

# **R8**

**8-OUTPUT MIDI-CONTROLLED RELAY ARRAY**

## **OPERATING INSTRUCTIONS**

MIDI Solutions R8 Operating Instructions M426-100

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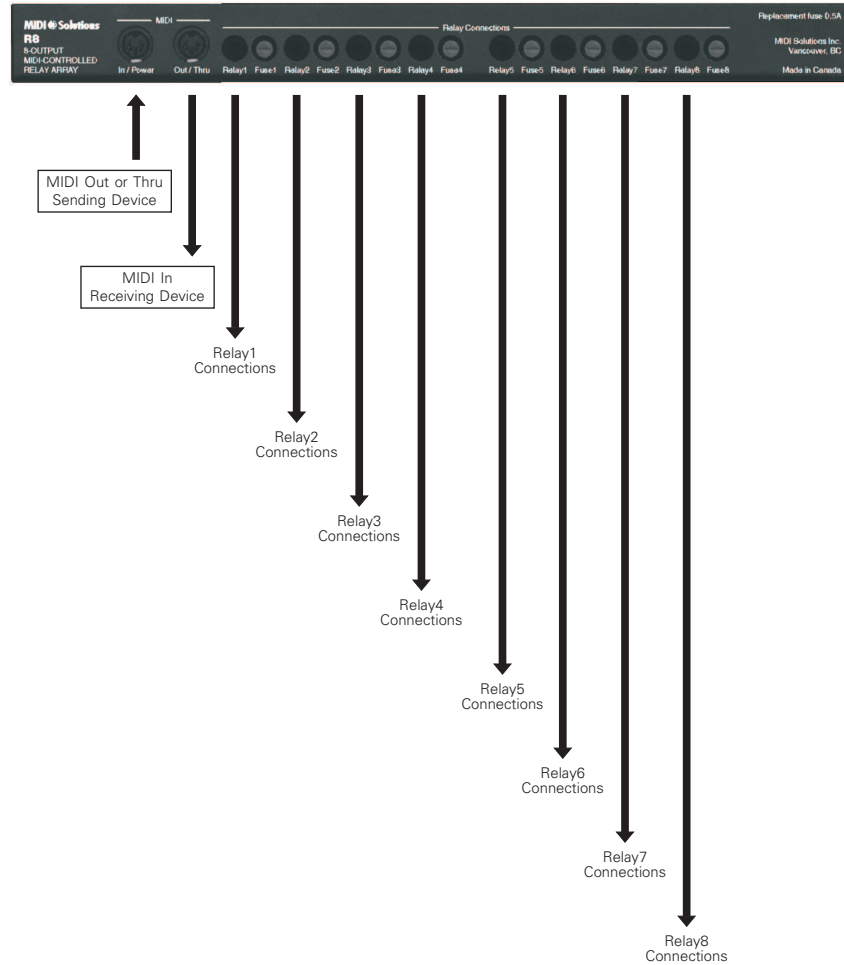
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## INTRODUCTION

Thank you for purchasing the MIDI Solutions R8 8-output MIDI-controlled Relay Array.

The MIDI Solutions R8 contains eight MIDI-controlled relays that enable switches or footswitch inputs to be placed under MIDI control. Each relay can be programmed to respond to a wide variety of MIDI messages, including Note, Control Change, Program Change, and System Exclusive messages, and programmed settings are retained even after power is removed from the unit. The MIDI Solutions R8 is MIDI-powered and requires no batteries or power supply to operate.



## CONNECTIONS

To program the R8 connect the MIDI Out from your MIDI interface to the MIDI In of the R8. The MIDI Out and Relay Connections can be left disconnected during programming.

Once the R8 has been programmed it can be inserted wherever it is required in your MIDI setup. Connect the MIDI Out or Thru of the sending device to the MIDI In of the R8. The Relay Connections can be made directly to footswitch inputs or the contacts to be switched. The MIDI Out of the R8 can be connected to the MIDI In of a receiving MIDI device or left disconnected. It is recommended that the number of MIDI Solutions products powered by a single MIDI Out or Thru be limited to four.

**IMPORTANT: Switching high current or inductive loads can permanently damage the unit, please see the relay contact ratings at the end of these instructions, and navigate to the following link for more information: [www.midisolutions.com/backemf.htm](http://www.midisolutions.com/backemf.htm)**

## PROGRAMMING

The R8 is programmed by sending it MIDI System Exclusive programming commands from a computer with a MIDI interface. These commands are described on the MIDI Solutions website, however **the Programming Tools software creates these commands automatically (see [www.midisolutions.com/support.htm](http://www.midisolutions.com/support.htm))**.

Upon receipt of a programming command, the R8's MIDI indicator LED flashes rapidly for about one second to indicate that the setting has been stored. Ensure that the LED completes its flashing after receiving a programming command before sending another programming command (the Programming Tools software automatically inserts these delays). Settings are retained after power is removed, and the unit can then be inserted wherever it is required in your MIDI setup.

## OPERATION

The R8's MIDI Indicator LED will light as soon as the sending device is turned on, and flashes whenever MIDI data passes through the unit. The R8 will respond to incoming MIDI messages according to its programmed settings. All MIDI messages appearing at the MIDI In are passed to the MIDI Out.

## PROGRAMMING COMMANDS

### CLEAR SETTINGS

To clear all of the R8's settings, send it the following System Exclusive programming command:

► **F0 00 00 50 26 00 F7**

It is recommended to send the Clear Settings command to the R8 prior to programming the unit to ensure that all previous settings are cleared.

### DUMP SETTINGS

To dump all of the R8's current settings, send it the following System Exclusive message:

► **F0 00 00 50 26 10 F7**

Upon receipt of this command the R8 will dump its current settings to the MIDI Out.

### LINK SETTINGS

To link together the Note and Control Change settings of a specific relay, send the R8 the following programming command:

► **F0 00 00 50 26 05 rr aa F7**

**rr** = Relay (00 for Relay1 ... 07 for Relay8)

**aa** is set as follows:

**aa** = 00: Link OFF - each Note and Control Change setting operates independently

**aa** = 01: CLOSED Link - relay closes only if conditions of all Note and Control Change settings are in the closed state

**aa** = 02: OPEN Link - relay opens only if conditions of all Note and Control Change settings are in the open state

The link setting also has an effect on the power-up state of each relay. When link is OFF for a specific relay, that relay will power up in the state in which it was previously powered down (powering up has no effect on the relay). When a relay is set to CLOSED link, that relay will power up in the open state in order to prevent the relay from closing until all messages to close it are received. When a relay is set to OPEN link, that relay will power up in the closed state in order to prevent the relay from opening until all messages to open it are received.

## NOTE

To program the R8 to respond to a Note message, send it the following System Exclusive programming command:

- ▶ **F0 00 00 50 26 01 rr aa nn cc (pp) F7** (**pp** is optional)

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

**rr** = Relay (00 for Relay1 ... 07 for Relay8)

**aa** is set as follows:

if **pp** is omitted then:

**aa** = 00: relay OPENS for Note-Ons and Note-Offs

**aa** = 01: relay CLOSES for Note-Ons and Note-Offs

**aa** = 02: relay CLOSES for Note-Ons, OPENS for Note-Offs

**aa** = 03: relay OPENS for Note-Ons, CLOSES for Note-Offs

if **pp** is included then:

**aa** = 00: relay produces CLOSED pulse for Note-Ons

**aa** = 01: relay produces CLOSED pulse for Note-Offs

**aa** = 02: relay produces OPEN pulse for Note-Ons

**aa** = 03: relay produces OPEN pulse for Note-Offs

**nn** = MIDI Note number

**cc** = MIDI channel (see MIDI channel table at end)

**pp** = Pulse width in 8 ms increments, or 1 s increments if preceded by 00

The R8 will accept a combined total of 10 Note or Control Change settings per relay.

## Example

To program the R8 to close Relay6 for 10 seconds when Note-On middle C is received on any MIDI channel, set **rr** = **05** (Relay6), **aa** = **00** (relay produces CLOSED pulse for Note-Ons), **nn** = **3C** (middle C is Note number 60, 3C is the hexadecimal value for 60), **cc** = **7F** (7F specifies all MIDI channels), and **pp** = **00 0A** (0A is the hexadecimal value for 10, preceded by 00 to specify 1s increments). These values result in the following System Exclusive programming command:

**F0 00 00 50 26 01 05 00 3C 7F 00 0A F7**

## CONTROL CHANGE

To program the R8 to respond to a Control Change message, send it the following System Exclusive programming command:

- ▶ **F0 00 00 50 26 02 rr aa nn cc (tt pp) F7** (**tt** and **pp** are optional)

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

**rr** = Relay (00 for Relay1 ... 07 for Relay8)

**aa** is set as follows:

if **pp** is omitted then:

**aa** = 00: relay OPENS for *all* control values

**aa** = 01: relay CLOSES for *all* control values

**aa** = 02: relay CLOSES *above* threshold, OPENS *below* threshold

**aa** = 03: relay OPENS *above* threshold, CLOSES *below* threshold

if **pp** is included then:

**aa** = 00: relay produces CLOSED pulse *above* threshold

**aa** = 01: relay produces CLOSED pulse *below* threshold

**aa** = 02: relay produces OPEN pulse *above* threshold

**aa** = 03: relay produces OPEN pulse *below* threshold

**nn** = MIDI Control Change number

**cc** = MIDI channel (see MIDI channel table at end)

**tt** = Threshold value (threshold defaults to 64 if this byte omitted)

**pp** = Pulse width in 8 ms increments, or 1 s increments if preceded by 00

The R8 will accept a combined total of 10 Note or Control Change settings per relay.

### Example

To program the R8 to close Relay2 when the volume on MIDI channel 16 drops below a value of 10, and open when it rises above, set **rr** = **01** (Relay2), **aa** = **03** (relay OPEN *above* threshold, CLOSED *below* threshold), **nn** = **07** (07 is the Control Change number for Volume), **cc** = **0F** (0F specifies MIDI channel 16), and **tt** = **0A** (0A is the hexadecimal value for 10, the desired threshold). These values result in the following System Exclusive programming command:

F0 00 00 50 26 02 **01 03 07 0F 0A** F7

## PROGRAM CHANGE

To program the R8 to respond to Program Change messages, send it the following System Exclusive programming command:

- ▶ **F0 00 00 50 26 03 rr (aa pp) cc nn nn ... nn F7** (aa pp) is optional

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

**rr** = Relay (00 for Relay1 ... 07 for Relay8)

if **aa pp** is omitted then relay CLOSES for all programs **nn** and OPENS for all other program numbers.

Otherwise, **aa pp** are set as follows:

**aa** = 10: relay produces OPEN pulse for all programs **nn**

**aa** = 11: relay produces CLOSED pulse for all programs **nn**

**pp** = Pulse width in 8 ms increments, or 1 s increments if preceded by 00.

**cc** = MIDI channel (see MIDI channel table at end)

**nn nn ... nn** = Program numbers for relay to respond to

New Program Change settings overwrite previous settings for the specified relay.

### Example

To program the R8 to close Relay1 for a duration of 4 seconds when programs 5, 7, or 12 on MIDI channel 10 are received, send it the following System Exclusive programming command:

**F0 00 00 50 26 03 00 11 00 04 09 05 07 0C F7**

## START/STOP/CONTINUE

To program the R8 to respond to Start, Stop, and Continue messages, send it the following System Exclusive programming command:

- ▶ **F0 00 00 50 26 06 rr aa (pp) F7** (pp is optional)

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

**rr** = Relay (00 for Relay1 ... 07 for Relay8)

**aa** is set as follows:

if **pp** is omitted then:

**aa** = 00: relay CLOSES for Start/Continue, OPENS for Stop

**aa** = 01: relay OPENS for Start/Continue, CLOSES for Stop

if **pp** is included then:

**aa** = 00: relay produces CLOSED pulse for Start/Continue

**aa** = 01: relay produces CLOSED pulse for Stop

**aa** = 02: relay produces OPEN pulse for Start/Continue

**aa** = 03: relay produces OPEN pulse for Stop

**pp** = Pulse width in 8 ms increments, or 1 s increments if preceded by 00

### Example

To program the R8 to close Relay5 when a MIDI Start or Continue message is received, and open it when a MIDI Stop message is received, send it the following System Exclusive programming command:

**F0 00 00 50 26 06 04 00 F7**

## SYSTEM EXCLUSIVE

To program the R8 to CLOSE upon receiving a System Exclusive message, send it the following programming commands:

- ▶ **F0 00 00 50 26 04 rr 01 (pp) F7** followed by **F0 ... F7** (**pp** is optional)  
where **F0 ... F7** is the System Exclusive message the relay is being programmed to respond to (**max. 20 bytes**)  
All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)  
**rr** = Relay (00 for Relay1 ... 07 for Relay8)  
**pp** = Pulse width (CLOSED pulse) in 8 ms increments, or 1 s increments if preceded by 00.

To program the R8 to OPEN upon receiving a System Exclusive message, send it the following programming commands:

- ▶ **F0 00 00 50 26 04 rr 00 (pp) F7** followed by **F0 ... F7** (**pp** is optional)  
where **F0 ... F7** is the System Exclusive message the relay is being programmed to respond to (**max. 20 bytes**)  
All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)  
**rr** = Relay (00 for Relay1 ... 07 for Relay8)  
**pp** = Pulse width (OPEN pulse) in 8 ms increments, or 1 s increments if preceded by 00.

### Example

To program the R8 to CLOSE Relay8 when the MIDI Machine Control *Play* command (F0 7F 7F 06 02 F7) is received, and OPEN it when the *Stop* command (F0 7F 7F 06 01 F7) is received, send it the following programming commands:

F0 00 00 50 26 04 **07 01** F7 followed by **F0 7F 7F 06 02 F7**

F0 00 00 50 26 04 **07 00** F7 followed by **F0 7F 7F 06 01 F7**



## MIDI CHANNEL TABLE

The value **cc** in the programming commands is assigned according to the following table:

MIDI Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	ALL
cc	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	7F

## MIDI CONTROL CHANGE TABLE

Decimal	Hexadecimal	Control Function
0	00	Bank Select
1	01	Modulation wheel or lever
2	02	Breath Controller
3	03	Undefined
4	04	Foot controller
5	05	Portamento time
6	06	Data entry MSB
7	07	Channel Volume
8	08	Balance
9	09	Undefined
10	0A	Pan
11	0B	Expression Controller
12-13	0C-0D	Effect Controls 1-2
14-15	0E-0F	Undefined
16-19	10-13	General Purpose Controllers (#'s 1-4)
20-31	14-1F	Undefined
32-63	20-3F	LSB values for 0-31
64	40	Damper pedal (sustain)
65	41	Portamento On/Off
66	42	Sostenuto
67	43	Soft pedal
68	44	Legato Fsw (vv=00-3F: Normal, 40-7F: Legato)
69	45	Hold 2
70	46	Sound Controller 1 (default: Sound Variation)
71	47	Sound Controller 2 (default: Timbre/Harmonic Content)
72	48	Sound Controller 3 (default: Release Time)
73	49	Sound Controller 4 (default: Attack Time)
74	4A	Sound Controller 5 (default: Brightness)
75-79	4B-4F	Sound Controllers 6-10 (no defaults)
80-83	50-53	General Purpose Controllers (#'s 5-8)
84	54	Portamento Control
85-90	55-5A	Undefined
91	5B	Effects 1 Depth (formerly External Effects Depth)
92	5C	Effects 2 Depth (formerly Tremolo Depth)
93	5D	Effects 3 Depth (formerly Chorus Depth)
94	5E	Effects 4 Depth (formerly Celeste (Detune) Depth)
95	5F	Effects 5 Depth (formerly Phaser Depth)
96,97	60,61	Data increment, Data decrement
98,99	62,63	Non-Registered Parameter Number LSB, MSB
100,101	64,65	Registered Parameter Number LSB, MSB
102-119	66-77	Undefined
120-127	78-7F	Reserved for Channel Mode Messages

## HEXADECIMAL CONVERSION TABLE

Dec/Hex	16	10	32	20	48	30	64	40	80	50	96	60	112	70	
0	00	16	10	32	20	48	30	64	40	80	50	96	60	112	70
1	01	17	11	33	21	49	31	65	41	81	51	97	61	113	71
2	02	18	12	34	22	50	32	66	42	82	52	98	62	114	72
3	03	19	13	35	23	51	33	67	43	83	53	99	63	115	73
4	04	20	14	36	24	52	34	68	44	84	54	100	64	116	74
5	05	21	15	37	25	53	35	69	45	85	55	101	65	117	75
6	06	22	16	38	26	54	36	70	46	86	56	102	66	118	76
7	07	23	17	39	27	55	37	71	47	87	57	103	67	119	77
8	08	24	18	40	28	56	38	72	48	88	58	104	68	120	78
9	09	25	19	41	29	57	39	73	49	89	59	105	69	121	79
10	0A	26	1A	42	2A	58	3A	74	4A	90	5A	106	6A	122	7A
11	0B	27	1B	43	2B	59	3B	75	4B	91	5B	107	6B	123	7B
12	0C	28	1C	44	2C	60	3C	76	4C	92	5C	108	6C	124	7C
13	0D	29	1D	45	2D	61	3D	77	4D	93	5D	109	6D	125	7D
14	0E	30	1E	46	2E	62	3E	78	4E	94	5E	110	6E	126	7E
15	0F	31	1F	47	2F	63	3F	79	4F	95	5F	111	6F	127	7F

## **RELAY CONTACT RATINGS**

### **Contact Ratings**

Contact Rating: Maximum 10 Watts

Switching Voltage: Maximum 200 Volts DC

Switching Current: Maximum 0.5 Amps DC

### **Replacement Fuse**

0.5A 3AG Fast Acting

## **WARRANTY**

MIDI Solutions Inc. warrants this product to be free from defects in material and workmanship for a period of one (1) year from date of purchase. This warranty is void if the product has been damaged by accident, misuse, alteration, unauthorized repairs or other causes not arising out of defects in material or workmanship. Under no circumstances will MIDI Solutions be liable for any loss of profits, benefits, time, interrupted operation, commercial loss, or consequential damages arising out of the use or inability to use the product. MIDI Solutions specifically disclaims any implied warranties of merchantability and fitness for a particular purpose. If the product requires service, a Return Merchandise Authorization (RMA) number must be obtained from MIDI Solutions and the product must be shipped prepaid to a specified Service Center. MIDI Solutions will repair or replace the product at our discretion and will pay return shipping fees. The customer is responsible for any damage or loss sustained during shipment in any direction.