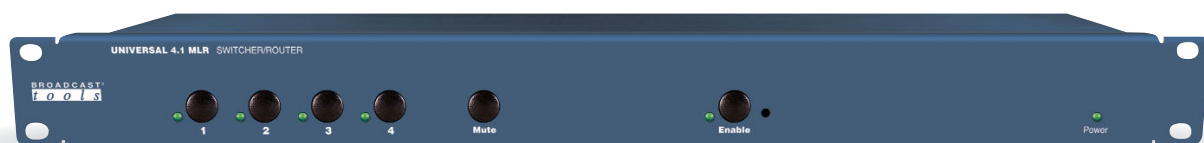


BROADCAST[®]
t o o l s **INC**
PROBLEM SOLVED

Installation and Operation Manual



Universal 4.1 MLR ***Switcher/Router with Mechanical Latching Relays***

Manual update: 7/14/2016

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

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NOTE: We recommend the use of Chrome, Firefox or Safari as your browser.

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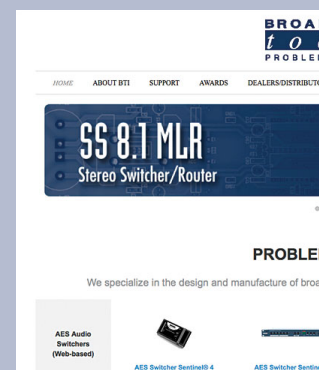
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INTRODUCTION

Thank you for your purchase of a BROADCAST TOOLS® UNIVERSAL 4.1 MLR transparent four input, one output switcher/router (referred to as the UNIVERSAL 4.1 MLR 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® UNIVERSAL 4.1 MLR.

SAFETY INFORMATION

Only qualified technical personnel should install the UNIVERSAL 4.1 MLR. 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 UNIVERSAL 4.1 MLR 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 UNIVERSAL 4.1 MLR. 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.

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:

Broadcast Tools, Inc.

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Sedro-Woolley, WA 98284-1503 USA
Voice: 360.854.9559
Fax: 866.783.1742

Internet Home Page: www.broadcasttools.com
E-mail: support@broadcasttools.com

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Designed, Assembled and Supported in WA State, 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.

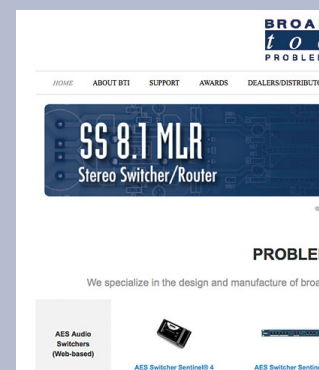


NOTE:

This manual should be read thoroughly before installation and operation.

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INTRODUCTION

Product Overview

The Universal 4.1 MLR is a transparent four input, one output switcher/router with mechanical latching relays designed to pass AES/EBU digital audio or stereo analog audio signals. The Universal 4.1 MLR is perfect for all types of passive signal switching via front panel controls, contact closures or logic remote control. Each input features stereo Neutrik “Combo” XLR, ¼” T/R/S and StudioHub+ RJ45’s connectors. The output features stereo XLR, ¼” T/R/S and StudioHub+ RJ45 connectors. Switching is accomplished via mechanical latching gold contact relays, which means that the unit can route a signal in either direction and will keep routing signal even after losing power. 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.

Features/Benefits

- Front panel channel selection push buttons with active channel LED indicators.
- The “MUTE” function with LED indicator allows the user to turn off all audio to the output.
- Front panel Enable switch with enabled LED indicator can be configured to provide a safety lock to the front panel selection push buttons.
- Signal switching via mechanical latching sealed relays utilizing 2-form-C bifurcated – crossbar silver alloy with gold overlay contacts.
- Remote control via contact closures and 5-volt TTL/CMOS logic levels.
- Four normally open relay contact closures for remote channel status.
- Stereo Neutrik “Combo” XLR, ¼” T/R/S and StudioHub+ RJ45’s connectors. The RJ45’s conform to the StudioHub+ wiring standard and pass “DC-LINK” power.
- Removable euro-block screw terminal connectors are used for remote control connections. Necessary mating plugs are supplied.
- If power is lost, the last selected channel is passed to the output.
- Fully RFI proofed.
- Surge protected internal power supply, 9 VDC universal switching power supply with domestic connector supplied. International connectors optional.
- Small 1-RU rack chassis.

Applications

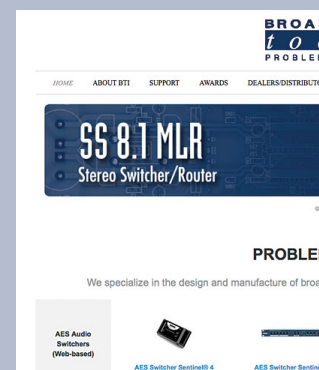
Source switching; Studio selection and routing; Audio processing selection; Exciter input selection; Remote broadcast input selection; STL source selection; PA switching; IFB selection; Satellite audio channel switching and console monitor input and output selection.

Inspection

Please examine your UNIVERSAL 4.1 MLR 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 UNIVERSAL 4.1 MLR, and a 9 to 12 VDC wall transformer. Manuals may be downloaded from our web site.

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Installation

Surge Protection

The UNIVERSAL 4.1 MLR 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 UNIVERSAL 4.1 MLR 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 UNIVERSAL 4.1 MLR to a UPS system. A UPS helps minimize the risk to the UNIVERSAL 4.1 MLR and provides power during a power outage.

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

Installation/Operation

Front Panel Controls

The first four front panel push buttons represent the four inputs that can be routed to the switcher's output, additionally there are mute and enable push buttons. Each push button has an associated LED indicator. When an input channel is selected its LED will light and the previously selected channel is deselected (interlock). Only one input can be routed to the output at a time. When the Mute button is pressed the switcher will deselect all inputs and stop routing audio, the Mute LED will light to indicate this state. The enable (safety) function can be turned on, which will require the user to hold down the enable push button while selecting any of the other front panel push buttons, the enable LED is illuminated when this function is enabled.

SW7 Enable Configuration Switch:

IN = Front panel enable switch defeated.

OUT = Front panel ENABLE push button active and the Enable LED is illuminated.

NOTE: The enable 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.

LED indicators

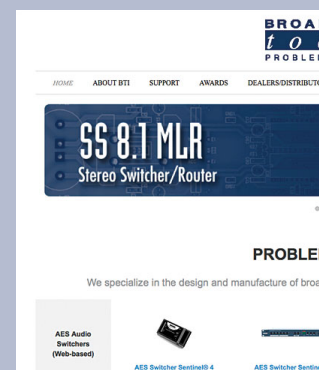
- "Power" LED: Illuminates when power is applied.
- "Enable" LED: Illuminates when the front panel enable push button option is enabled.
- Channel and Mute LED's illuminate when the input channel is selected.

Power

Connect the 2.1mm coaxial barrel type power connector into the unit and the 9 to 12 VDC universal switching power supply with domestic connector into a 120 Vac 50-60 Hz power source. Never use any type of power supply other than the specified/supplied power supply.

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INSTALLATION

Audio Inputs and Outputs

Each of the Universal 4.1 MLRs four inputs have StudioHub+ compatible RJ45 jacks, and balanced stereo XLR/1/4" TRS combination jacks all wired in parallel. The output has a StudioHub+ compatible RJ45 jack, balanced stereo XLR jacks and balanced stereo 1/4" TRS jacks, also wired in parallel. This means any input connector can route to any output connector, providing an easy way to interface between devices with different connectors without the need for custom cables.

Switching is accomplished via mechanical latching gold contact relays, which means that the unit can route a signal in either direction and will keep routing that signal even after losing power. 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

XLR Connector Pinout

The input and output XLR connector pinouts conform to 3-pin XLR wiring standards: Pin 1 = Ground. Pin 2 = Positive. Pin 3 = Negative.

1/4" TRS Connector Pinout

The input and output 1/4" connector pinouts conform to balanced 1/4" TRS (tip, ring, sleeve) wiring standards: Tip = Positive. Ring = Negative. Sleeve = Ground.

RJ45 Pinout

The input and output RJ45 jacks conform to StudioHub+ wiring standards. Please use shielded twisted pair Cat5e or Cat6 cables and connectors (STP).

StudioHub+ Pinout:

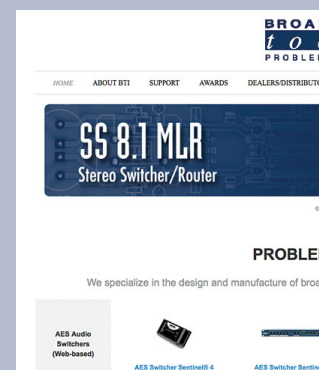
Function:	Wire Pair:	RJ45 Pins:
Left+/AES+	White/Orange	1
Left-/AES-	Orange/White	2
Right+	White/Green	3
Right -	Green/White	6
n/c	White/Blue	5
GND*	Blue/White	4
15V-*	White/Brown	7
15V+*	Brown/White	8
GND	Shield	Shield

* StudioHub+ "DC-LINK" allows +/-15 VDC and Ground to pass on pin 8, 7, and 4 (respectively) of the RJ45. These pins are connected in parallel across all RJ45s on the Universal 4.1 MLR.

For AES/EBU signals please use AES/EBU qualified cable.

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INSTALLATION

Remote Control Inputs

The Universal 4.1 MLR has five remote control inputs that can be used to select input channels or mute the switcher. The inputs accept momentary contact closures (sustained, if break before make); open collector or TTL/CMOS input logic levels. For example, pulsing the “I2” input to ground would switch Input 2 to the output of the Universal 4.1 MLR and remain switched that way until a front panel source switch is pressed, a different remote control input is activated.

Relay Outputs

(Top row, TB1)

I1 (Input 1)	I2 (Input 2)	I3 (Input 3)	I4 (Input 4)	Mute	Gnd (Ground)

See Below
(Bottom Row, TB1)

Relay Outputs

The Universal 4.1 MLR has four relay contact outputs that are used to indicate switch position. O1 indicates for Input 1, O2 indicates for Input 2, etc. The relay output for the selected channel will connect to the “Com” (common) terminal providing a return for an LED indicator, TTL/CMOS logic or relay.

See Above
(Top row, TB3)

O1	O2	O3	O4	Com	Gnd

Relay Outputs
(Bottom Row, TB3)



CAUTION!

Installation of the UNIVERSAL 4.1 MLR in high RF environments should be performed with care. The station ground should be connected to the chassis using a 20 to 24-gauge wire.

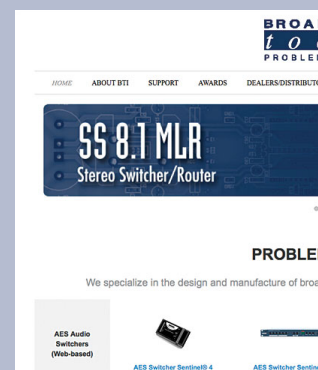


NOTE:

For wiring information, refer to the grids in this section of the manual, the silk-screen text on the rear panel of the product or the fractional schematic in the appendix.

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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.
Operation Control:	Front Panel - Momentary switches. Remote - Momentary or sustained, compatible with 5 volts CMOS/TTL logic, open collector or contact closures to ground.
Status:	Front Panel - LED Indicators. Remote – Four channel relay status output contacts. 30 VDC @ 1 amp maximum.

CAUTION! For safety, never connect 120 Vac circuits to the relays!

Interfacing:	Audio I/O- balanced stereo XLR, balanced stereo ¼" TRS and StudioHub+ RJ45 connectors. Remote control - Rear panel pluggable screw terminals. Mating connectors supplied.
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Power Requirements:	7.5 to 12 VDC @ >500 ma. Center positive. Universal switching power supply with domestic connector supplied. International connectors optional.
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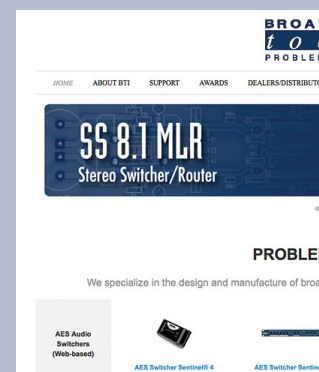
Physical Dimensions:	19.00" x 4.00" x 1.75" (WDH), 1-RU rack mount painted aluminum chassis.
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Weight:	2.0 lb.
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Shipping Weight:	3.0 lb.
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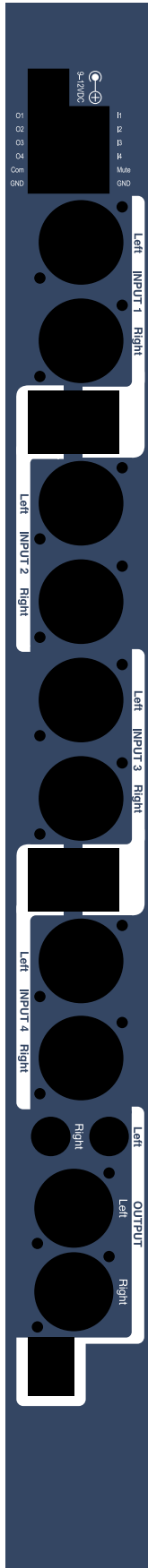
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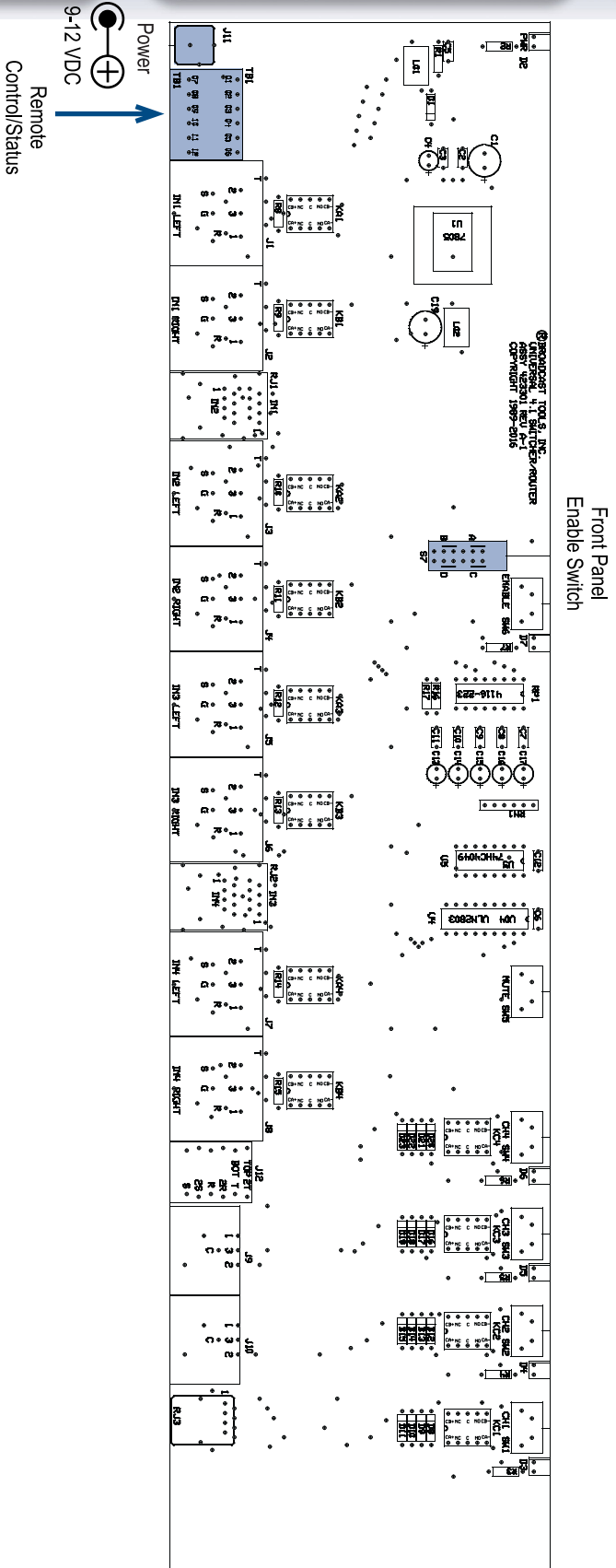
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Universal 4.1 MLR

Component Layout



Fractional Schematic

