ PSE, but at lower power levels.

9. Warranty Information

9.1. Warranty Summary

All Stewart Audio amplifiers and accessories, unless excluded in this summary, are covered by a 3-year limited warranty on parts and labor from the date of purchase. In order to be eligible for warranty repairs, the amplifiers and accessories must have been purchased through an authorized Stewart Audio dealer and submitted by the original purchaser. This warranty is only valid in the country in which the amplifier was purchased.

9.2. Eligibility Requirements

Stewart Audio warrants against all malfunctions which come as a result of component or manufacturer defect. The amplifier is also covered from all failures which arise during the warranty period (3 years from date of purchase) that are not a result of misuse. The following actions will void your warranty:

- The power cord or AC plug has been damaged through misuse.
- The amplifier has been exposed to moisture or extreme temperatures.
- The amplifier has been dropped, items have been dropped on the amplifier, or the enclosure has been damaged.
- The amplifier has been opened by the operator.
- The amplifier was improperly packaged when sending to the factory for repair, resulting in damage.
- Any of the precautions or instructions found in this manual were not followed.

Damages resulting to the amplifier which are not covered under this warranty can be factory-repaired at cost to the customer. Use the contact information below to initiate the repair process.

9.3. Non-warranty repairs

An estimate for all non-warranty repairs will be provided to the customer once the unit has been shipped to the factory. The customer is responsible to approve this estimate within 7 days. If the repairs are not approved within 14 days, Stewart Audio reserves the right to consider the unit scrap and may discard it. Payment for non-warranty repairs must be submitted to Stewart Audio before the product will be returned to the customer.

10. Return Procedure

All returns to the factory for service or credit must be accompanied by a Return Authorization (RA) number. All Product(s) included on the Return Authorization (RA) must be received by Stewart Audio within 30 days of issuance of the Return Authorization (RA) number. Product(s) not received within the 30 day window void the Return Authorization (RA). Customers may re-apply for a Return Authorization (RA) number which may be subject to administrative fees. Return Authorization (RA) numbers are obtained by contacting Stewart Audio at 209-588-8111 or via e-mail at support@stewartaudio.com.

NOTE: Any defective products received without an RA number will be returned to sender at their expense.

If Stewart Audio is unable to contact the sender in 14 days, the merchandise will be considered scrap and may be disposed of.

10.1. Shipment Instructions

- If Stewart Audio requests that you ship the defective product back to their service center, please refer to the guide below. To ensure prompt warranty service, be sure to follow all instructions.
- Return Authorization (RA) is required for product being sent to the factory for service.
- See packing instructions in **Section 9.2**.
- Ship the defective product using a method which provides for order tracking or order confirmation. The service center is located at the following address:

Stewart Audio
14335 Cuesta Court Suite C
Sonora, CA 95370

- Use a bold black marker and write the RA number on three sides of the box.
- Record the RMA number for future reference. The RA number can be used to check the repair status.

10.2. Packaging Instructions

Should Stewart Audio request that you ship your product to their service center, these instructions must be followed in order to ensure safe delivery. If they are not followed, Stewart Audio assumes no responsibility for damaged goods and/or accessories that are sent with your unit.

1. Please write the RA number on three sides of the box. Include the Stewart Audio RA number inside the box and a brief description of the problem.
2. You will be advised during the RA process what accessories should be included with the amplifier (power supplies, connectors, cords, etc.). This is dependent on the failure assessment.
3. When shipping your amplifier, it is important that it has adequate protection. We recommend you use the original packing material when returning the product for repair. If you do not have the original box, see number 4.
4. If you provide your own shipping pack, use materials adequate to prevent damage during transit.

Securely seal the package with an adequate carton sealing tape.

Do not use light boxes or “peanuts”.

NOTE: Damage caused by poor packaging will not be covered under warranty.