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GAI-TRONICS®
A HUBBELL COMPANY

Model 723-901
SmartSeries® Remote Subset Amplifier

Confidentiality Notice

General Information

Product Overview

The Model 723-901 SmartSeries® Remote Subset Amplifier is an intelligent handset amplifier, speaker amplifier, and FSK modem intended for use in GAI-Tronics Page/Party® and S SmartSeries® systems. The amplifier is an integral part of GAI-Tronics desktop, desk-edge, and flush-mount stations. It has been designed to be remotely mounted with the enclosure, allowing the associated subsets to be mounted on a desktop, on the edge of a desk, or flush mounted. The amplifier is not designed for outdoor use and must be mounted at an indoor location.

⚠**WARNING**⚠ **Explosion Hazard: Substitution of components may impair suitability for Class I, Div. 2 usage.**

System Requirements and Limitations

For proper operation, the Model 723-901 SmartSeries® Remote Subset Amplifier must be installed in the Model 7245-004 Amplifier Enclosure with auxiliary inputs, and with a subset from the following list for proper operation:

Single Party Subsets:	Multi-Party Subsets:
Model 726-101 Desktop Subset	Model 7265-101 Desktop Subset (five-party)
Model 711-102 Desk-Edge Subset	Model 7115-102 Desk-Edge Subset (five-party)
Model 716-102 Flush-Mount Subset	Model 7165-102 Flush-Mount Subset (five-party)

The SmartVolume™ feature is **not** supported for Model 7265-101 or Model 726-101 Subsets. Also, the SmartVolume™ feature is **not** available for speakers equipped with L-Pads or for multiple speaker applications. The Model 723-901 Remote Amplifier is designed **solely** for use with the magnetic hookswitch subsets listed above. Subsets containing an RF hookswitch are **not** supported.

Features and Functions

The Model 723-901 Remote Subset Amplifier provides the following features when installed in a SmartSeries® ADVANCE system:

- Enables one-way paging from the remote subset handset. Priority Page feature enables important messages to override operational communication
- Enables two-way party line communication from the remote subset handset
- Monitors and controls off-hook and page status of the remote subset handset. Limits off-hook and page durations to prevent open microphone and nuisance page problems
- Supervises the externally connected speaker (desk-edge and flush-mount stations only)
- SmartVolume™ feature measures the ambient noise and automatically adjusts the speaker output level (desk-edge and flush-mount stations only) when used with externally connected speaker
- Contains page amplification to broadcast announcements over the station's speaker
- Monitors and reports problems with handset amplifier, the speaker amplifier, and speaker voice coil to the MCU
- Monitors and reports the status of the auxiliary inputs

Optional Features

The following features are available as options to the standard configuration of a station used in a SmartSeries® ADVANCE system and installed in a special enclosure. 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 up to 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.
- The Station Emergency Party Line feature supports annunciation for two party lines.

Description of Major Components

The Model 723-901 Remote Subset Amplifier's major external and internal components are described below.

External Components

User Level Adjustment: This assembly contains a User Level Adjustment that is accessible beneath the nameplate on the front panel. See Figure 1. The User Level Adjustment controls the Minimum Speaker Output Level, the Speaker Offset Level (dB above ambient), and the Volume Level Control (VLC). Refer to the Maintenance section for the adjustment procedures.

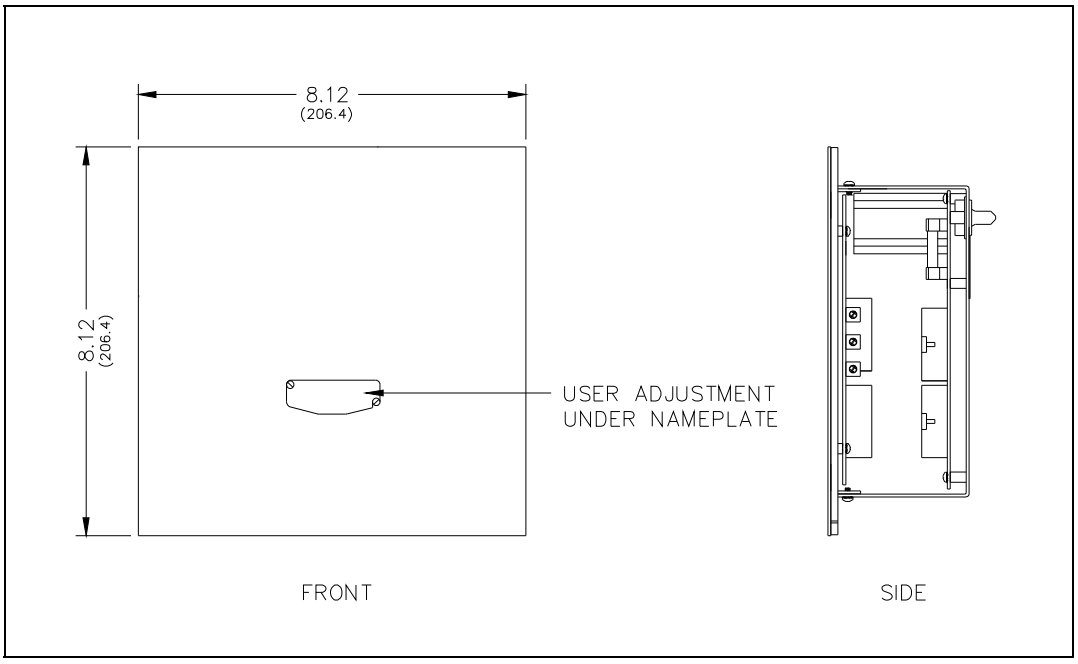

Figure 1. Remote Subset Amplifier - Front Outline and Side View

Internal Components

As shown from the side in Figure 2, the Model 723-901 Remote Subset Amplifier assembly contains the following components or subassemblies:

- Chassis
- Front panel affixed to the front of the chassis
- Handset Amp/FSK/µP PCBA (printed circuit board assembly) (Ref. 14) affixed to the rear of the front panel
- Remote Speaker Amp/Power Supply PCBA (Ref. 13) affixed to the rear of the chassis, with a plug (P1) at the top, pointing to the rear

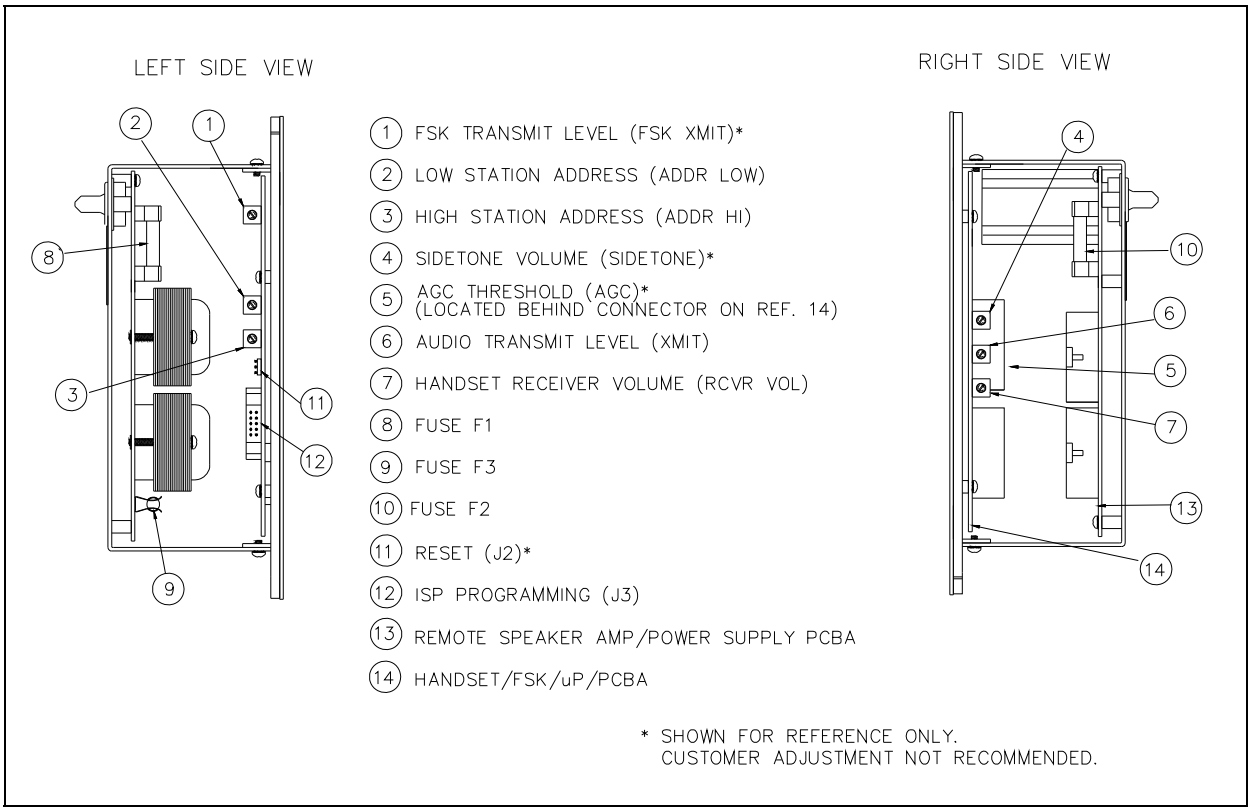

Figure 2. Remote Subset Amplifier Outline Detail

Block Diagram

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

Connector J1A and J1B on the Remote 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 Handset Amp/FSK/µP PCBA. Connector J2 of the Remote Speaker Amp/Power Supply PCBA connects to optional external devices.

The Handset Amp/FSK/µP PCBA has connections to the handset and the hookswitch via spade terminal connectors E1 to E7, and it connects via J3 on the Remote Speaker Amp/Power Supply PCBA.

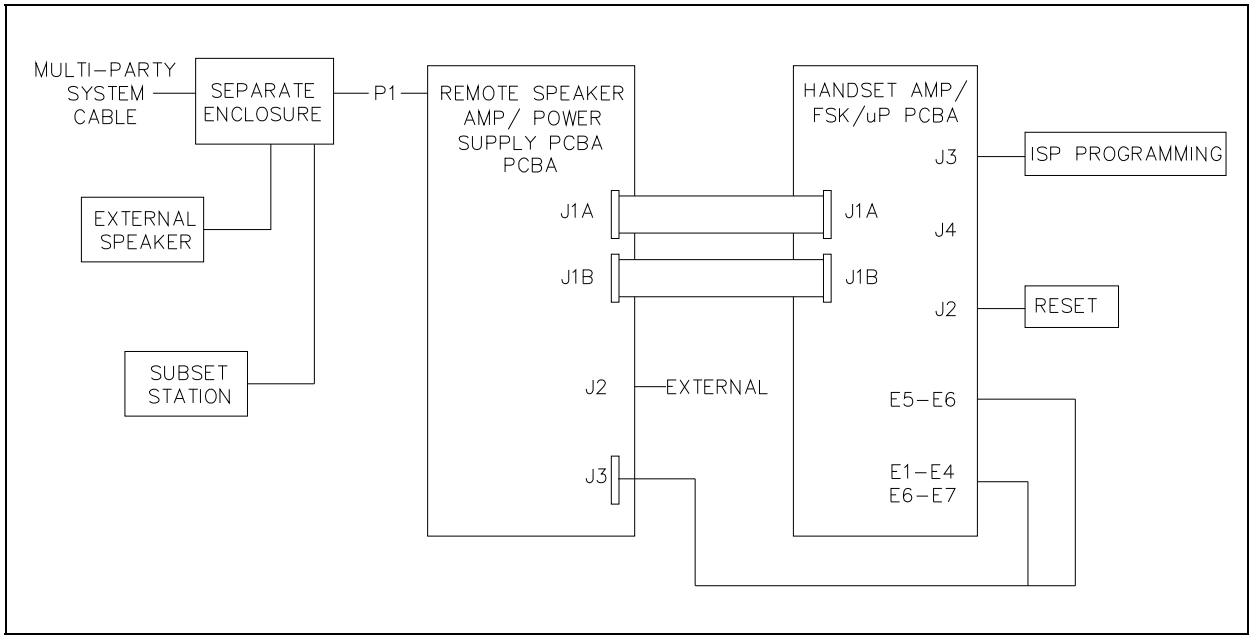

Figure 3. Remote Subset Amplifier Block Diagram

Installation

⚠WARNING⚠ Explosion Hazard - Substitution of components may impair suitability for Class 1, Div. 2 usage.

Do not remove equipment while circuit is energized.

⚠CAUTION⚠

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

The installation procedure for the Model 723-901 SmartSeries® Remote Subset Amplifier is as follows:

1. Plug the amplifier connector P1 (located on the rear of the amplifier) into the J1 connector of the Model 7245-004 Enclosure.

2. Tighten the four screws in the corners of the amplifier.

Operation

The Model 723-901 SmartSeries® Remote Subset Amplifier supports page, party, and auxiliary input (optional) operations of the remote subset. Refer to the appropriate remote subset manual for all operating details.

Maintenance

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 fully counterclockwise. 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 initial beep. (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, the page signal should be used to make the minimum level adjustment. If the page line is inactive following the beep, 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 fully clockwise and listen for the two beeps 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.

NOTES:

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

2. This adjustment should only be made while the ambient noise is at its maximum level.

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 fully counterclockwise, 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

Although they typically require no adjustments, the following volume levels can be set internally:

Sidetone Volume and Handset Receiver Volume

To make an adjustment it is necessary to remove the assembly from its enclosure and make a temporary connection between the assembly and the enclosure. Refer to Figure 2 for the reference numbers and locations of the adjustment controls. Turn a control clockwise to increase the volume or threshold; turn it counterclockwise to decrease the volume or threshold. Use a small flat-blade screwdriver with an insulated shaft to make adjustments.

To access the controls, perform the following steps:

1. Loosen the four screws that secure the front panel.

2. Remove the assembly from the enclosure. If the enclosure is equipped with an optional EOL Module or SmartSeries® station RTU, be careful to not disconnect the ribbon cable on J2 of the Speaker Amp/Power Supply PCBA.

3. Connect the assembly to the enclosure using a Model 10440-003 Maintenance Cable between P1 on the assembly and J1 on the enclosure.

4. Locate and adjust the control on the appropriate PCBA.

5. When you are finished with the adjustment:
   a) Disconnect the Model 10440-003 Maintenance Cable.
   b) Insert the assembly into the enclosure.
   c) Tighten the four screws.

Handset Receiver Volume

Use the control labeled RCVR VOL (Ref. 7, on the Handset/FSK/μP PCBA) to adjust to the desired level the handset receiver volume for voice signals from a party line.

Sidetone Volume

The control labeled SIDETONE (Ref. 4, on the Handset/FSK/μP PCBA) adjusts the handset/headset sidetone.

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 from the handset and hookswitch connect to the Handset/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 04 for conventional Page/Party® 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 "VLC Level Adjustment" section on page 8.
Incoming subset handset speech level needs adjustment	Use the RCVR VOL control to adjust the handset receiver volume. Refer to the Adjustments section of this document.
Acoustic feedback or speech distortion during page or party operation, or The user hears himself when speaking	• If the problem affects all stations, the line may not be terminated correctly, may have loose connections, or a short to ground. Line balance connections are critical. • If the problem affects only this assembly, the problem may be with its sidetone setting. Contact the GAI-Tronics Field Service Department.
Feedback during page only	• Check within the enclosure for a purple wire on terminal 7: this is the default setting for local speaker mute. If the wire is on terminal 8, then the speaker is unmuted and may be causing feedback. Connect the wire to terminal 7. • An adjacent speaker could be causing feedback. If an adjacent speaker is the source of the feedback, adjust the orientation of the speaker so that it is not aimed directly at the station. As a last resort, enable the mutual muting function of the station. This is done by interconnecting terminal 7 of the two stations with the spare orange wire in the system cable (if this wire is available).
Crosstalk	Likely to be external to the assembly and related to system cable faults.

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 Handset/FSK/µP PCBA are temporarily shorted or when the watchdog timer does not receive regular status pulses from U4 on the Handset/FSK/µP PCBA. It can also be caused by poor FSK communications and power fluctuations. **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 Handset/FSK/µP PCBA are not shorted. • Replace the Handset/FSK/µP PCBA.
Stuck Contact on Polled Device Paging Pressbar Depressed	**Cause**—The station has been in page mode longer than the configured page limit. **Effect**—Station page is cut off. When the pressbar is released, a restore message is sent to the MCU. The station then resumes normal operation.	• Verify that the associated subset's handset pressbar page switch is not stuck. • Replace the Handset/FSK/µP PCBA. • Replace the Remote Speaker Amp/Power Supply PCBA.
Stuck Contact on Polled Device Handset Off-hook	**Cause**—The station has been in the off-hook state longer than the configured time limit. **Effect**—Station handset/headset operation is cut off. When the station is returned to the on-hook state, a restore message is sent to the MCU. The station then resumes normal operation.	• Verify that the associated subset's handset is not off-hook. • Replace the associated subset or the Handset/FSK/µP PCBA. • Replace the Remote Speaker Amp/Power Supply PCBA.
Supervised Audio Path Handset	**Cause**—The station failed its internal health check of the Handset/FSK/µP PCBA. **Effect**—The station disables the handset amplifier health-check function after the first failure.	• Replace the Handset/FSK/µP PCBA. • Replace the Remote Speaker Amp/Power Supply PCBA.

Fault Message	Cause and Effect	Possible Solution
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 Remote Speaker Amp/Power Supply 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 Remote Speaker Amp/Power Supply PCBA. • Replace Handset/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 Handset/FSK/µP PCBA.
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
Output limiter ..... 13 watts (adjustable via configuration)
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

Handset Amplifier

Output ..... 1.5 V_{RMS} nominal into 33-ohm load
Frequency response with 5 mV_{RMS} input (AGC on) ..... 350–6,500 Hz, +0/−3 dB ref. to 1 kHz
Distortion ..... 1.5% maximum THD @ 1 kHz

Mechanical

Dimensions ..... 8.12 H × 8.12 W × 3.00 D inches (206 × 206 × 76 mm), overall
Internal controls ..... User level adjustment through hole behind nameplate: AGC threshold, audio transmit level, FSK transmit level, receiver volume, sidetone volume, station address, reset

Environmental

Temperature range ..... −22° F to +158° F (−30° C to +70° C), operating and storage
Humidity ..... 95%, non-condensing

Approval

NRTL-certified for use in US and Canada for ..... Class 1, Div. 2, Groups A, B, C, D when used with a certified Model 7245 Series Amplifier Enclosure

Temperature code T4

Replacement Parts

Model No.	Description
46101-012	Amplifier Enclosure Mounting Hardware
12523-001	GAI-Tronics Nameplate Kit
69383-001	Handset/FSK/µP PCBA
69387-001	Remote 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.