BROADCAST tools inc.

Installation and Operation Manual

for the

SS 12.4

12 Stereo Input, Quad Output Stereo Switcher

For Software Version 01.22 or higher
All specifications and features are subject to change without notice.

Manual update 07/16/2001 *PCB Ver "D"*

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

INTRODUCTION

Thank you for your purchase of a **Broadcast Tools, Inc., SS 12.4, 12 Stereo Input, Quad Outpu Stereo Switcher.** 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 unit.

☛ **NOTE:** This manual should be read thoroughly before installation and operation.

SAFETY INFORMATION

Broadcast Tools products should be installed only by qualified personnel. Incorrect or inappropriate use and/or installation could result in a hazardous condition.

Broadcast Tools Products, as 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 or contact us directly.*

If you would like more information about Broadcast Tools, Inc., products, you may reach us at:

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

Voice 360 . 854 . 9559
Fax 360 . 854 . 9479

Internet Home Page www.broadcasttools.com

E-mail bti@broadcasttools.com

Thank you for choosing Broadcast Tools!

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

PRODUCT DESCRIPTION

The **SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher (**referred to throughout this manual as the **SS 12.4**) is designed to accommodate 12 stereo inputs and 4 stereo outputs. The front panel 16 character x 2-line backlit LCD display provides user programmable source and destination descriptions. The rotary digital encoder allows both source and destination selection. Operation is as simple as dialing the input and output via the encoder knob and pushing the "STORE" button. The **SS 12.4** may be configured for three different switching modes. The *mix mode* allows the mixing of any/or all inputs to any/or all outputs. The *overlap mode* provides the overlapping of any two inputs to an output. The duration of the overlap may be set in increments of 1/10 of a second, with a maximum of 9.9 seconds. In *interlock mode*, the selected input is immediately connected while the previous input is immediately disconnected. The **SS 12.4** may be controlled remotely via an optional remote panel (**SS 12.4/RC**) or Personal Computer. The **SS 12.4** is equipped with both RS-232 and RS-485 serial ports. The **SS 12.4** may be configured as a multiple studio router. Also, the **SS 12.4** is addressable for multi-drop control.

FEATURES

❖ 16 x 2-line LCD backlit display ❖ Rotary digital encoder source selector ❖ Multi-turn input and output trimmers ❖ Power-up selection of inputs to outputs ❖ Configuration via an 8 position DIP switch ❖ Electronically balanced stereo inputs and outputs ❖Front panel LCD contrast control ❖ Digitally controlled professional level "clickless" analog switches ❖ Low noise and distortion circuitry ❖ Full function optional remote control units ❖ Built-in 9600 baud RS-232 / RS-485 multi-node serial port ❖ Multiple units may be cascaded to expand inputs/outputs ❖ All audio input and output connections are via removable screw terminals.

A user selectable feature allows a choice on how the **SS 12.4** will act when power is first applied (or re-applied after a power failure). Choices include having all channels being off on power-up or an one of the twelve input channels being assigned to any or all of the four output channels at power-up

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

INSTALLATION

Please examine your **SS 12.4** 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.**

Packing List

The **SS 12.4** is shipped with the following items:

1) The **SS 12.4 Switcher.**
2) Female DB-9 D-Sub to RJ-11 ("**S-x**") modular adapter.
3) Modular cable.
4) A 12 VAC @ 1.0 amp power cube. **Warning, do not substitute!**
5) Mating audio connectors.
6) This manual.

Available Option: **SS 12.4/RC** Remote Panel

☛ **Note:** We recommend before permanently installing the **SS 12.4,** you bench test and become familiar with the operation of this unit.

The top cover must be removed for the following step.

The **SS 12.4** is shipped with DIP switch SW-1, programmed as follows:

Switch SW1 settings

Sw-1-1	ON = Router	OFF = Switcher (Default)
Sw-1-2	ON = RS-232 (Default)	OFF = RS-485
Sw-1-3	ON = Interlock mode (Default)	OFF = Mix mode
Sw-1-4, 5, 6	See ID setup.	
Sw-1-7	ON = Don't Care	OFF = Don't Care
Sw-1-8	Not Used	

Please refer to the setup notes for each switch before changing.

The **SS 12.4** may be configured for eight ID's. This feature is handy when controlling multiple **SS 12.4's** on one serial port. This is available in either the RS-232 or RS-485 modes. We ship the **SS 12.4** set for ID 0, Switcher and RS-232.

The **SS 12.4** is designed to be rack mounted in a standard 19" rack. It should be mounted in an area that is accessible from the rear and preferably away from sources of heat.

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

Front Panel Operation

To select an input channel, press the I/O select push button once to display channel one. Next, twist the selector knob until the desired channel is found. Press the I/O select push button to move the cursor to the output channel desired. The cursor is advanced from left to right (Output channels one through four) each time the I/O select push button is pressed. When the desired output channel i selected, twist the Selector knob one click to display the output channel. Next press the "STORE" pusl button to select that combination.

Contrast control setup

Use a small (Green or Red) screwdriver to adjust the LCD's contrast for best viewing.

LCD back lighting

The LCD back lighting is factory adjusted for normal room brightness. If additional LCD back lighting is required, remove power and the top cover of the **SS 12.4** and place the supplied jumper over JP-8. Reinstall the top cover and power to the unit.

ID setup

SW1 Switch Position	**4**	**5**	**6**
Digit Value for Switch On	**1**	**2**	**4**
EXAMPLES:			
ID = 0 (DEFAULT Setting)	OFF ↓	OFF ↓	OFF ↓
ID = 1	ON ↑	OFF ↓	OFF ↓
ID = 2	OFF ↓	ON ↑	OFF ↓

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

Switching Mode Setup

The **SS 12.4** features three audio switching modes:

Switching modes are selected on the main SS 12.4 via DIP switch SW1

1 - **Overlap mode** allows the overlap of one audio source with another. This function is only active in the serial BURST mode.

2 - **Mix mode** (SW1-7 = OFF & SW-1-3 = OFF) allows any or all channels to be connected (mixed) to any or all output channels.

3 - **Interlock mode** (SW1-7 = OFF & SW-1-3 = ON) provides that when a channel is switched on the previous channel is immediately turned off.

The **SS 12.4** is supplied with a modular cable and modular 9-pin D-sub adapter for serial contro Use only the cord that is provided with the **SS 12.4** or a replacement that reverses, such as Radio Shac Catalog No. 279-347. Connect the cable between the **SS 12.4** and your computer. The **SS 12.4 is** operated at 9600 baud. The unit is shipped set for 9600 baud, with 8 data bits; no parity and one stop bit. Load your favorite communication software package (Procomm, Bitcom, Windows 3.1/3.11 Terminal, Windows 95/98/NT Hyper Terminal, Mac, etc). Using the protocol of ***9600-N-8-1*** Set the mode to: ***DIRECT to COM x***, Flow Control to: ***NONE*** and emulation to: ***ANSI***.

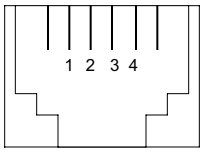
Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

Connecting the SS 12.4 to the computers RS-232 serial port

Use the provided modular 9 pin D-sub connector adapter and modular cord to connect the SS 12.4's serial connector to your computers' COM port. Connect one end of the modular cable to the modular receptacle on the SS 12.4, while inserting the other end into either the 9 pin female D-Sub modular adapter. Plug the 9-pin female D-Sub into the desired COM port on your computer and verify that **SW1-2 is ON and JP-4 is set on the RS-232 position.**

The pin out of the adapter is shown below.

RJ-11 Adapter Pin	DB-9/25 Pin	SS 12.4 (Point of view)
4	3/2	RS-232 Receive
3	2/3	RS-232 Transmit
2	5/7	Ground



Modular Connector
SS 12.4 Point of View

Input / Output Description Setup

The **SS 12.4 's** LCD display may be configured to display input descriptions up to 13 characters and output descriptions up to 3 characters. From the terminal program, press the <SPACE BAR> proceeded by the unit's ID number (0, Default). The configuration menu is then displayed.

Press < 1 > to configure any of the 12 input descriptions or < 2 > for the outputs. Follow the prompts to enter descriptions. To quit this function, simply press < Q > or the < Enter Key >.

Power-up Mode:

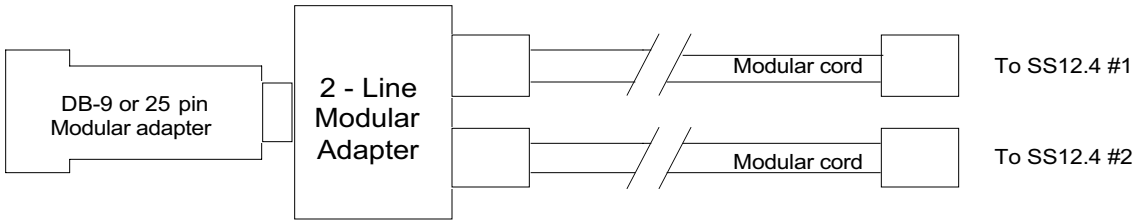
To select a channel configuration at power-up, select the desired input and output channels, move the cursor to the top line of the display, press and hold the "STORE" push button while pressing the "I/O Select" push button. Your channel setup is now saved.

Daisy-Chaining Two SS 12.4's in RS-232 mode for computer control.

Multiple **SS 12.4's** may be cascaded serially to operate from the same COM port. The first step is to remove the top cover of the **SS 12.4**. Next assign each **SS 12.4** its own ID, by locating DIPSWITCH SW-1. Switches SW1# 4, 5, 6 represent BINARY 0 to 7. Follow the chart on page five. The third step is to lift and stow JP-7. This disables send data from the **SS 12.4's** RS-232 port. Be sure to test each unit and return the top cover to each unit. Remember that by lifting JP-7 the serial status is disabled.

Paralleling the serial connectors of two **SS 12.4's** may by accomplished by using a duplex modular adapter such as Radio Shack part Cat No. 279-407. Plug the male end of the duplex modular adapter into the supplied female DB-9 to RJ-11 adapter and then attach the supplied modular line cord into each of the duplex modular adapter receptacles and the other ends into each **SS 12.4**. See the diagram below.

* **Note:** Three or more **SS 12.4's** may be daisy chained by using the above description and a Radi Shack 279-410, 5-jack modular adapter



Connecting the SS 12.4 to the RS-485 serial port for computer control.

Single or multiple **SS 12.4's** may be cascaded serially to operate from the same RS-485 port. There are a number of companies providing RS-232 to RS-485 converters. One advantage of RS-485 is the length of cable as opposed to RS-232. With RS-485 you are able to have a total of 4000 feet of cable. With RS-232, this is restricted to approximately 50 feet. The first step is to remove the top cover of the **SS 12.4**. Step 2 assigns each **SS 12.4** its own ID, by locating DIP Switch SW1. Switches SW1# 4, 5, 6 represent Binary 0 to 7. Follow the chart on page five. The third step is to move JP-4 to the RS-485 position. Step four is to move SW1 switch # 2 to the OFF position. Be sure to test each unit and return the top cover to each unit. Connect your RS-485 cable pair to the terminal labeled "RS-485". Be sure to observe the correct polarity for this port. Wiring single or multiple **SS 12.4's** may be accomplished by using two-conductor cable between each **SS 12.4** and the controllin computer. Polarity of each device along with termination should be performed and/or observed at the last SS 12.4 and the computer. Termination may be disabled by removing and stowing JP-5. Connect your RS-485 cable pair to the terminal labeled "RS-485".

Connecting the SS 12.4 as a Switcher with SS 12.4/RC remote units.

The first step is to remove the tops of each unit. Next, move SW1-1 to the OFF position. Step three, move the jumper on JP-4 to the RS-485 position. Step four; set up the 1st remote panel for address 00 (default), each additional remote must have any address 01 to 03 (4 - remotes max). Step five is to determine if the system is to operate in the mix or interlock mode. For the mix mode set SW1-3 OFF, for interlock mode set SW1-3 ON. Wiring the **SS 12.4 and multiple SS 12.4/RC** may be accomplished by using two-conductor cable between the Main SS 12.4 and each of the **SS 12.4 /RC's.** Polarity of each device along with terminating only at the main SS 12.4 and the last SS 12.4/RC must be observed. Termination may be disabled by removing and stowing JP-5. Connect your RS-485 cabl pair to the terminal labeled "RS-485".

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

Connecting the SS 12.4 as a Router with SS 12.4/RC remote units.

The first step is to remove the tops of each unit. Next, move SW1-1 to the ON position. Step three, move the jumper on JP-4 to the RS-485 position. Step four, set up the remote panel for output one for address 00 (default), output two, address 01, output three, address 02 and output four, addres 03. Step five is to determine if the system is to operate in the mix or interlock mode. For the mix mode set SW1-3 OFF, for interlock mode set SW1-3 ON. Wiring the **SS 12.4 and multiple SS 12.4/RC** may be accomplished by using two-conductor cable between the Main SS 12.4 and each of the **SS 12.4 /RC's.** Polarity of each device along with terminating only at the main SS 12.4 and the last SS 12.4/RC must be observed. Termination may be disabled by removing and stowing JP-5. Connect your RS-485 cable pair to the terminal labeled "RS-485".

Downloading input/output descriptions to the remote units

Press the I/O Select and Store push buttons simultaneously. Within seconds, the new descriptions will be uploaded to the SS 12.4/RC remote units.

Input / Output Wiring

The **SS 12.4 i**nterfaces to your audio equipment through removable rear panel screw terminals Follow the legends for the desired audio input and output connections, which appear on the rear side of the printed circuit board and also on the layout drawing on the last page of this manual. 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. Connections may be made to the + and - inputs for balanced operation, or to the + input and grounding the - side for unbalanced input operation. Connections can be made to the + and - outputs for balanced operation, or to the + output and ground for unbalanced output operation.

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

Level Setup:

Once the input and output connections have been made, the input levels may be set. The switcher is factory set for unity gain. Recommended input levels should be in the range of -10 dbm to +10 dbm. The gain through the system can provide an additional 11 dB of gain from the factory settings. Should input or output levels need to be changed, they are accessible from the rear panel. Each stereo input and output is labeled and has one input adjustment per channel.

Input expansion

Input expansion may be accomplished by connecting a shielded cable between the first units unbalanced SUM INPUT on P-13 to the second units unbalanced output terminal. The shield to be connected to the AGND terminal. Follow the same procedure for the right channel. The above example provides 24 Stereo inputs, with the first unit as the main output.

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

Burst Mode Command Protocol

☛ **NOTE:** A burst mode command must be sent within 5 seconds. It starts with an asterisk < * >, then has the command codes. (Carriage returns or line feeds are not required).

✎ SS 12.4 Burst Mode Command Summary

u = unit (device) ID
ii = Input number (01-12)
o = Output number (1-4)
tt = Tenths of second

*uFiiov -	Force Input ii -> Output o to: On if v = 1 / Off if v = 2
*uiio -	Connect Input ii to Output o
*uiiA -	Connect Input ii to All Outputs
*uiiMo -	Mute Input ii to Output o
*uiiMA -	Mute Input ii to all outputs
*uE -	End overlap if in overlap mode. This applies to ALL outputs that have changed since the last end overlap End Overlap
*uiiEott-	Cause Overlap of Input ii to Output o to terminate after tt tenths

☐ **NOTE:** Only one at a time can be pending per output Maximum of (99) 9.9 seconds

*uI -	Send Identification (unit type, version)
*uS1 -	Send short system status: For each output, display a line: S1uo,pp,tt,x,x,x,x,x,x,x,x,x,x,x<cr><lf> S1u - short status indicator w/ unit ID
o -	output number of this line
pp -	input number pending overlap (if any) else 00
tt -	seconds until timed overlap (if any) else 00
x -	0 if corresponding input off, 1 if on
*uS2 -	Send Long Status First send same thing as the short system status, then for each input, send its description S1Iiiaaaaaaaaaaaaa<cr><lf> Then for each output, send its description: S2Ooaaa<cr><lf>

☐ Note that only significant characters of descriptions are sent. Thus input #2 labeled STUDIO would be: S20I02STUDIO<cr><lf> and output #3 with no description would be: S20O3<cr><lf

Broadcast Tools, Inc.
SS 12.4, 12 Stereo Input, Quad Output Stereo Switcher

SPECIFICATIONS

Max Input Levels:	+24 dBu, Active balanced @ 20k Ω.
Output Levels:	Active balanced output, +18 dbu, @ 100 Ω.
Gain:	11dB.
Frequency Response:	20 to 20 Khz; +/- 0.5 dB
Signal to Noise Ratio:	>80dB nominal, unweighted, below +4dBu.
Distortion:	Less than 0.01% THD at +18dBu.
Crosstalk:	-75 dB @ 1khz / -65dB @ 10 Khz from adjacent off channel.
Mix Inputs:	Unbalanced summing inputs @ 10k Ω, 0 dbu.
Logic:	Microprocessor, Non-volatile memory.
Switching Method:	Digitally controlled professional level "clickless" analog switches
Control/Status:	*Front panel* – Rotary digital encoder – 16 x 2 LED backlit LCD display *Remote - RS-232 / RS-485* - Serial 9600, 8N1.
Connectors:	*Audio* – Removable screw terminals. Supplied *RS-232 Serial* - RJ-11 Modular, Adapters & cable supplied. *RS-485 Serial* - Screw style wire captive terminals.
Power:	*SS 12.4* - 12 Vac @ 1 amp, 120 Vac 50-60 Hz, Xfmr supplied. *SS 12.4/RC* – 9 to 12Vac @ 500ma, 120 Vac 50-60 Hz Xfmr Supplied
Dimensions:	*SS 12.4* - 19"W x 1.75"H x 10.0"D, 1-RU. *SS 12.4/RC* - 19"W x 1.75"H x 4.5"D, 1-RU.
Weight:	SS 12.4 - 7.0 lbs. SS 12.4/RC – 3.0 lbs.
Options:	SS 12.4/RC, Full function (Look-A-Like) remote panel

BROADCAST TOOLS, INC.
LIMITED WARRANTY AND REMEDIES

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 enti 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 its is shipped by Broadcast Tools if the item is properly installed, used and maintained.

EXCLUSIVE REMEDIES

If Broadcast Tools is notified of 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.

NO OTHER WARRANTIES OR REMEDIES

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, BROADCAST TOOLS AND ITS SUPPLIERS DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE; AND THE FOREGOING ALTERNATIVE REMEDIES SHALL BE EXCLUSIVE OF ALL OTHER REMEDIES. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, NEITHER BROADCAST TOOLS NOR ANY OF IT SUPPLIERS SHALL HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL O PUNITIVE DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, ANY DAMAGES FOR LOST PROFIT BUSINESS INTERRUPTION, LOSS OF DATA OR INFORMATION, COST OF CAPITAL, CLAIMS OF CUSTOMER OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR THE INABILITY TO USE ANY ITE SUPPLIED BY BROADCAST TOOLS), EVEN IF BROADCAST TOOLS HAS BEEN ADVISED OF THE POSSIBILIT OF SUCH DAMAGES HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY O PUNITIVE DAMAGES. THIS LIMITATION OF LIABILITY APPLIES WHETHER A CLAIM IS ONE ALLEGING BREAC OF A CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT, FOR THE VIOLATION OF ANY STATUTOR DUTY, THE FAILURE OF ANY LIMITED OR EXCLUSIVE REMEDY TO ACHIEVE ITS ESSENTIAL PURPOSE, O ANY OTHER CLAIM OF ANY NATURE. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW TH EXCLUSION OR LIMITATION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, THIS LIMITATIO MAY NOT APPLY TO YOU.

BROADCAST TOOLS, INC.
131 State Street
Sedro-Woolley, WA 98284 USA

Voice 360 . 854 . 9559
Fax 360 . 854 . 9479