REFERENCE

604

Power Amplifier

OWNERS MANUAL AND INSTALLATION GUIDE

SOUNDSTREAM®

TECHNOLOGIES

CONGRA TULATIONS!

You now own the REFERENCE604 Amplifier, the product of an uncompromising design and engineering philosophy. Your Soundstream REFERENCE amplifier will outperform any other amplifier in the world.

To maximize the performance of your system, we recommend that you thoroughly acquaint yourself with its capabilities and features. Please retain this manual and your sales and installation receipts for future reference.

Soundstream amplifiers are the result of American craftsmanship and the highest quality control standards, and when properly installed, should provide you with many years of listening pleasure. Should your amplifier ever need service or replacement due to theft, please record the following information, which will help protect your investment.

Model and Serial # _____

Dealer's Name _____

Date of Purchase _____

Installation Shop _____

Installation Date _____

CAUTION!

Prolonged listening at high levels may result in hearing loss. Even though your new Soundstream REFERENCE604 sounds better than anything you've ever heard, exercise caution to prevent hearing damage.

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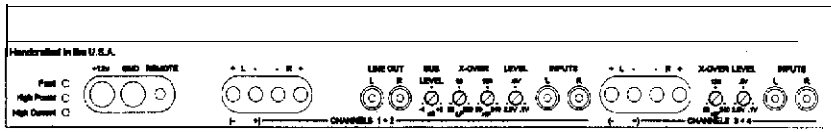
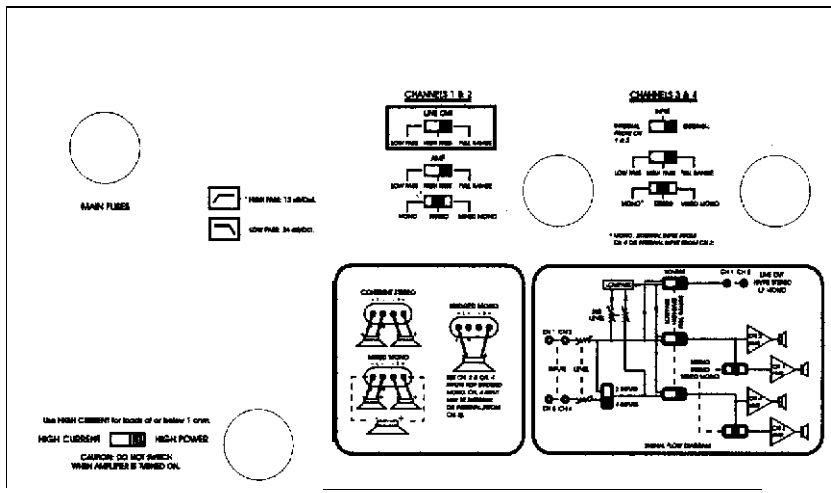
REFERENCE604





DESIGN *FEATURES*

- Uncompromising Design and Construction including mil-spec glass epoxy circuit boards and high current custom gold-plated solid brass connections that will accept up to 4 gauge power/ground wire.

. High Power/High Current Capability - Soundstream's exclusive circuitry permits customization of your amplifier to its particular application-High Current, for ultra-low impedance loads (multiple subwoofers, less than 2 ohms mono) or High Power, for higher impedance loads (2 ohms mono and up).

. Coherent Stereo/Mixed Mono selection for either "pure" stereo operation or mixed mono for simultaneous stereo and mono.

. **Chassisink™ Darlington** Power Array - Soundstream's "overbuilding" of the output section incorporates multiple output transistors instead of a few for faster, stronger power delivery The transistors are directly sandwiched between the circuit board and the heatsink in a design called Chassisink™ to ensure cool. efficient amplifier operation.

- **Staggered** Asymmetrical Electronic Crossover - Continuously variable crossovers with 12 dB/octave high pass and 24 dB/octave low pass slopes. Line outputs provide high or low pass or full range signal.

. **PowerGrid** Power Supply Design -All power supply components have the shortest current path possible, connected by thick, wide PCB traces, which ensures rapid, high current delivery. The entire power supply is isolated on one side of the circuit board while the audio stage is located opposite it, guaranteeing minimal noise.

. Ultra-Low ESR Capacitance Bank - Multiple input capacitors are used to provide low ESR (Equivalent Series Resistance), which means more power, faster.

. **Smart Thermal** Rollback - Most amplifiers shut off when they get too hot. In the unlikely event the REFERENCE604 reaches 65" C, it will gradually roll back its average power (without affecting the dynamics). Once the amplifier has cooled off, it returns to full power output. If overheating should continue, a second thermal sensing protection circuit will shut off the amplifier if the heatsink reaches 95" C.

. Unregulated Power Supply - 4 ohm power ratings are measured at 12 volts, which means substantially greater output in the real world when the vehicle is running, where voltages range from 13.2 to 14.4 volts. Dynamic capability of the unregulated power supply is vastly greater than that of a tightly regulated power supply.

. Fault Monitor LED on the front panel notifies you of blown power supply fuses.

. Subwoofer Level Control - Separate adjustment of subwoofer signal from high pass signal for greater installation flexibility

. 1/2 ohm Drive Ability-The REFERENCE604 is designed to be stable at any load and is rated down to 1/2 ohm stereo (1 ohm mono).

. **Four Dual Discrete Class A Drive Stages - Over** six times the drive current of most amps, which guarantees maximum performance at all impedances.

- **Drive Delay™ Muted Turn-on/off Circuit - A** unique circuit which completely eliminates any amplifier-related turn-on/off noises.

. Flexible Input Sensitivity accepts voltages from 100 mV to 2.5 V. permitting maximum output with virtually any source unit.

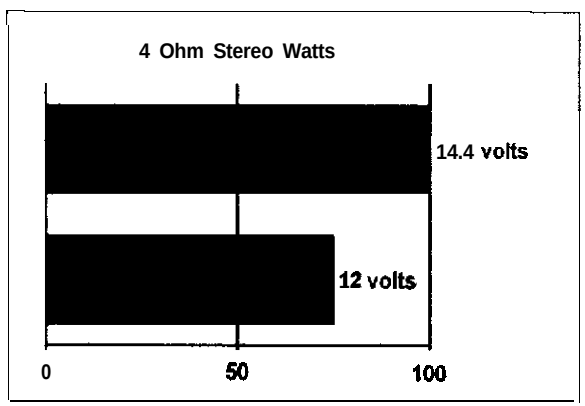
. Balanced Input Design (single-ended) for added immunity to noise caused by component and vehicle electrical system interaction.

REFERENCE POWER SUPPLY DESIGN

The REFERENCE604 employs an extremely efficient unregulated pulse-width modulated power supply. Like the rest of the REFERENCE amplifiers from Soundstream, the 604 is rated at 12 volts but is designed to take advantage of the additional voltage available when the vehicle is running. The two major advantages of the unregulated power supply are:

- increased dynamic power capabilities
- added continuous **power with higher** voltages (see chart below)

Because of the dynamic properties of most music, all audio components should be able to react accordingly. Thanks to their unregulated power supplies, the REFERENCE amplifiers can comfortably exceed their rated power for dynamic portions of the music.



4 ohm Power

75 watts x 4 @ 12 volts
***100 watts x 4* @ 14.4 volts**

INSTALLATION STEP 1

SETTING THE HIGH POWER/HIGH CURRENT SWITCH

The High Power/High Current switch **allows** the REFERENCE604 to be one of two types of amplifiers: either producing maximum power at higher impedances (perfect for satellites) or at lower impedances (usually with multiple **subwoofers).**

The circuit operates by selecting a set of power supply voltage rails best suited to your particular application. One is **a** higher voltage 'tap" optimized for high impedance applications while the other is lower voltage designed to provide more current. Unlike other amplifiers, Soundstream's REFERENCE amplifiers can be configured to drive virtually any impedance *and* make maximum power!

To determine the setting for your application, follow the chart below:

	4 Ω stereo (8 Ω Bridged)	2 Ω stereo (4 Ω Bridged)	1 Ω Stereo (2 Ω Bridged)	1/2 Ω stereo (1Ω Bridged)
High Power Watts	75x4 (150 x 2)	125x4 (250 x 2)	150x4 (300 x 2)	n/a
High Current Watts	37.5 x 4 (75 x 2)	75x4 (150 x 2)	125x4 (250 x 2)	150x4 (300 x 2)

**NOTE: The High Power/High Current switch affects both* pairs *of* channels *of the REFERENCE604.*

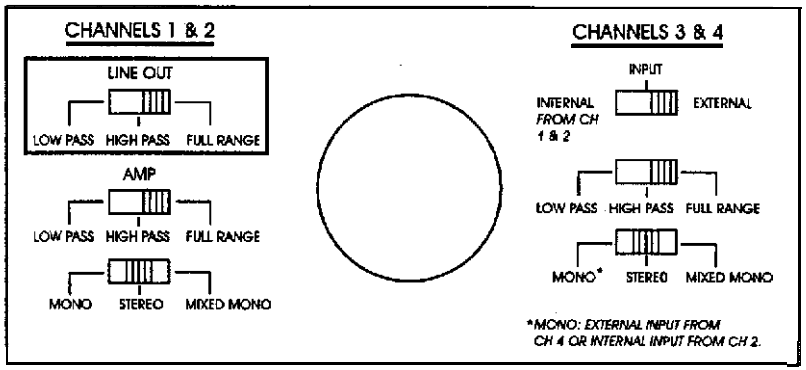
OTHER COMMENTS:
If you blow fuses with the REFERENCE604, switch to the High Current mode. If the problem persists, it is likely that the amplifier is seeing a dead short, either in the speaker wire or in the speaker itself. *Rectify the problem before blowing multiple fuses!*

INSTALLATION STEP 2

SETTING THE CROSSOVER MODES

The REFERENCE604 incorporates a sophisticated, fully adjustable electmnic crossover for each of its two pairs of channels, as well as its crossover outputs. The REFERENCE604 can drive a full system with a second amplifier without need of an outboard electmnic crossover.

Before installing the amplifier. make certain the switches on the bottom are set to the correct positions. Pages 16 - 21 contain six sample systems illustrating switch settings. After setting the switches, be sure to install the hole plugs included with the amplifier.



LOW PASS

The low pass crossover is used for sending only low frequency information to particular speakers (or crossover outputs). Activate the low pass crossover if you intend to drive subwoofers. Low pass signal is derived from all four inputs, allowing constant bass (low pass) with front to rear fading. You can later adjust the exact frequency from the front of the amplifier. For ease ofadjustment, there is one low pass setting for all channels (and *crossover* outputs) receiving low frequency information.

HIGH PASS

The high pass crossover is used for sending only midrange and high frequency information to particular speakers (or crossover outputs). Activate the high pass crossover if you intend to drive satellite or coaxial speakers in the system along with subwoofers. Even if your system does not include subwoofers, it may be helpful to activate the high pass crossover with smaller speakers to protect them from low frequency information. You can later adjust the exact frequency from the front of the amplifier. The high pass frequency for Channels 1 & 2 is adjusted separately from the high pass frequency for Channels 3 & 4.

***NOTE:** RCA signal output in high pass and full range is derived from Channels 1 & 2 input. In low pass, RCA signal output is summed from Channels, 1, 2, 3, & 4 input.*

INSTALLATION STEP 3

SELECTING INPUT MODES

The REFERENCE604 can be driven with either one or two pairs of stereo inputs. If your source unit has front and rear outputs, you can take advantage of its fading capability by driving the REFERENCE604 with two pairs of inputs. In addition, if you have another amplifier, you can drive it with the outputs of the REFERENCE604. The REFERENCE604 is capable of operating in a "pure" Coherent Stereo mode with identical left and right channels. or in a "mixed-mono" mode allowing you to operate each pair of channels in stereo (not Coherent Stereo) and mono simultaneously.

4 *CHANNEL OPERATION **WITH** 4 CHANNELS OF INPUT*

. Input to Channels 1 & 2 and set stereo switch to either "Coherent Stereo" or 'Mixed-Mono"

. Input to Channels 3 & 4 and set input switch to "3 & 4"; stereo stitch to either "Coherent Stereo' or 'Mixed-Mono"

4 *CHANNEL OPERATION **WITH** 2 CHANNELS OF INPUT*

- Input to Channels 1 & 2; set stereo switch to either "Coherent Stereo" or 'Mixed-Mono"

. Channels 3 & 4: set input switch to 'Internal From Ch 1 8 2"; stereo switch to either "Coherent Stereo" or "Mixed-Mono"

*BRIDGED 2 CHANNEL OPERATION **WITH** 2 CHANNELS OF INPUT*

. Input to Channel 2: set stereo switch to "Mono"

- Input to Channel 4: set input switch to "3 8 4"; stereo stitch to "Mono"

3 *CHANNEL OPERATION WITH 2 OR 3 CHANNELS OF INPUT*

Either half of the REFERENCE604 can be bridged mono while the other half operates in stereo.

'NOTE: When in "Mono'; only fhe right channel input is active. If your inputs to the amplifier are stereo, you can sef the stereo switch to "Mixed-Mono" and use both inputs. The amplifier will sum left and right to mono.

For system examples and diagrams, see pages 16 - 21.

INSTALLATION STEP 4

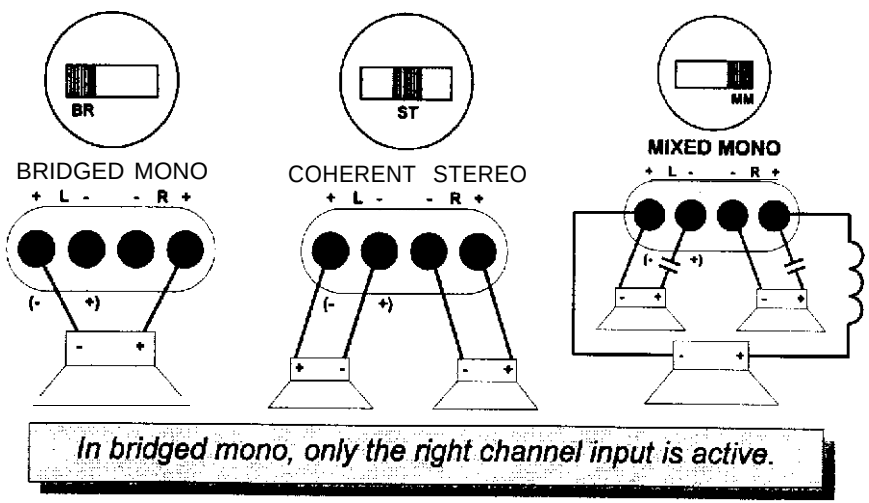
COHERENT STEREO/MIXED-MONO/BRIDGED MONO

The REFERENCE604 has the ability to operate in any of the following modes:

Coherent Stereo with identical left and right stereo channels for maximum fidelity. Best choice for satellite speakers. Use this mode unless Mixed-Mono is necessary.

Mixed-Mono in **order** to drive stereo and mono simultaneously; works well for center channels. It can be used anytime you need a summed mono channel. Somewhat sacrifices sonic accuracy as additional circuitry is introduced to one channel. ***In Mixed-Mono, the left channel is inverted; see*** **diagram** *below* ***or on the bottom of the amplifier.***

Bridged Mono for dedicated single channel operation: ideal for driving subwoofers. It is also used when large amounts of power are necessary for single speakers. In ***bridged mono, only the right channel input (per pair of channels) is active.***



NOTE: *If you intend to drive a REFERENCE amp in Mono but have stereo outputs from your crossover or source unit, you can put the switch in Mixed-Mono but follow the normal wiring for Bridged Mono.*

INSTALLATION STEP 5

WIRING

POWER AND GROUND

To assure maximum output from your REFERENCE604, use high quality. low-loss power and ground cables. The REFERENCE604 will accept up to 4 gauge power and ground cables. Using a 4 gauge cable is ideal, however, 6 gauge is acceptable when the amplifier is mounted near the power source. 4 gauge is capable ***of delivering more power to the*** amplifier, ***and the more power you get into the amp, the more you get out!*** Determine from the chart below the minimum gauge power and ground wire for your application.

	up to 10'	***up to 20'***
REFERENCE604	Soundstream Power40 or Power80 (4 or 8 ga.)	Soundstream Power40 (4 ga.)

CIRCUIT BREAKERS/FUSES

EXTERNAL

Like all car audio amplifiers, the REFERENCE604 must be fused near the battery. A fuse or circuit breaker must be located within **18"** of the battery. This will prevent a fire in the event of a shorted cable. The value of the circuit breaker or fuse should be 70 - 100 amps.

INTERNAL

The REFERENCE604 is fused internally with two 30 amp automotive-type fuses. In the event of blown power supply fuses, the "Fault" indicator on the front panel will light. The fuses are accessible via a plastic plug on the bottom of the amplifier. Never replace the fuses **with** a higher value than what is supplied. ***This may result in amplifier damage and will*** void the ***warranty!***

REMOTE TURN-ON

Connect the 'Remote" to the turn-on lead from the source unit. When +12 volts is received, the amplifier will turn on.

SIGNAL CABLE

Depending on your application, you may use one or two pairs of signal cables to drive your REFERENCE604. Use a high-quality cable that will be easy to install and has minimal signal loss to guarantee optimum performance. Soundstream's DL·1 and SL·1 are ideal.

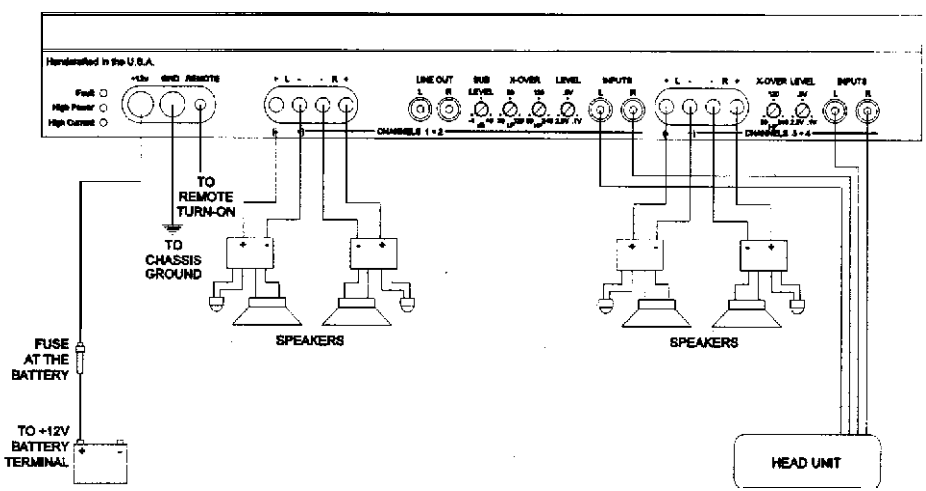
(Continued on page 12)

(Continued from page 11)

SPEAKER CABLE

The REFERENCE604 will accept up to 6 gauge speaker cable. Use a high quality, flexible, multi-strand cable for best performance and longevity. Soundstream Speaker120 & 160 (12 and 16 gauge) are ideal.

WIRING DIAGRAM



INSTALLATION STEP 6

INSTALLATION AND MOUNTING

1. AMPLIFIER LOCATION

The REFERENCE604 employs highly efficient circuitry and a unique Chassisink™ design to maintain lower operating temperatures. Additional cooling may be required if the amplifier is located in a tightly confined area or when driving especially low impedance loads at extremely high levels.

When mounting the amplifier, it should be securely mounted to either a panel in the vehicle or an amp board or rack that is securely mounted to the vehicle. The mounting location should be either in the passenger compartment or in the trunk of the vehicle, away from moisture, stray or moving objects, and major electrical components. To provide adequate ventilation, mount the amplifier so that there are at least two inches of freely circulating air above and to the sides of it.

2. SWITCHES

Set High Power/High Current, Input Switches, and Crossover stitches to the appropriate positions (see pages 7 - 10). After setting the switches, be sure to install the hole plugs included with the amplifier.

3. MOUNTING THE AMPLIFIER

a. Using the amplifier as a template, mark the mounting surface.

b. Remove the amplifier and drill the holes.

c. Mount the amplifier to the surface using the provided hardware.

4. WIRING

a. Route and connect the audio signal and remote turn-on cables to the amplifier from the source unit.

b. **Carefully run the positive cable** from the amplifier **to a fuse or circuit breaker within 18" of the battery.**

c. Connect the fuse or circuit breaker to the battery Leave the circuit breaker off or the fuse out until everything is bolted down.

d. Secure the ground cable to a solid chassis ground on the vehicle. It may be necessary to sand paint down to raw metal for a good connection.

e. Double check each and every connection!

f. Re-connect the fuse or circuit breaker.

5. POWER UP

Power up the system and look at the green and red LEDs, depending on the configuration. one should be lit. There may be a 2 -3 second delay from the time the the source unit is turned on to the time that the LED on the amp turns on. which is normal.. Once the amplifier power LED is on and the source unit is playing, you should have sound coming from the speakers.

INSTALLATION STEP 7

LEVEL SETTING

The input levels are adjusted by means of the input level controls located on the front of the amplifier. This is a unique dual-stage circuit that adjusts both level and gain. This topology maintains better Signal to Noise ratios even with sources with minimal output.

In the ideal situation, all components in the audio system reach maximum undistorted output at the same time. The reason for this is because an amplifier will only make what comes into it bigger. So, if you send it a distorted signal from the head unit, it is going to amplify distorted information. The same thing holds true if an outboard processor or crossover begins to distort before you have maximum output from the amplifier. By setting all components to reach clipping at the same time, you can maximize the output of your system. For the REFERENCE604, follow the below procedure for the quickest, easiest means of setting the levels.

1. Turn the amp's input levels to minimum position (fully counterclockwise).
2. Set source unit volume to approximately 3/4 of full volume.
3. While playing dynamic source material, slowly increase the amplifier's input level until a near maximum undistorted level is heard in the system.

NOTE: Your *best combination of output level and Signal to Noise ratio will be achieved when the input levels are set between 500 mV and 2.5 V.*

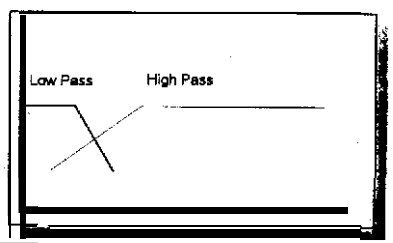
There is an additional level control on the REFERENCE604 for subwoofer level adjustment. The purpose of this control is to provide additional range for the subwoofer signal in relation to the high frequency information. This adjustment controls the level of any channels or outputs in the low pass mode.

***NOTE:** It may be necessary to adjust the balance between low and high pass levels after listening to the system. These settings are dependent upon personal preferences.*

INSTALLATION STEP 8

CROSSOVER ADJUSTMENTS

In most car audio installations, there is a tendency for a "midbass boom". Because of their interior dimensions, most cars will resonate or ring at these midbass frequencies. If we design the system so there is less musical information in this region. the final response is very smooth and natural sounding.



Staggered Asymmetrical Crossover
24 dB/octave low pass, 12 dB/octave high pass

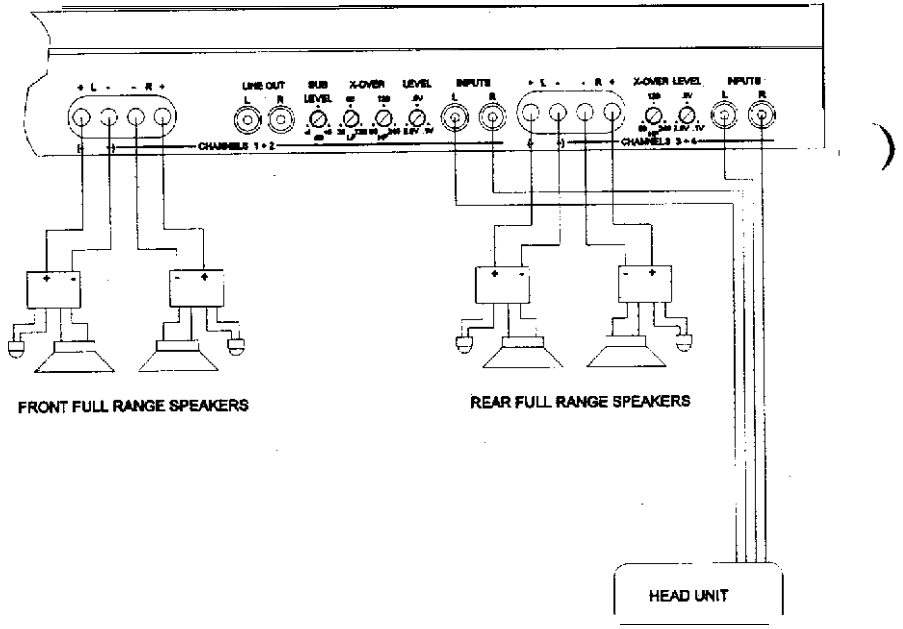
The REFERENCE604 incorporates a continuously variable staggered asymmetrical electronic crossover. The high and low pass portions of the crossover can be adjusted independent of one another. Follow the procedure below to adjust the crossover.

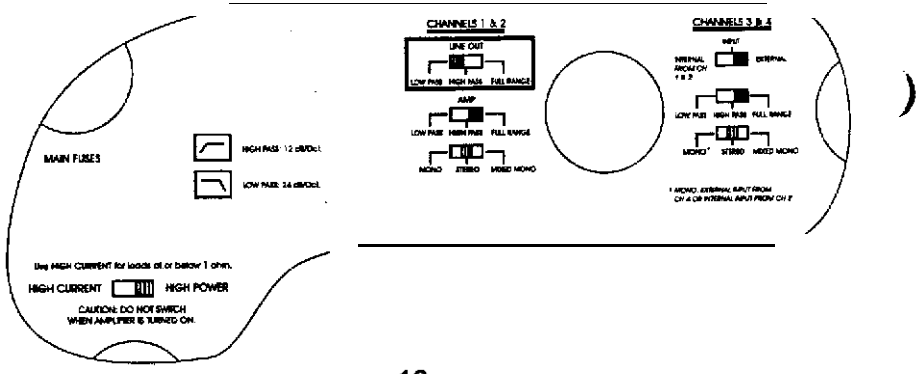
1. With the crossover activated, set the frequency adjustments to the 12 o'clock position.
2. While listening to music, adjust the high pass frequency dial for the high pass. Select a frequency high enough to prevent damage to the speakers, yet low enough that you are able to retain midbass in the front speakers.
3. Adjust the low pass frequency control in the same way as the high pass. This time, listen to the bass. You should find a setting that will give you a solid sound with minimum *boom" from resonating frequencies.

***NOTE:** You may find it necessary to readjust the crossover after listening to the system. The correct settings are a combination of the capabilities of the equipment and your listening preferences.*

SAMPLE SYSTEM #1

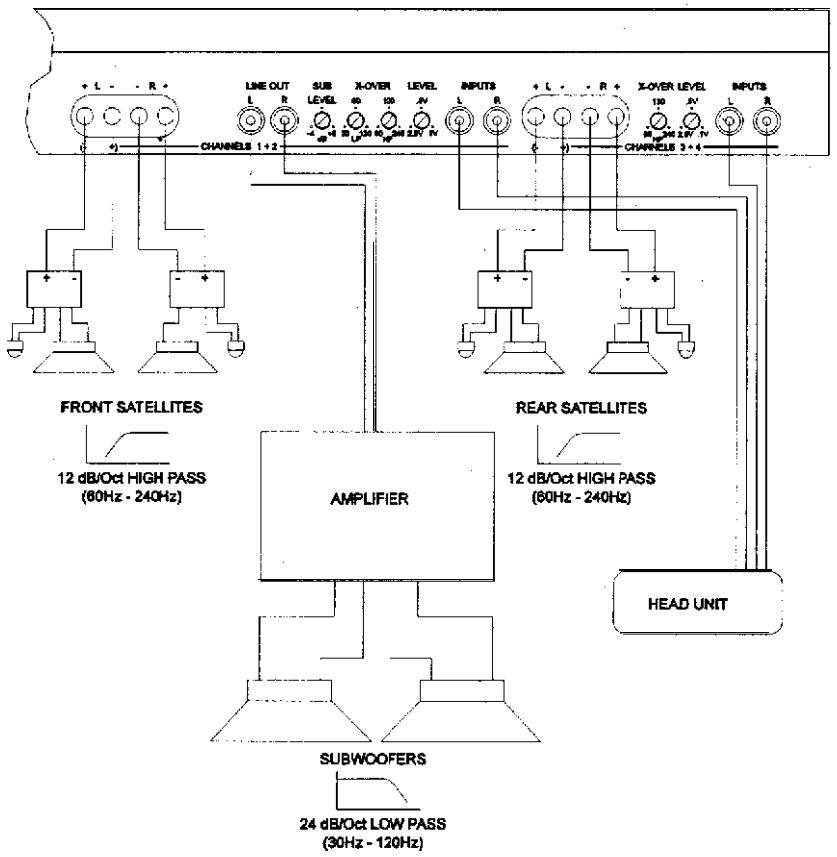
4 channels of input (front to rear fading)
4 channels of full range

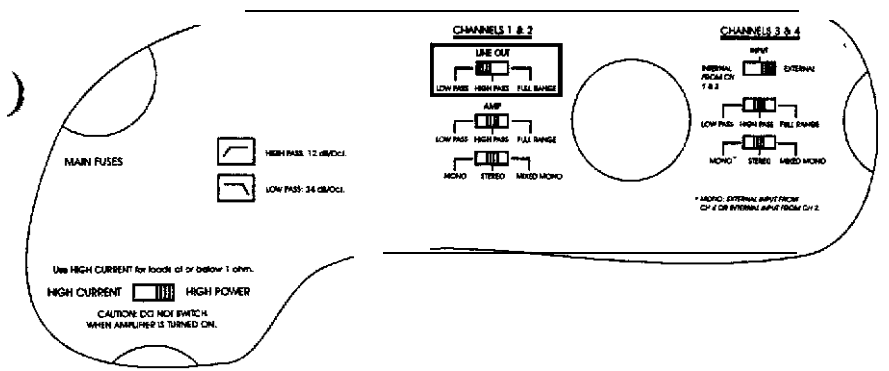




SAMPLE SYSTEM #2

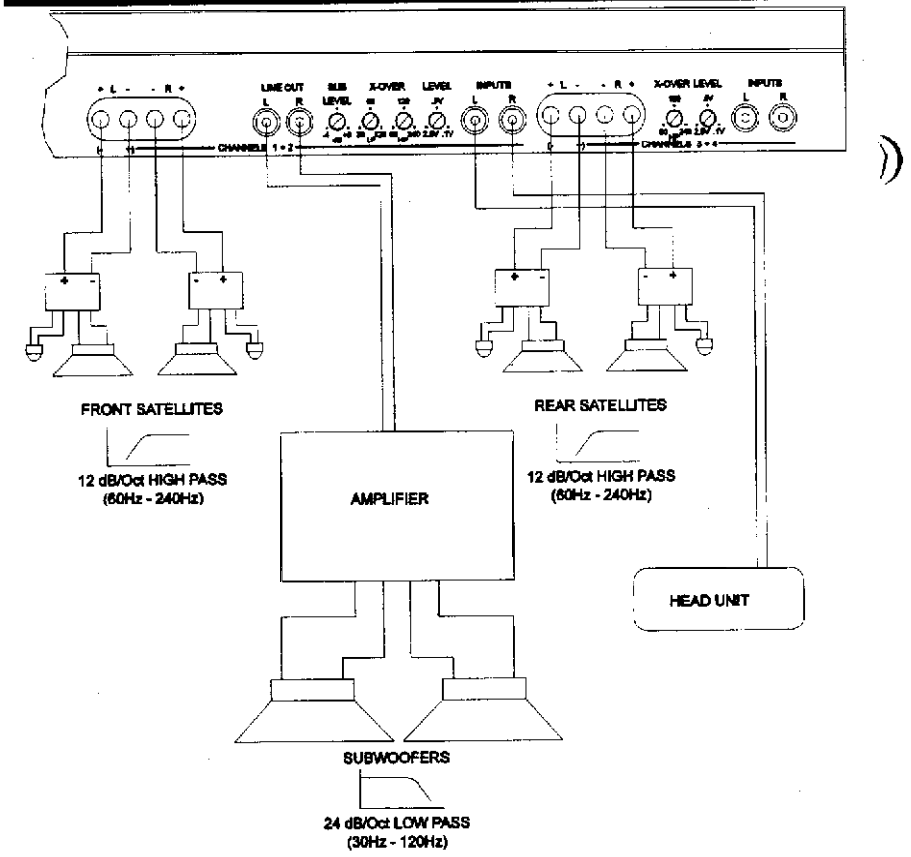
4 channels of input (front to rear fading with non-fading outputs)
4 channels of high pass; low pass outputs

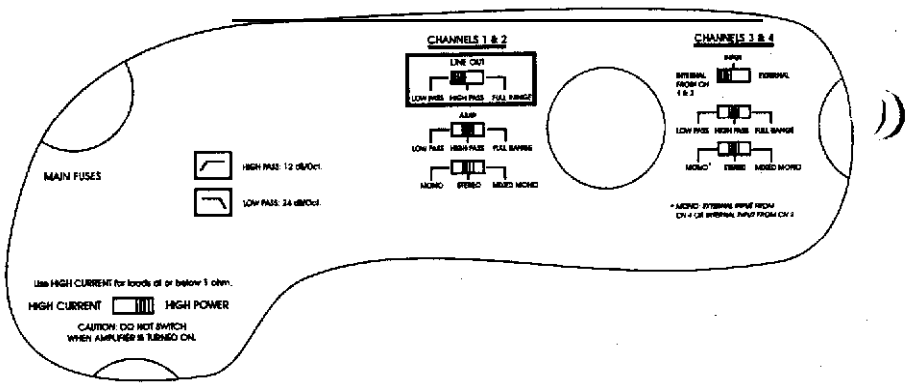




SAMPLE SYSTEM #3

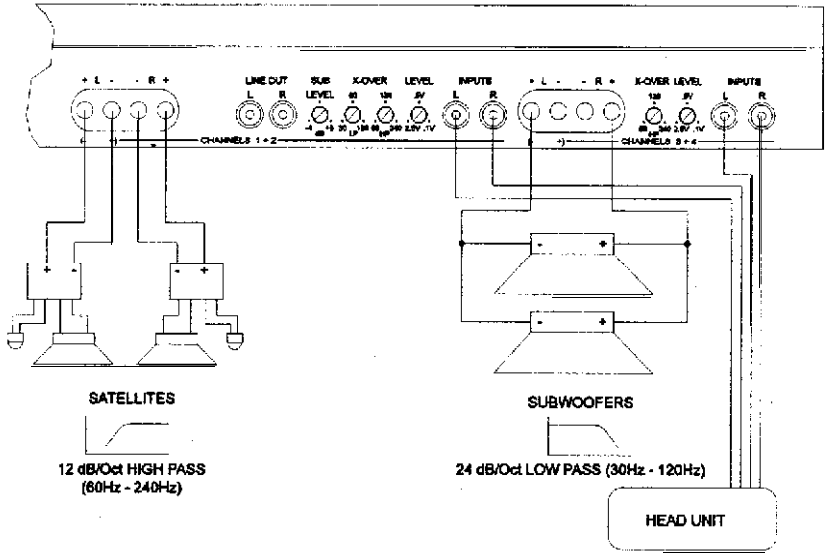
2 channels of input (non-fading)
4 channels of high pass; low pass outputs

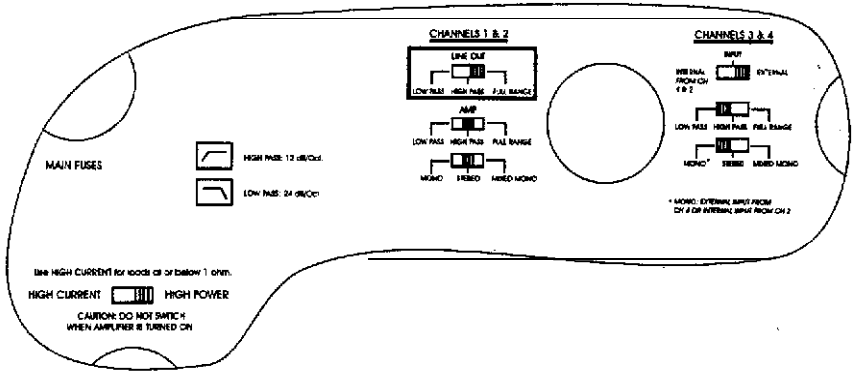




SAMPLE SYSTEM #4

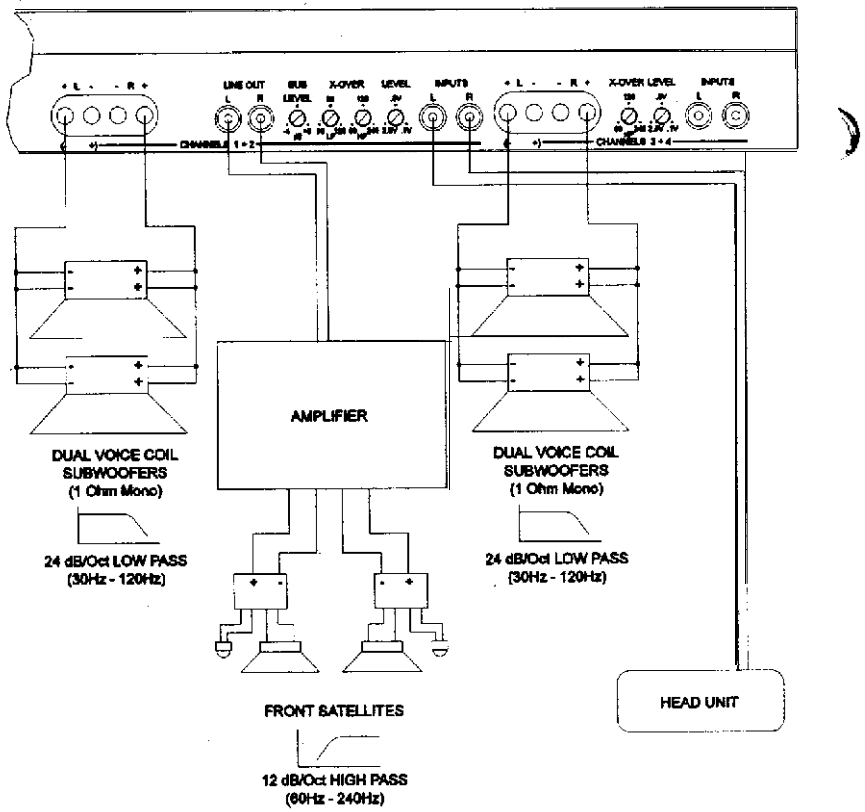
4 channels of input (high and low pass fading)
2 channels of high pass; 1 bridged channel of low pass

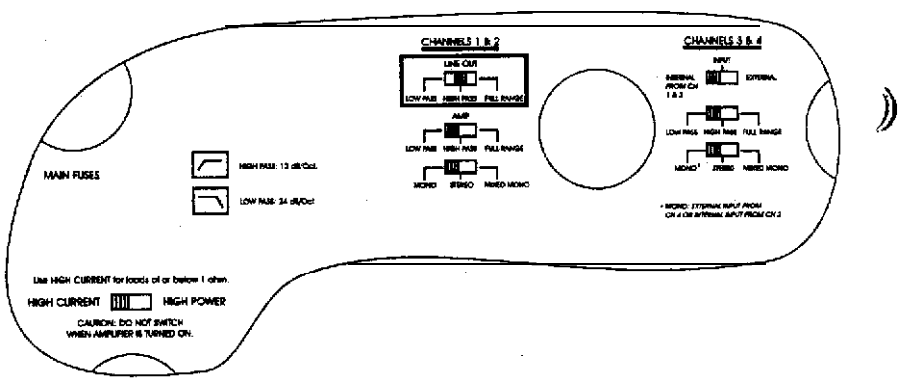




SAMPLE SYSTEM #5

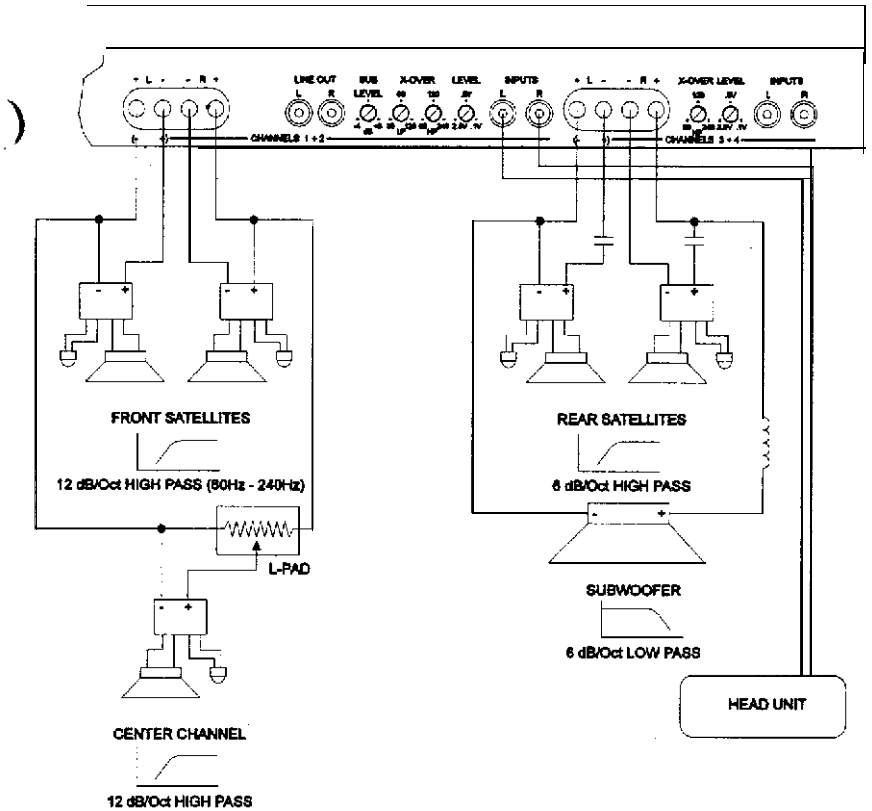
2 channels of input (non-fading)
2 bridged channels of low pass; high pass outputs

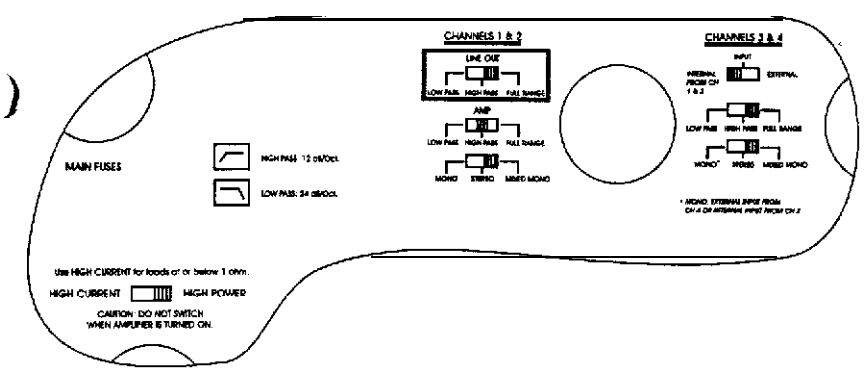




SAMPLE SYSTEM #6

2 channels of input (non-fading)
2 channels high pass in mixed mono with center channel
2 channels full range in mixed mono using passive crossovers





PROTECTION CIRCUITRY

Your REFERENCE604 is protected against both overheating and short circuits by means of the following circuitry:

- Main power supply fuses (2 at 30 amps each)
- Smart Power Supply Thermal Rollback activating at 65°C.
- A fail-safe thermal protection circuit activating at 95°C.

Your amplifier also incorporates an innovative Fault Diagnosis system that identifies blown power supply fuses when the "Fault" LED is illuminated.

NOTE: If you experience blown main power supply fuses, DO NOT increase values beyond the 30 amp (each) fuses! Doing so *will* void your *warranty* and may damage your *amplifier.*

TROUBLESHOOTING

PROBLEM	CAUSE
No sound and LEDs are not lit	• no power or ground at amp • no remote turn-on signal • blown fuse near battery
Fault LED is lit	• amp power supply fuse is blown or missing
Repeatedly blown amp fuse, frequent activation of Smart Power Supply Circuit	. check speaker configuration, amp may be in "High Power" mode, put amp into "High Current" mode if speaker load is less than 2 ohms (see p.7, "Setting High Power/High Current Switch") . speaker or leads may be shorted . verify adequate amplifier ventilation
no sound from channels 3 & 4 with 2 channels of input	. check input settings on bottom of amplifier-stitch should be set to inputs "1 & 2

SERVICE

Your Soundstream REFERENCE amplifier is protected by a limited warranty. Please read the enclosed warranty card.

SPECIFICATIONS

POWER OUTPUT

	4 Ω stereo (8 Ω Bridged)	2 Ω stereo (4 Ω Bridged)	1 Ω Stereo (2 Ω Bridged)	112 Ω stereo (1Ω Bridged)
High Power Watts	75x4 (150x2)	125x4 (250 x 2)	150x4 (300 x 2)	n/a
High Current Watts	37.5 x 4 (75 x 2)	75x4 (150x2)	125x4 (250 x 2)	150x4 (300 x 2)

THD	<0.1%
Signal to Noise	>100 dB
Frequency Response	20 Hz to 20 kHz +I- 0.5 dB
Bandwidth	15 Hz to 50 kHz
Stereo Separation	>90 dB
Damping	>200
Input Sensitivity	100 mV - 2.5 V
Input Impedance	12 k ohms
Crossover Output	400 mV output w/ 100 mV input (+12 dB)

CROSSOVER SPECIFICATIONS

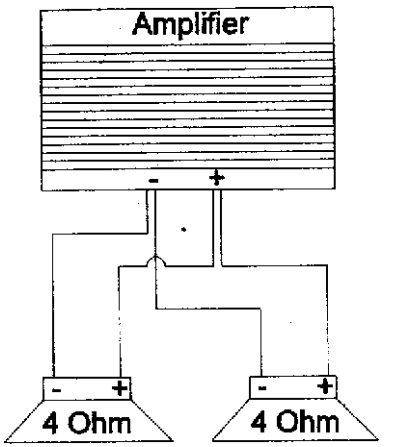
(same for channels 1 & 2, 3 & 4, and outputs)

High Pass: 12 dB/octave, continuously variable from 60 - 240 Hz
Low Pass: 24 dB/octave, continuously variable from 30 - 120 Hz

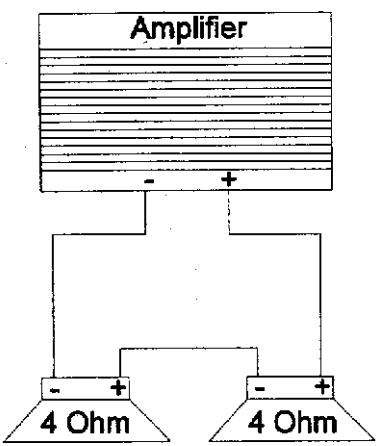
DIMENSIONS

15 1/4" W x 9 1/2" D x 2 1/4" H

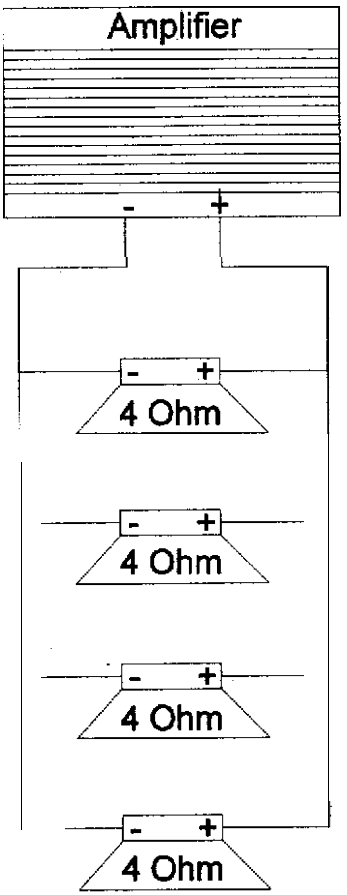
SPEAKER WIRING CONFIGURATIONS



*2-4 ohm woofers in **parallel** = 2 ohms*



2-4** ohm woofers in series = **8 ohms



4-4 ohm *woofers in parallel* = *1 ohm*

SOUNDSTREAM®

T E C H N O L O G I E S

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