



## INSTALLATION AND OPERATION

### MANUAL

for the

**Broadcast Tools® 6 x 1**

**Six Input, Single Output Stereo Switcher/Router**

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ALL SPECIFICATIONS AND FEATURES FOR THIS PRODUCT ARE SUBJECT TO CHANGE  
WITHOUT NOTICE

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Firmware version 1.15 and above  
05/30/2002

Manual update

**6 x 1 Stereo Audio Switcher/Router  
Broadcast Tools, Inc.**

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# 6 x 1 Stereo Audio Switcher/Router

## Broadcast Tools, Inc.

### INTRODUCTION

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Thank you for your purchase of a **Broadcast Tools® 6x1, Six input, Single Output Stereo Switcher/Router** (referred to as the 6x1 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® 6x1, Six input, Single Output Stereo Switcher/Router.

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

### SAFETY INFORMATION

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

 **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.*

### WHO TO CONTACT FOR HELP

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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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**131 State Street**

**Sedro-Woolley, WA 98284-1540 USA**

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THANK YOU FOR CHOOSING BROADCAST TOOLS® BRAND PRODUCTS!

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# 6 x 1 Stereo Audio Switcher/Router

## Broadcast Tools, Inc.

### PRODUCT DESCRIPTION

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The 6 x 1 passively switches or routes a variety of electrical signals to a destination. The 6 x 1 Stereo Audio Switcher/Router selects any one of six stereo inputs to a single stereo output. The 6 x 1 Stereo Audio Switcher/Router provides PASSIVE switching through gold contact relays. The passive switching means that the unit can route a signal in both directions (any one of six stereo inputs to a single destination, or a single source to any one of six destinations). Due to the passive nature of the switching, distortion and noise are almost non-existent and in no way change the quality of the signal it is switching. In addition to their normal use with audio signals, the unit can also be used to switch digital signals and telephone lines.

The 6 x 1 Stereo Audio Switcher/Router is controlled by means of front panel switches, and may be optionally controlled from a rear panel 15 pin male D-connector or a 2400 baud serial port.

The 6 x 1 Stereo Audio Switcher/Router has features to allow selecting which of any source is active at power-up; audio mute; allowing the user to turn off the audio output when activated; an Enable switch; providing a safety lock to the front panel source selection switches; a step input, providing a means of stepping through each source and an serial port; allowing operation from a computers serial port. Source number one is configured to route audio to the output in the case of loss of power to the unit. The sources which are *not* selected are terminated with a 620  $\Omega$ ,  $\frac{1}{2}$  watt load resistor.

### Applications

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

### Front Panel Description

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#### Source Switches:

Each switch represents an input to be routed to the switcher's output. The switches are highly reliable switches, which will give the user years of dependable service. Each switch has an 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 **ENABLE** switch must be pressed and held in order for any of the source switches to function. This function may be bypassed, for the six source switches. The front panel is also equipped with a **MUTE** switch. This switch, when pressed in combination with the **ENABLE** switch, mutes the output.

# 6 x 1 Stereo Audio Switcher/Router

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### REAR PANEL DESCRIPTION

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The rear panel contains all the inputs, outputs and remote control interfacing connectors. Audio inputs and outputs are routed through pluggable screw terminals. Remote control is accomplished via a 15 pin "D" connector and the 2400-baud serial port.

#### **Power:**

Connect the 2.1mm coaxial type power connector into the unit and the wall transformer into a 120 Vac 50-60 Hz power source. The front panel power LED indicates when power is applied to the unit. (220 Vac 50-60 Hz wall transformer OPTIONAL)

#### **Audio Signal Connector:**

Pluggable Screw terminals. Mating connectors supplied. Channel designators can be found on the left side of the printed circuit board, as viewed from the rear.

#### **Options:**

Input selection at power-up may be determined by removing the cover and placing a jumper between the "C" terminal and any one of the numbered input pins on the POWER-UP HEADER, J3.

**Example:** A jumper between C and the pin labeled 4 would select input 4 at power-up. If audio mute is required at power-up, remove the jumper. Factory power-up default is source # 1. The **Enable** switch is disabled at the factory. This feature may be **ENABLED** by removing the jumper on JP3.

#### **Remote Connector:**

A male 15 pin "D" connector is provided for connection to equipment which will remotely control the 6 x 1 Stereo Audio Switcher/Router. Pulsing the "MUTE" input to ground (low) will turn off the output of the 6 x 1 Stereo Audio Switcher/Router 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 two-second rate, allowing you to preview each source. 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 the music on-hold feed.

# 6 x 1 Stereo Audio Switcher/Router Broadcast Tools, Inc.

## INSTALLATION GUIDELINES

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Installation of the 6 x 1 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 EGROUND terminals. The station ground should be connected to the chassis ground screw located on the far right side of the 6 x 1 as viewed from the rear. It is recommended that all cables connected to the 6 x 1 be looped through ferrite cores to suppress RF. Surge protection with RF filtering such as the Tripp Lite "ISOBAR 4 or 6" is also suggested for the wall transformer. The purchase of an inexpensive UPS will provide back-up in case of power outages.

The 6 x 1 Stereo Audio Switcher/Router is simple to install. The signal inputs, outputs are connected via pluggable screw terminals. Installation of the 6 x 1 Stereo Audio Switcher/Router consists of six steps:

1. Inspection
2. Removal of the source termination resistors, if applicable
3. Bench test
4. Mount the unit on a rack shelf or a desk top
5. Connect your equipment to the unit
6. Label the front panel switches
7. Serial operation, if applicable

### STEP 1: INSPECTION

Please examine your 6 x 1 Stereo Audio Switcher/Router carefully for any damage that may have been sustained during shipping. If any is noted, please notify the shipper immediately. Retain the packaging for inspection by the shipper. The package should contain the 6 x 1 Stereo Audio Switcher/Router, wall power transformer, this manual, 15 pin female D-connector/shell, 7 foot modular cable, 9 & 25 pin D-Sub adapter and audio mating connectors.

### STEP 2: SOURCE TERMINATION RESISTOR REMOVAL

Input sources that are not selected are terminated with a 620  $\Omega$  load (1/4 watt maximum). 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, relay K1 A&B switches the signal; R28 & R29 are the load resistors. As delivered, all channels are configured with these resistors installed. To remove the load resistors from a channel, locate via the schematic the proper resistors for that channel, cut its leads and discard the resistors.

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## INSTALLATION GUIDELINES

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### STEP 3: BENCH TEST

Place each unit on a workspace and connect power to the unit. Check to see if LED #1 (Switch 1) and the power 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. This would also be a good time to set up the desired jumper options.

### STEP 4: MOUNTING

Mount the unit on a rack shelf, such as the Broadcast Tools RM-1, allowing adequate airflow for cooling. The optional RM-1 may be ordered separately for rack mounting. The FP-1, filler panel may be ordered to fill the gap if only one 6 x 1 Stereo Audio Switcher/Router is mounted in the RM-1.

### STEP 5: CONNECT YOUR EQUIPMENT

The 6 x 1 Stereo Audio Switcher/Router interfaces to your equipment (sources, loads and remote control) through pluggable rear panel screw terminals. Follow the legends for the desired audio input and output connections. 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, 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. The 6 x 1 Stereo Audio Switcher/Router also provides a means of monitoring source audio through 4.7 K bridging resistors. Be sure as not to **unbalance** this source.

### STEP 6: DESIGNATION STRIP

The designation strip is provided in order to write the source descriptions under each source switch.

### STEP 7: SERIAL OPERATION

The supplied modular cable, 9 and 25 pin D-sub adapters may be connected to the 6 x 1's rear panel modular connector. Plug in the D-sub adapter into your computers 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 6 x 1. The protocol is as follows: 2400, N81. Flow Control should be NONE, emulation ANSI and the mode should be DIRECT TO COMx (x = the available com port).

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## INSTALLATION GUIDELINES

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### STEP 7: SERIAL OPERATION Continued

To select a channel, send the following string: `*#<cr>`

Where the `<*>` denotes start of string and the `<#>` is a channel 1 through 6 or m, denoting MUTE.

**Example:** `*6<cr>` This string would turn on channel 6. No serial status is provided.

Apply power via the wall transformer to the unit. Your 6 x 1 Stereo Audio Switcher/Router is now fully functional.

J1 Switch Pin numbers:		Remote Control Connector Pinouts:
1 -- Switch number 1	2 -- Switch number	<b>2</b>
3 -- Switch number 3	4 -- Switch number	<b>4</b>
5 -- Switch number 5	6 -- Switch number	<b>6</b>
13 -- Mute input	14-- Step input	
15-- Digital ground		

The front panel switches are brought out through the rear panel REMOTE CONTROL connector, providing a means of controlling the 6 x 1 Stereo Audio Switcher/Router from a remote point. These 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 or 5-volt logic signals.

J1 Status Pin numbers:		Control:
7 -- Status number 1	8 -- Status number	<b>2</b>
9 -- Status number 3	10 -- Status number	<b>4</b>
5 -- Switch number 5	6 -- Switch number	<b>6</b>
11 -- Status number 5	12 -- Status number	<b>6</b>



# 6 x 1 Stereo Audio Switcher/Router

## Broadcast Tools, Inc.

### INSTALLATION GUIDELINES

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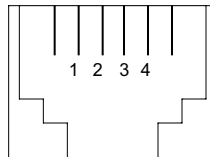
#### Status:

The status signals from the front panel indicator LEDs are supplied through the remote control connector as individual open collectors. This may provide status to a remote control point to indicate which source is selected. The status output for the selected output will go low, providing a return for an LED indicator or TTL/CMOS logic. External pull-up resistors may be required in some installations.

#### Serial:

Pin out of the modular/D-Sub adapter is shown below.

RJ-11 Adapter. Pin Number.	DB-9 Female. Pin Number.	DB-25 Female. Pin Number.	Product's point of view Function Name.
4	3	2	RS-232 Receive
3	2	3	RS-232 Transmit
2	5	7	Ground



Modular connectors point of view.

**6 x 1 Stereo Audio Switcher/Router**  
**Broadcast Tools, Inc.**

**BROADCAST TOOLS® 6X1 SIX INPUT, SINGLE OUTPUT STEREO**  
**SWITCHER/ROUTER SPECIFICATIONS**

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<b>Frequency Response:</b>	<i>DC to 100 Khz; +/- .1 dB</i>
<b>Signal/Noise Ratio:</b>	<i>&gt;90 Db</i>
<b>Channel Separation:</b>	<i>&gt;90 Db</i>
<b>Switching Method:</b>	<i>Passive. Sealed relays utilizing 2-form-C Bifurcated-Crossbar silver alloy with gold overlay contacts.</i>
<b>Logic:</b>	<i>Microprocessor.</i>
<b>Operation Control:</b>	<i>Front Panel - Momentary switches. Remote - Momentary closure to ground. Serial - RS-232c, 6P4C modular /w 9 pin-D-Sub adapter, Receive only, 2400, 8,N,1</i>
<b>Status:</b>	<i>Front Panel - Indicator LED in Switch. Remote - Open collector output, limit current to 50ma per output. Pull-ups may be required.</i>
<b>Interfacing:</b>	<i>Audio - Rear panel pluggable screw terminals. Mating connectors supplied. Remote Control - Male 15 pin "D" connector. RS-232 - 4C6P Modular.</i>
<b>Power Requirements:</b>	<i>9 Vac, 500 ma. 120 Vac 50-60 hz transformer.</i>
<b>Physical Dimensions:</b>	<i>8.5" X 1.75" X 6.0" (WHD)</i>
<b>Weight:</b>	<i>3.0 lb.</i>
<b>Shipping Weight:</b>	<i>4.0 lb.</i>
<b>Mounting:</b>	<i>Optional RM-1 rack mount. Optional FP-1 filler panel</i>

# 6 x 1 Stereo Audio Switcher/Router Broadcast Tools, Inc.

## **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 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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