



Installation and Operation Manual



16 x 1 ***Sixteen Input, Single Output Stereo Switcher/Router***

Firmware Version 060201

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INTRODUCTION

Thank you for your purchase of a Broadcast Tools® **16 x 1 Sixteen Input, Single Output Stereo Switcher/Router**, (referred to as the 16 x 1 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® 16 x 1 Sixteen Input, Single Output Stereo Switcher/Router.

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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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.

PRODUCT DESCRIPTION

The 16x1 passively switches or routes any one of 16 stereo inputs to one stereo output or vice-versa through gold contact relays. The passive nature of the switching allows for any input level and impedance to 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 16x1 can also be used to switch digital signals and telephone lines. Control is via front panel switches, contact closures, open collector status and/or multi-drop RS-232 port. Removable screw terminals are provided for all audio connections.

The 16 x 1 has several unique features. The Power-Up feature allows the user to select which of any source is active at power up, including the last source selected. Audio mute allows the user to turn off the audio output when activated. The Enable switch provides a safety lock to the front panel source selection switches. An Audio Activity Monitor LED with remote status. A Step Input provides a means of stepping through each source, including MOH Station Selection. A Serial Port allows communication and operation from a computer's serial port. A 2 x 1 bypass output switcher is provided to allow switching between the 16 x 1 and an external source. Source number one is configured by default 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.

APPLICATIONS

Some of the applications of the 16 x 1 include: Studio selection and routing; Audio processing selection; Exciter input selection; Remote broadcast input selection; STL source selection; Automation source selection; Multiple station Music 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 ENABLE switch, when enabled, must be pressed and held in order for any of the source switches to function. This function may be bypassed. The front panel is also equipped with a MUTE switch. This switch, when pressed in combination with the ENABLE switch, turns off the output.

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FRONT PANEL DESCRIPTION

LEDs:

LED indicators, which 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.

REAR PANEL DESCRIPTION

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 37 pin “D” connector. A modular jack is provided for the multi-drop serial port.

Power:

Connect the 2.1mm coaxial type power connector into the unit and the 9 VAC @ 500 ma 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:

The 16 x 1 is supplied with Pluggable Screw terminals (Euro) and Mating connectors. Channel and polarity designators can be found on the left side of the printed circuit board, as viewed from the rear.

“Remote” J3, Connector:

A male 37 pin “D” connector is provided for connection to equipment which will remotely control the 16 x 1. Pulsing the “MUTE” input to ground (low) will turn off the output of the 16 x 1 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 menu programmable for 1 to 999 seconds. The number of inputs sequenced may be programmed for channel 1 to 16. 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.

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FRONT PANEL

INSTALLATION GUIDELINES

Installation of the 16 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 EGND terminals. The station ground should be connected to the chassis ground screw located on the far right side of the 16 x 1 as viewed from the rear. It is recommended that all cables connected to the 16 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 16 x 1 is simple to install. The signal inputs, outputs are connected via plug-gable screw terminals. Installation of the 16 x 1 consists of six 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 or desktop
5. Connect your equipment to the unit
6. Label the front panel switches
7. Serial operation, if applicable

STEP 1: INSPECTION

Please examine your 16 x 1 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 16 x 1, this manual, 37 pin female D-connector/shell, 7 foot modular cable, 9 VAC @ 500 ma transformer, modular cable, 9-pin D-Sub adapter and audio mating connectors.

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 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

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.

• OPTIONS:

JP13 Selects the logic level for the bypass relay, when bypass is active (factory default). If JP3 is set to LOW, a logic low is required to turn bypass OFF. If JP3 is set to HIGH, a logic low is required to turn bypass ON.

JP2 To enable the front panel "ENABLE" switch, place a jumper over JP2

Input selection at power-up may be determined by holding down the desired channel push button until all LEDs flash. Factory power-up default is source # 1. The **Enable** switch is disabled at the factory.

DIP (SW-19) Switch Functions

| Unit ID | SW19-1 | SW19-2 | SW19-3 |
|---------------|------------|------------|------------|
| ID 0 * | OFF | OFF | OFF |
| ID 1 | ON | OFF | OFF |
| ID 2 | OFF | ON | OFF |
| ID 3 | ON | ON | OFF |
| ID 4 | OFF | ON | ON |
| ID 5 | ON | OFF | ON |
| ID 6 | OFF | ON | ON |
| ID 7 | ON | ON | ON |

| Baud Rate | SW19-4 | SW19-5 |
|---------------|------------|------------|
| 2400 | ON | OFF |
| 9600 * | OFF | OFF |
| 19200 | OFF | ON |
| 38400 | ON | ON |

* = Default setting

SW19-6 **OFF = Power up selection**
 ON = Last source selected

! TIP

The "ACT" LED is also an audio output indicator.

STEP 4: MOUNTING

Mount the unit in a rack or desktop, allowing adequate airflow for cooling.

STEP 5: CONNECT YOUR EQUIPMENT

The 16 x 1 interfaces to your equipment (sources and loads) through the rear panel pluggable 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, 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.

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 and 9 pin D-sub adapters may be connected to the 16 x 1'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 16 x 1. The protocol is as follows: 2400, 9600, 19200, 38400, 8N1. Flow Control should be NONE, emulation ANSI and the mode should be DIRECT TO COMx (x = the available com port). The default is 9600, 8,N,1.

To select a channel, send the following string: *I##<cr> Where the * denotes start of string, I is the ID, the ## is channel 01 through 16 or a command and <cr> denotes a carriage return or enter key.

Commands:

*b<cr>= Bypass ON
*f<cr>= Bypass OFF
*m<cr>= Audio mute
*u<cr>= Set up menu

• **EXAMPLE** without ID: *16<cr> This string would turn on channel 16. No serial status is provided.

• **EXAMPLE** with ID: *116<cr> This string would turn on channel 16. No serial status is provided.

Command Examples without ID:

- *b<cr>Turn ON bypass
- *u<cr>Bring up set up menu.

Menu:

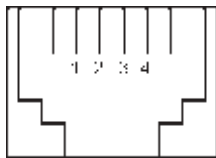
The menu allows the selection of stepping time and the selection of the last channel in the step.

The stepping time can be between 1 and 999 seconds. The last channel step is selectable from channels 1 through 16.

Serial:

Pin out of the modular/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.

Remote Control Connector Pinouts:

Control:

The front panel switches are brought out through the rear panel “REMOTE” connector (J3), providing a means of controlling the 16 x 1 Stereo Audio Switcher/Router 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 or 5-volt logic signals.

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INSTALLATION GUIDELINES

INSTALLATION GUIDELINES

Remote Control Connector Pinouts: Control Continued

| J3 Remote Status Pin Numbers: | | | |
|-------------------------------|--------------------------|----|------------------|
| 20 | Status number 1 | 21 | Status number 2 |
| 22 | Status number 3 | 23 | Status number 4 |
| 24 | Status number 5 | 25 | Status number 6 |
| 26 | Status number 7 | 27 | Status number 8 |
| 28 | Status number 9 | 29 | Status number 10 |
| 30 | Status number 11 | 31 | Status number 12 |
| 32 | Status number 13 | 33 | Status number 14 |
| 34 | Status number 15 | 35 | Status number 16 |
| 36 | Audio Activity Led/OC | 37 | Ground |

| J3 Remote Switch Pin Numbers: | | | |
|-------------------------------|------------------|----|------------------|
| 1 | Switch number 1 | 2 | Switch number 2 |
| 3 | Switch number 3 | 4 | Switch number 4 |
| 5 | Switch number 5 | 6 | Switch number 6 |
| 7 | Switch number 7 | 8 | Switch number 8 |
| 9 | Switch number 9 | 10 | Switch number 10 |
| 11 | Switch number 11 | 12 | Switch number 12 |
| 13 | Switch number 13 | 14 | Switch number 14 |
| 15 | Switch number 15 | 16 | Switch number 16 |
| 17 | Mute input | 18 | Step (MOH) |
| 19 | Bypass input | 37 | Ground |

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.

WEBSITE:

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BROADCAST TOOLS® 16 X 1 SPECIFICATIONS

| | |
|-----------------------------|---|
| Inputs/Outputs: | <i>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.</i> |
| Switching Method: | <i>Passive. Sealed relays utilizing 2-form-C Bifurcated-Crossbar silver alloy with gold overlay contacts.</i> |
| Logic: | <i>Flash Microprocessor, non-volatile memory</i> |
| Operation Control: | <i>-Front Panel - Momentary switches. Remote - Momentary closure to ground or 5 Volt TTL/CMOS Logic levels. Serial - RS-232c, 6P4C modular /w 9 pin-D-Sub adapter, 2400, 9600, 19200, 38400 / 8,N,1</i> |
| Status: | <i>Front Panel - Indicator LED in Switch. Remote "Act" LED – Trip level set at –35db below Ref. Remote - Open collector outputs, limit current to 50ma per output. Pull-ups may be required.</i> |
| Interfacing: | <i>Audio - Pluggable screw terminals (Euro). Remote Control - Male 37 pin "D" connector. RS-232 - 4C6P Modular. All mating connectors, modular cable and adapter supplied.</i> |
| Power Requirements: | <i>9 Vac, 500 ma. 120 Vac 50-60 hz transformer.</i> |
| Physical Dimensions: | <i>19" X 1.75" X 4.5" (WHD)</i> |
| Weight: | <i>3.0 lb.</i> |

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