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REFERENCE

300sx

Power Amplifier

OWNERS MANUAL  
AND  
INSTALLATION GUIDE

**SOUNDSTREAM**<sup>®</sup>

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

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**SOUNDSTREAM**<sup>®</sup>

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

## CONGRATULATIONS!

You now own **the** REFERENCE 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 **will** 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 \_\_\_\_\_

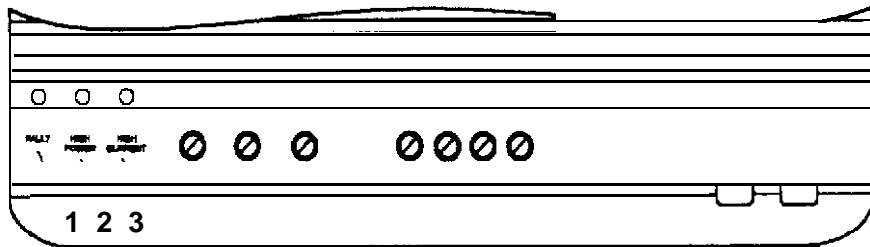
Installation Date \_\_\_\_\_

## DESIGN FEATURES

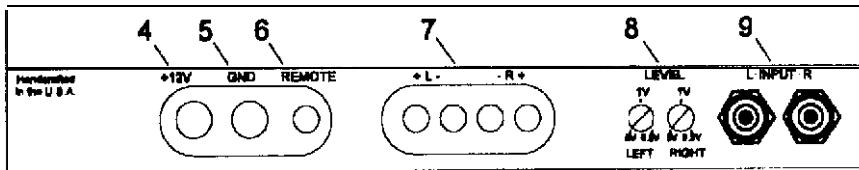
- Uncompromising Design and Construction - including **mil-spec** glass epoxy circuit boards and high **current** custom gold-plated solid brass connections that will accept up to 4 gauge power/ground wire.
- High **Power/High Current Capability** - Soundstream's exclusive circuit which permits customization of your amplifier to its particular application-high current, low impedance loads (multiple subwoofers, less than 2 ohms mono) or High Power, 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** sandwiched between the circuit board and **the heatsink** in a design called **Chassisink™** to ensure cool, efficient amplifier operation.
- **PowerGrid Power** Supply Design - **All** power supply components are located near one another, 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 small input power capacitors are **used** to provide a lower ESR (Equivalent Series Resistance), which means more power *in and out* faster.
- **Smart Thermal** Rollback - Most amplifiers **shut** off when they get too hot. In the unlikely event the REFERENCE300sx amplifier reaches 85° 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, meaning substantially greater **output** in the real world when the vehicle is running, where voltages range from 13.2 to 14.4 volts.
- **Fault** Monitor LED - on **the** top panel notifies you of blown power supply fuses.
- **1/2 ohm Drive Ability** -The REFERENCE amplifiers are designed to drive virtually any load-all the way down to 1/2 ohm stereo (1 ohm mono).
- Dual Discrete Class A Drive Stages - Over six times the drive current of most amps, which maintains **performance** into low impedance loads.
- 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 200 mV to 5.0 V, permitting maximum output from the amplifier with virtually any source.
- Differential Balanced input Design -for **added** immunity to noise caused by component and vehicle electrical system interaction when using **unbalanced** RCA inputs.

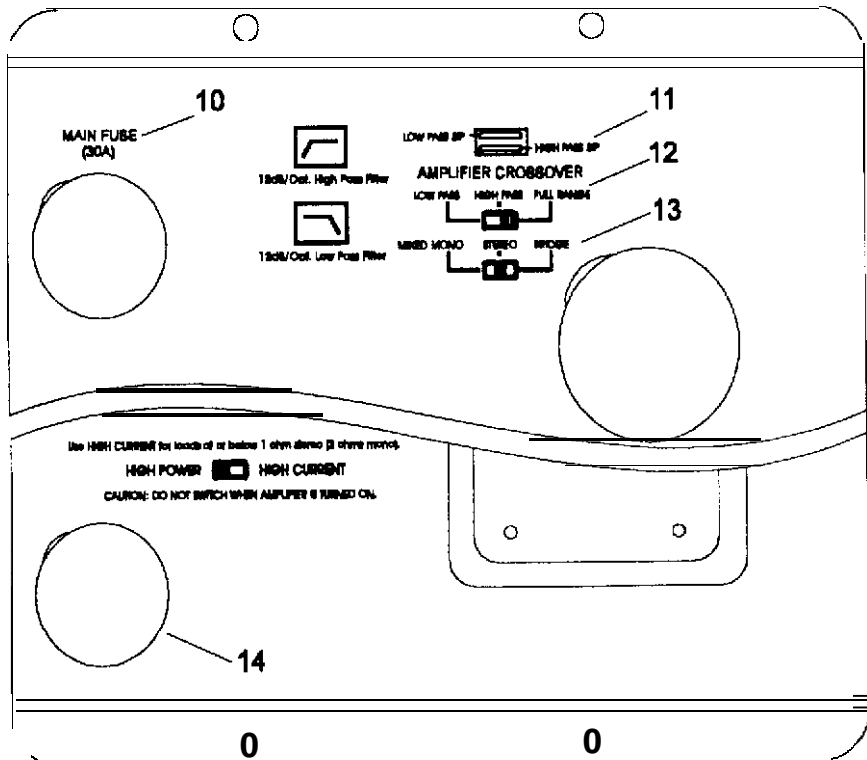
# Reference300sx



TOP VIEW (PARTIAL)



FRONT VIEW



BOTTOM VIEW (PARTIAL)

## Key to Callouts

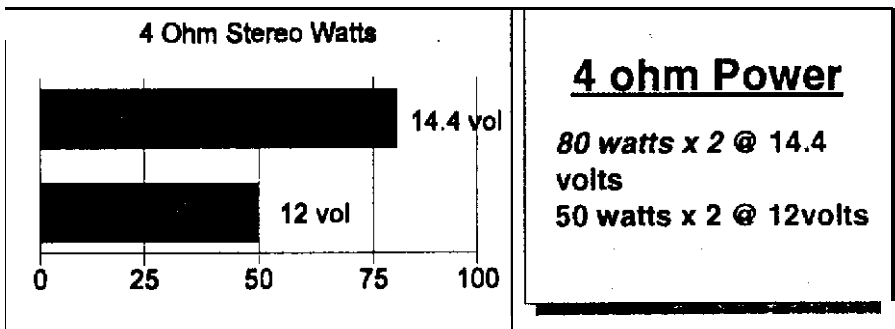
1. Fault LED - Indicates a blown fuse.
2. High Power LED - Indicates amplifier power on in "High Power" mode.
3. High Current LED - Indicates amplifier power on in "High Current" mode.
4. **+12V** - Connect to a fuse or circuit breaker, then to the battery's positive post.
5. **GND** - Main ground connection. Bolt to a clean chassis ground in the vehicle.
6. REM - Remote turn-on input from the head unit. Accepts +12V.
7. Speaker Output Connections - Left and right channels.
8. Input Level - independent Left and Right channel input level controls.
9. Inputs - Right and left channel RCA (Differential Balanced ) inputs; only right channel input is used in "Mono" mode.
10. Main Fuse-Main power supply fuse. **Replace only with the same value fuse.**
11. Crossover **S.I.P.s** -Crossover frequency settings for the amplifier. See page 9 for more details.
12. Amplifier Crossover - Select high pass, low pass or full range amplifier operation.
13. Mixed Mono/Stereo/Bridge - Select "Bridge" for bridged mono operation (use right channel input). Select "Stereo" for coherent stereo operation. Select "Mixed Mono" for simultaneous stereo / bridged mono operation.
14. High Power / High Current Switch - Use HIGH CURRENT for loads at or below 1 ohm stereo (2 ohms mono). **CAUTION: DO NOT SWITCH WHEN AMPLIFIER IS TURNED ON.**

## REFERENCE POWER SUPPLY DESIGN

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

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

Because of the dynamic properties of most music, all audiocomponents 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.

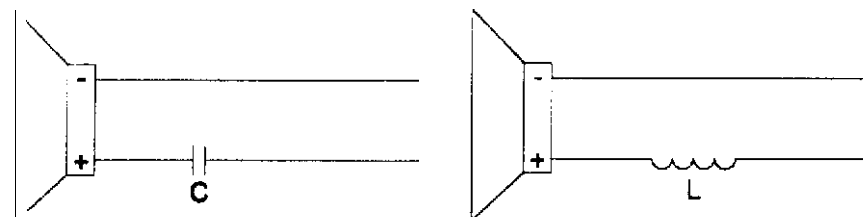


## PASSIVE AND ELECTRONIC CROSSOVERS

Your REFERENCE amplifier is unique in its ability to switch between Coherent Stereo™, Bridged Mono, and Mixed Mono output mode. The REFERENCE amplifiers are capable of driving a complete subwoofer and satellite system in the Mixed Mono configuration. However, for lowest distortion, maximum output, and best sound quality, we recommend that you use an electronic crossover and multiple channels of amplification.

If a single REFERENCE amplifier is to drive a subwoofer and satellite system, passive high and low pass crossovers will be necessary. Use the charts on pages 7 and 8 to determine the values of the crossover components.

## 6 dB/OCTA VE PASSIVE CROSSOVER CHART



6 dB/octave high pass

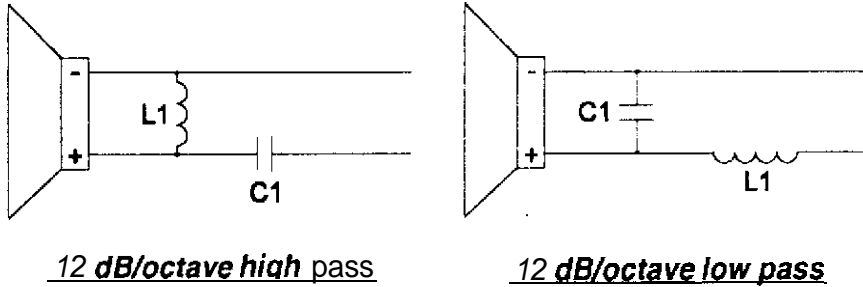
6 dB/octave low pass

### KEY

L = high quality (DCR < 1 ohm) inductor/coil  
 C = non-polarized 50 v (or greater) capacitor

FREQ.	2 ohms		4 ohms		8 ohms	
	L	C	L	C	L	C
80 Hz	4.1 mH	1000 µF	8.2 mH	500 µF	16 mH	250 µF
100 Hz	3.1 mH	800 µF	6.2 mH	400 µF	12 mH	200 µF
130 Hz	2.4 mH	600 µF	4.7 mH	300 µF	10 mH	150 µF
200 Hz	1.6 mH	400 µF	3.3 mH	200 µF	6.8 mH	100 µF
260 Hz	1.2 mH	300 µF	2.4 mH	150 µF	4.7 mH	75 µF
400 Hz	0.8 mH	200 µF	1.6 mH	100 µF	3.3 mH	50 µF
600 Hz	0.5 mH	136 µF	1.0 mH	68 µF	2.0 mH	33 µF
800 Hz	0.41 mH	100 µF	0.82 mH	50 µF	1.6 mH	26 µF
1000 Hz	0.31 mH	78 µF	0.62 mH	39 µF	1.2 mH	20 µF
1200 Hz	0.25 mH	66 µF	0.51 mH	33 µF	1.0 mH	16 µF
1800 Hz	0.16 mH	44 µF	0.33 mH	22 µF	0.68 mH	10 µF
4000 Hz	0.08 mH	20 µF	0.16 mH	10 µF	0.33 mH	5 µF

## 12 dB/OCTAVE PASSIVE CROSSOVER CHART

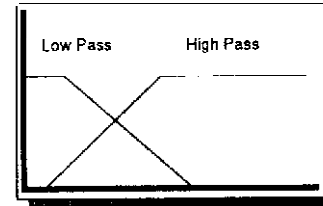


KEY  
 L1= high quality (DCR < 1 ohm) inductor/coil  
 C1 = non-polarized 50 v (or greater) capacitor

FREQ.	2 ohms		4 ohms		8 ohms	
	L1	C1	L1	C1	L1	C1
80 Hz	5.5 mH	680 μF	11 mH	330 μF	22 mH	180 μF
100 Hz	4.7 mH	560 μF	9.1 mH	270 μF	18 mH	150 μF
130 Hz	3.3 mH	400 μF	6.8 mH	200 μF	15 mH	100 μF
200 Hz	2.2 mH	300 μF	4.7 mH	150 μF	9.1 mH	75 μF
260 Hz	1.6 mH	200 μF	3.6 mH	100 μF	6.6 mH	50 μF
400 Hz	1.1 mH	150 μF	2.2 mH	68 μF	4.7 mH	33 μF
600 Hz	0.76 mH	100 μF	1.5 mH	47 μF	3.0 mH	26 μF
800 Hz	0.5 mH	68 μF	1.0 mH	33 μF	2.0 mH	15 μF
1000 Hz	0.47 mH	50 μF	0.9 mH	27 μF	1.6 mH	13 μF
1200 Hz	0.33 mH	44 μF	0.75 mH	22 μF	1.5 mH	11 μF
1800 Hz	0.27 mH	30 μF	0.50 mH	15 μF	1.0 mH	6.8 μF
4000 Hz	0.10 mH	15 μF	0.22 mH	6.8 μF	3.47 mH	3.3 μF

## 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.



The REFERENCE300sx incorporates a staggered electronic crossover. The high and low pass portions of the crossover can be set independent of one another.

Below is a chart of S.I.P. values which can be used for changing the factory preset crossover points for the REFERENCE300sx.

**Staggered Crossover**  
 12 dB/octave low pass,  
 12 dB/octave high pass

FREQUENCY	RESISTOR VALUE	COLOR CODE
53 Hz	30 K Ω	Green-Green
73 Hz	22 K Ω	Green-White
89 Hz	18 K Ω	
107 Hz	15 K Ω	Violet-Green
145 Hz	11 K Ω	Violet-White
195 Hz	8.2 K Ω	
286 Hz	5.6 K Ω	
465 Hz	3.3 K Ω	
800 Hz	2.0 K Ω	



NOTE: The following formula may be used to determine values in creating "custom" resistor packs. The frequency is equal to 1,600,000 divided by the individual resistor value, or  $1,600,000 / R \text{ ohms} = X \text{ Hz}$ . To make a custom S.I.P., use 4 identically valued resistors of 2% or tighter tolerance. See the drawing of the S.I.P. for more information.  
 Example:  $1,600,000 / 22,000 = 73 \text{ Hz}$

# INSTALLATION STEP 1

## SETTING THE HIGH POWER/HIGH CURRENTS WITCH

The High Power/High Current switch allows the REFERENCE amplifier to be one of two types of amps: 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!

POWER	4 Ω Stereo (8 Ω Bridged)	2 Ω Stereo (4 Ω Bridged)	1 Ω Stereo (2 Ω Bridged)	1/2 Ω Stereo (1 Ω Bridged)
	<i>REFERENCE300sx</i>			
High Power Watts	50x2 (100x1)	100x2 (200x1)	150x2 (300 x 1)	n/a
High Current Watts	25x2 (50x1)	50x2 (100x1)	100x2 (150x1)	150x2 (300 x 1)

### OTHER COMMENTS:

If you blow fuses with the REFERENCE amplifiers, 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

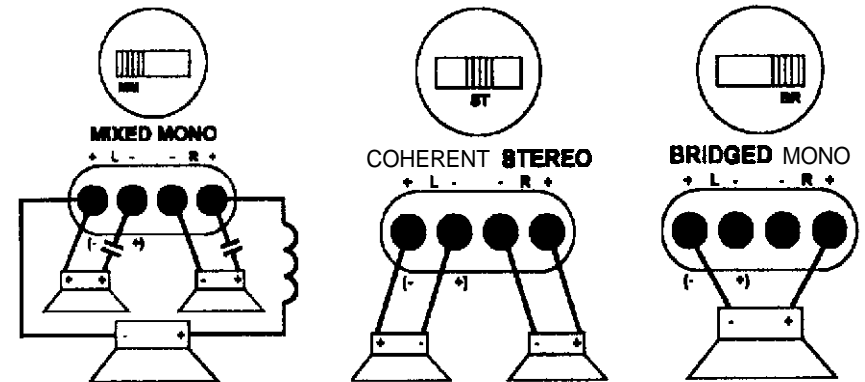
## COHERENT STEREO™ / MIXED-MONO / BRIDGED MONO

The REFERENCE amplifiers have the ability to operate in any one 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 is active.**



*In bridged mono, only the right channel input 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 3

## WIRING

### POWER AND GROUND

To ensure maximum output from your REFERENCE amplifier, use high quality, low-loss power and ground cables. The REFERENCE amplifiers will accept up to 4 gauge or 8 gauge power and ground cables. Determine from the chart below the minimum gauge power and ground wire for your application.

	up to 10'	up to 20'
REFERENCE300sx	Soundstream Power40 or Power80 (4 or 8 ga.)	Soundstream Power40 (4 ga.)

### CIRCUIT BREAKERS/FUSES

#### EXTERNAL

Like all audio components, the REFERENCE amplifiers 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. See the chart below to determine the correct fuse value.

#### INTERNAL

The REFERENCE amplifiers are fused with automotive-type fuses. In the event of blown power supply fuses, the "Fault" indicator on the top panel will light. The fuses are accessible via a plastic plug on the bottom of the amplifier. See the chart below to determine the fuse value. Never replace the fuses with a higher value than what is supplied. This may result in amplifier damage and will void the warranty!

### REFERENCE Amplifier Fuse Values

Amplifier	Amplifier Fuse	Battery Fuse
REFERENCE300sx	30 amp automotive	50 amp

### 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.

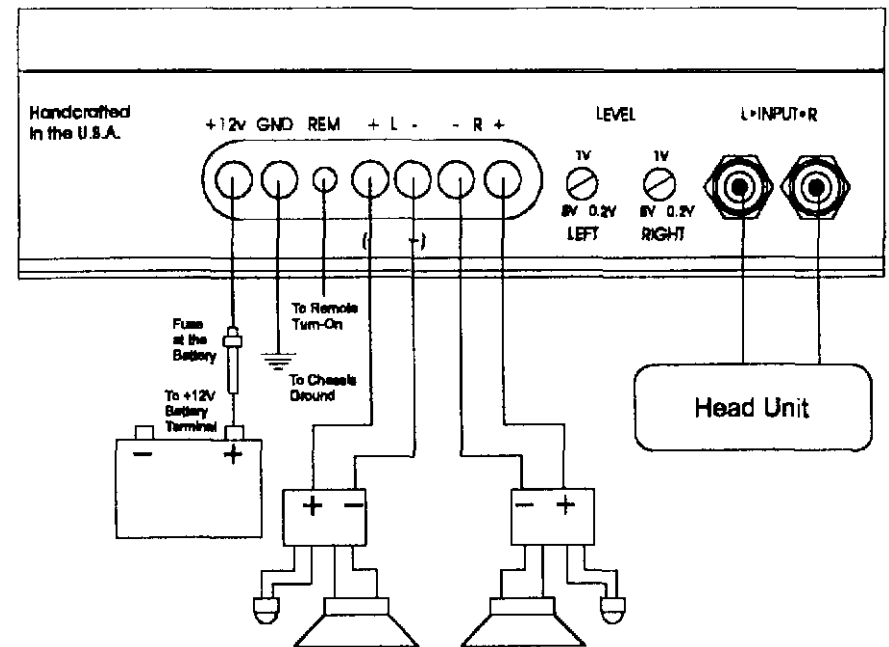
### SIGNAL CABLE

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.

### SPEAKER CABLE

The REFERENCE amplifiers will accept up to 8 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 4

## INSTALLATION AND MOUNTING

### 1. **AMPLIFIER LOCATION**

The REFERENCE amplifiers employ 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 and Coherent Stereo™/Mixed-Mono/Bridged Mono switches to the appropriate positions (see page 11).

### 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. **Run** 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 19" 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. Reconnect 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 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.

**NOTE:** There may be a sizable spark when connecting the power and ground lead to the amplifier for the first time. This is caused by current rushing into the amplifier to charge the power supply capacitors, and is completely normal.

# INSTALLATION STEP 5

## 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 when using sources with minimal output. In the ideal situation, all components in the audio system reach maximum undistorted output at the same time. The reason is because an amplifier will only make what comes into it bigger. So, if you send it a distorted signal from the head unit, the amplifier 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 REFERENCE amplifiers, follow the below procedure for the quickest, easiest means of setting the levels.

1. Turn the amp's input levels to minimum position (fully counter-clockwise).
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.

### **CAUTION!**

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

## **PROTECTION CIRCUITRY**

Your REFERENCE amplifier is protected against both overheating and short circuits by means of the following circuits:

- Main power supply fuses
- Circuit breakers
- Smart Power Supply Thermal Rollback activating at 85°C.
- A fail-safe thermal protection circuit activating at 95°C.

Your amplifier also incorporates an innovative Fault Diagnosis system that identifies a blown power supply fuse.

**NOTE:** If you experience blown main power supply fuses, **DO NOT** increase values beyond the original fuse value! Doing so will void your warranty and may damage your amplifier.



## AIRBASS™ ACCESSORY OPTION

Soundstream's new AIRBASS™ feature can be added to the REFERENCE300sx amplifier. This feature allows wireless RF remote control level adjustment of the amplifier, while the low pass filter on the amplifier's internal crossover is engaged.

**NOTE:** The AIRBASS™ accessory is intended to be used only while the REFERENCE300sx amplifier is driving subwoofers. When the AIRBASS™ accessory is added to a REFERENCE300sx amplifier, it automatically configures the amplifier into Bridged Mono mode. (The Coherent Stereo / Mixed Mono/Bridged Mono switch is bypassed.) Therefore, when using AIRBASS™, follow the Bridged Mono input and output wiring instructions. (See page 11.)

Installing AIRBASS™ involves removing the bottom plate of the amplifier, adding the AIRBASS™ circuit board, and flipping a switch. The switch is labeled on the amplifier's main circuit board. DO NOT set the AIRBASS™ switch to the 'IN' position unless the AIRBASS™ module has been added. DO NOT move the AIRBASS™ switch while the amplifier is 'ON'. Doing so may damage your speakers. (Please refer to the AIRBASS™ owner's / installation manual for more details.)

## TROUBLESHOOTING

<i>PROBLEM</i>	<i>CAUSE</i>
No sound and LEDs are not lit	<ul style="list-style-type: none"> <li>• no power or ground at amp</li> <li>• no remote turn-on signal</li> <li>• blown fuse near battery</li> </ul>
No sound and LEDs are lit, and AIRBASS™ is not installed	• AIRBASS™ switch is engaged
Fault LED is lit. Amp has power, but the Power LED is not lit	• amp power supply fuse is blown or missing
Repeatedly blown amp fuse, frequent activation of Smart Power Supply Circuit	<ul style="list-style-type: none"> <li>• 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.10, "Setting High Power/High current Switch")</li> <li>• speaker or leads may be shorted</li> <li>• verify adequate amplifier ventilation</li> </ul>

## SPECIFICATIONS

<i>POWER</i>	<i>4 Ω Stereo (8 Ω Bridged)</i>	<i>2 Ω Stereo (4 Ω Bridged)</i>	<i>1 Ω Stereo (2 Ω Bridged)</i>	<i>1/2 Ω Stereo (1 Ω Bridged)</i>
	<i>REFERENCE300sx</i>			
High Power Watts	50x2 (100 x 1)	100x2 (200 x 1)	150x2 (300 x 1)	n/a
High Current watts	25 x2 (50 x 1)	50 x 2 (100 x 1)	100x2 (150 x 1)	150x2 (300x 1)

THD	<0.1%
Signal to Noise	>100 dB
Frequency Response	20 Hz to 20 kHz ± 0.5 dB
Stereo Separation	>90 dB
Damping	>200
Input Sensitivity	200 mV - 5.0 V
Input Impedance	12K ohms

### **Crossover Specifications**

High Pass: 12 dB/octave, factory set at 150 Hz  
Low Pass: 12 dB/octave, factory set at 75 Hz

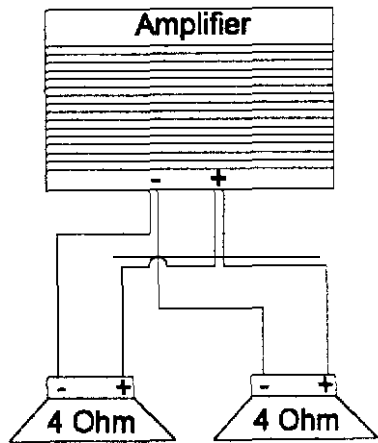
### **Dimensions (W x D x H)**

REFERENCE300sx: 8.625" x 9.8" x 2.25"

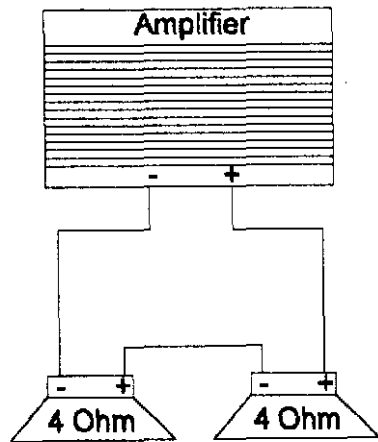
## SERVICE

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

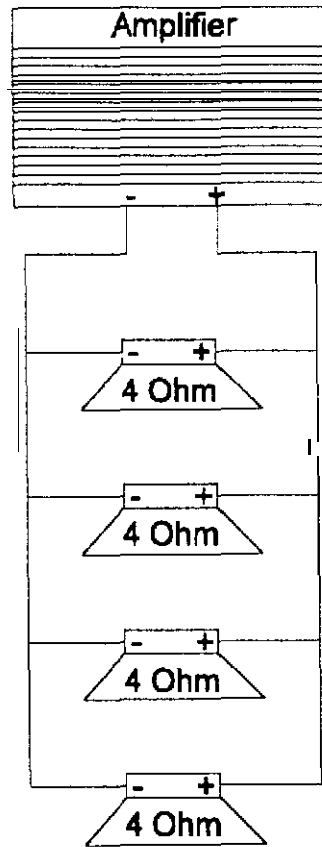
## SERIES AND PARALLEL WIRING



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



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



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