BROADCAST tools ®
INC

PROBLEM SOLVED

Installation and Operation Manual
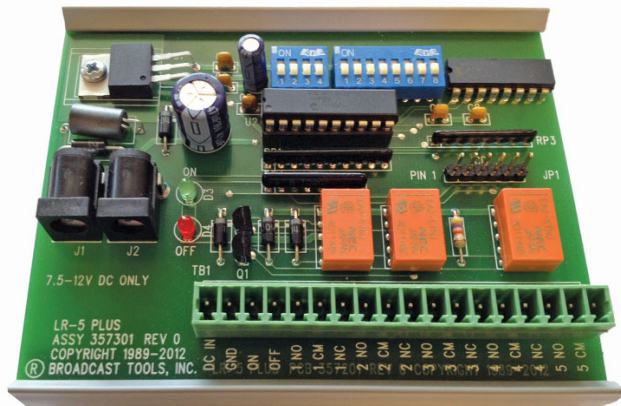
LR-5 Plus
Smart Mechanical Latching Relay

Manual update: 08/27/2012

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

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INTRODUCTION

Thank you for your purchase of the Broadcast Tools® LR-5 Plus, smart mechanical latching relay, which we will refer to throughout the manual as the LR-5 Plus. We're confident 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 product.

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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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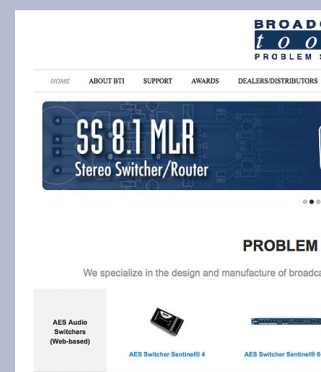
NOTE:

This manual should be read thoroughly before installation and operation.

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PRODUCT DESCRIPTION

The LR-5 Plus is a mechanical latching relay with one set of four pole double throw contacts and one set of single pole normally open contacts. The LR-5 Plus provides two control inputs which may be configured for sustained, toggle, set-reset (flip-flop), dual alternate action or falling/rising edge, along with additional Boolean logic functions. The LR-5 Plus may be used to switch all types of audio, AES and AC/DC circuits. Additional features include; Independent user programmable logic and pulse stretching (delays) from 100 milliseconds to 12.7 seconds in 100 millisecond steps, or 10 seconds to 21 minutes and 10 seconds in 10 second steps, removable euro-block screw terminals and LED indicators to display relay ON/OFF. The LR-5 Plus assembly is housed in a plastic snap track.

FEATURES

- One set of four pole double throw mechanical latching relay contacts and one set of single pole normally open mechanical latching relay contacts.
- Two configurable control inputs (closure to ground).
- Fifteen logic functions include sustained, toggle, set-reset (flip-flop), dual alternate action or falling/rising edge, along with additional Boolean logic functions.
- The independent pulse stretcher or time delays may be configured from 100ms to 12.7 seconds in 100 millisecond steps, or 10 sec. to 21 minutes and 10 seconds in 10 second steps.
- On/Off LED indicators are provided for relay position status
- A four-position dipswitch is provided for logic function configuration and an eight-position dipswitch is provided for timing configuration.
- Dual power jacks allows for the daisy chaining of units from one wall supply as well as a DC in connection on the terminal block.
- All I/O connections via removable euro-block screw terminals.

APPLICATIONS

- Convert differing logic levels to mechanical latching contact closures.
- Time delay relay.
- Pulse stretcher.
- Sustained contact to pulse converter.
- Rising and/or falling edge pulse converter.
- Latching (flip-flop) relay.
- Toggle action relay.
- Dual alternate action relay.
- Additional Boolean logic functions include; XOR, AND, NAND, OR, NOR.

INSPECTION

Please examine your LR-5 Plus 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 LR-5 Plus installed in a plastic snap track, a DC wall power transformer, and this manual.

Installation of the LR-5 Plus in high RF environments should be performed with care. Surge protection with RF filtering such as the Tripp-Lite "ISOBAR 4 or 6" is also suggested for the wall transformer.

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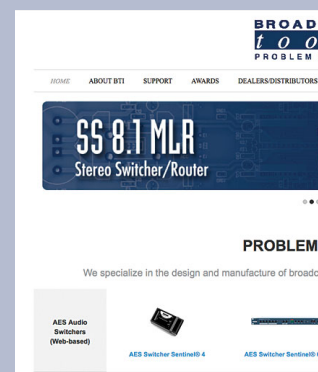
DESCRIPTION

INSTALLATION

The LR-5 Plus interfaces with your equipment through a removable euro-block screw terminal (TB1). Follow the labels on the circuit board for all connections. Refer to the terminal functions below. Unplug the plug and remove about 1/8" of insulation from the wire, insert the wire into the plug, and tighten the screw. Reinsert the plug when finished. Be certain that no bare wires are exposed. The terminals accommodate wire sizes from 18 - 28 AWG solid or stranded wire.

TB1, Terminal Connections / Pin-out

Pin 1 = DC IN (+7.5-12 VDC Input)
Pin 2 = GND (Ground)
Pin 3 = Relay ON (Odd)
Pin 4 = Relay OFF (Even)
Pin 5 = Contact 1 N.O.
Pin 6 = Contact 1 Common (wiper)
Pin 7 = Contact 1 N.C.
Pin 8 = Contact 2 N.O.
Pin 9 = Contact 2 Common (wiper)

Pin 10 = Contact 2 N.C.
Pin 11 = Contact 3 N.O.
Pin 12 = Contact 3 Common (wiper)
Pin 13 = Contact 3 N.C.
Pin 14 = Contact 4 N.O.
Pin 15 = Contact 4 Common (wiper)
Pin 16 = Contact 4 N.C.
Pin 17 = Contact 5 N.O.
Pin 18 = Contact 5 Common (wiper)

Note: N.C. refers to the relay being OFF.

Mounting the LR-5 Plus may take many forms. The LR-5 Plus may be removed from the snap track for alternate mounting. The plastic snap track can be screwed, cable tied or velcro'ed to most surfaces. An optional DIN rail and clips may be purchased from other manufacturers to mount the snap track to a DIN rail.

When installation is complete, proper power can be applied to either jack J1, J2, or the DC IN/GND connection on TB1. The additional jack is supplied for daisy-chaining multiple LR-5 Plus's.

SETUP

The LR-5 Plus has two sets of dipswitches which are used to configure the device's operating behavior. The FUNCTION dipswitches set the function mode and the **TIMING dipswitches set the timing (when used.) In order for any new settings to take effect the LR-5 Plus must be power-cycled.**

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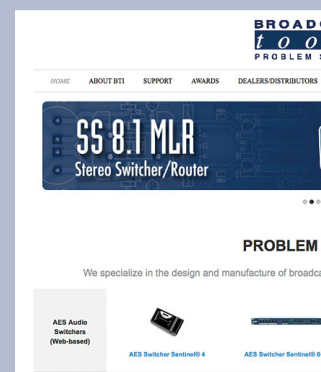
Function Modes

The function dipswitches are weighted in binary: SW1=1, SW2=2, SW3=4, SW4=8
Add the weighted values to get the mode number.

| Mode	Function Dipswitch 0=Off,1=On	Description
0	0000	The relay closes on the leading edge of the odd input. Relay remains closed until the leading edge of the even input is active.
1	1000	Relay toggles on leading edge of the odd input.
2	0100	Relay closes when the odd input is active and opens when the odd input is inactive.
3	1100	The relay closes after the odd input has been active for the programmed time period. It opens after the even input is closed for the time period.
4	0010	The relay closed on the leading edge of the odd input. The relay opens after the trailing edge is closed for the time period.
5	1010	Relay closes on leading edge of the odd input for time period.
6	0110	Relay closes for the time period on the trailing edge of the odd input.
7	1110	Relay closes for the time period on the leading or trailing edge of the odd input.
8	0001	Relay closes on leading edge of the odd input and remains closed for at least the time period. If the odd input stays active for longer than the time period, the relay will open on the trailing edge of the odd input.
9	1001	Relay closes on the leading edge of the odd input for no longer than the time period. If a trailing edge is encountered before the time has expired, the relay will open with the edge. Otherwise, the relay opens when the time period expires.
10	0101	Two input NOR (0 = input inactive, 1 = active) 00 = 1 01 = 0 10 = 0 11 = 0
11	1101	Two input OR 00 = 0 01 = 1 10 = 1 11 = 1
12	0011	Two input XOR 00 = 0 01 = 1 10 = 1 11 = 0
13	1011	Two input AND 00 = 0 01 = 0 10 = 0 11 = 1
14	0111	Two input NAND 00 = 1 01 = 1 10 = 1 11 = 0
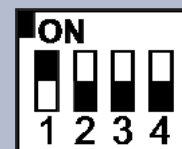
**Mode 1
(1)**
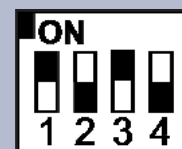
**Mode 5
(1+4)**
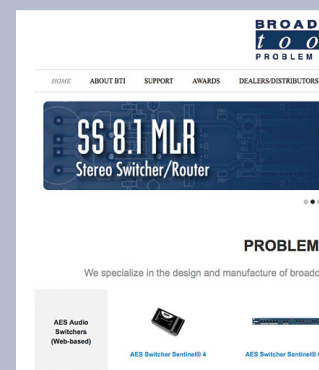
INSTALLATION

Timing

The function dipswitches are weighted in binary: 1,2,4,8,16,32,64. SW-8 sets the time resolution multiplier, either 100 ms. (Off) or 10 sec. (On.)

100 Millisecond Resolution Mode: From 100 milliseconds to 12.7 seconds in 100 millisecond steps. Examples:

Time	SW-1 (1)	SW-2 (2)	SW-3 (4)	SW-4 (8)	SW-5 (16)	SW-6 (32)	SW-7 (64)	SW-8 (Resolution)
100 ms.	On	Off	Off	Off	Off	Off	Off	Off
200 ms.	Off	On	Off	Off	Off	Off	Off	Off
300 ms.	On	On	Off	Off	Off	Off	Off	Off
400 ms.	Off	Off	On	Off	Off	Off	Off	Off
500 ms.	On	Off	On	Off	Off	Off	Off	Off
600 ms.	Off	On	On	Off	Off	Off	Off	Off
700 ms.	On	On	On	Off	Off	Off	Off	Off
800 ms.	Off	Off	Off	On	Off	Off	Off	Off
900 ms.	On	Off	Off	On	Off	Off	Off	Off
1 sec.	Off	On	Off	On	Off	Off	Off	Off
1.1 sec.	On	On	Off	On	Off	Off	Off	Off
2 sec.	Off	Off	On	Off	On	Off	Off	Off
3 sec.	Off	On	On	On	On	Off	Off	Off
4 sec.	Off	Off	Off	On	Off	On	Off	Off
5 sec.	Off	On	Off	Off	On	On	Off	Off
12 sec.	Off	Off	Off	On	On	On	On	Off
12.7 sec.	On	On	On	On	On	On	On	Off

100 milliseconds
(1) x 100ms.

5 seconds
(2+16+32) x 100ms.
= 5000 ms. = 5 sec.
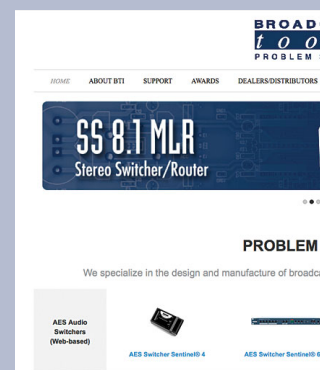
Timing

10 Second Resolution Mode: From 10 seconds to 21 minutes and 10 second in 10 second steps. Examples:

Time	SW-1 (1)	SW-2 (2)	SW-3 (4)	SW-4 (8)	SW-5 (16)	SW-6 (32)	SW-7 (64)	SW-8 (Resolution)
10 sec.	On	Off	Off	Off	Off	Off	Off	On
20 sec.	Off	On	Off	Off	Off	Off	Off	On
30 sec.	On	On	Off	Off	Off	Off	Off	On
40 sec.	Off	Off	On	Off	Off	Off	Off	On
50 sec.	On	Off	On	Off	Off	Off	Off	On
60 sec.	Off	On	On	Off	Off	Off	Off	On
70 sec.	On	On	On	Off	Off	Off	Off	On
80 sec.	Off	Off	Off	On	Off	Off	Off	On
90 sec.	On	Off	Off	On	Off	Off	Off	On
100 sec.	Off	On	Off	On	Off	Off	Off	On
110 sec.	On	On	Off	On	Off	Off	Off	On
2 min.	Off	Off	On	On	Off	Off	Off	On
3 min.	Off	On	Off	Off	On	Off	Off	On
4 min.	Off	Off	Off	On	On	Off	Off	On
5 min.	Off	On	On	On	On	Off	Off	On
21 min	Off	On	On	On	On	On	On	On
21.1 min	On	On	On	On	On	On	On	On

10 seconds
(1) x 10 sec. = 10 sec.

5 minutes
(2+4+8+16) x 10 sec.
= 300 sec. = 5 min.

INSTALLATION

8
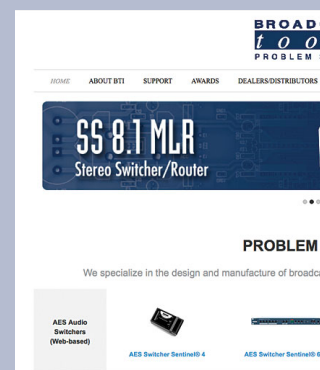
OPERATION

The LR-5 Plus ships in Mode 0. In Mode 0 to turn the relay ON, place a momentary contact closure across the GND and "ON" terminals.

To turn the relay OFF, place a momentary contact closure across the GND and "OFF" terminals.
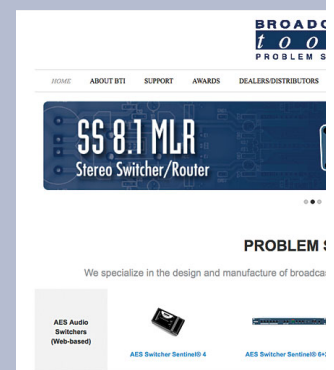
Please refer to the Function Modes section of this manual for a description of each function mode and setup instructions.

CAUTION!

The LR-5 Plus utilizes mechanical latching relays, removing power DOES NOT force the relay to open.

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OPERATION

SPECIFICATIONS

Control inputs: ON (Odd), and OFF (Even). Activate by grounding one or both input(s).

Mechanical Latching Relays:
    Contact form: 2 x 2 form C and 1 – form A
    Contact material: Silver alloy with gold alloy overlay
    Maximum switching voltage: 30vdc
    Maximum switching current: 1 amp
    Minimum contact ratings   10 mVdc, 10 µA (resistive)

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

Connectors: Removable euroblock screw terminals

Power Requirement: 7.5 to 12 VDC only @ up to 1 amp. 2.1mm ID x 5.5mm OD coaxial connector. Surge protected. Domestic PS supplied

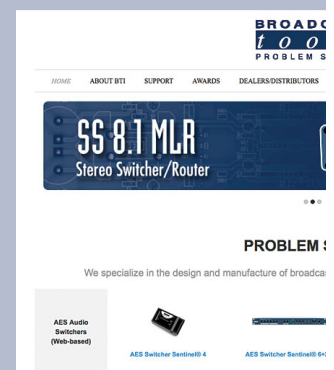Size: 3.00" x 4.00" x 1.00", supplied with a plastic snap-track.

Weight: 1.0 lb.

Options: * CE certified universal power supply.

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LIMITED WARRANTY

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Fractional Schematic

Modification date: 11/08/2012

Broadcast Tools® LR–5 Plus

Component Layout

LR–5 PLUS
ASSY 357301 REV B
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BROADCAST TOOLS, INC.

7.5–12V DC ONLY
CENTER POSITIVE

FUNCTION
Binary
1 2 4 8

TIMING
Binary
1 2 4 8 16 32 64

TIMING RESOLUTION
OFF = 100ms
ON = 10 seconds

TB1 terminals:
DC IN
GND
ON
OFF
1 NO
1 CM
1 NC
2 NO
2 CM
2 NC
3 NO
3 CM
3 NC
4 NO
4 CM
4 NC
5 NO
5 CM