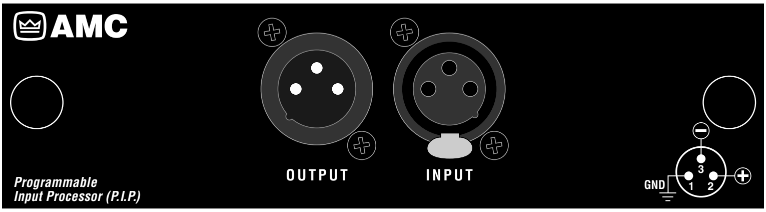
P.I.P.–AMCb

REFERENCE MANUAL



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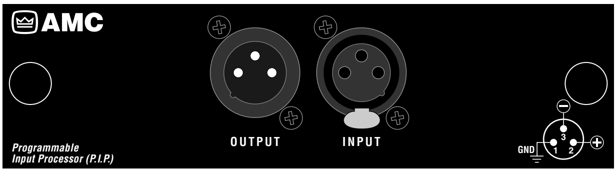


Fig. 1.1 P.I.P.–AMCb

1 Welcome

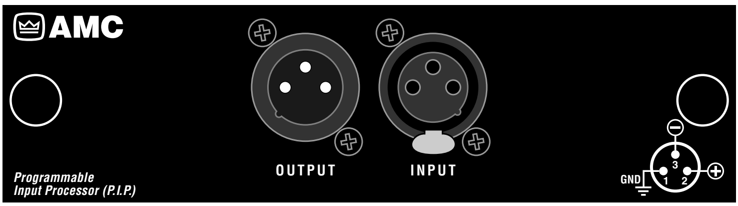
Congratulations on your purchase of Crown's *P.I.P.®–AMCb*. *PIP™* modules are designed to quickly install in the back of many Crown amplifiers. PIP stands for "Programmable Input Processor." Each PIP has features that expand the capabilities of your amplifier, enabling you to customize it for your particular needs.

The P.I.P.–AMCb is a versatile monophonic Acoustic Modeling Crossover (version b) that plugs into any PIP-capable Crown amplifier. It combines the functions of a crossover, equalizer and compressor.

DIP switches, plug-in SIP resistors and convenient jumper blocks make it easy to configure any of its powerful operating features.

Features

- ❏ Variable 24-dB/octave (4th order) Linkwitz-Riley crossover with state-variable topology.
- ❏ Variable 12-dB/octave (2nd order) low-frequency filter with Q=2 for vented box equalization.
- ❏ Variable 6-dB/octave high frequency shelving network with variable 12-dB/octave high-frequency low-pass filter for constant-directivity horn equalization.
- ❏ Variable threshold, feedback/error-driven compressor/limiter with infinite compression ratio.
- ❏ Configurable compressor control path.
- ❏ Fully configurable outputs to supply the amplifier channels.
- ❏ Configurable "daisy chain" output.
- ❏ 3-pin balanced XLR connectors for input and daisy chain output.



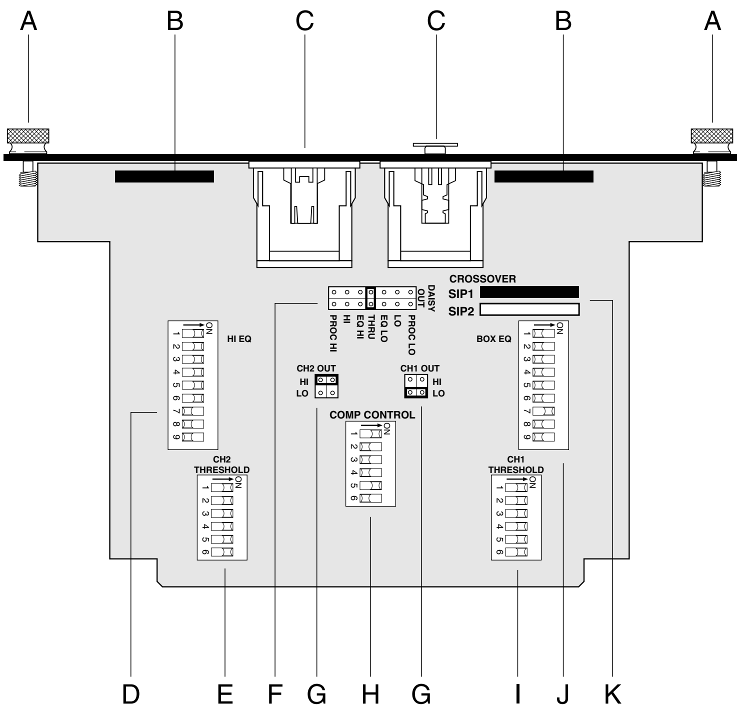


Fig. 2.1 Front & Bottom Views

2 Facilities

A. Thumb Screws

Use these thumb screws to fasten the PIP to the amplifier. A circlip prevents them from falling out.

B. Auxiliary SIP sockets

The two auxiliary SIP sockets hold spare crossover SIP resistors. SIPs with values of 33, 20 and 10 kohm are provided. Crossover frequencies are chosen using various SIP combinations.

C. XLR Connectors

Balanced 3-pin XLR connectors are provided for input (female XLR) and output (male XLR). These connectors are wired with pin 2 high.

D. Constant-Directivity Horn Equalization DIP Switch

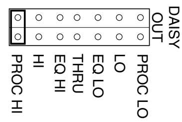
This nine-segment DIP switch sets both the +3 dB shelving frequency and the –3 dB low pass roll-off frequency of the constant-directivity horn equalization filter. See Figure 3.6.

E. Channel 2 Compressor Threshold DIP Switch

This six-segment DIP switch sets the threshold of the channel 2 compressor. See Figures 3.8, 3.9a and 3.9b.

F. Daisy Out Jumper

This seven-position jumper configures the "daisy chain" output. Seven options are available: (1) PROC LO passes processed low frequencies (EQ and compression); (2) LO passes unprocessed low frequencies; (3) EQ LO passes equalized low frequencies; (4) THRU directly passes the input to the output; (5) EQ HI passes equalized high frequencies; (6) HI passes the unprocessed high frequencies; and (7) PROC HI passes processed high frequencies (EQ and compression) to the daisy chain output.



G. CH1/CH2 OUT Jumpers

Each output channel has a jumper that sends high or low frequencies, or no signal to the selected channel.

H. Compressor Control

This six-segment DIP switch makes it possible to select the feedback path that will drive the compressors. Each compressor can be controlled by the channel 1 or channel 2 feedback signal. The compressors can also be controlled by both channels or neither channel (off).

I. Channel 1 Compressor Threshold DIP Switch

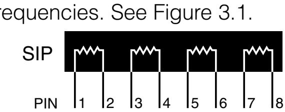
This six-segment DIP switch sets the threshold of the channel 1 compressor. See Figures 3.8, 3.9a and 3.9b.

J. Low-Frequency Equalization DIP Switch

This nine-segment DIP switch sets the +6 dB boost frequency of the vented box equalization filter. See Figure 3.4.

K. Crossover SIPS

These SIP resistors control the crossover frequency. A 20 kohm SIP is installed at the factory providing a crossover frequency of 800 Hz. Spare SIPs are provided (B) which can be used to set up several other crossover frequencies. See Figure 3.1.



3 Installation

Before installing any *P.I.P.* in your amplifier, turn down the amplifier's level controls, turn off the amplifier and disconnect the AC power. Even though the amplifier is off, there could still be enough energy in the circuitry to cause electric shock.

Crossover Selection

The crossover is a fourth-order Linkwitz-Riley type with state-variable topology. Its frequency is set by the Single Inline Package (SIP) resistors installed in the SIP1 and SIP2 sockets (see Figure 2.1). *Note: Four equal value 1% resistors can also be used in place of each SIP.*

The factory set crossover frequency is 800 Hz. The supplied SIPs can be installed in combinations for crossover frequencies of 500, 800, 1200, 1600, 2000 and 2400 Hz. The extra SIPs are stored on the circuit board in two spare sockets (see Figure 2.1).

The Crossover Resistor Value Table (see Figure 3.1) shows resistor values (R) required to achieve a specific crossover frequency. Standard SIP values are used, which are identical to the required values of single 1% resistors.

To calculate the resistor values for any crossover frequency, use this formula:

$$\text{Crossover Frequency (Hz)} = \frac{15{,}915{,}000}{\text{R (ohms)}}$$

When a single socket is used, this equation is concise. But because the two sockets are in parallel, a special equation must be used to calculate R (resistance) when using both sockets:

$$\text{R (ohms)} = \frac{R_1 \times R_2}{R_1 + R_2}^{*}$$

CROSSOVER	
R (kohms)	**Frequency (Hz)**
220	72
150	106
120	133
100	159
68	234
47	339
39	408
33	**483** (500)
27	590
22	723
20	**796** (800)
18	884
15	1062
12.5 **(33+20)**	**1278** (1200)
10	**1592** (1600)
8.7	1942
7.7 **(33+10)**	**2074** (2000)
6.7 **(20+10)**	**2387** (2400)
5.6	2843
5.1	3122
4.7	3388
3.9	4083
3.3	4825
3.0	5308
2.7	5898
2.2	7238
2.0	7962

Fig. 3.1 Crossover Resistor Value Table

Figures 3.2 and 3.3 show the typical frequency and phase response of the crossover when set for 800 Hz (R=20 kohm). Notice that each side of the crossover has identical phase response. This has been shown by Linkwitz[1] to yield optimum on-axis response in a multiple driver system.

* R_1= resistor value for socket 1; R_2= resistor value for socket 2.

[1] Siegfried H. Linkwitz, "Active Crossover-Networks for Noncoincident drivers," JAES, Jan/Feb, 1976.

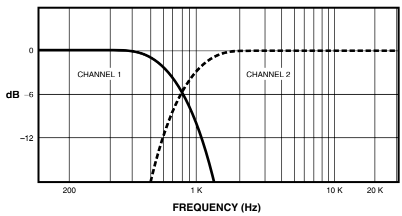


Fig. 3.2 Crossover Frequency Response (800 Hz)

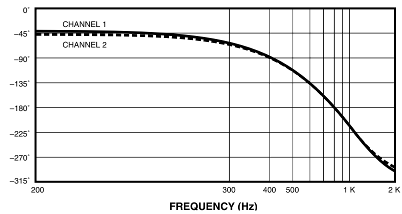


Fig. 3.3 Crossover Phase Response (800 Hz)

Low-Frequency EQ

After the crossover, low frequencies are equalized by a second-order high pass filter with a Q of 2. Such a filter is specified by Thiele[2] and in a more recent paper by Keele[3] where it is used to form a sixth-order Butterworth high pass response with a vented box low-frequency system.

The filter uses the Sallen-Key non-inverting second-order high pass topology. The 9-segment "BOX EQ" DIP switch (Figure 2.1) sets the +6 dB boost frequency as shown in the table in Figure 3.4. There are fifteen settings (including FLAT). Figure 3.5 shows typical response curves for these settings.

LOW-FREQUENCY (BOX) EQUALIZATION									
Switch Settings									+6 dB Frequency (Hz)
1	2	3	4	5	6	7	8	9	
ON	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF	20
OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF	24
ON	**ON**	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	28
ON	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	30
OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	36
OFF	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	38
ON	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**	42
ON	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	44
OFF	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**	56
ON	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**	65
OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	68
OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**	102
ON	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	OFF	120
ON	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	180
---	---	---	---	---	---	**ON**	---	---	FLAT

Fig. 3.4 Low-Frequency EQ Settings

[2]A.N. Thiele, "Loudspeakers in Vented Boxes," JAES, Vol 19 Part 1, May 1971, Part 2, June 1971.
[3]D.B. Keele Jr., "A New Set of Sixth-Order Vented Box Loudspeaker System Alignments," JAES, June 1975.

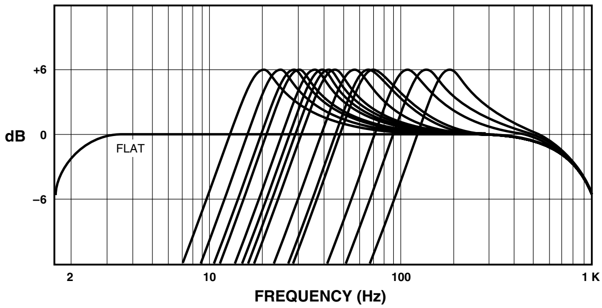


Fig. 3.5 Low-Frequency EQ Response Curves

Constant-Directivity Horn EQ

After the crossover, the high-frequency band is equalized for the inherent roll-off in constant-directivity horns. Both a first-order shelving network and a second-order low pass filter are provided.

The +3 dB frequency of the shelving network is set by switches 7, 8 and 9 of the "HI EQ" DIP switch (see Figure 2.1). Switches 1-6 set the –3 dB roll-off frequency of the low-pass filter. Overall equalizer boost is a combination of the shelving and roll-off filters (see Figures 3.7a and 3.7b). Notice that the shelving network can be disabled (set to FLAT) but the low pass filter is always active.

Note: When the –3 dB roll-off frequency is set to 28 kHz, the signal will be –1 dB at 20 kHz.

Figures 3.6, 3.7a and 3.7b show the switch settings and their respective response curves.

CONSTANT-DIRECTIVITY HORN EQUALIZATION										
Switch Settings									–3 dB Roll–Off Frequency (kHz)	+3 dB Shelving Frequency (kHz)
1	2	3	4	5	6	7	8	9		
OFF	OFF	OFF	OFF	OFF	OFF				12	
ON	OFF	OFF	**ON**	OFF	OFF				15	
OFF	**ON**	OFF	OFF	**ON**	OFF				16	
ON	**ON**	OFF	**ON**	**ON**	OFF				18	
OFF	OFF	**ON**	OFF	OFF	**ON**				22	
ON	OFF	**ON**	**ON**	OFF	**ON**				25	
OFF	**ON**	**ON**	OFF	**ON**	**ON**				26	
ON	**ON**	**ON**	**ON**	**ON**	**ON**				28	
						ON	**ON**	**ON**		1.8
						OFF	**ON**	**ON**		2.2
						ON	OFF	**ON**		2.4
						OFF	OFF	**ON**		3.2
						ON	**ON**	OFF		4.0
						OFF	**ON**	OFF		6.8
						ON	OFF	OFF		10
						OFF	OFF	OFF		FLAT

Fig. 3.6 Constant-Directivity Horn EQ Settings

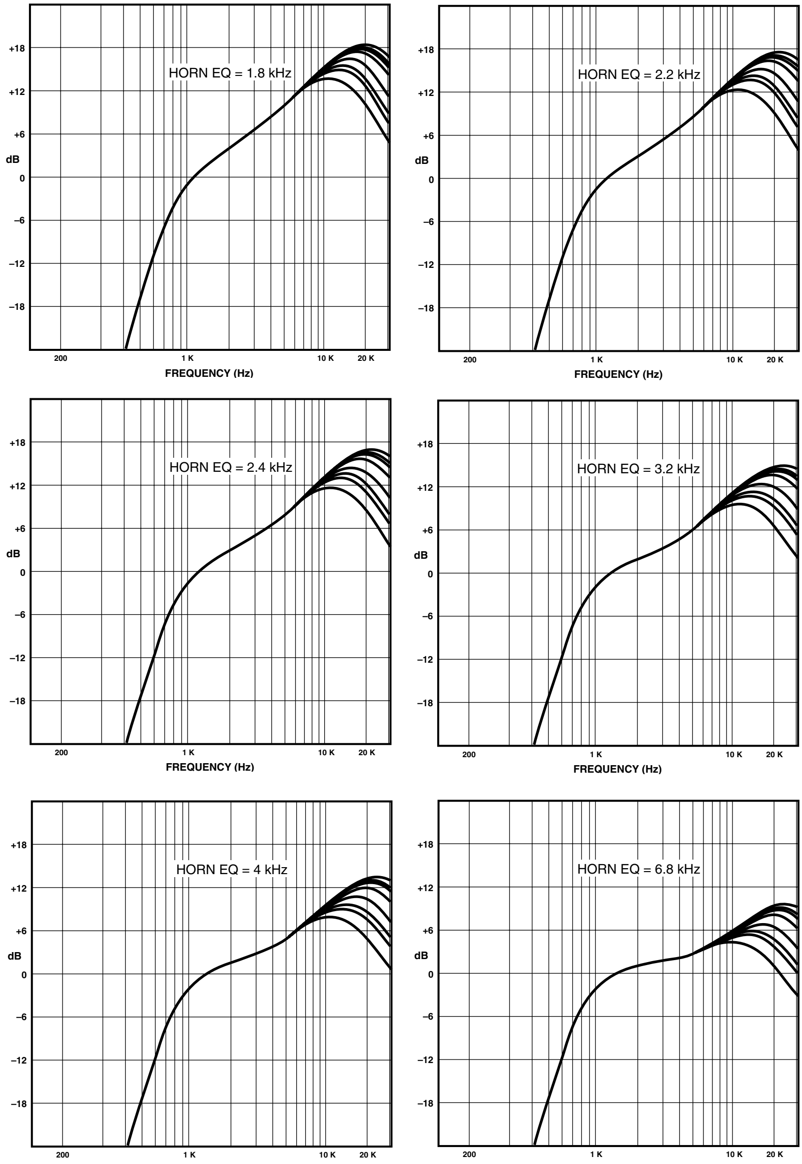
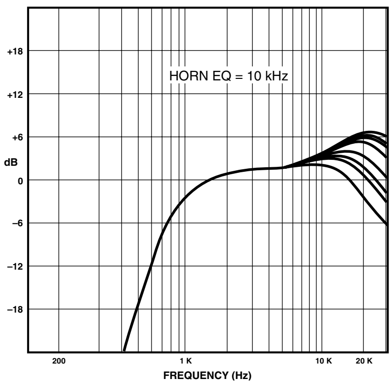


Fig. 3.7a High-Frequency EQ Response Curves (800 Hz Crossover)



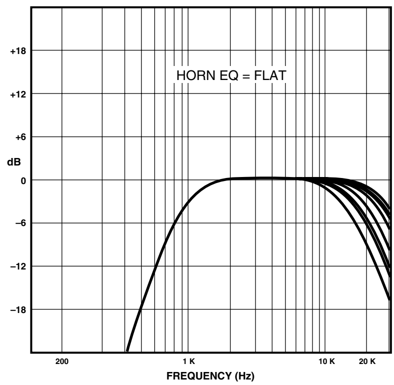


Fig. 3.7b High-Frequency EQ Response Curves (800 Hz Crossover)

Compressor Threshold

Tracing the signal path, the compressors follow the crossover and equalizers. Variable-threshold signal-driven compressors are provided for both the high and low frequencies, but by default, the compressors are error-driven.

The purpose of the compressors is to limit the signal level for applications where driver and/or system protection is desired.

The low-frequency compressor is set at the factory with a 10 msec attack time and a 360 msec release time. The high-frequency compressor is set with a 5 msec attack time and a 180 msec release time.

Both compressors have an infinite compression ratio. This means that when the threshold is reached, an increase in input level will not result in a change in output level. The range of compression is 16 dB. If the input is driven more than 16 dB over the threshold, the portion of the signal over 16 dB over will be passed linearly. At that point, clipping the amplifier is the only way the compressor would limit the signal further.

The threshold is selectable from approximately 8 to 164.5 VRMS in 2.5 V increments using the CH1 and CH2 threshold DIP switches (see Figure 2.1).

Figure 3.8 shows power levels expressed in watts at 2, 4 and 8 ohms along with a column showing corresponding RMS voltage levels. Use this chart to find the desired RMS voltage threshold. Figures 3.9a and 3.9b show the voltage outputs and corresponding switch settings for both Dual (stereo) and Parallel-Mono modes of operation. In Bridge-Mono mode the threshold voltages shown must be doubled.

Regardless of the threshold, if an amplifier output clips, the compressor will be activated. This is because the compressor's drive is derived from the amplifier's *IOC*® error signal.

THRESHOLD CONVERSION			
W @ 2Ω	W @ 4Ω	W @ 8Ω	RMS Volts
32.5	16.2	8.12	8.06
34.9	17.4	8.72	8.35
37.5	18.7	9.37	8.66
40.3	20.1	10.1	8.98
43.3	21.6	10.8	9.31
46.5	23.3	11.6	9.65
50.0	25.0	12.5	10.0
53.7	26.9	13.4	10.4
57.7	28.9	14.4	10.7
62.0	31.0	15.5	11.1
66.7	33.3	16.7	11.5
71.7	35.8	17.9	12.0
77.0	38.5	19.2	12.4
82.7	41.4	20.7	12.9
88.9	44.5	22.2	13.3
95.5	47.8	23.9	13.8
103	51.3	25.7	14.3
110	55.2	27.6	14.9
119	59.3	29.6	15.4
127	63.7	31.9	16.0
137	68.5	34.2	16.5
147	73.6	36.8	17.2
158	79.1	39.5	17.8
170	85.0	42.5	18.4
183	91.3	45.6	19.1
196	98.1	49.1	19.8
211	105	52.7	20.5
227	113	56.6	21.3
243	122	60.9	22.1
262	131	65.4	22.9
281	141	70.3	23.7
302	151	75.5	24.6
325	162	81.2	25.5
349	174	87.2	26.4
375	187	93.7	27.4
403	201	101	28.4
433	216	108	29.4
465	233	116	30.5
500	250	125	31.6
537	269	134	32.8

THRESHOLD CONVERSION			
W @ 2Ω	W @ 4Ω	W @ 8Ω	RMS Volts
577	289	144	34.0
620	310	155	35.2
667	333	167	36.5
717	358	179	37.9
770	385	192	39.2
827	414	207	40.7
889	445	222	42.2
955	478	239	43.7
1030	513	257	45.3
1100	552	276	47.0
1190	593	296	48.7
1270	637	319	50.5
1370	685	342	52.3
1470	736	368	54.2
1580	791	395	56.2
1700	850	425	58.3
1830	913	456	60.4
1960	981	491	62.6
2110	1050	527	64.9
2270	1130	566	67.3
2430	1220	609	69.8
2620	1310	654	72.3
2810	1410	703	75.0
3020	1510	755	77.7
3250	1620	812	80.6
3490	1740	872	83.5
3750	1870	937	86.6
4030	2010	1010	89.8
4330	2160	1080	93.1
4650	2330	1160	96.5
5000	2500	1250	100
5370	2690	1340	104
5770	2890	1440	107
6200	3100	1550	111
6670	3330	1670	115
7170	3580	1790	120
7700	3850	1920	124
8270	4140	2070	129
8890	4450	2220	133
9550	4780	2390	138

THRESHOLD CONVERSION			
W @ 2Ω	W @ 4Ω	W @ 8Ω	RMS Volts
10300	5130	2570	143
11000	5520	2760	149
11900	5930	2960	154
12700	6370	3190	160
13700	6850	3420	165
14700	7360	3680	172
15800	7910	3950	178
17000	8500	4250	184
18300	9130	4560	191
19600	9810	4910	198
21100	10500	5270	205
22700	11300	5660	213
24300	12200	6090	221
26200	13100	6540	229
28100	14100	7030	237
30200	15100	7550	246
32500	16200	8120	255
34900	17400	8720	264
37500	18700	9370	274
40300	20100	10100	284
43300	21600	10800	294
46500	23300	11600	305
50000	25000	12500	316
53700	26900	13400	328
57700	28900	14400	340
62000	31000	15500	352
66700	33300	16700	365
71700	35800	17900	379
77000	38500	19200	392
82700	41400	20700	407
88900	44500	22200	422
95500	47800	23900	437
102700	51300	25700	453
110300	55200	27600	470
118600	59300	29600	487
127400	63700	31900	505
136900	68500	34200	523
147100	73600	36800	542

Fig. 3.8 Threshold Conversion Table (Peak Power in Watts to RMS Volts)

CH1 & CH2 COMPRESSOR THRESHOLD SETTINGS							
Switch Settings						Threshold* (RMS Volts)	
1	2	3	4	5	6	MA-3600VZ	All Other Amps
OFF	OFF	OFF	OFF	OFF	OFF	10.5	8
ON	OFF	OFF	OFF	OFF	OFF	14	10.5
OFF	**ON**	OFF	OFF	OFF	OFF	17	13
ON	**ON**	OFF	OFF	OFF	OFF	20	15.5
OFF	OFF	**ON**	OFF	OFF	OFF	23.5	18
ON	OFF	**ON**	OFF	OFF	OFF	27	20.5
OFF	**ON**	**ON**	OFF	OFF	OFF	30	23
ON	**ON**	**ON**	OFF	OFF	OFF	33.5	25.5
OFF	OFF	OFF	**ON**	OFF	OFF	36.5	28
ON	OFF	OFF	**ON**	OFF	OFF	40	30.5
OFF	**ON**	OFF	**ON**	OFF	OFF	43	33
ON	**ON**	OFF	**ON**	OFF	OFF	46.5	35.5
OFF	OFF	**ON**	**ON**	OFF	OFF	49.5	38
ON	OFF	**ON**	**ON**	OFF	OFF	53	40.5
OFF	**ON**	**ON**	**ON**	OFF	OFF	56	43
ON	**ON**	**ON**	**ON**	OFF	OFF	59.5	45.5
OFF	OFF	OFF	OFF	**ON**	OFF	62	47.5
ON	OFF	OFF	OFF	**ON**	OFF	65	49.5
OFF	**ON**	OFF	OFF	**ON**	OFF	68	52
ON	**ON**	OFF	OFF	**ON**	OFF	70.5	54.5
OFF	OFF	**ON**	OFF	**ON**	OFF	74.5	57
ON	OFF	**ON**	OFF	**ON**	OFF	78	59.5
OFF	**ON**	**ON**	OFF	**ON**	OFF	81	62
ON	**ON**	**ON**	OFF	**ON**	OFF	84.5	64.5
OFF	OFF	OFF	**ON**	**ON**	OFF	88	67
ON	OFF	OFF	**ON**	**ON**	OFF	91	69.5
OFF	**ON**	OFF	**ON**	**ON**	OFF	94	72
ON	**ON**	OFF	**ON**	**ON**	OFF	97.5	74.5
OFF	OFF	**ON**	**ON**	**ON**	OFF	101	77
ON	OFF	**ON**	**ON**	**ON**	OFF	104	79.5
OFF	**ON**	**ON**	**ON**	**ON**	OFF	107.5	82
ON	**ON**	**ON**	**ON**	**ON**	OFF	110.5	84.5

*Note: Threshold voltages and power levels are only valid for Dual (stereo) and Parallel-Mono modes of operation. Voltages shown must be doubled for Bridge-Mono mode.

Fig. 3.9a Compressor Threshold Settings

CH1 & CH2 COMPRESSOR THRESHOLD SETTINGS							
Switch Settings						Threshold* (RMS Volts)	
1	2	3	4	5	6	MA-3600VZ	All Other Amps
OFF	OFF	OFF	OFF	OFF	ON	115.5	88
ON	OFF	OFF	OFF	OFF	ON	118.5	90.5
OFF	ON	OFF	OFF	OFF	ON	122	93
ON	ON	OFF	OFF	OFF	ON	125	95.5
OFF	OFF	ON	OFF	OFF	ON	128.5	98
ON	OFF	ON	OFF	OFF	ON	131.5	100.5
OFF	ON	ON	OFF	OFF	ON	135	103
ON	ON	ON	OFF	OFF	ON	138	105.5
OFF	OFF	OFF	ON	OFF	ON	141.5	108
ON	OFF	OFF	ON	OFF	ON	145	110.5
OFF	ON	OFF	ON	OFF	ON	148	113
ON	ON	OFF	ON	OFF	ON	151.5	115.5
OFF	OFF	ON	ON	OFF	ON	154.5	118
ON	OFF	ON	ON	OFF	ON	158	120.5
OFF	ON	ON	ON	OFF	ON	161	123
ON	ON	ON	ON	OFF	ON	164.5	125.5
OFF	OFF	OFF	OFF	ON	ON	167	127.5
ON	OFF	OFF	OFF	ON	ON	169.5	129.5
OFF	ON	OFF	OFF	ON	ON	173	132
ON	ON	OFF	OFF	ON	ON	176	134.5
OFF	OFF	ON	OFF	ON	ON	179	137
ON	OFF	ON	OFF	ON	ON	183	139.5
OFF	ON	ON	OFF	ON	ON	186	142
ON	ON	ON	OFF	ON	ON	189.5	144.5
OFF	OFF	OFF	ON	ON	ON	192.5	147
ON	OFF	OFF	ON	ON	ON	196	149.5
OFF	ON	OFF	ON	ON	ON	199	152
ON	ON	OFF	ON	ON	ON	202.5	154.5
OFF	OFF	ON	ON	ON	ON	205.5	157
ON	OFF	ON	ON	ON	ON	209	159.5
OFF	ON	ON	ON	ON	ON	212	162
ON	ON	ON	ON	ON	ON	215.5	164.5

Also Note: To use the *P.I.P.–AMCb* as a "clip" eliminator, set all six switches ON. Remember, the *Macro-Tech 5000VZ* also has a built-in compressor! Only use one at a time.

Fig. 3.9b Compressor Threshold Settings

Output Channel Control

The P.I.P.–AMCb provides several options for routing high and low frequency signals from each of its two output channels to the amplifier inputs. The “CH OUT” jumpers are used to set this (see Figure 2.1).

These jumpers can be set so that each amplifier channel is supplied with either the high- or low-frequency signal. The possible configurations are: (1) high frequencies to both channels, (2) low frequencies to both channels, (3) high frequencies to Channel 1 and low frequencies to Channel 2, and (4) low frequencies to Channel 1 and high frequencies to Channel 2.

IMPORTANT: If you are using the P.I.P.–AMCb with an amplifier in either mono mode, remove the CH2 OUT jumper. Only the Channel 1 audio signal is required to drive the amplifier during mono operation.

Compressor Control

The compressor control is a six-segment DIP switch that provides complete control over the compressors' drive circuits.

Channel 1, Channel 2 or both channels can control the high and low frequency compressors in any combination. The compressor switches should be set based on the output signal routing you choose (see previous section).

Often, it is desirable for the low-frequency signal to control the low-frequency compressor, and the high-frequency signal to control the high-frequency compressor. Another desirable way of using the “COMP CONTROL” DIP switch might be to have the low-frequency signal control both the low-frequency compressor and the high-frequency compressor. In this mode, the highs and lows will be compressed equally.

Figure 3.10 shows the available setups: (1) channel 1 controls the low-frequency compressor, channel 2 controls the high-frequency compressor; (2) channel 1 controls the high-frequency compressor, channel 2 controls the low-frequency compressor; (3) channel 1 controls both high- and low-frequency compressors; (4) channel 2 controls both high- and low-frequency compressors; and (5) both channels control both compressors.

Note: Switches 3 and 6 are unused.

COMPRESSOR CONTROL							
Switch Settings						Low Compressor Controlled By	High Compressor Controlled By
1	2	3	4	5	6		
ON	OFF	---	OFF	**ON**	---	Channel 1	Channel 2
OFF	**ON**	---	**ON**	OFF	---	Channel 2	Channel 1
OFF	OFF	---	**ON**	**ON**	---	Channel 1	Channel 1
ON	**ON**	---	OFF	OFF	---	Channel 2	Channel 2
ON	**ON**	---	**ON**	**ON**	---	Channel 1 or 2	Channel 1 or 2

Fig. 3.10 Compressor Control DIP Switch Settings

Input/Output Wiring

A balanced mono input is provided via a female 3-pin XLR connector where pin 1 is ground, pin 2 is noninverting, and pin 3 is inverting. Figures 3.11 and 3.12 illustrate this:

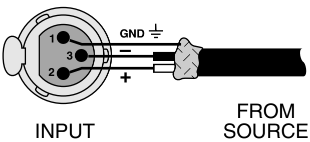


Fig. 3.11 Balanced Input Wiring

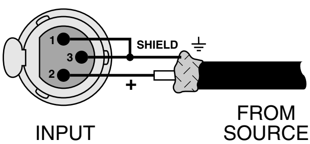


Fig. 3.12 Unbalanced Input Wiring

The "daisy chain" output is a balanced output. It can be programmed to pass low-frequency signals with compression and EQ (PROC LO), unprocessed low-frequency signals (LO), low-frequency signals with EQ (EQ LO), direct signals from the input (THRU), high-frequency signals with EQ (EQ HI), unprocessed high frequency signals (HI) or high frequency signals with compression and EQ (PROC HI). Simply select the appropriate position for the jumper on the daisy chain jumper block (Figure 2.1).

The ¼-inch phone jacks on *Macro-Tech®* amplifiers should <u>not</u> be used for input while the P.I.P.–AMCb is installed but they may be used as unbalanced "daisy chain" outputs with loads greater than 5 kohms. If used in this manner, the signal available at each jack will be the actual signal that the P.I.P.–AMCb supplies to drive the amplifier. For example, the signal will be equalized and compressed based on the status of the switch and jumper settings of the respective channel. This provides another way to have several amplifiers to track one P.I.P.–AMCb.

IMPORTANT: When operating an amplifier in either Bridge- or Parallel-Mono modes, only Channel 1 of the amplifier should be driven. This means the CH2 OUT jumper should be removed from the jumper block (Figure 2.1).

Installation

You may need a phillips screwdriver to remove the existing PIP module or panel from your amplifier.

CAUTION: Before connecting this or any PIP module, it is important to turn your amplifier's level controls down, turn it off and remove the AC power. Don't touch the circuitry. Even though the amplifier is off, there could still be enough energy remaining to cause electric shock.

1. Turn down the level controls (full counterclockwise), turn off the amplifier and unplug it from the AC power source.
2. Remove the existing PIP module or panel (two screws). For *PIP2™* amplifiers, this may involve disconnecting the PIP from a PIP2 input adapter (see Figures 3.14 and 3.15). If a PIP2 input adapter is already present, do not remove the ribbon cables from the adapter. Otherwise you will have to reconnect them in the next step.
3. *Standard P.I.P. Amplifiers*: Align the edges of the P.I.P.–AMCb in the PIP card rails and firmly push the unit in until it is seated against the mounting bracket (see Figure 3.13).

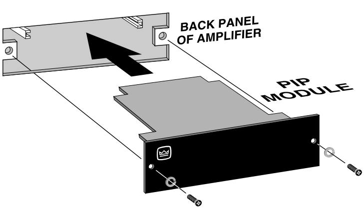


Fig. 3.13 Installation into a Standard PIP Amplifier

PIP2 Amplifiers: (Requires a PIP2 input adapter. Crown part number Q43528-1.) Connect the PIP2 input adapter to the two input cables of the amplifier (see Figure 3.14). Notice that the PIP2 input adapter should be positioned with the PIP edge connector on top and facing away from the amplifier. The 20 pin cable (A) is connected first then the 18 pin cable (B) is connected. Both ribbon cables should extend below the PIP2 input adapter.

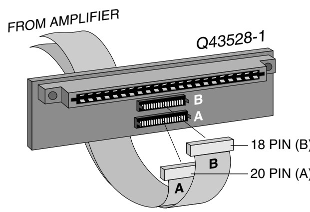


Fig. 3.14 PIP2 Input Adapter Connection

Next, insert the edge connector of the P.I.P.–AMCb into the PIP2 input adapter (see Figure 3.15) and insert the assembly into the PIP opening in the back of the amplifier.

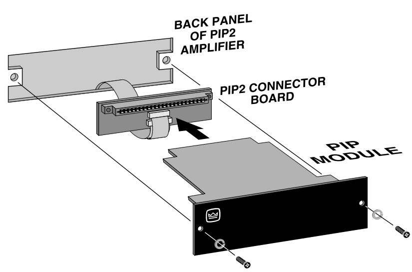


Fig. 3.15 Installation into a PIP2 Amplifier

4. Tighten the two PIP mounting thumbscrews.
5. Connect input and output wiring as described in the preceding section (Input/Output Wiring).
6. Plug in the amplifier and turn it on. Adjust its level controls to a desired setting. (In Dual mode, the level controls can now be used to balance the low and high frequencies.)

Do not tamper with the circuitry. Circuit changes made by unauthorized personnel, or unauthorized circuit modifications are not allowed.

Remember: Crown is not liable for any damage resulting from overdriving other components in your sound system.

4 Specifications

Signal to Noise Ratio: Greater than 85 dB (equivalent input noise) from 20 Hz to 20 kHz.

Common Mode Rejection: Greater than 90 dB at 60 Hz; greater than 60 dB at 20 kHz.

Crosstalk: Greater than 46 dB below the signal level at 20 kHz.

Harmonic Distortion: Less than 0.05% THD at 1 kHz with any setting and no compression. Less than 0.5% (either channel) at 800 Hz crossover with 6 dB of compression.

Input Impedance: Nominally 50 kohms balanced and 25 kohms unbalanced.

Maximum Input Level: +18 dB at mid-band. Other bands will vary with equalizer amplitude boost.

Nominal Gain: Unity ±0.5 dB.

Crossover: Linkwitz-Riley, 24 dB/octave with state variable topology. Crossover frequency: 80 Hz to 8 kHz, controlled by plug-in SIP resistors; Factory set to 800 Hz with options of 500, 1200, 1600, 2000 and 2400 Hz using the provided SIPs (others available on request).

Low-Frequency Equalization: 2nd order high pass filter with Q=2 for classic Thiele–Keele B_6 vented system alignment. Boost: +6 dB. Roll-off: 2nd order below boost (set by filter). Boost frequency: selectable as 20, 24, 28, 30, 36, 38, 42, 44, 56, 65, 68, 102, 120, 180 Hz or flat using 9-segment DIP switch.

High-Frequency Equalization: 1st order shelving network for "constant-directivity" horn equalization. Selectable boost frequency (+3 dB): 1.8, 2.2, 2.4, 3.2, 4.0, 6.8, 10.0 kHz or flat using 9-segment DIP switch. (Bandwidth determines total boost—see Figures 3.7a and 3.7b.) Boost roll-off: 2nd order above boost. Selectable upper limit roll-off: 12, 15, 16, 18, 22, 25, 26, 28 kHz using 9-segment DIP switch.

Compressor: Driven by the audio and the *IOC*® error signal. Threshold: adjustable in nominal 2.5 V steps from 8 to 164.5 VRMS using 6-segment DIP switch. Dynamic Range: Greater than 16 dB. Low Frequency Compressor: 10 msec attack with 360 msec decay. High Frequency Compressor: 5 msec attack with 180 msec decay. Compression Ratio: ∞:1.

Connectors

Input: Balanced female 3-pin XLR.

Output: Balanced male 3-pin XLR.

Maximum Output Level: +18 dB (into a 600 ohm load).

Power Requirements: When plugged into a Macro-Tech, *Com-Tech*® or *Studio Reference*™ amplifier, the P.I.P. receives ± 24 V power.

Dimensions: 6 ⅜ x 1 ⅞ x 3 ⅞ in (16.2 x 4.8 x 9.8 cm).

Weight: 10 ounces (284 grams).

Note: All specifications are referenced to a 0.775 V input signal.

Notes:

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