GAI-TRONICS ®
A HUBBELL COMPANY

NEMA 4X VoIP Telephones

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General Information

The GAI-Tronics Model 354-70x Series NEMA 4X VoIP Telephones are designed for use in extreme weather conditions where temperature and moisture are a concern. They are also ideal for use in areas that require a direct water spray (hose-down) for cleaning purposes or where a non-corrosive material is required.

The 354-70x Series Telephone is perfectly suited for areas considered too harsh for a standard telephone.

The 354-70x Series Telephone operates in the same manner as a standard telephone – simply lift the handset, listen for a dial tone, and dial the desired telephone number. If the telephone is an autodial model, simply lift the handset and the pre-programmed number will be dialed automatically.
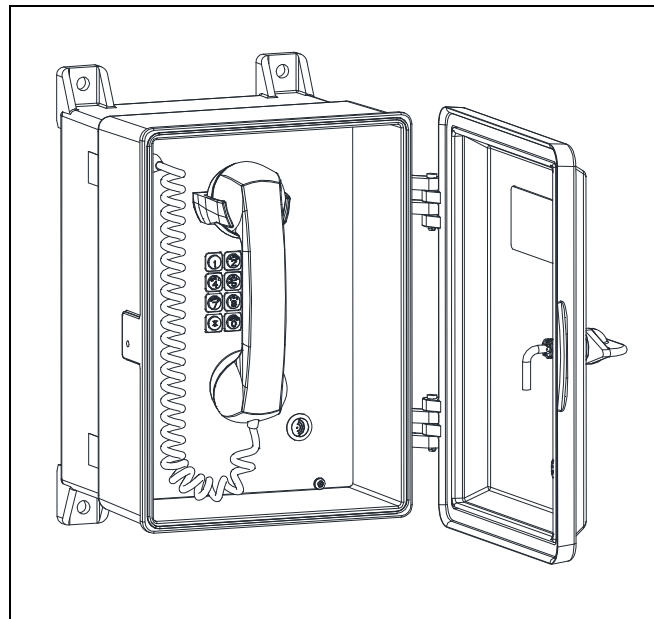

Figure 1 Model 354-700 Series NEMA 4X VoIP Telephone

The 354-70x Series Telephones are designed for connection to a 10/100 Base-T Ethernet network, and operate from a Power-over-Ethernet (PoE) or a local 24 to 48 V dc power source. The VoIP telephones provide point-to-point communications between personnel throughout a facility over an existing LAN.

In addition to providing standard telephone operation, the NEMA 4X VoIP Telephones provide real-time alarm reporting via email. This enables system supervisors to monitor the telephones' activity and to address caller needs or maintenance issues immediately. The telephones can also be monitored and reported via GAI-Tronics' Telephone Management Application (TMA) software. There are also configurable inputs and outputs available in all models.

Ordering Information

The Model 354-70x series NEMA 4X VoIP Telephone is available in eight standard models with a 6-foot handset cord:

Table 1. Model Chart

Model	Description
354-700	NEMA 4X VoIP Telephone, Gray
354-700YL	NEMA 4X VoIP Telephone, Yellow
354-700OR	NEMA 4X VoIP Telephone, Orange
354-700RD	NEMA 4X VoIP Telephone, Red
354-701	NEMA 4X VoIP Auto-dial Telephone, Gray
354-701YL	NEMA 4X VoIP Auto-dial Telephone, Yellow
354-701OR	NEMA 4X VoIP Auto-dial Telephone, Orange
354-701RD	NEMA 4X VoIP Auto-dial Telephone, Red

Options

The following options are available:

- Key-lock front door
- Coiled cord (15-foot)
- Armored handset cord (15-inch)
- Spring door closure

System Requirements and Limitations

Two VoIP telephones can be connected in a peer-to-peer configuration without the need for a LAN; however, a 10/100 Base-T Ethernet network with a Sessions Initiation Protocol (SIP) server is required for systems containing three or more VoIP telephones. Conferences are limited by the customer's LAN media capabilities and the services available at each end point.

Tips for VoIP Subscribers

If you have or are thinking of subscribing to an interconnected VoIP service, you should:

- Provide your accurate physical address to your interconnected VoIP service provider to ensure that emergency services can quickly be dispatched to your location.
- Be familiar with your VoIP service provider's procedures for updating your address and promptly update your address information in the event of a change.
- If your power is out or your internet connection is down, be aware that your VoIP service may not work. Consider installing a backup power supply, maintaining a traditional telephone line, or having a wireless telephone as a backup.
- If you have questions about VoIP in general, see http://www.fcc.gov/cgb/consumerfacts/voip.html.

Feature and Functions

GAI-Tronics VoIP telephones include the following features:

- NEMA 4X rated with door closed (NEMA 3R with door open)

- Handset with 6-foot Hytrel coiled cord and noise-cancelling microphone

- Panel-mounted push-button volume control

- Chrome-plated keypad with protective rubber boot and braille reference

- Brushed stainless steel panel

- Stainless steel assembly hardware.

- SIP compatible (RFC3261)

- Real-time alarm reporting via email or syslog

- Power-over-Ethernet compatible (Power Mode A, Class 0)

- Configurable via web page, serial link or download

- Four configurable auxiliary inputs and two configurable voltage-free contact outputs

Installation Guidelines

⚠ **ATTENTION** ⚠   Installation should be performed by qualified personnel and only in accordance with the National Electrical Code or applicable local codes.

When installing any GAI-Tronics telephone equipment, please adhere to the following guidelines to ensure the safety of all personnel:

- NEVER install telephone wiring during a lightning storm.

- **Install a UL Listed lightning arrestor** on any telephone installed where the telephone or telephone cable is at risk of being exposed to lightning strikes. The lightning arrestor must be installed as close to the telephone as possible to maximize the protection. The lightning arrestor must not be installed within the enclosure supplied with the telephone.

- NEVER install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

- NEVER touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

- USE CAUTION when installing or modifying telephone lines.

- Install a UL Listed telephone line suppressor (customer-supplied) on the telephone line.

- Use silicone sealant or equivalent around and inside of all conduit entries

- **Install a Cat5 data line lightning surge protector** on any phone installed where the phone or phone cable is at risk of being exposed to lightning strikes. The lightning arrestor must be installed as close to the phone as possible in a non-hazardous environment. The lightning arrestor must not be installed within the telephone enclosure.

- USE CAUTION when installing or modifying Category 5 data lines.

GAI-Tronics recommends the following precautionary steps to protect the unit during installation:

1. Install this unit using appropriate wiring methods.

2. It is recommended that the network cable be contained within conduit for physical protection.

3. Use a conduit entry on the bottom of the enclosure to prevent any condensation forming inside the conduit from dripping into the unit. Additionally, using bottom conduit entries makes water less likely to enter the unit at the conduit connection points.

4. Use Teflon™ pipe joint tape or a thread sealing compound around the conduit threads to seal threaded connections and prevent water from entering into the unit at the conduit location.

5. Apply a small amount of silicone sealant inside and around the end of the conduit pipe that is inside the unit. The sealant helps to prevent any condensation formed inside the conduit from dripping into the unit. This is especially important when using the conduit entry located on the top of the enclosure. (Manufacturers of silicon sealant include: Dow Corning, Duron, General Electric, and DuPont.)

6. Sealed fittings should be installed at all cable entry points to prevent liquids from entering the unit.

Security Hardware

The Model 354-70x Series Telephone is vandal-resistant, with the front panel attached to its enclosure with security screws. A GAI-Tronics Model 233-001 Security Screwdriver (sold separately) or Torx T-25 security head tip (included with the telephone) is recommended for installing the security screws.

Conduit Installation Details

GAI-Tronics recommends installing telephone cable in conduit to protect against damage and vandalism. Mounting and wiring of the Model 354-70x Series Telephones must be in accordance with installation standard practices.

Entering the enclosure from the top is not recommended. Bottom (preferred) or side entry helps prevent condensation moisture from dripping onto the telephone electronics causing severe damage. If using conduit, an appropriate hub (Myers STG Series recommended) or a UL Listed NEMA 4X rated connector appropriate for the installation should be used. If a top entry must be made, a drip path is strongly recommended. Seal all conduit entrances around the entry point and inside the conduit using a silicone-type sealant.

The Model 354-70x Series Telephones are not supplied with openings for conduit or cable because of potential installation variations. Conduit entrances must be installed prior to mounting the enclosure to the wall surface.

1. Open the door and remove the front panel assembly (carefully set aside).

2. Drill (hole saw) or punch entry openings. There must be a minimum of 1 inch (26 mm) of material between entry holes.

3. Install hub or fitting.

Mounting the Enclosure

Mount the enclosure using the four 0.437-inch (11mm) diameter holes located on the mounting flanges with 3/8-inch (M8) hardware. The recommended entry is via the enclosure bottom to prevent moisture from dripping onto the connection terminals. When mounting the enclosure, use caution to avoid damaging the internal components. The suggested mounting height is 48 inches (1219 mm) to the center of the bottom mounting holes of the enclosure.
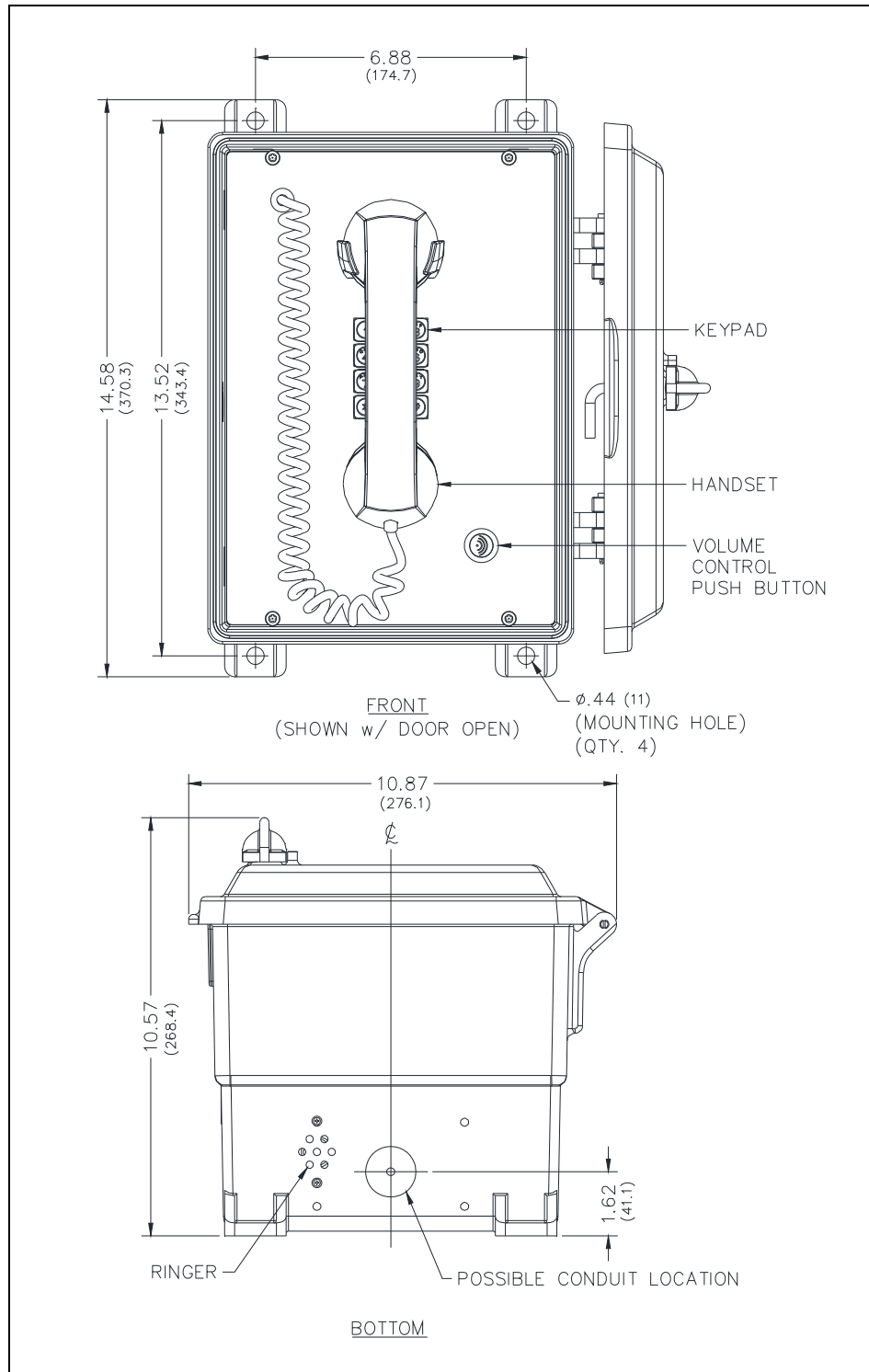
Figure 2. Mounting and Entry Locations

Hardware Description

External

NEMA 4X VoIP Telephones may contain a handset, standard keypad, volume control push button, and ringer. The handset rests on a cradle, which has a magnetic reed switch to signal an off-hook condition. See Figure 3.

Figure 3. NEMA 4X VoIP Telephone

Internal

The Model 354-70*x* NEMA 4X VoIP Telephones include a relay PCBA and a ringer in the rear enclosure. The front cover holds the main VoIP carrier PCBA, VoIP circuit PCBA, and keypad PCBA. See Figure 4 for parts layout.

Figure 4. Model 354-700 NEMA 4X VoIP Telephone

Wiring

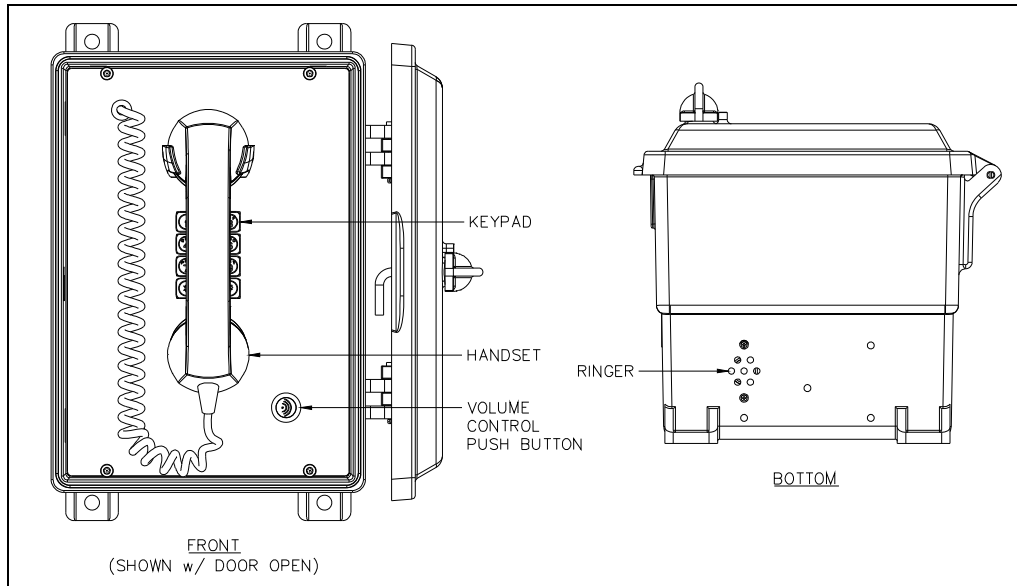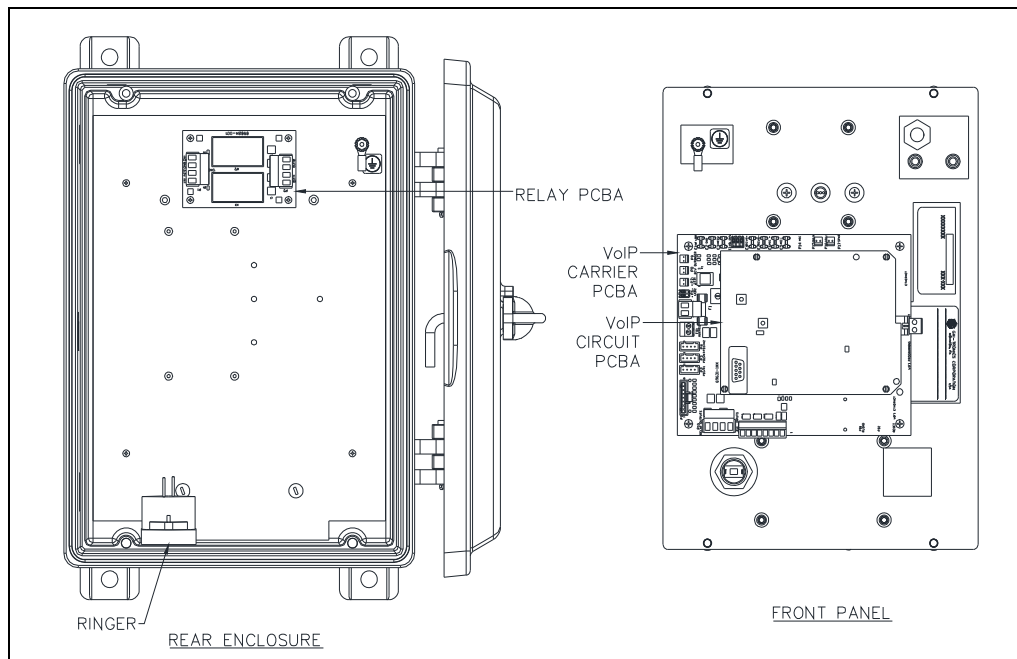1. Remove the four screws from the front panel and turn it to the right so that the interior surface faces you. Allow the wiring to remain connected. The front panel can be hung from the front door by hooking a small piece of wire in the mounting holes of the panel. The front panel interior surface and the back box interior now face you. Refer to Figure 5. This configuration presents the easiest access for troubleshooting and setting adjustments.

2. Plug the incoming Cat5 data line to the network RJ45 cable jack on the underside of the VoIP circuit PCBA. See Figure 6.

Install any additional connections as indicated below. Refer to Figure 5 for wiring details. Refer to Table 4 on Page 9 for the recommended conductor sizes.
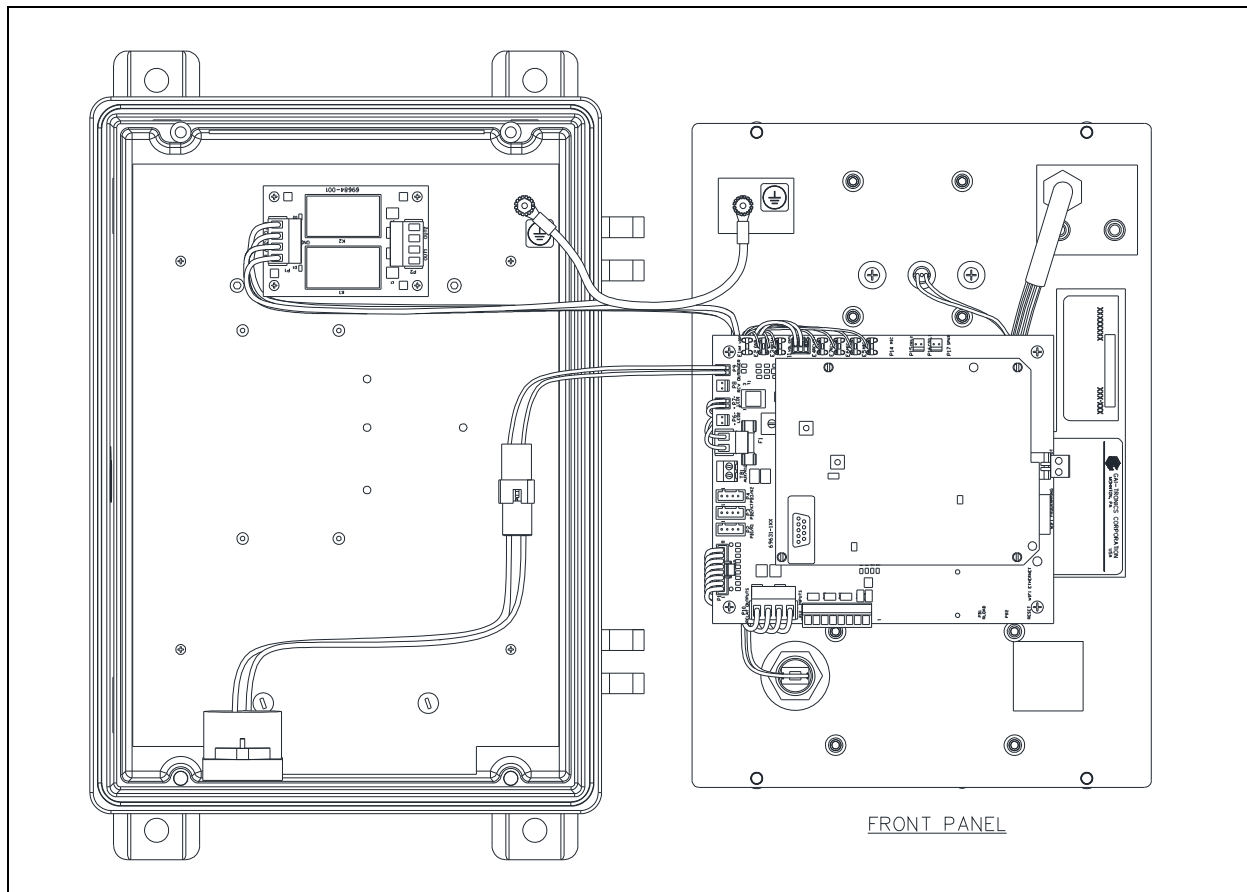

FRONT PANEL

Figure 5. Installation and Maintenance Configuration

Network Cable

Connect a Cat5 or Cat5e UTP cable with an RJ45 connector between the Local Area Network (LAN) and the VoIP PCBA. See Figure 6.

Power-Over-Ethernet (POE)

Connect power to the system as indicated in your POE equipment manual. (Power Mode A, Class 0)

I/O

Inputs

Four clean dry-contact auxiliary inputs have been provided for customer use. Terminations for these inputs are provided on terminal block P12. Refer to Figure 7. Connect each input between the desired input (INPUT 1–4) and common (GND) on terminal block P12. Refer to the "Inputs" section of GAI-Tronics Pub. 42004-481, "VoIP Telephone Configuration Guide" for programming instructions for these inputs.

Table 2. Auxiliary Inputs—Terminal Block P12

Pin	Label	Function
1	IN4	Input 4
2	COM	Common
3	IN3	Input 3
4	COM	Common
5	IN2	Input 2
6	COM	Common
7	IN1	Input 1
8	COM	Common

Inputs have an internal pull-up resistor and need to be 3.3 V dc tolerant.

Outputs

Two outputs have been provided for customer use. Terminations for these outputs are provided on connector P2 on the relay PCBA. Refer to Figure 7.

The function of each output is configurable. Outputs can be configured for one of the following modes: On, Off, Pulse, Mute, Ring, Call, Connect, Hook, In Use, Ring Cadence, Ring Out, Page, Registered, or Emergency. In some modes, the duration of the activation or on/off times can also be set. Refer to the "Logic Settings" section of Pub. 42004-481, "VoIP Telephone Configuration Guide" for more details.

Table 3. Output Contacts—Connector P2

Pin	Label	Description
1	C2	Common Output 2
2	NO2	Normally Open Output 2
3	C1	Common Output 1
4	NO1	Normally Open Output 1

Relay capacity is 5 A at 30 V dc or 120 V ac.
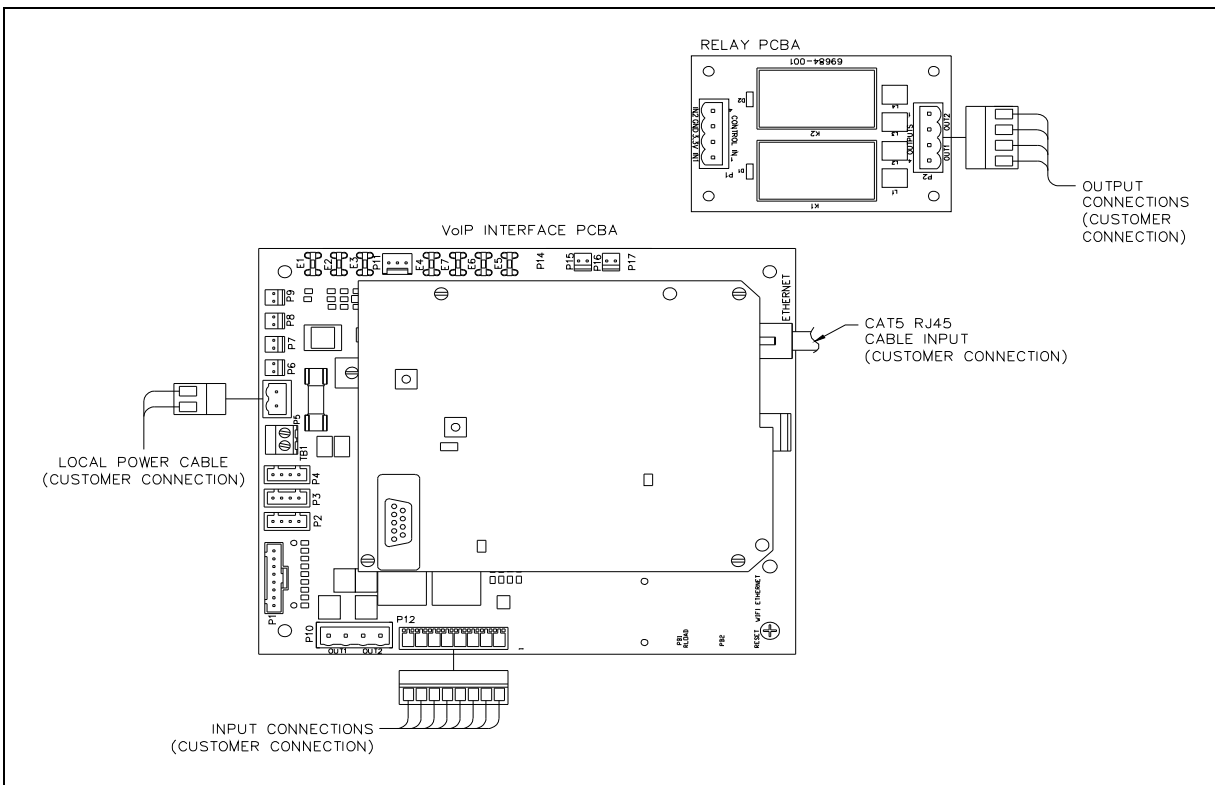
Figure 6. Internal PCBA Connections

Table 4. Recommended Cabling

Cable Use	Size
LAN	Cat5 or Cat5e UTP cable with an RJ-45 connector
Power	Two-conductor, No. 18 AWG is typical
Inputs	Two-conductor, No. 22 AWG is typical
Output contacts	Two-conductor, No. 18 AWG is typical

Status Indication

Power

The power LED located on the VoIP PCBA illuminates when power is applied to the telephone. Refer to Figure 7 for the location.

Heartbeat

The heartbeat LED located on the VoIP PCBA will flash when the telephone is operational over the WLAN. Refer to Figure 7 for the location.

NOTE: It may take up to a minute for the heartbeat to initialize after power up.

EACT

The EACT LED located on the VoIP PCBA will turn ON when VoIP PCBA is connected to an Ethernet device and will flash when data is being transmitted. Refer to Figure 7 for the location.
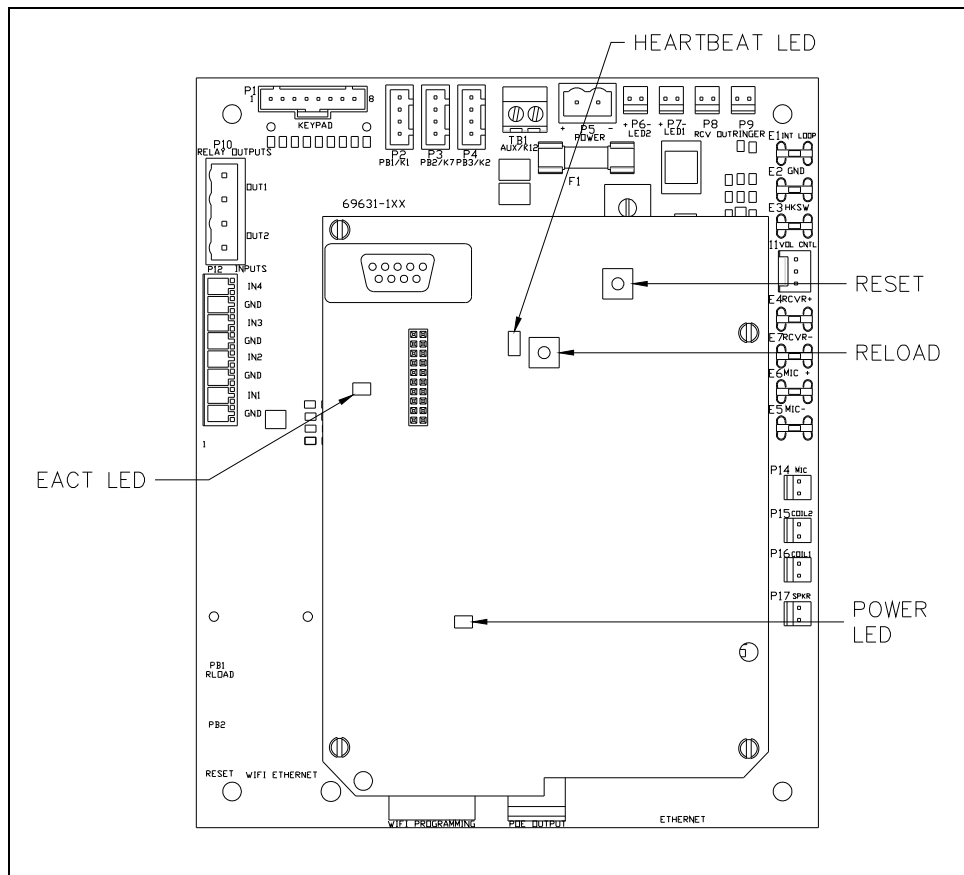
Figure 7. VoIP Carrier PCBA Component Location

Attach the Front Cover

After all wiring and cable connections have been completed, place the front panel on the rear enclosure, being careful not to pinch any cables. Secure the front panel using the four screws and washers provided. Torque the screws to 10–12 lb·in (1.13–1.36 Nm).

External Controls

Handset Receiver Volume Control

A push-button switch is provided on the front panel for adjustment of the handset receiver volume. When pressed, it decreases the volume gain from 20 dB to 12 dB, to 0 dB, and back up to 20 dB of the original signal. After the end of each call the signal level is automatically set to 20 dB.

Maximum (Handset Receiver) Level Remote Control

The receiver volume level can be controlled remotely by changing the setting in the configuration file. Refer to the "Handset Volume Setting" in the "Audio Settings" section of Pub. 42004-481, "VoIP Telephone Configuration Guide" for programming instructions.

Programming

The installer should ensure that the network is configured to allow VoIP communications (using the SIP protocol) between the desired locations before attempting to configure GAI-Tronics VoIP Telephones.

VoIP PCBA Setup

Verify the PC is connected to the same network as the VoIP telephone.

The easiest way to get started is to make a network connection to the unit and log on via a web browser. The unit is initially set with a static IP address:

IP address   192.168.1.2

A user name and password will be requested. The initial factory settings are:

User Name   **user**

Password   **password**

Changing the user name and password is recommended. This security measure helps to prevent unauthorized changes to the VoIP telephone interface's configuration.

VoIP PCBA Initial Network Configuration

Each VoIP PCBA must be set up for the network prior to installation. Assign a local ID, domain, proxy, and registrar.

Assign a host name	The host name provides identification of the different VoIP PCBAs on the network.
Test	Verify that calls can be made successfully.
Maintain	Monitor alarms. Set up auto-updates.

Refer to Pub. 42004-481 VoIP Telephone Configuration Guide for detailed programming instructions for this VoIP device.

Alternative Configuration Methods

There are three methods for configuring GAI-Tronics Handset VoIP telephones:

- Web pages
- Configuration file
- Command Line Interface (CLI)

Web pages (held within the telephone) can be accessed over the network using a browser such as Internet Explorer™, to view and change settings within a single unit.

Configuration files are ASCII text files containing configuration options that can be read and edited by a knowledgeable user. The telephone can automatically download a configuration file from the network, providing a controlled method of configuring multiple telephones.

The telephone can also be configured using a command line interface, either via the local serial port or remotely via a TELNET session over the network.

Operation

Model 354-700 Handset Operation

1. Lift the handset to place a call.
2. The handset receiver volume control; located on the front panel, can be adjusted to the desired level by pressing the volume control push button.
3. Dial the desired number.
4. After completion of the call, place the handset on hook.

Model 354-701 Auto-dial Handset Operation

1. Lift the handset to place a call.
2. The handset receiver volume control; located on the front panel, can be adjusted to the desired level by pressing the volume control push button.
3. A call will be placed to a preprogrammed number (garage, dorm, etc.)
4. After completion of the call, place the handset on hook.

Monitoring and Reporting

Each telephone can recognize and generate several hardware and configuration fault condition alarms. These alarms can be signaled to a remote site using three methods:

- Syslog output over TCP
- SMTP mail message
- Telephone Management Application (TMA) software (purchased separately)

Available alarms are:

- Handset integrity loop
- Configuration error
- Cold reset (power cycle)
- Warm reset (internal command)
- Keypad error, such as a stuck button (if applicable)
- Key hook (off-hook status)
- Register fail
- Audio Path Test

Maintenance

Service

If your telephone requires depot 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 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 inside the USA or 610-777-1374 outside the USA for help identifying the Regional Service Center closest to you.

Troubleshooting

Table 5. Troubleshooting Chart

Problem	Possible Solution
Low volume in handset or headset	Increase the volume setting using the Volume Adjust button on the front panel.
High volume in handset or headset	Decrease the volume setting using the Volume Adjust button on the front panel.
Front panel push buttons are not operational	Verify the push buttons are properly configured.
Inputs not operational	Check the input connections. Verify the inputs are properly configured.
Outputs not operational	Check the output connections. Verify the outputs are properly configured.
Cannot make or receive calls	Check the connection of the LAN cable. Verify that power is applied to the unit. Verify the LAN parameters have been configured properly. Verify the telephone has been set up on the network.
No power indication	Check the power connections. Check fuses. Replace fuses with identical type/ratings. If using POE, check the operation of the POE equipment.

Replacement Parts and Accessories

Table 6. Available Parts and Accessories

Part Number	Description
10113-122	Replacement Handset Assembly, 6-Foot Hytrel Cord
12505-005	Replacement Door Assembly, Gray
12505-005OR	Replacement Door Assembly, Orange
12505-005RD	Replacement Door Assembly, Red
12505-005YL	Replacement Door Assembly, Yellow
12542-002	Replacement Panel Screws/Washers, 15-Pack
230-001	Pole-Mounting Kit
12509-044	Telephone Management Application Package for VoIP Telephones

Specifications

Power Requirements

DC Power Supply

     Input voltage ....24 V dc to 48 V dc

Power-over-Ethernet.. 12.95 W

     802.11af compliant (via RJ45) Power Mode A, Class 0

VoIP Network

Network .... 10/100 BaseT Ethernet RJ45, Cat5/6 UTP

     Static IP or DHCP STUN client (NAT traversal) address provisioning

Call control signaling................................. SIP (RFC3261 compliant) Loose routing call control signaling

Configuration ....Embedded web server

     Configuration file download

     Direct serial connection

     Password protection

Handset Audio

Analog microphone gain...30 dB

Analog earpiece gain... Default: +20 dB

     Setting 2: +12 dB

     Setting 3: 0 dB

Frequency response...250 Hz to 6500 Hz

Frequency response flatness .... 3 dB minimum

THD @ 1 kHz... 1% minimum

Inputs

Keypad* ....3×4 matrix

Push buttons... Volume control

Configurable inputs (quantity = 4).. Internal pull-up 3.3 V dc tolerant

*Not available on all models.

Outputs

Output 1 .... 5 A @ 30 V dc or 120 V ac maximum (resistive load)

Output 2 .... 5 A @ 30 V dc or 120 V ac maximum (resistive load)

Indicators

Internal on VoIP Circuit Board..Power, Heartbeat, & EACT LEDs

Monitoring and reporting...........................Real-time over TCP/IP proprietary Syslog application or email

....Embedded SMTP client

.... Automatic fault reporting

Environmental

Operating temperature ....−4 ºF to +140 ºF (−20 ºC to +60 ºC)

Weather resistance ....NEMA Type 4X with door closed

Humidity .... 90% non-condensing

Mechanical

Enclosure (gray, yellow, orange, or red)...Engineered plastic

Handset Cord ....G-style handset/Hytrel® (standard)

Connection ....RJ45 receptacle

Dimensions, outside (VoIP)....................................... 14.6 H × 10.9 W × 10.5 D in (371 × 276 × 267 mm)

Mounting...Wall or column, four 0.44-inch (11 mm) diameter mounting holes

Shipping weight .... 13.5 lb (6.1 kg)

Net weight... 12.5 lb (5.7 kg)

Approvals

UL/cUL Listed.

Outdoor environmental rating..Type 3R, Type 4X with door closed

User Instructions (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.