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Installation and Operation Manual



SS 2.1 MLR/TERM *Switcher/Router with Mechanical Latching Relays*

Manual update: 03/19/2013

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

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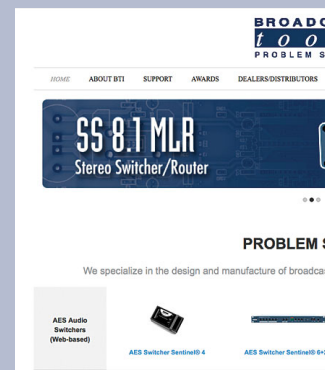
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INTRODUCTION

Thank you for your purchase of a BROADCAST TOOLS® SS 2.1 MLR/TERM transparent two input, dual output switcher/router (referred to as the SS 2.1 MLR/TERM 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® SS 2.1 MLR/TERM.

SAFETY INFORMATION

Only qualified technical personnel should install the SS 2.1 MLR/TERM. 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 SS 2.1 MLR/TERM 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 SS 2.1 MLR/TERM. 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.

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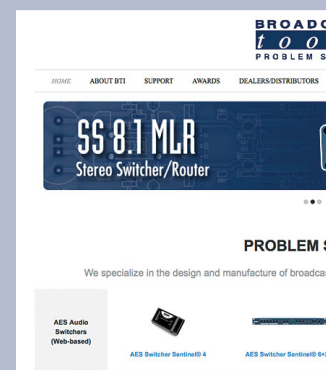


NOTE:

This manual should be read thoroughly before installation and operation.

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INTRODUCTION

Product Overview

The SS 2.1 MLR/TERM is a transparent two input, dual output switcher/router with mechanical latching relays. The SS 2.1 MLR/TERM is perfect for all types of passive signal switching via front panel switches, contact closures and/or serial RS-232. The switching is accomplished with mechanical latching gold contact relays, which means that the unit can route a signal in either direction. Due to the passive nature of the switching, any input level and impedance can be used. Inputs may be balanced or unbalanced, while output levels, impedance, distortion, noise and balancing will match that of the selected input. The SS 2.1 MLR/TERM can be controlled and monitored locally and/or with simple contact closures to ground, as well with multi-drop RS-232 serial commands.

Features/Benefits

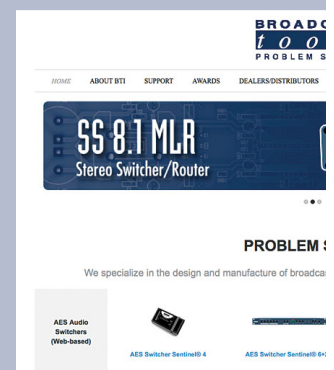
- Front panel channel selection push buttons with active channel LED indicators.
- The audio “MUTE” function allows the user to turn off all audio.
- Front panel Enable switch can be configured to provide a safety lock to the front panel selection push buttons.
- Remote control via contact closures, 5-volt TTL/CMOS logic levels and/or the multi-drop RS-232 serial port. TCP/Telnet control/monitoring with our optional ESS-1, RS-232 to Ethernet adapter.
- Two SPDT relay outputs for remote channel status.
- Internal silence sensor with front panel LED indicator; separate SPST silence sensor alarm relay, adjustable alarm delay and restore duration.
- Audio/signal switching via mechanical latching sealed relays utilizing 2-form-C bifurcated - crossbar silver alloy with gold overlay contacts.
- Removable euro-block screw terminal connectors are used for audio/signal I/O and remote control connections. Necessary mating plugs are supplied.
- The power-up source selection feature allows the user to select which source is active at power up, including the last source selected.
- If power is lost, the last selected channel is passed to the output.
- Fully RFI proofed.
- Surge protected internal power supply, domestic power supply provided. Optional CE 240 Vac 50-60 Hz power supply available.
- Up to three units may be mounted on the optional RA-1 rack shelf. Desk top and wall mounting is also possible.

Applications

Switching/routing applications include: Analog and/or AES audio sources, Studio selection, Audio processing selection, EAS audio, RS-232, RS-422 or RS-485 data signals and telephone lines.

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OVERVIEW

Inspection

Please examine your SS 2.1 MLR/TERM 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 SS 2.1 MLR/TERM, a modular cable with 9-pin “S9” female D-sub adapter, a 7.5 to 12 VDC wall transformer and a quick start guide. Manuals may be downloaded from our web site.

Installation

Surge Protection

The SS 2.1 MLR/TERM 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 SS 2.1 MLR/TERM 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 SS 2.1 MLR/TERM to a UPS system. A UPS helps minimize the risk to the SS 2.1 MLR/TERM and provides power during a power outage.

NOTE: If power is lost, the last selected channel is passed to the output.

Installation/Operation

Selection push buttons

Each push button represents an input to be routed to the switcher’s output, along with the mute and enable push button. Each push button has an associated LED indicator, which will illuminate when that particular channel or function is selected. When a channel is selected, the previous channel is deselected (interlock). The enable (safety) push button (the enable LED is illuminated when this function is enabled) requires the user to hold down the enable push button while selecting any of the other front panel push buttons.

LED indicators

- “PWR” LED: Illuminates when power is applied and blinks when serial data is active.
- “Enable” LED: Illuminates when the front panel enable push button is enabled.
- “SS”: (silence sensor) operation and LED (not active on the BNC version.)
- Channel and Mute LED’s illuminate when the input channel is selected.

Power

Connect the 2.1mm barrel type power connector into the unit and the 7.5 to 12 VDC domestic power transformer into a 120 Vac 50-60 Hz power source. Never use any type of power supply other than the specified/supplied power supply.

I/O and Remote Control Connectors

The rear panel contains all the inputs, outputs and remote control interfacing connectors. All audio I/O and remote control connections are through pluggable screw terminals with mating connectors. The multi-drop serial port is equipped with a modular RJ-11 jack.

The SS 2.1 MLR/TERM 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.

Input 1 (J1)

1L- 1L+ Gnd 1R- 1R+

Input 2 (J2)

2L- 2L+ Gnd 2R- 2R+

Output (J3)

L- L+ Gnd R- R+

Remote Control Wiring

The remote control connection to the switcher is via the bottom row of the connector TB4. Each channel may be selected by a momentary or sustained (depending on the configuration) contact to ground. Each channel is pulled high (5-volts) through a 22K resistor.

Remote Control

The remote control connection to the switcher is via the bottom row of the connector TB4. Each channel may be selected by a momentary or sustained (depending on the configuration) contact to ground. Each channel is pulled high (5-volts) through a 22K resistor.

Relays

SPDT relay contacts are available on the top row of the remote control connector TB4. K3 is associated with input channel one, while K4 is associated with input channel two.

Note: K5 is not installed on the BNC version.

Note: For wiring information, refer to the grid below, silk-screen text on the rear panel of the product or the fractional schematic(s) in the appendix.

Relay Outputs (Top Row, TB 4)

K3 N.O.	K3 Common	K3 N.C.	K4 N.O.	K4 Common	K4 N.C.
SW-1	SW-2	SW-3 (Mute)	GND	K5 N.O./N.C. (SS)	K5 Common (SS)

Control Inputs (Bottom Row, TB 4)

Configuration Jumpers

JP2: NO = Brings the N.O. contact for K5 out to the relay output terminal. Jumper on pins 1+2.

NC = Brings the N.C. contact for K5 out to the relay output terminal. Jumper on pins 2+3.

JP3: Disabled = Front panel enable switch defeated.

Enabled = Front panel ENABLE push button active. The enable LED is illuminated.

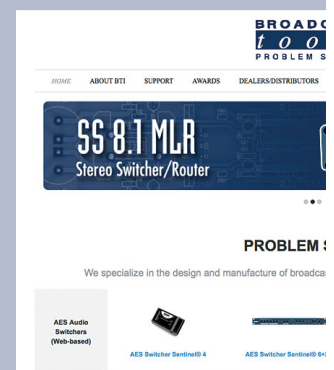
NOTE: This push button must be held closed to operate any of the other front panel push buttons and isn't associated with any of the remote control functions.



Installation of the SS 2.1 MLR/TERM in high RF environments should be performed with care. The station ground should be connected to the designated chassis ground terminal using a 20 to 24-gauge wire.

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INSTALLATION

Configuration DIP-switch Setup (SW5)

Follow the tables below for configuration options.

Unit ID	SW5-1	SW5-2
ID 0 *	OFF	OFF
ID 1	ON	OFF
ID 2	OFF	ON
ID 3	ON	ON

Baud Rate	SW5-3	SW5-4
2400	ON	OFF
9600 *	OFF	OFF
19200	OFF	ON
38400	ON	ON

Power Up	SW5-5
User selected	ON
Last source selected*	OFF

Note: To select an input at power-up with SW5-5 ON, hold down the push-button for the desired input channel or mute until the front panel LED's flash.

Operation	SW5-6	SW5-7
Normal *	OFF	OFF
Sustained	ON	OFF
EAS/MSRP	OFF	ON
Toggle	ON	ON

- Normal operation mode: Pulse 1-IN to select channel 1, Pulse IN-2 to select channel 2, or pulse the "M-IN" (mute) pin to turn off both channels.
- Sustained operation mode: Hold IN-2 low to select channel 2.
- EAS/MSRP operation mode: See Sage ENDEC EAS Installation Guidelines section of this manual.
- Toggle operation mode: Alternately pulse 1-IN to select between the two channels.

Note: After changing any dipswitch, please repower the unit.

Note: * Denotes factory setting.

Sage ENDEC EAS Installation Guidelines

The SS 2.1 MLR/TERM can be set to a special Multi-Station Relay Panel (MSRP) EAS switcher emulation mode which enables it to receive the serial control commands sent by the Sage Digital ENDEC EAS system. You can operate up to four independent stations off of one Sage Digital ENDEC by using one SS 2.1 MLR/TERM per station.

To use the SS2.1 MLR/TERM in EAS switcher mode with an ENDEC you must set the DIP switch SW-5 for the proper unit ID, station ID, and mode of operation.

Unit ID	SW5-1	SW5-2
ID 0 *	OFF	OFF
ID 1	ON	OFF

Station ID	SW5-3	SW5-4
1*	OFF	OFF
2	ON	OFF
3	OFF	ON
4	ON	ON

Mode	SW5-6	SW5-7
EAS/MSRP	OFF	ON

* Denotes factory default setting.

Note: After changing any DIP switch, please re-power the unit.

Connecting a single SS 2.1 MLR/TERM to the Sage ENDEC serial port:

Attach the supplied “S9” DB-9 female adapter to a Sage ENDEC COM port configured for “Relay,” 1200 baud, and the desired station ID. Connect the S9 modular cable to the RJ11 jack on the SS 2.1 MLR/TERM. Make sure SW-5 on the SS 2.1 MLR/TERM is configured according to the settings listed above.

Set the Sage ENDEC’s MSRP settings.

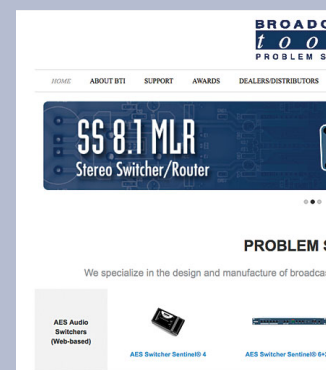
Connecting two or more SS 2.1 MLR/TERMs to the Sage ENDEC Serial Port:

Multiple SS 2.1 MLR/TERMs may be cascaded serially to operate from the same serial port by assigning unique unit/station ID’s to each SS 2.1 MLR/TERM.

Once the SS2.1 MLR/TERMs are configured properly they can be attached in parallel to the ENDEC using a duplex modular adapter such as the Allen-Tel AT202-6 in conjunction with the S9 adapter and reverse modular cables. Plug the male end of the duplex modular adapter into the supplied female “S9”, DB-9 to RJ-11 adapter, then attach one end of the supplied reversed modular line cords into each of the duplex modular adapter receptacles and the other ends into each of the SS 2.1 MLR/TERM modular receptacles. Three or more SS 2.1 III/TERM’s may be daisy chained by using the above description and a 5-jack modular adapter such as the Allen-Tel AT150.

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INSTALLATION

SERIAL OPERATION

RS-232 Control

Connect one end of the modular cable to the RJ11 jack on the rear panel of the product and the other end to the RJ11 to the jack on the "S9" 9-pin female D-sub adapter. Connect the 9-pin female D-sub "S9" adapter to the COM port of the controlling PC. Note: An optional USB to RS-232 adapter cable may be required if your PC isn't equipped with a RS-232 COM port. Select the desired address for each unit using the configure DIP-switches. Never duplicate addresses. The default protocol is as follows: 9600, N, 8, 1 (other baud rates are user selectable).

Serial Commands

The switcher may be controlled and monitored by burst serial strings or by the embedded menu.

Where the

- < * > Denotes start of string character
- < - > Unit ID (address, 0 through 3)
- < i > Input channel (1, 2 or M (MUTE)).

- *-i Switch to input i.
- *-M Mute audio output (Turn Off Audio)
- *-SL Send Audio Status: SuL1,x,x<cr><lf>
Note: x: 0 = OFF / x: 1 = ON
- *-SS Send Silence Sensor Status.
- *POLL Display unit ID in appropriate time slot.
- *-U Enter menu mode

Examples:

- *02 This string would turn on channel 2.
- *0M This string would MUTE the switcher's output.
- *0U Accesses the menu. (NOTE: The menu times out after 60 seconds of keyboard inactivity).

Menu Operation

Broadcast Tools(R) SS2.1MLR, v1.11 - Setup Menu

- 1 - Set Silence Sense Acquire Delay (sec) - Now: 10
- 2 - Set Silence Sense Restore Delay (sec) - Now: 2
- 3 - Set Silence Sense Threshold - Now: OFF

S - Turn ON audio input

M - Turn OFF audio

V - Save Audio State for Power Up

C - Show Configuration and Status

F - Set Factory Defaults

Audio Status:Chan 1 On

Enter Selection, or Q to quit:

To select a menu function, simply enter the letter on the left side of the menu and wait for the prompt. Example: Type the letter S

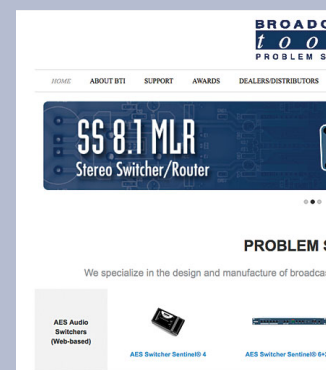
Response: Enter Input Channel: Entering a 1 would select channel 1.

SPECIFICATIONS

Inputs/Outputs:	Any input level and impedance can be used. Inputs may be balanced or unbalanced. Output levels, impedance, distortion, noise and balancing will match that of the selected input.
Switching Method:	Passive. Mechanical latching sealed relays utilizing 2-form-C bifurcated-crossbar silver alloy with gold overlay contacts.
Logic:	Flash microprocessor with non-volatile memory.
Operation Control:	Front Panel - Momentary switches. Remote - Momentary or sustained, compatible with 5 volts CMOS/TTL logic, open collector or contact closures to ground. Serial - Multi-drop RS-232, 2400, 9600, 19200, 38400 8,N,1.
Status:	Front Panel - LED Indicators. Remote - Two SPDT relays. 1-amp 30 vdc. Refer to the fractional schematic and/or text on the rear panel for connection details. One SPST Silence Sense relay.
Interfacing:	I/O and Remote control - Rear panel pluggable screw terminals. Mating connectors supplied. RS-232 - (RJ-11) Reversed modular cable/female "S9" 9-pin D-Sub adapter supplied.
Power Requirements:	7.5 to 12 VDC @ >500 ma. 120 Vac 50-60 hz transformer supplied.
Physical Dimensions:	5.65" x 7.10" x 1.575" (WDH)
Weight:	2.0 lb.
Shipping Weight:	3.0 lb.
Options:	RA-1 rack shelf, holds three units (1-RU) / Filler panels supplied. (CE 240 Vac 50-60 Hz power supply optional)

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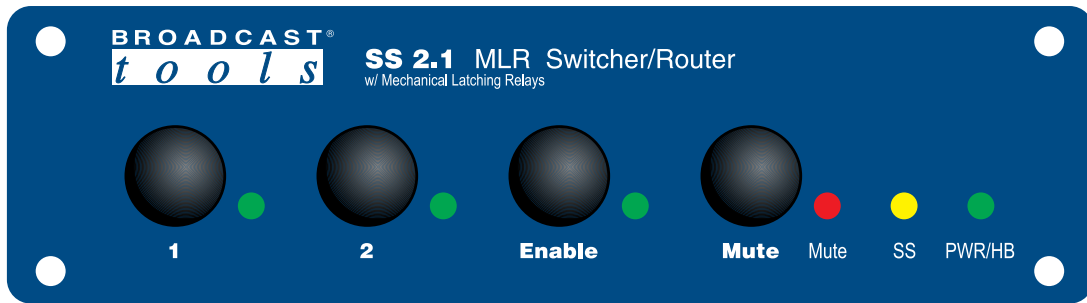
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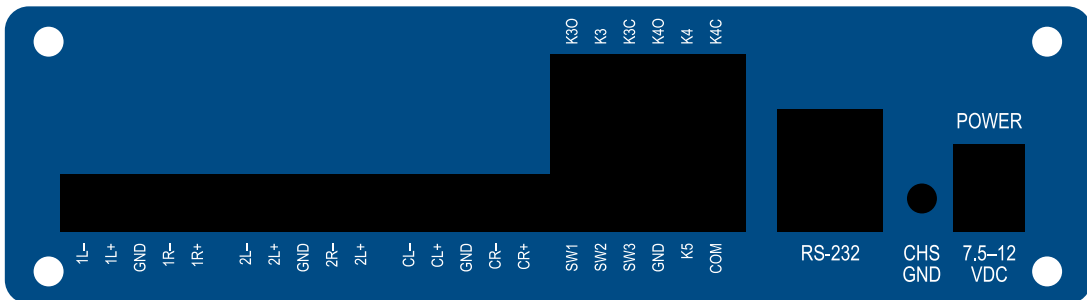
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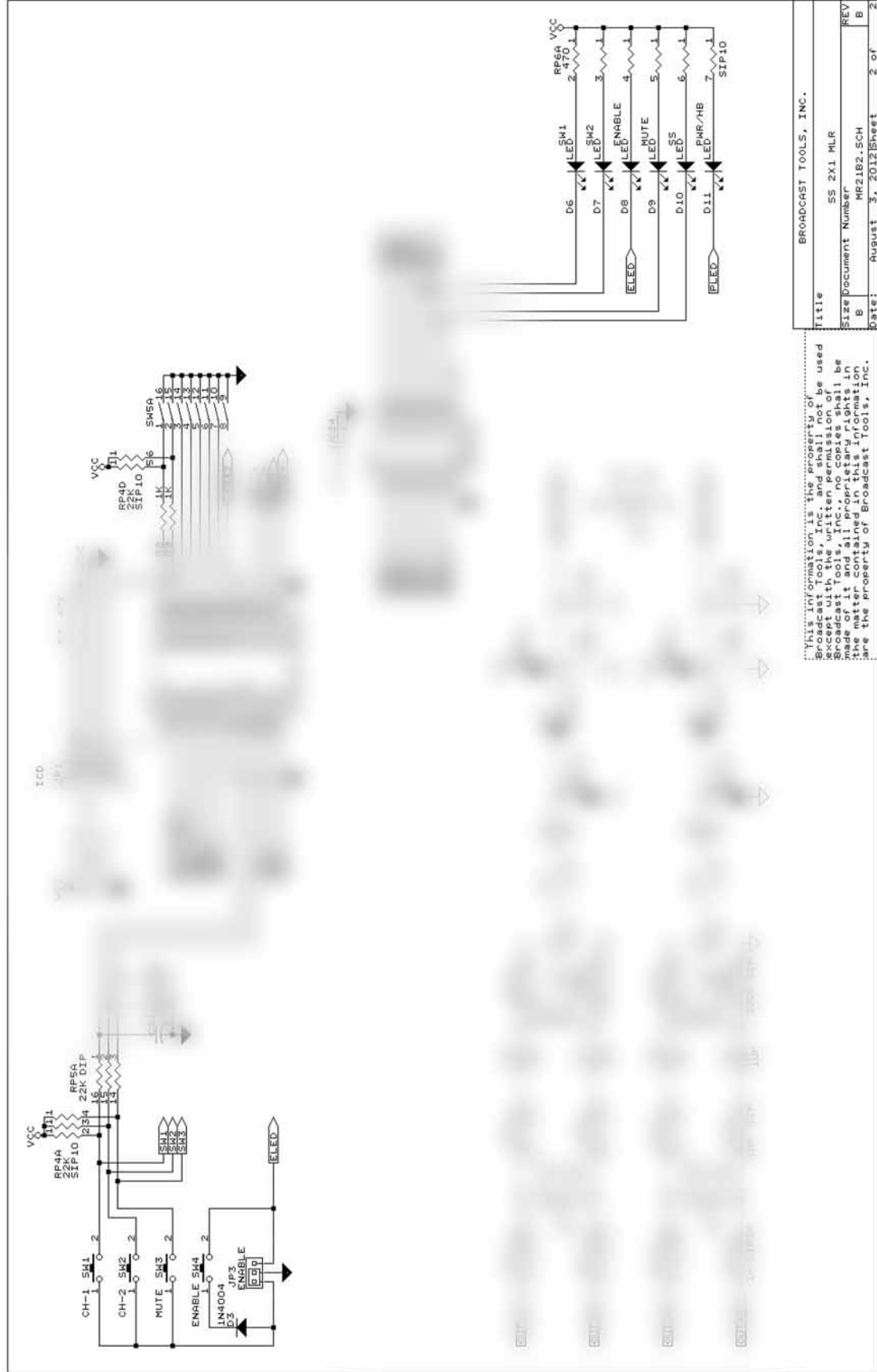


FRONT PANEL



REAR PANEL

Fractional Schematic



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Broadcast Tools® SS 2.1 MLR/TERM Jumper and Switch Layout

