

**HE
HI FONICS®**

SERIES VIII

AMPLIFIERS
EQUALIZERS
ACTIVE CROSSOVERS

MADE IN USA

Power

INTRODUCTION

Congratulations, you have purchased the finest auto stereo equipment that today's technology can offer. When used with Hifonics speakers and a head unit of comparable quality, this equipment will provide you with the ultimate in sound quality. For continued enjoyment, please read this manual in its entirety. Thank you for purchasing this product.

HIFONICS CORPORATION

Dear Customer,

Selecting fine audio equipment such as the unit you have just purchased is only the start of your musical enjoyment. Now is the time to consider how you can maximize the sound and excitement your equipment can offer. Hifonics Corporation and the Electronic Industries Association's Consumer Electronics group want you to get the most out of your equipment by playing it at a safe level. that allows the sound to come through loud and clear without annoying blaring or distortion, and, most importantly, without affecting your sensitive hearing.

CAUTION:

Some of our amplifiers are capable of producing sound pressure levels that can cause PERMANENT DAMAGE to the human hearing system with prolonged exposure.

Sound can be deceiving. Over time your "hearing comfort" level adapts to higher volumes of sound. Thus, "normal" can actually be too loud and harmful to your hearing. Guard against this by setting your equipment at a safe level BEFORE your hearing adapts.

To establish a safe level:

Start your volume control at a low setting.

Slowly increase the volume until you can hear the music comfortably and clearly, without any distortion.

Once you have established a comfortable loudness level, set the volume control and leave it in that position.

WE WANT YOU LISTENING FOR A LIFETIME

SOUND PRESSURE	EXAMPLE
30 dB	Quiet library, soft whispers
40 dB	Living room, refrigerator
50 dB	Light traffic, normal conversation
60 dB	Air conditioner at 20 feet
70 dB	Vacuum cleaner, hair dryer
80 dB	Average city traffic, garbage disposals

THE FOLLOWING NOISES CAN BE DANGEROUS WITH CONSTANT EXPOSURE:

90 dB	Subway, motorcycle, lawn mower	4 hours max
100 dB	Garbage truck, chain saw	2 hours max
120 dB	Rock band live concert	1/2 hour max
140 dB	Gunshot blast, jet plane	0 hours

Information courtesy of the Deafness Research Foundation

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HIFONICS AMPLIFIER AND SIGNAL PROCESSOR FEATURES

MOSFET PULSEWIDTH MODULATED POWER SUPPLIES

The high frequency capability of the Metal Oxide Field Effect Transistors contribute to the high switching efficiencies obtained with Hifonics power amplifiers.

Pulsewidth modulation supplies with tight regulation enables the amplifiers to maintain their rated powers from 11.5 volt to 16 volt battery supply.

This tight regulation allows the amplifier sections to deliver optimum performance at all times.

COMPLEMENTARY CASCODE INPUT STAGE

This technology puts Hifonics amplifiers squarely in the audiophile class. It improves power supply noise rejection and the general musicality of the units.

VARIPOWER

Our proven Varipower technology reduces the amplifier current demand under music conditions and as a by product reduces the heat dissipation of the amplifiers.

PROTECTION CIRCUITRY

The first line of defense against damaging the amplifiers is the thermal or overheating protection. This prevents the units from overheating by shutting them off until they cool down to a safe temperature.

When the speaker leads are short circuited, or if the amplifier section feeds DC into the speakers, the diagnostic system will shut the amplifier off. To restore the unit to operation, the fault has to be remedied and the amplifier has to be reset by turning it off and back on.

DISCRETE BUILDING BLOCK MODULES

Since virtually all the amplifiers share the same power supply and amplification technology, it made sense to produce the basic functions of the power supply controller and the amplifier drive circuits in modular form.

For ultimate reliability and quality, we decided to use discrete components in these modules as opposed to surface mount technology.

An extra advantage of using these modules is that the main printed circuit cards are now less cluttered with components, allowing us to use wider copper traces for high current paths, reducing their impedances.

DIRECT CONNECT

Direct connect is simply a bypass of the front end pre-amp in the amplifiers, thus bypassing its noise and distortion, albeit very small.

Bypassing this gain stage reduces the basic gain of the amplifiers, thus reducing their sensitivity to system noise and allowing them to accept the higher outputs available from the Hifonics signal processors.

The end result is a much reduced system noise in terms of both hiss and engine noise.

LOW IMPEDANCE OPERATION

Unlike most manufacturers who claim "stable" into 2, 1 or 1/2 ohm, Hifonics amplifiers will deliver guaranteed power into any given model's impedance ratings.

By examining our specification tables, it is obvious that Hifonics amplifiers will deliver substantial powers into these loads.

MONO BRIDGING

Except for the mono amplifiers, all Hifonics amplifiers are capable of mono bridging with a simple Y-adaptor RCA cable. Most will mono bridge to 4 ohm, the Gold series will bridge to 2 ohm mono and the Platinum series down to 1 ohm mono.

SIMULTANEOUS STEREO SATELLITES AND MONO BASS OPERATION

As with any bridgable amplifier, all Hifonics amplifiers are capable of driving stereo satellites and a mono bass speaker, single or dual voice coil, simultaneously.

Provided careful attention is paid to the passive crossovers required, this method is capable of excellent sonic performance.

SLOW TURN ON AND MUTING

This eliminates annoying and potentially damaging turn on and off thumps in a system.

1% TOLERANCE LOW NOISE METAL FILM RESISTORS DOUBLE SIDED EPOXY FIBER GLASS PC BOARDS LOW NOISE SEALED POTENTIOMETERS

By using military grade components, we can guarantee repeatability in quality and top performance.

The sealed potentiometers will deliver high performance in an automobile's dusty environment.

Our printed circuit boards are of the highest quality, and quite frankly, we think they are works of art.

UTILINK SPEAKER AND POWER CONNECTORS

These exclusive Hifonics connectors are truly unique in that they offer the flexibility of both barrier strips and plug in connectors.

The connectors being flush with the amplifier rear panels will make installations neater and easier to do.

POWER TRANSISTOR HEATSINK CLIPS

Hifonics amplifiers feature a newly designed power device clamping method to the heatsink. This enables assembly to be done speedily and efficiently and reduces the weight of the units.

HIGH VOLTAGE SUPPLIES IN SIGNAL PROCESSORS

The switching power supplies in Hifonics signal processors enable them to have large output voltage swings.

When used in conjunction with the Direct Connect feature on Hifonics amplifiers, these voltage swings allow the user to optimize the system noise.

The switching power supplies also isolate the vehicle chassis ground from the signal grounds, thereby eliminating ground loops, which can cause interference pickup.

INPUT AND OUTPUT LEVEL CONTROLS ON SIGNAL PROCESSORS

These controls allow the user to match our processors to any signal source, as well as matching them to any amplifiers.

TWO CHANNEL AMPLIFIERS

GENERAL

Hifonics offers a wide range of two channel amplifiers in every power class. Any of these amplifiers by themselves are capable of powering a full range system with passive crossovers.

However, by combining two or more with our active crossovers, any number of different systems can be designed to satisfy the most discerning and power hungry listeners.

BLUE SERIES : CUPID THRU COLOSSUS

These are our so-called "normal" amplifiers (including Colossus!). They are rated into 4 ohm and 2 ohm per channel or 8 ohm and 4 ohm mono bridged.

The Colossus amplifier is highly regarded by audiophiles for its transparent sound and sheer power.

GOLD SERIES : EROS AND TITAN

The two Gold amplifiers are also rated into 1 ohm per channel or 2 ohm mono bridged. This enables them to drive these lower impedances at higher powers than their Blue series cousins, which makes them extremely suitable for those competition sound installations.

PLATINUM SERIES : ULYSSES AND ISIS

Capable of driving 1/2 ohm per channel or 1 ohm mono bridged, these two amplifiers are the cream of the crop for those extremely competitive installations.

INSTALLATION AND WIRING

Follow the general installation procedures as outlined in the INSTALLATION chapter. Please consult the specification tables on PAGES 5 and 6 for the minimum impedances for each model.

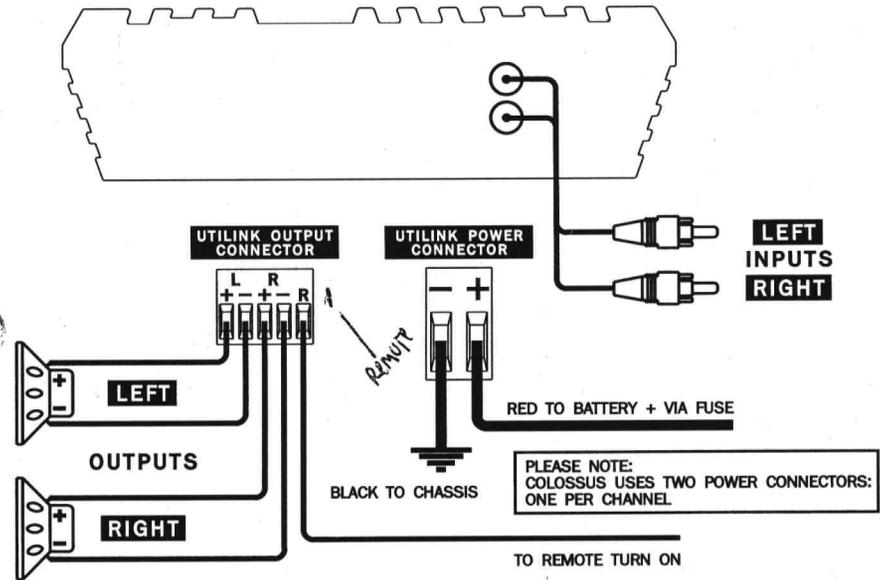
STEREO MODE

Refer to the top wiring diagram on PAGE 4.

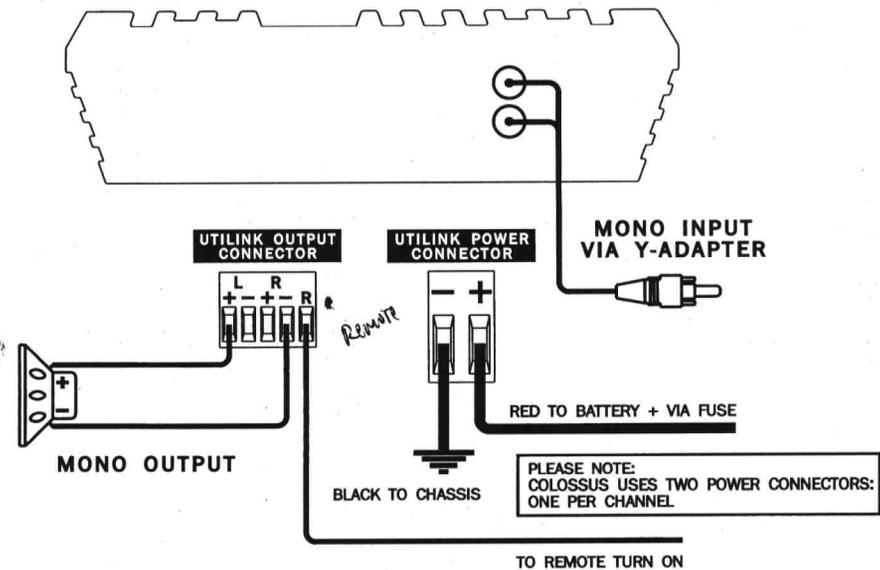
MONO MODE

Refer to the bottom wiring diagram on PAGE 4.

TWO CHANNEL AMPLIFIER WIRING DIAGRAM - STEREO



TWO CHANNEL AMPLIFIER WIRING DIAGRAM - MONO



TWO CHANNEL AMPLIFIER SPECIFICATIONS

Battery 11.5 to 16 Volt	CUPID	PLUTO	VULCAN	ODIN	THOR
Continuous output power with both channels driven into 4 ohm each with less than 0.02% THD	22 w/ch	35 w/ch	50 w/ch	75 w/ch	125 w/ch
Continuous output power with both channels driven into 2 ohm each with less than 0.1% THD	44 w/ch	60 w/ch	90 w/ch	120 w/ch	200 w/ch
Continuous output power with both channels driven into 1 ohm each with less than 0.12% THD	N/A	N/A	N/A	N/A	N/A
Continuous output power with both channels driven into 1/2 ohm each with less than 0.15% THD	N/A	N/A	N/A	N/A	N/A
Mono bridged into 8 ohm	44 w	70 w	100 w	150 w	250 w
Mono bridged into 4 ohm	88 w	120 w	180 w	240 w	400 w
Mono bridged into 2 ohm	N/A	N/A	N/A	N/A	N/A
Mono bridged into 1 ohm	N/A	N/A	N/A	N/A	N/A
THD at any power level 20Hz to 20KHz	0.05%	0.02%			
IMD (SMPTE)	0.05%	0.02%			
Slew rate volt/microsecond	10	10	17	21	25
Noise below rated output	98 dB	107 dB	110 dB	112 dB	114 dB
Frequency response at 1 watt output	2Hz to 200KHz -3 dB				
Power bandwidth	10Hz to 32KHz -0.1 dB				
Phase response 20 KHz	Lagging 12 Degrees at 20KHz				
Input sensitivity for rated power	0.25V to 13V	Switchable in two ranges : 0.25 volt to 1.5 volt and			
Min input impedance 20Hz to 20KHz	18 K ohm	22K ohm at 0.25V and 5K ohm at 1.5V			
Damping factor 20 to 200Hz	50	150	150	200	250
Channel separation	70 dB	70 dB	Greater than 80 dB		
Protection	Thermal	Thermal, Short circuit and DC			
Idling current	150 mA	300 mA	400 mA	500 mA	800 mA
Max current (4 ohm)	7 A	11 A	18 A	29 A	50 A
Typical current with music	1.5 A	5 A	12 A	10 A	14 A
Output stage current capability per channel	5 A	10 A	10 A	15 A	22 A
Height mm (in)	45 (1.8)	63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)
Width mm (in)	190 (7.5)	220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)
Depth mm (in)	130 (5.1)	100 (4)	155 (6.1)	155 (6.1)	195 (7.7)
Fuse rating 4 ohm	10 A	10 A	15 A	25 A	35 A
2 ohm	10 A	15 A	25 A	35 A	50 A
Weight (Kg.)	0.9	1.3	1.6	1.6	2.27

BOLTAR	ZEUS	COLOSSUS	EROS	TITAN	ULYSSES	ISIS
200 w/ch	300 w/ch	600 w/ch	35 w/ch	50 w/ch	25 w/ch	50 w/ch
350 w/ch	450 w/ch	900 w/ch	70 w/ch	100 w/ch	50 w/ch	100 w/ch
N/A	N/A	N/A	140 w/ch	190 w/ch	100 w/ch	200 w/ch
N/A	N/A	N/A	N/A	N/A	180 w/ch	275 w/ch
400 w	600 w	1200 w	70 w	100 w	50 w	100 w
700 w	900 w	1800 w	140 w	200 w	100 w	200 w
N/A	N/A	N/A	280 w	380 w	200 w	400 w
N/A	N/A	N/A	N/A	N/A	360 w	550 w
			0.02%			
0.02%						
35	39	50	10	17	15	20
116 dB	118 dB	116 dB	107 dB	110 dB	106 dB	110 dB
2Hz to 200KHz -3 dB						
10Hz to 32KHz -0.1 dB						
Lagging 12 Degrees at 20KHz						
1.5 volt to 9 volt						
22K ohm at 0.25V and 5K ohm at 1.5V						
300	400	500	150			
Greater than 80 dB		90 dB	70 dB	Greater than 80 dB		
Thermal, Short circuit and DC						
1 A	1.2 A	1 A x 2	300 mA	400 mA	400 mA	600 mA
67 A	100 A	100 A x 2	11 A	18 A	40 A	80 A
20 A	30 A	30 A x 2	10 A	24 A	15 A	30 A
24 A	38 A	75 A	15 A	22 A	27 A	55 A
63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)
220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)
290 (11.4)	395 (15.5)	670 (26.4)	155 (6.1)	195 (7.7)	290 (11.4)	440 (17.3)
50 A	60 A	60 A x 2	25 A 2 ohm	35 A 2 ohm	25 A 1 ohm	40 A 1 ohm
70 A	90 A	90 A x 2	35 A 1 ohm	50 A 1 ohm	35 A 1/2 ohm	60 A 1/2 ohm
3.4	5.4	11	1.7	2.3	3.4	5.8

MULTI CHANNEL AMPLIFIERS

GENERAL

The range of multi channel amplifiers available from Hifonics is unmatched in versatility by any other comparable units. An amplifier for every application is available to simplify installation.

All of these amplifiers will drive 4 or 2 ohm loads per channel, or pairs can be mono bridged together into 8 or 4 ohm loads.

They can be combined with other Hifonics amplifier models, equalizers and crossovers to design high performance auto stereo systems.

FOUR CHANNEL AMPLIFIERS WITHOUT CROSSOVERS

Juno and Jupiter are simple four channel amplifiers, which can replace two stereo units in any system, thus simplifying the installation, yet offering the same high quality as a Hifonics two channel amplifier.

Like all Hifonics four channel amplifiers, these can be mono bridged in combinations to provide 2 or 3 channel operation.

FOUR CHANNEL AMPLIFIERS WITH ACTIVE TWO WAY CROSSOVERS

Europa, Gemini and Olympus all feature four channels of high quality amplification, with built in two way active crossovers.

The amplifier inputs are isolated from the crossover inputs and outputs. This allows the amplifier or crossover sections to be used independently of each other for maximum versatility.

The crossover frequencies are fully variable from 50Hz to 5KHz.

The lowpass outputs of the crossovers can be switched to mono for single woofer sub bass operation. This also provides antiphase mono bass outputs for bridging older, non bridgable amplifiers. It is only necessary to feed one of these mono outputs via a Y-adaptor to a Hifonics stereo amplifier to mono bridge it.

SIX CHANNEL AMPLIFIER WITH BUILT IN ACTIVE TWO OR THREE WAY CROSSOVER

Aphrodite, this last word in versatility offers so many features and possibilities.

The inputs of the six channels are independent of the inputs and outputs of the active crossover.

These six channels can also be mono bridged in any combination to end up with 3, 4, or 5 channels!

The active crossover can be switched into a two or a three way mode.

In the two way mode, with the crossover coupled to the amplifiers, a full system with front and rear satellites and mono sub bass is possible.

In the three way mode, a three way active crossover system with mono or stereo bass output can be realised.

Of course, these are simply two basic applications for Aphrodite, and many more combinations are possible.

The two crossover frequencies are fully variable from 45Hz to 5KHz, which should cover all needs.

INSTALLATION AND WIRING

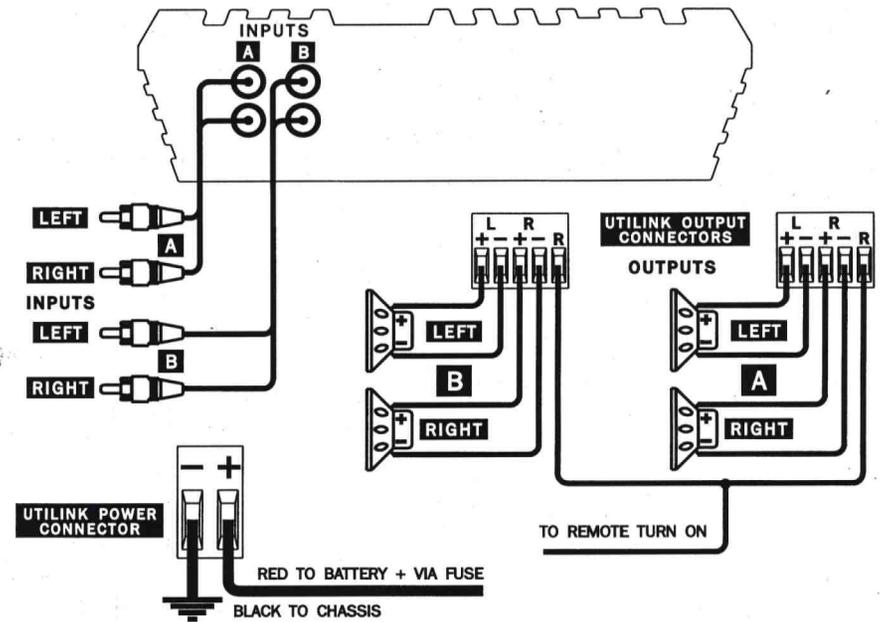
Follow the general installation procedures as outlined in the INSTALLATION chapter.

Please observe the minimum impedances of 2 ohm per channel or 4 ohm mono for the multi channel amplifiers.

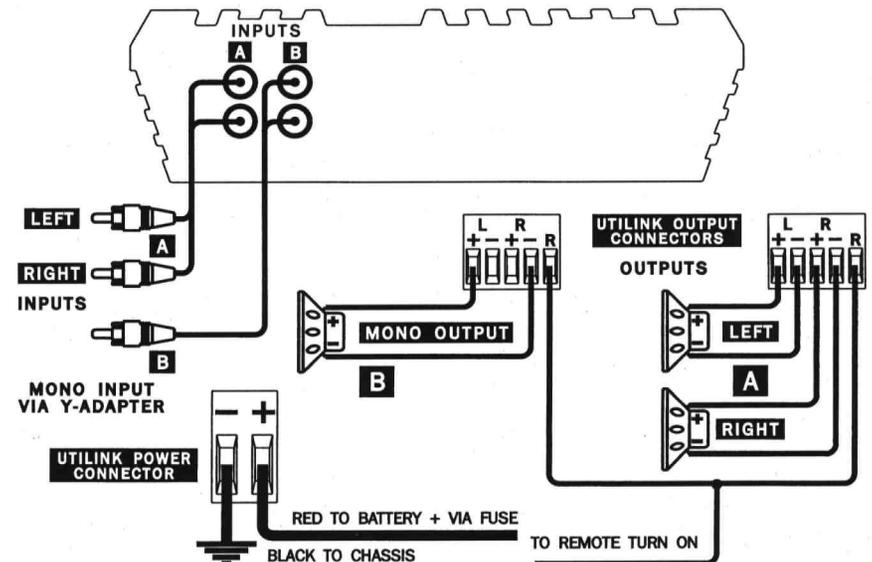
Refer to the wiring diagrams on the following pages for specific applications.

Remember, these are only suggestions, and many more uses are possible.

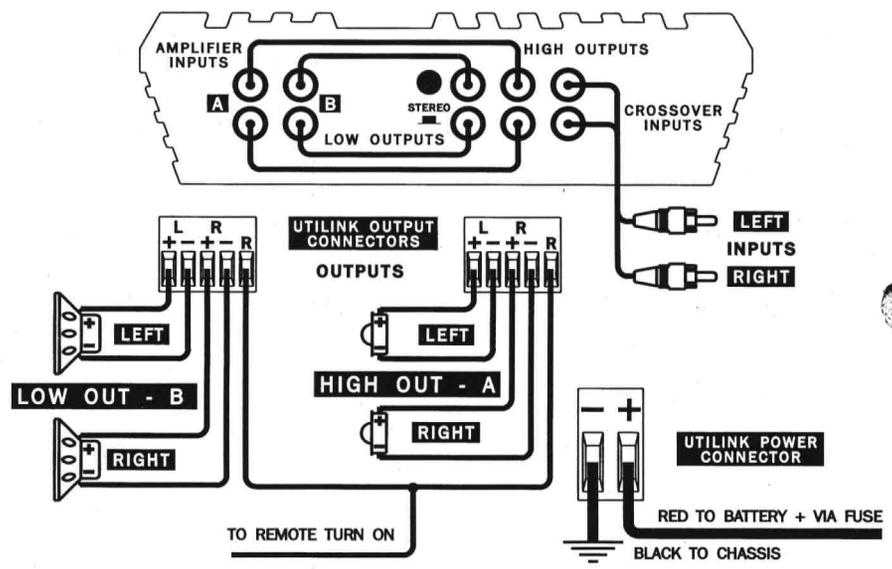
FOUR CHANNEL AMPLIFIER WIRING DIAGRAM - DISCRETE 4 CHANNELS



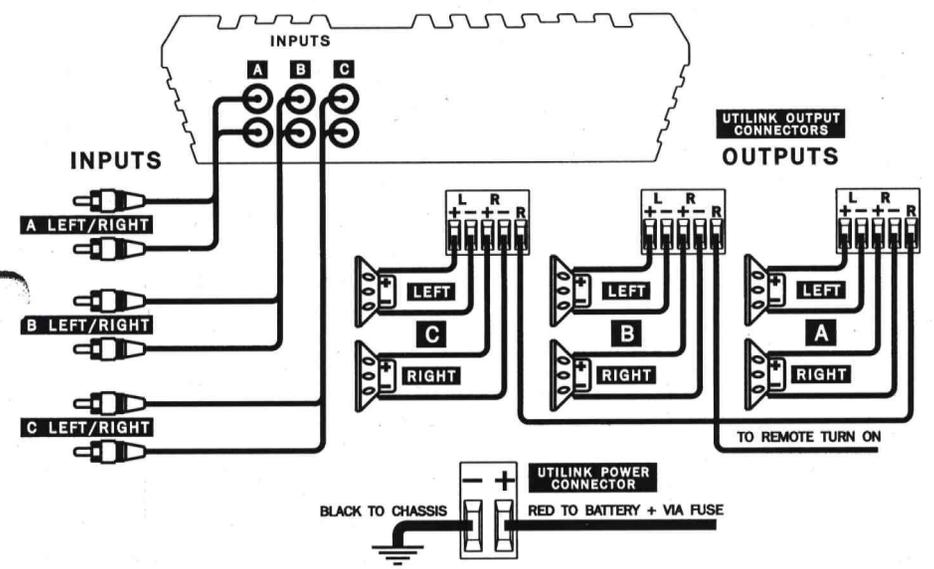
FOUR CHANNEL AMPLIFIER WIRING DIAGRAM DISCRETE 2/3 CHANNELS 3 CHANNEL SHOWN



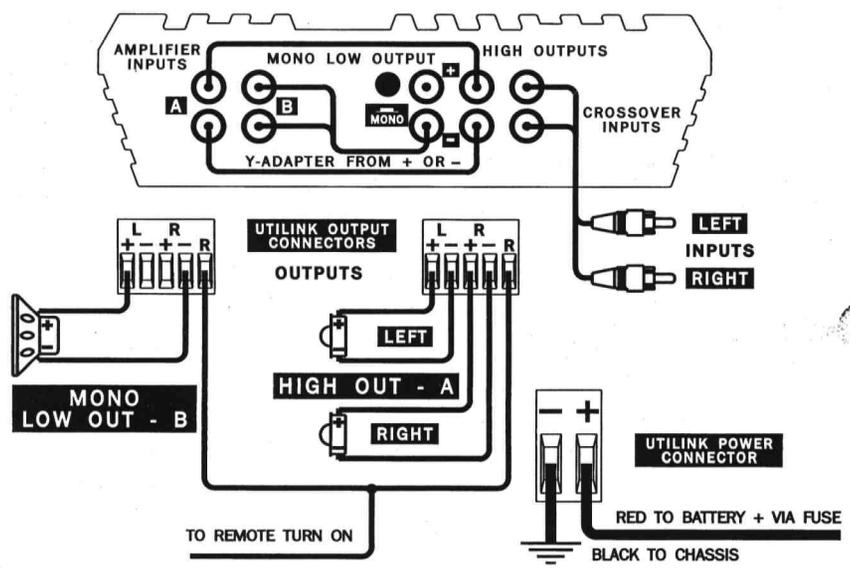
FOUR CHANNEL AMPLIFIER WIRING DIAGRAM BI-AMPLIFIED USING THE BUILT IN CROSSOVER WITH STEREO BASS



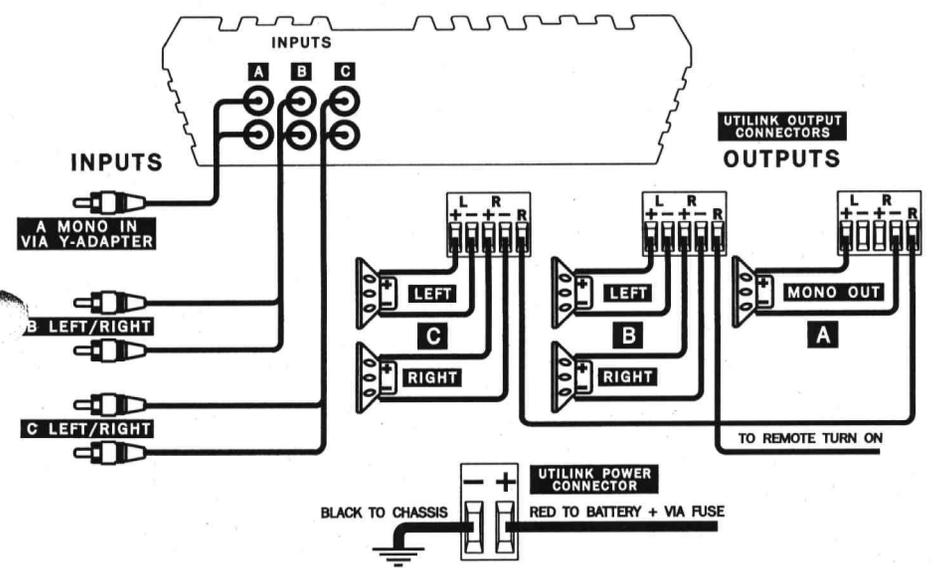
SIX CHANNEL AMPLIFIER WIRING DIAGRAM DISCRETE 6 CHANNELS



FOUR CHANNEL AMPLIFIER WIRING DIAGRAM BI-AMPLIFIED USING THE BUILT IN CROSSOVER WITH MONO BASS



SIX CHANNEL AMPLIFIER WIRING DIAGRAM DISCRETE 3, 4 OR 5 CHANNELS 5 CHANNEL SHOWN



MULTI CHANNEL AMPLIFIER APPLICATIONS

FOUR CHANNEL AMPLIFIERS

The diagrams on PAGE 8 applies to units with or without crossovers, as the amplifier sections are identical.

Examples of using the built in crossovers with these amplifiers are found on PAGE 9. Remember to use a Y-adaptor as illustrated for mono bridging.

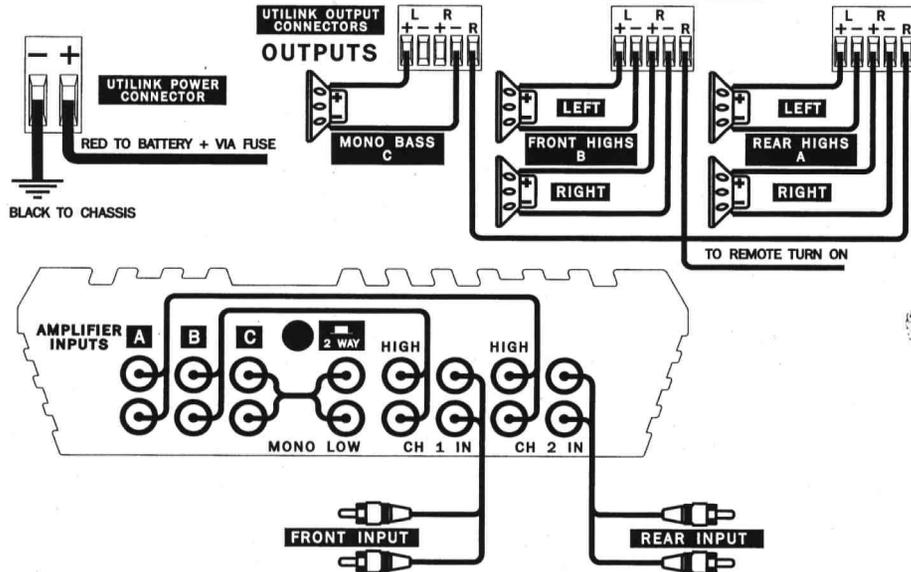
APHRODITE SIX CHANNEL AMPLIFIER

To use this amplifier in discrete (no crossover) mode, refer to the wiring diagrams of PAGE 10. Think of Aphrodite as three stereo amplifiers with bridging capability in one chassis, which opens up various possibilities.

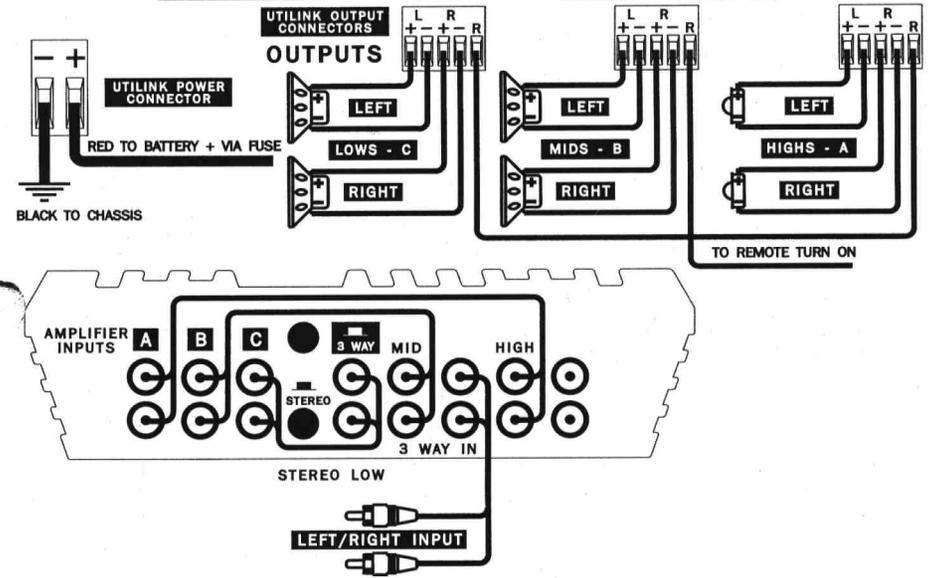
The wiring diagram on PAGE 11 shows the most basic and popular application for Aphrodite. This is a simple system which accepts front and rear outputs from a head unit or equalizer, with front and rear highpass outputs that can drive passive two way speaker systems. A mono lowpass output is provided for constant sub bass. To achieve the same results with separate amplifiers and crossovers would typically need three stereo amplifiers and a separate crossover, with the associated power wiring and signal cables!

On PAGE 12 you will find three way active crossover applications for Aphrodite. These systems accept stereo left and right inputs and will drive a stereo three way system with stereo or mono bass.

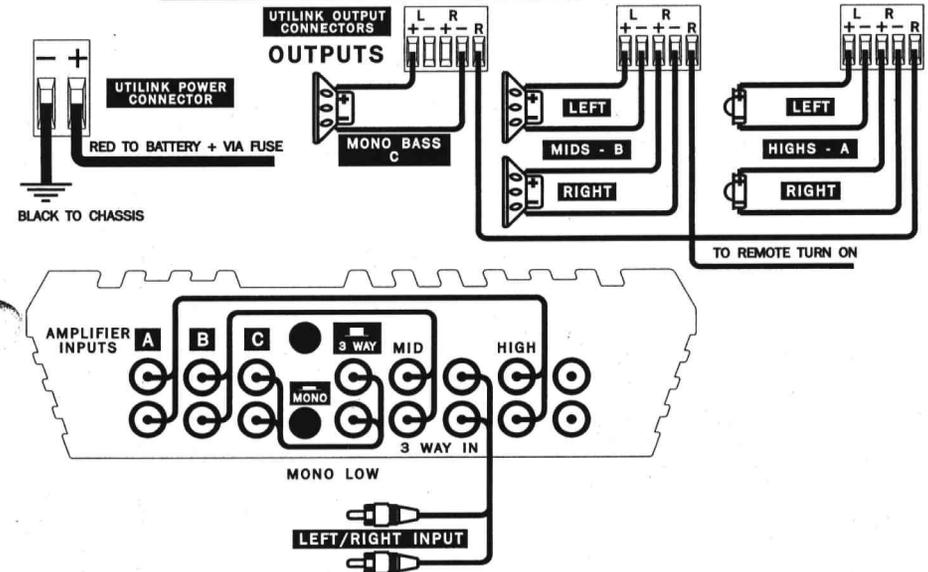
SIX CHANNEL AMPLIFIER WIRING DIAGRAM BI-AMPLIFIED USING THE BUILT IN CROSSOVER MONO BASS ONLY



SIX CHANNEL AMPLIFIER WIRING DIAGRAM TRI-AMPLIFIED USING THE BUILT IN CROSSOVER STEREO BASS



SIX CHANNEL AMPLIFIER WIRING DIAGRAM TRI-AMPLIFIED USING THE BUILT IN CROSSOVER MONO BASS



MULTI CHANNEL AMPLIFIER SPECIFICATIONS

Battery 11.5 to 16 Volt	JUNO	JUPITER EUROPA	GEMINI	OLYMPUS	APHRODITE
Continuous output power with both channels driven into 4 ohm each with less than 0.02% THD	22w x 4ch	35w x 4ch	50w x 4ch	110w x 4ch	50w x 6ch
Continuous output power with both channels driven into 2 ohm each with less than 0.15% THD	44w x 4ch	60w x 4ch	70w x 4ch	180w x 4ch	80w x 6ch
Mono bridged into 8 ohm	44w x 2	70w x 2	100w x 2	220w x 2	100w x 3
Mono bridged into 4 ohm	88w x 2	120w x 2	140w x 2	360w x 2	160w x 3
THD at any power level 20Hz to 20KHz	0.05%	0.02%			
IMD (SMPTÉ)	0.05%	0.02%			
Slew rate volt/microsecond	10	10	17	25	17
Noise below rated output	98 dB	107 dB	109 dB	114 dB	98 dB
Frequency response at 1 watt output	2Hz to 200KHz -3 dB				
Power bandwidth	10Hz to 32KHz -0.1 dB				
Phase response 20 KHz	Lagging 12 Degrees at 20KHz				
Input sensitivity for rated power	0.25V to 13V	Two ranges : 0.25V to 1.5V or 1.5V to 9V			0.25V to 1.5V
Input impedance 20Hz to 20KHz	18K ohm	22K ohm at 0.25V and 5K ohm at 1.5V			22K ohm
Damping factor 20 to 200Hz	50	100	150	250	150
Channel separation	70 dB	75 dB	78 dB	81 dB	72 dB
Protection	Thermal	Thermal, Short circuit and DC			
Idling current	250 mA	500 mA	900 mA	900 mA	1.2 A
Max current (4 ohm)	14 A	21 A	40 A	85 A	55 A
Typical current with music	3 A	14 A	23 A	30 A	36 A
Output stage current capability per channel	5 A	10 A	10 A	15 A	10 A
Height mm (in)	45 (1.8)	63 (2.5)	63 (2.5)	63 (2.5)	63 (2.5)
Width mm (in)	190 (7.5)	220 (8.75)	220 (8.75)	220 (8.75)	220 (8.75)
Depth mm (in)	260 (10.2)	195 (7.7)	290 (11.4)	395 (15.5)	440 (17.3)
Fuse rating 4 ohm	15 A	15 A	30 A	50 A	40 A
2 ohm	25 A	25 A	50 A	70 A	60 A
Weight (Kg.)	1.8	2.27	3.4	5.4	5.8
Number of channels	4				6

CROSSOVER SECTION SPECIFICATIONS

	EUROPA/GEMINI/OLYMPUS ONLY 2 WAY	APHRODITE 2/3 WAY
Variable crossover frequencies	50Hz to 5KHz	45Hz to 5KHz
All filter slopes	12 dB per octave	
THD (20Hz to 20KHz)	0.02%	
IMD	0.02%	
Max output voltage	9 volt	
Output impedance	100 ohm	
Noise	95 dB below 5 volt RMS output	
Frequency response	5Hz to 50KHz at 5 volt RMS output	
Input impedance	22K ohm	

MONO AMPLIFIERS

GENERAL

Cyclops, Hercules and Atlas, the three Hifonics mono amplifiers are dedicated to low frequency amplification, and will deliver their rated powers into 4 ohm and 2 ohm. These units have two way active crossovers built in. The power amplifier section can be switched between a direct input jack or the mono low output of the crossover. This mono low out is also available at all times on its own RCA jack to feed the inputs of slave bass amplifiers.

Stereo satellite amplifiers can derive their inputs from the crossover highpass output RCA jacks.

The crossover high and lowpass frequencies are independently adjustable from 43Hz to 550Hz.

The mono amplifiers can be added to any system as an upgrade, or can be designed in at the onset.

INSTALLATION AND WIRING

Follow the general installation procedures as outlined in the INSTALLATION chapter. Please observe the 2 ohm minimum speaker impedance.

BASIC MONO AMPLIFIER CONFIGURATION

The top diagram on PAGE 15 shows the basic mono amplifier input and output functions.

Connect the crossover inputs to the outputs of a head unit or an equalizer.

The highpass outputs can feed the inputs of any amplifier, or the inputs of one of the Hifonics crossovers, or even a crossover in one of the multi channel amplifiers to form a more complex active system.

If more bass power is needed to drive more bass units, connect the mono low out to slave amplifiers.

Depress the "LOW OUT TO AMP" switch on the left side of the front panel to connect the power amplifier section to the crossover low out.

In this mode, the input level is determined by the "LOW OUT TO AMP LEVEL" switch on the right side as marked on the front panel of the amplifier.

REMOTE SUB BASS LEVEL CONTROL WITH THE VESTA CONTROLLER

Those listeners who have to adjust their bass amplifier level on the fly, need look no further than the bottom diagram on PAGE 15. This illustrates how a dash mounted Vesta Controller can be used for this purpose.

Connect the low out jack to one input on the Vesta, and loop the corresponding Vesta output back to the AMP DIRECT IN jack on the mono amplifier. A stereo male RCA to RCA patchcord can be used for this, one leg for the send to the Vesta and the other for the return to the amplifier.

Set the input and output preset level controls on the Vesta to 0dB (center) and the AMP DIRECT IN switch on the amplifier to the out position, to disconnect the power amplifier section input from the crossover low out.

HIGHPASS FRONT TO REAR FADE WITH THE VESTA CONTROLLER

The bottom wiring diagram on PAGE 15 also shows how to use a Vesta controller to split the stereo high out from the mono amplifiers to a faded front and rear highpass signal.

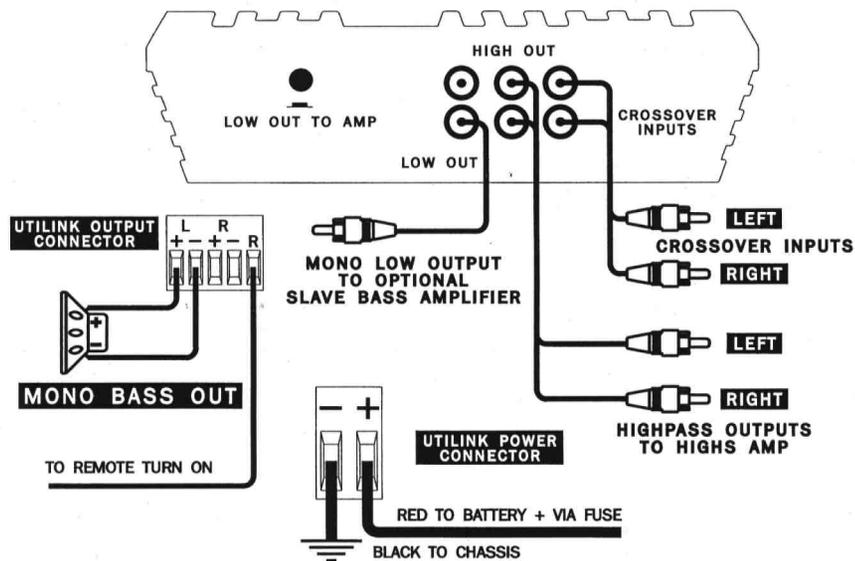
Simply feed the highpass to the dash mounted Vesta inputs and connect the outputs marked to two stereo amplifiers or a four channel amplifier to drive front and rear satellite speakers. Or, these outputs can feed further active crossovers to create a more complex active system.

If the front and rear amplifiers have the DIRECT CONNECT feature, set the LEVEL switch on them to the least sensitive range (depressed), and turn the level control to the 9 o'clock position. Then set the Vesta output level presets to 0dB and boost the input level presets as far as possible without causing distortion.

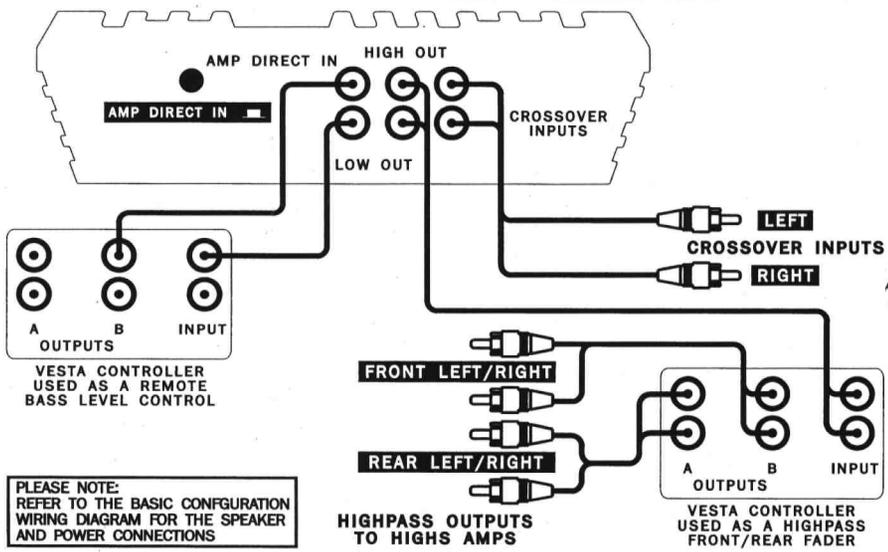
Since the mono sub bass output is pre-fade, its level will remain constant regardless of the fader position.

If a second Vesta is used for remote bass level control, the AMP DIRECT IN switch should be in the out position. If only one Vesta is used as a fader, this switch must be depressed to connect the low output straight to the power amplifier section input.

**MONO AMPLIFIER WIRING DIAGRAM
BASIC CONFIGURATION WITH BUILT IN CROSSOVER
SHOWING OPTIONAL SLAVE BASS AMPLIFIER CONNECTION**



**MONO AMPLIFIER WIRING DIAGRAM
SHOWING REMOTE BASS LEVEL CONTROL
AND/OR HIGHPASS FRONT/REAR FADE
WITH THE VESTA CONTROLLER**



MONO AMPLIFIER SPECIFICATIONS

Battery 11.5 to 16 Volt	CYCLOPS HERCULES ATLAS		
	Continuous output power into 4 ohm with less than 0.02% THD	100 watt	200 watt
Continuous output power into 2 ohm with less than 0.15% THD	175 watt	375 watt	600 watt
THD at any power level 20Hz to 20KHz	0.02%		
IMD (SMPTE)	0.02%		
Slew rate volt/microsecond	25	35	45
Noise below rated output	113 dB	116 dB	119 dB
Frequency response at 1 watt output	2Hz to 200KHz -3 dB		
Power bandwidth	10Hz to 32KHz -0.1 dB		
Phase response 20 KHz	Lagging 12 Degrees at 20KHz		
Input sensitivity for rated power: Amp direct in	1.8V to 10.6V		
Input sensitivity for rated power: Through crossover	Two ranges: 0.24V to 1.4V 1.4V to 8.4V		
Min input impedance 20Hz to 20KHz	5K ohm at 1.8V		
Damping factor 20 to 200Hz	150	200	400
Protection	Thermal, Short circuit and DC		
Idling current	400 mA	700 mA	800 mA
Max current (4 ohm)	20 A	40 A	67 A
Typical current with music	12 A	24 A	20 A
Output stage current capability I	15 A	30 A	45 A
Height mm (in)	63 (2.5)	63 (2.5)	63 (2.5)
Width mm (in)	220 (8.75)	220 (8.75)	220 (8.75)
Depth mm (in)	155 (6.1)	290 (11.4)	440 (17.3)
Fuse rating 4 ohm	20 A	30 A	50 A
2 ohm	30 A	50 A	70 A
Weight (Kg.)	1.6	3.4	5.2
CROSSOVER SECTION SPECIFICATIONS			
Variable crossover frequencies	43Hz to 550Hz		
All filter slopes	12 dB per octave		
THD (20Hz to 20KHz)	0.02%		
IMD	0.02%		
Max output voltage	9 volt		
Output impedance	100 ohm		
Noise	95 dB below 5 volt RMS output		
Frequency response	5Hz to 50KHz at 5 volt RMS output		
Input impedance	22K ohm		

EQUALIZERS

GENERAL

Hifonics equalizers are useful for taming bad car acoustics.

Epsilon, a half DIN dash mount four band piece, is used for fine tuning a sound system from song to song.

Cleo and Plato are trunk mount units for preset system equalization. These should be preset and left alone for total system equalization.

All these units have switching power supplies to increase output voltage capability and isolate audio and 12 volt grounds to prevent ground loops.

Also included are input and output preset level controls for level matching and noise optimization on Epsilon and Plato. Cleo has an internally optimized gain structure for best noise performance.

EPSILON DASH MOUNT EQUALIZER

Epsilon is half DIN size for ease of in dash mounting. A mounting bracket is provided for under dash mount. Its four EQ bands are more than adequate for touch up equalization.

A volume control and front to rear fader is included.

CLEO AND PLATO TRUNK MOUNT EQUALIZERS

Cleo and Plato are three and ten band respectively VARIOFREQUENCY trunk mount equalizers. These are invaluable for pre equalizing a sound system. One of these can be used for both front and rear. Better yet, use one for the front and another for the rear system. This is necessary as different speakers and mounting locations in the front and rear are normally used.

The VARIOFREQUENCY feature is the ability to vary the center frequency of any EQ band for exact equalization.

Mounting them is simplicity itself using the mounting flanges.

INSTALLATION AND WIRING

Follow the general installation procedures as outlined in the INSTALLATION chapter. Refer to the wiring diagrams on PAGE 18.

The Epsilon inputs can be connected to a signal source, such as a head unit, and its outputs can drive front and rear amplifiers directly, or via trunk mount equalizers or active crossovers.

Cleo or Plato can be inserted anywhere in the signal chain.

To use one to equalize an entire system, insert it before any dash mount equalizer or a front to rear fader such as the Vesta CONTROLLER.

To equalize front and rear systems separately, insert one in each of the front and rear outputs of the dash mount equalizer or fader.

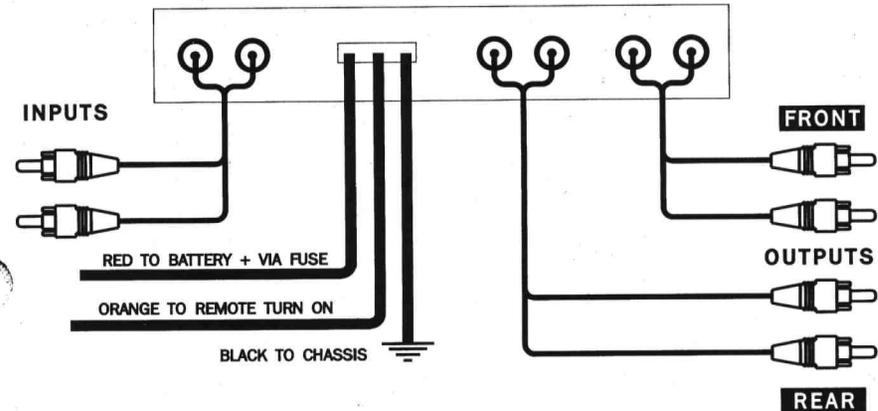
INPUT/OUTPUT PRESET LEVEL ADJUSTMENTS

These controls will affect the noise level in a system.

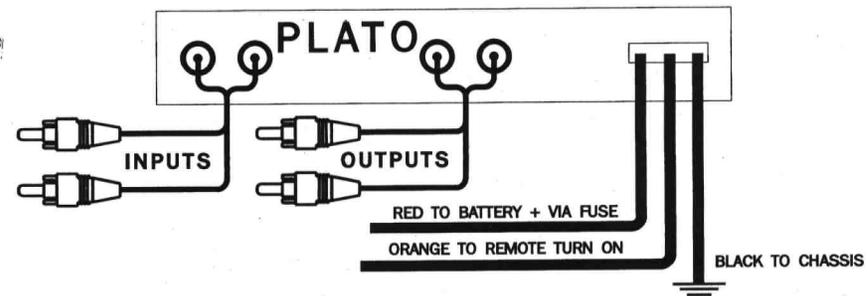
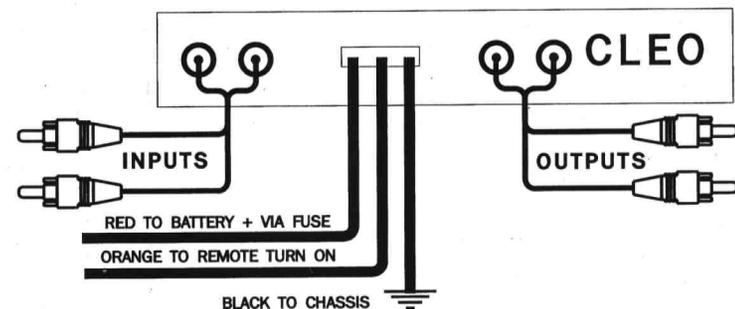
To reduce system noise, you generally need to boost the input level presets as much as possible without running into overload distortion. Then cut the output level presets to reduce this boosted signal, and consequently the absolute noise.

This procedure is explained in more detail in the SYSTEM SETUP chapter.

EPSILON 4 BAND EQUALIZER WIRING DIAGRAM



TRUNK MOUNT EQUALIZER WIRING DIAGRAMS



EQUALIZER SPECIFICATIONS

	CLEO	PLATO	EPSILON
Frequency bands	3	10	4
Center frequencies	Variable	Variable	Fixed
Band 1	23Hz to 47Hz	23Hz to 47Hz	50Hz
2	185Hz to 375Hz	47Hz to 95Hz	200Hz
3	12KHz to 24KHz	95Hz to 180Hz	3KHz
4		180Hz to 375Hz	16KHz
5		375Hz to 750Hz	
6		750Hz to 1.5KHz	
7		1.5KHz to 3KHz	
8		3KHz to 6KHz	
9		6KHz to 12KHz	
10		12KHz to 24KHz	
Maximum boost/cut	+/- 12dB		
Frequency response	5Hz to 50KHz -3dB all controls flat		
Signal to noise ratio	103dB A-weighted		
THD and IMD	Less than 0.02% at any output		
Slew rate	11 V/micro second	13 V/micro second	
Channel separation	80dB		70dB
Maximum output voltage	2.7 V RMS	10 V RMS	
Maximum input voltage	2.7 V RMS	2.7 V to 15 V RMS	
Input gain range	0dB	+/- 18dB variable	
Output gain range	0dB	+/- 18dB variable	
Input impedance	15K ohm		
Output impedance	300 ohm		
Supply voltage	9 V to 14.4 V negative ground		
Current consumption	400 mA		
Size H x W x D			
Millimeters	25.4 x 178 x 89	25.4 x 221 x 122	25.4 x 187 x 105
Inches	1 x 7 x 3.5	1 x 8.7 x 4.8	1 x 7.4 x 4.1

ACTIVE CROSSOVERS

GENERAL

The Apollo stereo two way crossover has separate, fully variable high and lowpass frequency controls. Crossover frequencies from 10Hz to 10.5KHz in two ranges are possible. Apollo is half DIN size and can be mounted in or under dash with a supplied bracket.

Callisto is a dual stereo three way crossover and can be switched to a stereo four way unit.

Both crossovers feature switching power supplies for increased output voltage capability and ground loop prevention.

As with the other Hifonics signal processors, input and output preset level controls are featured for level matching and system noise reduction.

The versatility of Callisto, especially simplifies the design of complex active multi way sound systems.

POLLO 2 WAY CROSSOVER

The highpass outputs can be used as subsonic filters when the frequency is set to the lower end of the scale, say below 50Hz.

Another handy feature is the ability to set the high and lowpass frequencies to different points, perhaps to create a gap or peak in the total response for equalization purposes.

CALLISTO 3/4 WAY CROSSOVER

The front and rear main highpass frequencies can be set separately from the sub bass frequency. Each also has a mid to high frequency control.

The front can be set to 2 way only for simple passive satellites in front.

In both the 3 and 4 way mode the sub bass output is mono. This signal path has:

- A switchable 12 or 18 dB per octave lowpass slope.
- Fully variable lowpass frequency.
- Variable subsonic filter frequency.
- A single VARIOFREQUENCY section for sub bass equalization.
 - A left + right output is available for front center channels.
 - A left - right is provided for rear ambience channels.

INSTALLATION AND WIRING

Follow the general installation procedures as outlined in the INSTALLATION chapter. Refer to the wiring diagrams on PAGES 21 and 22.

Apollo is suited for simple 2 way applications, receiving its input from any signal source, such as a head unit or equalizer. The high and lowpass outputs will each drive an amplifier connected to the appropriate speakers.

Callisto has several applications, perhaps better illustrated by the wiring diagrams.

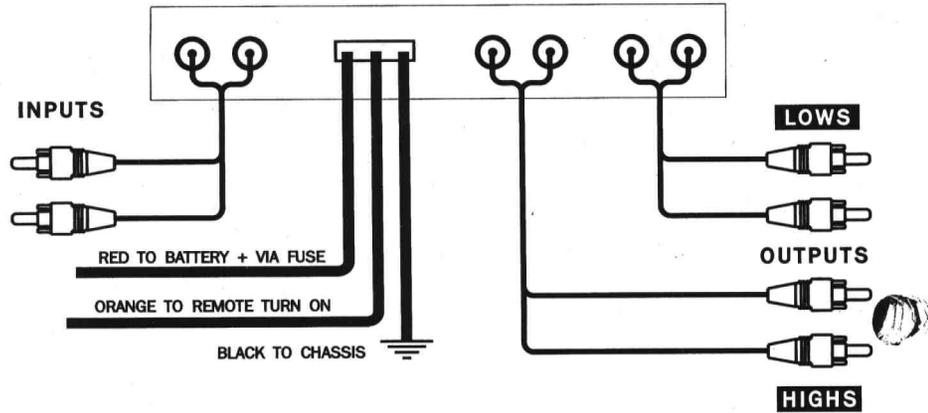
In the dual 3 way mode, front and rear midrange and high frequency signals are derived, together with the sub bass signal. The "INPUT HIGHPASS FREQUENCY" control sets the crossover point between the sub bass and midrange. The "CROSSOVER FREQUENCY" control sets the crossover point between midrange and highs.

If the front system needs to be simplified, set the 2/3 way switch in that signal path to "2 WAY". Now the front highpass output will be controlled by "INPUT HIGH FREQUENCY" setting, to form a 2 way system with the sub bass output contributing the low frequencies.

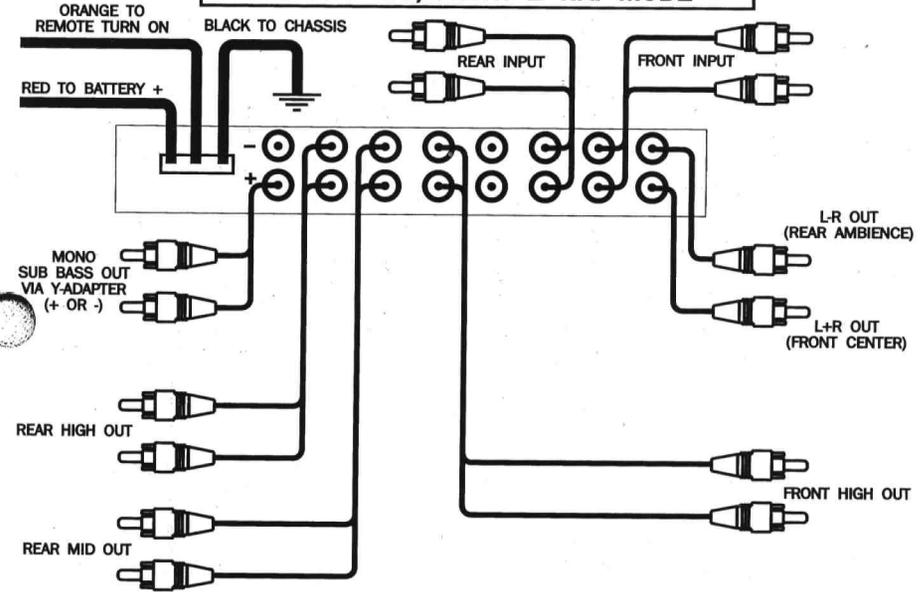
In the 4 way mode, the Callisto becomes a single stereo 4 way crossover. Note that here again the bass is mono only.

IMPORTANT: The sub bass outputs are MONO and 180 degrees out of phase! Use only ONE of these as indicated in the wiring diagrams to drive the bass amplifier inputs with a Y-adaptor.

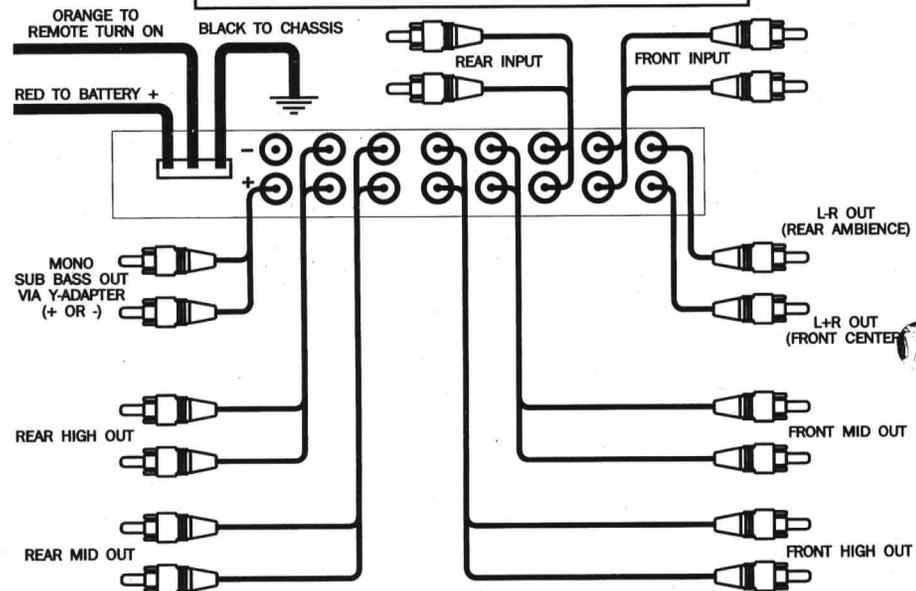
APOLLO 2 WAY ACTIVE CROSSOVER WIRING DIAGRAM



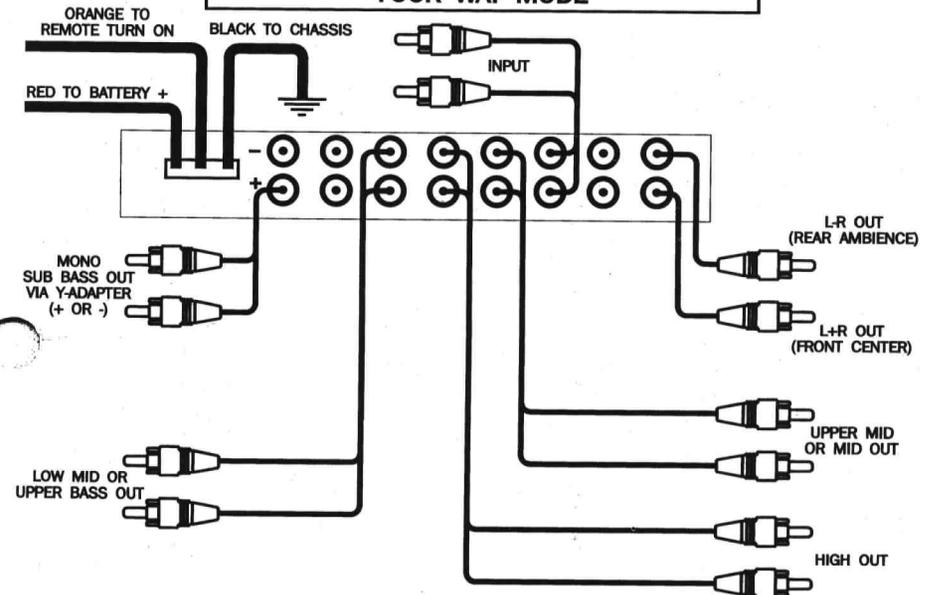
CALLISTO DUAL 3 WAY ACTIVE CROSSOVER WIRING DIAGRAM REAR 3 WAY, FRONT 2 WAY MODE



CALLISTO DUAL 3 WAY ACTIVE CROSSOVER WIRING DIAGRAM THREE WAY MODE



CALLISTO DUAL 3 WAY ACTIVE CROSSOVER WIRING DIAGRAM FOUR WAY MODE



	CALLISTO	APOLLO
Crossover frequency	Variable	Variable
Sub bass	50 Hz to 310Hz	N/A
Low pass	N/A	10Hz to 10.5KHz
Midrange high pass	50Hz to 545Hz	N/A
Midrange to highs	250Hz to 7.2KHz	N/A
Highs	N/A	10Hz to 10.5KHz
Center channels: Left + right	Fixed	Not applicable
Left - right	280Hz to 7.2KHz	
Frequency response	-3dB	
Sub bass phase	0 or 180 degrees	Not applicable
Sub bass subsonic filter	Variable	Not applicable
Highpass frequency	20Hz to 52Hz	
Sub bass filter slope	12 or 18dB /octave	Not applicable
All others	12dB /octave	12dB /octave
VARIOFREQUENCY EQ		Not applicable
On sub bass only:		
Boost/cut	+/- 12dB	
Center frequency	28Hz to 80Hz	
Frequency response	4Hz to 50KHz all outputs combined	
Signal to noise ratio	103dB A-weighted	
THD and IMD	Less than 0.02% at any output	
Slew rate	11 V/micro second	
Channel separation	80dB	
Maximum output voltage	10 V RMS	
Maximum input voltage	2.7 V to 15 V RMS	
Input gain range	+/- 18dB variable	
Output gain range	+/- 18dB variable	
Input impedance	22K ohm	
Output impedance	300 ohm	
Supply voltage	9 V to 14.4 V negative ground	
Current consumption	400 mA	
Size H x W x D		
Millimeters	38 x 267 x 147	25.4 x 187 x 105
Inches	1.5 x 10.5 x 5.8	1 x 7.4 x 4.1

Any stereo amplifier that is bridgable can drive stereo and mono loads at the same. The only proviso is that the final combined load impedance seen by each channel is not less than the recommended minimum impedances for that particular amplifier.

Keep in mind that each of the two bridged channels will "see" half of the bridged load. In other words, 8 ohm mono is the same as 4 ohm stereo as far as the amplifier is concerned, etc.

So, if an amplifier is loaded by a 4 ohm speaker on each channel, plus a bridged 8 ohm speaker, it is really "seeing" two 4 ohm loads in parallel per channel. This translates to a final load impedance per channel of 2 ohms!

Since all Hifonics amplifiers are bridgable, this concept can be used to drive stereo satellite speakers plus a mono bridged sub bass speaker with one stereo amplifier.

Any system which involves bass and high frequency speakers connected to the same amplifier need passive crossovers to route the correct frequency ranges to the proper speakers. This type of system will need two highpass crossovers, one each for the satellite speakers.

If a single voice coil woofer is used, one passive lowpass crossover is necessary.

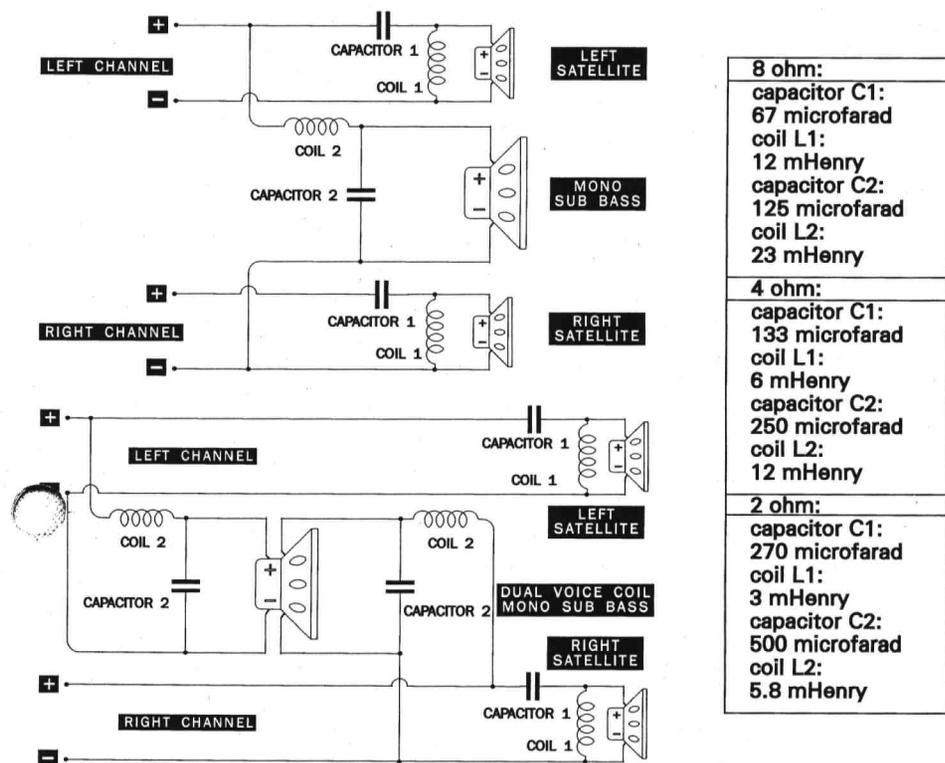
The preferred method to obtain more accurate mono bass is to use a dual voice coil woofer. Each amplifier channel will be connected to one voice coil via a passive low pass crossover.

Refer to the wiring diagram for speaker and passive crossover hook up details.

Please check the amplifier spec sheets for minimum impedances .

The following table gives generic component values for passive crossovers. These designs will work fine with most speakers, but the speaker manufacturer should be consulted for more accurate details.

All capacitors should be 150 Volt minimum non polarised types. Coils or inductors should use thick enough wire so as not to cause power losses.



8 ohm:
capacitor C1: 67 microfarad
coil L1: 12 mHenry
capacitor C2: 125 microfarad
coil L2: 23 mHenry
4 ohm:
capacitor C1: 133 microfarad
coil L1: 6 mHenry
capacitor C2: 250 microfarad
coil L2: 12 mHenry
2 ohm:
capacitor C1: 270 microfarad
coil L1: 3 mHenry
capacitor C2: 500 microfarad
coil L2: 5.8 mHenry

INSTALLATION

GENERAL

Any system is only as good as its weakest link. Remember that the installation itself is part of the system, and a well planned and execution will ensure that your sound system will give continued listening pleasure for years.

- 1) Only use good quality RCA patch cords.
- 2) Use power and ground cables with sufficient current capability.
- 3) Use #14 gauge wire for speaker leads.
- 4) Make sure all connections are good. never twist wires together and tape them. The best method is to solder wires together and cover the joint with heatshrink tubing, if splicing is necessary.
- 5) To make ground connections to the chassis of the vehicle, crimp a lug to the cable AND solder the crimp. Scrape the paint off the chassis under the ground lug area. Now bolt this lug down, using a star washer to ensure a good electrical and mechanical connection. Spread a small amount of grease around the bolthead and lug to prevent corrosion.
- 6) Never share or run excessively long ground leads. Always use a grounding point as near to the equipment as possible.
- 7) Mount the equipment fuses directly by the battery, and not by the equipment on the other end of the power cables. Remember, the fuse also has to protect the vehicle against possible electrical fires caused by short circuits. Inserting the fuse should be the last installation step in any system before initial power up.
- 8) Never use the factory in dash power and ground wires for head units, equalizers or crossovers. These wires are typically very noisy, because they may be fed from the same points as the car electrical equipment. It is better to run a power wire straight from the battery positive, and run the power ground to a point on the firewall behind the dashboard.
- 9) Amplifiers must be mounted in open areas for adequate air flow to prevent overheating. Mount the amplifiers so that the fins run vertically for best natural convection cooling. If necessary, install a fan to force cool the amplifiers.

UTILINK CONNECTORS

These new Hifonics power and speaker connectors offer the versatility of both screw-in type terminal posts and plug-in connectors. They flushmount with the amplifier endplates for better looking installations.

The speaker connectors will accept up to #14 gauge and the power connectors up to #8 gauge wire. The wires are clamped between metal plates to ensure good connections.

To install the wires, loosen the screws on the top of the plug in female connectors first. Strip the insulation off the speaker wires by about 1/4" and off the power cable about 1/2" before inserting into the connectors. Now tighten the screws to clamp down firmly on the wire ends.

Firmly, but gently, plug the connectors into the panel mounted male receptacles on the amplifier. The plug will be seated correctly with the screw heads facing to the bottom of the amplifier and the body flush with the male tabs.

Simply pull the plug out by the wires when necessary. In the event that the plug is inserted without any wires, pull it out with a small pair of pliers.

ABOUT WIRE SIZES, BATTERIES AND ALTERNATORS

A car sound system needs clean voltage and a good supply of current to perform properly. It may be necessary to upgrade the alternator and the battery system. Consult the specification sheets for the amplifier models in the system. Add the TYPICAL CURRENT WITH MUSIC values for these amplifiers together and add that to the total current of the car electrical equipment, as illustrated in the following table. The higher values are typically for larger vehicles.

Headlights	15 to 25 Amp
Engine operation	10 Amp
Windshield wipers	15 to 20 Amp
Lighting	1 Amp per bulb
Heater	25 to 35 Amp
Air conditioner	25 to 35 Amp

If this new total exceeds 80% of the alternator current rating, it should be upgraded. Auxiliary batteries will add another 10 to 60 Amps to this requirement. Give this information to a qualified auto electrician who will advise you in more detail. He will probably recommend the auxiliary batteries with battery isolators.

IMPORTANT: A supply voltage of at least 11.5 volt should be maintained at the amplifier power connectors. Once the alternator and battery system has been analysed, check the following table for minimum power wire sizes for your system.

Current in Amps:	Distance	Distance	Distance	Distance	Distance	Distance
	4 foot:	4 to 7 feet:	7 to 10 feet:	10 to 13 feet:	13 to 16 feet:	16 to 19 feet:
0 to 20	14	12	12	10	10	8
20 to 35	12	10	8	8	6	6
35 to 50	10	8	8	6	6	4
50 to 65	8	8	6	4	4	4
65 to 85	6	6	4	4	2	2
85 to 105	6	6	4	2	2	2
105 to 125	4	4	4	2	2	0
125 to 150	2	2	2	2	0	0

SYSTEM SETUP

USING THE DIRECT CONNECT PREAMP BYPASS FEATURE

Level matching adjustments in a sound system will affect overload distortion and noise performance, so it is worthwhile spending time to do it properly.

Since the Hifonics amplifiers are capable of accepting the high output voltages of our signal processors, sound systems can be made less sensitive to noise. By running signal level as high as possible through the signal processors, any noise present will have a much smaller effect than with conventional equipment without this capability.

In all these examples it will be assumed that all volume controls on dash mount head units and equalizers are set to 75% full.

SYSTEM WITH A HEAD UNIT AND ONE AMPLIFIER:

Start with amp level control at minimum, advance till distortion occurs and back off a touch.

SYSTEM WITH A HEAD UNIT, EQUALIZER AND ONE AMPLIFIER:

Switch the amplifier level to the least sensitive range, and set the level control to minimum. Set the equalizer output preset level to 0dB. Turn the equalizer input preset level up till distortion occurs. Advance the amplifier level control a bit and back off on the equalizer output preset level. Try variations on these settings in small increments until the lowest noise and distortion is obtained.

SYSTEMS WITH MULTIPLE EQUALIZERS AND ACTIVE CROSSEOVERS:

Set as above, but only boost the input level preset of the first processor in the signal path, set both the input and output level presets on the balance of the equipment to 0dB.

With more complex systems this process will take longer, but is well worth the effort.

TROUBLE SHOOTING GUIDE**GENERAL**

When a fault in the system is encountered, please check the following first:

- 1) All fuses.
- 2) All power and ground connections.
- 3) All speaker connections.
- 4) All RCA patch cords.
- 5) All remote turn on wires.
- 6) Adequate battery voltage at the equipment.

NO POWER LED

Check:

- 1) Remote turn on voltage.
- 2) Voltage on amplifier power conncter.
- 3) Fuse.

DIAGNOSTIC LED LIGHTS UP

- 1) Disconnect speaker and input RCA leads. Turn the amp off, wait five seconds and turn it back on. If The diagnostic LED is still lit, the amplifier could be faulty.
- 2) If the LED does not light up again, and the power LED is on, the amplifier is good, and the fault is in the speaker or RCA input leads.

NO SOUND

If the power LED is on, check the loudspeakers and that an input signal is present. Also, check that level controls are set correctly.

DISTORTED SOUND

- 1) Check the signal source. Substitute the head unit and see if that cures the problem.
- 2) See that levels are set correctly for level matching.

AMPLIFIER CYCLES OFF AND BACK ON

See if the amplifier is excessively hot. If it is, provide adequate air flow or force cool it with a fan. Check that the impedance is not less than the rated minimum for that model.

EXCESSIVE BACKGROUND NOISE (HISS)

- 1) Disconnect the input RCA cords. If the noise is still audible, the fault is from this point on. If not, check the previous piece of equipment.

- 2) Check that level matching controls are set properly.

EXCESSIVE ENGINE NOISE

- 1) Check for shared ground leads.
- 2) Check for speaker leads shorting to the car chassis.

CONTINUATION OF THE WARRANTY CONDITIONS

This warranty shall become null and void under the following circumstances:

- * Serial number removed or defaced.
- * Unit has been opened and worked on or modified by personell other than HIFONICS.
- * Electrical abuse, such as reversed power leads, operating the units below their rated impedances, improper connections, such as bad crimps or splices and twisted wires.
- * Mechanical abuse, such as water or acid damage, damaged speaker or RCA connectors or broken controls.
- * Painting or any other non factory finish on the heatsinks.