

**BROADCAST<sup>®</sup>**  
**t o o l s** **INC**  
**PROBLEM SOLVED**

## *Installation and Operation Manual*



### **STA-III Plus** **Smart Telephone Auto-Coupler**

Manual update: 03/16/2016

Firmware Version 1.16 or greater. If you need a firmware upgrade, contact Broadcast Tools®.

No part of this document may be reproduced or distributed without permission.  
ALL SPECIFICATIONS AND FEATURES FOR THIS PRODUCT ARE SUBJECT TO  
CHANGE WITHOUT NOTICE

**NOTE: We recommend the use of Chrome, Firefox or Safari as your browser.**

Due to the dynamic nature of product design, the information contained in this document is subject to change without notice. Broadcast Tools, Inc., assumes no responsibility for errors and/or omissions contained in this document. Revisions of this information or new editions may be issued to incorporate such changes.

*Broadcast Tools® is a registered trademark of Broadcast Tools, Inc.  
All Sentinel® labeled products are registered trademarks of Broadcast Tools, Inc.  
Copyright® 1989 - 2016 by Broadcast Tools, Inc. All rights reserved.  
No part of this document may be reproduced or distributed without permission.*

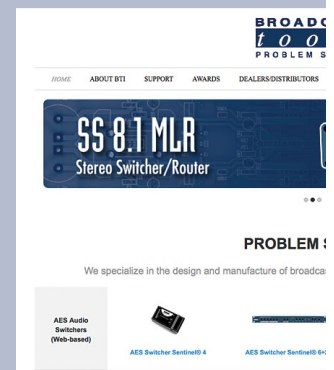
Visit [www.broadcasttools.com](http://www.broadcasttools.com) for important product update information.

## Table of Contents

Section Title . . . . .	Page #
Introduction . . . . .	3
Safety Information . . . . .	3
Who to Contact for Help . . . . .	3
Product Overview . . . . .	4
Features/Benefits . . . . .	4
Applications . . . . .	4
Inspection . . . . .	5
Installation . . . . .	5
Surge Protection . . . . .	5
Mounting . . . . .	5
UPS standby power system . . . . .	5
Power . . . . .	5
Telephone Line Connections . . . . .	5
Audio Input . . . . .	5
Audio Output . . . . .	5
Remote Control Inputs . . . . .	6
Relay/Open Collector Outputs . . . . .	6
Cable Preparation . . . . .	7
Connecting the STA-III Plus . . . . .	7
Programming . . . . .	8
Examples . . . . .	8
Jumpers Settings . . . . .	8
Operation . . . . .	9
LED Indicators . . . . .	9
Front Panel Controls . . . . .	9
Control Commands . . . . .	10
Specifications . . . . .	11
Warranty . . . . .	12
Front and rear panel drawings . . . . .	Appendix
Connector layout . . . . .	Appendix
Fractional schematic . . . . .	Appendix
Installation example . . . . .	Appendix

### WEBSITE:

*Visit our web site for product updates and additional information.*



### CONTENTS

## INTRODUCTION

Thank you for your purchase of a BROADCAST TOOLS® STA-III PLUS is a professional quality telephone auto-coupler. We're confident that this product will give you many years of dependable service. This manual is intended to give you all the information needed to install and operate the BROADCAST TOOLS® STA-III PLUS.

## SAFETY INFORMATION

Only qualified technical personnel should install the STA-III PLUS. Any attempt to install this device by a person who is not technically qualified could result in a hazardous condition to the installer or other personnel or damage to the STA-III PLUS or other equipment. Please ensure that proper safety precautions have been taken before installing this device. If you are unfamiliar with this type of equipment, please contact a properly qualified engineer to handle the installation and setup of the STA-III PLUS. Broadcast Tools, Inc., is unable to support NON-Broadcast Tools software, hardware or NON-Broadcast Tools computer/hardware/software problems. If you experience these problems, please research your hardware/software instruction manuals or contact the manufacturers technical support department.

## WHO TO CONTACT FOR HELP

If you have any questions regarding your product or you need assistance, please contact your distributor from whom you purchased this equipment. If you would like more information about BROADCAST TOOLS® products, you may reach us at:

### Broadcast Tools, Inc.

131 State Street  
Sedro-Woolley, WA 98284-1503 USA  
Voice: 360.854.9559  
Fax: 866.783.1742

Internet Home Page: [www.broadcasttools.com](http://www.broadcasttools.com)  
E-mail: [support@broadcasttools.com](mailto:support@broadcasttools.com)

**THANK YOU FOR CHOOSING  
BROADCAST TOOLS® BRAND PRODUCTS!**

Broadcast Tools is a Veteran Owned Business



Designed, Assembled and Supported in WA State, USA



## CAUTION!

**Broadcast Tools®** Products, as with any electronic device, can fail without warning. Do not use this product in applications where a life threatening condition could result due to failure.

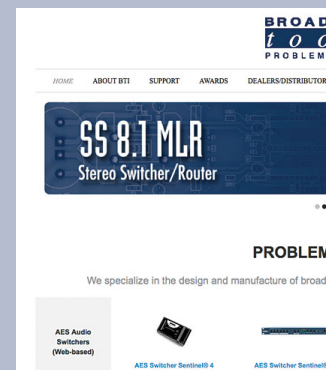


## NOTE:

This manual should be read thoroughly before installation and operation.

## WEBSITE:

*Visit our web site for product updates and additional information.*



## INTRODUCTION

### Product Overview

The STA-III Plus provides a convenient interface between a telephone line and the user's equipment. Features include auto-answer after a user programmed number of rings, user programmed numeric DTMF access code and relay and audio in/out control via numeric DTMF commands.

### Features/Benefits

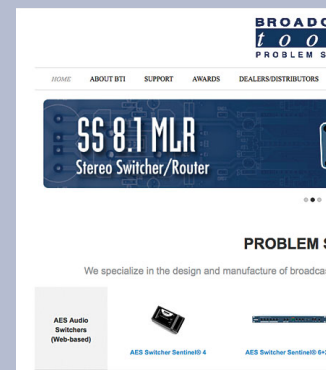
- Auto-answer and auto-disconnect via CPC (calling party control) and/or long dial tone hang up signals, allowing use behind analog PBX switches and POTS lines.
- Front panel, plus remote line seize and drop control for manual operation.
- Electronic telephone hybrid.
- Remote controllable send and receive audio.
- Balanced bridging audio input with front panel level control.
- Balanced low Z audio output with front panel level control.
- Front panel LED's display power, hook, ring and valid DTMF tone.
- Two remote controllable SPDT relays
- SPDT End of Call relay.
- External SPDT hook relay activates when a valid access code is entered.
- Remote line busy input.
- User programmable number of rings before auto-answer.
- User programmable access code, up to 10 digits.
- Loop-thru phone jack.
- Plug-in euro-block screw terminals for audio and remote control connections, mating plugs supplied.
- Fully RFI proofed.
- Surge protected internal power supply, 12 VDC universal switching power supply with domestic connectors supplied. International AC connectors optional.
- Each unit may be set on a desktop, mounted on a wall or rack-mounted with the optional RA-1 rack shelf for mounting up to three units in 1-RU.

### Applications

Remote broadcasting, remote IFB, remote confidence monitoring, automated answering systems.

### WEBSITE:

*Visit our web site for product updates and additional information.*



## Inspection

Please examine your STA-III PLUS carefully for any damage that may have been sustained during shipping. If any damage is present, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the STA-III PLUS, a modular telephone cord, and a 12 VDC wall power supply with domestic connector. Manuals may be downloaded from our web site.

## Installation

### Mounting

Mount the STA-III Plus where it will be visible and rear panel accessible. The STA-III Plus may be set on a desktop, mounted on a wall or optional RA-1 rack shelf for mounting up to three units in 1-RU using supplied hardware.

### Surge Protection

The STA-III PLUS has built-in resistance to voltage changes; we recommend that you use a power surge protector or line conditioner on the incoming AC and phone line. Lightning strikes and/or other high voltage surges may damage your STA-III PLUS and connected equipment if it is not properly protected. For lightning protection devices, check out [www.polyphaser.com](http://www.polyphaser.com) and [www.itwlinx.com](http://www.itwlinx.com).

### UPS Standby Power System

We recommend that you connect your STA-III PLUS to a UPS system. A UPS helps minimize the risk to the STA-III PLUS and provides power during a power outage.

### Power, 12 VDC Connector

Connect the 2.1mm barrel type power connector (center positive) into the unit and 12 VDC universal switching power supply with domestic AC connector into a 120 VAC 50-60 Hz power source.

**NOTE:** Never use any type of power supply other than the specified/supplied power supply.

### Chassis Ground (Chs Gnd)

Tie to station ground system.

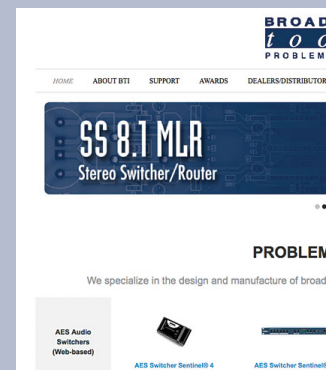
### Telephone Line Connections

**Line Jack:** RJ-11 phone jack used to connect to a loop start POTS telephone line.

**Loop Jack:** RJ-11 phone jack used to loop-thru other telephone equipment. This jack is disconnected from the telephone line when the STA-III Plus is off-hook.

## WEBSITE:

*Visit our web site for product updates and additional information.*





### Audio Input and Output Connections

The STA-III Plus has balanced mono audio inputs and outputs that can be turn off and on via DTMF commands from the phone line. Audio level adjustment can be made from the front panel.

**Input (IN-, IN+):** Balanced audio input (Send) to the telephone line.

**Output (OUT-, OUT+):** Balanced audio output (Caller) from the telephone line.

#### (J07 Top)

OUT- Audio Output	OUT+ Audio Output	Gnd
IN- Audio Input	IN+ Audio Input	Gnd

#### (J07 Bottom)

### Remote Control Inputs

The STA-III Plus has three remote control inputs for interfacing with external equipment. The inputs accept contact closures, open collectors, or TTL/CMOS input logic levels. Each input is pulled high (5-volts) through a 10K resistor and is considered active/on when pulled low to ground.

**Drop Input:** Momentary contact closure to ground (Gnd) will drop the line/end a call.

**Seize Input:** Momentary contact closure to ground (Gnd) will seize the telephone line.

**Busy input:** Sustained contact closure to ground (Gnd) will drop the line and prevent the STA from seizing the line automatically or manually until the input is released.

#### (J06 Top)

Ring Open Collector	Busy Input	Gnd
Drop Input	Seize Input	Gnd

#### (J06 Bottom)

### Relay and Open Collector Outputs

The STA-III Plus has four SPDT relay outputs and one open collector output for interfacing with external equipment.

**Hook (HK) Relay:** This relay closes when the caller enters a valid access code or when the line is manually seized using the seize control. It remains closed for the duration of the call and can be used to trigger an external audio switch (see appendix for diagram.)

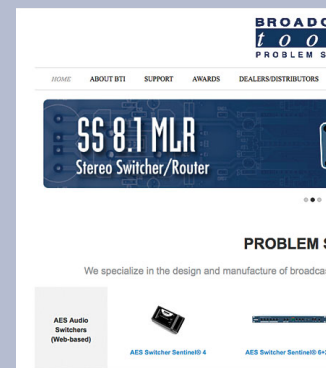
**AUX (AU) Relay:** This relay is controlled by the user via DTMF command.

**PGM Relay:** This relay is controlled by the user via DTMF command.

**Call End (CE) Relay:** This relay will close for 1 second at the end of the call (hang up.)

### WEBSITE:

*Visit our web site for product updates and additional information.*



**Ring Open Collector:** This open collector output indicates each ring occurrence. It can be used to provide a return (ground) for an LED indicator, TTL/CMOS logic or relay. External pull-up resistors may be required in some installations; voltages must be limited to 12 VDC at 100 mA.

**(J05 Top)**

CE-NO (Call End) Normally Open	CE-CM (Call End) Common	CE-NC (Call End) Normally Closed	AU-NO (AUX Relay) Normally Open	AU-CM (AUX Relay) Common	AU-NC (AUX Relay) Normally Closed
PGM-NO (PGM Relay) Normally Open	PGM-CM (PGM Relay) Common	PGM-NC (PGM Relay) Normally Closed	HK-NO (Hook Relay) Normally Open	HK-CM (Hook Relay) Common	HK-NC (Hook Relay) Normally Closed

**(J05 Bottom)**

## Cable Preparation

The STA-III Plus interfaces to external equipment through removable euro-block screw terminals. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire. Before installing a wire, remove the euro-block screw terminal plug and turn each capture screw fully counterclockwise. Strip each conductor to a length of 0.25" and insert the conductor fully into the terminal. Turn the capture screw fully clockwise to secure the conductor. Verify that no bare wires are exposed.

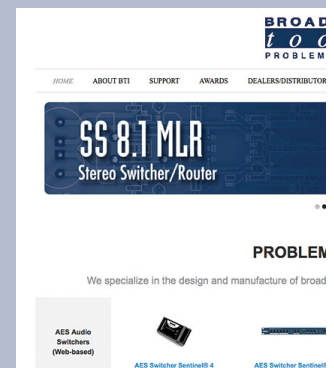
**CAUTION!** Installation of the STA-III Plus in high RF environments should be performed with care. The station ground should be connected to the designated "Chs Gnd" ground terminal.

## Connecting the STA-III Plus

1. Connect the supplied 12 VDC wall power supply to the "12 VDC" power jack on the rear panel of the STA-III Plus.
2. Connect your audio source (air monitor etc.) to the balanced audio input terminal block labeled "IN-, IN+". Adjust the front panel "Input Lvl" trimmer for a good level and check for proper DTMF detection operation. Note: If the audio input level is too high, the unit may have trouble detecting or falsely detect DTMF tones. Reducing the input level and set the guard time jumper JP3 to the "SLOW" position will help prevent this.
3. Connect the balanced audio output of the STA-III Plus to your equipment (switcher, etc.) The output terminal block is labeled "OUT-, OUT+". The output level may be adjusted on the front panel. This control is labeled "Output Lvl."
4. Connect to you external equipment to the STA's relay outputs and remote control inputs.
5. Connect the analog POTS phone line to the "Line" RJ-11 jack and any shared telephone equipment to the rear panel "Loop" RJ-11 jack.

## WEBSITE:

*Visit our web site for product updates and additional information.*



## INSTALLATION

### PROGRAMMING

To program, plug a standard touch-tone® telephone into the program jack on the front panel and press the recessed front panel “PGM” button with a non-metallic device. The PGM LED will illuminate to indicate the STA is in Program mode.

Follow the steps below to change the programming on the STA-III Plus.

1. Enter the number of rings you want the STA-III Plus to answer on. The number of rings may set from 1 to 10 rings. DTMF “0” equals ten rings. Entering \* as the number of rings will put the STA in to a special Audio Only Mode. In this mode it will answer on 1 ring and turn the Caller and Send audio switches on. Control commands are disabled in this mode.
2. Enter a “0” if you want to turn OFF the long dial tone hang-up or a 1 if you want to turn it ON.
3. Enter your chosen access code. The access code can be 0 - 12 digits. Press the PGM button to complete the programming. If no access code is desired just press the PGM button without any additional dialing to complete the programming and return the STA to normal operation.

**Example One:** If you want to program the STA-III Plus to answer on the 3rd ring, with long dial-tone hang up turned OFF and an access code of 567, press the PGM button, dial 30567 and press the PGM button again. You will hear a beep to confirm entry.

**Example Two:** If you want to program the STA-III Plus to answer the phone on the first ring, with long dial-tone hang up turned ON and NO access code, press the PGM button, dial 11 and press the PGM button again. You will hear a beep to confirm entry.

Factory Defaults:	
Number of rings	= 1
Access code	= 123
CPC	= Always ON
Long dial tone	= ON

### Reset to Defaults

The STA-III Plus can be reset to default settings by depressing the recessed front panel “default” push button for five seconds while powering up the unit.

### Jumper Settings

JP1: Tone Enable jumper.

Removing this jumper disables the STA’s tone output.

JP3: DTMF Tone detection jumper (Guard time)

The STA-III Plus is equipped with a 4-position jumper, labeled “JP3” on its PCB. This is used to adjust how quickly DTMF tones are detected. The settings are as follows:

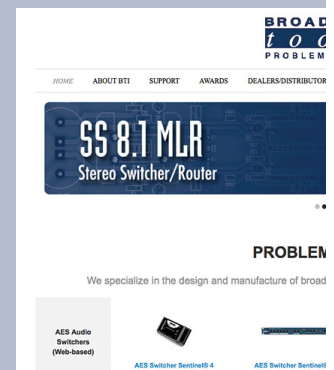
Fast = 50ms ON / 50ms OFF

Medium = 100ms ON / 100ms OFF

Slow = 150ms ON / 150ms OFF.

### WEBSITE:

*Visit our web site for product updates and additional information.*





### OPERATION

Before you started using the STA-III Plus please familiarize yourself with the front panel controls and indicators.

#### Front Panel LED Indicators

- “Power” LED: Lit when power is applied. (Green)
- “Hook” LED: Lit when the STA has seized the telephone line (Off-Hook). (Yellow)
- “Tone” LED: Lights when a valid DTMF tone is detected on the phone line. (Red)
- “Ring” LED: Lights when ringing is detected on the phone line. (Red)
- “PGM” LED: Lit when in Programming Mode. (Yellow)

#### Front Panel Controls/Connections

**Seize Button:** Will force the STA-III Plus off-hook and manually seize/answer the line.

**Drop Button:** Will drop the line/end a call.

**Program Button (PGM):** Program switch, recessed switch used to put the STA-III Plus in programming mode. The PGM LED will light to indicate program mode is active. Press again to exit programming mode.

**Output Level Control:** This control adjusts the output/receive audio level (from the caller). Turn clockwise to increase the volume.

**Input Level Control:** This control adjusts the input/send audio level (to the caller). Turn clockwise to increase the volume.

**PGM Phone RJ-11 Jack:** Attach a touch-tone (DTMF) telephone to this jack and follow the programming instructions to change settings on the STA. 12VDC talk-battery is provided.

#### Auto-Answering a call:

**Step 1** When a call comes in to the STA the front panel Ring LED should light to indicate that the line is ringing.

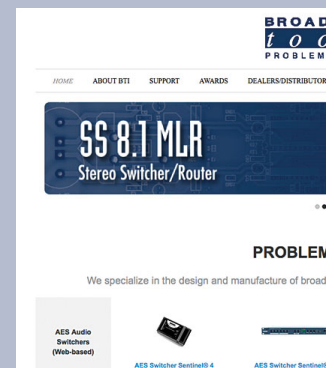
**Step 2** The STA will automatically answer (go off hook) after the programmed number of rings, and beep.

**Step 3** Enter the access code, you will hear a beep to confirm access granted. If no access code has been configured the Hook relay will automatically close and the STA will be ready to control.

**Step 4** If send and receive audio are enabled they will come on after access is granted. NOTE: Be sure you have enabled the send/caller audio with the Audio Control commands below.

#### WEBSITE:

*Visit our web site for product updates and additional information.*



### Dropping a call:

Hang up automatically occurs if the STA receives a 12 second dial tone (if Long Dial Tone is enabled), or when the caller hangs up and a CPC disconnect signal is sent over the phone line. Hang up can be manually triggered with the \*99 command or by the front panel drop button/rear panel drop input.

**NOTE: CPC and loss of loop current are ignored if an off-hook condition is manually initiated by the front panel Seize button/input. Hang-up must be triggered by DTMF command or the Drop button/input.**

### Audio Control Commands:

Once access has been granted the STA-III Plus will automatically recall the previously set audio settings. By default both the input and output are set to off. To change the audio settings use the following commands:

- \*9 # turns OFF input/send (to phone line) audio.
- \*9 \* turns ON input/send audio.
- \*8 # turns OFF output/caller (from telephone line) audio
- \*8 \* turns ON output/caller audio

### Relay Operation:

The Hook (HK) Relay automatically turns ON when a valid access code is entered or the line is manually seized. Once access is granted the AUX and PGM relays can be control using the following commands:

- 3 \* turns ON "AUX" Relay
- 3 # turns OFF "AUX" Relay
- 3 0 turns ON "AUX" Relay for one second
- 5 \* turns ON "PGM" Relay
- 5 # turns OFF "PGM" Relay
- 5 0 turns ON "PGM" Relay for one second

The Call End (CE) Relay closes for 1 second when hang up occurs.

### Firmware Version:

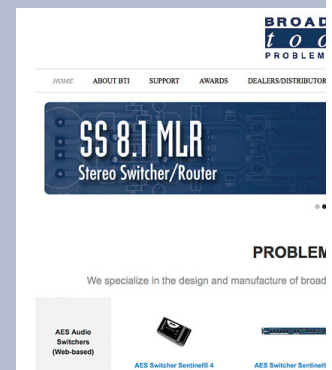
98\* will generate beeps corresponding to the version. For example, version 1.16 will be: Beep (pause) Beep (pause) Beep, beep, beep, beep, beep, beep.

### Hang-up:

- \*99 will cause the STA to hang-up.

### WEBSITE:

*Visit our web site for product updates and additional information.*

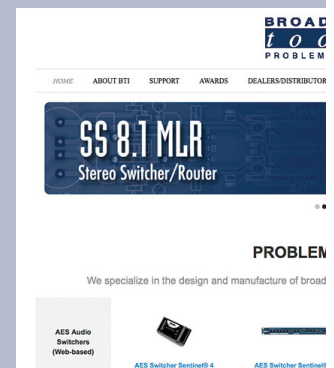


### SPECIFICATIONS

Send input level:	Adjustable, MIL +24dbu, balanced audio input, 20 K $\Omega$ bridging (Input to Phone line).
Caller output level:	Adjustable, Off to +4 dbu, @ 100 $\Omega$ , balanced audio output (Receive from phone line).
Logic:	Flash microprocessor, non-volatile memory, DTMF transceiver.
Relays/OC:	Relays, four SPDT. 30 VDC @ 1 amp maximum. Open collectors (ground sink), 12 VDC @ 100 mA maximum.
<b>CAUTION! For safety, do NOT connect 120 Volt circuits to the relays.</b>	
Remote Control inputs:	Compatible with CMOS/TTL, open collector or contact closures. Active low. Max logic voltage 5 VDC.
Connectors:	Plug-in euro-block screw terminals, mating plugs supplied. 3 - Modular, RJ-11C/W programming telephone, phone line and loop-thru. One modular phone cable supplied.
FCC registration:	Complies with FCC parts 15 & 68. Reg. BRDUSA-36042-OT-T
Ringer equivalence:	0.4B
Power Supply:	12 VDC Input only. CE certified universal switching 12 VDC, 500 mA adapter with domestic AC connector supplied. International connectors optional.
Size:	5.66" x 7.00" x 1.58", aluminum extrusion chassis w/ 4 - 4-40 (or 6/32 screw threads) mounting holes.
Weight:	2.0 lbs.
Options:	* RA-1 rack shelf, holds three units (1-RU) / Filler panels supplied. * International AC Plug kit for wall power supply.

### WEBSITE:

*Visit our web site for product updates and additional information.*



### SPECIFICATIONS

### **LIMITED WARRANTY**

The term "Buyer" as used in this document refers to and includes both (but only) (a) any person or entity who acquires such an item for the purpose of resale to others (i.e., a dealer or distributor of an item), and (b) the first person or entity who acquires such an item for such person's or entity's own use.

Broadcast Tools warrants to each Buyer of any item manufactured by Broadcast Tools that the item will be free from defects in materials and workmanship at the time it is shipped by Broadcast Tools if the item is properly installed, used and maintained.

### **EXCLUSIVE REMEDIES**

If Broadcast Tools is notified, in writing, of a failure of any item manufactured by Broadcast Tools to conform to the foregoing Limited Warranty within one (1) year following the date of the Buyer's acquisition of the item, and if the item is returned to Broadcast Tools in accordance with Broadcast Tools' instructions for confirmation by inspection of the defect (which at Broadcast Tools' election may include, without limitation, a requirement that the Buyer first obtain a Return Authorization number from Broadcast Tools, that the Buyer furnish proof of purchase in the form of an invoice and/or receipt, and that the Buyer prepay all freight charges associated with any return of the item to Broadcast Tools using such freight service as Broadcast Tools reasonably may specify), Broadcast Tools will repair or replace the defective item, or will refund the purchase price paid by the Buyer for the item. Broadcast Tools shall have the exclusive right to choose between these alternative remedies.

### **NO OTHER WARRANTIES OR REMEDIES**

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, BROADCAST TOOLS AND ITS SUPPLIERS DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE; AND THE FOREGOING ALTERNATIVE REMEDIES SHALL BE EXCLUSIVE OF ALL OTHER REMEDIES. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

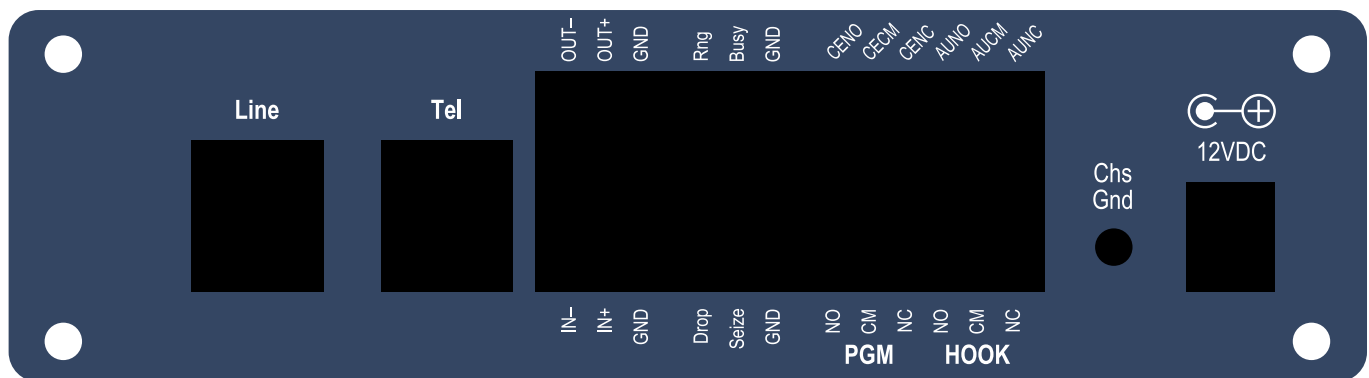
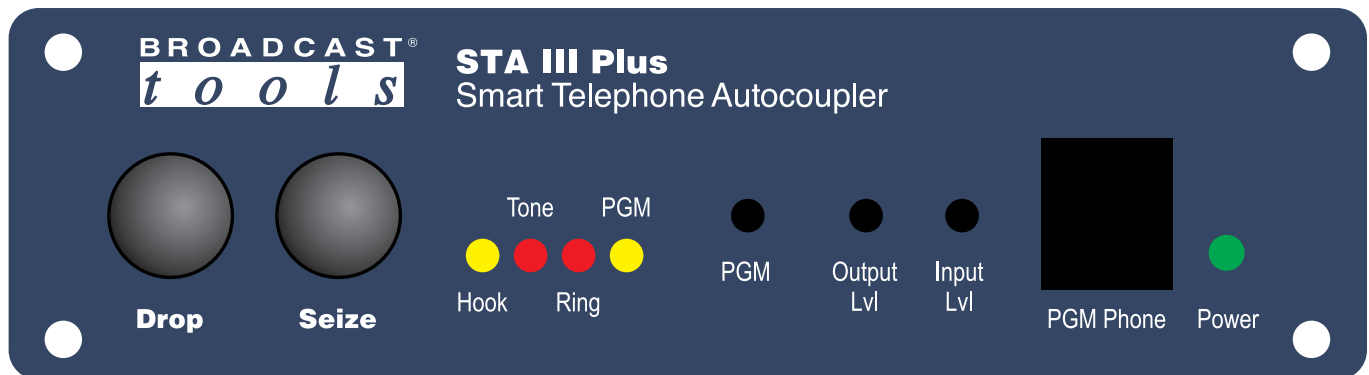
### **NO LIABILITY FOR CONSEQUENTIAL DAMAGES**

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, NEITHER BROADCAST TOOLS NOR ANY OF ITS SUPPLIERS SHALL HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, ANY DAMAGES FOR LOST PROFITS, BUSINESS INTERRUPTION, LOSS OF DATA OR INFORMATION, COST OF CAPITAL, CLAIMS OF CUSTOMERS, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR THE INABILITY TO USE ANY ITEM SUPPLIED BY BROADCAST TOOLS, EVEN IF BROADCAST TOOLS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR PUNITIVE DAMAGES. THIS LIMITATION OF LIABILITY APPLIES WHETHER A CLAIM IS ONE ALLEGING BREACH OF A CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT, FOR THE VIOLATION OF ANY STATUTORY DUTY, THE FAILURE OF ANY LIMITED OR EXCLUSIVE REMEDY TO ACHIEVE ITS ESSENTIAL PURPOSE, OR ANY OTHER CLAIM OF ANY NATURE. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, THIS LIMITATION MAY NOT APPLY TO YOU.

#### **Broadcast Tools, Inc.**

131 State Street  
Sedro-Woolley, WA 98284 • USA

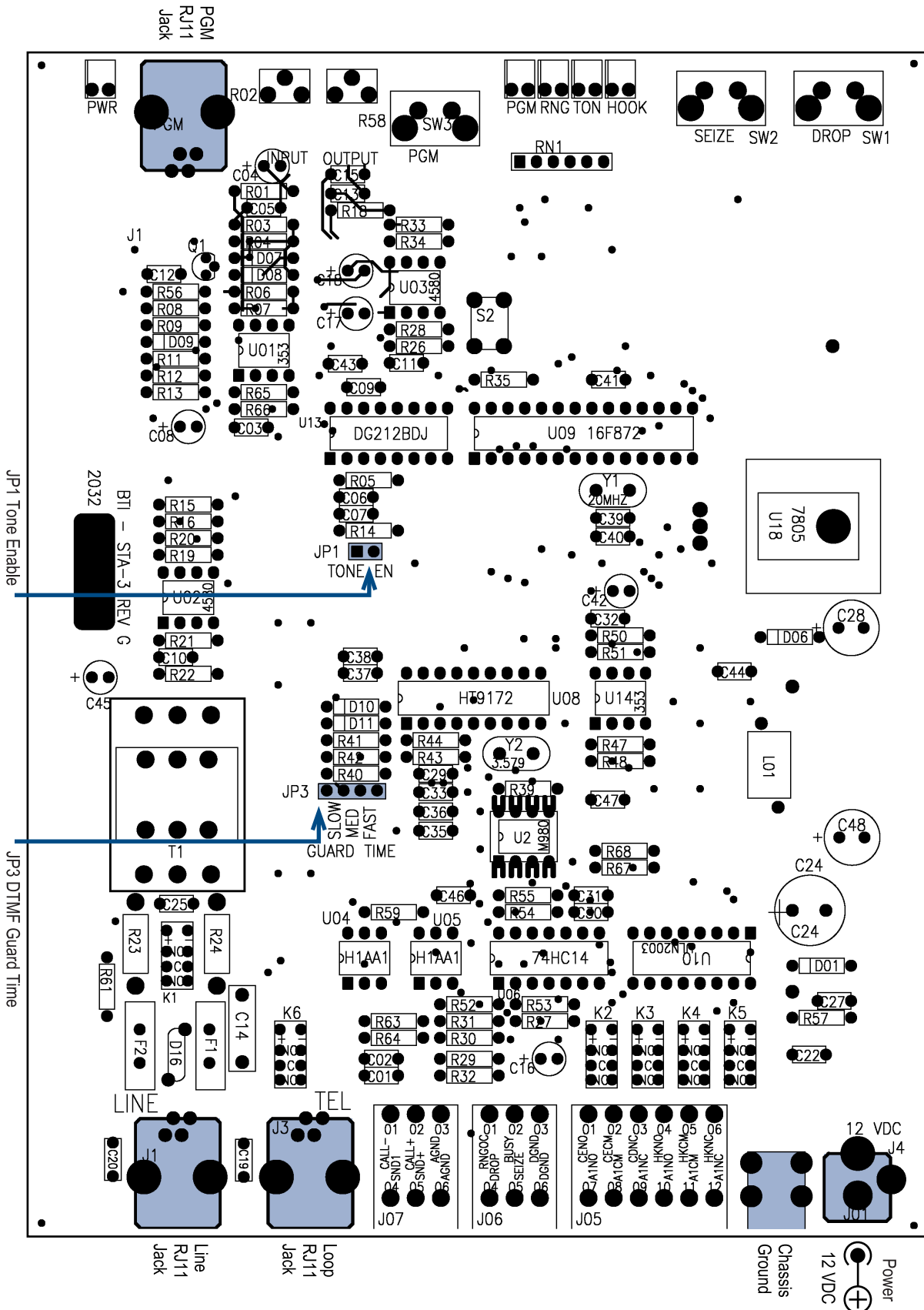
360.854.9559 **voice** • 866.783.1742 **fax**  
support@broadcasttools.com **e-mail**  
www.broadcasttools.com **website**





# STA-III Plus

## Component Layout



## FRACTIONAL SCHEMATIC



# Broadcast Tools® STA-III Plus & SS2.1 MLR/Term

## Installation Application

