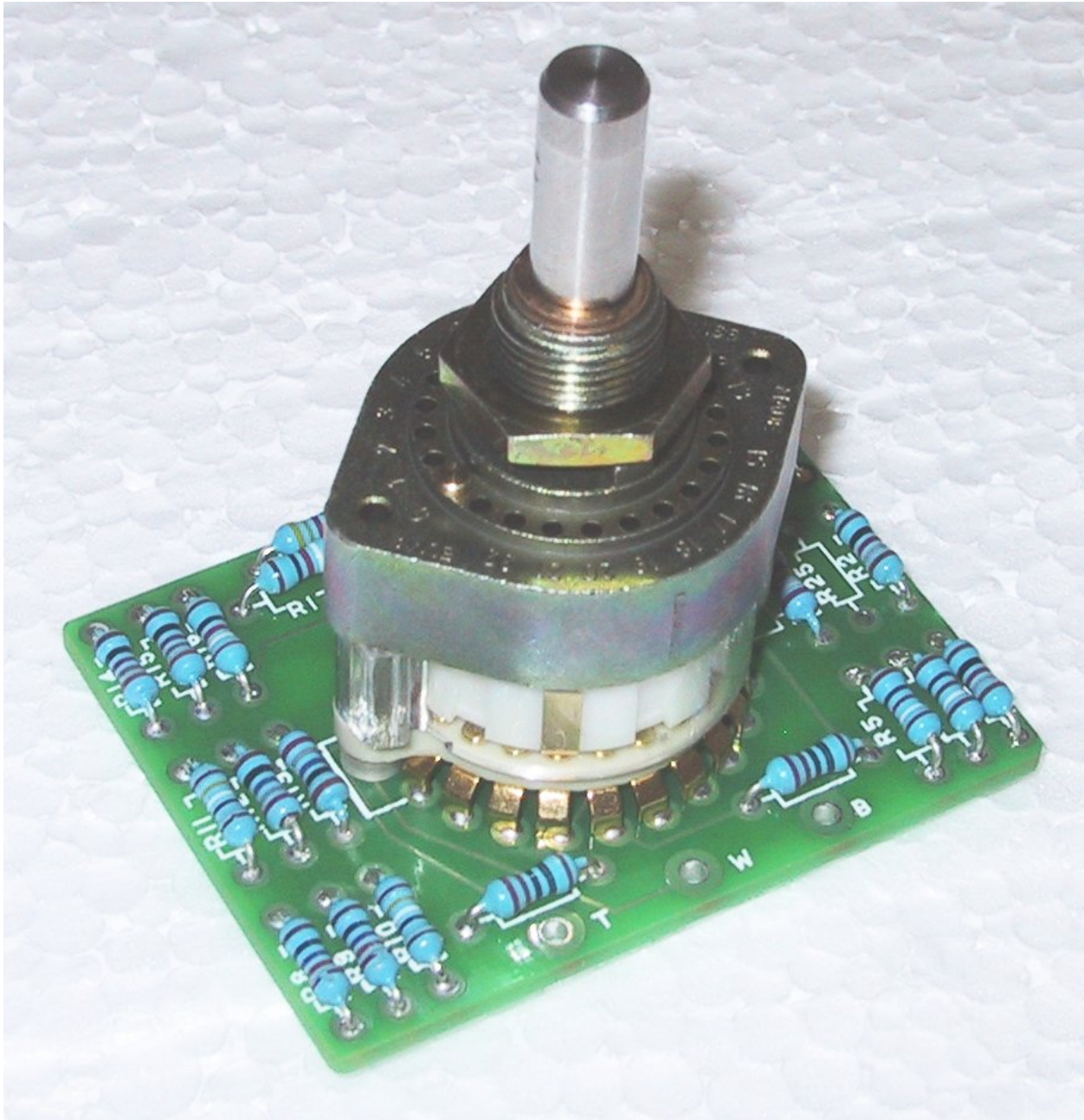


## Marchand Electronics Inc.

PO Box 18099, Rochester, NY 14618  
Tel:(585) 423 0462 Fax:(585) 423 9375  
info@marchandelec.com www.marchandelec.com  
(c)2002 Marchand Electronics Inc.



**24 position stepped attenuator**

## Assembly Instructions

- Step 1: Assemble circuit board by inserting resistors onto component side of circuit board. Solder on solder side. See tables for resistor values. Clean the board.
- Step 2: Check the circuit board with DMM. The resistance between I and B pads should be within 2% of nominal value (eg. 50K +/- 1K)
- Step 3: Attach lead wires: I: brown, W: red, B: orange.

Table 1

10K nominal, log taper, 1.0 dB steps  
Special taper for XM9LS

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	806	1% ,1/4W, Metal Film	1	1.0
R25	not used		3	3.0
R23	806 Ohm	1% ,1/4W, Metal Film	5	3.0
R22	806 Ohm	1% ,1/4W, Metal Film	6	5.0
R21	768 Ohm	1% ,1/4W, Metal Film	7	6.0
R20	768 Ohm	1% ,1/4W, Metal Film	8	7.0
R19	681 Ohm	1% ,1/4W, Metal Film	9	8.0
R18	681 Ohm	1% ,1/4W, Metal Film	10	9.0
R17	549 Ohm	1% ,1/4W, Metal Film	11	10.0
R16	549 Ohm	1% ,1/4W, Metal Film	12	11.0
R15	442 Ohm	1% ,1/4W, Metal Film	13	12.0
R14	442 Ohm	1% ,1/4W, Metal Film	14	13.0
R13	332 Ohm	1% ,1/4W, Metal Film	15	14.0
R12	332 Ohm	1% ,1/4W, Metal Film	16	15.0
R11	287 Ohm	1% ,1/4W, Metal Film	17	16.0
R10	287 Ohm	1% ,1/4W, Metal Film	18	17.0
R9	237 Ohm	1% ,1/4W, Metal Film	19	18.0
R8	237 Ohm	1% ,1/4W, Metal Film	20	19.0
R7	182 Ohm	1% ,1/4W, Metal Film	21	20.0
R6	182 Ohm	1% ,1/4W, Metal Film	22	21.0
R5	137 Ohm	1% ,1/4W, Metal Film	23	off
R4	137 Ohm	1% ,1/4W, Metal Film		
R3	102 Ohm	1% ,1/4W, Metal Film		
R2	102 Ohm	1% ,1/4W, Metal Film		

Parts list

- | #  | Description          |
|----|----------------------|
| 1  | 24 position switch   |
| 2' | brown hookup wire    |
| 2' | red hookup wire      |
| 2' | orange hookup wire   |
| 1  | ELMA01 circuit board |
|    | resistors            |

Table 2

50K nominal, log taper, 0.5 dB steps  
Special taper for XM126LS

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	6.49K	1% ,1/4W, Metal Film	1	1.0
R25	not used		3	2.0
R23	4.53K	1% ,1/4W, Metal Film	5	3.0
R22	2.21K	1% ,1/4W, Metal Film	6	3.5
R21	2.21K	1% ,1/4W, Metal Film	7	4.0
R20	2.05K	1% ,1/4W, Metal Film	8	4.5
R19	2.05K	1% ,1/4W, Metal Film	9	5.0
R18	1.91K	1% ,1/4W, Metal Film	10	5.5
R17	1.91K	1% ,1/4W, Metal Film	11	6.0
R16	1.65K	1% ,1/4W, Metal Film	12	6.5
R15	1.65K	1% ,1/4W, Metal Film	13	7.0
R14	1.54K	1% ,1/4W, Metal Film	14	7.5
R13	1.54K	1% ,1/4W, Metal Film	15	8.0
R12	1.50K	1% ,1/4W, Metal Film	16	8.5
R11	1.50K	1% ,1/4W, Metal Film	17	9.0
R10	1.24K	1% ,1/4W, Metal Film	18	9.5
R9	1.24K	1% ,1/4W, Metal Film	19	10.0
R8	1.18K	1% ,1/4W, Metal Film	20	10.5
R7	1.18K	1% ,1/4W, Metal Film	21	11.0
R6	1.02K	1% ,1/4W, Metal Film	22	18.0
R5	1.02K	1% ,1/4W, Metal Film	23	off
R4	953 Ohm	1% ,1/4W, Metal Film		
R3	953 Ohm	1% ,1/4W, Metal Film		
R2	8.06K	1% ,1/4W, Metal Film		

Parts list

- | #  | Description          |
|----|----------------------|
| 1  | 24 position switch   |
| 2' | brown hookup wire    |
| 2' | red hookup wire      |
| 2' | orange hookup wire   |
| 1  | ELMA01 circuit board |
|    | resistors            |

**Table 3**  
100K nominal, log taper, 0.5 dB steps

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	28.0K	1% ,1/4W, Metal Film	1	0.5
R25	not used		3	1.5
R23	5.23K	1% ,1/4W, Metal Film	5	2.5
R22	5.23K	1% ,1/4W, Metal Film	6	3.0
R21	4.99K	1% ,1/4W, Metal Film	7	3.5
R20	4.99K	1% ,1/4W, Metal Film	8	4.0
R19	4.22K	1% ,1/4W, Metal Film	9	4.5
R18	4.22K	1% ,1/4W, Metal Film	10	5.0
R17	3.92K	1% ,1/4W, Metal Film	11	5.5
R16	3.92K	1% ,1/4W, Metal Film	12	6.0
R15	3.40K	1% ,1/4W, Metal Film	13	6.5
R14	3.40K	1% ,1/4W, Metal Film	14	7.0
R13	2.94K	1% ,1/4W, Metal Film	15	7.5
R12	2.94K	1% ,1/4W, Metal Film	16	8.0
R11	2.61K	1% ,1/4W, Metal Film	17	8.5
R10	2.61K	1% ,1/4W, Metal Film	18	9.0
R9	2.21K	1% ,1/4W, Metal Film	19	9.5
R8	2.21K	1% ,1/4W, Metal Film	20	10.0
R7	2.05K	1% ,1/4W, Metal Film	21	10.5
R6	2.05K	1% ,1/4W, Metal Film	22	11.0
R5	1.91K	1% ,1/4W, Metal Film	23	Off (open)
R4	1.91K	1% ,1/4W, Metal Film		
R3	1.78K	1% ,1/4W, Metal Film		
R2	1.78K	1% ,1/4W, Metal Film		

### Parts list

#	Description
1	24 position switch
2'	brown hookup wire
2'	red hookup wire
2'	orange hookup wire
1	ELMA01 circuit board
	resistors

**Table 4**  
50K nominal, log taper, 0.5 dB steps

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	15.0K	1% ,1/4W, Metal Film	1	0.5
R25	not used		3	1.5
R23	2.55K	1% ,1/4W, Metal Film	5	2.5
R22	2.55K	1% ,1/4W, Metal Film	6	3.0
R21	2.21K	1% ,1/4W, Metal Film	7	3.5
R20	2.21K	1% ,1/4W, Metal Film	8	4.0
R19	2.05K	1% ,1/4W, Metal Film	9	4.5
R18	2.05K	1% ,1/4W, Metal Film	10	5.0
R17	1.91K	1% ,1/4W, Metal Film	11	5.5
R16	1.91K	1% ,1/4W, Metal Film	12	6.0
R15	1.78K	1% ,1/4W, Metal Film	13	6.5
R14	1.78K	1% ,1/4W, Metal Film	14	7.0
R13	1.58K	1% ,1/4W, Metal Film	15	7.5
R12	1.58K	1% ,1/4W, Metal Film	16	8.0
R11	1.43K	1% ,1/4W, Metal Film	17	8.5
R10	1.43K	1% ,1/4W, Metal Film	18	9.0
R9	1.27K	1% ,1/4W, Metal Film	19	9.5
R8	1.27K	1% ,1/4W, Metal Film	20	10.0
R7	1.15K	1% ,1/4W, Metal Film	21	10.5
R6	1.15K	1% ,1/4W, Metal Film	22	11.0
R5	1.02K	1% ,1/4W, Metal Film	23	Off (open)
R4	1.02K	1% ,1/4W, Metal Film		
R3	909	1% ,1/4W, Metal Film		
R2	909	1% ,1/4W, Metal Film		

### Parts list

#	Description
1	24 position switch
2'	brown hookup wire
2'	red hookup wire
2'	orange hookup wire
1	ELMA01 circuit board
	resistors

**Table 5**  
10K nominal, log taper, 0.5 dB steps

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	2.94K	1% ,1/4W, Metal Film	1	0.5
R25	not used		3	1.5
R23	536 Ohm	1% ,1/4W, Metal Film	5	2.5
R22	536 Ohm	1% ,1/4W, Metal Film	6	3.0
R21	499 Ohm	1% ,1/4W, Metal Film	7	3.5
R20	499 Ohm	1% ,1/4W, Metal Film	8	4.0
R19	442 Ohm	1% ,1/4W, Metal Film	9	4.5
R18	442 Ohm	1% ,1/4W, Metal Film	10	5.0
R17	392 Ohm	1% ,1/4W, Metal Film	11	5.5
R16	392 Ohm	1% ,1/4W, Metal Film	12	6.0
R15	332 Ohm	1% ,1/4W, Metal Film	13	6.5
R14	332 Ohm	1% ,1/4W, Metal Film	14	7.0
R13	287 Ohm	1% ,1/4W, Metal Film	15	7.5
R12	287 Ohm	1% ,1/4W, Metal Film	16	8.0
R11	249 Ohm	1% ,1/4W, Metal Film	17	8.5
R10	249 Ohm	1% ,1/4W, Metal Film	18	9.0
R9	237 Ohm	1% ,1/4W, Metal Film	19	9.5
R8	237 Ohm	1% ,1/4W, Metal Film	20	10.0
R7	210 Ohm	1% ,1/4W, Metal Film	21	10.5
R6	210 Ohm	1% ,1/4W, Metal Film	22	11.0
R5	191 Ohm	1% ,1/4W, Metal Film	23	Off (open)
R4	191 Ohm	1% ,1/4W, Metal Film		
R3	182 Ohm	1% ,1/4W, Metal Film		
R2	182 Ohm	1% ,1/4W, Metal Film		

### Parts list

#	Description
1	24 position switch
2'	brown hookup wire
2'	red hookup wire
2'	orange hookup wire
1	ELMA01 circuit board
	resistors

**Table 6**  
50K nominal, linear taper, 17 positions.

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	not used		1	0.56
R25	jumper		3	1.80
R23	3.24K	1% ,1/4W, Metal Film	5	3.25
R22	3.24K	1% ,1/4W, Metal Film	6	4.08
R21	3.24K	1% ,1/4W, Metal Film	7	5.00
R20	3.24K	1% ,1/4W, Metal Film	8	6.00
R19	3.24K	1% ,1/4W, Metal Film	9	7.18
R18	3.24K	1% ,1/4W, Metal Film	10	8.52
R17	3.24K	1% ,1/4W, Metal Film	11	10.10
R16	3.24K	1% ,1/4W, Metal Film	12	12.04
R15	3.24K	1% ,1/4W, Metal Film	13	14.54
R14	3.24K	1% ,1/4W, Metal Film	14	18.06
R13	3.24K	1% ,1/4W, Metal Film	15	24.08
R12	3.24K	1% ,1/4W, Metal Film	16	Off
R11	3.24K	1% ,1/4W, Metal Film		
R10	3.24K	1% ,1/4W, Metal Film		
R9	3.24K	1% ,1/4W, Metal Film		
R8	3.24K	1% ,1/4W, Metal Film		
R7	not used			
R6	not used			
R5	not used			
R4	not used			
R3	not used			
R2	not used			
R1	not used			

### Parts list

#	Description
1	24 position switch
2'	brown hookup wire
2'	red hookup wire
2'	orange hookup wire
1	ELMA01 circuit board
	resistors



Table 7

20K nominal, log taper, 2.5 dB steps  
Special taper for PR41, AT24 standard

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	182 Ohm	1% ,1/4W, Metal Film	1	2.5
R25	237 Ohm	1% ,1/4W, Metal Film	3	7.5
R23	3.92 K	1% ,1/4W, Metal Film	5	12.5
R22	3.48 K	1% ,1/4W, Metal Film	6	15.0
R21	2.94 K	1% ,1/4W, Metal Film	7	17.5
R20	2.55 K	1% ,1/4W, Metal Film	8	20.0
R19	1.78 K	1% ,1/4W, Metal Film	9	22.5
R18	1.43 K	1% ,1/4W, Metal Film	10	25.0
R17	1.00 K	1% ,1/4W, Metal Film	11	27.5
R16	715 Ohm	1% ,1/4W, Metal Film	12	30.0
R15	536 Ohm	1% ,1/4W, Metal Film	13	32.5
R14	392 Ohm	1% ,1/4W, Metal Film	14	35.0
R13	287 Ohm	1% ,1/4W, Metal Film	15	37.5
R12	210 Ohm	1% ,1/4W, Metal Film	16	40.0
R11	154 Ohm	1% ,1/4W, Metal Film	17	42.5
R10	115 Ohm	1% ,1/4W, Metal Film	18	45.0
R9	100 Ohm	1% ,1/4W, Metal Film	19	47.5
R8	64.9 Ohm	1% ,1/4W, Metal Film	20	50.0
R7	249 Ohm	1% ,1/4W, Metal Film	21	52.5
R6	191 Ohm	1% ,1/4W, Metal Film	22	55.0
R5	137 Ohm	1% ,1/4W, Metal Film	23	off
R4	102 Ohm	1% ,1/4W, Metal Film		
R3	75 Ohm	1% ,1/4W, Metal Film		
R2	54.9 Ohm	1% ,1/4W, Metal Film		

Parts list

- | #  | Description          |
|----|----------------------|
| 1  | 24 position switch   |
| 2' | brown hookup wire    |
| 2' | red hookup wire      |
| 2' | orange hookup wire   |
| 1  | ELMA01 circuit board |
|    | resistors            |

Table 8

50K nominal, log taper, 2.5 dB steps  
Special taper for PR41, AT24 standard

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27	86.6 Ohm	1% ,1/4W, Metal Film	1	2.5
R25	not used	1% ,1/4W, Metal Film	3	7.5
R23	12K4	1% ,1/4W, Metal Film	5	12.5
R22	9K53	1% ,1/4W, Metal Film	6	15.0
R21	6K98	1% ,1/4W, Metal Film	7	17.5
R20	5K23	1% ,1/4W, Metal Film	8	20.0
R19	3K92	1% ,1/4W, Metal Film	9	22.5
R18	2K94	1% ,1/4W, Metal Film	10	25.0
R17	2K21	1% ,1/4W, Metal Film	11	27.5
R16	1K65	1% ,1/4W, Metal Film	12	30.0
R15	1K27	1% ,1/4W, Metal Film	13	32.5
R14	953 Ohm	1% ,1/4W, Metal Film	14	35.0
R13	698 Ohm	1% ,1/4W, Metal Film	15	37.5
R12	536 Ohm	1% ,1/4W, Metal Film	16	40.0
R11	392 Ohm	1% ,1/4W, Metal Film	17	42.5
R10	287 Ohm	1% ,1/4W, Metal Film	18	45.0
R9	210 Ohm	1% ,1/4W, Metal Film	19	47.5
R8	154 Ohm	1% ,1/4W, Metal Film	20	50.0
R7	115 Ohm	1% ,1/4W, Metal Film	21	52.5
R6	100 Ohm	1% ,1/4W, Metal Film	22	55.0
R5	75 Ohm	1% ,1/4W, Metal Film	23	off
R4	54.9 Ohm	1% ,1/4W, Metal Film		
R3	42.2 Ohm	1% ,1/4W, Metal Film		
R2	30.9 Ohm	1% ,1/4W, Metal Film		

Parts list

- # Description
- 1 24 position switch
- 2' brown hookup wire
- 2' red hookup wire
- 2' orange hookup wire
- 1 ELMA01 circuit board
- resistors

Table9

Custom Worksheet

ID	Value	Description	Attenuation	
			CCW rotation steps	dB
R27			1	
R25			3	
R23			5	
R22			6	
R21			7	
R20			8	
R19			9	
R18			10	
R17			11	
R16			12	
R15			13	
R14			14	
R13			15	
R12			16	
R11			17	
R10			18	
R9			19	
R8			20	
R7			21	
R6			22	
R5			23	
R4				
R3				
R2				

Parts list

- # Description
- 1 24 position switch
- 2' brown hookup wire
- 2' red hookup wire
- 2' orange hookup wire
- 1 ELMA01 circuit board resistors

