

BROADCAST[®] tools INC

PROBLEM SOLVED

Installation and Operation Manual



Silence Sentinel[®] RJ *Dual Channel Stereo Silence Sensor*

Firmware version: PIC1.08 or greater.

Manual updated 05-11-2022

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

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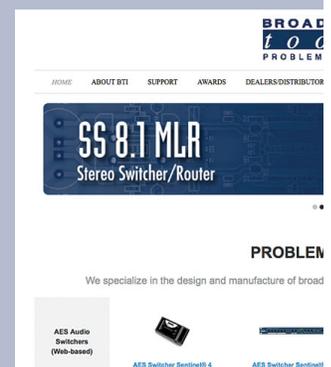
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INTRODUCTION

Thank you for your purchase of the Broadcast Tools® Silence Sentinel® RJ (referred to as the Silence Sentinel® RJ 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® RJ.

SAFETY INFORMATION

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

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
E-mail: support@broadcasttools.com

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BROADCAST TOOLS® BRAND PRODUCTS!**

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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.

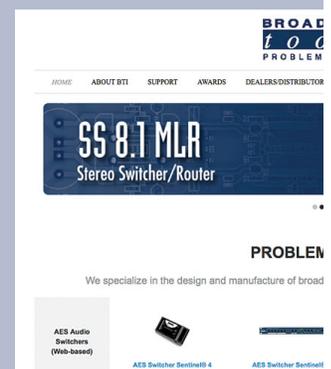


NOTE:

This manual should be read thoroughly before installation and operation.

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Product Overview

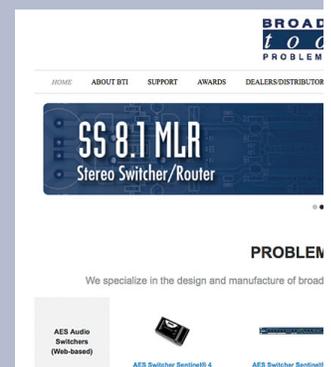
The Broadcast Tools® Silence Sentinel® RJ is designed to monitor any two stereo analog audio sources for silence or an out of phase condition (polarity), generate alarms, and transparently switch to a back-up source using mechanically latching relays. Additional features include front panel controls, remote control inputs and status relay outputs, RJ45 audio connectors, plug-in euroblock screw terminals for remote control, dipswitch configuration of silence detection from -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® RJ may be set on a desktop, mounted on a wall or optional RA-1 rack shelf for mounting up to two units in 1-RU.

Features/Benefits

- Transparent stereo program switcher with front panel input selection switches, indicator LEDs, and tally relay outputs.
- Front panel “Manual/Automatic” switch with front panel LED, remote input, relay output.
- “External Ext” alarm trigger input with front panel LED indicator.
- Front Panel Power/Heartbeat LED.
- Dip-switch selection of silence detection of -20, -25, -30 and -35dB below zero reference.
- Dip-switch selection of reverse polarity (out of phase) stereo detection.
- Dip-switch selection of alarm time delay from OFF to 8 minutes, 30 seconds in 2 second increments or 85 minutes in 20 second increments.
- Dip-switch 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 SPDT switch position tally relays, four SPST status/alarm relays.
- Logic functions via microprocessor and non-volatile memory.
- RJ45 connectors for audio and plug-in euroblock screw terminals for remote control, mating plugs supplied.
- Fully RFI proofed.
- Surge protected internal power supply, 9 VDC universal desktop power adapter with IEC inlet included.
- 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 two units in 1-RU. Velcro mounting

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Installation Guidelines

Inspection

Please examine your Silence Sentinel® RJ 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® RJ, 9 VDC wall universal switching power supply with domestic power plug and Velcro feet. Manuals may be downloaded from our web site.

Mounting

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

Surge Protection

The Silence Sentinel® RJ 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® RJ 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

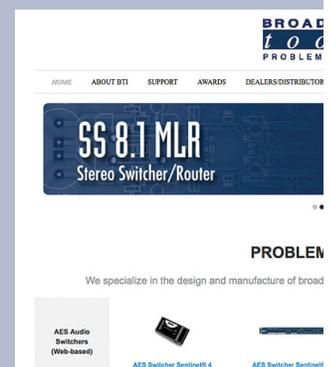
We recommend that you connect your Silence Sentinel® RJ to a UPS system. A UPS, like the BE600M1 from APC helps to minimize the risk to the Silence Sentinel® RJ and provides power during a power outage.

POWER: 9-12 VDC power connector

Connect the center-positive coaxial type power connector from the supplied switching power supply to the power jack on the unit. Plug the power supply's IEC AC cord into a 100-240 Vac 50-60 Hz power source. Never use any type of power supply other than the specified/supplied power supply.

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Cable Preparation

The Silence Sentinel® RJ interfaces to external remote-control 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.

Audio Connector Pinouts

The Silence Sentinel® RJ interfaces to external equipment via RJ45 audio jacks for audio signals, and removable euro-block screw terminals for status and control.

The terminals blocks accommodate wire sizes from 16 - 28 AWG solid or stranded. 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.

RJ45 Connectors

The input and output RJ45 jacks conform to the RJ45 audio wiring standards. Please use shielded twisted pair Cat5e or Cat6 cables and connectors (STP).

RJ45 Pinout:

Function:	Wire Pair:	RJ45 Pins:
Left+	White/Orange	1
Left-	Orange/White	2
Right+	White/Green	3
Right -	Green/White	6
n/c	White/Blue	5
GND	Blue/White	4
n/c	White/Brown	7
n/c	Brown/White	8
GND	Shield	Shield

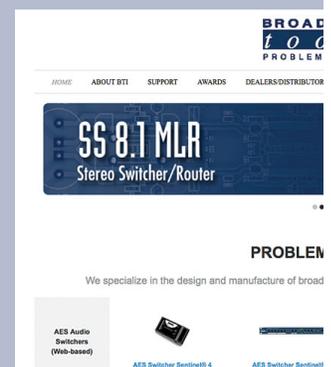


CAUTION!

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

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Audio Inputs and Outputs

The Silence Sentinel® RJ's two inputs and output have RJ45 audio jacks. Audio switching is accomplished via mechanical latching gold contact relays which means that it will keep routing signal even after losing power.

RJ45 Audio Inputs and Outputs

Input 1	Input 2	Output
RJ45	RJ45	RJ45
(J8)	(J9)	(J7)

Connecting your equipment

Silence Sentinel® RJ audio connection configuration for Backup Switching:

1. Connect the source (MAIN/PRIMARY) equipment (Console, etc.) to Input 1 jack.
2. Connect the source (BACKUP) equipment (CD player, etc.) to Input 2 RJ45 jack.
3. Connect the destination equipment (PROCESSING) to the Output RJ45 jack.

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.

Relay Outputs and Remote Control Inputs

The K1 and K2 SPDT relays provide switch position tallies for the Silence Sentinel® RJ. K1 is closed when Input 1 is switched to the output, K2 is closed when Input 2 is switched to the output. In addition to the two tally relay outputs, the Silence Sentinel® RJ has four SPST relay outputs with a shared relay COMmon, that are used to indicate input silence alarm status, auto/manual mode, or phase alarm. The K4 relay indicates an alarm for Input 1 (ALM1) and K5 relay indicates an alarm for Input 2 (ALM2.) If phase monitoring is enabled the K6 relay acts as a phase alarm indicator and when phase monitoring is disabled, it acts as an Auto/Manual mode status indicator. The K3 relay output will activate if silence is

(TB-1 Top)

RMT1 Input	RMT2 Input	Auto/ Manual Input	EXtErnal Input	K4NO (In1 Alarm)	K5NO (In2 Alarm)	K6NO (Auto/Man. or Phase)	GND (Ground)
K1NO (IN1 Tally)	K1CM (IN1 Tally)	K1NC (IN1 Tally)	K2NO (IN2 Tally)	K2CM (IN2 Tally)	K2NC (IN2 Tally)	K3NO (IR Alarm)	COM (Relay common)

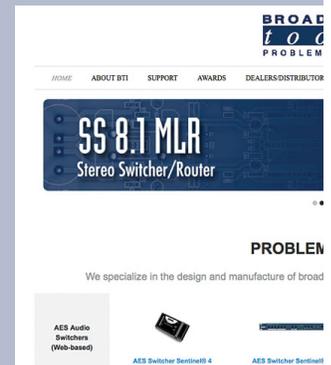
(TB-1 Bottom)

The Silence Sentinel® RJ has for four remote control inputs that and 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.

All the remote-control inputs except for the “EXtErnal” input are triggered by momentary closure to ground. For example, pulsing the “RMT2” 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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INSTALLATION

Programming Guidelines

Dip Switch Setup

Silence Sentinel® RJ is configured via two 10-position dipswitches, SW-4 and SW-5, located on the front panel of the unit. Follow the grids below to set the delay times, threshold, and modes.

Delay timing setup

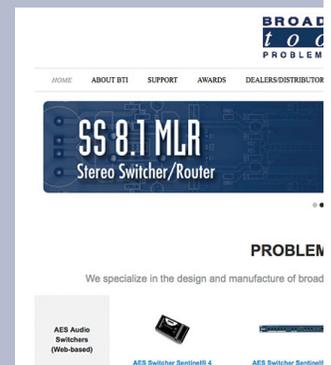
The alarm delay time is the time between when valid audio fails and when an alarm is triggered. The Silence Sentinel® RJ's alarm time delay is set using the first 9 positions of the SW-4 dipswitch on the front of the unit. The table below provides TWO second resolution settings. To provide longer time resolution, turn SW-4 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								
SW-4 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 ↑							
1 + 2 = 3 x 2 = 6 seconds	ON ↓	ON ↓	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

SW-4 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 ↑	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 ↓								

Restore timing setup

The restore period is the time between when valid audio returns and when the alarm is cleared. The Silence Sentinel® RJ restore time delay is with the first 7-positions on the SW-5 dipswitch on the front of the unit. Up = Off, down = On. The table below provides TWO second resolution settings. To provide longer time resolution, turn SW-5 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.

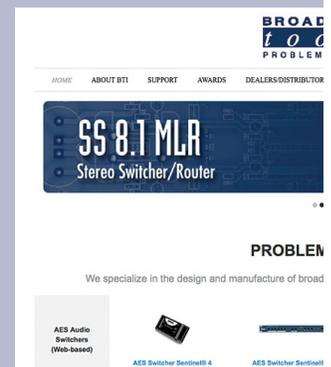
Restore Delay

Two (2) Second Resolution Table

SW-5, 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 ↑						

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Restore Delay Twenty (20) Second Resolution Table

SW-5, switch positions and switch 7 ON.	1	2	3	4	5	6	7
Digit Value	1	2	4	8	16	32	2/20 secs
➔ 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 SW-5 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	SW-5, switch 8	SW-5, switch 9
- 20 db	OFF ↑	OFF ↑
- 25 db	ON ↓	OFF ↑
- 30 db	OFF ↑	ON ↓
- 35 db	ON ↓	ON ↓

Switcher bounce setting

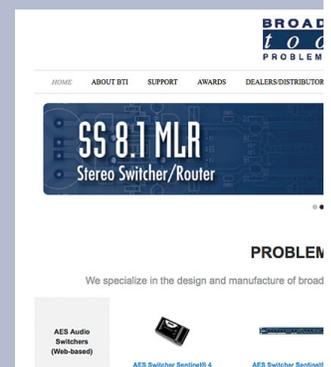
With the switcher bounce feature on (SW-4-10 ON) in Auto mode, the unit will automatically restore to the primary input when valid audio returns to it. With switcher bounce OFF (SW-4-10 OFF) in Auto mode manual/remote control will be required for the unit to switch back to input one after an alarm event causes it to switch to the backup input.

Phase monitoring setting

The Silence Sentinel® RJ 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 SW-5-10 in the ON position. When out of phase audio is detected on an input its alarm LED will flash and the K6 relay output will activate. If the unit is in auto mode, it will switch on silence alarms and phase alarms.

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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)

“ON” LEDs: Lit when input is routed to output. (Green)

“ACT” LEDs: Lit when input audio is above threshold. (Yellow)

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 channel is selected. When a channel is selected, the previous channel is deselected (interlock).

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

Operation Modes

Both inputs on the Silence Sentinel® RJ are constantly monitored for audio level and stereo phase. 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 relay output will activate to indicate silence on that input.

When the Silence Sentinel® RJ is in Auto (automatic switching) the following actions will occur when silence is detected on Input 1:

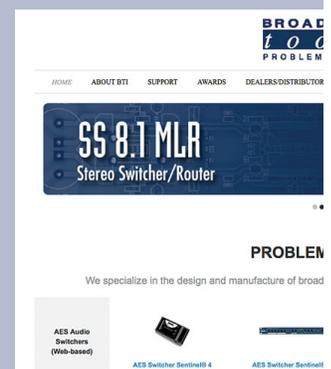
1. The front panel Input 1 ACT LED will extinguish to indicate that the input audio on one or both inputs of the stereo channels has dropped below the silence sense threshold.
2. After the alarm delay time expires, the unit will automatically switch to the back-up input (Input 2.) The K2 relay will close and the K1 relay will open.
3. The ALM1 alarm LED and K4 ALM1 relay output will activate.

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 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 ALM1 alarm LED and K4 ALM1 relay output will de-activate.
3. If Switcher Bounce is enabled unit will automatically switch back to the primary input (Input 1.) The K2 relay will open and the K1 relay will close. If Switcher Bounce is not enabled Input 2 will remain routed to the output until manually switched back to Input 1.

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

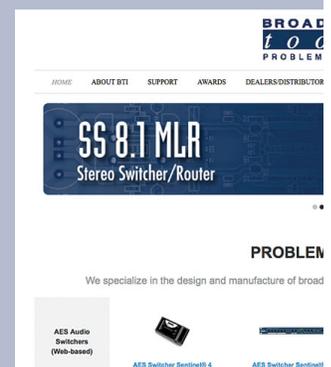
1. The front panel Input ACT LED will extinguish to indicate that the input audio on one or both inputs of the stereo channels has dropped below the silence sense threshold.
2. After the alarm delay time expires the ALM1 and/or ALM2 alarm LEDs K4 ALM1 and/or K5 ALM2 relay outputs will activate.

NOTE: If phase monitoring is enabled the alarm LEDs will flash to indicate phase-cancellation has been detected and the K6 relay output will activate.

NOTE: If silence is detected on both inputs the K3 relay 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. Inputs pulled up to 5V internally.
Relays K1 and K2:	SPDT dry contacts each, 30 VDC @ 1 Amp.
Relays K3-K6:	Normally open dry contacts, 30 VDC @ 1 Amp, shared common.

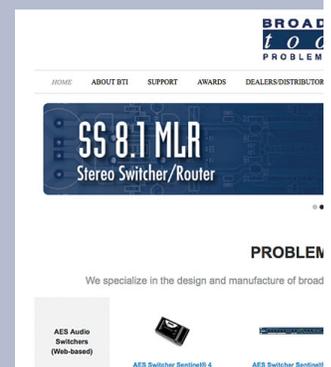
CAUTION! For safety, never connect 120 Vac circuits to the above relays!

Connectors:	Standard pinout RJ45 jacks for audio and removable euroblock screw terminals for remote control.
Power supply:	9-12 VDC, greater than 500 mA. 2.1mm ID x 5.5mm OD coaxial connector, center positive, surge protected. Universal switching power supply with domestic connector supplied. International power supply optional.
Operating Temperature:	-40°F to +185°F (-40°C to +85°C)
Size:	6.25" x 7.75" x 1.63", Plastic chassis.
Weight:	3.0 lb.
Options:	RA-1 Rack Shelf. 1 RU. Accommodates up to two units.

Note: Included Velcro may be used to secure the product to an RA-1 rack shelf.

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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

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Functional Diagram

