GAI-TRONICS®
A HUBBELL COMPANY

Model 12599-002
Hot Standby Amplifier Module

Confidentiality Notice

General Information

The Model 12599-002 Hot Standby Amplifier Module is designed for use in system cabinets equipped with central power amplifiers requiring hot (automatic) switching of a standby (backup) amplifier when any one of the primary power amplifiers fail.

This module provides prioritized switching for either six single-channel power amplifiers, or three dual-channel amplifiers with up to 700 watts of output power per channel. Also, multiple modules can be cascaded using an "in/out" board control feature.

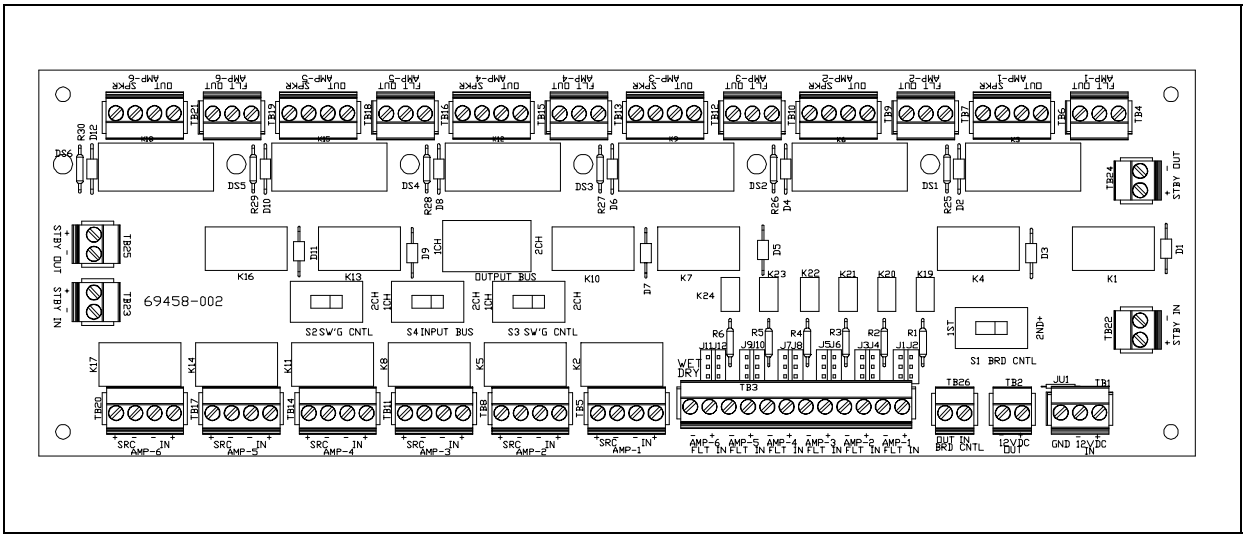

Figure 1. Model 12599-002 Hot Standby Amplifier Module
(Switches shown in factory default position)

Hardware Configuration

The Model 12599-002 Hot Standby Amplifier Module is a printed circuit board assembly (PCBA) equipped with plug-in type terminal blocks, six high-current relays for switching amplifier outputs, and 12 low-power relays for switching amplifier inputs and providing dry contact status outputs.

The module is also equipped with five slide switches for mode select functions, and six LEDs to indicate actively switched circuits. Each fault detect input is comprised of a Photo-MOS relay with jumper clips (J1–J12) to select "wet" or "dry" activation. Each activation type is briefly described below:

Wet Activation – requires an active source voltage of 10–15 V dc from the amplifier when healthy and removal of the voltage when the amplifier is faulted.

Dry Activation – requires a normally closed (N.C.), dry contact from the amplifier when healthy and removal of the contact when the amplifier is faulted. This setting is also used when the amplifier has an open collector fault output, which is actively low (sinking to dc common) when healthy, and floating high when the amplifier is faulted.

NOTE: Jumper clips J1–J12 are set-up in pairs, and each pair must be set to the same position for its respective input. The following table depicts the corresponding input and jumper pair, and the mode of operation based on the jumper clip position.

Fault Input	Jumper Clips	Wet Mode	Dry Mode
1	J1 & J2	Pos. 1–2	Pos. 2–3
2	J3 & J4	Pos. 1–2	Pos. 2–3
3	J5 & J6	Pos. 1–2	Pos. 2–3

Fault Input	Jumper Clips	Wet Mode	Dry Mode
4	J7 & J8	Pos. 1–2	Pos. 2–3
5	J9 & J10	Pos. 1–2	Pos. 2–3
6	J11 & J12	Pos. 1–2	Pos. 2–3

Installation

⚠WARNING ⚠ Disconnect power for safety when installing or replacing the module.

The Model 12599-002 Hot Standby Amplifier Module measures 12 L× 4 W × 1.5 H inches (305 × 102 × 31.75 mm) and is designed for mounting on 4-inch Snap Trak.

Carefully press the module edges into the SnapTrak to avoid damage to the module's PCBA and/or components. Once installed, ensure the module edges are secured in the channels so that the module does not dislodge during transport or operation if subjected to vibration.

Also, if this module is used with other (cascaded) modules, a 1-inch (25.4-mm) spacing between modules will facilitate wiring at the edge-mounted terminal blocks.

Terminations

The Model 12599-002 Hot Standby Amplifier Module is equipped with modular (plug-in type) terminal blocks. These modular terminal blocks simplify external wire connections during installation, and provide quick disconnect if replacement is ever required.

The following is a breakdown of each terminal block and its function(s):

TB1 – is the 12 V dc power input to the module.

TB2 – is a 12 V dc power output to another (cascaded) module or another 12 V dc-powered device.

TB3 – is the Amp-1 through Amp-6 fault inputs. The **+** and **-** terminals connect to the amplifier's fault output, which can be a wet (active) output or a dry, normally closed contact. Since each fault input operates independently, amplifiers with different fault output types can be simultaneously connected to this module's inputs. The following details the different types of amplifier fault outputs, and the required jumper settings. See Note 1.

WET (ACTIVE) OUTPUT – requires the amplifier to output 10–15 V dc when operating in a healthy state and the respective jumper clips set to the wet position. Be sure to match polarity markings, e.g., **+** to **+** (plus to plus) and **–** to **–** (minus to minus) between the amplifier's fault output and input terminals at this module for proper operation. Refer to Figure 2 for a connection detail.

DRY (N.C.) CONTACT OUTPUT – requires the amplifier to provide a dry, normally closed contact when operating in a healthy state and the respective jumper clips set to the dry position. Connection of the amplifier's normally closed fault contact connects across the **+** (plus) and **–** (minus) terminals at the module. Refer to Figure 3 for a connection detail.

OPEN COLLECTOR (ACTIVE LOW) – requires the amplifier to provide an active low output (sinking to dc common) when operating in a healthy state, and the respective jumper clips to be set to the dry position. Connection of the amplifier's fault output has the input (common or emitter) side connected to the **+** (plus) terminal, and the output (collector) connected to the **–** (minus) terminal for proper operation. Refer to Figure 4 for a connection detail.

TB4, TB7, TB10, TB13, TB16 and TB19 – are dry output contacts for Amp-1 through Amp-6 faults respectively. Each contact set is a Form "C" type. The maximum switching capacity for each contact set is 24 V dc @ 1 amp and can be used for triggering a remote status indicator or for an input at a supervised system device for a visual text display. See Note 5.

TB5, TB8, TB11, TB14, TB17 and TB20 – are the audio source and input connections for Amp-1 through Amp-6. The amplifier's audio source is connected at the SRC (source) terminals. The amplifier's input is connected at the IN (input) terminals. Be sure to observe polarity markings at these terminals for proper operation and audio performance. Refer to Figure 5.

TB6, TB9, TB12, TB15, TB18 and TB21 – are the audio output and speaker line connections for Amp-1 through Amp-6. The active amplifier output (e.g., 4-ohm, 8-ohm, 16-ohm, 25 V, 70 V or 100 V) is connected at the OUT (output) terminal. The designated speaker(s) or speaker line connects to the module at the SPKR (speaker) terminals. Be sure to observe polarity markings at these terminals for proper operation and audio performance. Refer to Figure 6.

TB22 – is where the standby amplifier input connects if using a single-channel amplifier. If using a dual-channel amplifier, connect the channel 1 input to these terminals. See Note 2 and refer to Figure 7 and Figure 8.

TB23 – is for busing the standby amplifier input to another (cascaded) module when using a single-channel amplifier. However, if a dual-channel amplifier is used with the module, the channel 2 input of the standby amplifier should connect to these terminals. See Note 2 and refer to Figure 7 and Figure 8.

TB24 – is where the standby amplifier output connects if using a single-channel amplifier. If using a dual-channel amplifier connect the channel 1 output to these terminals. See Note 2 and refer to Figure 7 and Figure 8.

TB25 – is for busing the standby amplifier output to another (cascaded) module when using a single-channel amplifier. However, if a dual-channel amplifier is used with the module, then the channel 2 output of the standby amplifier should connect to these terminals. See Note 3 and refer to Figure 7 and Figure 8.

TB26 – is the BRD CNTL (board control) IN (input) and OUT (output), which is used in a cascade arrangement of multiple modules. In a cascade arrangement, no connection is made at the IN terminal at the first module. For the second module in the cascade, connect the OUT terminal of the first module to IN terminal of the second module, and continue this wiring scheme across subsequent modules in the cascade. See Note 4 and refer to Figure 7 and Figure 8.

NOTES:

1. When the module is operated in 2-channel (dual-channel) mode, the Amp-4, Amp-5 and Amp-6 fault inputs are not used, and a jumper must be wired across each unused input terminal set at TB3. Also, the respective input jumper clips must be set to the dry position to prevent false activation of unused fault input circuits.
2. To use both inputs of a dual-channel standby amplifier across multiple cascaded modules, wire TB22 and TB23 in parallel (respectively) across all modules.
3. To use both outputs of a dual-channel standby amplifier across multiple cascaded modules, wire TB24 and TB25 in parallel (respectively) across all modules.
4. Most central amplifier system applications usually employ or specify a ratio of one standby amplifier for every five or six primary amplifiers to minimize the risk of lost coverage. Be sure to check the specified system requirements for the ratio of standby (backup) amplifiers to primary amplifiers.
5. When the module is operated in 2-channel (dual-channel) mode, the Amp-4, Amp-5 and Amp-6 fault output contact are not used at TB13, TB16 and TB19 respectively.

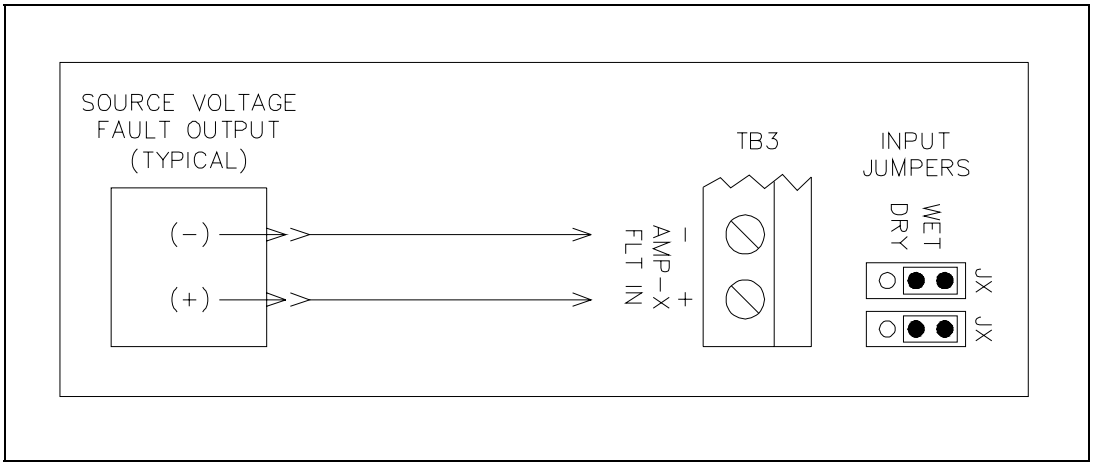

Figure 2. Source Voltage (Active) Fault Connection

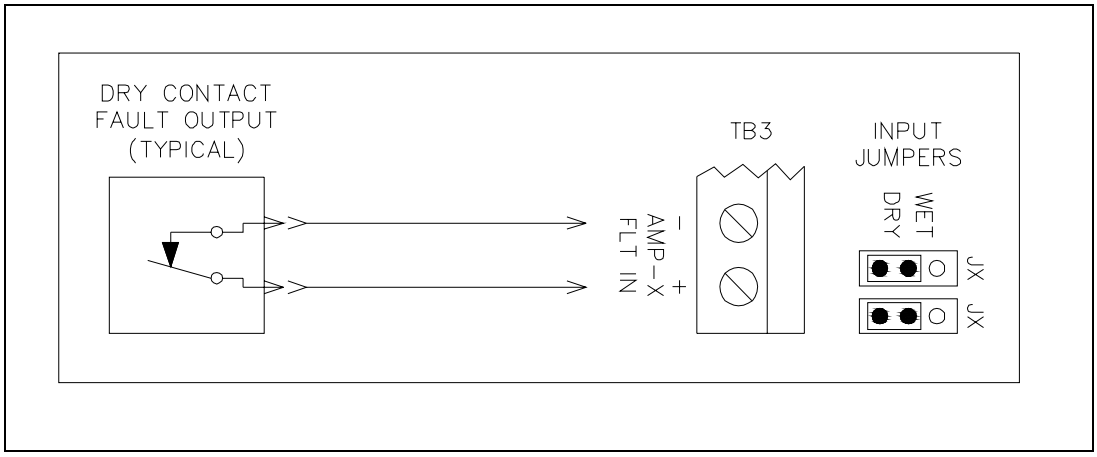

Figure 3. Dry Contact Fault Connection

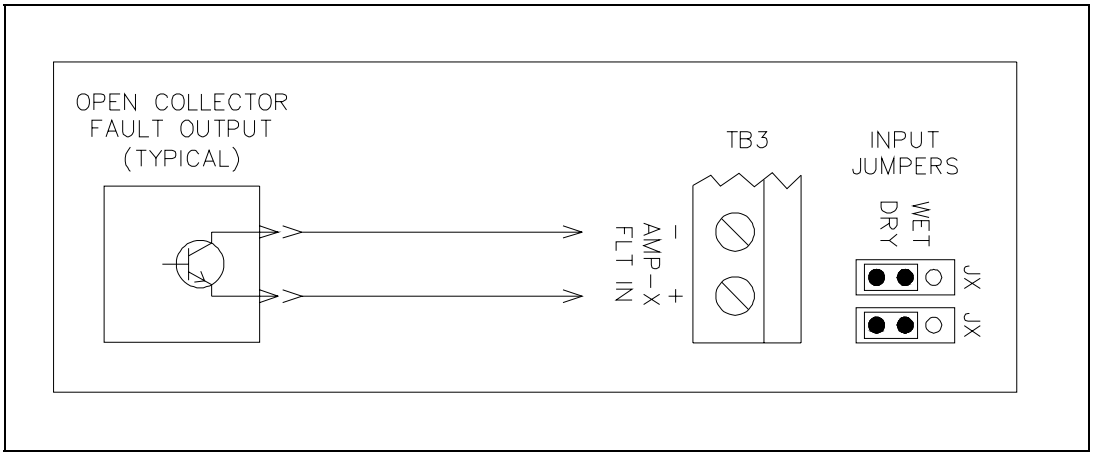

Figure 4. Open Collector Fault Connection

The following is a summary of all terminal block function(s). Number references shown in the following tables are from **right** to **left** when viewed from the edge of the module.

TB1 – 12 V dc Power Input	
Terminal Ref.	Function
1	12 V dc positive (+)
2	12 V dc negative (-)
3	Ground (optional)

TB2 – 12 V dc Output	
Terminal Ref.	Function
1	12 V dc positive (+)
2	12 V dc negative (-)

TB3 – Amplifier Fault Control Inputs	
Terminal Ref.	Function
1	Amp-1 Fault Input (+)
2	Amp-1 Fault Input (-)
3	Amp-2 Fault Input (+)
4	Amp-2 Fault Input (-)
5	Amp-3 Fault Input (+)
6	Amp-3 Fault Input (-)
7	Amp-4 Fault Input (+)
8	Amp-4 Fault Input (-)
9	Amp-5 Fault Input (+)
10	Amp-5 Fault Input (-)
11	Amp-6 Fault Input (+)
12	Amp-6 Fault Input (-)

TB4 – Amp-1 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB5 – Input and Source Amp-1 (Single Channel Mode) Amp-1, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB6 – Output and Speaker Amp-1 (Single Channel Mode) Amp-1, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB7 – Amp-2 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB8 – Input and Source Amp-2 (Single Channel Mode) Amp-2, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB9 – Output and Speaker Amp-2 (Single Channel Mode) Amp-2, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Speaker Line (+)
2	Speaker Line (-)
3	Amplifier Output (+)
4	Amplifier Output (-)

TB10 – Amp-3 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB11 – Input and Source Amp-3 (Single Channel Mode) Amp-3, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB12 – Output and Speaker Amp-3 (Single Channel Mode) Amp-3, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Speaker Line (+)
2	Speaker line (-)
3	Amplifier Output (+)
4	Amplifier Output (-)

TB13 – Amp-4 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB14 – Input and Source Amp-4 (Single Channel Mode) Amp-1, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB15 – Output and Speaker Amp-4 (Single Channel Mode) Amp-1, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Speaker Line(+)
2	Speaker Line (-)
3	Amplifier Output (+)
4	Amplifier Output (-)

TB16 – Amp-5 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB19 – Amp-6 Fault Contact Output	
Terminal Ref.	Function
1	Normally Open Contact
2	Normally Closed Contact
3	Common Contact

TB17 – Input and Source Amp-5 (Single Channel Mode) Amp-2, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB20 – Input and Source Amp-6 (Single Channel Mode) Amp-3, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (+)
2	Amplifier Input (-)
3	Audio Signal Source (+)
4	Audio Signal Source (-)

TB18 – Output and Speaker Amp-5 (Single Channel Mode) Amp-2, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Speaker Line (+)
2	Speaker Line (-)
3	Amplifier Output (+)
4	Amplifier Output (-)

TB21 – Output and Speaker Amp-6 (Single Channel Mode) Amp-3, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Speaker Line (+)
2	Speaker Line (-)
3	Amplifier Output (+)
4	Amplifier Output (-)

TB22 – Input Standby Amp (Single Channel Mode) Standby Amp, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Input (-)
2	Amplifier Input (+)

TB23 – Input, or Feed-Thru (Single Channel Mode) Standby Amp, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Output (-)
2	Amplifier Output (+)

TB24 – Output Standby Amp (Single Channel Mode) Standby Amp, Ch-1 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Output (-)
2	Amplifier Output (+)

TB25 – Output, or Feed-Thru (Single Channel Mode) Standby Amp, Ch-2 (Dual Channel Mode)	
Terminal Ref.	Function
1	Amplifier Output (-)
2	Amplifier Output (+)

TB26 – Board Control	
Terminal Ref.	Function
1	Board Control IN
2	Board Control OUT

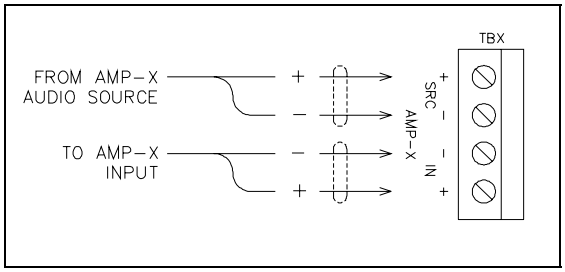

Figure 5. Input Connections

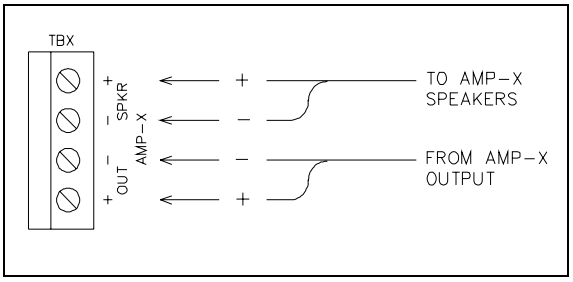

Figure 6. Output Connections

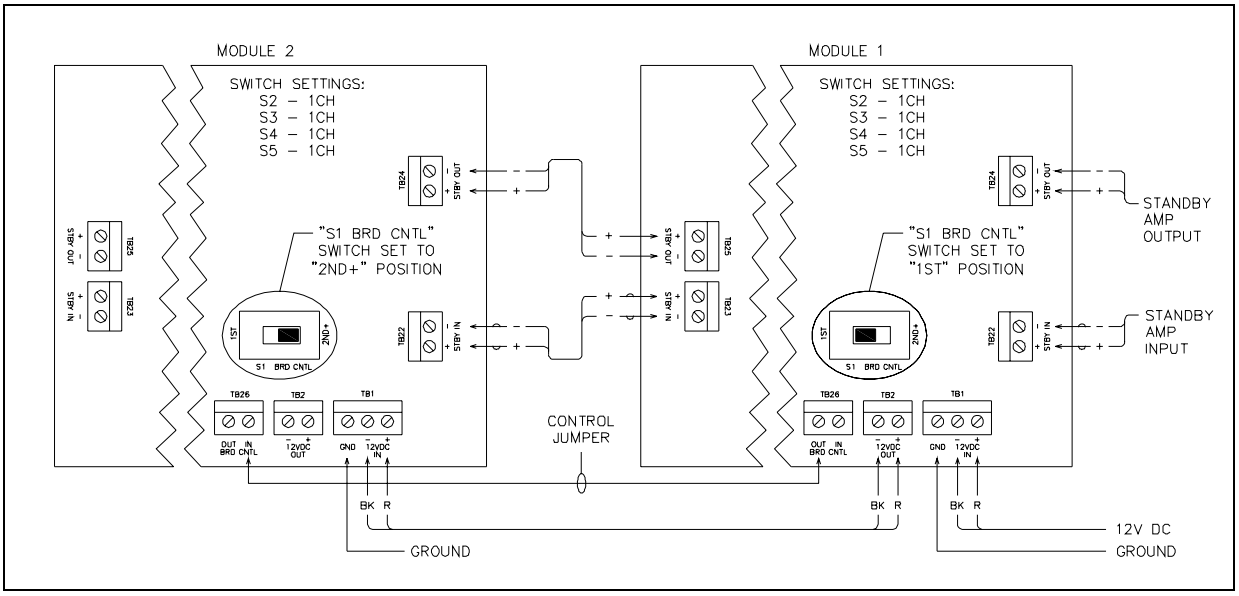

Figure 7. Cascaded modules operated in single-channel mode

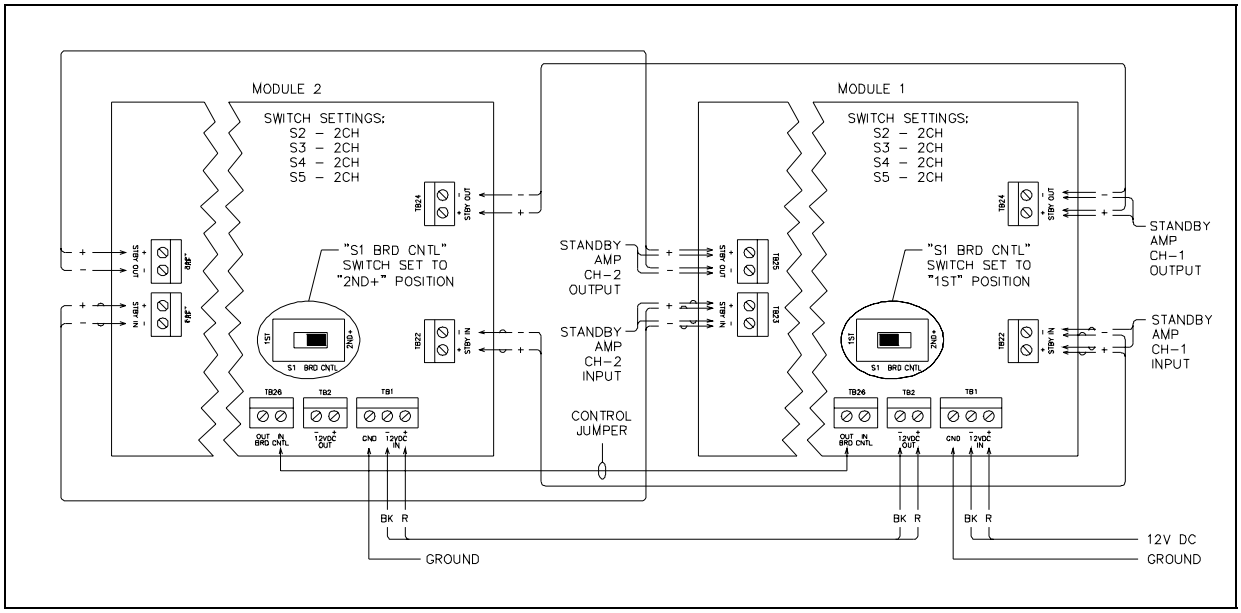

Figure 8. Cascaded modules operated in dual-channel mode

Operation

The Model 12599-002 Hot Standby Amplifier Module operates from a 12 V dc power source. With power applied, all switches properly set and all inputs properly connected, no circuits should be active until an amplifier fault occurs. The block diagrams below depict typical circuit functions when the module is operated in either single or dual-channel modes.

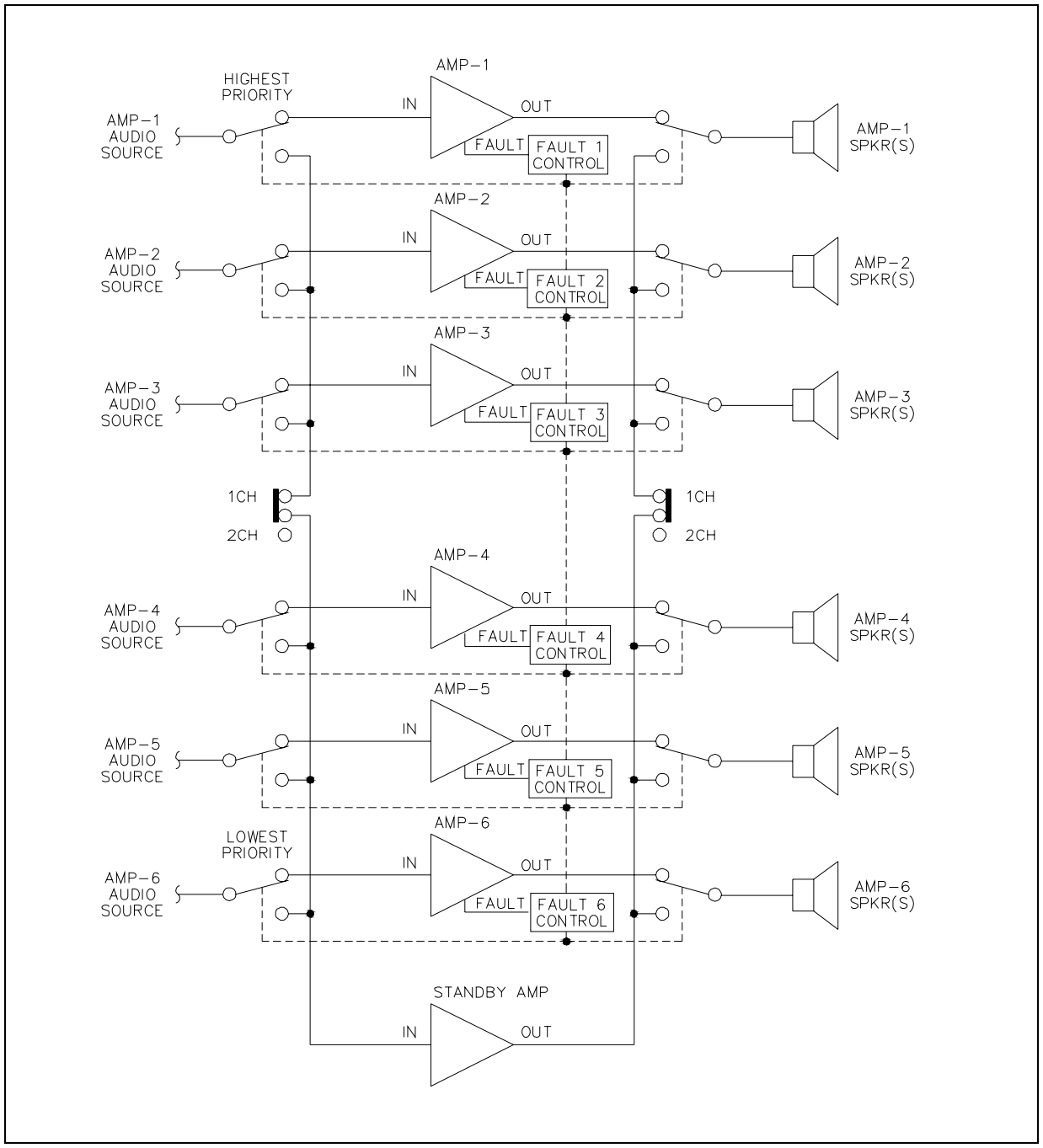

Figure 9. Block Diagram – Single-channel operation

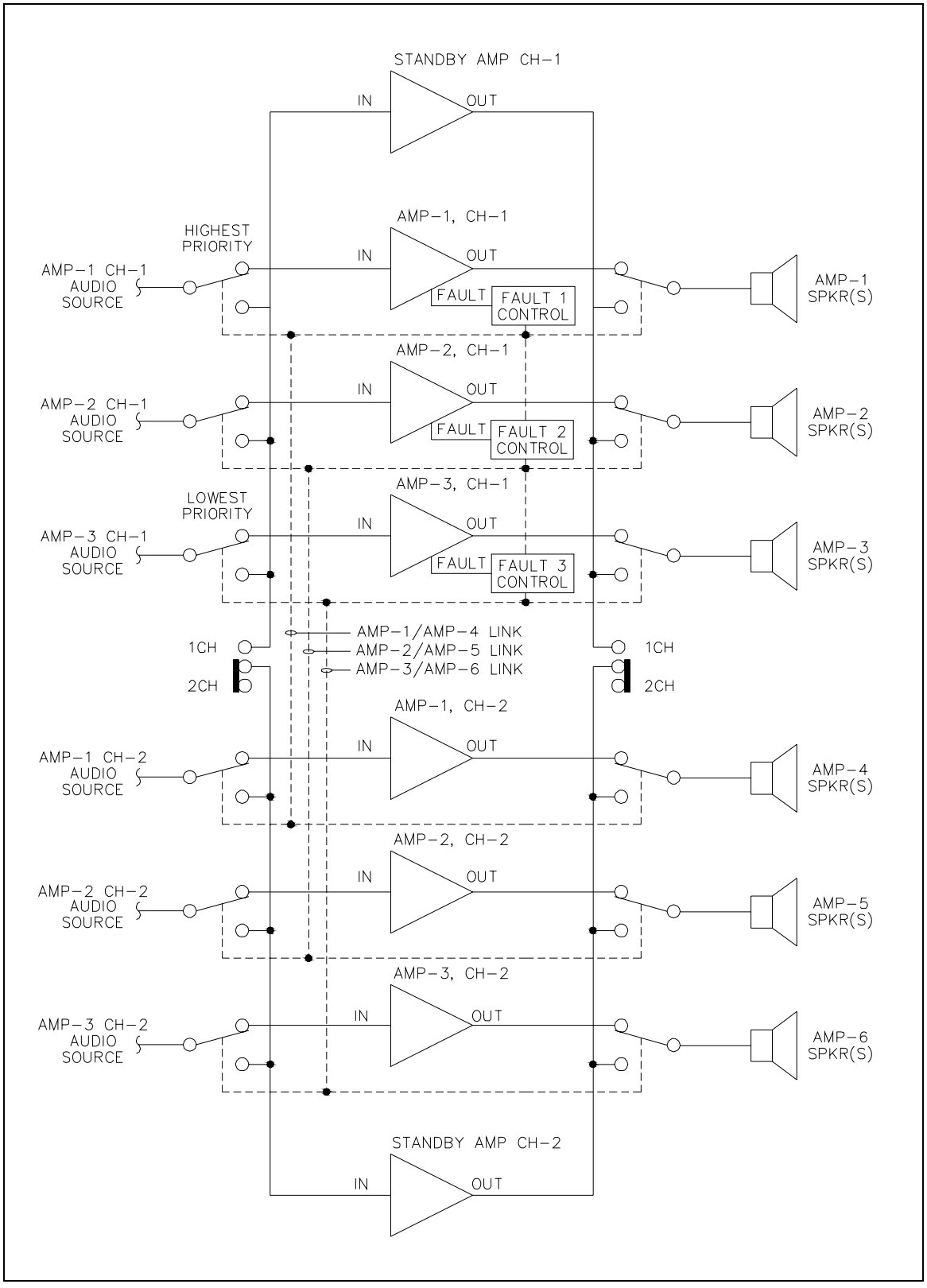

Figure 10. Block Diagram - Dual-channel operation

Theory of Operation

The Amp-1 through Amp-6 fault inputs at TB3 on the Model 12599-002 Hot Standby Amplifier Module provide a single connection point for each amplifier fault output. The module's fault inputs can be configured to accept a range of amplifier fault output types, and each is described in the following text:

Wet Mode – Active Fault Output

When the input jumper clip pair is set to the wet position, the **+** (plus) terminal accepts a positive dc voltage and the **-** (minus) terminal accepts negative (dc common) voltage from the amplifier's internal fault circuit. When the connected power amplifier is healthy, the amplifier fault output signal to these terminals must be active.

If the amplifier's internal fault circuits detect a problem (e.g., a shorted or overloaded output, excessive temperature, etc.), or ac power is removed from the amplifier, the amplifier's fault output is no longer producing an active output voltage. The associated input circuit detects this change, and activates the associated relay group to switch the standby amplifier in place of the faulty amplifier. The circuit will remain active until the amplifier fault condition remedied.

Dry Mode – N.C. Fault Contact

When the input jumper clip pair is set to the dry position, the **+** (plus) and **-** (minus) terminals accept a normally closed, dry contact from the amplifier's internal fault circuit. If the amplifier's internal fault circuits detect a problem (e.g., a shorted or overloaded output, excessive temperature, etc.), or ac power is removed from the amplifier, the amplifier's fault output contact opens. The associated input circuit detects this change, and activates the associated relay group to switch the standby amplifier in place of the faulty amplifier. The circuit will remain active until the amplifier fault condition remedied.

Dry Mode – Active Open Collector Fault Output

When the input jumper clip pair is set to the DRY position, the **+** (plus) terminal connects to the "input" (or emitter) side of the amplifier's fault terminals, and the **-** (minus) terminal connects to the output (or Collector) side of the amplifier's fault terminals. When the connected power amplifier is healthy, the amplifier fault output must be actively low (sinking to dc common) to the **–** (minus) terminal, of this module's input.

If the amplifier's internal fault circuits detect a problem (e.g., a shorted or overloaded output, excessive temperature, etc.), or ac power is removed from the amplifier, the amplifier's fault output floats high. The associated input circuit detects this change, and activates the associated relay group to switch the standby amplifier in place of the faulty amplifier. The circuit will remain active until the amplifier fault condition remedied.

Priority Switching

The 12599-002 Hot Standby Amplifier Module prioritizes the switching of the standby amplifier for two reasons, which are:

1. To avoid excessive loading of the standby amplifier in the event of multiple amplifier failures, and
2. To ensure that critical facility areas receive alarm and voice audio broadcasts during emergencies.

The order of priority switching is from highest to lowest; Amp-1 has highest priority and Amp-6 has lowest priority. This prioritization scheme applies if the board is operated in either 1-channel or 2-channel modes. If cascaded with other modules, module 1 has a higher priority than module 2, and module 2 has higher priority than module 3, etc.

While it is difficult to determine which area of a facility is the most critical (as in item 2 above), an example would be an offshore oil platform system with multiple amplifiers. In this case, the living quarters (LQ) are usually considered such an area. In this type of system/cabinet design, the LQ amplifier should be connected to the Amp-1 terminals to ensure that personnel (sleeping in the LQ) will be alerted during emergencies.

Dry Contact Outputs

The Model 12599-002 Hot Standby Amplifier Module provides six, Form "C" dry contact outputs (one per amplifier circuit) that can be used for triggering either a remote status indicator, or an input at a supervised system device for visual text display. Each output contact operates in conjunction with its respective fault detection circuit so that the status of all connected amplifiers can be monitored at all times, regardless of their priority assignment.

Cascading Modules

The Model 12599-002 Hot Standby Amplifier Module can be operated with a series of other modules in a cascade. This feature is useful in cabinet/system applications when the following criteria must be met:

- A higher ratio of primary (active) amplifiers to a standby amplifier is needed, or
- In particular, when dual-channel amplifiers are employed.

When using the cascade feature, the IN/OUT control at TB26 must be used between modules. For the cascade to function properly, connect the OUT terminal of the first module to the IN terminal at the second module. Do not make any connections to the IN terminal at the first module. For subsequent modules in the cascade, this in/out wiring arrangement must continue across all modules.

In addition to in/out control across modules, the mode switches S1 through S5 must also be set to the proper operating position. See the Mode Switches (S1–S5) section below for information on the function and settings of these switches.

Mode Switches (S1–S5)

The Model 12599-002 Hot Standby Amplifier Module is equipped with five mode control switches. The function of each is switch is described below:

S1 Brd Cntl (Board control) – Since relay switching on this module is prioritized, this switch determines if the module is operated as standalone, the first of multiple modules, or is operating behind another module. If the module is used standalone, or is the first of multiple modules, the switch must be set to the 1ST position. However, if the module operates behind another module in a cascaded control path, the switch must be set to the 2ND+ position.

S2/S3 Sw'g Cntl (Switching control) – Since this module is designed to switch either six single-channel amplifiers or three dual-channel amplifiers, these two switches must be set to the appropriate position for the type of amplifier being switched, e.g., 1CH (1-channel) or 2CH (2-channel) respectively. (See the note below.)

When the switches are set to the 1CH position, all six relay circuit groups operate independently via control from their respective fault input circuits. When the switches are set to the 2CH position, the Amp-1/Amp-4 circuits, Amp-2/Amp-5 circuits, and Amp-3/Amp-6 circuits are linked for switching both channels of the amplifier simultaneously.

S4 Input Bus – This switch allows the input signal bus to function across all six relay circuits for six single-channel amplifiers, or be split for three dual-channel amplifiers. Thus, if switches S2 and S3 are set to either 1CH or 2CH, this switch must also be set to the same operating mode. See the note below.

S5 Output Bus – This switch allows the output signal bus to function across all six relay circuits for six single-channel amplifiers, or be split for three dual-channel amplifiers. Thus, if switches S2, S3 and S4 are set to either 1CH or 2CH, this switch must also be set to the same operating mode. See the note below.

⚠ **NOTE** ⚠

Switches S2, S3, S4 and S5 must be set to the same operating position. Do NOT operate any of the switches in opposite positions as this will result in improper operation of this module.

Maintenance

The Model 12599-002 Hot Standby Amplifier Module does not contain any user serviceable parts. Do **not** attempt to make any repairs to the module.

If the module requires service, contact your Regional Service Center for a return authorization number (RA#). The module should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the module is under warranty, repairs or a replacement will be made in accordance with GAI-Tronics' warranty policy. 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.

Troubleshooting

Problem	Solution
Module is damaged.	Do not attempt to repair the module. Contact GAI-Tronics service for repair or replacement of the module in accordance with the information provided on page 15.
Module does not switch to backup amplifier when any of the primary amplifiers fail or are powered-down.	Check polarity of wiring between fault inputs at the module, and the fault outputs at each amplifier. If using an amplifier equipped with a RJ-11 fault output connector, a reversal of the cable leads should correct the problem. Also, be sure the input jumper clips (J1–J12) are set to the correct position for either wet or dry mode, based on the fault output type produced by amplifier.
Unused circuits are energized.	Set the designated input jumper clips to the dry position (as defined on page 2) and install a jumper across any/all unused fault inputs.
Relay switching activity can be heard on the module and output contacts are functioning. But the associated LED does not illuminate and the primary audio lines are not switching to the standby (backup) amplifier.	If the module is used standalone or is the first in a cascade, set the BRD CNTL switch S1 to the 1ST position, as described in the Theory of Operation section.
Amplifier 4 switches when amplifier 1 fails. Likewise, amplifier 5 switches when amplifier 2 fails, and amplifier 6 switches when amplifier 3 fails.	Be sure switches S2 through S5 are set to the 1CH position when using single-channel (monaural) amplifiers, as described in the Theory of Operation section.
Both channels of the amplifiers are not switching simultaneously when faulted.	Be sure switches S2 through S5 are set to the 2CH position when using dual-channel (stereo) amplifiers, as described as described in the Theory of Operation section.
Amplifiers on the second (cascaded) module operate independently.	In a cascade arrangement, switch S1 must be set to the 1ST position at the first module, and the 2ND+ position at the second module, and all subsequent modules, as described in the Theory of Operation section. Also, be sure wiring at the IN/OUT CNTL terminals at TB26 conforms to Figure 5 or Figure 6 respectively.
After performing all wiring checks, trouble-shooting, etc. as described in this section, the module still does not function properly.	Contact GAI-Tronics service for repair or replacement of the module in accordance with the information provided on page 15.

Specifications

Electrical

Power requirements ..... 9.5 to 14 V dc (12 V dc nominal)
Current draw ..... 300 mA maximum @ 12 V dc
Number of amplifier inputs ..... 6-single channel or 3-dual channel
Fault input terminal voltage (Wet mode) ..... 12 V dc (nominal)
Fault input voltage range (Wet mode) ..... 10–15 V dc (active); <8 V dc (inactive)
Fault input circuit current (Wet mode) ..... 1.2 mA
Number of fault output contacts ..... 6 (single-channel mode) or 3 (dual-channel mode)
Fault output contact type ..... Single Form "C"
Fault output contact rating ..... 2 A maximum @ 30 V dc

Amplifier Audio Switching

Amplifier type ..... Single or dual-channel
Audio input levels (typical per circuit) ..... 600 ohm @ 0.775 Vrms (0 dBm) to 1.5 Vrms
Amplifier output power (maximum per circuit) ..... 700 watts (100% duty cycle)
Speaker load switching ..... Standard 4, 8 or 16-ohms, or 25 V, 70 V or 100 V constant voltage lines

Terminations

Type ..... Modular (plug-in) terminal blocks
Minimum conductor size ..... No. 28 AWG (0.5 mm^2)
Maximum conductor size ..... No. 12 AWG (3.0 mm^2)

Mechanical

Module dimensions ..... 12.00 L × 4.00 W × 1.25 H inches (304.8 × 101.6 × 31.7 mm)
Module weight ..... 1.1 lbs. (0.5 kg)

Environmental

Temperature range (operating/storage) ..... 32° F to 140° F (0° C to 60° C)
Humidity ..... 85% relative non-condensing humidity

Warranty

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

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.