

Owners Manual

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TABLE OF CONTENTS



BEFORE YOU BEGIN YOUR INSTALLATION	1
FEATURES AND SPECIFICATIONS	2-3
CONTROLS AND FUNCTIONS	4-6
MOUNTING AND LOCATION	7
ELECTRICAL INSTALLATION	8
INTERNAL CROSSOVER ADJUSTMENTS	9
AMPLIFIER BASS & GAIN ADJUSTMENTS.....	10-11
SYSTEM DESIGN	12
BASS AND YOUR VEHICLE	13
PHOENIX GOLD SYSTEM DESIGNS.....	14-17
System 1: 3 Channel System With Subwoofers.....	14-15
System 2: 6 Channel System With Optional Sub Amplifier ..	16-17
CROSSOVER / COMPONENT VALUES	18-20
6 dB Per Octave High & Low Pass Filter Table	18
12 dB Per Octave High & Low Pass Filter Table	19
18 dB Per Octave High Pass Filter Table	20
PHOENIX FACTS.....	21

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BEFORE YOU BEGIN YOUR INSTALLATION

Thank you for choosing a Phoenix Gold product. In doing so you've demonstrated a desire to own the finest in audio reproduction. Phoenix Gold strives to provide you, the customer, with the finest products possible.

Properly installed, your Phoenix Gold amplifier will provide years of high quality sonic reproduction. Before installing the M44 in your vehicle, please read the entire manual carefully. It is required reading for the protection of your vehicle and for the maximum performance of your car audio system.

The M44 utilizes the fastest output devices in the industry. Where most manufacturers use 3 to 5 MHz output devices, Phoenix Gold utilizes 25 MHz high temperature devices. These devices are not only faster, but more costly... and much more reliable. At Phoenix Gold, we don't just use run-of-the-mill capacitors in our circuitry, but rather low ESL/ESR type capacitors. And we use them extensively in our amplifiers. This helps reduce one of the major failure modes of all car audio amplifiers - HEAT. The M44 amplifier has been extensively tested and "burned-in" for maximum reliability.

Phoenix Gold Warranty

This high performance car audio amplifier has a limited warranty of 30 days if installed by a consumer. If installed by an authorized Team Phoenix Gold Dealer, the limited warranty is 18 months from the date of purchase. This 18 month limited warranty can be extended to a 36 month limited warranty, if the warranty card and a copy of the sales receipt is returned to Phoenix Gold.

Remember, at Phoenix Gold, we don't just manufacture mobile electronics. We also manufacture cables, "PowerFlow" distribution systems, alternators, batteries & accessories for the professional.



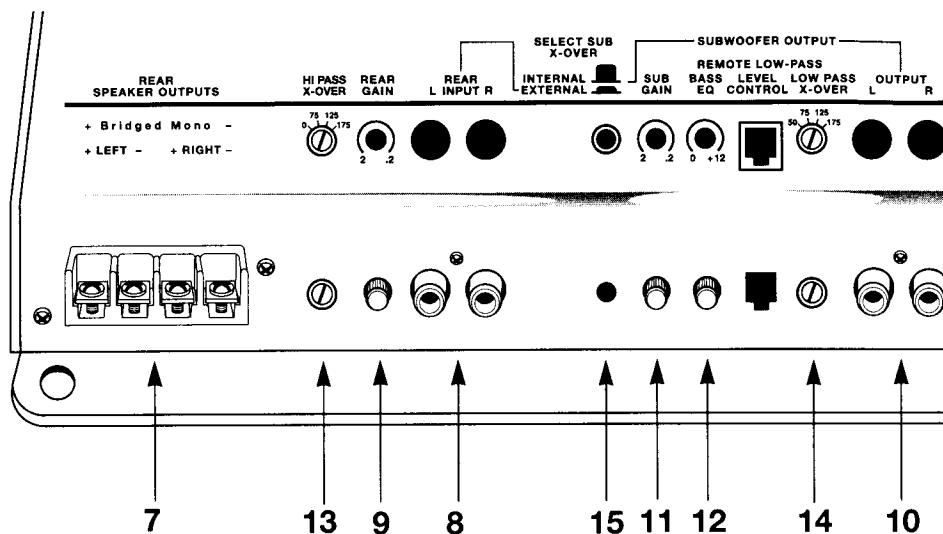
M44 POWER AMPLIFIER FEATURES

- 4 X 40 watts per channel
- 320 watts Total Dynamic Output Power
- 4/3/2 Channel Operation
- Internal Asymmetrical 12dB / Octave High Pass, Low Pass or Full Range electronic X-over
- External Low Pass output
- Bridgeable Outputs
- TRI-LINEAR™ output capability, simultaneous stereo & bridged mono set up is possible
- Adjustable Bass EQ (0 to +18dB) at 45Hz
- Pulse Width Modulated (PWM) MOS-FET Switching Power Supply
- Stable into 2 ohm loads
- Low RFI / EMI design
- Triple Darlington Output Design
- 2 layer 20 mil GOLD PLATED G10 Glass-Epoxy Printed Circuit Board
- 200mV to 2V variable input sensitivity
- Thermal Overload Protection
- Fully muted turn-on / turn-off circuitry
- Optically isolated power supply
- VI limiting circuitry with overcurrent LED
- Extensive burn-in and QC testing for the ultimate in reliability
- Optional LPL44 input • Dash Mount Subwoofer Gain Control
- MADE IN THE GOOD OL' USA

M44 POWER AMPLIFIER SPECIFICATIONS

- Output Power per Channel • Both Channels Driven
 - Into 4 Ω @ 13.8V DC55 WRMS
 - Into 2 Ω @ 13.8V DC110 WRMS
 - Bridged Power into 4 Ω 160 WRMS
- Total Dynamic Output Power.....352 WRMS
- THD at rated power 4 Ω< 0.02%
- SMPTE at rated power 4 Ω< 0.05%
- DIM at rated power 4 Ω< 0.01%
- Frequency response.....5Hz to 30KHz +/-1dB
- Signal to Noise Ratio > 100dB (20 to 20kHz)
- Input Sensitivity.....200mV to 2V
- Output Impedance2 to 16 Ω
- Input Impedance.....20K Ω
- Idle Current.....1A
- Current Consumption @ 4 Ω stereo23 Amps
- Power Supply Efficiency..... > 80%
- Damping Factor @ (20 to 10Khz)500 to 1
- Min to Max Voltage requirements10.2 to 15.5V DC
- High Pass Crossover Frequencies0 (All Pass), 75, 125, 175Hz
- Low Pass Crossover Frequencies.....50, 75, 125, 175Hz
- Dimensions.....18.00" L x 10.63" W x 2.00" H

AMPLIFIER CONTROLS AND FUNCTIONS



1. POWER ON - GREEN LED INDICATOR

Indicates amplifier is "ON".

2. OVERLOAD - RED LED INDICATOR

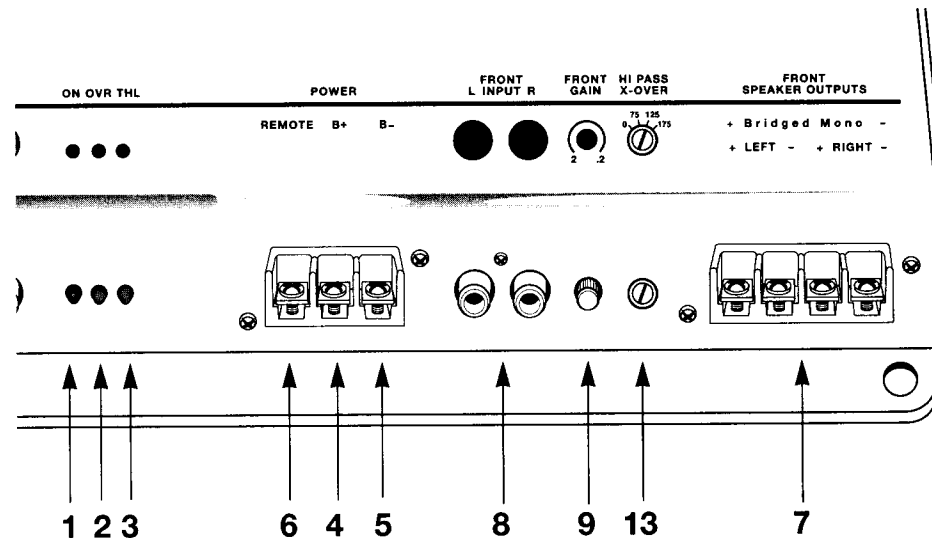
When this LED lights up it is an indication that the amplifier has: a output current overload condition.

3. THL - AMBER LED INDICATOR

When this LED lights up it indicates the amplifier has a temperature overload condition. The amplifier has temporarily "shut-off" as the temperature of the heatsink has reached 90° C or approximately 200° F. In simple terms, the amplifier is EXTREMELY HOT and has gone into protection!

4. POWER INPUT (B+ POSITIVE VOLTS DC)

This 24kt Gold three position barrier type connector is designed to accommodate up to 7 gauge power cable. We suggest termination with a Phoenix Gold PRO80/81 Gold spade terminal. An external 30 amp fuse is recommended.



5. POWER GROUND TERMINAL (B- CHASSIS GROUND)

This terminal is located next to the B+ input. It should also be the same gauge as the B+ supply cable. We suggest termination with a Phoenix Gold PRO80/81 Gold spade terminal.

6. REMOTE TURN-ON

This connection allows the M44 to be turned on/off by the source unit. Located on the three position barrier connector. Connect the automatic antenna lead or "remote" switched 12V DC lead from source unit to this terminal.

7. FRONT & REAR SPEAKER OUTPUT

This 24kt Gold barrier connector enables the usage of any size speaker wire. We suggest termination with a Phoenix Gold PRO80/81 Gold spade terminal.

8. FRONT & REAR INPUT

Any source unit with RCA outputs should operate correctly with all Phoenix Gold amplifiers. Front and rear amplifier outputs operate when using only front inputs.

AMPLIFIER CONTROLS AND FUNCTIONS CONT.

9. FRONT & REAR GAIN CONTROL

Allows for the correct matching of any signal source from its pre-amp output into the M44. Adjustments range from .2 volts (200 mV) to 2 Volts.

10. SUBWOOFER OUTPUT

This output connects to a separate amplifier (optional) used to drive subwoofer speakers.

11. SUB GAIN CONTROL

This gain control adjusts the gain of the sub-crossover and allows for the correct matching of any output from the source. Adjustments range from .2 volts (200 mV) to 2 Volts (AC/Audio).

12. BASS EQ

This bass equalizer circuit boosts sub bass up to +18dB at 45Hz

13. HI PASS X-OVER FRONT & REAR

These four position rotary Hi Pass crossover selectors control the frequency output of front and rear speaker outputs. These frequencies are 0 (All Pass), 75Hz, 125Hz, 175Hz.

14. LOW PASS X-OVER

This four position rotary Low Pass crossover selector controls the frequency of the Low Pass crossover for internal or external subwoofer. These frequencies are 50Hz, 75Hz, 125Hz, 175Hz

15. INTERNAL / EXTERNAL SELECT X-OVER SWITCH

This switch selects the signal directed to the rear speaker outputs. In the Internal position Low Pass signals from the internal Sub X-over or signal from front RCA jacks are selected. In the External position signals from the rear RCA jacks are selected.

AMPLIFIER MOUNTING AND LOCATION

The M44 has been designed to dissipate heat more efficiently than any other amplifier manufactured today. However, prolonged operation at high volumes or extremely low impedances without the aid of a fan shroud can cause the unit to overheat and protect itself. Regardless of where you decide to mount the M44 make sure that there is at least a 2-inch clearance above and around the amplifier.

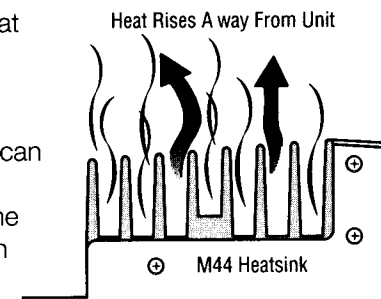


Figure 1 - Upright Mount

The amplifier may be mounted either upright (Fig 1) or horizontally (Fig 2) but if possible NEVER upside down (Fig 3) this position causes the rising heat to "feed-back" into the amplifier causing a premature system shut down.

Heat Rises Through Heatsink Causing Each Fin To Heat More Rapidly.

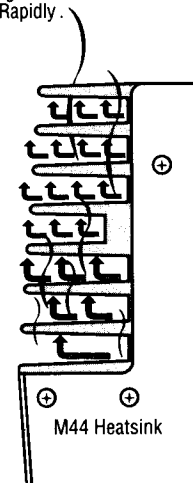


Figure 2 - Horizontal Mount

Mounting considerations: Is there enough space for the RCA input plugs? Will the speaker cables be able to enter the terminal connectors straight? Will your mounting position allow easy viewing of indicator LED's and amplifier controls? Note: Do not mount directly to metallic surfaces.

Use the M44 as the template. Mark the mounting surface with a felt pen or pencil. (Placing masking tape on the surface first will make these marks more visible). Do not drill any holes while using the amplifier as a template. It is very easy to damage the amplifier's powder coated surface in this manner.

Drill 1/8 inch pilot holes.

Mount the amplifier with four panhead phillips screws.

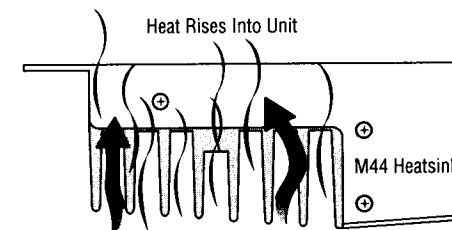
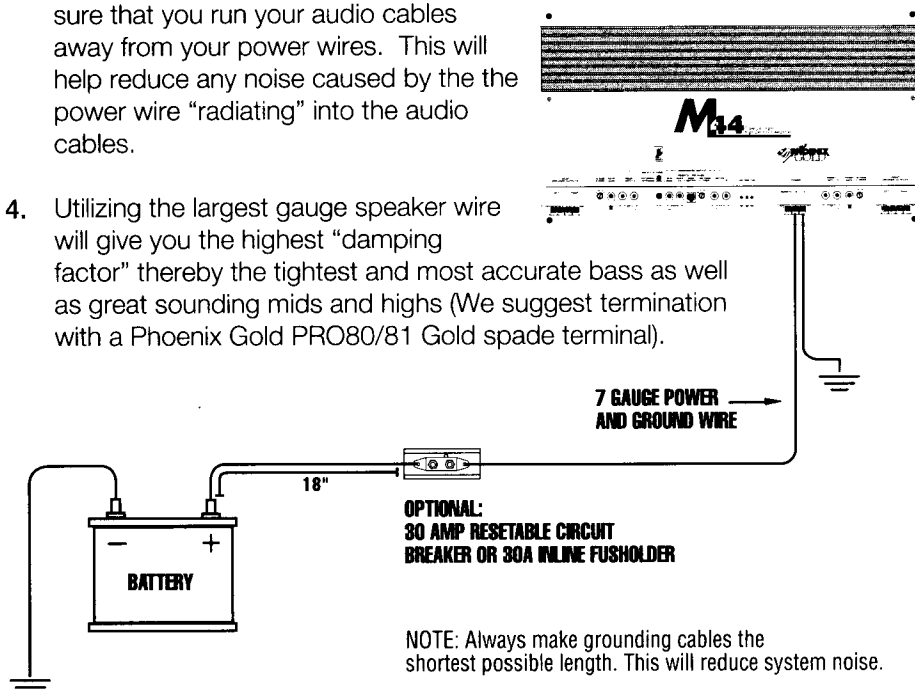


Figure 3 - Inverted Mount

AUDIO / ELECTRICAL INSTALLATION

REMEMBER TO ALWAYS DISCONNECT BATTERY GROUND BEFORE WORKING ON A VEHICLE'S ELECTRICAL SYSTEM

1. Always use the largest gauge power / ground cable available. The M44 requires 7 gauge cable (Phoenix Gold numbers PS7R /PS7B). We suggest termination with a Phoenix Gold PRO80/81 Gold spade terminal.
2. Always place a fuse or circuit breaker no more than 18 inches from the battery. This protection is only for the vehicle, not the stereo and should be no greater than 30 amps for this amplifier.
3. For audio connections, we recommend using high-quality audio interconnects like the Phoenix Gold STS (Super-TRIPLE-Shielded) or our compact CSI cables. The Triple-Shielded cables are the ultimate in sound quality and reducing or eliminating unwanted "radiated noise" from your system. Make sure that you run your audio cables away from your power wires. This will help reduce any noise caused by the the power wire "radiating" into the audio cables.
4. Utilizing the largest gauge speaker wire will give you the highest "damping factor" thereby the tightest and most accurate bass as well as great sounding mids and highs (We suggest termination with a Phoenix Gold PRO80/81 Gold spade terminal).



PowerFlow System

INTERNAL CROSSOVER ADJUSTMENTS

The M44 has a built-in 4 channel 12dB asymmetrical High Pass active crossover and a 2 channel 12dB Low Pass active crossover. The front and rear High Pass crossover points are All Pass (0), 75,125,175 Hz. The Low Pass crossover points are 50,75,125,175 Hz. When setting the crossover points for front, rear, and subwoofer outputs, always use compact discs that have good dynamic range.

1. To adjust crossover points, center all source unit controls.
2. Set the volume control to approximately 5/8 - 3/4 of maximum.
3. Adjust the Bass EQ to the minimum setting (0/flat).
4. Adjust the subwoofer crossover frequency first. The subwoofer crossover frequency will be the most time consuming to adjust because, in most automobiles, low frequency resonances are more predominant.
5. Starting at the pre-setting of 125 Hz, adjust the subwoofer crossover frequency downward to a typical setting of 100 Hz or below.
6. Listen to the bass quality. If it is "boomy sounding", adjust the crossover frequency even lower. Subwoofer crossover points of 75 Hz or below are common. Be sure to make the adjustments for good sound quality.
7. If the bass quality is tight and deep sounding, but the volume level is lower than the mid-range, increase the sub-woofer gain control to match the mid-range volume level.
8. Adjust the high pass crossover frequency by first centering the fader of your source unit. Starting at the pre-setting of 125 Hz, adjust the high pass channel crossover frequency downward or upward slowly and listen to the sound quality. **NOTE:** This frequency adjustment may be higher or lower depending on the sound quality desired, as well as the size and location of the front speakers. Adjust this setting to obtain the preferred performance.
9. After performing the crossover frequency adjustments in a stationary vehicle, test drive the vehicle to check for sound quality. Due to the road/motor noise inside a moving vehicle, you may want to re-adjust the output level of the subwoofer relative to the mid-range again.

AMPLIFIER ADJUSTMENTS

The M44 has front, rear and low pass gain adjustments and a Bass EQ adjustment. Care should be taken to adjust these properly as they affect each other.

1. Start adjustments at minimum sensitivity (Gain control at 2V, Bass EQ at 0), a counter-clockwise setting for Bass EQ and Gain (See Figure 4).

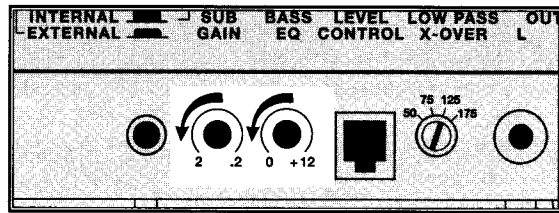


Figure 4 - Bass & Gain Controls

2. Adjust the volume control on your source unit to approximately 5/8 to 3/4 volume setting. (See Figure 5)

Approximately 3 o'clock
or 3/4 volume setting

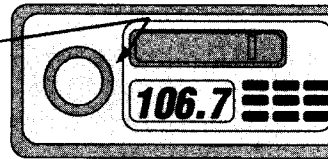


Figure 5 - Head Unit

3. Turn the "Gain" setting adjustments on the M44 clock-wise (i.e. to the right) until you hear the amplifier distort. The M44 "clips" very softly so this can sometimes be a difficult adjustment. Please listen carefully! (see Figure 6)

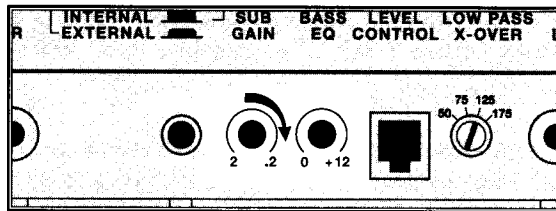


Figure 6 - Gain Control

AMPLIFIER ADJUSTMENTS

4. If, after adjusting the "input" gains, the bass sound quality is to your liking it would be best to not adjust the "Bass EQ" level control. Adding any "EQ" into the system either through an external equalizer or the built-in one provided with the M44 can cause the amplifier to:
 - A. Distort easier, or...
 - B. Overheat at a much more rapid rate than is normal.

5. If you desire more Bass output, adjust the "Bass EQ" level clockwise. The adjustment range is from "0" to "+12 dB". We recommend using as little Bass EQ as possible. Remember, boosting +12 dB at 45Hz requires the amplifier to work 16 times harder! (See Figure 7).

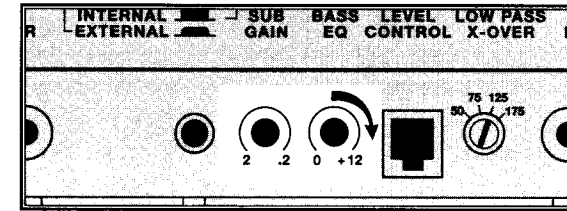


Figure 7 - Bass Controls

6. If you need to boost the "Bass EQ" to the maximum level +12 dB to obtain the desired bass output- SOMETHING IS VERY WRONG ! Check the design notes for your subwoofer enclosure. More than likely the woofer and the enclosure are not working together correctly.

**Your Installation Is Now Complete!
Relax and Enjoy...**

If you experience any problems with your M44 amplifier, do not hesitate to contact us at (503) 288-2008. We are here to help.

Phoenix Gold is a proud member of IASCA (International Autosound Challenge Association). If you would like to know more about sound off competitions in your area contact IASCA at (714) 688-8051.

AUDIO SYSTEM DESIGN & PASSIVE X-OVER

With the extreme flexibility of the PHOENIX GOLD M44, we highly recommend that you carefully design the entire system BEFORE its installation. The following system diagrams should be used as ideas towards designing a truly awesome car audio system. Remember that THIS amplifier likes to be driven hard. Whenever possible ALWAYS choose the TRI-LINEAR mode (i.e., stereo & bridged mono simultaneously).

Passive crossover networks are optional and may be utilized to improve system performance. When passive components (capacitors and inductors) are used in multiple speaker systems, the crossover's impedance AND the speaker system combinations MUST be considered especially when determining the amplifier loading. 12dB per octave passive crossovers are good, but tend to create sonic problems if not utilized correctly. A 12dB per octave passive crossover (an inductor and capacitor for each speaker) forms a series resonant circuit to ground whose impedance at that resonance frequency is determined by the speakers DYNAMIC impedance. If the speaker, for whatever reason, becomes "open" or disconnected the crossover input impedance is theoretically zero (0). In other words, a direct SHORT.

Fortunately ALL PHOENIX GOLD amplifiers are designed to withstand this punishment. Generally, most amplifiers DO NOT like to see this condition when using passive crossovers. We recommend 6 dB or 18 dB per octave type crossovers, especially in automobiles. These crossover slopes are "In-Phase" and tend to sound better.

The following pages are for your reference. Clearly, we cannot take into account crossover component values for the system you have chosen, since those values will be determined by frequency you select for your crossover point and the impedance of the speakers selected for your system.

BASS AND YOUR VEHICLE

A number of factors cause frequency response variations inside the vehicle. Some of these variations are caused by highly reflective material like glass, as well as highly absorbent materials, such as carpet and upholstery. Other variations are caused by resonances produced within the vehicle, due to its relatively small interior. These are called standing waves or "modes and nodes". Resonances are an important consideration inside the vehicle because its interior dimensions are only a few wavelengths long at lower (bass) frequencies. Following are two mathematical equations describing the relationship between wavelength and dimension, as well as frequency and wavelength:

$$W = 2 \times L \qquad F = \frac{V}{W}$$

where W is wavelength, L is length, F is frequency and V is the speed of sound in air (approximately 1128 feet per second).

Combining the two equations, we get:

$$F = \frac{V}{2L} \qquad F = \frac{1128}{2L}$$

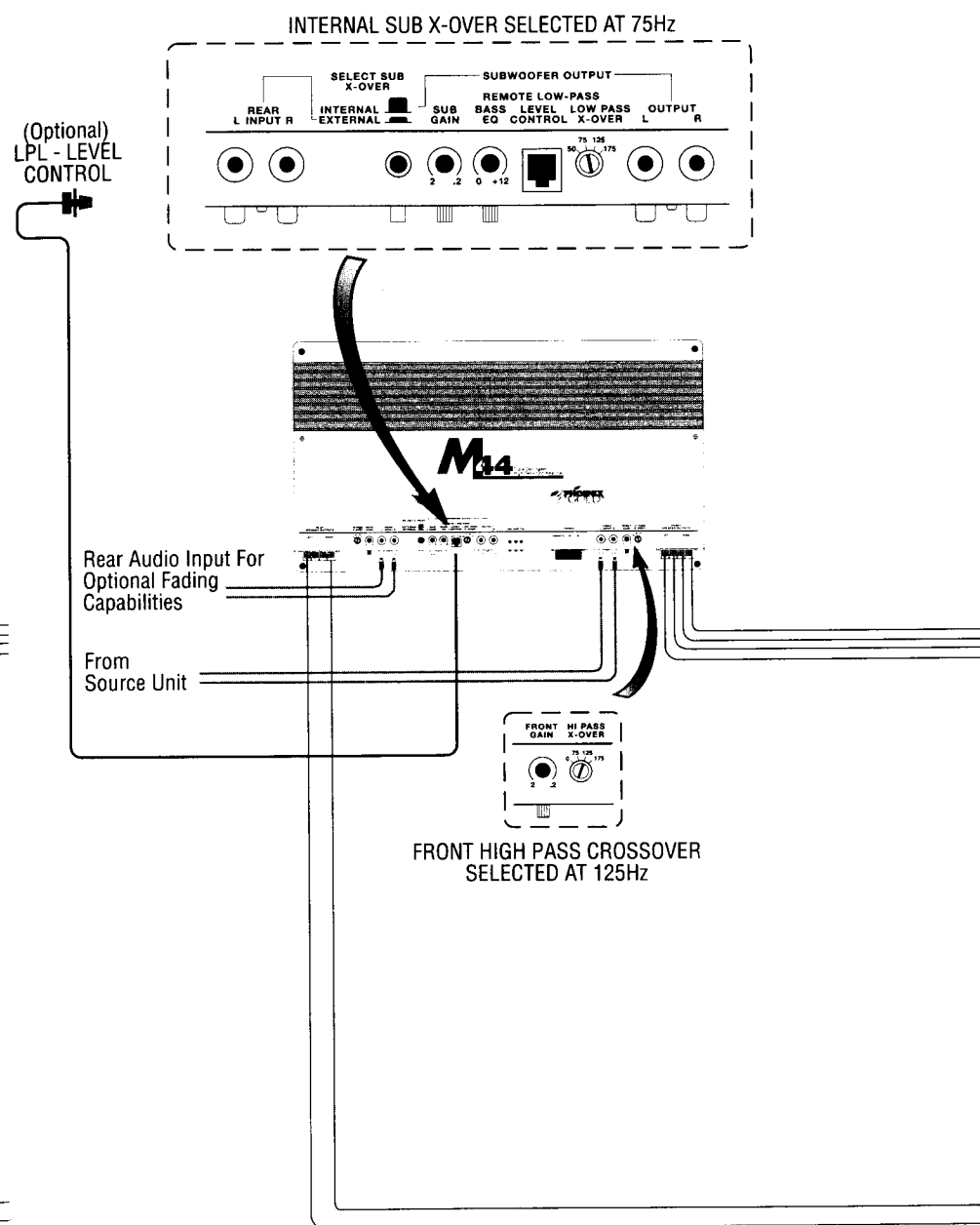
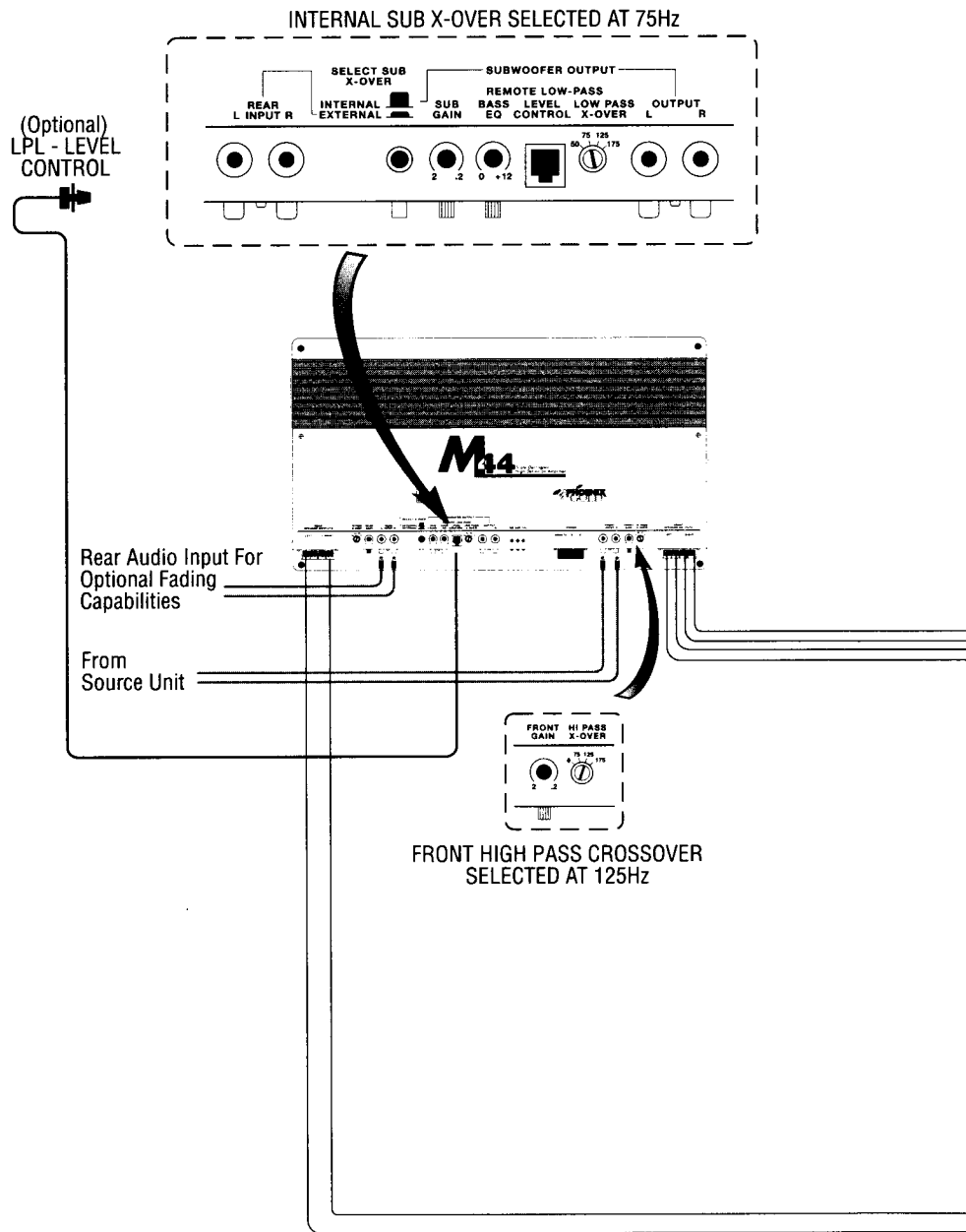
where frequency is the speed of sound divided by two times the length (2L). This frequency is called the "fundamental resonant frequency" and is considered a natural frequency of the space between two reflecting surfaces. To help understand why this is important inside a vehicle, we have compiled a table showing the relationship between certain lengths and certain frequencies.

Length (feet) / Frequency (hertz)

0.50	1128
1.00	564
2.00	282
3.00	188
4.00	141
5.00	113
6.00	94
7.00	80
8.00	70
9.00	62
10.00	56

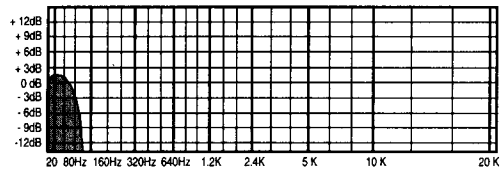
Table 1. Relationship between lengths and fundamental resonant frequency.

PHOENIX GOLD M44 SYSTEM 1

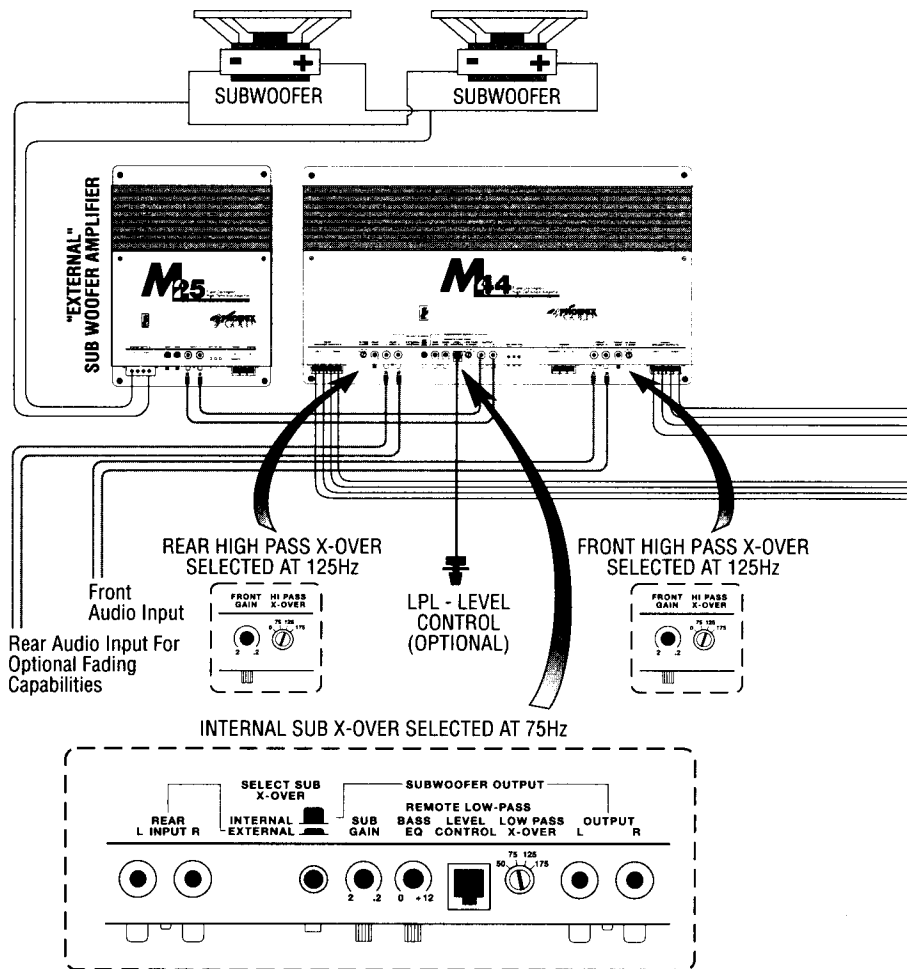


PHOENIX GOLD M44 SYSTEM 2

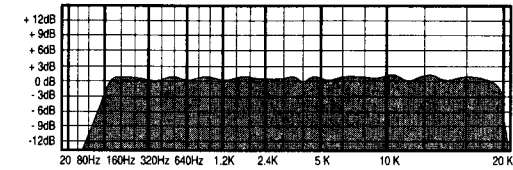
LOW-PASS-75Hz and Down (MONO-for woofers)



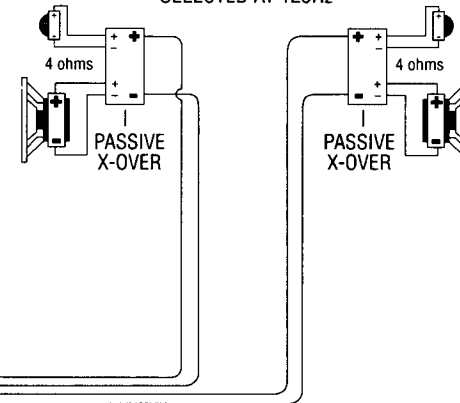
With the "Select Sub X-Over" switch in the Internal position, the rear channels become the Low Pass outputs.



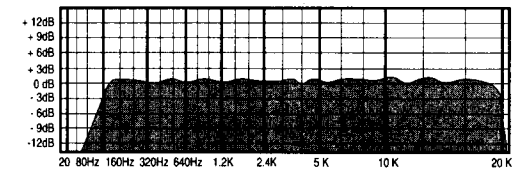
FRONT HIGH-PASS-125Hz and Up (STEREO-for mid-tweeter)



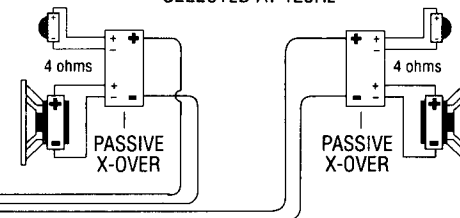
FRONT HIGH PASS CROSSOVER
SELECTED AT 125Hz



REAR HIGH-PASS-125Hz and Up (STEREO-for mid-tweeter)



REAR HIGH PASS CROSSOVER
SELECTED AT 125Hz

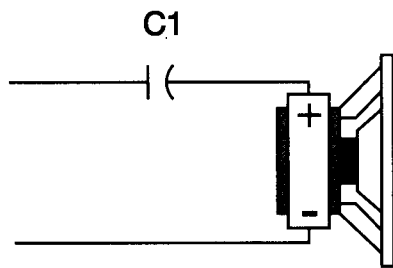


6dB/Octave CROSSOVER SLOPES / COMPONENT VALUES

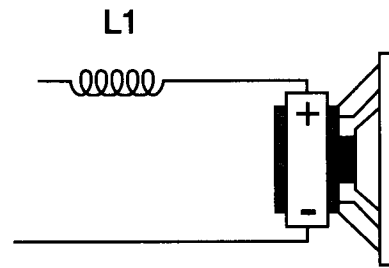
FREQUENCY HERTZ	SPEAKER IMPEDANCE					
	2 Ohm		4 Ohm		8 Ohm	
	L1	C1	L1	C1	L1	C1
80	4.1 mH	1000 uF	8.2 mH	500 uF	16 mH	250 uF
100	3.1 mH	800 uF	6.2 mH	400 uF	12 mH	200 uF
130	2.4 mH	600 uF	4.7 mH	300 uF	10 mH	150 uF
200	1.6 mH	400 uF	3.3 mH	200 uF	6.8 mH	100 uF
260	1.2 mH	300 uF	2.4 mH	150 uF	4.7 mH	75 uF
400	.8 mH	200 uF	1.6 mH	100 uF	3.3 mH	50 uF
600	.5 mH	136 uF	1.0 mH	68 uF	2.0 mH	33 uF
800	.41 mH	100 uF	.82 mH	50 uF	1.6 mH	25 uF
1000	.31 mH	78 uF	.62 mH	38 uF	1.2 mH	20 uF
1200	.25 mH	66 uF	.51 mH	33 uF	1.0 mH	16 uF
1800	.16 mH	44 uF	.33 mH	22 uF	.68 mH	10 uF
4000	80 uH	20 uF	.16 mH	10 uF	.33 mH	5 uF
6000	51 uH	14 uF	.10 mH	6.8 uF	.29 mH	3.3 uF
9000	34 uH	9.4 uF	68 uH	4.7 uF	.15 mH	2.2 uF
12000	25 uH	6.6 uF	51 uH	3.3 uF	.1 mH	1.6 uF

12dB/Octave CROSSOVER SLOPES / COMPONENT VALUES

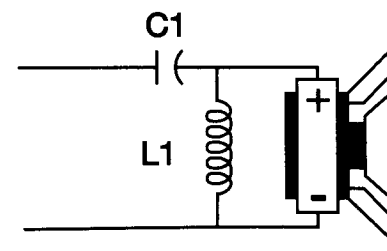
FREQUENCY HERTZ	SPEAKER IMPEDANCE					
	2 Ohm		4 Ohm		8 Ohm	
	L1	C1	L1	C1	L1	C1
80	5.5 mH	680 uF	11 mH	330 uF	22 mH	180 uF
100	4.7 mH	560 uF	9.1 mH	270 uF	18 mH	150 uF
130	3.3 mH	400 uF	6.8 mH	200 uF	15 mH	100 uF
200	2.2 mH	300 uF	4.7 mH	150 uF	9.1 mH	75 uF
260	1.8 mH	200 uF	3.6 mH	100 uF	6.8 mH	50 uF
400	1.1 mH	150 uF	2.2 mH	68 uF	4.7 mH	33 uF
600	.75 mH	100 uF	1.5 mH	47 uF	3.0 mH	27 uF
800	.50 mH	68 uF	1.0 mH	33 uF	2.0 mH	15 uF
1000	.47 mH	50 uF	.91 mH	27 uF	1.8 mH	13 uF
1200	.33 mH	44 uF	.75 mH	22 uF	1.5 mH	11 uF
1800	.27 mH	30 uF	.50 mH	15 uF	1.0 mH	6.8 uF
4000	.10 mH	15 uF	.22 mH	6.8 uF	.47 mH	3.3 uF
6000	75 uH	10 uF	.15 mH	4.7 uF	.33 mH	2.2 uF
9000	50 uH	6.8 uF	.10 mH	3.3 uF	.23 mH	1.5 uF
12000	39 uH	4.7 uF	75 uH	2.2 uF	.15 mH	1.0 uF



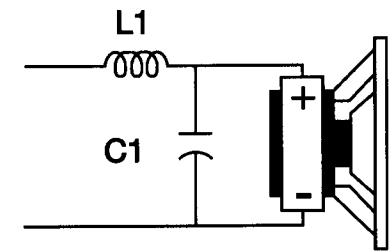
6 dB Per Octave High-Pass Filter



6 dB Per Octave Low-Pass Filter



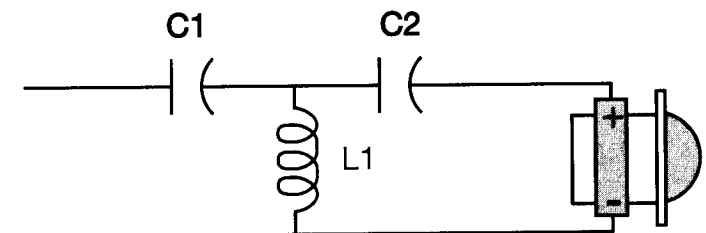
12 dB Per Octave High-Pass Filter



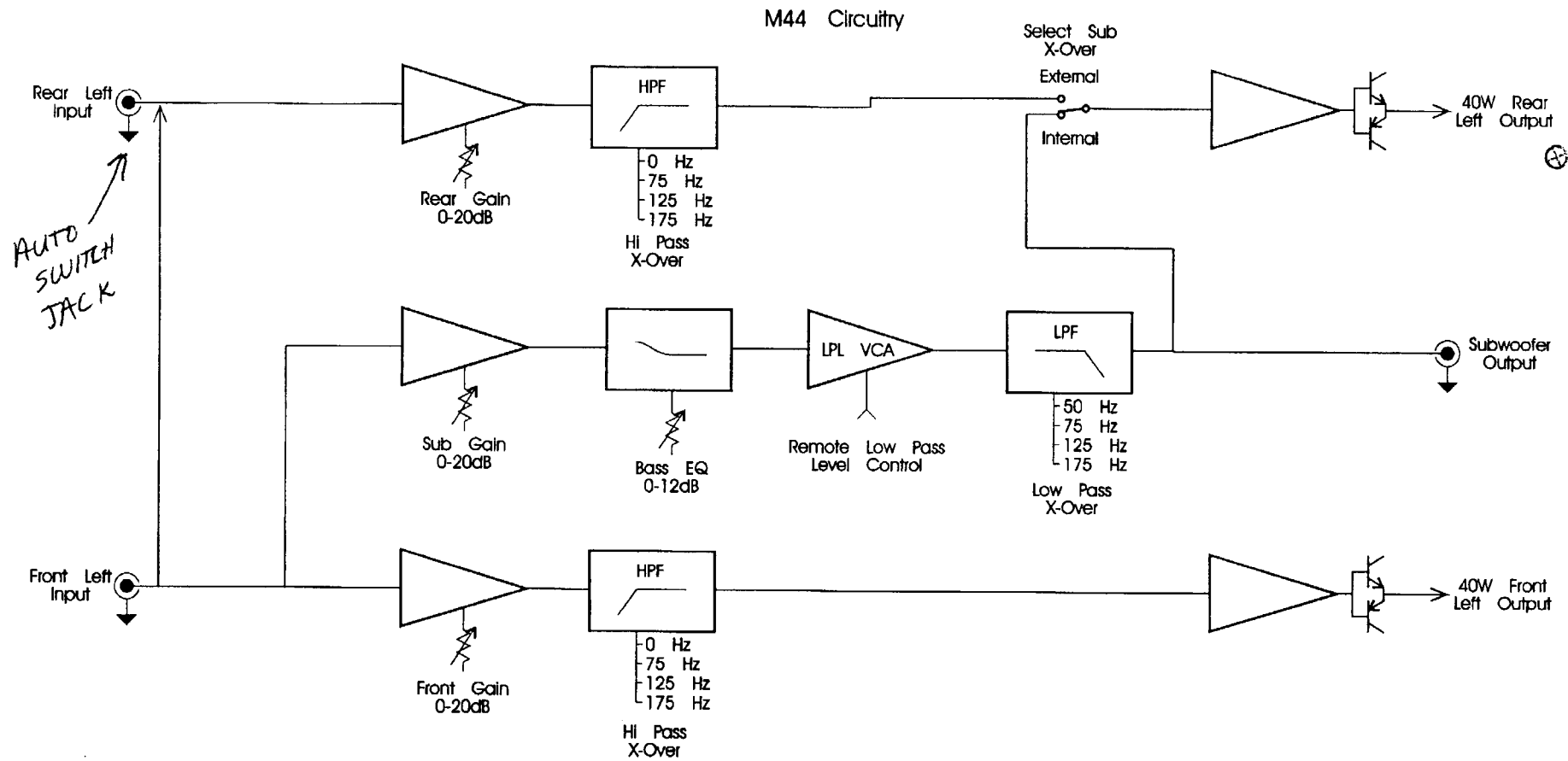
12 dB Per Octave Low-Pass Filter

18dB/Octave CROSSOVER SLOPES / COMPONENT VALUES

FREQUENCY HERTZ	SPEAKER IMPEDANCE					
	4 Ohm			8 Ohm		
	C1	L1	C2	C1	L1	C2
80	330 uF	6.0 mH	1000 uF	160 uF	12 mH	500 uF
100	270 uF	4.7 mH	800 uF	150 uF	10 mH	400 uF
130	200 uF	3.3 mH	600 uF	100 uF	7.5 mH	300 uF
200	150 uF	2.2 mH	400 uF	68 uF	5.4 mH	200 uF
260	100 uF	1.8 mH	300 uF	50 uF	3.3 mH	150 uF
400	68 uF	1.1 mH	200 uF	33 uF	2.4 mH	100 uF
600	47 uF	.80 mH	130 uF	21 uF	1.6 mH	68 uF
800	33 uF	.60 mH	100 uF	16 uF	1.2 mH	50 uF
1000	27 uF	.47 mH	75 uF	13 uF	.90 mH	39 uF
1200	22 uF	.39 mH	68 uF	11 uF	.80 mH	33 uF
1800	15 uF	.27 mH	47 uF	7.5 uF	.50 mH	22 uF
2000	13 uF	.24 mH	40 uF	6.8 uF	.47 mH	20 uF
3000	8.8 uF	.16 mH	27 uF	4.7 uF	.33 mH	14 uF
4000	6.8 uF	.12 mH	20 uF	3.3 uF	.24 mH	10 uF
6000	4.7 uF	82 uH	13 uF	2.2 uF	.21 mH	6.8 uF
8000	3.3 uF	60 uH	10 uF	1.5 uF	.12 mH	5.0 uF
10000	2.7 uF	47 uH	8.2 uF	1.3 uF	.10 mH	3.9 uF
12000	2.2 uF	38 uH	6.8 uF	1.1 uF	82 uH	3.3 uF



18 dB Per Octave High-Pass Filter



M44 Block Diagram

Left Channel Shown

Rev 1 7-13-95 BWH