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Installation and Operation Manual



Silence Sentinel[®] Standard

Firmware version: PIC1.04 or greater.

Manual updated 02/02/2017

If you need a firmware upgrade, contact Broadcast Tools[®]

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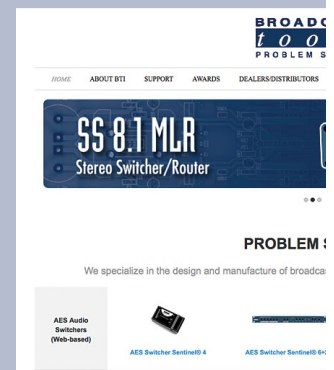
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INTRODUCTION

Thank you for your purchase of a Broadcast Tools® Silence Sentinel® Standard (referred to as the Silence Sentinel® Standard throughout this manual). 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® Silence Sentinel® Standard.

SAFETY INFORMATION

Only qualified technical personnel should install the Silence Sentinel® Standard. 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 Silence Sentinel® Standard 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 Silence Sentinel® Standard. 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.

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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.

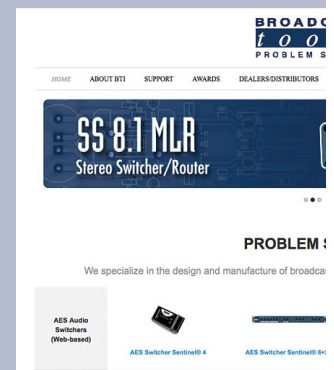


NOTE:

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INTRODUCTION

Product Overview

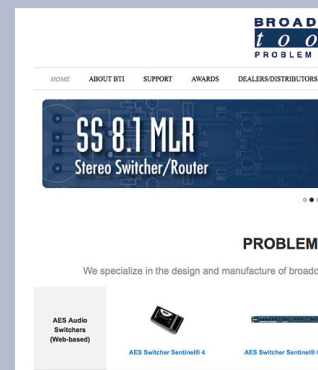
The Broadcast Tools® Silence Sentinel® Standard is designed to monitor any two stereo analog audio sources for silence or an out of phase condition, polarity, generate alarms and transparently switch to a back-up source using mechanically latching relays. Additional features include: front panel controls, remote control inputs and status outputs; plug-in euroblock screw terminals; dipswitch selection of silence detection of -20, -25, -30 and -35db below zero reference; precise alarm timing delay from off to 85 minutes; precise restore timing delay from off to 21 minutes. The Silence Sentinel® Standard 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.

Features/Benefits

- Transparent stereo program switcher with front panel input selection switches and indicator LED's.
- Front panel "Manual/Automatic" switch with front panel LED, remote input and open collector status output.
- Stereo output LED level display.
- "External Ext" alarm trigger input with front panel LED indicator.
- Front Panel Power/Heartbeat LED.
- Dipswitch selection of silence detection of -20, -25, -30 and -35dB below zero reference.
- Dipswitch selection of reverse polarity (out of phase) detection.
- Dipswitch selection of alarm time delay from OFF to 8 minutes, 30 seconds in 2 second increments or 85 minutes in 20 second increments.
- Dipswitch selection of restore timing delay from OFF to 21 minutes in 20 second increments.
- Audio switching via mechanical latching sealed relays utilizing 2-form-C bifurcated - crossbar silver alloy with gold overlay contacts.
- Two independent SPDT alarm relays and LED indicators.
- Two pulse open collector alarm outputs.
- Active balanced stereo input level monitoring.
- Logic functions via microprocessor and non-volatile memory.
- Plug-in euroblock screw terminals, mating plugs supplied.
- Fully RFI proofed.
- Surge protected internal power supply, PS-1515 universal switching +/- 15VDC 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.

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Installation Guidelines

Inspection

Please examine your Silence Sentinel® Standard for any damage that may have been sustained during shipping. If any is noted, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the Silence Sentinel® Standard and +/- 15 volt DC @ 400 ma wall universal switching (PS-1515) power supply with domestic power plug. Manuals may be downloaded from our web site.

Mounting

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

Surge Protection

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

UPS Standby Power System

We recommend that you connect your Silence Sentinel® Standard to a UPS system. A UPS helps minimize the risk to the Silence Sentinel® Standard and provides power during a power outage.

POWER: +/- 15 VDC power connector

Connect the 3-pin AMP-style latching power connector to the unit and the +/-15 VDC switching power supply with domestic connector into a 120 Vac 50-60 Hz power source. Never use any type of power supply other than the specified/supplied (PS-1515) power supply.

Cable Preparation

The Silence Sentinel® Standard interfaces to external equipment through removable euroblock screw terminals. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire. Before installing a wire, remove the euroblock 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.

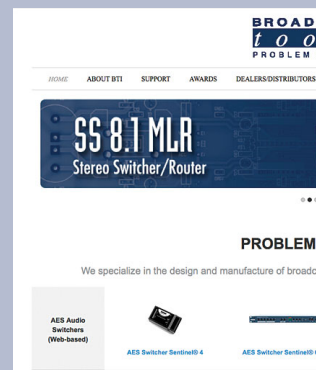


CAUTION!

Installation of the Silence Sentinel® Standard in high RF environments should be performed with care. The station ground should be connected to the designated "Chs Gnd" ground terminal.

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Connecting your equipment

Silence Sentinel® Standard connection configuration for Backup Switching:

1. Connect the source (MAIN/PRIMARY) equipment (Console, Automation, etc) to 1L- and 1L+ for the left channel and 1R- and 1R+ for the right channel.
2. Connect the source (BACKUP) equipment (CD player, etc) to 2L- and 2L+ for the left channel and 2R- and 2R+ for the right channel.
3. Connect the destination equipment (PROCESSING) to OL- and OL+ for the left and OR- and OR+ for the right channel.

Audio inputs may be balanced or unbalanced. When using unbalanced sources, feed the + input and jumper the minus (-) input to GND. When using a monaural source, tie the left and right inputs together and observe proper stereo phasing.

Input 2 (Top row, TB1)					Output (Top row, TB2)				
2L-	2L+	Gnd	2R-	2R+	OL-	OL+	Gnd	OR-	OR+
1L-	1L+	Gnd	1R-	1R+					
Input 1 (Bottom row, TB1)					(Bottom row, TB2)				

NOTE: If the audio source is a tuner or receiver, be sure to feed the input(s) from the fixed output, such as the tape monitor outputs.

Relay and Open Collector connections

The K1 and K2 SPDT relays provide switch position tallies for the Silence Sentinel® Standard. K1 is closed when Input 1 is switched to the output, K2 is closed when Input 2 is switched to the output.

The Silence Sentinel® Standard has four open collector outputs that are used to indicate input silence alarm status, auto/manual mode or phase alarm. The A1 OC indicates an alarm for Input 1 and the A2 OC indicates an alarm for Input 2. If phase monitoring is enabled the AMOC open collector acts as a phase alarm indicator and when phase monitoring is disabled it acts as an Auto/Manual mode status indicator. The IROC open collector output will activate if silence is detected on both input channels at the same time. These open collector outputs will go low providing a return for an LED indicator, TTL/CMOS logic or relay. External pull-up resistors may be required in some installations; voltages must be limited to 6 VDC at 100 mA.

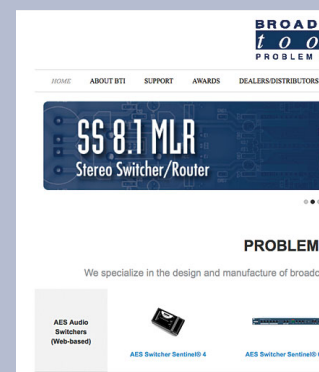
(TB3 Top)

K1NC (IN1 Tally)	K1CM (IN1 Tally)	K1NO (IN1 Tally)	AMOC (Auto/Man. or Phase)	IROC	DGND
K2NC (IN2 Tally)	K2CM (IN2 Tally)	K2NO (IN2 Tally)	A1OC (IN1 Alarm)	A2OC (IN2 Alarm)	DGND

(TB3 Bottom)

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CONNECTION

Remote Control connections

The Silence Sentinel® Standard has four remote control inputs that accept momentary contact closures, open collector, or TTL/CMOS input logic levels. Each input is pulled high (5-volts) through a 22K resistor and is considered active/on when pulled low to ground.

(Top row, TB2)

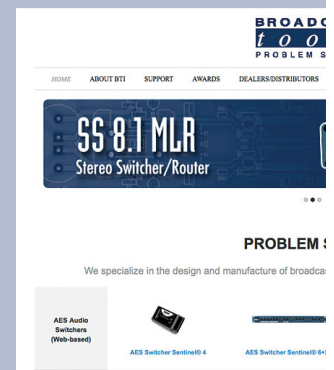
CH1 (Input 1)	CH2 (Input 2)	A/M (Auto/Manual.)	EXT (EXTernal)	DGND
------------------	------------------	-----------------------	-------------------	------

(Bottom Row, TB2)

All of the inputs except for the “Ext” input are triggered by momentary closure to ground. For example, pulsing the “CH2” input to ground would switch the unit to input 2 until a front panel source switch is pressed or a different remote control input is activated. The remote external transfer input (“Ext”) requires a sustained closure to ground to switch to input 2 and when the closure is removed, the unit will switch back to input 1.

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Programming Guidelines

DIPSwitch Setup

Locate dipswitch SW-5 & 6 on the rear panel of the unit and follow the grids below.

Delay timing setup

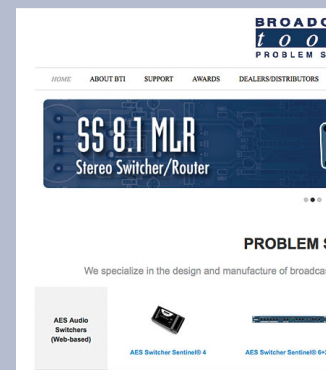
The alarm delay time period is the time between when valid audio fails and when an alarm is triggered. The Silence Sentinel® Standard's alarm time delay is set using the first 9 positions of the SW5 dip-switch on the back of the unit. The table below provides TWO second resolution settings. To provide longer time resolution, turn SW5 switch 9 ON, which will provide 20 second resolution. For the factory default setting, as shown in the two-second-resolution table below, we have turned ON switches one and two. Each switch has a digit value as shown in the two tables below. Follow the two-second-resolution table below. We add these digit values together to obtain a total digit value. The total digit value is the multiplied by the resolution value, either two or twenty seconds, to obtain the delay time.

NOTE: The following table refers to the time delay in seconds.

Time Delay	Two (2) Second Resolution Table								
SW5 Switch positions and switch number nine OFF.	1	2	3	4	5	6	7	8	9
Digit Value	1	2	4	8	16	32	64	128	2/20 sec's
→ EXAMPLES:									
1 = 2 seconds	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓
1 + 2 = 3 x 2 = 6 seconds	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓
1 + 2 + 4 = 7 x 2 = 14 seconds	ON ↑	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓
32 x 2 = 64 seconds, or 1 minute and 4 seconds	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑	OFF ↓	OFF ↓	OFF ↓
255 x 2 = 510 seconds, or 8 minutes and 30 seconds	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	OFF ↓

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Time Delay

Twenty (20) Second Resolution Table

SW5 Switch positions and switch number nine ON.	1	2	3	4	5	6	7	8	9
Digit Value	1	2	4	8	16	32	64	128	2/20 secs
➔ EXAMPLES:									
1 = 20 seconds	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑
1 + 2 = 3 x 20 = 60 seconds or 1 minute	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑
1 + 2 + 4 = 7 x 20 = 140 seconds or 2 minutes and 20 seconds	ON ↑	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑
32 x 20 = 640 seconds or 10 minutes and 40 seconds.	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑	OFF ↓	OFF ↓	ON ↑
255 x 20 = 5,100 seconds or 85 minutes.	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑	ON ↑

Restore timing setup

The restore period is the time between when valid audio returns and when the alarm is cleared. The Silence Sentinel® Standard restore time delay is with the first 7-positions on the SW6 dipswitch of the back of the unit. Up = Off, Down = On. The table below provides TWO second resolution settings. To provide longer time resolution, turn SW6 switch 7 ON, which will provide 20 second resolution. All seven switches are set at the factory for OFF, NO restore delay. Each switch has a numeric value as shown in the two tables below. Follow the two-second-resolution table below. The total digit value is the multiplied by the resolution value, either two or twenty seconds, to obtain the restore delay time. **NOTE: The following table refers to the restore time delay in seconds.**

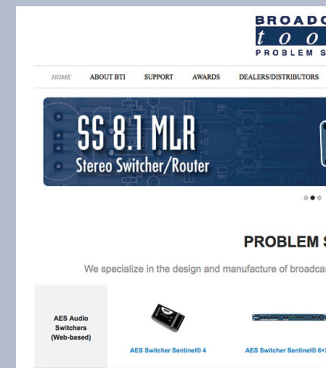
Restore Delay

Two (2) Second Resolution Table

SW6, switch positions and switch 7 OFF.	1	2	3	4	5	6	7
Digit Value	1	2	4	8	16	32	2/20 secs
➔ EXAMPLES:							
1 = 2 seconds	ON ↓	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑
1 + 2 = 3 x 2 = 6 seconds	ON ↓	ON ↓	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑
1 + 2 + 4 = 7 x 2 = 14 seconds	ON ↓	ON ↓	ON ↓	OFF ↑	OFF ↑	OFF ↑	OFF ↑
32 x 2 = 64 seconds, or 1 minute and 4 seconds	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	ON ↓	OFF ↑
Restore is turned OFF.	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑

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Restore Delay Twenty (20) Second Resolution Table

SW6, switch positions and switch 7 ON.	1	2	3	4	5	6	7
Digit Value	1	2	4	8	16	32	2/20 <u>secs</u>
➔ EXAMPLES:							
1 = 20 seconds	ON ↓	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	ON ↓
1 + 2 = 3 x 20 = 60 seconds or 1 minute	ON ↓	ON ↓	OFF ↑	OFF ↑	OFF ↑	OFF ↑	ON ↓
1 + 2 + 4 = 7 x 20 = 140 seconds or 2 minutes and 20 seconds	ON ↓	ON ↓	ON ↓	OFF ↑	OFF ↑	OFF ↑	ON ↓
32 x 20 = 640 seconds or 10 minutes and 40 seconds.	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	ON ↓	ON ↓
Restore is turned OFF.	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	OFF ↑	ON ↓

Silence sense threshold settings

The silence sensor trip levels are referenced from zero dBu. Switches 8 and 9 on dip-switch SW6 are used to set the silence sensor trip levels. The factory default is both switches OFF, (-20). We recommend setting the trip level to -25 for most installations.

Sensitivity	SW6, switch 8	SW6, switch 9
- 20 db	OFF ↑	OFF ↑
- 25 db	ON ↓	OFF ↑
- 30 db	OFF ↑	ON ↓
- 35 db	ON ↓	ON ↓

Switcher bounce setting

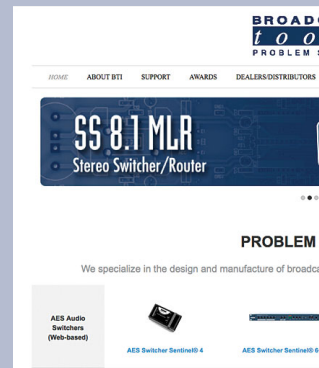
With the switcher bounce feature on (SW5-10 ON) in Auto mode the unit will automatically restore to the primary input when valid audio returns to it. With switcher bounce OFF (SW5-10 OFF) in Auto mode manual/remote control will be required for the unit to switch back to input one after an alarm event causes it to switch to the back-up input.

Phase monitoring setting

The Silence Sentinel® Standard is capable of monitoring both of its inputs for out of phase stereo audio (phase-cancellation) as well as silence. To enable this feature place SW6-10 in the On position. When out of phase audio is detected on an input its alarm LED will flash and the “AMOC” open collector output will activate. If the unit is auto mode it will switch on silence alarms and phase alarms.

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PROGRAMMING

Operational Guidelines

Operation

Front Panel LED indicators

- “PWR/HB” LED: Blinks to indicate operation when power is applied. (Green)
- “EXT” LED: Lit when EXTERNAL alarm input is active. (Yellow)
- “ALM-1” LED: Lit = Input 1 silence alarm. Flashing = Input 1 phase alarm. (Red)
- “ALM-2” LED: Lit = Input 2 silence alarm. Flashing = Input 2 phase alarm. (Red)
- “Auto” LED: Lit when in automatic switching mode, in manual mode when not lit. (Green)
- “Enable” LED: Illuminates when the front panel enable push button option is enabled.
- “ON” LEDs: Lit when input is routed to output. (Green)
- “ACT” LEDs: Lit when input audio is above threshold. (Yellow)
- Stereo Level Meter LEDs:

Front Panel Controls

“1” and “2” pushbuttons: Used to select which input is routed to the output when in Manual mode. Each push button has an associated LED indicator, which will illuminate when that particular channel is selected. When a channel is selected, the previous channel is deselected (interlock).

“Auto” pushbutton: Used to toggle between automatic and manual switching modes.

“Enable” pushbutton: The enable (safety) push button can be enabled to require the user to hold down the enable push button while selecting any of the other front panel push buttons, the enable LED is illuminated when this function is selected by setting the JP3 jumper on the printed circuit board.

Operation Modes

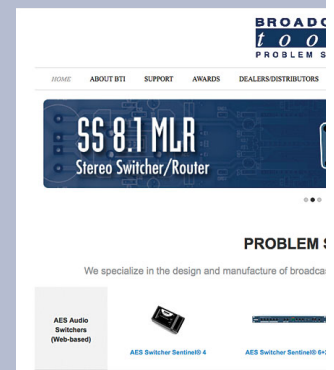
Both of the inputs on the Silence Sentinel® Standard are constantly monitored for audio level. If an input's audio is above the silence sense threshold its ACT LED will be lit, if the input audio goes below the threshold the ACT LED will extinguish. If the inputs audio remains below threshold for the configured alarm delay time then its alarm LED and alarm open collector output (ALM1 or ALM2) will activate to indicate silence on that input.

When the Silence Sentinel® Standard is in Auto (automatic switching) mode with Switcher Bounce enabled the following actions will occur when silence is detected on Input 1:

1. The front panel Input 1 ACT LED will extinguish to indicate that the input audio on one or both of the inputs stereo channels has dropped below the silence sense threshold.
2. After the alarm delay time expires the unit will automatically switch to the backup input (Input 2.)
3. The ALM1 alarm LED and open collector output will activate. The K2 relay will close and the K1 relay will open.

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OPERATION

When both stereo channels on Input 1 return to normal (above the silence sense threshold) the following action occurs:

1. The front panel Input 1 ACT LED will light to indicate that the audio on both of the Input 1 stereo channels is above of the silence sense threshold.
2. After the restore delay time has expired with the audio above the silence sense threshold (if configured) the unit will automatically switch back to the primary input (Input 1.)
3. The ALM1 alarm LED and open collector output will de-activate. The K2 relay will open and the K1 relay will close.

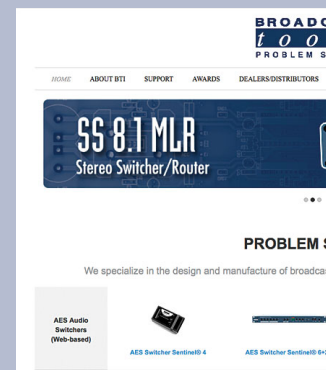
When the Silence Sentinel® Standard is in Manual (manual switching) mode the following actions will occur when silence is detected:

1. The front panel Input ACT LED will extinguish to indicate that the input audio on one or both of the inputs stereo channels has dropped below the silence sense threshold.
2. After the alarm delay time expires the unit will automatically the ALM1 and/or ALM2 alarm LEDs and open collector outputs will activate. If silence is detected on both inputs the IROC open collector output will activate.

NOTE: If phase monitoring is enabled the alarm LEDs will flash to indicate phase-cancellation has been detected and the AMOC open collector output will activate.

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Specifications

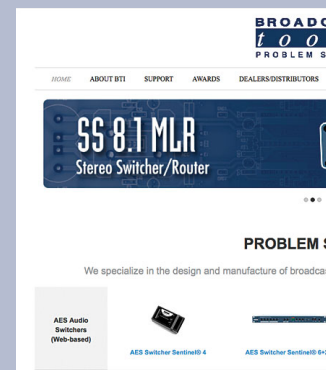
Input Level:	-15 to +24 dBu, MIL. 22 K ohm, balanced.
Silence Sense trip levels:	-20, -25, -30 and -35dB below zero reference.
Alarm Delay:	OFF to 85 minutes in 20 seconds increments and OFF to 8 minutes, 30 seconds in 2 second increments.
Restore Delay:	OFF to 21 minutes in 20 second increments and OFF to 2 minutes / 6 seconds in 2 second increments.
Remote control:	Remote EXT input requires a sustained closure to ground, all others, momentary closure to ground.
Relays, K1 and K2:	SPDT dry contacts each, 30 VDC @ 1 Amp.

CAUTION! For safety, never connect 120 Vac circuits to the above relays!

Open collector outputs:	Each output sinks 6 vdc @ 100 mA (max.)
Connectors:	Removable euroblock screw terminals.
Power supply:	PS-1515 universal switching power supply with domestic AC connector supplied. International connectors optional. +/-15 VDC 400mA output with 3-pin AMP-style latching power connector.
Operating Temperature:	-40°F to +185°F (-40°C to +85°C)
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 lb.
Options:	*International power plug adapters. * RA-1, 1-RU rack shelf. Accommodates three units.

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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.

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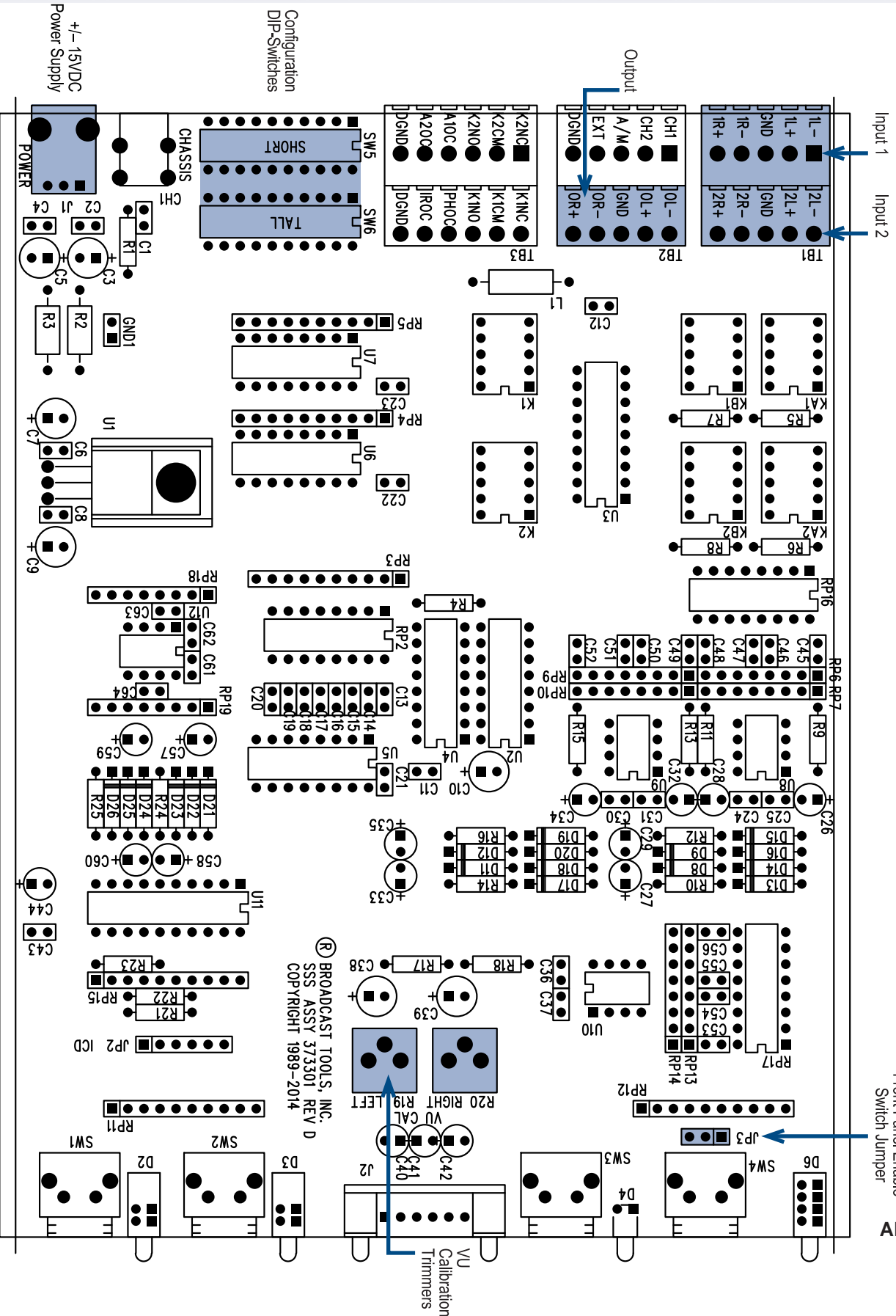
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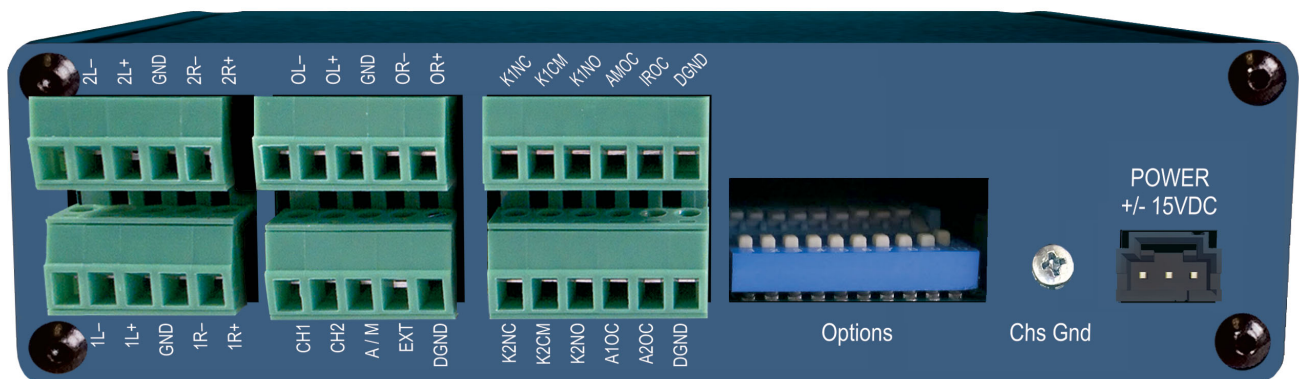
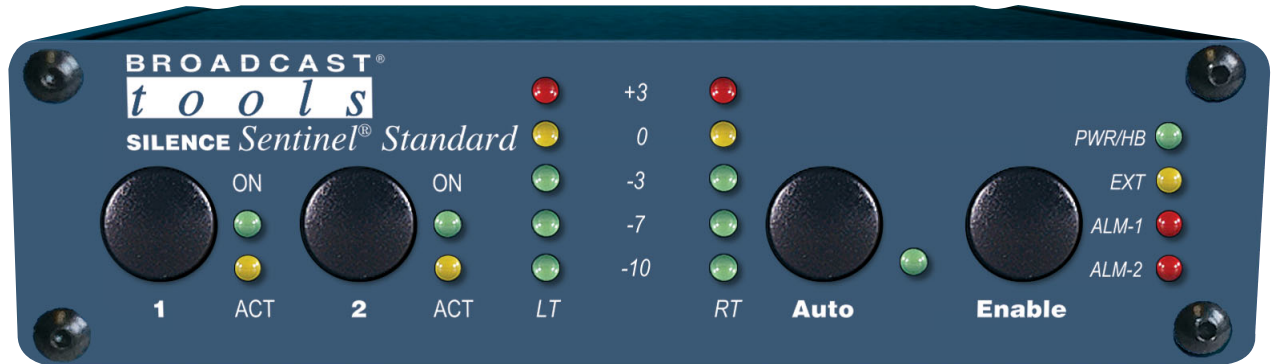
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Component Layout

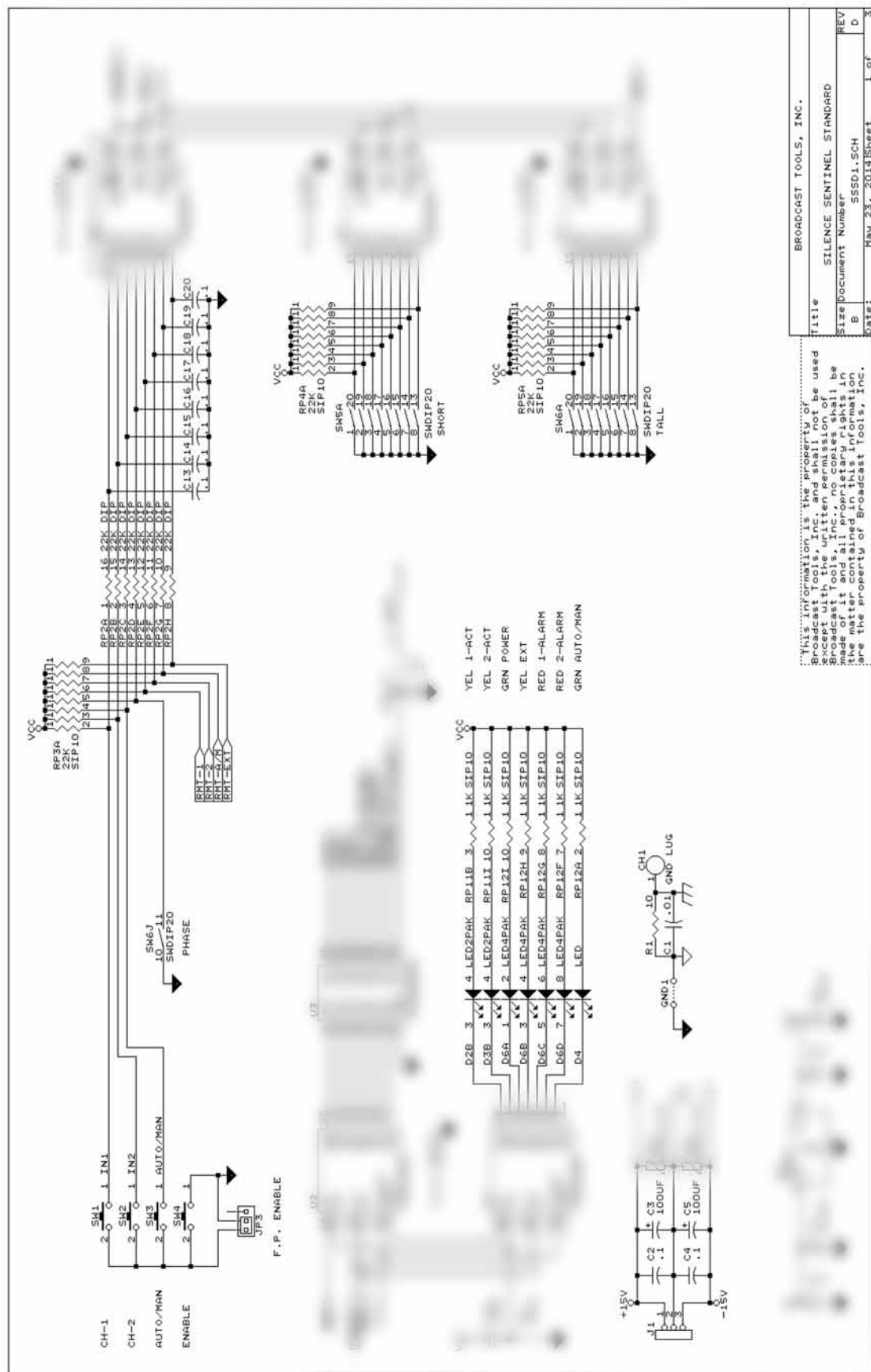


APPENDIX

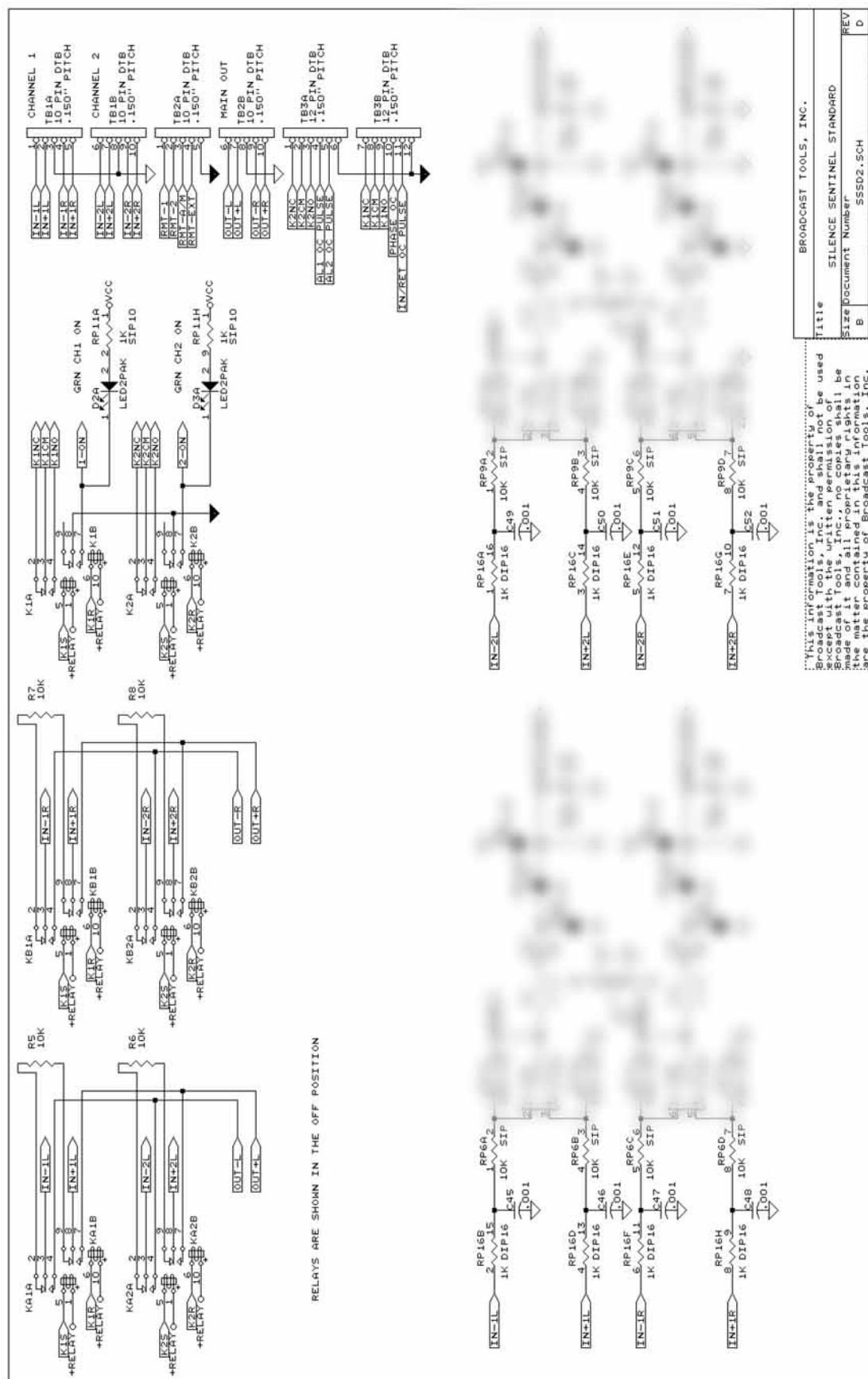
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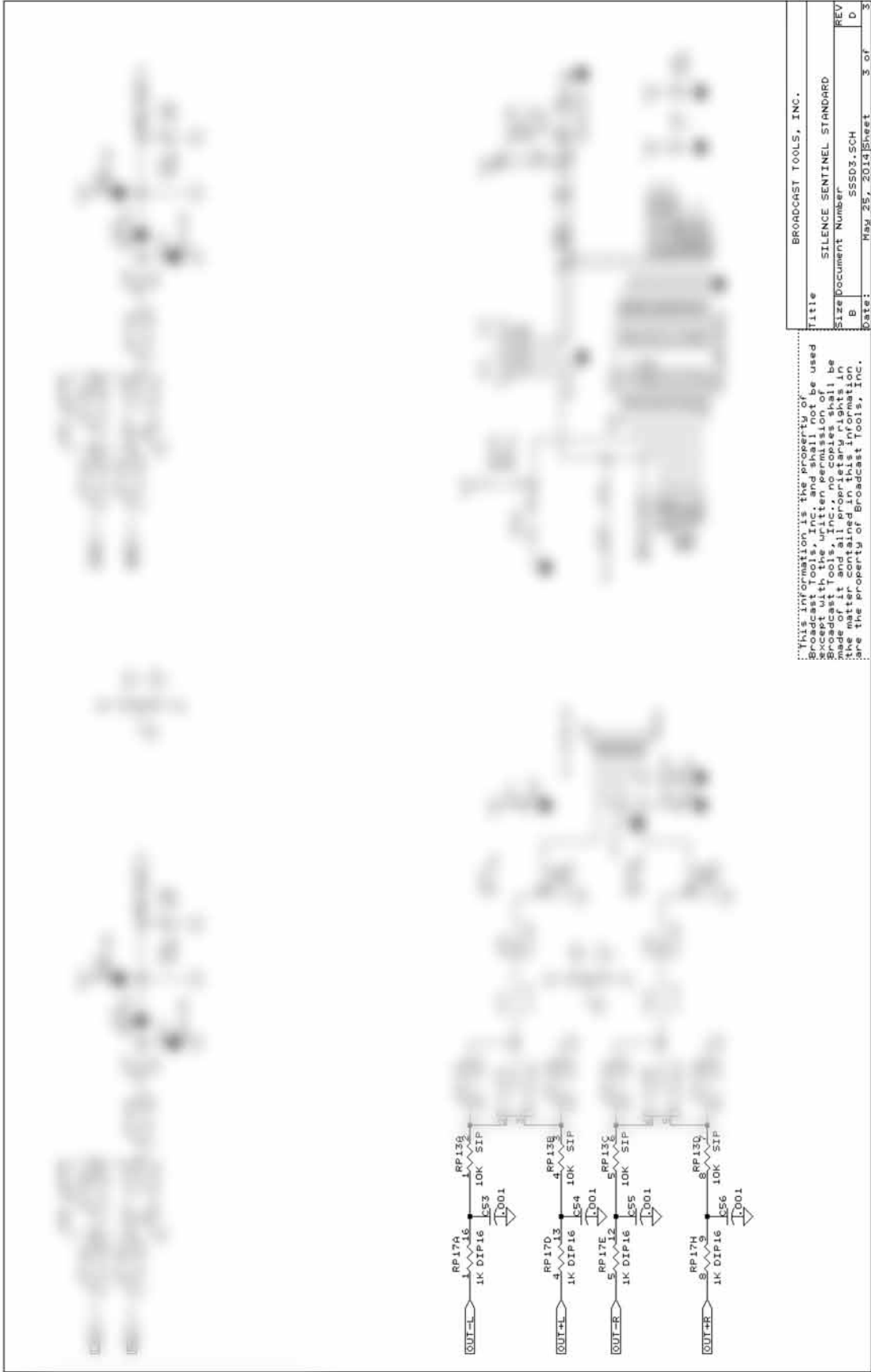
APPENDIX



APPENDIX



FRACTIONAL SCHEMATIC



BROADCAST TOOLS, INC.		
Title		
SILENCE SENTINEL STANDARD		
Size/Document Number		
B	SSSD3.SCH	REV
Date:		
May 25, 2014	Sheet	3 of 3

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