BROADCAST tools®
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Installation and Operation Manual

SS 8.1 II
Eight Input, Single Output Stereo Switcher/Router

Firmware Version 1.6 or above

Manual Revised 08/27/13

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INTRODUCTION

Thank you for your purchase of a Broadcast Tools® SS 8.1 II, Eight Input, Single Output Stereo Switcher/Router (referred to as the SS 8.1 II 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 8.1 II.

SAFETY INFORMATION

Only qualified personnel should install Broadcast Tools® products. Incorrect or inappropriate use and/or installation could result in a hazardous condition.

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:

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

**Designed and Assembled
in the 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 DESCRIPTION

The SS 8.1 II passively switches or routes a variety of electrical signals to a destination. The SS 8.1 II selects any one of 8 stereo inputs to a single stereo output. The SS 8.1 II provides PASSIVE switching through gold contact relays. The passive switching 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. In addition to their normal use with audio signals, the unit can also be used to switch AES/EBU digital signals and telephone lines.

FEATURES
• Operational control by front panel switches with LED indicators, contact closures, 5-volt TTL/CMOS logic levels and/or the multi-drop RS-232 serial port.
• Removable screw terminals (Euro) are provided for audio and remote control connections.
• Audio switching via sealed relays utilizing 2-form-C bifurcated - crossbar silver alloy with gold overlay contacts.
• Logic functions via microprocessor and non-volatile memory.
• The power-up feature allows the user to select which one source is active at power up, including the last source selected.
• The "ACT" circuit performs as an audio activity monitor with front panel LED and open collector status output.
• The "ENABLE" switch provides a safety lock to the front panel source selection switches.
• The audio "MUTE" switch allows the user to turn off the audio output when activated.
• The "STEP" function allows the user to single step through each channel or to automatically sequence with user programmed channel steps and speed.
• Eight remote inputs, user configured for remote control or "PIP" (GPI) functions.
• Eight open collector outputs provide remote channel status or may be user programmed for GPO's.
• Configuration via dipswitches, serial port menu or burst mode.
• Source number one is configured to route audio to the output in the case of loss of power to the unit.
• Non-selected sources are terminated with 10K Ω, load resistors.
• The SS 8.1 II may be set on a desktop, mounted on a wall or as part of the new RA-1, "Rack-Able" mounting shelf.
• Optional RA-1 rack shelf for mounting up to two units in 1-RU.

APPLICATIONS
Automation source switching; Studio selection and routing; Audio processing selection; Exciter input selection; Remote broadcast input selection; STL source selection; Multiple station program on-hold and/or PA switching; EAS audio switching; ISDN or Phone hybrid feed selection; IFB selection; Satellite audio channel switching and console monitor inputs and outputs selection.

FRONT PANEL DESCRIPTION
Source Switches:
Each switch represents an input to be routed to the switcher's output. High quality tactile switches will give the user years of dependable service. Each switch has an associated LED indicator, which will illuminate when that particular source is routed to the output. When a source is selected, the previous source will be deselected, (interlocked). The front panel is also equipped with a MUTE switch. This switch turns off the audio output. The **ENABLE** switch, when enabled, **must** be pressed and held in order for any of the other switches to function. This function may be bypassed.

LEDs:

LED indicators will illuminate when the desired channel is selected. The Pwr/Ser LED displays valid power and serial data activity. The mute LED denotes when audio is off. The activity LED is lit when audio is present at the output. Threshold is set at –40db.

REAR PANEL DESCRIPTION

The rear panel contains the inputs, outputs and remote control interfacing connectors. Audio inputs, outputs and remote control connections are routed through removable screw terminals (Euro). A RJ-11 modular jack is provided for the multidrop serial port.

Power:
Connect the 2.1mm coaxial type power connector into the unit and the power supply into a 120 Vac 50-60 Hz power source. The front panel Pwr/Ser LED indicates when power is applied to the unit.

Audio Signal Connector:
The SS 8.1 II is supplied with Pluggable Screw terminals (Euro) and Mating connectors. Channel and polarity designators can be found on the chassis, as viewed from the rear.

"Remote" Control Connector:
Pluggable Screw terminals (Euro) and mating connectors are provided for connection to equipment, which will remotely control the SS 8.1 II. Pulsing the "MUTE" input to ground (low) would turn off the output of the SS 8.1 II until a front panel source switch is pressed, a remote control input is activated or the unit is powered up. Pulsing the "STEP" input to ground will step the unit one source for each low to high transition on this input. Automatic sequence may be accomplished by holding the step input low for two seconds. The unit will now step to each source at a user programmable rate from 1 to 999.9 seconds. The number of inputs sequenced may be programmed for channels 1 to 8. The step input is helpful in freeing up valuable remote control channels. This feature may also be used to sequence through multiple station air monitor signals for program on-hold feed.

DESCRIPTION

INSTALLATION GUIDELINES

It is recommended that all cables connected to the SS 8.1 II be looped through ferrite cores to suppress RF. Surge protection with RF filtering such as the Tripp Lite "ISOBAR 4" is also suggested for the power transformer. The purchase of an inexpensive uninterruptible power supply (UPS) will provide back up in case of power outages. Check out our web site for lightning protection links.

The SS 8.1 II is simple to install. The signal inputs, outputs are connected via pluggable screw terminals. Installation of the SS 8.1 II consists of seven steps:

1. Inspection
2. Removal of the source termination resistors, if applicable
3. Bench test and option set-up
4. Mount the unit in a rack (RA-1), desktop or wall
5. Connect your equipment to the unit
6. Label the front panel switches
7. Serial operation, if applicable

STEP 1: INSPECTION

Please examine your SS 8.1 II carefully 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 SS 8.1 II, power supply, reversed modular cable, 9-pin "S9" D-Sub adapter and audio and remote control mating connectors. Manual for this product may be downloaded from the Broadcast Tools web site.

STEP 2: SOURCE TERMINATION RESISTOR REMOVAL

Input sources that are not selected are terminated with a 10K Ω. If you do not want this load applied across the **deselected sources,** it may be removed from each channel. Each channel has a pair of resistors.

EXAMPLE: Channel 1, relays K1 A&B switches the signal; R15 & R21 are the 10K Ω load resistors. As delivered, all channels are configured with these resistors installed. To remove the load resistors from a channel, locate the proper resistors for that channel, cut its leads and discard the resistors.

STEP 3: BENCH TEST and OPTIONS

Place each unit on a workspace and connect power to the unit. Check to see if LED #1 (Switch 1) and the Pwr/Ser LED are lit (Source one is the power-up factory default). Connect an audio source to stereo input one and a monitoring device to the output. Verify that audio is present. Repeat the process until each channel's operation has been verified.

Tool Tip: The "ACT" LED is also an excellent audio output indicator.

CAUTION!

Installation of the SS 8.1 II in high RF environments should be performed with care. Shielded cable is suggested for all control, audio inputs and outputs. All shields should be tied to the "CHASSIS GROUND" terminal. The station ground should be connected to the chassis ground screw (CH1) located behind J1, as viewed from the rear. For lightning protection, check out www.polyphaser.com and www.itwlinx.com

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Jumpers:

JP1: To enable the front panel "ENABLE" switch, remove and stow the jumper over JP1.　　　Note: The Enable switch is disabled at the factory.

Dipswitches:　　　**DIP (SW-11) Switch Functions**

Unit ID	SW11-1	SW11-2
ID 0 *	OFF	OFF
ID 1	ON	OFF
ID 2	OFF	ON
ID 3	ON	ON

Baud Rate	SW11-3	SW11-4
2400	ON	OFF
9600 *	OFF	OFF
19200	OFF	ON
38400	ON	ON

Power Up	SW11-5
User selected	ON
Last source selected *	OFF

NOTE: Input selection at power-up may be configured by holding down the desired channels push button until the mute and Pwr/Ser LED's flash. Factory power-up default is channel one. To select "MUTE" at power up. Turn SW11-5 off, select "MUTE" and then turn SW11-5 back ON.

Remote/PIP	SW11-6
PIP (GPI) and Open Collectors	ON
Remote Control *	OFF

Note: After changing any dipswitch, please repower the unit.
Note: * Denotes factory setting.

STEP 4: MOUNTING

Mount the unit on a rack shelf, such as the Broadcast Tools RA-1, allowing adequate airflow for cooling. The RA-1 is furnished with filler panels to cover open spaces.

STEP 5: CONNECT YOUR EQUIPMENT

The SS 8.1 II interfaces to your equipment (sources and loads) through the rear panel pluggable screw terminals. Follow the legends for the desired audio input, output and remote control connections, which appear on the rear side of the chassis. Remove each screw terminal, strip each conductor and insert the conductor into the terminal and screw down the capture screw. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire.

Control:

The front panel functions are brought out through the rear panel "REMOTE" connectors TB 6 & 7, providing a means of controlling the SS 8.1 II from a remote point. The digital inputs may be connected to any remote pair of switch contacts, such as external relays, switches, etc. The digital inputs may also be connected to external open-collector circuits, contact closures or 5-volt TTL/CMOS logic signals.

Status:

The status signals are supplied through the "Remote" control connector as individual open collectors. The open collectors may be used to provide status to a remote control point to indicate which source is selected. The status output for the selected output will go low (user programmable function), providing a return for an LED indicator, TTL/CMOS logic or relay. External pull-up resistors may be required in some installations.

Rear Panel Connectors

TB 1 --> TB 4 *EVEN* **Inputs** **Top Row**

Input x – Left	Input x + Left	Chs Gnd	Input x – Right	Input x + Right
Input x – Left	Input x + Left	Chs Gnd	Input x – Right	Input x + Right

ODD Inputs **Bottom Row**

TB 5 **Output** **Top Row**

Output – Left	Output + Left	Chs Gnd	Output – Right	Output + Right

TB 6 **Remote input selection** **Top Row**

Input 1	Input 2	Input 3	Input 4	Input 5
Open Collector 1	Open Collector 2	Open Collector 3	Open Collector 4	Open Collector 5

Open Collector Outputs **Bottom Row**

TB 7 **Remote input selection** **Top Row**

Input 6	Input 7	Input 8	Mute	Step
Open Collector 6	Open Collector 7	Open Collector 8	"ACT"	Ground

Open Collector Outputs **Bottom Row**

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INSTALLATION

STEP 6: LABEL SWITCHES
Write the source descriptions under each source switch, if desired.

STEP 7: SERIAL OPERATION
The supplied reversed modular cable and 9-pin (S9) D-sub adapters may be connected to the SS 8.1 II's rear panel modular connector. Plug in the D-sub adapter into your computer's serial port. Plug the supplied wall transformer into a source of 117 vac and the cable end of the transformer into the power receptacle on the SS 8.1 II. The protocol is as follows: 2400, 9600, 19200, 38400, 8N1. Flow control should be set to NONE, emulation to ANSI and the mode should be set to DIRECT TO COMx (x = the available com port). The default is 9600, 8,N,1.

Commands

*ui	Turn on input i

EXAMPLE: *08   This string would turn on channel 8 on unit 0

*uMA	Mute audio output (Turn Off Audio)
*uCA	Set active channel for power up
*uCDEF	Reset to factory defaults
*uCIIttt	Set PIP minimum pulse length ttt: 000 – 255 => off to 2.55 seconds
*CLx	Lock front panel. x = L (Lock) x = U (Unlock)
*uCOx	Open Collector Control: P = Pulse Follow, F = Full Follow, B = Software Control. **Note: SW 11-6 must be OFF**
*uCFSx	Set first step channel to x. x = 1 –> 8, 0 to disable
*uCSLx	Set last step channel to x. x = 1 –> 8, 0 to disable
*uCSTtttt	Set step interval in tenths: 0000 –> 9999, Off to 999.9 seconds
*uDxx	Delay xx seconds before processing the next command
*POLL	Display unit ID in appropriate time slot
*uOOoF	Unlatch open collector o (Note: SW 11-5 must be ON)
*uOOoL	Latch open collector o (Note: SW 11-5 must be ON)
*uOOoP	Pulse open collector o (Note: SW 11-5 must be ON)
*uSL	Send Audio Status SuL1,x,x,x,x,x,x,x,x<cr><lf> Note: x: 0 = Not Connected / x: 1 = Connected
*uSO	Send status of all open collectors SuO,x,x,x,x,x,x,x,x<cr><lf>
*uSPi	Send single PIP status i: SuP,i<cr><lf>
*uSPA	Send PIP status: SuP,A,x,x,x,x,x,x,x,x<cr><lf>
*uU	Send unit info: ,name><firmware version><cr><lf>
*uY	Display configuration
*uZx	Echo character x to serial port (Used to debug command strings)
*uMM	Enter menu mode

EXAMPLE: *0MM   Brings up the menu.

Menu:

The menu allows the selection of step time, the selection of the last channel in the step and the behavior of the open collector status outputs.

The stepping time can be between 1 and 9999 seconds. The last channel step is selectable from channels 1 through 8.

The open collector status outputs may be set for: Follow or 1-second pulse.

Broadcast Tools® SS 8.1 II v 1.8

Setup Menu
1 - Set PIP Minimum (0 - 2.55 sec)   - Now: 1.00
2 - Set Remote Mode Open Collector Mode   - Now: "Follow"
3 - Set First Step Channel (0 to disable) - Now: 1
4 - Set Last Step Channel (0 to disable)   - Now: 8
5 - Set Step Interval in Tenths of Seconds - Now: 10
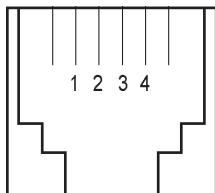
A - Save Current Audio State for Power Up
C - Show Current Configuration
F - Set Factory Defaults

Enter Selection, or Q to quit:

Serial: Pin out of the RJ-11 modular/"S9" D-Sub adapter is shown below.

RJ-11 Adapter. Pin Number.	DB-9 Female. Pin Number.	Product's point of view Function Name.
4	3	RS-232 Receive
3	2	RS-232 Transmit
2	5	Ground

Modular connectors point of view.

INSTALLATION

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. Sealed relays utilizing 2-form-C bifurcated - crossbar silver alloy with gold overlay contacts.

Logic: Microprocessor, non-volatile memory.

Operation Control: Remote - Momentary or sustained, compatible with 5 volts CMOS/TTL logic, open collector or contact closures to ground.
Serial – Multi-drop RS-232, Receive only, 2400, 9600, 19200, 38400
8,N,1.

Status: Front Panel - Indicator LED.
Remote "ACT" LED – Trip level set at –40db.
Remote - Open collector outputs, 12 vdc, limit current to 50ma per output. Pull-ups may be required.

Interfacing: Audio & Remote Control - Pluggable screw terminals (Euro). RS-232 - 4C6P Modular. All mating connectors, reversed modular cable and (S9) adapter supplied.

Power Requirements: 9 VAC @ 500ma or 12 Volt DC, 500ma universal switching wall power supply, supplied. Internal power supply surge protected. Domestic AC power adapter supplied. 2.1mm coax connector, center positive. Optional international power supply AC input plug adapters.

Physical Dimensions: 8.50" x 6.50" x 1.55" (WDH)

Weight: 3.0 lb.

Shipping Weight: 4.0 lb.

Options: RA-1 rack shelf, holds three units (1-RU) / Filler panels supplied.

WEBSITE:

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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

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

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CE Conformance I Hazard I Warning Labels

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK. DO NOT REMOVE ANY COVER OR PANEL. NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUAUFIED PERSONNEL.

WARNING: To reduce the risk of electrical shock. DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE

WARNING – This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. The device has been formally submitted for testing and found to comply with the limits for a Class B computing device (pursuant to subpart J of Part 15 FCC Rules) and has been designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference and the user and at his expense will be required to take any measures required to correct interference.

CANADA WARNING – This digital apparatus does not exceed the Class B limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications.

CE CONFORMANCE – This device complies with the requirements of the EEC Council Directives: 93/68/EEC (CE Marking); 73/23/EEC (Safety -low voltage directive); 89/336/EEC (electromagnetic compatibility). Conformity is declared to those standards: EN50081-I , EN50082- I.

USE OF SHIELDED CABLING – In order to conform to the CE requirements for High Frequency radiation, shielded cables must be used for all audio and data connections.

NOTE: When the unit is operated in an extremely high RF environment, it may be helpful to connect cable shields to the connector terminal that connects cable shield to chassis ground. Additionally, a 0.01uF capacitor connected between ground and the chassis terminal may be helpful in some instances.