GAI-TRONICS®
A HUBBELL COMPANY

751-901 SmartSeries®
Speaker Amplifier

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Confidentiality Notice

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General Information

Product Overview

This manual discusses installing, operating, and maintaining the SmartSeries® 751-901 Speaker Amplifier. The SmartSeries® 751-901 Speaker Amplifier broadcasts page announcements over the station's speaker. It also serves as a control interface to optional devices such as the party line End-of-Line (EOL) Module or the SmartSeries® station Remote Terminal Unit (RTU) when installed into a SmartSeries® RTU enclosure.

System Requirements and Limitations

The SmartSeries® 751-901 Speaker Amplifier is designed to provide an intelligent speaker amplifier for use on the GAI-Tronics multi-party system cable (system cable) in either a standard Page/Party® system or an ADVANCE system.

Features and Functions

- Measure the ambient noise and adjust the speaker output level accordingly.

- Supervise the local speaker.

- Support an optional SmartSeries® station RTU, which monitors and supervises input and output devices.

- Support an optional party line EOL Module, which supervises party line 1.

- Transfer data messages on the system cable.

Description of Major Components

These assemblies include external components accessible to the user as well as internal components or subassemblies.

External Components

To the right of the product label is the nameplate that conceals the User Level Adjustment control.
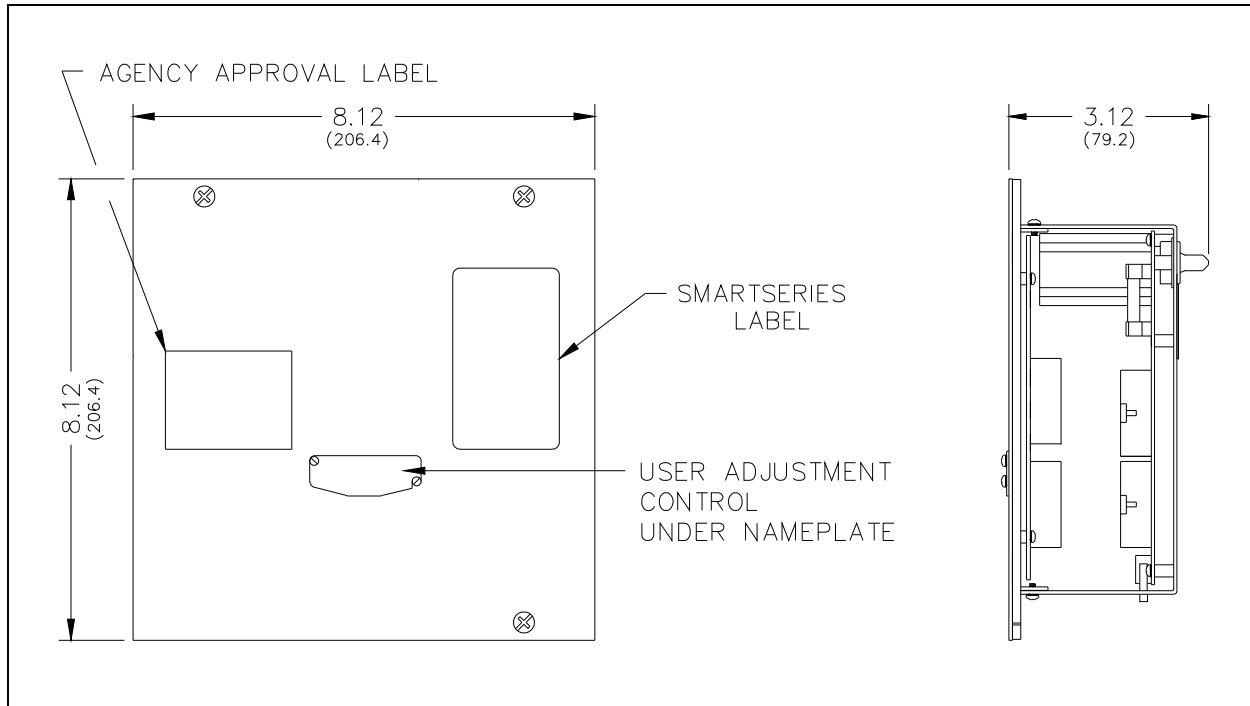

Figure 1. Front View

Internal Components

As shown from the side in Figure 2, the assembly contains the following components or subassemblies:

- Chassis

- Front panel affixed to the front of the chassis

- FSK/μP PCBA (printed circuit board assembly) (Ref. 10) affixed to the rear of the front panel

- Speaker Amp/Power Supply PCBA (Ref. 9) affixed to the rear of the chassis, with a plug (P1) at the top, pointing to the rear

LEFT SIDE VIEW   RIGHT SIDE VIEW

1. FSK TRANSMIT LEVEL (FSK XMIT)*
2. LOW STATION ADDRESS (ADDR LOW)*
3. HIGH STATION ADDRESS (ADDR HI)*
4. FUSE F1
5. FUSE F3
6. FUSE F2
7. RESET (J2)*
8. ISP PROGRAMMING (J3)*
9. SPEAKER AMP/POWER SUPPLY PCBA
10. FSK/uP/PCBA

*SHOWN FOR REFERENCE ONLY.
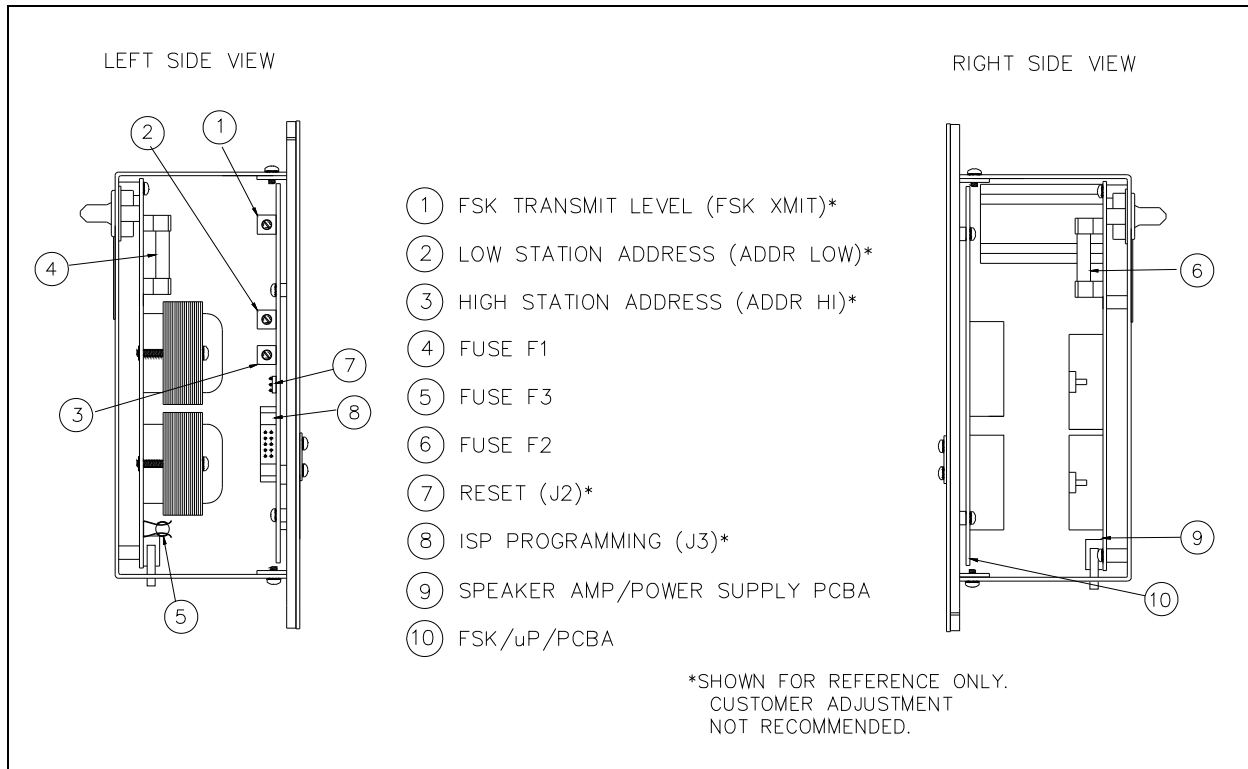CUSTOMER ADJUSTMENT
NOT RECOMMENDED.

Figure 2. Side View

Block Diagram

The P1 connector on the rear of the Speaker Amp/Power Supply PCBA plugs into the socket in an enclosure connected to the system cable, accessing the Page/Party® lines and ac power. Refer to Figure 3. The Speaker Amp/Power Supply PCBA contains the low voltage power supplies and the speaker amplifier circuitry.

Connector J1A and J1B on the Speaker Amp/Power Supply connects regulated +5 V dc, +/−15 V dc, and V_{RLY} voltages along with control, monitoring, and line signals to the J1A and J1B on the FSK/μP PCBA. Connector J2 of the Speaker Amp/Power Supply PCBA connects to optional external devices.
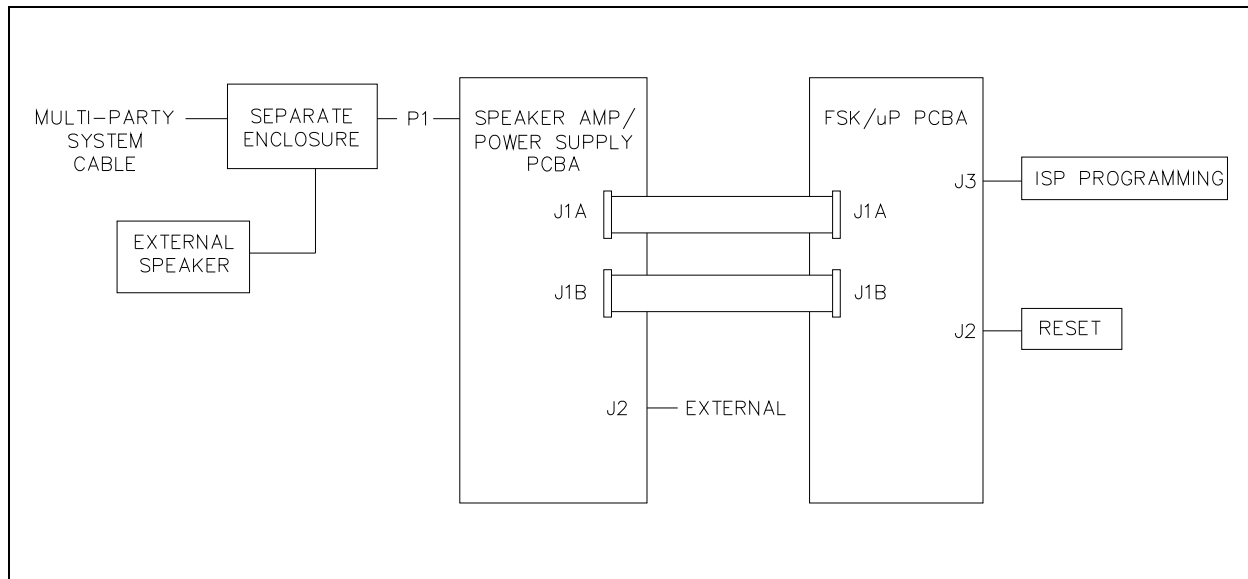

Figure 3. Block Diagram

Interfaces

The assembly interfaces to the system cable, an external loud speaker, and auxiliary devices via P1, a 16-pin connector. All connections to the system cable are made by qualified installation technicians during the system installation. Direct questions about these connections to the GAI-Tronics Field Service Department at 800-492-1212 inside the USA or 610-777-1374 outside the USA. Other connections on the Speaker Amp/Power Supply PCBA provide quick connect/disconnect of subassemblies.

Connector J2 on the bottom of the Speaker Amp/Power Supply PCBA connects to optional devices such as the SmartSeries® RTU installed in specially designed enclosures.

Installation

⚠ **CAUTION** ⚠ **Do not install this equipment in hazardous areas other than those indicated on the approval listing in the "Specifications" section of this manual. Such installation may cause a safety hazard and consequent injury or property damage.**

The SmartSeries® 751-901 Speaker Amplifier plugs directly into any standard GAI-Tronics 700 Series enclosure. It also plugs into standard SmartSeries® enclosures such as a SmartSeries® station RTU enclosure or an enclosure that houses a party line EOL Module. Use extra care not to damage the protruding latch wings of connector J2 located on the bottom edge of the amplifier during installation.

When installing the assembly in one of these enclosures, you must also connect the 10-conductor keyed ribbon cable to J2 on the bottom of the Speaker Amp/Power Supply PCBA. Be sure that the red line on the edge of the cable lines up with J2-pin 1.

Ensure that the connectors mate securely and then tighten the four screws in the corners of the front panel.

Operation

The 751-901 SmartSeries® Speaker Amplifier amplifies incoming pages, provides speaker supervision, and supports other optional features listed below.

Optional Features

The following features are available as options to the standard configuration of a station used in an ADVANCE system and installed in a standard SmartSeries® or a custom enclosure. These features can be configured. Contact the GAI-Tronics Field Service Department at 800-492-1212 inside the USA or 610-777-1374 outside the USA for further information about these features.

- The Selected Page Destination feature allows the manual selection of one of four page destinations.

- The Supervised Input feature allows the monitoring and supervision of one or two initiating device circuits (IDCs), initiating an alarm when the supervised device is activated.

- The Power Relay Module provides a relay contact output, typically to switch power to a visual signaling device, for directed or relay group operation. Supervision of the controlled device's cable can also be enabled.

Maintenance

Regular inspection and a good preventive maintenance program will increase the reliability of your GAI-Tronics station. The GAI-Tronics Field Service Department can formulate a service contract suited to your facility's specific need for preventive maintenance.

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 the return authorization number and a purchase order number. If the equipment is under warranty, repairs will be made without charge. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts. Call 800-492-1212 for help in identifying the Regional Service Center closest to you.

⚠**WARNING** ⚠ **Before performing any of the following preventive maintenance steps, remove all power from the station.**

1. Inspect and replace frayed or cracked wiring.

2. Secure/replace loose wires and spade terminals.

3. Remove corrosion from terminals.

There are three replaceable fuses (F1, F2, and F3) mounted on the Speaker Amp/Power Supply PCBA. Refer to Figure 2.

- Fuse F1 protects the low voltage power supply circuits. Replace with GAI-Tronics Part No. 51801-027.

- Fuse F2 protects the current to the speaker amplifier. Replace with GAI-Tronics Part No. 51801-003.

- Fuse F3 limits the amount of current to any external device connected to J2. Replace with GAI-Tronics Part No. 51801-024.

Adjustments

The User Adjustment Control is located beneath the GAI-Tronics nameplate on the front panel. Refer to Figure 1. It is used to make all user adjustments normally required for installation. Loosen the two screws on the GAI-Tronics nameplate and rotate it counterclockwise to access the adjustment hole. Make adjustments by inserting a 1/8-inch flat blade screwdriver through the access hole and into the potentiometer located directly behind the hole.

The User Adjustment Control potentiometer can be used to make three separate adjustments:

- Minimum speaker amplifier output level setting

- Offset amplifier level (difference between the ambient noise and the amplifier output levels)

- VLC (volume level control) adjustment (sets a preset speaker level to override the normal volume control setting).

Minimum Level Adjustment

To set the minimum amplifier output level, insert the 1/8-inch flat blade screwdriver into the User Adjustment Control and set it <u>fully counterclockwise</u>. Listen for a single beep from the speaker indicating the speaker amplifier is in the Minimum Level Adjustment mode. A continuous tone should be heard after the beep tone. (See note below).

This test tone is used as a reference to adjust the speaker amplifier output level to the desired volume. Turn the adjustment pot clockwise for the desired output. The test tone automatically shuts off 5 seconds after the last adjustment. The factory default setting for minimum level is 4.0 watts nominal.

NOTE: If the page line is in use immediately after the beep tone, the page signal should be used to make the minimum level adjustment. If the page line is inactive following the beep tone, a continuous tone is activated to make the minimum level adjustment. After the tone is activated, all page line activity is ignored until completion of the adjustment.

Offset Level Adjustment

The Offset Level allows the output of the SmartVolume™ speaker amplifier to maintain a set difference or "offset" between the ambient noise level and the speaker output level. Turn the User Adjustment Control <u>fully clockwise</u> and listen for the two beep tones indicating that the station is in the Offset Adjustment mode. A continuous tone should be heard from the station speaker. Turn the adjustment pot counterclockwise to the desired output level.

NOTE: If the page line is in use immediately after the two beep tones are heard, the page signal should be used to make the offset level adjustment. If the page line is inactive immediately following the beep tones, a continuous tone is activated to make the minimum level adjustment. After the tone is activated, all page line activity is ignored until completion of the adjustment

VLC Level Adjustment

When activated, the VLC overrides the normal volume control setting allowing the amplifier level to change to a preset level during an emergency page. The factory default setting for the VLC Level is 10% of maximum power (nominally 1.2 watts).

NOTE: The system must be equipped with a SmartSeries® MCU (Master Control Unit) to activate the VLC function.

To adjust the VLC Level:

1. Force the station into the VLC mode by having someone execute a page from a station programmed by the MCU to activate the VLC function.

2. During the page, turn the User Adjustment Control <u>fully counterclockwise</u>, and listen for two beep tones through the page speaker indicating the VLC Adjustment mode has been activated.

3. After the two beep tones, turn the User Adjustment Control to the desired speaker level using the live paging signal to adjust the level. The station automatically exits the VLC Adjustment mode and reverts to normal operation 5 seconds after the last pot adjustment.

Internal Adjustments

There are no internal adjustments that are recommended to be made by the customer.

Troubleshooting

The following table lists some hints to aid technicians in troubleshooting.

Problem	Possible Solution
Any problem with station performance	Remove the assembly from the enclosure and examine it carefully for obvious faults such as unconnected plugs, loose connections where the wires connect to the FSK/µP PCBA, and so on. Determine whether the fault is in the assembly, or in the system, by plugging in a known good spare assembly (set to the same address as the assembly removed). If the fault is in the assembly, remove it for repair.
	NOTE: When replacing the assembly, perform the following steps:
	1. Set the address on the new assembly to 0, 3.
	2. Plug the assembly into the enclosure.
	3. After about 10 seconds, remove the assembly. The station is now set up to request a download of configuration variables from the MCU.
	4. Set the unit to the correct address. Set the address to 0, 4 for standard *dumb* station operation or consult the ADVANCE system manual for address assignment information.
	5. Plug the assembly back into the enclosure. The station initiates a configuration download request (ADVANCE systems only). The time required to complete the download depends upon system configuration and system activity, but several seconds is typical.
Speaker volume needs adjustment	Use the USER ADJ control to adjust the Minimum Level, Offset Level, or VLC Level (as appropriate). Refer to the "Adjustments" section on page 6.

How to Diagnose Assembly Faults

When the assembly is in an ADVANCE system that includes a vacuum fluorescent display (VFD), faults may be automatically detected, transmitted to the MCU in data messages, and displayed or printed. Fault messages and possible solutions for their causes are described in the table below.

Fault Message	Cause and Effect	Possible Solution
Watch-Dog timer Processor has Reset *x*d times (Where *x* is the decimal number of times the watchdog timer has reset the processor.)	**Cause**—The watchdog timer has forced the processor to reset. This occurs when the reset pins (J2) on the FSK/µP PCBA are temporarily shorted or when the watchdog timer does not receive regular status pulses from U4 on the FSK/µP PCBA. **Effect**—The processor maintains a count of the number of resets. If the station is powered down, the count restarts at zero. The station still amplifies incoming pages. For the fourth and subsequent resets, the count is zero.	• Verify that the reset pins 2 and 3 (J2) on the FSK/µP PCBA are not shorted. • Replace the FSK/µP PCBA.
Supervised Audio Path Page Amp	**Cause**—The station failed its internal speaker amplifier health check. **Effect**—The station disables the speaker amplifier health-check function after the first failure.	• Replace the Speaker Amp/Power Supply PCBA. • Replace FSK/µP PCBA
Supervised Audio Path Speaker Voice Coil	**Cause**—The station is detecting no ambient noise at the speaker or is detecting an ambient noise lower than the configured failure threshold. This may occur if there is a fault in the speaker wire or a fault at the voice coil. This also may occur if the ambient noise at the speaker is too low, as is the case in a quiet room. **Effect**—The station continues measuring speaker ambient noise. When acceptable noise levels are subsequently measured, a restore message is sent to the MCU.	• Verify that the speaker wire is connected and intact. • Verify that the voice coil is connected and intact. • Replace the Speaker Amp/Power Supply PCBA. • Replace FSK/µP PCBA.
Polled device	**Cause**—This message is output by the MCU when it loses communication with the station. This may occur if there is a fault in the page line, if the station is powered-down, or if there is some fatal malfunction within the station. **Effect**—The MCU continues to attempt communication with the station. When communication is resumed, a restore message is sent to the MCU.	• Verify that the page line is connected and intact. • Verify that the station is installed correctly. • Replace the FSK/µP PCBA.

Fault Message	Cause and Effect	Possible Solution
Polled End-of-line device	**Cause**—This message is the same as the "Polled device" fault, except that the affected station has been defined as an end-of-line station in the MCU configuration. **Effect**—When this fault occurs, the red EOL FLT LED on the PPI bezel lights. When communication is resumed, the LED extinguishes and a restore message is sent to the MCU.	• Verify that the page line is connected and intact. • Verify that the station is installed correctly. • Replace the station assembly.

Specifications

Electrical

Supply voltage .... 90–140 V ac (120 V ac nominal), 50/60 Hz

Power consumed @ nominal ac .... Zero/maximum signal (12 watts): 15 VA, 9 watts/59 VA, 32 watts

Speaker Amplifier

Output .... 12 watts minimum, with nominal supply voltage

Frequency response .... 350–6,500 Hz, +0/−3 dB, ref. to 1 kHz

Distortion .... 1% maximum THD @ 1 kHz, 12 watts

SmartVolume™

Monitor range (low gain) .... 62–100 dB SPL

Offset (above ambient) user level adjustment .... 0–48 dB

Minimum user level adjustment .... Off; 85–125 dB SPL

Mechanical

Dimensions .... 8.12 H × 8.12 W × 3.12 D inches (206.0 × 206.0 × 78.7 mm) overall

Package weight .... 6.1 lbs. (2.8 kg)

Net weight .... 5.1 lbs. (2.3 kg)

Environmental

Temperature range .... −22° F to +158° F (−30° C to +70° C) operating and storage

Humidity .... 95%, non-condensing

Approvals

NRTL Listed USA and Canada .... Class I, Div. 2, Groups A, B, C, D
when used with a listed GAI-Tronics 702 or 703 Series enclosure

Class I, Div. 2, Groups A, B, C, D;
Class II, Div. 2, Groups F, G; Class III, Div. 2
when used with a listed GAI-Tronics 732, 733, 7325, 7335, or 758 Series enclosure

Temperature code T4

Replacement Parts

Part No.	Description
12508-002	Amplifier Enclosure Mounting Hardware
12523-001	GAI-Tronics Nameplate Kit
69383-002	FSK/μP PCBA
69382-001	Speaker Amp/Power Supply PCBA

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.