



GAI-TRONICS® CORPORATION  
A HUBBELL COMPANY

# Installation of Call/Talk Systems

---

## Confidentiality Notice

This manual is provided solely as an operational, installation, and maintenance guide and contains sensitive business and technical information that is confidential and proprietary to GAI-Tronics. GAI-Tronics retains all intellectual property and other rights in or to the information contained herein, and such information may only be used in connection with the operation of your GAI-Tronics product or system. This manual may not be disclosed in any form, in whole or in part, directly or indirectly, to any third party.

## General Information

This publication contains information relating to Model MOD5300A, MOD5400A, and MOD5500A Call/Talk Stations. They consist of the following subassemblies:

A01B    B01B    B02B    B04    C01B    D01B

System layout should be planned in advance of installation. Stations should be located carefully, taking convenience, accessibility, and personnel safety into account. The quantity and location of paging speakers must be carefully considered, particularly in areas of high ambient noise or reverberation. The speaker amplifier built into each station drives one horn-loaded paging speaker. If additional paging speakers are needed, separate speaker amplifiers can be added to the system. In quiet areas, such as offices, several paging speakers can be connected to a single station. Please see publication 42004-135 Speaker/Horn Installation for GAI-Tronics Communication Systems or consult a GAI-Tronics sales representative for additional system planning information.

All units are wired in parallel. Good planning will minimize the cable required for each installation. GAI-Tronics can supply multi-conductor cable designed especially for this application. The number, size, and color coding of conductors are listed in the accompanying system connection diagrams. Standard cable has 600-volt insulation and is UL-rated for power cable tray use. The maximum standard cable length is 5,250 feet (1600 m) from the line balance assembly. For larger systems or non-standard cable, please contact a GAI-Tronics representative.

The cable described above includes conductors to provide ac power to each station. All stations operate from a common source, enhancing reliability, particularly if no other ac load is placed on the circuit breaker or branch line feeding the system. This configuration also allows easy transfer to an emergency power source in the event of a power failure. However, if preferred, each station may be individually powered from a nearby nominal 115 volt, 50 or 60 Hz single-phase outlet.

**⚠ WARNING ⚠** Do not install in any hazardous locations; such installations may cause a safety hazard and consequent injury or property damage.

**NOTICE:** Effective Jan. 1, 2005, the Call/Talk communication system and its components will not maintain any nationally recognized laboratory approval for hazardous locations.

## STEP 1 - Station and Speaker Amplifier Enclosure Mounting

Each Call/Talk station consists of an enclosure, a cover plate, a power supply, and a speaker amplifier module. Each enclosure provides a terminal strip for connecting interstation cable. The 16-gauge cold-rolled steel/light gray enamel enclosures use internal screw-type barrier terminal blocks. The suggested mounting height for all station enclosures is 54 inches (137 cm).

## STEP 2 - Line Balance Assembly Mounting

One line balance assembly is required for each communications system. The function of the line balance assembly is to properly load the page and the party line circuits. There are three primary considerations in determining the location of the line balance assembly:

- It should be near the electrical center of the system.
- It should be adjacent to the indoor station in a relatively quiet area.
- It should be no more than 5,250 feet (1600 m) from the most distant station when using GAI-Tronics standard cable. For larger systems or when non-standard cable is to be used, please contact a GAI-Tronics representative for further information.

The line balance assembly has one electrical adjustment that must be made while using a station (see the Step 5 - Checkout and Adjustment section).

The preferred mounting method is to suspend the assembly by a 1-inch conduit nipple (not supplied) from the lower side of an indoor wall station. The terminal blocks of the line balance assembly and the associated indoor wall station must be connected by one twisted pair for the page circuit and one similar pair for each party line. Refer to the typical wiring diagrams on pages 8 and 9 for the connections between the Model 305 Series Line Balance Assembly and the wall station enclosure.

## STEP 3 - Inter-station Conduit and Cable Installation

Generally, interstation cables are installed in cable trays or conduit. To help determine the required conduit sizes, the outside diameters of the GAI-Tronics cables discussed in this manual are listed in the following table:

Cable	Conductors	Outside Diameter
60038-101	8	0.60 in. (15.1 mm)
60029-101	16	0.68 in. (17.2 mm)

The size and installation of conduit and cable must meet the requirements of applicable electrical codes. A ground conductor, with green/yellow insulation, should be included with the cable in any area where no conduit or non-metallic conduit is used. Non-metallic enclosures used with metallic conduit and cables without a ground conductor *require* a bond between the conduit(s) and the ground terminal (terminal 3) within the enclosure.



**No station is to be installed or operated without having a proper ground.**

Where GAI-Tronics cable is installed, each conductor should be lugged and attached to the terminal. This must be performed in accordance with the color code shown on the applicable accompanying wiring diagrams, or with special drawings provided for this purpose.

**NOTE:** Some cables have an orange (spare) conductor. Unless otherwise instructed, this conductor should be taped and not connected to the terminal strip(s) in the enclosures.

## STEP 4 - Amplifier and Subset Installation

Call/Talk equipment is factory set for automatic local speaker muting. When the push-to-page switch is pressed at a particular station, the paging speaker connected to that station is silenced, preventing acoustic feedback to the handset microphone. For cases where the muting feature is not necessary or may be a disadvantage, it can be disconnected by removing the jumper between the MUTE IN and the MUTE OUT terminals.

### Remote Muting

Additional amplifiers can be muted by the paging station by connecting its MUTE OUT terminal to the MUTE IN terminal of all affected amplifiers. This can be performed to avoid feedback from stations in proximity of each other. A common ground must be present at all stations to be muted. Connect one end of the GAI-Tronics orange cable wire to the MUTE IN of one station, and connect the other end to the MUTE OUT of another station. Continue this procedure until all stations in that area are connected. To ensure that the stations are correctly wired, initiate a page from a station, and verify that speaker muting is occurring where desired.

After making any necessary muting changes, unpack and install the C01B power supply and the D01B speaker amplifier. The C01B and the D01B modules plug directly into the motherboard located in the station enclosure. Secure the module to the enclosure mounting bracket using the captive screws provided with the modules. The ribbon cable from the front panel containing the handset amplifier plugs into the mating connector on the motherboard. The cover plate should also be plug-connected to the motherboard and securely mounted to the enclosure using the hardware provided.

## Step 5 - Checkout and Adjustment

All field wiring connections (page line, party line(s), mute, ac power, and speaker) between stations must be tested, and *the line balance assembly installation must be complete* before checkout begins. Every handset should be on-hook.

Apply the ac power, and check the station next to the line balance assembly. Press the push-to-page switch (in the handset handle on some stations), and speak firmly and directly into the microphone of the handset. The broadcast should be heard at all paging speakers in the system except those associated with the station under test. The operator should hear little or no sidetone (the user hearing his voice from the earpiece of the handset). If the line balance assembly is not connected properly, there will be a high level of sidetone, perhaps enough to cause feedback. The line balance assembly adjusts to optimize sidetone rejection on the page line. If the system is complete when the first station is checked, adjust the line balance assembly as presented in the Line Balance Assembly Adjustment section below. Do NOT adjust the station (amplifier) controls until the line balance assembly is adjusted.

Release the push-to-page switch, and check the party line(s) sidetone level. Again, the operator speaking into the microphone of the handset should hear very little or none of his own voice from the earpiece in the handset. This sidetone rejection will only occur if the line balance assembly is properly connected, because it contains a fixed resistor load for each party line. In addition, no party line adjustments are provided; therefore, party line operation is checked by conversing between two or more stations.

### Line Balance Assembly Adjustment

Remove the line balance assembly cover to expose the page line balance control. To set the control for proper page circuit loading, lift the handset from the adjacent handset hook, and press the push-to-page button. From a normal speaking distance (approximately  $\frac{1}{2}$  inch), blow steadily into the handset microphone, and adjust the control to minimize receiver sidetone. This adjustment should be made only during the initial installation of a system. However, if more than ten speaker amplifiers are added or deleted, repeat the page line balance control adjustment.

After the final adjustment, replace the line balance assembly's cover, and secure it with the 4 mounting screws to discourage tampering by unauthorized personnel and to prevent the entry of contaminants.

### Handset Preamp Adjustment

The screwdriver-adjusted potentiometers are located on the printed circuit board mounted on the inside of the cover plate. R3 is the transmit level potentiometer and R13 is the receiver volume potentiometer. All the handset preamps are factory set but may require a level adjustment due to system loading and/or long cable runs. Party-line level checks should be approximately  $0.75 V_{RMS}$  when whistling into a handset microphone. Adjust the transmit level if the voltage is not correct from a station. Receiver volume must be adjusted according to the noise in the area and the preference of the user.

### Speaker Amplifier Adjustment

A nameplate on the D01B module indicates the position of the thumbwheel adjustment. The speaker amplifiers are factory set for approximately half output with a normal voice input. The output must be adjusted to suit conditions in the area. Maximum output is 9.8 V for an 8-ohm speaker. If maximum output is desired, whistle into a handset, and set the output for approximately 9 V for an 8-ohm speaker.

## Step 6 - Troubleshooting System Problems

### Hum or Buzz on the Line

A hum or buzz on the page circuit (or one or more party circuits) is usually due to either a short circuit of one of the two conductors for each circuit to the ground or an unbalanced leakage to the ground. As long as the two conductors are twisted pairs, and there are no significant leakage paths or short circuits to the ground, any induced voltages are the same on both conductors and do not appear across the line.

To correct the problem, locate the source of the ground. Using an ohmmeter, check various junction points of the system wiring to determine in which direction the ground can be located. By going from one junction point to another and disconnecting the affected circuit, the ground is located. The fault could be within a plug-in amplifier. However, most grounded circuits occur due to improper terminations or are caused by small strands protruding from an improperly lugged wire.

Another source of grounds or near-grounded circuits is junction boxes filled or partially filled with water. In many cases, there are deposits in the boxes, which when combined with water, produce conductive or corrosive solutions. These deposits cause leakage between circuits and can corrode the wire and terminals.

Isolation of field wiring may be necessary for test purposes. If such isolation removes the line balance assembly from the operating portion of the system, a 33-ohm,  $\frac{1}{2}$ -watt resistor should be connected across L1 and L2 of the Page/Party<sup>®</sup> line circuits. These resistors *must* be removed after completion of the tests.

### Feedback or Distortion on the System

Each page and party circuit must be loaded to the optimum 33 ohms using the line balance assembly. If the line balance is not connected or is defective, the system will have excessive gain and will break into feedback quite easily. The voice will also be distorted, and there will be a high level of sidetone in the handset receiver.

Each party line is terminated with a fixed 33-ohm resistor in the line balance assembly. However, an adjustable control is provided for the page line to compensate for the number of speaker amplifiers connected to the system. Improper adjustments will affect gain and will increase the level of sidetone. See the specific instructions for adjusting the line balance assembly in the Step 5 - Checkout and Adjustment section.

### Very Low Audio Level on One or More Lines at All Stations

It is possible for all or part of the system to function with a dead short across the page or party circuits. If this occurs, the level of the system will be very low, decreasing to a minimum level in the vicinity of the short circuit. To locate the short circuit, it is necessary to proceed in the same way as locating a ground checking junction points with an ohmmeter.

### Cross Talk

Cross talk, or inter-channel interference, is generally caused by the accidental crossing of circuits in a junction box. To check for this condition, measure the resistance between the circuits of the interfering channels. The resistance should be a very high value or infinite. Leakage or shorts to the ground in two or more circuits can result in cross talk on those circuits.

In a multi-party line system, it is possible to have a small amount of cross talk between channels if the line balance resistors are open or not connected. This condition can be detected by the presence of high sidetone in the handset.

### Static Charges

In many normal installations, a static ac voltage may be read from the conductors of the page and party line circuits to the ground. In many cases, this voltage may be as high as 50 volts or more. This voltage is induced into the circuits by capacitance to the ac power circuit (generally carried in the same cable and also from power cables paralleling the communication cables). This voltage is inconsequential and can be ignored. Only when one side of the page or party circuit becomes grounded are any undesirable effects produced.

### Audio Voltage

In a properly operating system, audio voltage read across any of the page or party circuits (L1 to L2) will be 0.5 to 0.75 volts ac on peaks when an audio signal is present such as when someone is speaking into a handset. The voltage will be proportional to the loudness of the person's voice using the handset.

### One Inoperative Station in a Working System

Except for a wiring error, an inoperative station indicates a defect in the amplifier at that station. This is quickly checked by installing a spare amplifier or exchanging amplifiers with a properly operating station.

## Safe Power Connection/Disconnection

The equipment will not create arcs or sparks, in normal operation, when completely installed and powered. Installing or removing an amplifier or plugging in a live enclosure is *not* normal operation and can create arcs. To guarantee safety, adhere to the following caution note.

### CAUTION

**Do not insert or remove equipment from the live enclosures.**

A better arrangement uses a separate power disconnect.

Connect the field wiring as detailed in the instructions for the same equipment.

Call/Talk Stations					
Station Model No.	Description	Consists of*			
		Enclosure	Cover Plate	Power Supply	Speaker Amplifier
MOD5300A	Indoor Single-party Handset/ Speaker Station	A01B	B01B	C01B	D01B
MOD5400A	Indoor Multi-party Handset/ Speaker Station	A01B	B02B	C01B	D01B
MOD5500A	Indoor Speaker Amplifier Station	A01B	B04	C01B	D01B
*Components are packaged separately for shipment.					

# Specifications

## Cover Assembly (B01B, B02B, B04)

### Handset Amplifier Circuit and Handset Assembly (B01B, B02B)

Output level.....	1.5 V <sub>RMS</sub> nominal into 33-ohm load
Output limiter .....	1.5 V <sub>RMS</sub> nominal
Frequency response.....	300-6500 Hz +/-1.5 dB
Distortion .....	1.5% max. THD @ 1 kHz at 1.25 V output
Controls.....	Transmitter level, receiver volume, handset pressbar
Microphone .....	Noise-canceling dynamic
Receiver .....	High efficiency dynamic; hearing aid compatible
Cable.....	Retractable, 7-foot extended PVC
External controls.....	B02B .....Party-line selector switch; 5 switch positions
Dimensions .....	B01B, B02B ..... 7.75 W × 8.25 H × 3.75 D inches (196.9 × 209.6 × 95.3 mm) with handset
	B04..... 7.75 W × 8.25 H inches (196.9 × 209.6 mm)
Material/finish .....	16-gauge cold-rolled steel/light gray enamel
Shipping weight .....	B01B, B02B .....4 lbs. (1.8 kg)
	B04.....2 lbs. (0.9 kg)

### Speaker Amplifier Circuit (D01B)

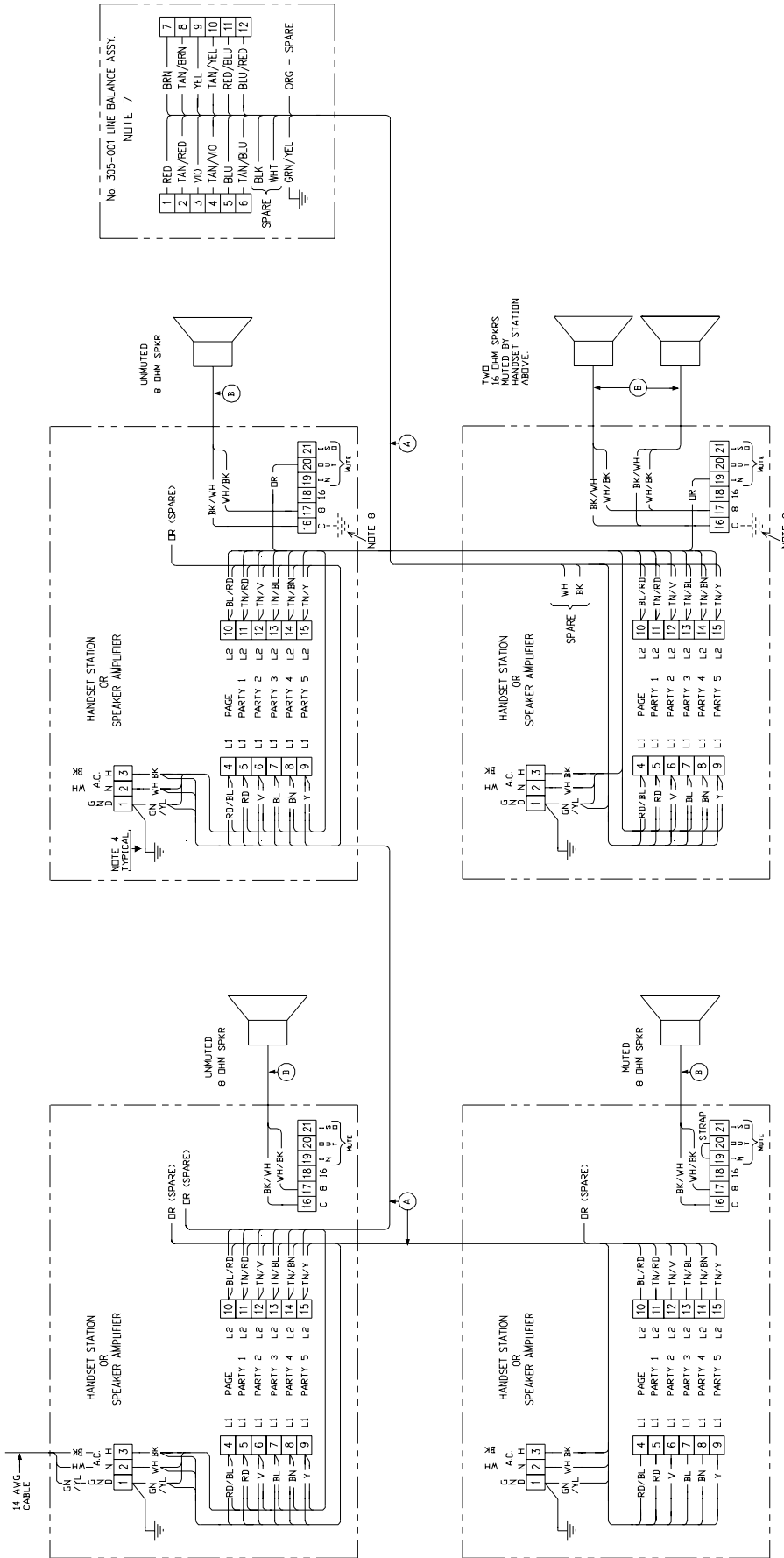
Output.....	12 watts minimum into 8- or 16-ohm load
Amplifier sensitivity.....	0.5 V ac, at rated output
Frequency response.....	250-6500 Hz
Distortion .....	Less than 1% THD at 12 W, 1 kHz
Input impedance.....	25,000 ohms nominal
Controls.....	Speaker volume (adjusted by removing cover the plate)
Dimensions.....	3.75 W × 2.69 H × 2.06 D inches
Shipping weight .....	1 lb. (2.2 kg)

### Power Supply (C01B)

Voltage.....	105-130 V ac, 50/60 Hz
Power consumed.....	Zero/Max signal.....3 W, 4 VA/30 W, 35 VA
Dimensions.....	3.75 W × 2.69 H × 2.75 D inches (95.3 × 68.3 × 69.85 mm)
Shipping weight .....	2 lbs. (1.1 kg)

### Enclosure (A01B)

Material/finish .....	16-gauge cold-rolled steel/light gray enamel (NEMA-12)
Mounting.....	Four 0.38-inch diameter mounting holes
Connections.....	Internal screw-type (single row) barrier terminal blocks
Temperature range.....	-30° C to +70° C
Shipping weight .....	6 lbs. (2.7 kg)
Dimensions.....	8.75 H × 7.5 W × 3.5 D inches (222.3 × 190.9 × 88.9 mm)



GAI-TRONICS CORPORATION  
READING, PA. 19603  
USA

TYPICAL SYSTEM WIRING DIAG.  
MULTI-PARTY CALL/TALK  
5000 SERIES SYSTEM

REV. 10/80  
D

FORM NO. 71890  
B

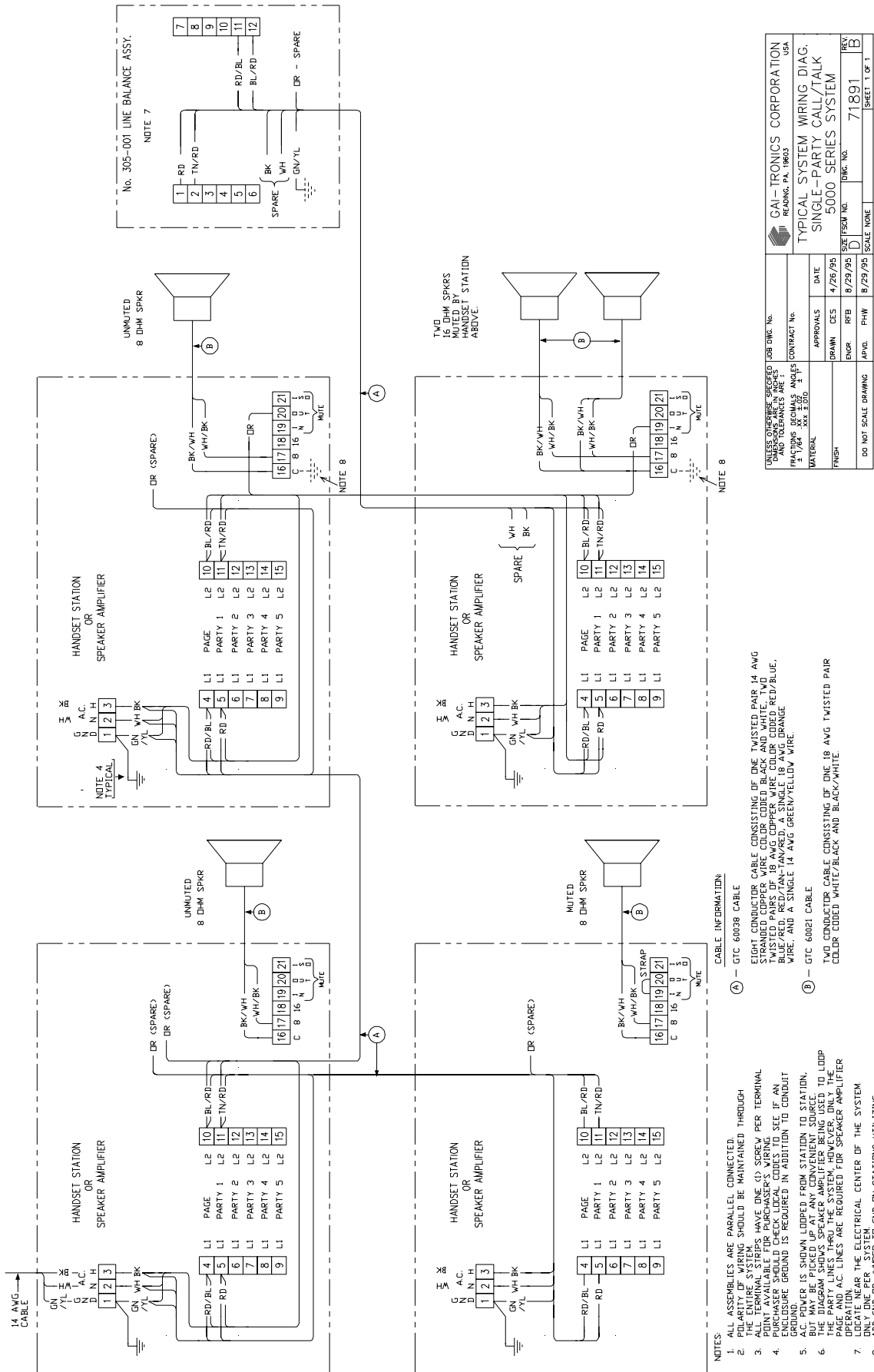
SCALE: NONE  
SHEET 1 OF 1

CABLE INFORMATION:

- (A) — GTC 60219 CABLE  
SYSTEM CONDUCTOR CABLE CONSISTING OF ONE TWISTED PAIR 14 AWG SYSTEM CONDUCTOR, USE CL. 2 CONDUIT, BLACK AND RED, 18 AWG TWISTED PAIRS OF 18 AWG COPPER WIRE COLOR CODED RED/BLUE, BLUE/RED, RED/TAN, TAN/RED, VIOLET/TAN, VIOLET, BLUE/TAN-BLUE, BROWN/TAN-BROWN, YELLOW/TAN-YELLOW, A SINGLE 18 AWG ORANGE WIRE, AND A SINGLE 14 AWG GREEN/YELLOW WIRE.
- (B) — GTC 6021 CABLE  
TWO CONDUCTOR CABLE CONSISTING OF ONE 18 AWG TWISTED PAIR COLOR CODED WHITE/BLACK AND BLACK/WHITE.

- NOTES:
1. ALL ASSEMBLIES ARE PARALLEL CONNECTED.
  2. POLARITY OF WIRING SHOULD BE MAINTAINED THROUGH ALL TERMINAL STEPS.
  3. ALL TERMINAL STEPS HAVE ONE (1) SCREW PER TERMINAL POINT AVAILABLE FOR PURCHASER'S WIRING.
  4. PURCHASER SHOULD CHECK LOCAL CODES TO SEE IF AN ENCLOSURE GROUND IS REQUIRED IN ADDITION TO CONDUIT GROUND.
  5. CONDUIT IS SHOWN LAPPED FROM STATION TO STATION, BUT MAY BE PICKED UP AT ANY CONVENIENT SOURCE.
  6. THE DIAGRAM SHOWS SPEAKER AMPLIFIER BEING USED TO LOOP THE PARTY LINES THRU THE SYSTEM, HOWEVER, ONLY THE OPERATION A.C. LINES ARE REQUIRED FOR SPEAKER AMPLIFIER.
  7. LOCATE NEAR THE ELECTRICAL CENTER OF THE SYSTEM.
  8. ONLY ONE PER SYSTEM.  
ADD GND DR JUMPER TO GND ON STATIONS UTILIZING MULTI-STATION NOTE.





UNLESS OTHERWISE SPECIFIED, JOB DWG. NO. _____		GAI-TRONICS CORPORATION READING, PA. 19603 USA	
DIMENSIONS ARE IN INCHES DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS		CONTRACT NO. _____	
MATERIAL: _____		APPROVALS:	DATE:
FINISH: _____		DRAWN: CES	4/26/95
DO NOT SCALE DRAWING		ENGR: RFB	8/29/95
SCALE: NONE		APVD: PHW	8/29/95
SHEET NO. 71891		SHEET 1 OF 1	

- NOTES:**
- ALL ASSEMBLIES ARE PARALLEL CONNECTED.
  - POLARITY OF WIRING SHOULD BE MAINTAINED THROUGH THE ENTIRE SYSTEM.
  - POINT TERMINALS FOR SPEAKERS SHOULD BE MAINTAINED FOR PARALLEL CONNECTIONS.
  - PURCHASER SHOULD CHECK LOCAL CODES TO SEE IF AN ENCLOSEURE GROUND IS REQUIRED IN ADDITION TO CONDUIT GROUND.
  - AC POWER IS SHOWN LOOPED FROM STATION TO STATION, BUT MAY BE PICKED UP AT ANY CONVENIENT SOURCE.
  - THE DIAGRAM SHOWS SPEAKER AMPLIFIER BEING USED TO LOOP PAGE AND A.C. LINES ARE REQUIRED FOR SPEAKER AMPLIFIER OPERATION.
  - LOCATE NEAR THE ELECTRICAL CENTER OF THE SYSTEM ADD GND OR JUMPER TO GND ON STATIONS UTILIZING MULTI-STATION MUTE.
- CABLE INFORMATION:**
- (A) - GTC 60038 CABLE  
EIGHT CONDUCTOR CABLE CONSISTING OF ONE TWISTED PAIR 14 AWG STRANDED COPPER WIRE COLOR CODED BLACK AND WHITE, TWO TWISTED PAIRS OF 18 AWG COPPER WIRE COLOR CODED RED/BLUE, WIRE AND A SINGLE 14 AWG GREEN/YELLOW WIRE.
  - (B) - GTC 60021 CABLE  
TWO CONDUCTOR CABLE CONSISTING OF ONE 18 AWG TWISTED PAIR COLOR CODED WHITE/BLACK AND BLACK/WHITE.

# 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.