BROADCAST tools® INC

PROBLEM SOLVED

Installation and Operation Manual

AES Silence Sentinel® Standard

Manual update: 06/23/2016
Firmware version: PIC1.05 or greater.
If you need a firmware upgrade, contact Broadcast Tools®

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

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e-mail: support@broadcasttools.com **voice:** 360.854.9559 **fax:** 866.783.1742

INTRODUCTION

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

SAFETY INFORMATION

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

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.

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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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

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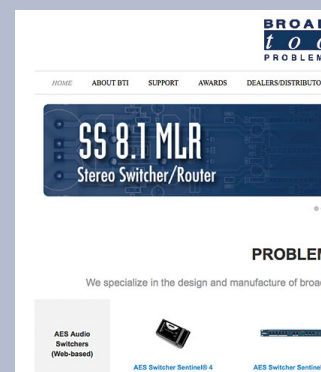
NOTE:

This manual should be read thoroughly before installation and operation.

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INTRODUCTION

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Product Overview

The Broadcast Tools® AES Silence Sentinel® Standard is designed to monitor an AES/EBU digital audio signal for silence or an out of phase audio condition, generate alarms and transparently switch to a back-up AES/EBU audio source. Signal bypass is built-in with AES input one passively routing to the AES output in the event of power loss. Integrated digital to analog converter with balanced stereo and headphone outputs. Additional features include: front panel controls, XLR AES input and output jacks, remote control inputs and status outputs; plug-in euro-block 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 10.2 minutes. The AES Silence Sentinel® Standard 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

- AES/EBU 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.
- Integrated 96 kHz, 24 bit DAC with balanced stereo and headphone outputs.
- Audio silence sensor.
- Dipswitch selection of silence detection threshold of -20, -25, -30 and -35dB below zero dBu reference.
- Stereo LED audio level display.
- External "Ext" alarm trigger input with front panel LED indicator.
- Front Panel Power/Heartbeat LED.
- 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 up to 85 minutes in 20 second increments.
- Dipswitch selection of restore timing delay from OFF up to 10 minutes 20 seconds in 20 second increments.
- Two independent SPDT alarm relays and LED indicators.
- Two open collector alarm outputs.
- Logic functions via microprocessor and non-volatile memory.
- Plug-in euro-block 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 two units in 1-RU.

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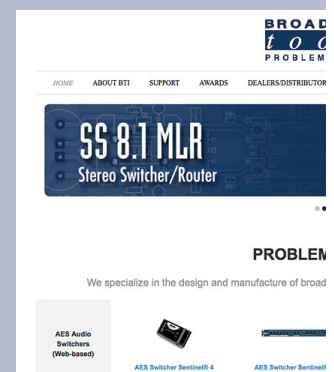
Installation Guidelines

Inspection
Please examine your AES 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 AES 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 AES Silence Sentinel® Standard where it will be visible and have its rear panel accessible. The AES Silence Sentinel® Standard 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 AES Silence Sentinel® Standard has built-in resistance to voltage changes; however, 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 AES 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 AES Silence Sentinel® Standard to a UPS system. A UPS helps minimize the risk to the AES 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.

Connector Pinout/Cable Preparation
The AES Silence Sentinel® Standard interfaces to external equipment through XLR jacks for AES/EBU signals and removable euro-block screw terminals for analog audio and remote control. The input and output XLR connector pinouts conform to 3-pin XLR Wiring Standards:
Pin 1 = Ground. Pin 2 = Positive. Pin 3 = Negative.
Please use 110-ohm cable that is qualified for AES/EBU digital audio signals.

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.

CAUTION!

Installation of the AES 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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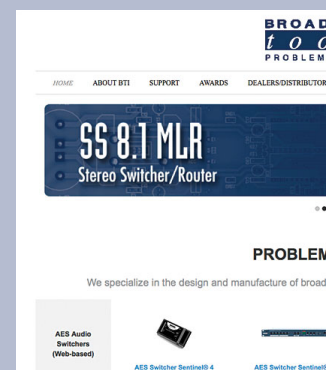
AES/EBU Digital Audio Inputs

The AES Silence Sentinel® Standard has two transformer isolated digital audio inputs with female XLR jacks labelled "AES In 1" and "AES In 2" respectively. Each input is set for 110-ohm termination from the factory as is typically used with balanced AES3 signals. The input termination can be changed to 75-ohm for unbalanced signals or open (no termination) for loop thru operation using the JP1 and JP2 jumper headers.

NOTE: When the unit is disconnected from power AES In 1 is passively routed to the AES Output.

AES/EBU Output

The AES Silence Sentinel® Standard has a transformer isolated 110-ohm AES/EBU outputs with a male XLR jack, labelled "AES Output."

Analog Audio Output

The AES Silence Sentinel® Standard has a balanced analog audio output on the bottom TB2 terminal block which is fed by its digital-to-analog converter (DAC). The output is fixed at +4dBu for -20dBfs AES input with a maximum analog output level of +24dBu.

(Top row, TB2)

OL- (Left-)	OL+ (Left+)	Gnd (Ground)	OR- (Right-)	OR+ (Right+)

(Bottom Row, TB2)

CAUTION: In no case should either the + or - outputs be connected to ground.

When the AES Silence Sentinel® Standard is in Primary Input Monitor mode Input 1 audio will always be fed to this output. In Output Monitor mode the Output audio is fed to this output. See the "Silence Sensor Monitor Mode Switch" section of this manual for more information

Connecting your equipment

AES Silence Sentinel® Standard connection configuration for Backup Switching:
1. Connect the source (MAIN/PRIMARY) equipment (Console, Automation, STL etc) AES/EBU signal to the "AES In 1" XLR jack.
2. Connect the source (BACKUP) equipment (CD player, etc) AES/EBU signal to the "AES In 2" XLR jack.
3. Connect the destination equipment (PROCESSING) to the "AES Output" XLR jack.

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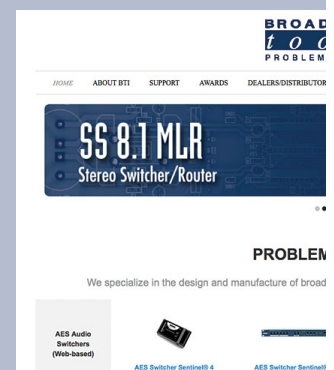
Relay and Open Collector connections

The AES Silence Sentinel® Standard has three relay outputs (K1, K2, and K3) that are used to indicate status:

Switch Position (K1): The K1 SPDT relay provides a switch position tally. K1 is closed when Input 1 is switched to the output and open when Input 2 is switched to the output.

Silence Alarm (K2): The K2 SPDT relay closes on silence and opens when valid audio returns, following the alarm and restore settings.

Pulse (K3): The K3 SPDT relay is activated for one second after an alarm. Great for rebooting external equipment.

The AES Silence Sentinel® Standard has two open collector outputs that are used to indicate status. The OC1 indicates loss on signal on BOTH inputs. The Phase open collector acts as a phase alarm indicator and when phase monitoring is disabled it acts as an Auto/Manual mode status indicator.

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.

(TB1 Top)

K2NC (SS Normally Closed)	K2CM (SS Common)	K2NO (SS Normally Open)	K3NC (Pulse Normally Closed)	K3CM (Pulse Common)	K3NO (Pulse Normally Open)
				Phase (Phase Alarm OC)	DGND

(TB1 Bottom)
(Top row, TB2)

K1NC (Switch Normally Closed)	K1CM (Switch Common)	K1NO (Switch Normally Open)	OC1	DGND

(Bottom Row, TB2)
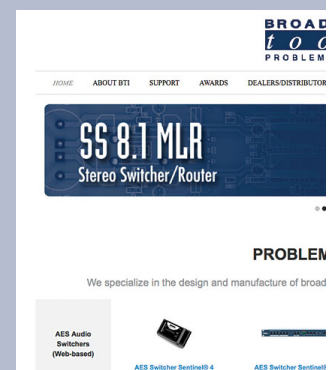
INSTALLATION

Remote Control connections

The AES Silence Sentinel® Standard has for 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/DGND.

(TB1 Top)

CH1 (Input 1)	CH2 (Input 2)	A/M (Auto/Manual)	EXT (External)		DGND

(TB1 Bottom)

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. Pulsing the A/M input to ground will toggle between Auto and Manual mode.

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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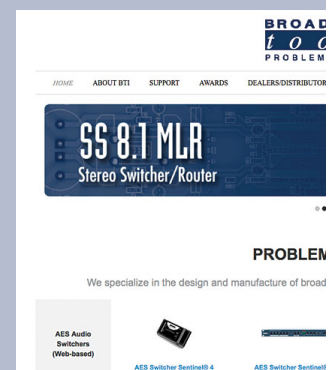
Programming Guidelines

Silence Sensor Monitor Modes

The AES Silence Sentinel® Standard has two silence sensor mode options, Primary Input Monitor Mode, and Output Monitor Mode set via the Monitor Mode toggle switch (SW7).

Primary Input Monitor Mode (SW7 IN) is just like Auto switching mode in the DMS-III. Input 1 is constantly fed into the internal digital-to-analog converter (DAC) and silence sensor. When in Auto switching mode if a silence/error longer than the alarm delay occurs the unit will switch to the backup input (Input 2) but continue to monitor Input 1 for silence until valid audio returns to Input 1 for the restore delay time period and then switch back to Input 2.

Output Monitor Mode (SW7 OUT) feds the internal digital-to-analog converter (DAC) and silence sensor with the Input signal currently routed to the output. When in Auto switching mode if a silence/error longer than the alarm delay occurs the unit will switch to the alternate input and check for valid audio, applying the the alarm delay again, if the alternate input is also silent the process repeats itself until one of the inputs returns to a valid audio state.

DIPSwitch Setup

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

Silence Sensor 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 (-44 dbfs)	OFF	OFF
- 25 db (-49 dbfs)	ON	OFF
- 30 db (-54 dbfs)	OFF	ON
- 35 db (-59 dbfs)	ON	ON

AES Loss Only Setting

In some situations it's desirable to only indicate an alarm when AES signal is lost and not when silence is detected. To enable AES Loss Only mode place SW6-7 in the ON positon.

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. If switcher bounce is OFF (SW5-10 OFF) when the unit is in Auto mode manual/remote control is 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 AES Silence Sentinel® Standard is capable of monitoring both 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.
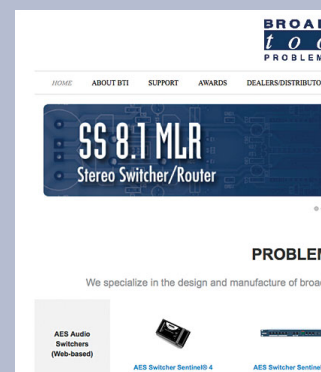
Alarm Delay Timing Setup

The alarm delay time period is the time between when valid audio fails and when an alarm is triggered. The AES 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. 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.

Time Delay — Two (2) Second Resolution Table

	1	2	3	4	5	6	7	8	9
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.
➜ 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 ↓

Time Delay — Twenty (20) Second Resolution Table

	1	2	3	4	5	6	7	8	9
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 sec.
➜ 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 ↑
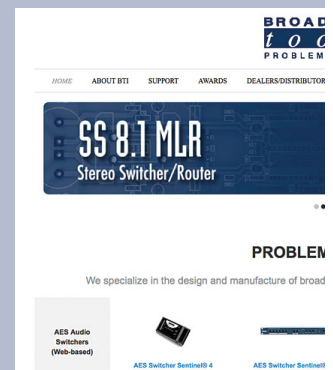
Alarm Restore Timing Setup

The restore time is the period between when valid audio returns and when the alarm is cleared. The AES Silence Sentinel® Standard restore time delay is with the first 6-positions on the SW6 dipswitch of the back of the unit. The table below provides TWO second resolution settings. To provide longer time resolution, turn SW6 switch 6 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 6 OFF.	1	2	3	4	5	6
Digit Value	1	2	4	8	16	2/20 sec.
➜ EXAMPLES:						
1 = 2 seconds	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓
1 + 2 = 3 x 2 = 6 seconds	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓
1 + 2 + 4 = 7 x 2 = 14 seconds	ON ↑	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓
16 x 2 = 32 seconds	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑	OFF ↓
Restore delay is 0 seconds.	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓

Restore Delay — Twenty (20) Second Resolution Table						
SW6, switch positions and switch 6 ON.	1	2	3	4	5	6
Digit Value	1	2	4	8	16	2/20 sec.
➜ EXAMPLES:						
1 = 20 seconds	ON ↑	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑
1 + 2 = 3 x 20 = 60 seconds or 1 minute	ON ↑	ON ↑	OFF ↓	OFF ↓	OFF ↓	ON ↑
1 + 2 + 4 = 7 x 20 = 140 seconds or 2 minutes and 20 seconds	ON ↑	ON ↑	ON ↑	OFF ↓	OFF ↓	ON ↑
16 x 20 = 320 seconds or 5 minutes and 20 seconds.	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑	ON ↑
Restore delay is 0 seconds.	OFF ↓	OFF ↓	OFF ↓	OFF ↓	OFF ↓	ON ↑

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PROGRAMMING
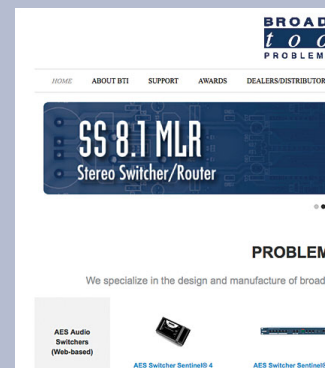
Operational Guidelines

Operation

Front Panel LED indicators
- "PWR/HB" LED: Blinks to indicate operation when power is applied. (Green)
- "44.1" "48" "32" LEDs: Indicate the detected sample rate of the AES/EBU input currently being monitored by the DAC. (Green)
- "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.
- "AES Error" LED: Error/loss of signal indicator from the DAC.(Red)
- "SS" LED: Silence Sensor indicator, lit when silence is detected on the input currently being monitored by the DAC. (Red)
- "ON" LEDs: Lit when the input is routed to output. (Green)
- "ACT" LEDs: Lit when an AES/EBU signal is present on the input. (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 and routed to the output. 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 JP5 jumper on the printed circuit board.

"HdPh Lvl" knob: Headphone audio volume adjustment knob.

"HdPh" jack: ¼" stereo headphone output. Fed by the internal DAC. When the AES Silence Sentinel® Standard is in Primary Input Monitor mode Input 1 audio will always be fed to this output. In Output Monitor mode the Output audio is fed to this output. See the "Silence Sensor Monitor Mode Switch" section of this manual for more information.

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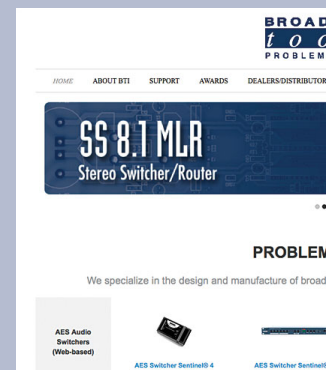
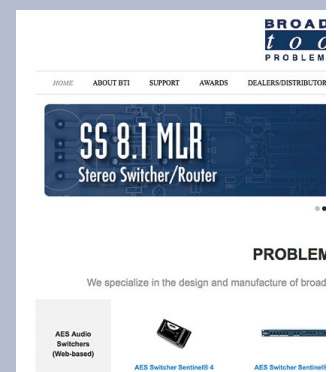## Specifications

Digital Inputs:	Two transformer isolated AES/EBU female XLR inputs. Jumper selectable 75-ohm or 110-ohm termination. May be disabled for loop-thru installation.
Switching Method:	Active differential line input receivers, internal switching relay and active differential line driver output.
Digital Output:	Transformer isolated AES/EBU male XLR output. 110-ohm impedance. Output follows input sample rate.
Silence Sense trip levels:	-20, -25, -30 or -35dB below zero reference, set via Dip-switch.
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 10 minutes and 20 seconds in 20 second increments and OFF to 1 minutes / 2 seconds in 2 second increments.
Remote control:	Remote EXT input requires a sustained closure to ground, all others, momentary closure to ground.
Relays, K1, K2. K3:	SPDT dry contacts each, 30 VDC @ 1 Amp (max.)

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

Open collector outputs:	Each output sinks 6 vdc @ 100 mA (max.)
Connectors:	XLR-M, XLR-F, and removable euro-block 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:	8.50" x 7.10" x 1.576" (WDH)
Weight:	3.0 lb.
Options:	* International power plug adapters. * RA-1, 1-RU rack shelf. Accommodates two units.

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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.

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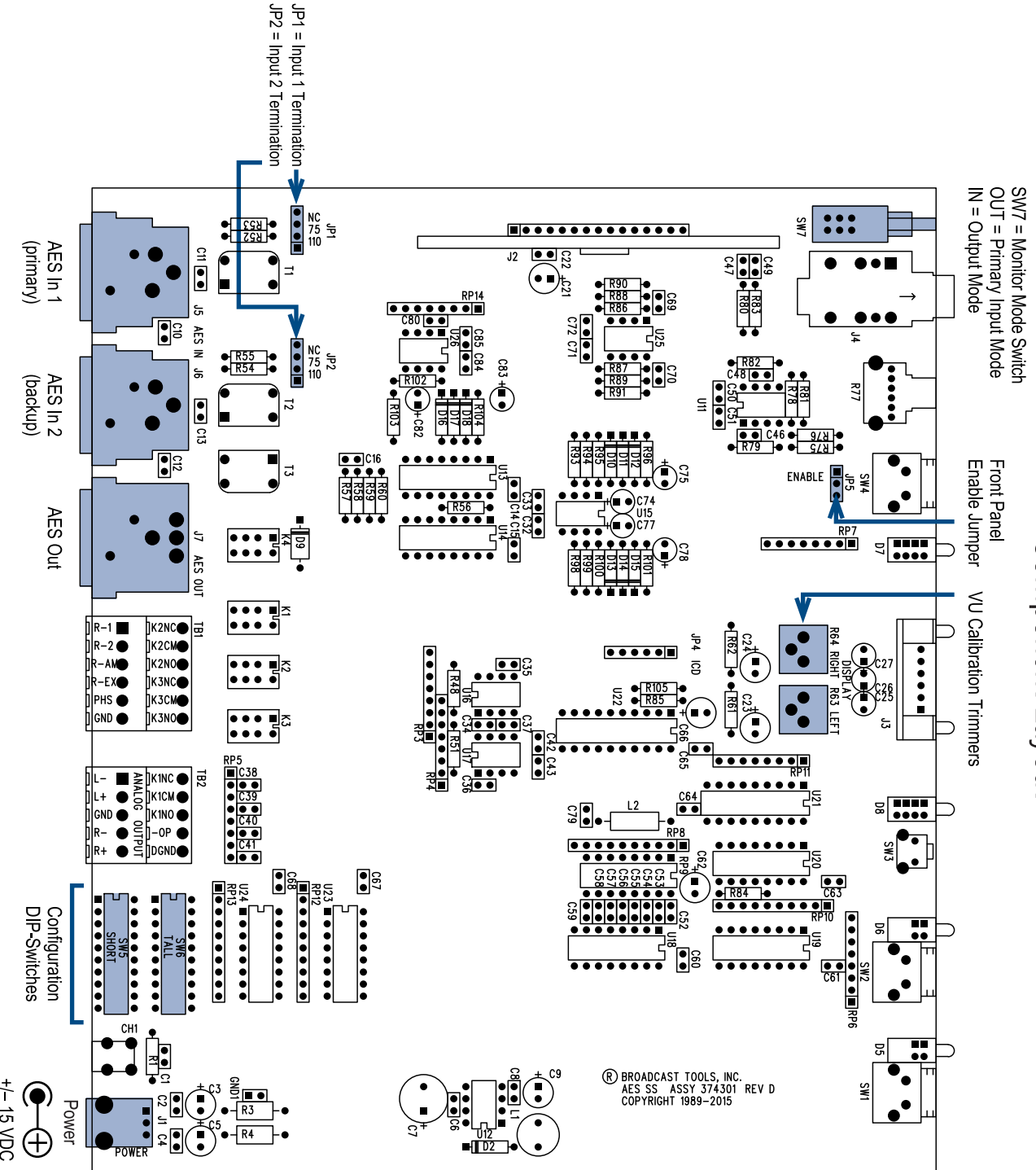
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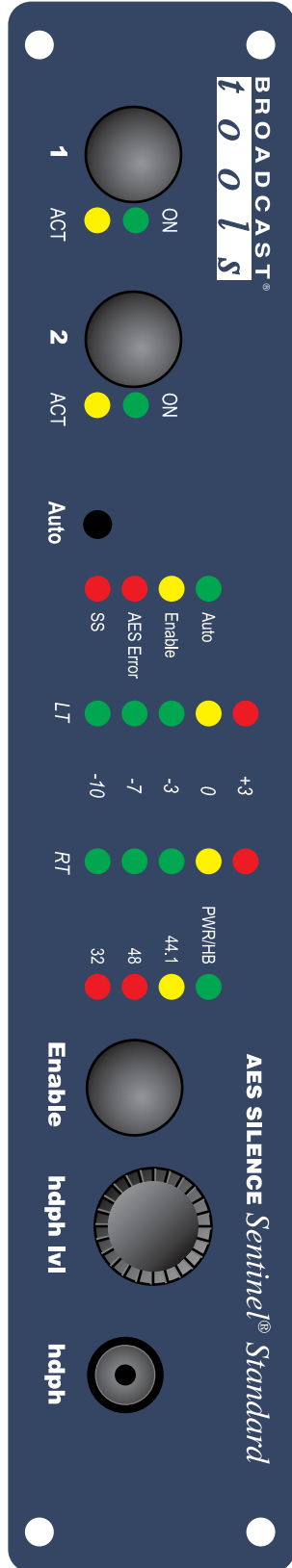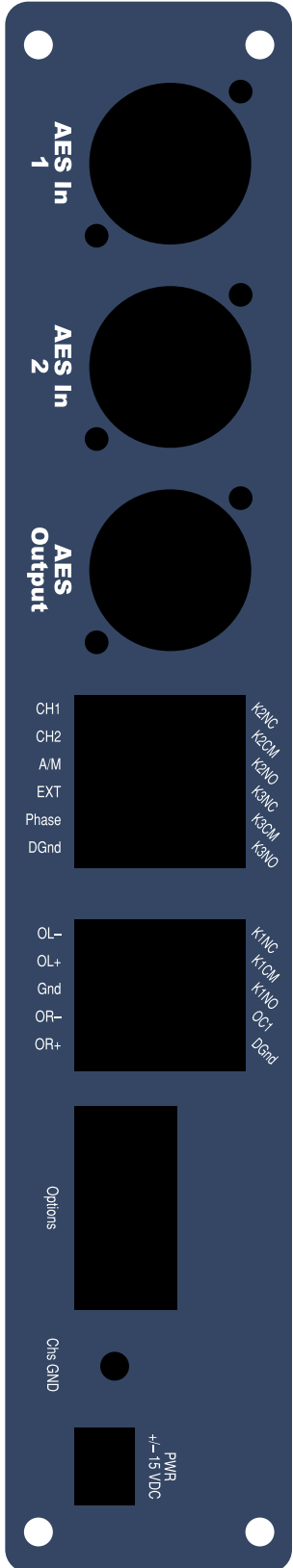
Broadcast Tools, Inc.
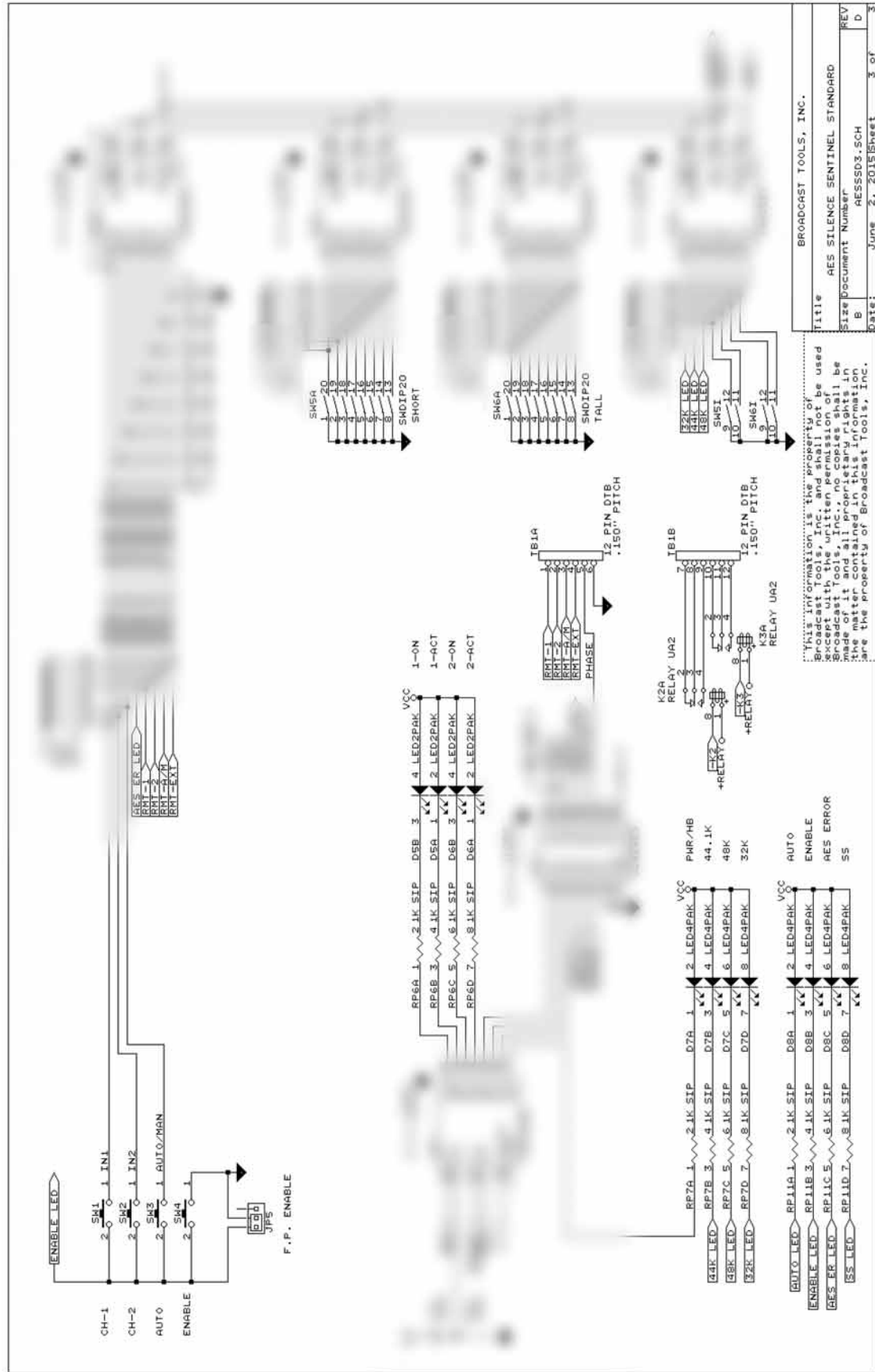131 State Street
Sedro-Woolley, WA 98284 • USA

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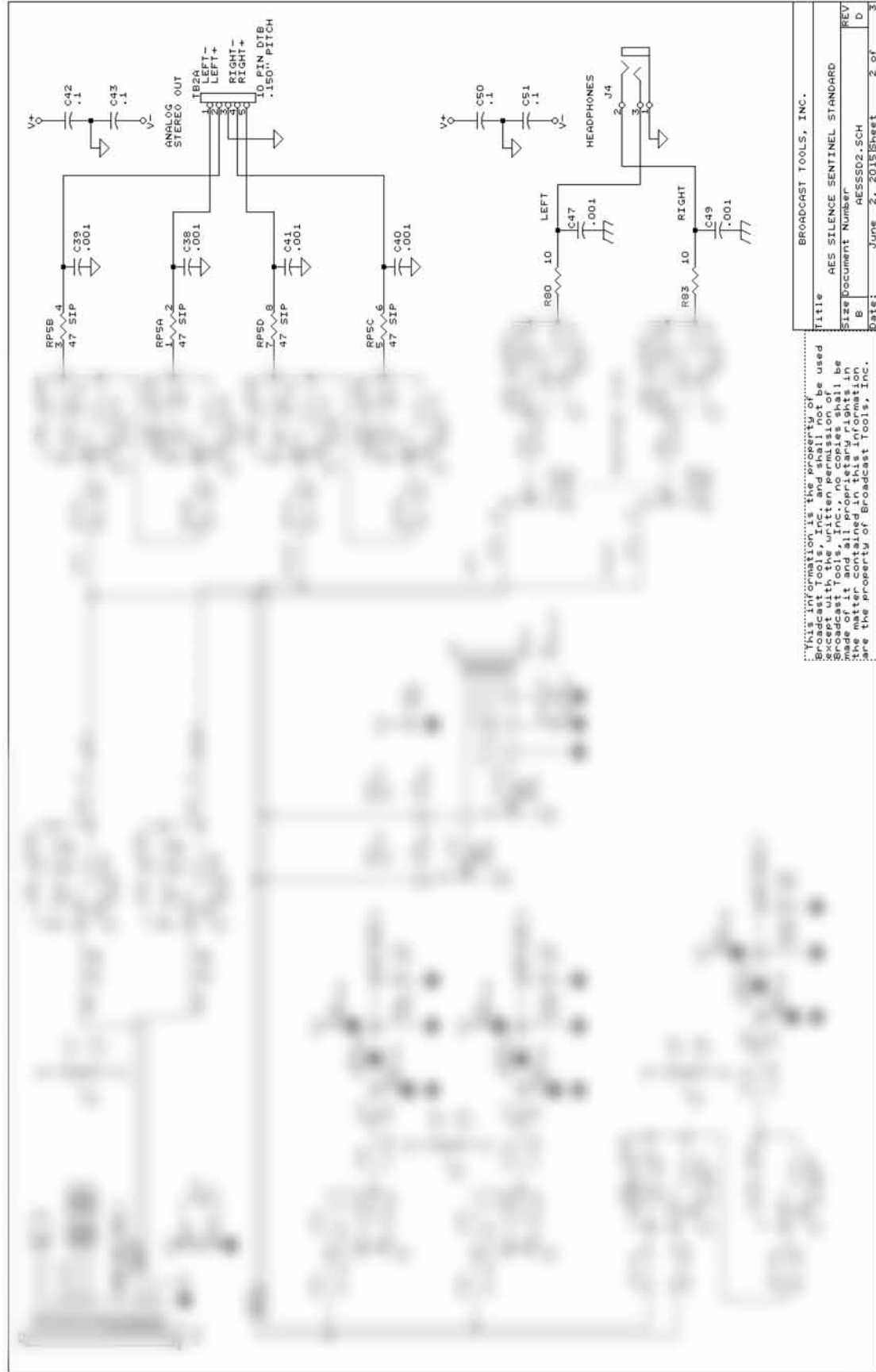# AES Silence Sentinel Standard

Component Layout

JP1 = Input 1 Termination
JP2 = Input 2 Termination

SW7 = Monitor Mode Switch
OUT = Primary Input Mode
IN = Output Mode

AES In 1 (primary)

AES In 2 (backup)

AES Out

Front Panel
Enable Jumper

VU Calibration Trimmers

Configuration
DIP-Switches

Power

+/- 15 VDC

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AES In 1

AES In 2

AES Output

CH1
CH2
A/M
EXT
Phase
DGnd

K2NC
K2CM
K2NO
K3NC
K3CM
K3NO

OL−
OL+
Gnd
OR−
OR+

K1NC
K1CM
K1NO
OC1
DGnd

Options

Chs GND

PWR +/− 15 VDC

BROADCAST *tools*®

1 ACT ON

2 ACT ON

Auto

SS
AES Error
Enable
Auto

LT

+3
0
-3
-7
-10

RT

PWR/HB
44.1
48
32

Enable **hdph lvl** **hdph**

AES SILENCE *Sentinel*® *Standard*

FRACTIONAL SCHEMATIC

Modification date: 06/27/16

BROADCAST tools

AES Silence Sentinel Standard

FRACTIONAL SCHEMATIC

FRACTIONAL SCHEMATIC