NOTIFIER® by Honeywell

AA-series Analog Audio Amplifiers

AA-30, AA-100, and AA-120

Installation Manual for DVC-AO Applications

Document 52526 Rev: B
8/13/2019 ECN: 18-305

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at http://www.systemsensor.com/appguides/. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, chimneys, even wet or humid areas may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets, such as air conditioning vents.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, compromising its ability to report a fire.

Audible warning devices such as bells, horns, strobes, speakers and displays may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol, or medication. Please note that:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A life safety system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

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Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49º C/ 32-120º F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Units with a touchscreen display should be cleaned with a dry, clean, lint free/microfiber cloth. If additional cleaning is required, apply a small amount of Isopropyl alcohol to the cloth and wipe clean. Do not use detergents, solvents, or water for cleaning. Do not spray liquid directly onto the display.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

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FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing devices pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when devices are operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his or her own expense.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

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Send email messages to:

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Section 1: About This Manual

1.1 Standards and Other Documents

■ This Fire Alarm Control Panel complies with the following NFPA standards:

- NFPA 12 CO2 Extinguishing Systems
- NFPA 12A Halon 1301 Extinguishing Systems
- NFPA 13 Sprinkler Systems
- NFPA 15 Water Spray Systems
- NFPA 16 Foam/Water Deluge and Foam/Water Spray Systems
- NFPA 17 Dry Chemical Extinguishing Systems
- NFPA 17A Wet Chemical Extinguishing Systems
- NFPA 72 Central Station Fire Alarm Systems (Automatic, Manual and Waterflow) Protected Premises Unit (requires UDACT).
- NFPA 72 Local (Automatic, Manual, Waterflow and Sprinkler Supervisory) Fire Alarm Systems.
- NFPA 72 Auxiliary (Automatic, Manual and Waterflow) Fire Alarm Systems (requires TM-4).
- NFPA 72 Remote Station (Automatic, Manual and Waterflow) Fire Alarm Systems
- NFPA 72 Proprietary (Automatic, Manual and Waterflow) Fire Alarm Systems (Protected Premises Unit).
- NFPA 2001 Clean Agent Fire Extinguishing Systems

The installer should be familiar with the following documents and standards:

- NFPA 72 Initiating Devices for Fire Alarm Systems
- NFPA 72 Inspection, Testing and Maintenance for Fire Alarm Systems
- NFPA 72 Notification Appliances for Fire Alarm Systems

Underwriters Laboratories

- UL 38 Manually Actuated Signaling Boxes
- UL 217 Smoke Detectors, Single and Multiple Station
- UL 228 Door Closers - Holders for Fire Protective Signaling Systems
- UL 268 Smoke Detectors for Fire Protective Signaling Systems
- UL 268A Smoke Detectors for Duct Applications
- UL 346 Waterflow Indicators for Fire Protective Signaling Systems
- UL 464 Audible Signaling Appliances
- UL 521 Heat Detectors for Fire Protective Signaling Systems
- UL 864 Standard for Control Units for Fire Protective Signaling Systems
- UL 1481 Power Supplies for Fire Protective Signaling Systems
- UL 1971 Visual Signaling Appliances
- UL 1076 Proprietary Burglar Alarm Systems
- Underwriters Laboratories of Canada (ULC)
- ULC-S527-99 Standard for Control Units for Fire Alarm Systems
- ULC S524 Standard for the Installation of Fire Alarm Systems

Other

- EIA-485 and EIA-232 Serial Interface Standards
- NEC Article 300 Wiring Methods
- NEC Article 760 Fire Protective Signaling Systems
- Applicable Local and State Building Codes
- Requirements of the Local Authority Having Jurisdiction
- Canadian Electrical Code, Part 1

1.2 UL 864 9th and 10th Edition

- Per the UL Continuing Certification Program, UL 864 9th edition fire alarm control equipment will retain certification after the rollout of UL 10th edition (12/2/2018).
- Installations of UL 864 10th Edition certified equipment are permitted to use UL864 9th Edition certified equipment when approved by the local Authority Having Jurisdiction (AHJ).

For product compliance, refer to the UL/ULC listing cards located on the UL online certification directory.
http://iq.ulprospector.com

1.2.1 Products Subject to AHJ Approval

These products have been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition. Operation of these products with products not tested for UL 864 9th Edition has not been evaluated. Such operation requires the approval of the local Authority Having Jurisdiction (AHJ).

Products mentioned in this manual that have not received UL 864 9th Edition certification:

- VCM-4RK
- DCM-4RK
- FFT-7/7S
- AMG-1/E

1.2.2 Applications Without DVC

This manual does not document applications using VCM-4RK, DCM-4RK, FFT-7, or AMG-1/E. To service systems containing those products, refer to the UL 8th Edition installation documentation supplied with your fire alarm control panel, or its voice alarm system. Use of the AA-30, AA-100, and AA-120 in UL 8th Edition installations requires the approval of the local Authority Having Jurisdiction (AHJ).

1.3 Supplemental Documentation

The table below provides a list of documents for the other components of a Digital Voice Command system.

Document	Document Number
DVC Digital Voice Command Manual	52411
DAA Digital Audio Amplifier Manual	52410
ACT-1 Installation Document	52527
ACT-2 Installation Document	51118

Table 1.1 Related Documentation

NOTE: Where used in this manual, the term CPU refers to the main circuit board for the fire alarm control panel's central processing unit.

1.4 Cautions and Warnings

This manual contains cautions and warnings to alert the reader as follows:

CAUTION: SUMMARY IN BOLD

INFORMATION ABOUT PROCEDURES THAT COULD CAUSE PROGRAMMING ERRORS, RUNTIME ERRORS, OR EQUIPMENT DAMAGE.

WARNING: SUMMARY IN BOLD

INDICATES INFORMATION ABOUT PROCEDURES THAT COULD CAUSE IRREVERSIBLE DAMAGE TO THE CONTROL PANEL, IRREVERSIBLE LOSS OF PROGRAMMING DATA OR PERSONAL INJURY.

Section 2: Product Overview

2.1 Audio Amplifier Features

There are three audio amplifier models; each provides a different power level:

- AA-30 - Up to 30 watts of power for driving 25 Vrms speaker circuits.
- AA-100 - Up to 100 watts of power for driving 70.7 Vrms speaker circuits.
- AA-120 - Up to 120 watts of power for driving 25 Vrms speaker circuits.

NOTE: Whenever AA-30, AA-100 and AA-120 are mentioned, it also refers to the AA-30E, AA-100E and AA-120E (240 VAC versions).

Audio amplifiers provide the following features:

- Built-in Supervision Each audio amplifier contains LEDs showing the type of trouble. Types of trouble include: brownout, loss of low-level supervision tone at the input, battery failure, audio output wiring failure (if set for four-wire output), and amplifier failure. During total loss of primary AC power, all LEDs extinguish to conserve battery power.
- Backup You can set up an audio amplifier as a backup amplifier for multiple amplifiers. If an amplifier fails, the signal automatically switches to the backup amplifier. When one backup amplifier is serving multiple primary amplifiers, only one primary amplifier failure will be supported.
- Speaker zone selection Set by Control-By-Event (CBE) or set manually using control switches on ACM-24AT modules or DVC-KD.
- Backup Tone The AA-100 and AA-120 will generate automatic backup tones if the low-level input is lost.

2.2 System Overview

Figure 2.1, “Product Overview” provides a functional overview of how analog audio amplifiers can fit into a Digital Voice Command system.

■ Amplifying the Low-Level Analog Audio Signal Received from DVC-AO

AA-series analog audio amplifiers receive low-level audio messages from the Digital Voice Command Analog Output module (DVC-AO) and send amplified output to the control modules (such as FCM-1 or XP6-C) that control the speaker zones. Any listed transponder or control module can be used with control-by-event equations.

■ Driving Speaker Circuits

The amplified signal from each Audio Amplifier must be connected to a control module that will switch the signal to a speaker circuit. The FCM-1 or XP6-C control module connects to any control panel with an SLC loop and gets its instructions via CBE programming.

The module is fed an amplified audio signal from an audio amplifier. When a circuit is activated, this audio power is switched to a speaker zone just as notification appliance power would be connected to a Notification Appliance Circuit (NAC).

When control modules are used to activate speaker circuits on an Audio Amplifier output, the control modules must be located within 20 ft of the amplifier output with cable in conduit. If installation of the control modules is required more than 20 ft away, the output must only serve one notification zone.

■ Speaker Circuit Power Limitations

The total power available from any group of speaker circuits cannot exceed the limitations of the audio amplifiers feeding that group. The maximum load connected to any one speaker circuit cannot exceed 30 watts. See the *ACT-2 Installation Document* for instructions on using this step-down transformer to take the high level output of one audio amplifier to the low-level input of another audio amp.

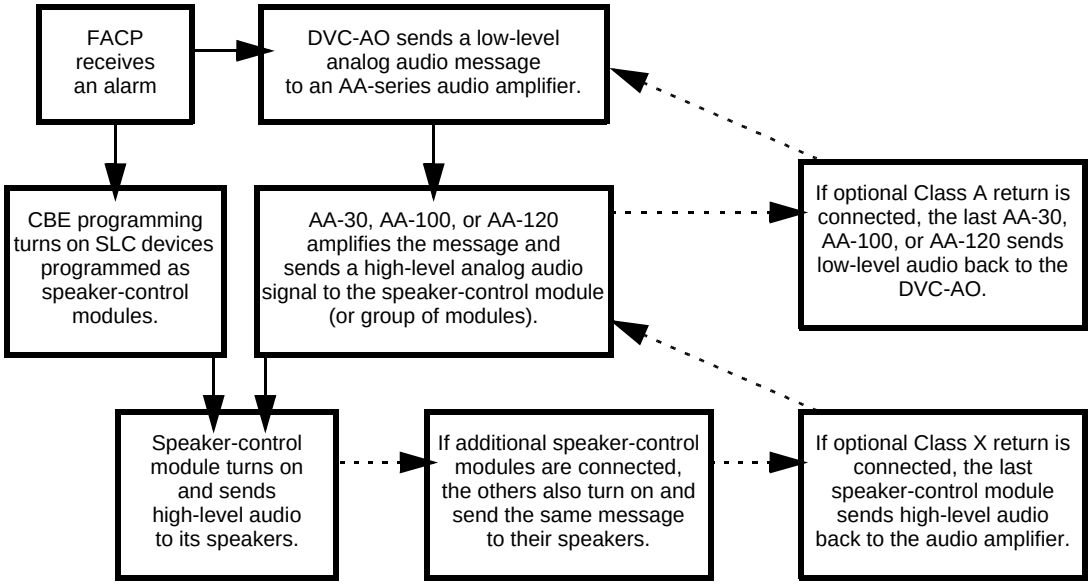


Figure 2.1 Product Overview

■ Retrofit Applications

When redesigning existing systems for compliance with UL 864 9th Edition, note the following functional replacements:

- AMG-1/E has been replaced by the DVC-AO.
- VCM-4RK and DCM-4RK have been replaced by SLC loop output control devices.
- The riser functions of FFT-7/7S have been integrated into Digital Voice Command systems as described in the main system manual; the permanent master handset is provided by the TELH-1. (Note that where "F.F.T." appears in print now, it serves as an acronym for "firefighters' telephone.)

2.3 Power-Supply and Battery Requirements

The installation manual for each fire alarm control panel (or its primary power supply if that is a separate document) provides calculations that must be done to determine standby and alarm DC current loads. Ampere-hour requirements must be calculated as well to determine battery size. The specific calculations may vary; use the instructions provided in your FACP/power supply documentation.

The following values are to be used in the FACP's Power Supply Calculations:

- For AC Branch Circuit current requirements, allow 1.0 A current for each AA-30, and 1.85 A current for each AA-100 or AA-120.
- For calculating Secondary, non-fire alarm current draw, allow 0.045 A for each AA-30, and 0.050 A for each AA-100 or AA-120. Do not include AA-series audio amplifiers in primary current-draw calculations, because they are calculated as power supplies when AC power is available. (If AA-series audio amplifiers are not specifically listed in the manual for your compatible, UL-listed FACP/power supply, enter this in the row provided for "Compatible devices not listed above".)
- For calculating the Maximum Secondary Power fire alarm current draw, allow 3.0 A for each AA-30 and 7.3 A for each AA-100 or AA-120. (Exclude amplifiers that are employed for backup.)

Section 3: Amplifying Audio Messages

3.1 Topics Covered

Audio-amplification topics covered in this section:

- Section 3.2 “DVC-AO Connections”
- Section 3.3 “AA-30 Installation”
- Section 3.4 “AA-30 Operation”
- Section 3.5 “AA-100/AA-120 Installation”
- Section 3.6 “AA-100/AA-120 General Operation”
- Section 3.7 “Adjusting the Audio Gain Level”
- Section 3.8 “Wiring Multiple Audio Amplifiers”
  - Section 3.8.1 “Two Primary AA-30s Without Backup”
  - Section 3.8.2 “Two Primary AA-100/AA-120s Without Backup”
  - Section 3.8.3 “Two Primary Amplifiers With Backup”

3.2 DVC-AO Connections

The DVC-AO option board generates low-level analog audio messages that may be used as inputs to AA-Series audio amplifiers. Figure 3.1 and Figure 3.2 provide a closeup view of connections on the DVC-AO, to be used in conjunction with the other wiring diagrams in this manual.

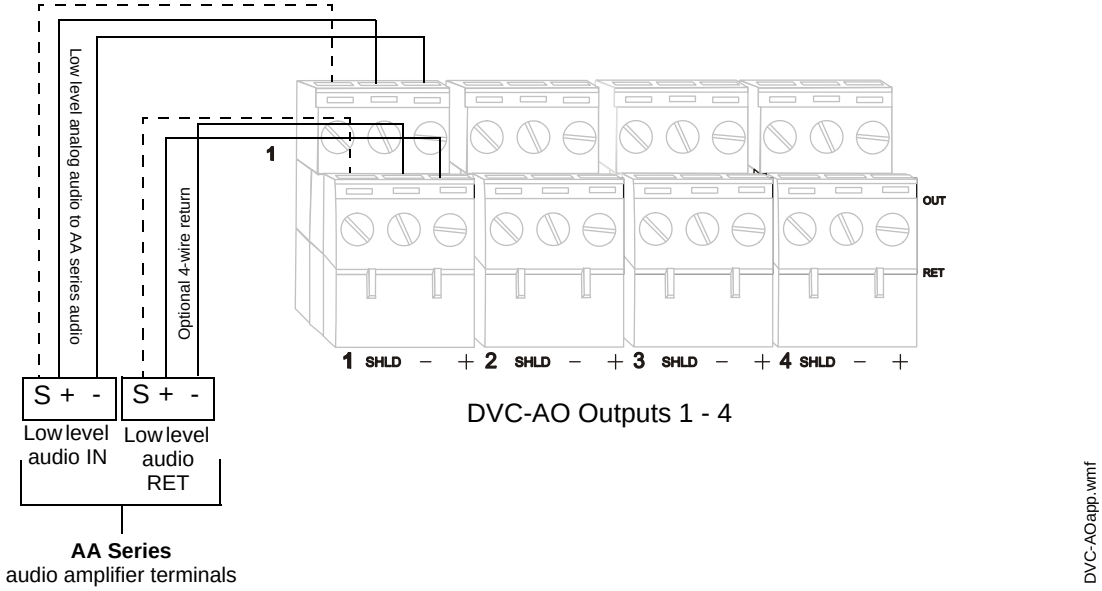
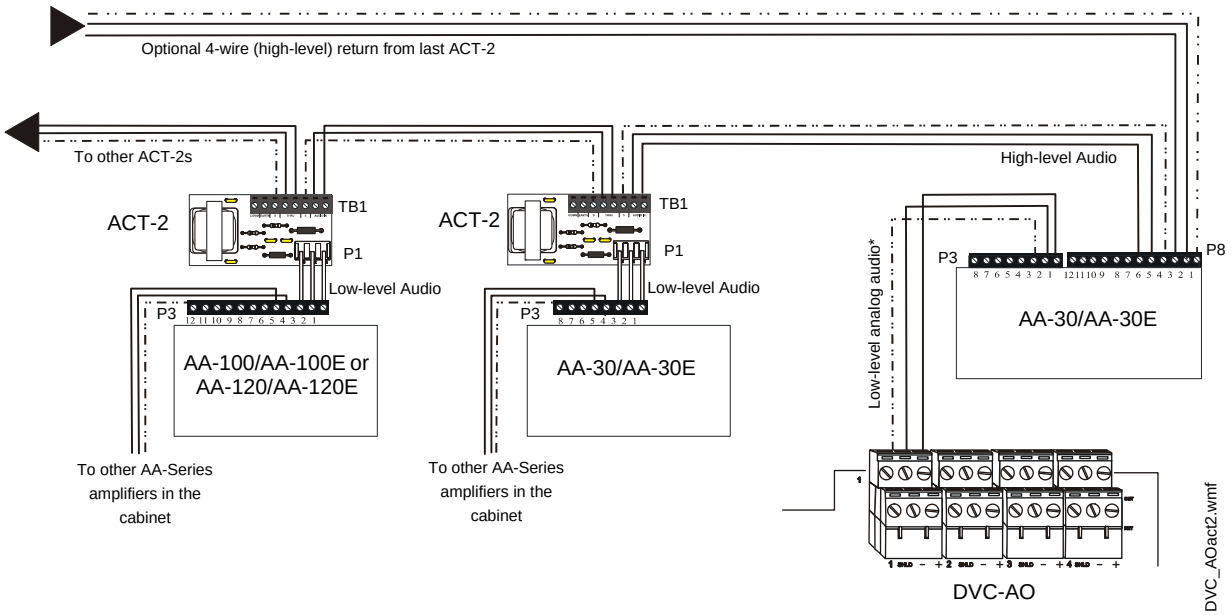


Figure 3.1 Wiring the DVC-AO Board



Note: For low-level audio's optional return, see Figure 3.1.

Figure 3.2 Wiring the DVC-AO Board

For further details and installation instructions about ACT-2, see the ACT-2 Product Installation Document.

3.3 AA-30 Installation

3.3.1 Mounting an AA-30

The AA-30 mounts in a CHS-4L chassis, which can hold two units placed side by side. The following steps apply to the installation of an Audio Amplifier.

1. Mount the unit(s) into the CHS-4L (see Figure 3.3):
   – Put the bottom end of the AA-30 assembly into the slots in the bottom of the CHS-4L chassis. Swing the assembly into the chassis.
   – Secure the AA-30 to the chassis with the washers and retaining nuts. Tighten securely.
2. Connect a primary (AC) and a secondary (24 VDC battery) power source to each unit.
3. Provide an external device (such as the CHG-120) for charging the batteries.
4. Adjust the Audio Gain Level. See Section 3.7 "Adjusting the Audio Gain Level".

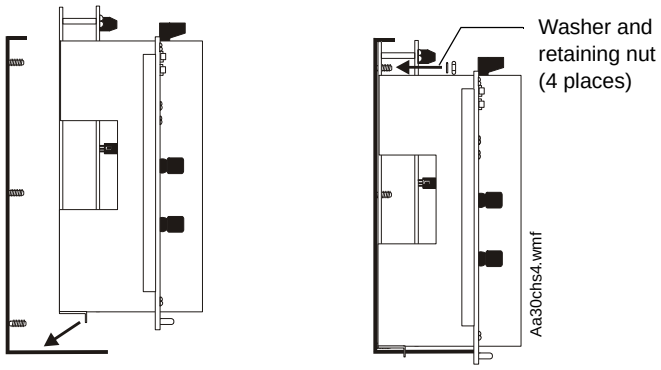


Figure 3.3 Mounting an AA-30 into the CHS-4L Chassis

3.3.2 Connecting an AA-30

Figure 3.4 and Figure 3.5 show terminal connections to an AA-30. See Section 3.8 "Wiring Multiple Audio Amplifiers" for applications using more than one amplifier.

- The low-level audio input and high-level audio output "P" connectors are primarily for in-cabinet applications where the wiring to or from the AA-30 remains in the cabinet. For multiple-cabinet applications, hard-wire the system using terminal blocks P3 and P8.
- To use high-level audio (25 Vrms output) with four-wire supervision:
  –Cut resistors R8 and R9 on the AA-30 (Figure 3.5), or
  –Cut resistor R100 on the AA-120 or AA-120 (Figure 3.10).
- Some installations require an ACT-1 or ACT-2 Audio Coupling Transformer. See the ACT-1 Installation Document or the ACT-2 Installation Document for further details and installation instructions.

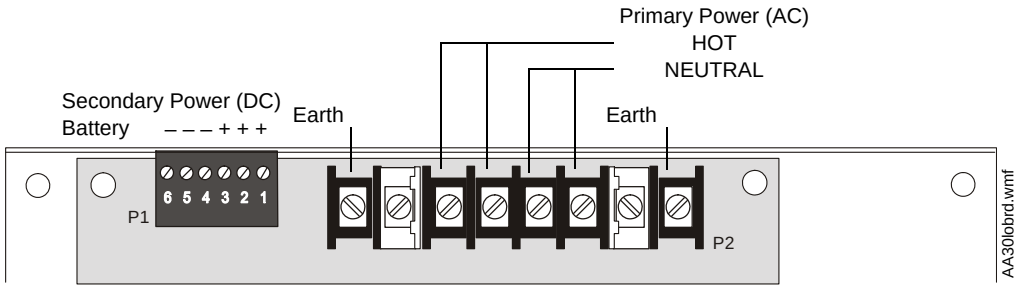


Figure 3.4 AA-30 Lower Board Connections (nonpower-limited)

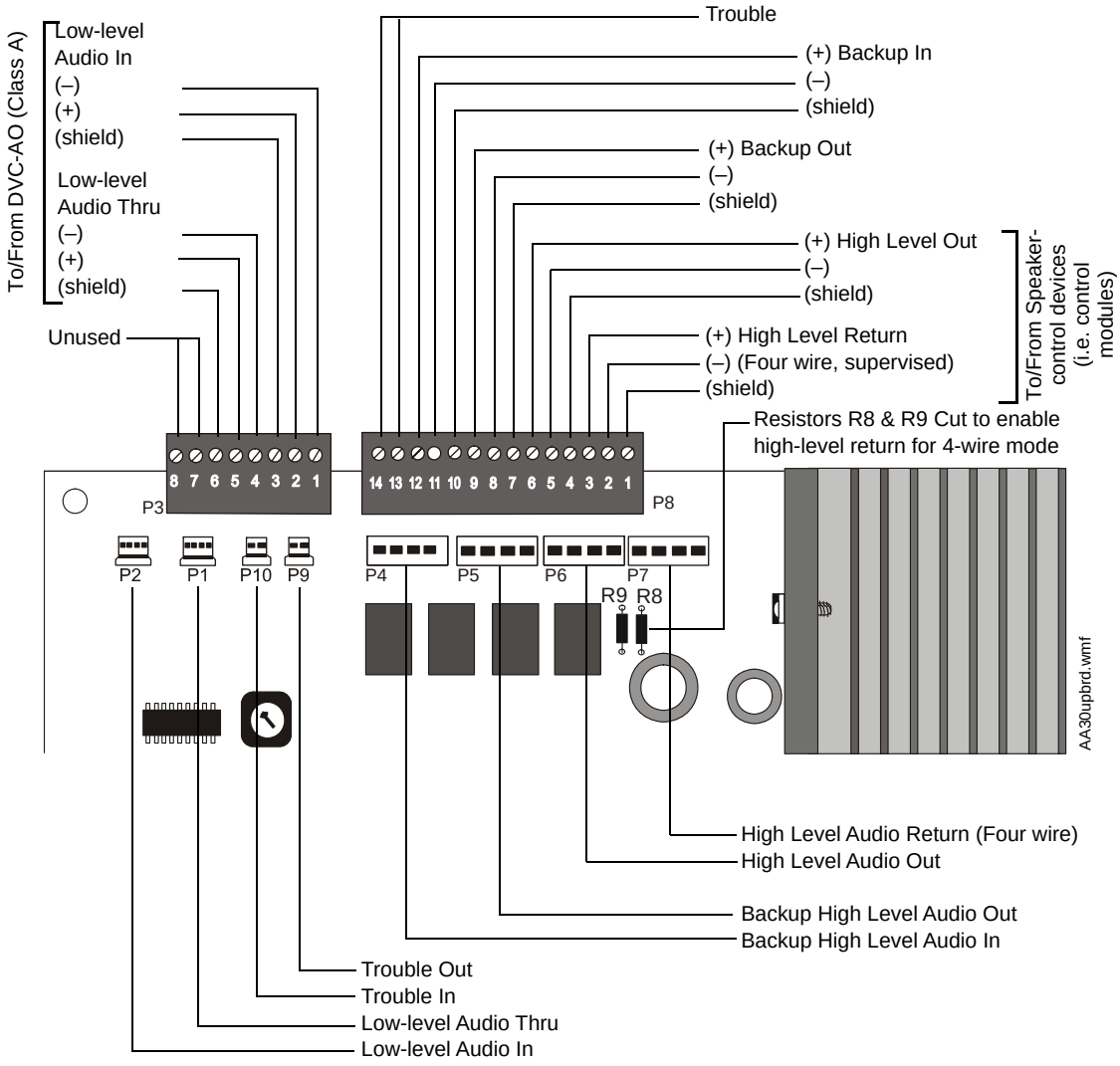


Figure 3.5 AA-30 Upper Board Connections (power-limited)

3.4 AA-30 Operation

During complete loss of primary (AC) power, the AA-30 operates on secondary (battery) power. To conserve secondary power, no LEDs light on the AA-30 while operating on batteries.

The amplifier does not indicate a trouble condition until 40 seconds after a fault occur.

3.4.1 Circuit Board Layout

Layout of the AA-30 circuit board and identification of its operating components:

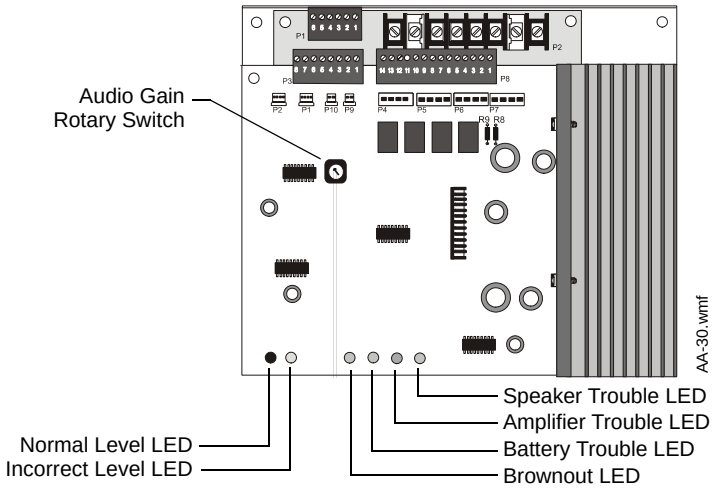


Figure 3.6 AA-30 LED and Switch Locations

3.4.2 LED Conditions

Conditions that cause each AA-30 System Status Indicator LED to light:

LED	Lights when
normal level	The audio amplifier is adjusted properly and operating correctly during normal (non-alarm) conditions.
incorrect level	Low-level audio input is missing, out of range, or the audio gain is out of adjustment.
speaker trouble	An open circuit condition occurs in the four-wire, high-level output.
amplifier trouble	A loss of the low-level audio input signal, or an amplifier failure.
battery trouble	The battery voltage is below a sufficient level.
brownout	The AC power source is below a sufficient level. During a complete loss of AC power, no LEDs will light on the AA-30.

Table 3.1 AA-30 LED Functions

3.5 AA-100/AA-120 Installation

3.5.1 Installing an AA-100 or AA-120

The AA-100 or AA-120 mounts directly to the cabinet backbox. The following steps apply to the installation of an Audio Amplifier:

1. Mount the unit into the system cabinet.
2. Connect primary (AC) and secondary (24 VDC battery) power source to the unit.
3. Provide an external device (such as a CHG-120) for charging the batteries.
4. Adjust the Audio Gain Level. See page 16.
5. Select a Backup Tone. See page 16.

3.5.2 Mounting an AA-100 or AA-120

Mount an AA-100 or AA-120 directly to the backbox by following these steps and referring to the figure below:

1. Mount the AA-100 or AA-120 onto the PEM studs on the cabinet backbox (in the same way as the CHS-4 and CHS-4L chassis) as shown below.

2. Install the two #8 nuts and lock washers (Figure 3.7) onto the PEM studs and tighten until secure.

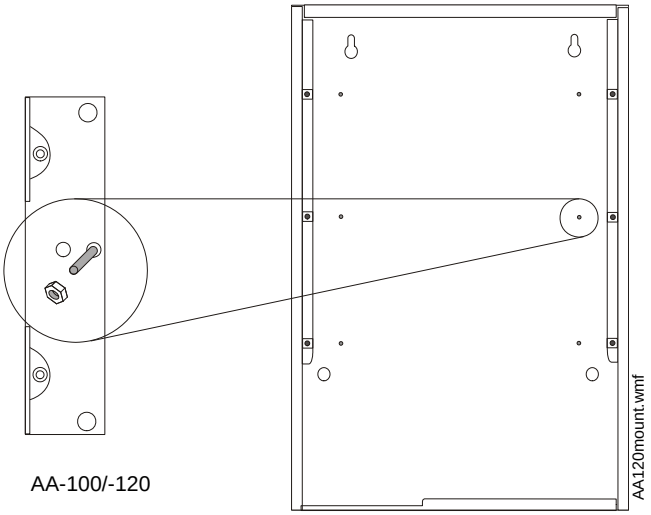


Figure 3.7 Mounting an AA-100 or AA-120

3.5.3 Connecting an AA-100 or AA-120

Figure 3.8 and Figure 3.9 show terminal connections to an AA-100/AA-120.

- Low-level audio input and high-level audio output "P" connectors are primarily for in-cabinet applications where the wiring to or from the amplifier remains in the cabinet. For multiple-cabinet applications hard-wire the system using terminal blocks P3 & P8. When more than one cabinet is required, cabinets must be mounted adjacent to each other and all interconnecting wiring must be installed in conduit.
- To use high-level audio (25 Vrms output) with four-wire supervision, cut resistor R100 as shown in Figure 3.10. **Note:** In the AA-120, this option is only required when output wiring leaves the cabinet.
- If the amplifier is being used in stand-alone mode (no connection to DVC-AO) where the backup high/low or slow whoop tone generator is being used, resistor R107 (see Figure 3.10) must be cut to prevent the amplifier from generating a trouble condition. The amplifier will indicate trouble within 90 seconds.
- Some installations require an ACT-1 or ACT-2 Audio Coupling Transformer. See the *ACT-1 Installation Document* or the ACT-2 Installation Document for further details and installation instructions.

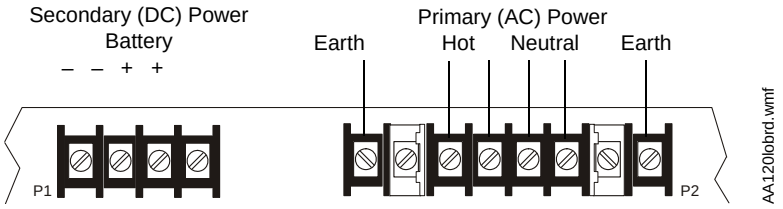
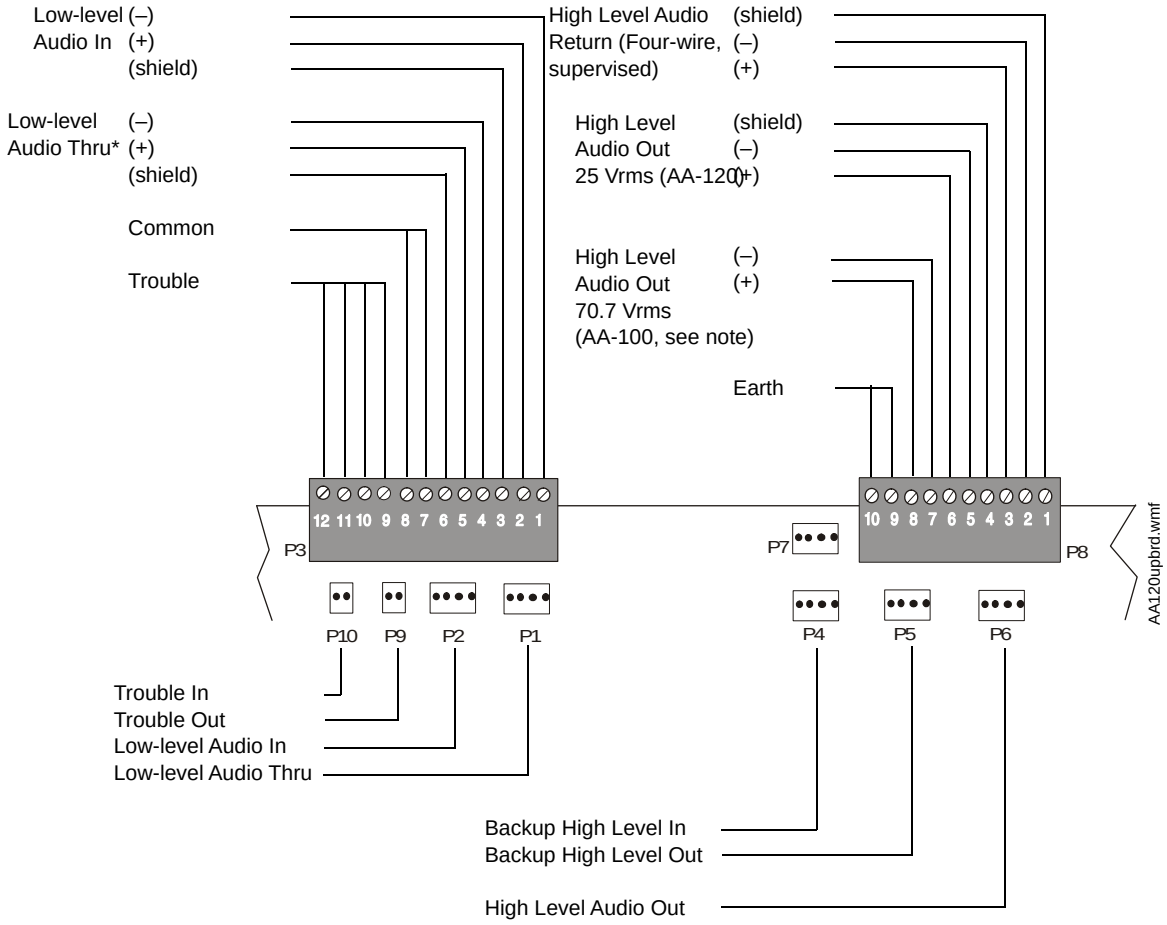


Figure 3.8 AA-100/AA-120 Lower Board Connections (nonpower limited)



Note if using 70.7 Vrms speakers: Due to higher power dissipation at the 70.7 volt audio level, the 2 watt, 4.7K end of line resistors supplied with the AA-100 Audio Amplifier must be used in place of the resistors supplied with the speaker-control devices. Systems configured for 70.7 Vrms operation must use Class B wiring.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.9 AA-100 and AA-120 Upper Board Connections (power-limited)

3.6 AA-100/AA-120 General Operation

During complete loss of primary (AC) power, the AA-100/AA-120 operates on secondary (battery) power. To conserve secondary power, no LEDs light on the AA-100 or AA-120 while operating on batteries.

The amplifier does not indicate a trouble condition until 40 seconds after a fault occurs.

3.6.1 AA-100/AA-120 Circuit Board Layout

Layout of the AA-100/AA-120 circuit board and identification of its operating components:

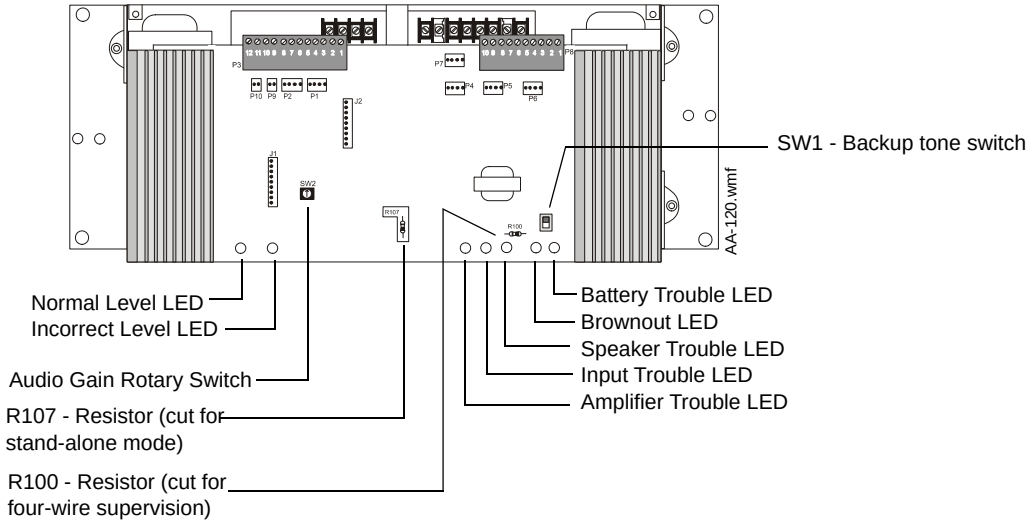


Figure 3.10 AA-100/AA-120 LED and Switch Locations

3.6.2 AA-100/AA-120 LED Conditions

Conditions that cause each AA-100/AA-120 System Status Indicator LED to light:

LED	Lights when
normal level	The audio amplifier is adjusted properly and operating correctly during normal (non-alarm) conditions.
incorrect level	The audio amplifier is not sensing low-level audio, or the gain is not adjusted properly.
battery trouble	The battery voltage is below a sufficient level.
brownout	The AC power source is below a sufficient level. During a complete loss of AC power, no LEDs will light on the AA-100/AA-120.
speaker trouble	An open circuit condition occurs in the four-wire, high-level output.
input trouble	A loss of the low-level audio input signal, or an amplifier failure.
amplifier trouble	A loss of the low-level audio input signal, or an amplifier failure.

Table 3.2 AA-100/AA-120 LED Functions

3.6.3 Selecting the Backup Tone on AA-100/AA-120

The AA-100 and AA-120 Audio Amplifiers automatically produce a backup tone when the low-level audio input is lost. You can select the backup tone by following these steps.

1. Locate SW1 in the lower right-hand corner of the AA-100 or AA-120 (Figure 3.10).
2. Set SW1 to Hi/Lo or Slow Whoop as the default backup tone as shown below.

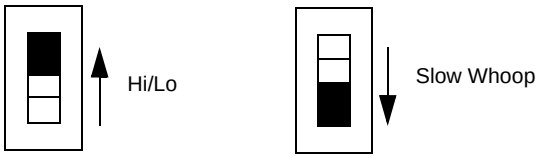


Figure 3.11 SW1 Backup Tone Switch

3.7 Adjusting the Audio Gain Level

An audio amplifier contains a multi-position rotary switch that lets you adjust the gain of the audio output signal. This adjustment compensates for audio line losses. After correct adjustment, an audio amplifier can produce its maximum rated output power of 25 Vrms (AA-30, AA-120) or 70.7 Vrms (AA-100).

When finished installing all amplifiers and associated circuitry, adjust the audio gain as follows:

1. Locate the Audio Gain Rotary Switch on AA-30 (Figure 3.6) or AA-100 and AA-120 (Figure 3.10).
2. Use a small common screwdriver to turn the Audio Gain Rotary Switch until the Normal Level LED and Incorrect Level LED are properly adjusted as shown in Table 3.3.

Audio Level	Normal Level LED	Incorrect Level LED
Properly Adjusted	ON	OFF
Adjusted too Low	OFF	ON
Adjusted too high	ON	ON

Table 3.3 Adjusting the Audio Level

NOTE: 70.7 Vrms speakers require the 2 watt, 4.7K end-of-line resistors (P/N 90224) supplied with the AA-100 Audio Amplifier in place of the resistors supplied with the speaker-control devices. Systems configured for 70.7 Vrms operation must be wired as Class B.

NOTE: If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

3.8 Wiring Multiple Audio Amplifiers

3.8.1 Two Primary AA-30s Without Backup

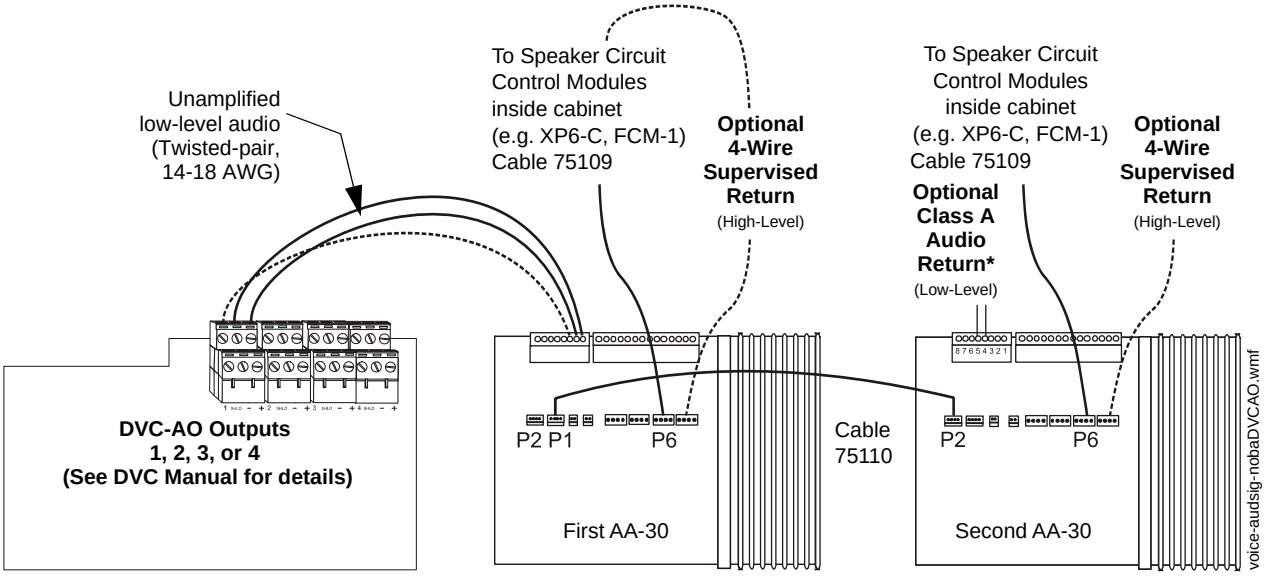
Figure 3.12 shows the use of two AA-30s without backup and Table 3.4 lists the wiring components used.

- The speaker circuits on the first AA-30 share 30 watts from that AA-30; the speaker circuits on the second AA-30 share 30 watts from that AA-30.
- To use high-level audio (25 Vrms output) with four-wire supervision, cut resistors R8 and R9 on the AA-30 (Figure 3.5).
- This wiring diagram applies to AA-30 audio amplifiers. Connections to plugs P1, P2, P4, P5, P6, P9, and P10 are identical.

Item	Supplied with	Part Number
Low-level audio cable	AA-30	75110
25-volt audio cable	AA-30	75109

Table 3.4 Wiring Inventory

Typical wiring of two primary AA-30 audio amplifiers without using a backup amplifier. This sample shows how to connect to speaker circuit control modules within cabinet, using Cable 75109:



Note: Cables must enter from top of the plug.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.12 Wiring Two AA-30's Without a Backup Amplifier

3.8.2 Two Primary AA-100/AA-120s Without Backup

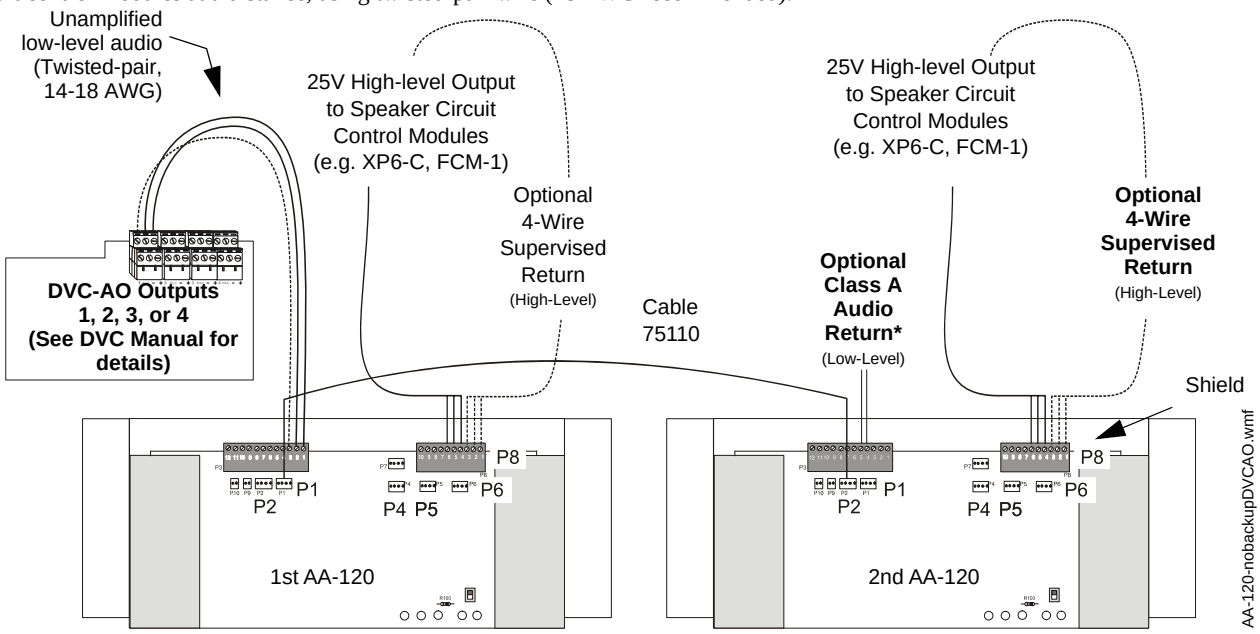
Figure 3.13 and Figure 3.14 show the use of two audio amplifiers without backup and Table 3.5 lists the wiring components used.

- The speaker circuits on the first audio amplifier share 100/120 watts from that audio amplifier; the speaker circuits on the second audio amplifier share 100/120 watts from that audio amplifier.
- To use high-level audio (25 Vrms output) with four-wire supervision, cut resistor R100 on the AA-120 or AA-120 (Figure 3.10).
- This wiring diagram applies to AA-100 and AA-120 audio amplifiers. Connections to plugs P1, P2, P4, P5, P6, P9, and P10 are identical.

Item	Supplied with	Part Number
Low-level audio cable	AA-100, and AA-120	75110
25-volt audio cable	AA-100, and AA-120	75109

Table 3.5 Wiring Inventory

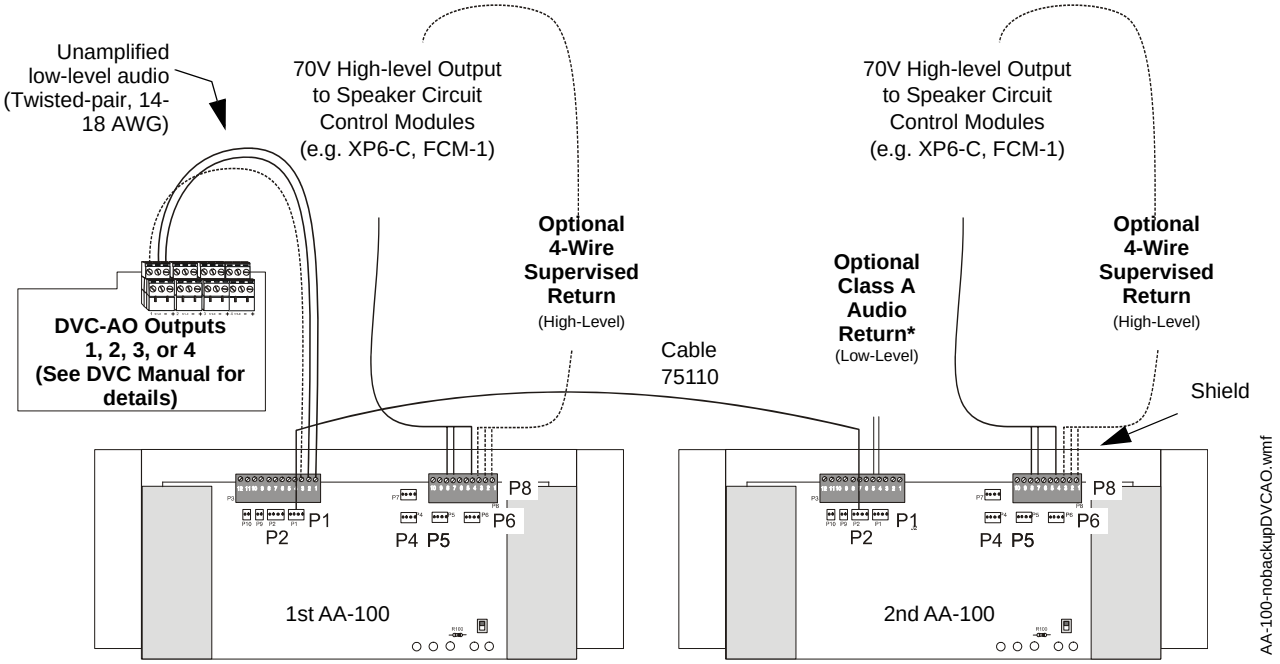
Typical wiring of two primary AA-120 audio amplifiers without using a backup amplifier. This option shows how to connect to speaker circuit control modules at a distance, using twisted-pair wire (18 AWG recommended):



Notes: Cables must enter from top of the plug.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.13 Wiring Two AA-120's Without a Backup Amplifier

Typical wiring of two primary AA-100 audio amplifiers without using a backup amplifier:



Note: Cables must enter from top of the plug.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.14 Wiring Two AA-100's Without a Backup Amplifier

3.8.3 Two Primary Amplifiers With Backup

Use an AA-30, AA-100 or AA-120 audio amplifier to back up one or more amplifiers. If an amplifier fails, backup amplifier switching is automatic.

Connect P6 on the backup amplifier to P4 on the first primary amplifier as shown in Figure 3.15. If there are multiple primary amplifiers, use P5 to feed the P4 connector on successive amplifiers.

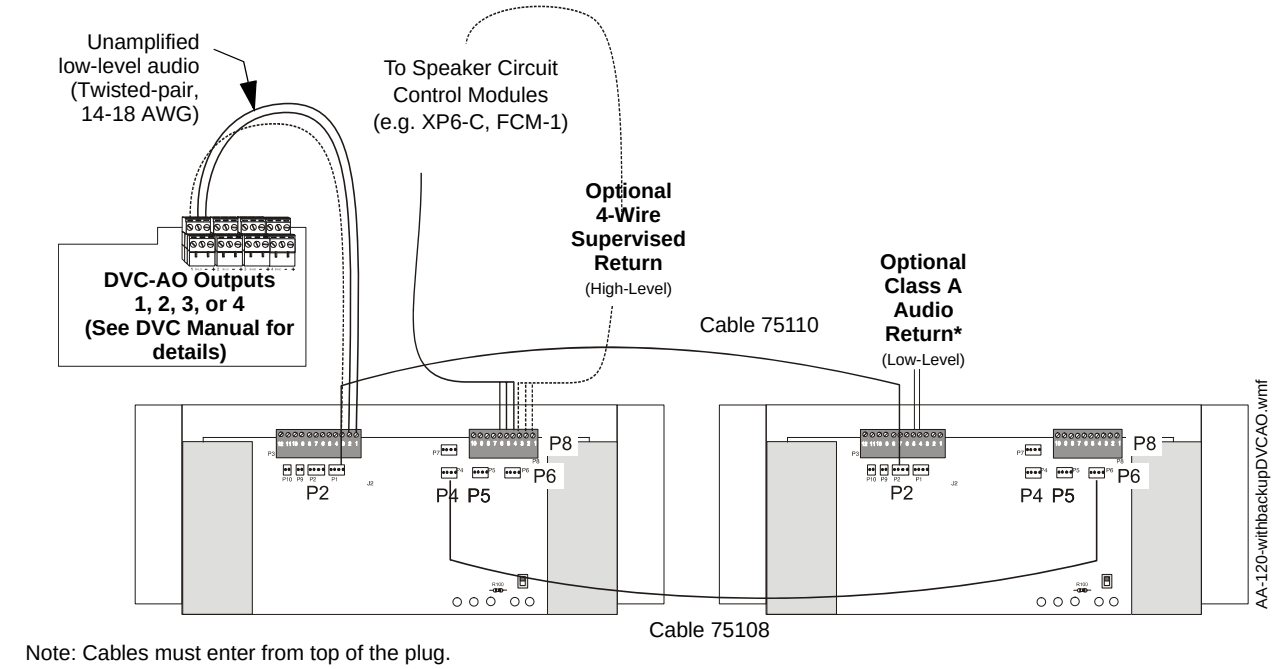
Figure 3.15 shows a typical wiring configuration using an AA-120 as a backup amplifier, Figure 3.16 below shows the use of two AA-30s where one serves as a backup, and Table 3.6 lists the wiring components used.

- This wiring diagram applies to AA-30, AA-100, and AA-120 audio amplifiers. Connections to plugs P1, P2, P4, P5, P6, P9, and P10 are identical.

Item	Supplied with	Part Number
Low-level audio cable	AA-30, AA-100, AA-120	75110
25-volt audio cable	AA-30, AA-100, AA-120	75109
Backup audio Cable		75108

Table 3.6 Wiring Inventory

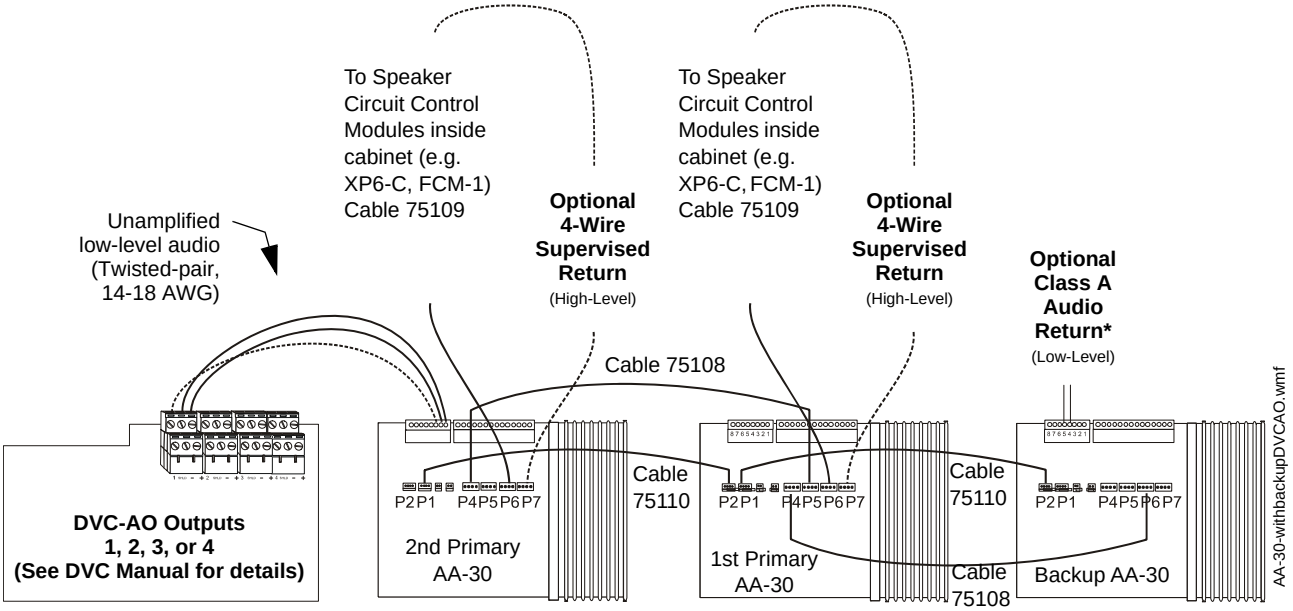
Typical wiring of two AA-120s using one AA-120 as a backup:



Note: Cables must enter from top of the plug.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.15 Wiring Multiple Audio Amplifiers: One Primary AA-120 With One Backup

Typical wiring of two AA-30s using one AA-30 as a backup:



Note: Cables must enter from top of the plug.
***Note:** If not using Class A low-level audio return, an R-470 resistor assembly may be installed across P3, pins 4 and 5 of the last directly connected device on the low-level audio riser; this may help to calibrate the audio amplifier.

Figure 3.16 Wiring Multiple Audio Amplifiers: Two Primary AA-30s With One Backup

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