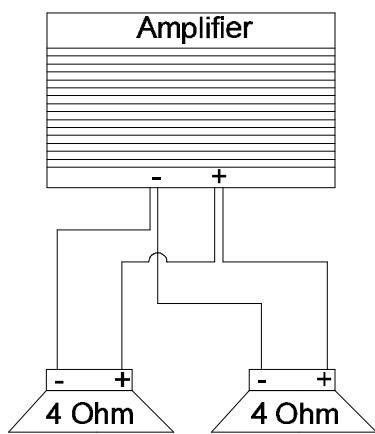
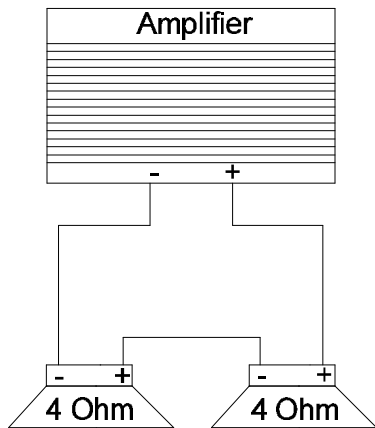


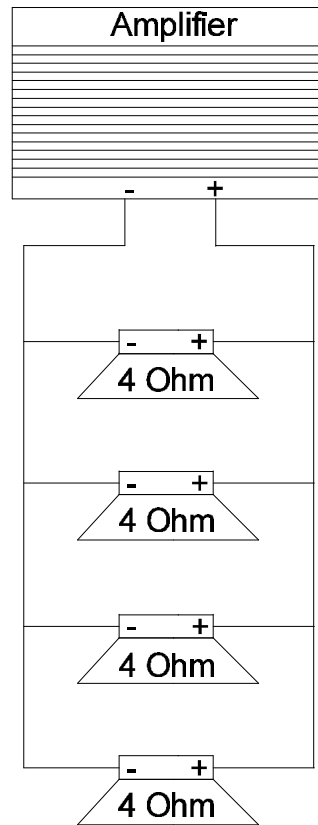
SERIES AND PARALLEL WIRING



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



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



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

REFERENCE 405s

5/3 Channel Power Amplifier

OWNERS MANUAL AND INSTALLATION GUIDE

SOUNDSTREAM TECHNOLOGIES
120 Blue Ravine Road Folsom California 95630 USA
ph 916.351.1288 fax 916.351.0414
rev B - 4.17.96

SOUNDSTREAM[®]
T E C H N O L O G I E S

CONGRATULATIONS!

You now own the **REFERENCE405s Amplifier**, the product of an uncompromising design and engineering philosophy. Your Soundstream REFERENCE405s 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 _____

CAUTION!

Prolonged listening at high levels may result in hearing loss. Even though your new Soundstream REFERENCE405s amplifier sounds better than anything you've ever heard, exercise caution to prevent hearing damage.

SPECIFICATIONS

REFERENCE405s - - Channels 1 & 2, 3 & 4

POWER	4 Ω Stereo (8 Ω Bridged) (12 Volts)	2 Ω Stereo (4 Ω Bridged)
Watts	25 Watts x 4	50 Watts x 4

REFERENCE405s - - Subwoofer Channel

POWER	4 Ω (12 Volts)	2 Ω	1 Ω	1/2 Ω
High Power	100 Watts	200 Watts	240 Watts	n/a
High Current	50 Watts	100 Watts	200 Watts	240 Watts

THD	<0.1%
Signal to Noise	>100 dB
Frequency Response (Ch's 1-4):	20 Hz to 20 kHz \pm 0.5 dB
Frequency Response (Sub Ch):	20 Hz to 400 Hz \pm 0.5 dB
Stereo Separation	>90 dB
Damping	>200
Input Sensitivity (Ch 1-4):	200 mV - 5.0 V
Input Sensitivity (Subwoofer Ch):	80 mV - 5.0 V
Input Impedance	12 k Ω

Crossover Specifications

High Pass (Channels 1 - 4):	12 dB/octave, continuously variable from 60 to 240 Hz
Low Pass (Subwoofer Channel):	24 dB/octave, continuously variable from 30 to 120 Hz

Dimensions

W x D x H:	15.0" x 9.8" x 2.25"
------------	----------------------

PROTECTION CIRCUITRY

Your REFERENCE405s amplifier is protected against both overheating and short circuits by means of the following circuits:

- Main power supply fuses
- Circuit breakers on channels 1,2,3 & 4
- 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

TROUBLESHOOTING

PROBLEM	CAUSE
No sound and LEDs are not lit	<ul style="list-style-type: none"> • no power or ground at amp • no remote turn-on signal • blown fuse near battery
Fault LED is lit	<ul style="list-style-type: none"> • 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"> • check speaker configuration, amp may be in "High Power" mode, put amp into "High Current" mode if speaker load is less than 1 ohm (see p.8, "Setting High Power/High Current Switch") • speaker or leads may be shorted • verify adequate amplifier ventilation
Channels 1,2,3 or 4 experiencing intermittent output	<ul style="list-style-type: none"> • activation of the internal circuit breakers. • check to make sure channels 1-4 are driving a 2 ohm per channel load or greater

SERVICE

Your Soundstream REFERENCE405s amplifier is protected by a limited warranty. Please read the enclosed warranty card.

TABLE OF CONTENTS

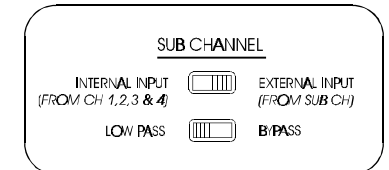
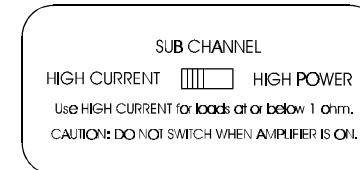
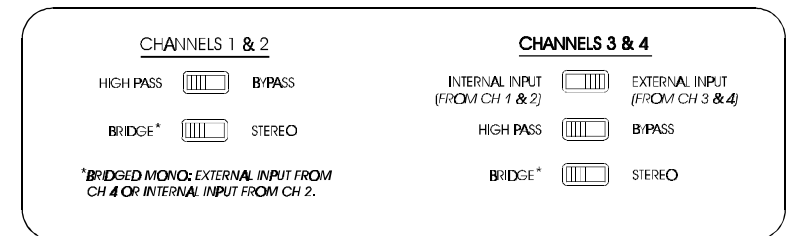
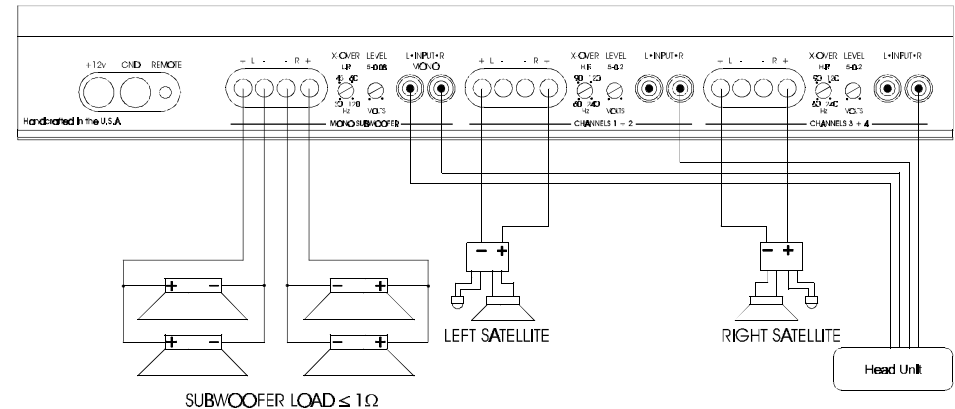
Design Features.....	4 - 5
REFERENCE405s Diagram.....	6 - 7
Setting the High Power / High Current Switch.....	8
Selecting Input Modes.....	9
Wiring & Wiring Diagram.....	10 - 11
Installation and Mounting	12
Level Setting	13
Crossover Adjustments	14
AIRBASS™.....	14
System Installation Diagrams.....	15 -17
Protection Circuitry	18
Troubleshooting	18
Service	18
Specifications.....	19

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 (Subwoofer Channel only)** - Soundstream's exclusive circuit which permits customization of your amplifier to its particular application—high current, low impedance loads (multiple subwoofers, less than 1 ohm) or High Power, higher impedance loads (1 ohm 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 REFERENCE405s 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.

SAMPLE SYSTEM #3

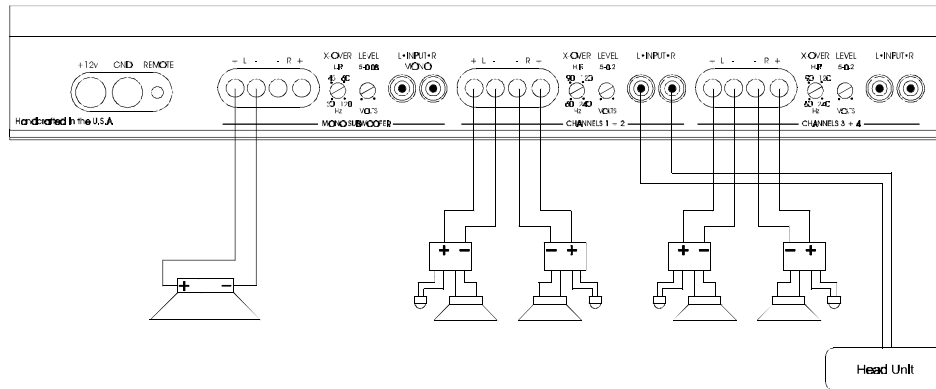
4 channels of input
3 channel operation with satellite to subwoofer fading
2 channels of bridged 2-way high pass, subwoofer channel in low pass



SAMPLE SYSTEM #2

2 channels of input

4 channels of 2-way high pass, subwoofer channel in low pass



CHANNELS 1 & 2

HIGH PASS ☐ BYPASS

BRIDGE* ☐ STEREO

*BRIDGED MONO: EXTERNAL INPUT FROM CH 4 OR INTERNAL INPUT FROM CH 2.

CHANNELS 3 & 4

INTERNAL INPUT ☐ EXTERNAL INPUT
(FROM CH 1 & 2) (FROM CH 3 & 4)

HIGH PASS ☐ BYPASS

BRIDGE* ☐ STEREO

SUB CHANNEL

HIGH CURRENT ☐ HIGH POWER

Use HIGH CURRENT for loads at or below 1 ohm.
CAUTION: DO NOT SWITCH WHEN AMPLIFIER IS ON.

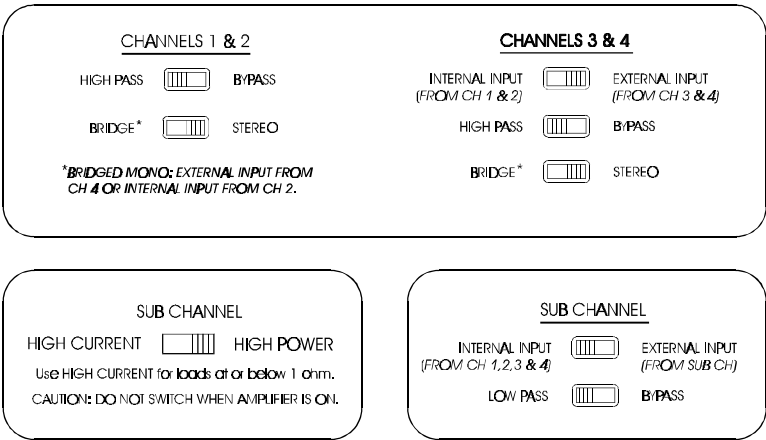
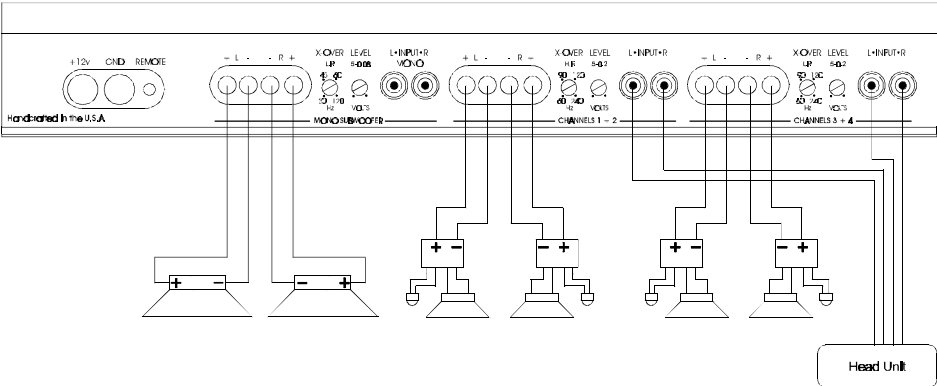
SUB CHANNEL

INTERNAL INPUT ☐ EXTERNAL INPUT
(FROM CH 1, 2, 3 & 4) (FROM SUB CH)

LOW PASS ☐ BYPASS

- **Fault Monitor LED** on the top panel notifies you of blown power supply fuses.
- **1/2 ohm Drive Ability (Subwoofer Channel only)** - The subwoofer channel on the REFERENCE405s amplifier is designed to drive virtually any load—all the way down to 1/2 ohm.
- **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 (80 mV to 5.0 V on the subwoofer channel), permitting maximum output from the amplifier with virtually any source unit.
- **Differential Balanced Input Design** for added immunity to noise caused by component and vehicle electrical system interaction.
- **A/RBASS™ Upgradable** - This feature allows RF wireless remote control level adjustment of the REFERENCE405s' subwoofer channel.

• • • • •

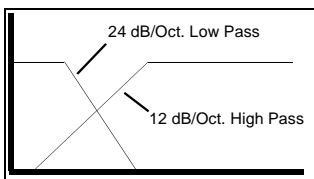


CROSSOVER ADJUSTMENTS

The REFERENCE405s amplifier incorporates an on-board staggered electronic crossover. No external electronic crossover is necessary. The high and low pass portions of the crossover can be set independently of one another.

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 high pass crossovers for Channels 1 & 2 and 3 & 4 are independently variable from 60 to 240 Hz at 12 dB/octave. The low pass crossover for the subwoofer channel is independently variable from 30 to 120 Hz at 24 dB/octave.

For initial crossover setup, try setting the low pass filter to approximately 60 Hz, and the high pass filters to approximately 100 Hz. Change the crossover



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

AIRBASS™ ACCESSORY OPTION

Soundstream's new AIRBASS™ feature can be added to the REFERENCE405s amplifier. This feature allows wireless RF remote control level adjustment of the REFERENCE405s' subwoofer channel.

NOTE: The AIRBASS™ accessory operates the subwoofer channel only. AIRBASS™ does not control the level of channels 1,2,3 & 4.

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.)

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** - Connected 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** - Mono subwoofer channel.
8. **Low Pass Crossover Adjustment Pot** - Subwoofer channel; crossover frequency setting for the internal low pass filter.
9. **Input Level** - Subwoofer channel level control.
10. **Inputs** - Right and left channel RCA inputs for the subwoofer channel.
11. **Speaker Output Connections** - Channels 1 & 2.
12. **High Pass Crossover Adjustment Pot** - Channels 1 & 2; crossover frequency setting for the internal high pass filter.
13. **Input Level** - Channels 1 & 2 level control.
14. **Inputs** - Right and left channel RCA inputs for channels 1 & 2.
15. **Speaker Output Connections** - Channel 3 & 4.
16. **High Pass Crossover Adjustment Pot** - Channels 3 & 4; crossover frequency setting for the internal high pass filter.
17. **Input Level** - Channels 3 & 4 level control.
18. **Inputs** - Right and left channel RCA inputs for channels 3 & 4.
19. **Subwoofer Channel Input Select** - Selectable inputs from internal (from channels 1 - 4) or external (from Subwoofer local RCA inputs).
20. **Subwoofer Channel Crossover Switch** - Select LOW PASS for use with the internal crossover, or BYPASS for use with an external crossover.
21. **Main Fuse** - Main power supply fuse.
22. **High Power / High Current Switch** - Subwoofer channel only.
23. **Channels 1 & 2 Crossover Switch** - Select HIGH PASS for use with the internal crossover, or BYPASS for use with an external crossover.
24. **Coherent Stereo™/Bridge Mono Switch** - Channels 1 & 2; Select "Bridge" for bridged mono operation (use right channel input). Select "Stereo" for coherent stereo operation.
25. **Channels 3 & 4 Input Select** - Selectable inputs from internal (from channels 1 & 2) or external (from channels 3 & 4 local RCA inputs).
26. **Channels 3 & 4 Crossover Switch** - Select HIGH PASS for use with the internal crossover, or BYPASS for use with an external crossover.
27. **Coherent Stereo™/Bridge Mono Switch** - Channels 3 & 4; Select "Bridge" for bridged mono operation (use right channel input). Select "Stereo" for coherent stereo operation.

INSTALLATION STEP 1

SETTING THE HIGH POWER / HIGH CURRENT SWITCH

The High Power/High Current switch allows the subwoofer channel of the REFERENCE405s amplifier to be one of two types of amps: either producing maximum power at higher impedances (one subwoofer) 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 REFERENCE405s amplifier can be configured to drive virtually any impedance *and* make maximum power!

REFERENCE405s Subwoofer Channel

POWER	4 Ω	2 Ω	1 Ω	1/2 Ω
High Power Watts	100 Watts	200 Watts	240 Watts	n/a
High Current Watts	50 Watts	100 Watts	200 Watts	240 Watts

OTHER COMMENTS:

If you blow fuses with the REFERENCE405s amplifier, 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 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 REFERENCE405s amplifier, 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.

NOTE: Even though the S/N ratio with low output sources is better with the REFERENCE405s amplifier than others, your best combination of output level and Signal to Noise ratio will be achieved when the input levels are set

INSTALLATION STEP 4

INSTALLATION AND MOUNTING

1. **AMPLIFIER LOCATION**

The REFERENCE405s amplifier 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 and Coherent Stereo™/Bridged Mono switches to the appropriate positions (see pages 8 - 9).

3. **MOUNTING THE AMPLIFIER**

- Using the amplifier as a template, mark the mounting surface.
- Remove the amplifier and drill the holes.
- Mount the amplifier to the surface using the provided hardware.

4. **WIRING**

- Run and connect the audio signal and remote turn-on cables to the amplifier from the source unit.
- Carefully run the positive cable from the amplifier to a fuse or circuit breaker within 18" of the battery.
- Connect the fuse or circuit breaker to the battery. Leave the circuit breaker off or the fuse out until everything is bolted down.
- 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.

NOTE: There may be a small 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.

- Double check each and every connection!
- 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

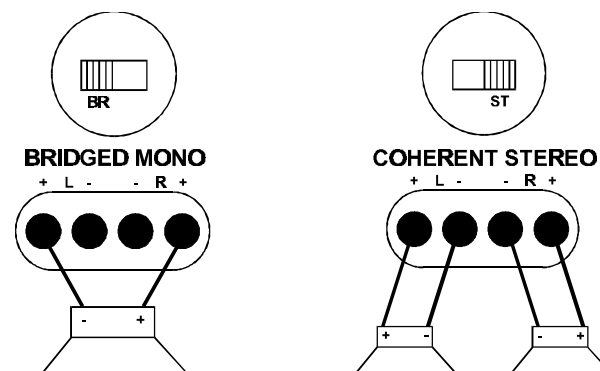
INSTALLATION STEP 2

COHERENT STEREO™ / BRIDGED MONO

The stereo channels (ch's 1,2,3 & 4) of the REFERENCE405s amplifier have the ability to operate in either of the following modes:

Coherent Stereo™ with identical left and right stereo channels for maximum fidelity.

Bridged Mono for dedicated single channel operation; ideal for using the REFERENCE405s in 3 channel mode.



Note: If you intend to drive your REFERENCE405s amplifier in 3 channel mode (channels 1 & 2 and 3 & 4 bridged mono), only the right channel inputs are active. (See SAMPLE SYSTEM #3 on page 17.)

INSTALLATION STEP 3

WIRING

POWER AND GROUND

To ensure maximum output from your REFERENCE405s amplifier, use high quality, low-loss power and ground cables. The REFERENCE405s amplifier will accept up to 4 gauge power and ground cables. Determine from the chart

	up to 10'	up to 20'
REFERENCE405s	Soundstream Power40 or Power80 (4 or 8 ga.)	Soundstream Power40 (4 ga.)

CIRCUIT BREAKERS/FUSES

EXTERNAL

Like all audio components, the REFERENCE405s amplifier 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 REFERENCE405s amplifier is 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!**

REFERENCE405s Amplifier Fuse Values

Amplifier	Amplifier Fuse	Battery Fuse
REFERENCE405s	(2) 20 amp automotive	50 amp

WIRING (cont.)

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 REFERENCE405s amplifier will accept up to 8 gauge speaker cable. Use a high quality, flexible, multi-strand cable for best performance and longevity.

WIRING DIAGRAM

