



**GAI-TRONICS®**  
A HUBBELL COMPANY

# Model 12580-001

## Amplifier Distribution/Monitor Module

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### Confidentiality Notice

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### Introduction

This document discusses installing, operating, and maintaining the 12580-001 Amplifier Distribution/Monitor Module (ADM), which provides the following features:

- Distributes audio to central amplifiers
- Verifies the integrity of speaker loops
- Monitors amplifier failure contacts
- Communicates with the Master Control Unit

### How to Use the Assembly

This section describes applications for the Amplifier Distribution/Monitor Module, its hardware configuration, block diagram, interfaces, and installation. Because this assembly is controlled by a 69254 Series or 69440 Series Master Control Unit (MCU) and is set up in the MCU's configuration software, there are no operating controls or software configuration for the ADM. Refer to the MCU Configuration details in your system manual for all operation information.

### Application

The Amplifier Distribution/Monitor Module is used to distribute audio to up to six central amplifiers. It is also used to verify the integrity of the related speaker loops and to monitor up to six amplifier failure contacts, reporting their status to the MCU. The ADM's speaker loop inputs allow it to detect various fault conditions on any of up to six speaker loops. These fault conditions include ground faults, cable breaks\*, wire-to-wire short circuits\*, and amplifier failures.

The ADM's contact closure inputs are typically used to monitor the amplifier failure contacts of the central amplifiers to determine amplifier failure. Figure 1 illustrates a typical application for one paging zone. Figure 2 illustrates an alternate application for one central amplifier and twelve speaker loops.

**NOTE:** (\*) indicates that fault detection occurs only while the associated amplifier is not in use.

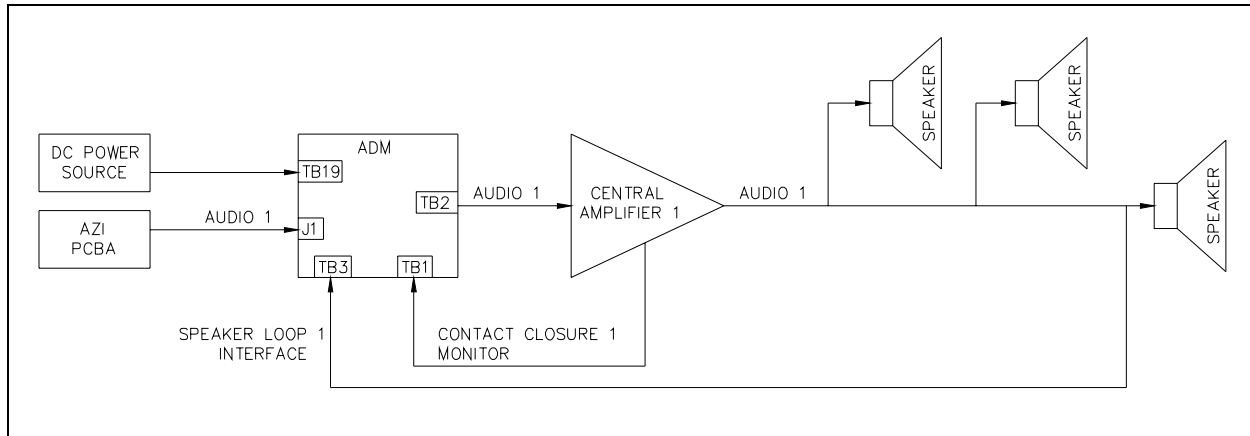


Figure 1. Single Page Zone - Typical Application

The ADM is comprised of two subassemblies: the 69250-xxx Distribution/Monitor printed circuit board assembly (PCBA) and the 69248-xxx Central Processing Unit (CPU) PCBA. The ADM mounts in a Snaptrack™, a grooved plastic channel that allows a PCBA to securely ‘snap’ into place. The Snaptrack™ provides flexible installation because it may be installed in an equipment rack wherever it is convenient.

The ADM communicates with the MCU via the CPU PCBA over a bi-directional RS-485 link. The CPU PCBA monitors the status of the module's contact closure inputs and speaker loop inputs and reports them to the MCU via this communication link.

The MCU periodically interrogates the ADM to determine its status. The MCU identifies a particular module on this RS-485 link by its address. (The ADM's module address is set by rotary hex switch S1, located on the CPU PCBA.)

Model 12580-001 Amplifier Distribution/Monitor Module

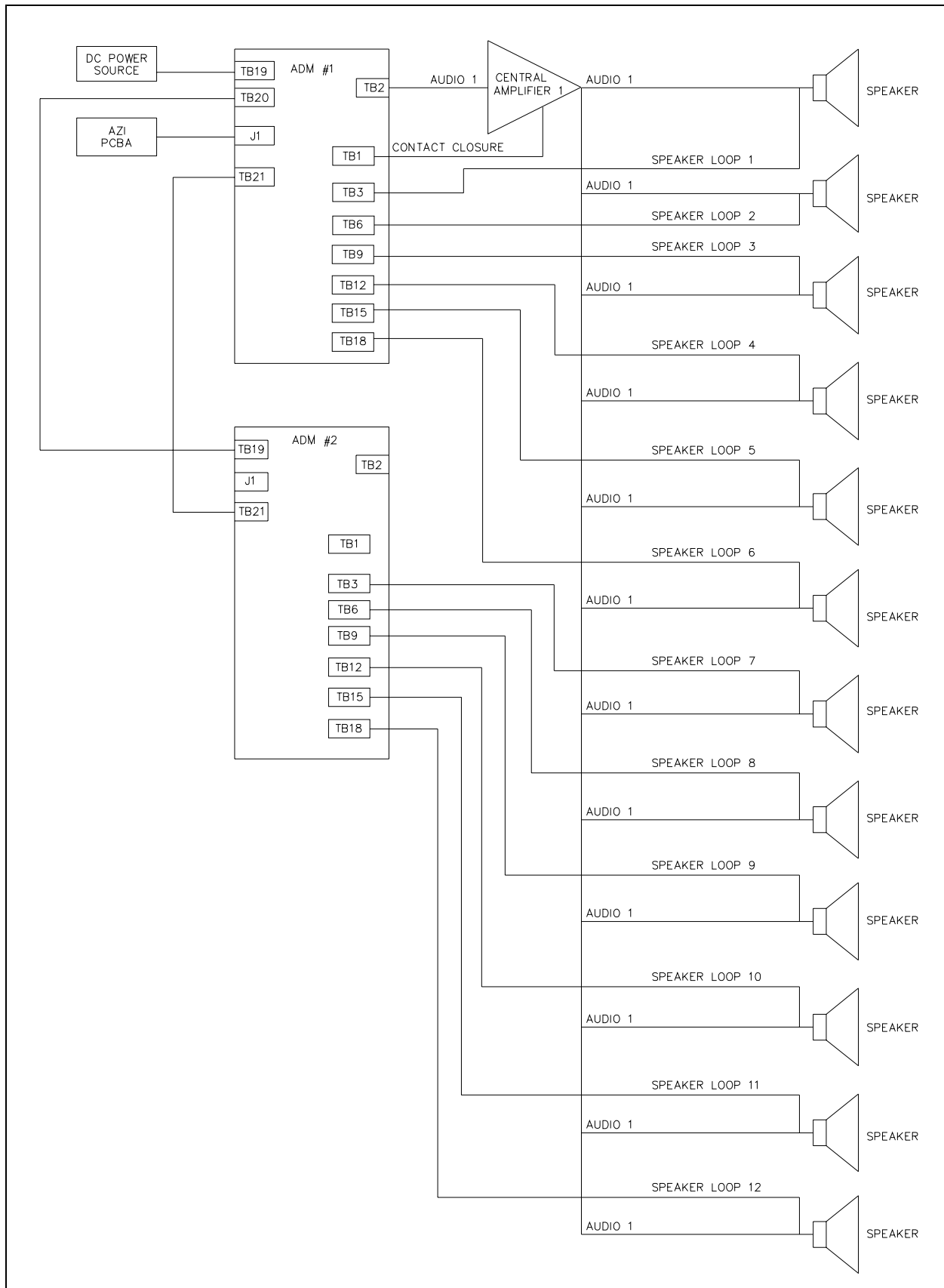


Figure 2. Single Amplifier with 12 Speaker Loops - Alternate Application

# Hardware Configuration

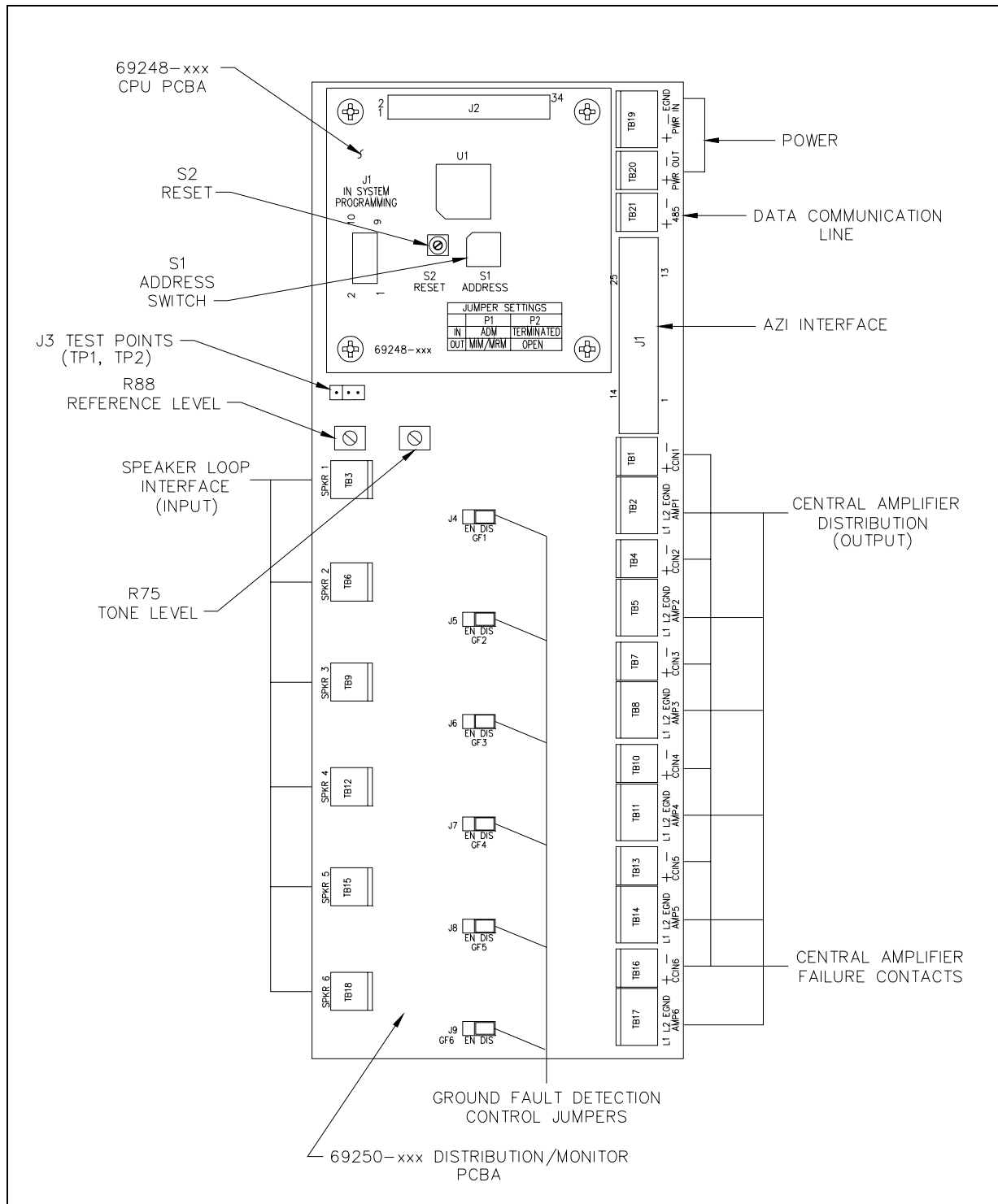


Figure 3. Hardware Configuration

## Interfaces

The Model 12580-001 Amplifier Distribution/Monitor Module provides a number of external interfaces, all of which are located on the Distribution/Monitor PCBA.

### Power

The ADM uses 3-position terminal block TB19 (labeled PWR IN) to deliver dc power (12 V dc) to the PCBAs and to provide an earth ground connection for them. Two-position terminal block TB20 (labeled PWR OUT) brings out the dc power from TB19, allowing additional Snaptrack™ modules to receive power. The pinout for TB19 is shown in Table 1 and the pinout for TB20 is shown in Table 2.



**Incorrect connection of the power source to TB19 or TB20 may cause damage to this assembly.**

Table 1. Power Input - TB19 Pinout

Pin No.	Function	Description
1	PWR IN +	Connects to the positive lead of the power supply (input)
2	PWR IN -	Connects to the negative (ground) lead of the power supply (input)
3	PWR IN EGND	Connects to earth ground (input)

Table 2. Power Output - TB20 Pinout

Pin No.	Function	Description
1	PWR OUT +	Connects the positive lead of the power supply to other Snaptrack™ modules (output)
2	PWR OUT -	Connects the negative (ground) lead of the power supply to other Snaptrack™ modules (output)

### AZI Interface

DB-25 style connector J1 interfaces the Amplifier Zone Interface (AZI) PCBA to the ADM. J1 connects the six central amplifier input lines, the RS-485 data communication line, and earth ground of the AZI PCBA to the ADM. The six central amplifier input lines are connected to the following 3-position terminal blocks: TB2, TB5, TB8, TB11, TB14, and TB17.

The RS-485 data communications line is connected to J2 (to interface with the CPU PCBA) and to 2-position terminal block, TB21. Earth ground is connected to TB19 pin 3. The pinout for AZI interface connector J1 is shown in Table 3.

Table 3. AZI Interface J1 Pinout

Pin No.	Function	Description	Pin No.	Function	Description
1	RS485+	Passes the positive leg of the RS-485 interface from the AZI PCBA to TB21 (485 +) (I/O)	14	RS485-	Passes the negative leg of the RS-485 interface from the AZI PCBA to TB21 (485 -) (I/O)
2	Not used		15	Not used	
3	Not used		16	Not used	
4	Not used		17	Not used	
5	AMP1_L1	Passes one leg of audio input for central amplifier 1 from the AZI PCBA to TB2 (AMP1 L1) (input)	18	AMP1_L2	Passes the other leg of audio input for central amplifier 1 from the AZI PCBA to TB2 (AMP1 L2) (input)
6	AMP2_L1	Passes one leg of audio input for central amplifier 2 from the AZI PCBA to TB5 (AMP2 L1) (input)	19	AMP2_L2	Passes the other leg of audio input for central amplifier 2 from the AZI PCBA to TB5 (AMP2 L2) (input)
7	AMP3_L1	Passes one leg of audio input for central amplifier 3 from the AZI PCBA to TB8 (AMP3 L1) (input)	20	AMP3_L2	Passes the other leg of audio input for central amplifier 3 from the AZI PCBA to TB8 (AMP3 L2) (input)
8	AMP4_L1	Passes one leg of audio input for central amplifier 4 from the AZI PCBA to TB11 (AMP4 L1) (input)	21	AMP4_L2	Passes the other leg of audio input for central amplifier 4 from the AZI PCBA to TB11 (AMP4 L2) (input)
9	AMP5_L1	Passes one leg of audio input for central amplifier 5 from the AZI PCBA to TB14 (AMP5 L1) (input)	22	AMP5_L2	Passes the other leg of audio input for central amplifier 5 from the AZI PCBA to TB14 (AMP5 L2) (input)
10	AMP6_L1	Passes one leg of audio input for central amplifier 6 from the AZI PCBA to TB17 (AMP6 L1) (input)	23	AMP6_L2	Passes the other leg of audio input for central amplifier 6 from the AZI PCBA to TB17 (AMP6 L2) (input)
11	not used		24	not used	
12	not used		25	not used	
13	EGND	Passes earth ground to the AZI PCBA (output)			

**NOTE:** Connector J1 of the ADM is connected to the AZI PCBA via a DB25 cable assembly. This cable assembly is not included with the ADM and must be purchased separately.

### Data Communication Line

Terminal block, TB21 is provided to enable the RS-485 signal to be daisy-chained to additional Snaptrack™ modules. The pinout for the data communications line is shown in Table 4.

Table 4. Data Communications Line - TB21 Pinout

Pin No.	Function	Description
1	485 +	Daisy-chains the positive leg of the RS-485 interface to other Snaptrack™ modules (I/O)
2	485 -	Daisy-chains the negative leg of the RS-485 interface to other Snaptrack™ modules (I/O)
<b>NOTE:</b> The conductors terminated on this terminal block should be a twisted pair.		

### Central Amplifier Audio Distribution

Terminal blocks TB2, TB5, TB8, TB11, TB14, and TB17 are provided to connect audio from the AZI to the six central amplifier inputs. The audio signals are differential, so a 2-conductor cable is required for each input. An additional termination point (EGND) has been provided for an earth ground connection. The pinout for TB2, TB5, TB8, TB11, TB14, and TB17 is shown in Table 5.

Table 5. Central Amplifier Audio Distribution - TB2, TB5, TB8, TB11, TB14, and TB17 Pinout

Pin No.	Function	Description
1	AMP L1	Connects one leg of audio to a central amplifier's input (output)
2	AMP L2	Connects the other leg of audio to a central amplifier's input (output)
3	AMP EGND	Connects earth ground to a central amplifier (output)
<b>NOTE:</b> For optimum audio quality, the conductors terminated on pins 1 and 2 of these terminal blocks should be twisted pairs.		

### Central Amplifier Failure Inputs

The ADM contains six 2-position terminal blocks (TB1, TB4, TB7, TB10, TB13, and TB16) to receive central amplifier failure contacts. A normally open or normally closed dry contact closure input is provided for each amplifier. The pinout for the central amplifier failure inputs is shown in Table 6.

Table 6. Central Amplifier Failure Inputs - TB1, TB4, TB7, TB10, TB13, and TB16 Pinouts

Pin No.	Function	Description
1	CCIN +	Connects to one leg of a central amplifier's contact closure (input)
2	CCIN -	Connects to the other leg of a central amplifier's contact closure (input)

### Speaker Loop Interfaces

The ADM contains six 2-position terminal blocks (TB3, TB6, TB9, TB12, TB15, and TB18) to enable termination of the six central amplifier speaker loops. The ADM monitors the speaker loops for ground faults, cable breaks\*, wire-to-wire shorts\*, and amplifier failures. The pinout for TB3, TB6, TB9, TB12, TB15, and TB18 is shown in Table 7.

#### NOTES:

- (\*) indicates that fault detection occurs only while the associated amplifier is not in use.
- Only one voltage type (25 V, 70 V, etc.) may be supervised at a time.

Table 7. Speaker Loop Interfaces TB3, TB6, TB9, TB12, TB15, and TB18 Pinouts

Pin No.	Function	Description
1	SPKR	Connects to one leg of a central amplifier's speaker loop (input)
2	SPKR	Connects to the other leg of a central amplifier's speaker loop (input)
<b>NOTE:</b> The conductors terminated on these terminal blocks should be twisted pairs. These connections are not polarity-sensitive.		



# Installation

This section contains installation instructions for the Amplifier Distribution/Monitor Module. Notify plant personnel of a system shutdown prior to servicing the unit.

## Precautions

Adhere to all warnings and all safety and operating instructions on the unit and in this manual.



**Disconnect power to the ADM and central amplifiers before installing, removing, or servicing the module.**

**Do not touch bare wires.**

**Avoid servicing the unit during electrical storms.**



Warning: Observe precautions for handling electrostatic sensitive devices.

## Hardware Configuration

Before installing a new ADM, set S1 on the CPU PCBA to the module address and set the jumper settings (J4-J9) as shown in the system manual. Valid address settings are (5 to E). Jumper settings (J4-J9) allow ground fault detection to be enabled or disabled. See Table 8 for the jumper setting details.

### NOTES:

- To ensure proper termination, crimp a ferrule on the end of any conductor that is to be terminated on a terminal block. The size of the ferrule depends on the size of the conductor used and may be obtained from suppliers such as Phoenix, Altec, or Weidmuller. The terminals accept a maximum conductor size of No. 12 AWG and a minimum conductor size of No. 28 AWG.
- Ground fault detection can be enabled only when one speaker loop from each amplifier is being monitored.

Table 8. Ground Fault Control Jumpers J4 through J9

Reference Designator	Description	Valid Settings
J4 (GF1)	Speaker loop 1 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
J5 (GF2)	Speaker loop 2 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
J6 (GF3)	Speaker loop 3 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
J7 (GF4)	Speaker loop 4 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
J8 (GF5)	Speaker loop 5 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
J9 (GF6)	Speaker loop 6 ground fault detection control	<ul style="list-style-type: none"> <li>• Pins 1 and 2 (EN) shorted: enabled</li> <li>• Pins 2 and 3 (DIS) shorted: disabled*</li> </ul>
<b>NOTE:</b> (*) indicates the factory default setting.		

## Mounting

To install the module into the Snaptrack™, slide either the right or left edge of the module into the top groove on the track. On the opposite edge of the module, press firmly on the top and bottom corners of the module until they snap into the groove. Carefully press from each corner toward the center and simultaneously snap the edge firmly into place.

## Power

After installing the ADM in the Snaptrack™, bring 12 V dc power from the auxiliary power supply to TB19 (labeled PWR IN). Connect the positive leg to terminal 1 (+) and the negative or return leg to terminal 2 (-). Connect earth ground to terminal 3 (EGND). TB20 (labeled PWR OUT) is paralleled with TB19 so that power may be distributed to additional Snaptrack™ modules.



**Incorrect connection of the power source to TB19 or TB20 may cause damage to this assembly.**

### NOTES:

- Although power may be daisy-chained between Snaptrack™ modules, the preferred method of delivering power to these modules is to provide a dedicated cable run from the power supply to each module.
- The auxiliary power supply is not part of the 10457 Series Card Rack Assembly nor does the card rack assembly power supply provide power to Snaptrack™ modules. An additional power supply must be included in the cabinet to support these modules.
- For proper operation, connect the auxiliary power supply return leg to earth ground at the auxiliary power supply.
- The ground reference for this assembly must be identical to that of the card rack assembly.
- The ADM does not provide any current-limiting for input power. An external fuse of the Slo-Blo® variety, with the appropriate voltage and current ratings, should be provided.

## AZI Interface

Connect a DB25 cable assembly (sold separately) from the AZI PCBA to the J1 connector of the ADM. J1 connects the six central amplifier input lines, the RS-485 data communication line, and earth ground of the AZI PCBA to the ADM.

## Data Communication Line

Terminal block TB21 has been provided to distribute the RS-485 data communication line to additional Snaptrack™ modules. If there are no additional Snaptrack™ modules, connect a 150-ohm, ½ watt terminating resistor (sold separately) across TB21 of the 69250-xxx, or install a jumper across the pins of P2 on the 69248-xxx CPU PCBA.



**The RS-485 line is polarity-sensitive. Be sure to maintain circuit polarity throughout installation.**

### NOTES:

1. The conductor terminated on TB21 should be a twisted pair.
2. Only one termination is to be applied to an RS-485 circuit - either a 150-ohm resistor across TB21, or a jumper across the pins of P2.

## Central Amplifier Audio Distribution

Connect terminal blocks TB2, TB5, TB8, TB11, TB14, and TB17 to the associated central amplifiers.

**NOTE:** For optimum audio quality, the conductors terminated on pins 1 and 2 of TB2, TB5, TB8, TB11, TB14, and TB17 should be twisted pairs.

## Central Amplifier Failure Inputs

Connect the central amplifier failure contacts to the ADM at terminal block connectors TB1, TB4, TB7, TB10, TB13, and TB16. These dry contact closures typically originate from the associated central amplifiers.

## Speaker Loop Return Lines

Terminate the central amplifier speaker loops to be monitored by the ADM on connectors TB3, TB6, TB9, TB12, TB15, and TB18. Typically, this connection is made to the last speaker on the circuit so that the entire loop is monitored. These connections are not polarity-sensitive.

**NOTE:** The conductors terminated on TB3, TB6, TB9, TB12, TB15, and TB18 should be twisted pairs.

Table 9. Circuit Relationships

Function → Ckt. No. ↓	Central Amplifier Audio Distribution	Speaker Loop Interfaces	Ground Fault Detection Control	Central Amplifier Failure Contact
1	TB2-1 (AMP1 L1) TB2-2 (AMP1 L2)	TB3 (SPKR 1)	J4 (GF1)	TB1 (CCIN1)
2	TB5-1 (AMP2 L1) TB5-2 (AMP2 L2)	TB6 (SPKR 2)	J5 (GF2)	TB4 (CCIN2)
3	TB8-1 (AMP3 L1) TB8-2 (AMP3 L2)	TB9 (SPKR 3)	J6 (GF3)	TB7 (CCIN3)
4	TB11-1 (AMP4 L1) TB11-2 (AMP4 L2)	TB12 (SPKR 4)	J7 (GF4)	TB10 (CCIN4)
5	TB14-1 (AMP5 L1) TB14-2 (AMP5 L2)	TB15 (SPKR 5)	J8 (GF5)	TB13 (CCIN5)
6	TB17-1 (AMP6 L1) TB17-2 (AMP6 L2)	TB18 (SPKR 6)	J9 (GF6)	TB16 (CCIN6)

Table 9 shows the relationship between the connectors and headers for each of the six circuits the ADM supports. It includes the component's designation and the label printed on the Distribution/Monitor PCBA, where applicable.

For example: audio for circuit 1's amplifier input is passed from the AZI PCBA to terminal block TB2 (labeled AMP1 L1 and AMP1 L2). The speaker loop return line for this circuit is via TB3 (labeled SPKR 1) and it includes ground fault detection control via header J4 (labeled GF1). The related contact closure input is via TB1 (labeled CCIN1).

After all terminations have been made, apply power to the equipment, and adjust reference level R88 and tone level R75 as described in the "Maintenance" section.

## How to Diagnose Assembly Faults

Table 10 describes possible solutions for some common problems.

Table 10. Fault Diagnosis

Problem	Possible Solution
General malfunction	<ul style="list-style-type: none"> <li>• Verify that power is properly connected to TB19.</li> <li>• Verify proper polarity and dc voltage range (+9 to +15 V dc) at TB19 (PWR IN).</li> <li>• Verify that the address (S1) matches the system configuration and the unit is enabled.</li> <li>• Verify that all Snaptrack™ modules are set to a unique address.</li> <li>• Verify the power supply negative terminal is connected to earth ground.</li> <li>• Verify the proper polarity of the RS-485 data line for all Snaptrack™ modules connected to this unit.</li> <li>• Verify that the cable assembly is properly connected between the ADM (on J1) and the AZI PCBA.</li> <li>• Verify that the CPU PCBA is properly seated on the Distribution/Monitor PCBA.</li> </ul>
Ground fault detector does not respond to ground faults on one or more speaker loop interfaces	<ul style="list-style-type: none"> <li>• Verify that the ground fault detection control header for the corresponding speaker loop interface (refer to Table 9) is set to the enable position (EN).</li> <li>• Verify the ground fault detection is enabled in the system configuration.</li> <li>• Call for service.</li> </ul>
Supervisory tone detector does not respond to tone on one or more speaker loop interfaces	<ul style="list-style-type: none"> <li>• Check the input and output cabling between the central amplifier and the ADM.</li> <li>• Verify that the central amplifier is operational.</li> <li>• Check the Tone Level R75, and Reference Level, R88 for proper adjustment.</li> <li>• Verify the speaker loop supervision is enabled in the system configuration.</li> <li>• Call for service.</li> </ul>
Central amplifier failure contacts are not reported.	<ul style="list-style-type: none"> <li>• Check cabling between the central amplifier and the ADM.</li> <li>• Verify the amplifier failure contacts are enabled in the system configuration.</li> <li>• Call for service.</li> </ul>

## How to Maintain the Assembly

This section describes maintenance for the Amplifier Distribution/Monitor Module and lists its specifications and replacement parts.

### Maintenance

 **WARNING**  **Disconnect power to the ADM and central amplifiers before servicing.**

1. Inspect and replace frayed or cracked wiring.
2. Secure/replace loose wires and spade terminals.
3. Remove corrosion from terminals.

### Adjustments

The ADM contains two adjustable controls; a Reference Level adjustment, and a Tone Level adjustment.

- The Reference Level adjustment, R88, sets a reference point (trip point). The Tone Level must exceed the reference level to enable detection of the Supervisory Tone.
- The Tone Level Adjustment, R75, controls the Supervisory Tone signal level applied to the detector.

These adjustments are set at the factory for a 70.7 V central amplifier system. Additional adjustments may be required during installation to meet the requirements of your system. Use a straight blade screwdriver and a dc voltmeter to make adjustments.

## Reference Level Adjustment

1. Set the dc voltmeter to the 20 V scale.
2. Connect the dc voltmeter between (J10 pin 2) ground and test point 2 (TP2-J10 pin 3).
3. Adjust the R88 Reference Level to one of the following set points:

Speaker Loop Input Voltage	Reference Level Setting	Tone Level Setting
10 V	50 mV	200 mV or higher
25 V	350 mV	500 mV or higher
70.7 V	1.85 V factory setting	2.0 V or higher
100 V	2.35 V	2.5 V or higher
141 V	2.35 V	2.5 V or higher

## Tone Level Adjustment

1. Set the dc voltmeter to the 20 V scale.
2. Connect the dc voltmeter between ground (J10 pin 2) and test point 1 (TP1-J10 pin 1).
3. While the Supervisory Tone is active (active approximately every 90 seconds), adjust R75 Tone Level until the dc voltage exceeds the Reference Level by at least 150 mV dc (factory setting), or rotate R75 fully clockwise.



# Specifications

## Electrical

Power requirements .....	+9 to +15 V dc (+12 V dc nominal)
Current draw .....	48 mA (min.), 70 mA (nominal), 132 mA (max.)
Input/output.....	Power in Power out RS-485 Six audio outputs (for use with external amplifiers) Six contact closure inputs Six speaker loop interfaces (for fault detection)
RS-485 termination.....	On board when P2 jumper is installed
Speaker loop ground fault detection .....	Less than 5 kilohms to ground
Supervisory tone detection sensitivity .....	10 V <sub>RMS</sub> min. @ speaker loop interface (f <sub>in</sub> = 19.394 kHz)
Speaker loop interface maximum voltage.....	141 V <sub>RMS</sub> max.
Speaker loop input impedance .....	20 kilohms min. (1 kHz)
Contact closure on-resistance.....	10 ohms max.

## Terminals

Minimum conductor size .....	No. 28 AWG (0.5 mm <sup>2</sup> )
Maximum conductor size.....	No. 12 AWG (3.0 mm <sup>2</sup> )

## Environmental

Temperature range (operating/storage).....	+32° F to +122° F (0° C to +50° C)
Humidity .....	95% non-condensing relative humidity (+50° C)

## Mechanical

Unit dimensions .....	4.0 H × 10.5 W × 1.50 D inches (102 × 267 × 38 mm)
Unit weight.....	1.0 lb. (454 g) max.

## Approval

CE Mark

## Replacement Parts

Model Number	Description
69248-xxx	CPU PCBA
69250-xxx	Distribution/Monitor PCBA

# Warranty

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Equipment. GAI-Tronics warrants for a period of one (1) year from the date of shipment, that any GAI-Tronics equipment supplied hereunder shall be free of defects in material and workmanship, shall comply with the then-current product specifications and product literature, and if applicable, shall be fit for the purpose specified in the agreed-upon quotation or proposal document. If (a) Seller's goods prove to be defective in workmanship and/or material under normal and proper usage, or unfit for the purpose specified and agreed upon, and (b) Buyer's claim is made within the warranty period set forth above, Buyer may return such goods to GAI-Tronics' nearest depot repair facility, freight prepaid, at which time they will be repaired or replaced, at Seller's option, without charge to Buyer. Repair or replacement shall be Buyer's sole and exclusive remedy. The warranty period on any repaired or replacement equipment shall be the greater of the ninety (90) day repair warranty or one (1) year from the date the original equipment was shipped. In no event shall GAI-Tronics warranty obligations with respect to equipment exceed 100% of the total cost of the equipment supplied hereunder. Buyer may also be entitled to the manufacturer's warranty on any third-party goods supplied by GAI-Tronics hereunder. The applicability of any such third-party warranty will be determined by GAI-Tronics.

Services. Any services GAI-Tronics provides hereunder, whether directly or through subcontractors, shall be performed in accordance with the standard of care with which such services are normally provided in the industry. If the services fail to meet the applicable industry standard, GAI-Tronics will re-perform such services at no cost to buyer to correct said deficiency to Company's satisfaction provided any and all issues are identified prior to the demobilization of the Contractor's personnel from the work site. Re-performance of services shall be Buyer's sole and exclusive remedy, and in no event shall GAI-Tronics warranty obligations with respect to services exceed 100% of the total cost of the services provided hereunder.

Warranty Periods. Every claim by Buyer alleging a defect in the goods and/or services provided hereunder shall be deemed waived unless such claim is made in writing within the applicable warranty periods as set forth above. Provided, however, that if the defect complained of is latent and not discoverable within the above warranty periods, every claim arising on account of such latent defect shall be deemed waived unless it is made in writing within a reasonable time after such latent defect is or should have been discovered by Buyer.

Limitations / Exclusions. The warranties herein shall not apply to, and GAI-Tronics shall not be responsible for, any damage to the goods or failure of the services supplied hereunder, to the extent caused by Buyer's neglect, failure to follow operational and maintenance procedures provided with the equipment, or the use of technicians not specifically authorized by GAI-Tronics to maintain or service the equipment. **THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES AND REMEDIES, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

## Return Policy

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If the equipment requires service, contact your Regional Service Center for a return authorization number (RA#). Equipment should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the equipment is under warranty, repairs or a replacement will be made in accordance with the warranty policy set forth above. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts.

Call 800-492-1212 (inside the USA) or 610-777-1374 (outside the USA) for help identifying the Regional Service Center closest to you.