DX7

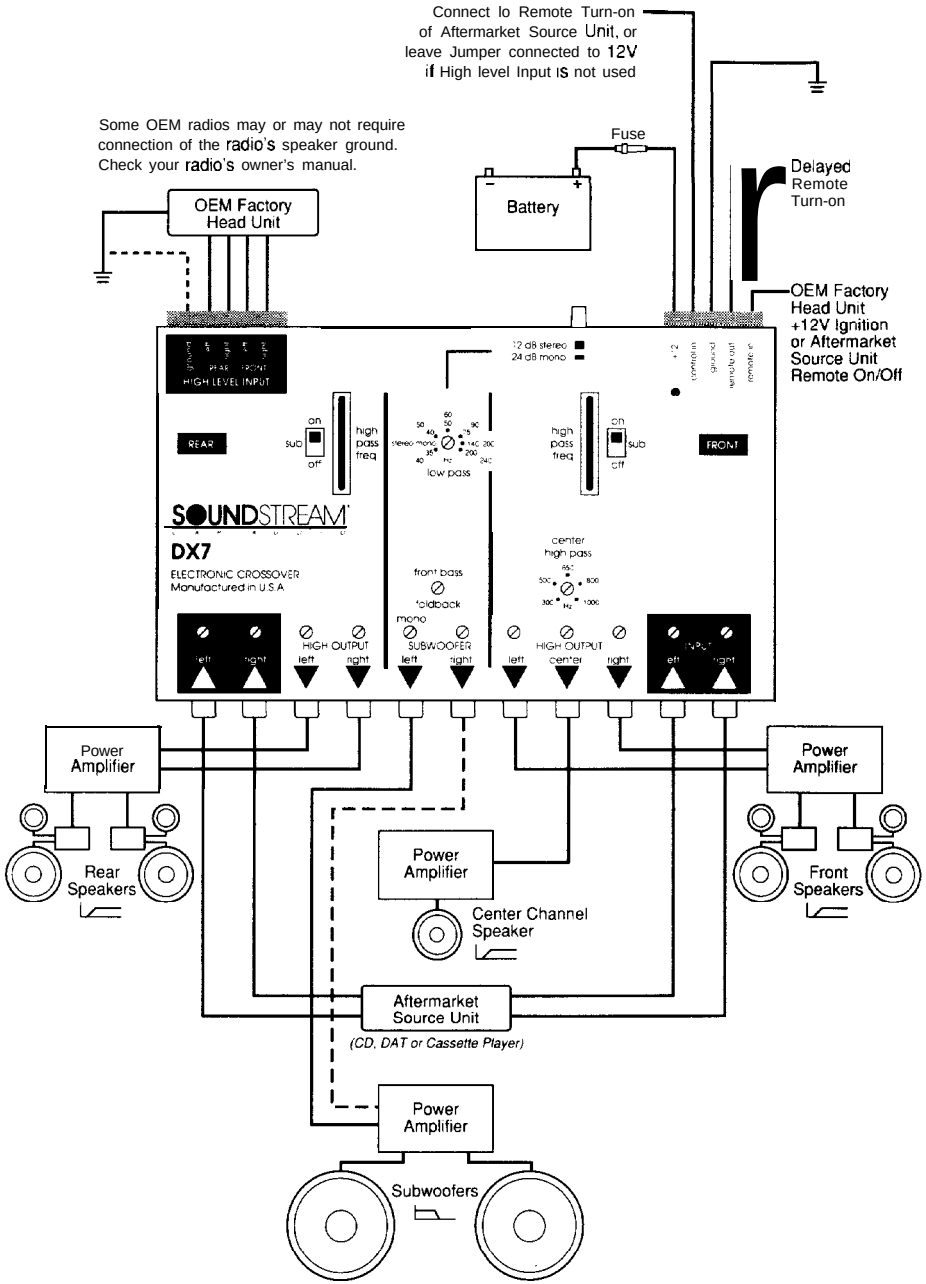
Staggered Electronic Crossover Network

OWNER'S MANUAL

SOUNDSTREAM®

TECHNOLOGIES

DX7 WIRING DIAGRAM



DX7 Staggered Electronic Crossover Network

OWNER'S MANUAL

Congratulations on your purchase of the Soundstreom DX7 electronic crossover. You now own one of the finest and most versatile electronic crossovers made, a precision component which provides true audiophile performance.

Please make note of the following information for your records. Doing so will protect your investment should your DX7 ever require service or replacement.

Model Number: Soundstreom DX7 Electronic Crossover

Serial Number: _____

Dealer's Name & City: _____

Date of Purchase: _____

Dote of Installation: _____

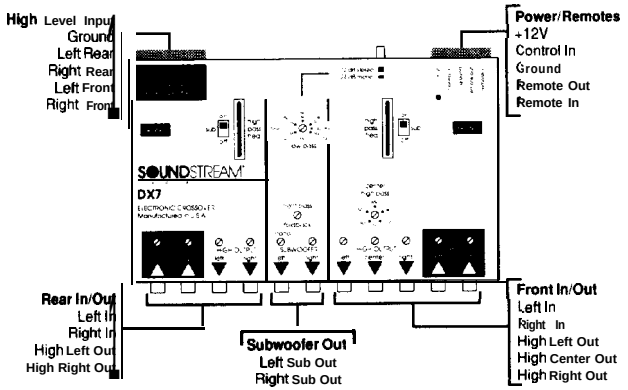
This Soundstreom product is the result of American design and craftsmanship, and was manufactured using the highest quality control standards. Your DX7 should deliver many years of pleasure.

We recommend that you review this manual in order to familiarize yourself with the remarkable capabilities of the DX7. Doing so will ensure your obtaining the best possible performance from the product. Please retain this manual for future reference.

OVERVIEW

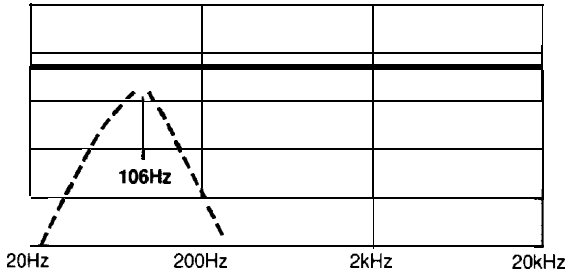
4-Channel Input/7-Channel Output Design

The Soundstream DX7 electronic crossover is a four-channel in/seven-channel out design which retains the full fading capability of your source(s). It provides a pair of subwoofer outputs and a summed center channel output in addition to he usual front (L&R) and rear (L&R) outputs. (See diagram.)



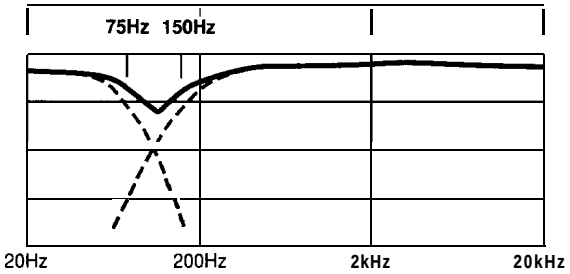
CROSSOVER CONFIGURATIONS

Symmetrical Configuration



The standard way to divide up the frequencies your system reproduces is to have one speaker pick up exactly where the previous one has left off. A single crossover frequency is chosen and the response is shaped such that the subwoofers and the mid-bass drivers are each reproducing half of the music at the crossover point, for a smooth transition from one to the next. This is the common configuration for most crossovers, despite the fact that it is often inappropriate for the automotive environment.

Asymmetrical Staggered Configuration



Great improvements in system definition and clarity are made possible by making the high-pass and low-pass sections of the crossover independent of one another. This is because most cars **have a mid-bass "resonance" somewhere between** 75 and 180 Hz, meaning that those frequencies are unnaturally emphasized by the car itself. This gives a muddy, boomy sound to an otherwise excellent system. But this resonant peak in the car's response can be eliminated by deliberately leaving a gap between the subwoofer's range and the mnge in which the rest of the speakers operate. This creates a precise "dip" in the response of the system which compensates for the car's "peak," restoring accurate, uncolored sound.

DESIGN FEATURES

Automatic Priority Switching

The DX7 can accept both high level (speaker level) and low level (line level) inputs, and will automatically switch from one to the other without user intervention. This capability allows the use of the existing factory-installed radio with an aftermarket source (a CD changer, for example). The DX7 will mute the input from the factory radio when it senses an

input from the CD changer, and will revert to the **mdio automatically a few seconds** after the CD changer has been turned off.

Remote Control Source Switching

If your CD changer (or other aftermarket source) has a remote turn-on control output, it can be connected ta the "Control In" input on the DX7 for switching between sources. In this mode, the DX7 will switch to the Low Level input when it senses that the CD changer has been turned on, **and,** in a few seconds, will revert to the factory-installed unit (at the High Level input) when the CD changer or other aftermarket source is turned off. After you have turned off the Low Level input (CD changer or other aftermarket source) the DX7 will take a few seconds to automatically revert to the High Level input when the Low Level input has been switched off.

Input and Output Level Controls

A full complement of input and output level controls is provided to allow proper matching and tuning of the system. Input level controls for both High Level and Low Level inputs can be used to match the relative volumes of the two sources, avoiding the abrupt (and potentially dangerous) changes in volume which sometimes occur when switching between sources in less sophisticated systems. Output level controls for all channels compensate for differences in amplifier and speaker sensitivity, so that appropriate Front-Rear and Left-Right balance can be obtained with both the Fader and the Balance controls of the sources set to their neutral position. This guarantees the maximum range of these controls during everyday use.

Summed Center Channel Output

A summed center channel output is provided on the DX7 which eliminates the "hole-in-the-middle" effect common to many car stereo installations. This undesirable effect is the result of our close proximity to the front speakers and the constraints on their placement in an automotive environment. By placing a center-channel speaker in the middle of the dash and using this output to drive its amplifier, a more satisfying, convincing front image is created. The effect works equally well for both front-seat passengers, often eliminating the everyday use of the balance **control.**

The DX7 also incorporates an independent high-pass filter which is continuously variable from 300–1000 Hz, with a 6 dB/octave slope. This extra measure of control gives the installer the ability to determine the effect of the center channel speaker, ranging from merely adding some additional "air" and sparkle to the sound, to providing a full center image for female vocalists.

Amplifier Turn-On Delay

The remote turn-on lead (sometimes called an "amplifier lead") from your source unit should be attached to the Remote Input on the DX7 and can be used in either of two ways. If the signal from the remote lead is connected to both the DX7 and the amplifier(s) in parallel, all units will

be powered up simultaneously. If the amplifier(s) receive their turn-on signal from the Remote Output of the DX7, a four or five second delay will be introduced between the time the DX7 powers up and when the amplifiers are switched on. This delay allows both the source unit and the DX7 a chance ta "settle" after turning on before the amplifier becomes active, which prevenk low level turn-on transients being amplified.

High-Pass Frequency Selection By SIP Modules

The high-pass frequency selection in the Soundstream DX7 is implemented through the use of Single In-Line Package modules. The use of SIPs provides far more accurate inter-channel frequency matching, for superior imaging and perceived channel balance. A wide variety of SIPs are available, combining the finest accuracy with almost unlimited flexibility. (See the *table on he rear cover for a list of* available frequencies.)

Separate SIP modules are used for the front and rear portions of the crossover, to allow the most appropriate selection of high-pass frequency, regardless of the speakers used. For example, if space constraints in your car require you to use a small speaker in the front which has limited mid-bass capability, you can increase the system's overall dynamic range by raising the high-pass frequency for those front speakers alone. You can then rely more heavily on the (presumably larger) speakers you have in the rear for your mid-bass, while the subwoofers handle the deep bass.

Switchable Low-Pass Crossover Slope

The subwoofer outputs may be run in either of two modes: 12 dB/octave in stereo, or 24 dB/octave in mono. This unusual feature bears some explanation. If your system design requires your subwoofers to operate at relatively high frequencies (say, above 150 Hz), you may choose ta retain the full stereo effect in those drivers. This has some advantage, since it is generally conceded that we can localize sounds beginning somewhere between 150 – 200 Hz and upward.

On the other hand, if your subwoofers will be limited to frequencies below 150 Hz, it is better to opt for the steeper slope, monophonic signal. This accomplishes several objectives: dynamic range is enhanced by more sharply limiting drivers to their optimal ranges; more amplifier power is reserved for the deepest bass, for greater impact; and any possible low-bass cancellation between the subwoofers is eliminated, since they are reproducing precisely the same signal. (This assumes they have been properly installed with regard to polarity, of course.)

Continuously Variable Low-Pass Frequency Adjustment

The turnover frequency of the low-pass portion of the crossover is continuously variable from approximately 35 Hz to 200 Hz in the mono mode (40-240 Hz in the stereo mode). This allows extremely precise fine-tuning of the width and depth of the "dip" created by staggering the crossover poink, for the flattest, most accurate response in the car. (See **Asymmetrical Staggered Configuration**, on page 2.)

Front Bass Foldback

Some cars have such a significant resonant peak that a rather large dip is required to restore flat response. In these situations, instruments which have deep bass sometimes appear to move backward in the car, toward the subwoofers. The DX7 has an innovative Front Bass Foldback feature which eliminates this problem by re-introducing some of the deep bass material (below the staggered crossover's "dip") to the front speakers. In this way, the deep bass is still perceived as coming from the front speakers, even though the subwoofers continue to do most of the work at those frequencies. Effective power handling and dynamic range in the front speakers remains high due to the use of an additional high-pass filter which limik the deepest portion of the "subwoofer" bass they are expected to reproduce. The overall level of this "folded-back" bass material relative to overall system volume is adjustable at the crossover, to avoid overloading the bass capabilities of small front speakers.

Switchable Subwoofer Tracking

The subwoofer output can be quickly and easily switched to track with either the front speakers or the rear speakers, or with both pairs of speakers. In this last case, the relative volume of the subwoofers will be independent of the fader control setting, and will appear to track with the system volume control only.

Subsonic Filter

The DX7 also incorporates a permanent 24 dB/octave subsonic filter to eliminate dangerous (though inaudible] signals below 20 Hz from entering the amplifiers. This ensures that the power of your amplifiers and the excursion capability of your subwoofers are being used for music that you can hear- rather than for noise which can only damage your valuable components.

INSTALLATION

Proper installation and adjustment of your DX7 will reward you with reliable operation and optimum performance. Automotive sound system installations can be tricky, especially for first-timers. For this reason, you may want to consider using a professional installer who has the tools and (more importantly) the experience to do the job right.

At the beginning of this manual is a diagram of recommended, proven system variations employing the DX7. Review these systems before attempting your own installation. You may find some ideas which you will wish to incorporate into your system design.

Location and Mounting

The DX7 is compact and generates virtually no heat. It can be located almost anywhere within the passenger compartment or in the trunk. Da not install the DX7 in the engine compartment or in any outside location exposed to dirt and moisture. The DX7 should be mounted firmly to your car's chassis (or an "amp rack") using the provided screws. Use the DX7 itself as a template for making pencil marks where you intend to drill,

but under no circumstances drill through the holes in the DX7's flanges, as you may inadvertently damage the crossover.

It is a good idea to "bench test" the system prior to mounting any components. If you have a +12V power source, you can connect and test the components outside the car. Or, you can connect them inside the car before mounting them. Either way, connect the components exactly as you intend to in the final installation; make all power connections last, test the system, then disconnect all power until the final installation is complete.

Wiring

Predetermine how you car's wiring is laid out. Keep all wiring inside the vehicle. Good audio practice suggests keeping signal wires away from all power lines. Wires can be run under carpet, however, make sure not to interfere with normal operation of the vehicle. (You might also wish to avoid the "high traffic" areas of the carpet under passengers' feet, as undue wear and tear on both carpet and cable may result.) All wires should be hidden-an exposed wire can be pulled inadvertently, causing disconnection or shorting.

Power Wires

The power wires for the DX7 connect via a terminal block at the top right edge of the crossover. (The High Level inpuk are on the top left edge.) Notice that these terminal blocks detach for quick and easy installation. Grasp the gray terminal block with your fingers and pull straight away from the crossover. As a safely measure, they cannot be inserted facing the wrong direction. When attaching wires to these terminals, take care to strip back only as much insulation as is needed for a solid connection, leaving insulation covering the wire right up to where it is encased by the terminal block. This minimizes the chances for short-circuits and maximizes long-term reliability.

The +12V terminal should be directly connected to a constant +12V supply. It should be "hot" even when the ignition key is off. (Don't worry, battery drain will not occur.) Connect the remote turn-on lead from your source unit to the Remote Input on the DX7.

The Ground terminal should be connected directly to the chassis of the vehicle. A nearby bolt can serve as a ground terminal, but make sure that the wire contacts bare metal, not coated metal or paint. It may be beneficial to use a single reference point for the grounding of the entire system, to minimize the possibility of ground-induced noise becoming audible.

Input Connections

As shipped from the factory, your DX7 has a jumper installed between the "+12V" and "Control In" terminals. If you plan on using the High Level Inputs you must remove the jumper connector. If you do not plan to use the High level Inputs, you must leave the jumper connector in place.

High level Input Connection

If you plan on connecting the DX7 to a powered head unit, connect only the positive speaker leads to the crossover. Leave the negative speaker connectors unkrminated.

Normally, the DX7's High Level Input Ground does not need to be connected. However, since different radios have different grounding schemes, we suggest you run a fifth (ground) wire along with the High Level Input (speaker) wires. Try the following connection options:

1. Leave the DX7's High Level Input Ground unconnected.
2. Connect the DX7's High Level Input Ground to the vehicle chassis.
3. Connect the DX7's High Level Ground to your radio.

In order to realize the maximum performance and the least amount of noise from your system, it's a good idea to try all three variations and use the one that provides the least amount of system noise.

low level Input Connection

All Low Level audio connections to the DX7 attach by means of standard RCA-type iacks. The DX7 achieves a level of performance at which cable and connector quality is important, and therefore we recommend the use of Soundstream DL•1, Streamline, or equivalent premium cable.

Connect the audio output of the head unit to the four input jacks of the DX7. Take care to ensure that the Front Left, Front Right, Rear Left, and Rear Right connections are all where they belong. (Rear is on the left side of the DX7; Front is on the right side.]

Output Connections

Connect the Output jacks of the DX7 to the inputs of the appropriate amplifiers.

Some systems may be tri-amplified or even quad-amplified. In these cases, the DX7 would normally be the first processor in line, with the high-pass outputs further divided up by electronic crossovers such as the Soundstream SX2. In some special applications, it may be desireable to quadra-amplify the system, in which case the subwoofer outputs of the DX7 can be further divided. If your system design calls for this level of sophistication and you are not totally comfortable with the methods used, please consult your Soundstream dealer.

Input level Controls

The DX7 provides individual level controls for all four Low Level inpuk. These can be used to match the volume of the aftermarket source to that of the factory-installed system which is preset at the High Level input. Compare similar kinds of music on both sources (for example, a rock CD with a local rock FM station), and adjust all four input level controls so there is not a dramatic difference in volume when switching from one to the other. (Using the fader and the balance controls in combination to adjust a single channel at a time greatly simplifies this process.)

Output level Controls

The DX7 provides individual output level controls for all seven outputs. These may be adjusted with a small, insulated, flat-bladed screwdriver.

The DX7 has 3.0 dB of available gain, meaning that the signal level may be boosted when the control is in its full clockwise position. There are two goals when setting these levels, whether using the controls on the DX7 or the comparable **controls** on your amplifier. One is to achieve the best balance between the high and the low outpuk. This can be done by ear, using familiar progmm material. If there is an equalizer in the system, make sure that it is defeated or in the flat position when setting these **levels. Set the** DX7 or amplifier levels for the most pleasing balance between mids/highs and lows.

The second use of level controls (whether on the DX7 or on the amplifiers) is to set overall system gain. If the gain is set too high, **noise from various** sources may become a problem, and the **response of the main volume control may** seem "touchy" or overly sensitive. If the gain is set too low, you will not be able to get adequate volume with your head unit volume control. Adjust all of the DX7 output level controls together, so that the volume **control** on your head unit provides the adjustment range you want.

Setting the Center Channel High-Pass Frequency

A potentiometer accessible through the top plate of the DX7 allows you to adjust the lower cut-off frequency of the center channel. The "best" setting depends on the desired effect.

Setting it to a relatively high frequency (700–1000 Hz) tends to add sparkle and an airiness to the sound which many find desirable. Suggested Center Channel speakers include the Soundstream SS 4.0, or any speaker capable of reproducing midrange signals without damage. A 1" soft-dome tweeter may be used if an appropriate passive high-pass crossover is used to prevent midrange frequencies from reaching the tweeter.

Adjusting the center high-pass frequency to the lower ranges (300–700 Hz) allows it to reproduce more of the midrange for a stronger center-channel effect. Female vocalists will have a strong center image from both front seats, even with the Balance control set to a neutral position.

Crossover Frequencies

The crossover frequencies are separately adjustable for both high-pass and the low-pass outputs. The high-pass adjustment is accomplished by plug-in SIP resistor modules, while the low-pass is adjustable by means of an infinitely variable potentiometer.

The DX7 comes preset from the factory with a 150 Hz high-pass module, and has low-pass frequency preset to 75 Hz (24 dB/octave, mono). While these settings will work in the majority of installations, individual installations may require some adjustments.

Two additional high-pass frequency modules are provided with the DX7 (125 Hz and 180 Hz). If alternative frequency modules are required, contact your Soundstream dealer. A list of available frequencies is provided at the end of this manual.

Front Bass Foldback Adjustment

Once you have estoblished your crossover frequencies, play some music with deep bass material to determine whether the image tends to float to the rear of the car (or wherever the subwoofers are). If this is so, dial in just enough gain on the front bass foldback control in the center of the DX7 to eliminate the effect. The goal is to use only as much of this low-bass signal in the Front speakers as required-using more than is necessary simply places an extra burden on the front speakers with no real benefit.

If your front speakers are small and have limited bass capability, reduce the front bass foldback level to ik minimum (counterclockwise) level to get as much dynamic range from the front speakers as possible.

Setting the Subwoofer Tracking

The two switches on the front of the DX7 control whether the subwoofers "take their cue" from the level of the front speakers, the rear speakers, or both. Switching both to their ON positions makes the subwoofer level independent of the system's Fader.

SERVICE Your DX7 is protected by a limited warranty. Please read the enclosed warranty information carefully. Should any problem occur, contact your authorized Soundstream dealer.

SPECIFICATIONS

Total Harmonic Distortion	less than 0.05%, 20 Hz-20 kHz
Crossover Slopes	
Low Pass (stereo)	12 dB per octave
Low Pass [mono)	24 dB per octave
High Pass	12 dB per octave
center Channel	6dB per octave
Crossover Frequencies	
Low Pass (stereo)	variable, 40 Hz-240 Hz
Low Pass (mono)	variable, 35 Hz-200 Hz
High Pass	selectable, 53 Hz–4800 Hz
Center Channel	300 Hz–1000 Hz
Signal to Noise Ratio	greater than 100 dB
Gain	+3.0 dB
High Level Input Impedance	20Ω
Low Level Input Impedance	7.5 kΩ
Output Impedance	10 kΩ
Maximum Input Level	13 V rms
Maximum Output Level	2.5 V rms
Maximum Current Draw	65 m A
Headroom	20 dB ref: 25 mV (8 dB ref: 1 V)
Dimensions (including flanges)	8.13" wide by 4.38" tall by 1.5" deep

SOUNDSTREAM SINGLE IN-LINE PACKAGE MODULES

TABLE OF VALUES

Frequency	Dot Code	Resistor Value
53 Hz	Red	1000 kΩ
63 Hz	Orange	820 kΩ
75 Hz	Blue	680 kΩ
90 Hz	Brown	560 kΩ
106 Hz	Green	470 kΩ
125 Hz	Violet	430 kΩ
150 Hz	White	330 kΩ
180 Hz	Red-Brown	300 kΩ
212 Hz	Red-Green	240 kΩ
250 Hz	Red-Violet	200 kΩ
300 Hz	Red-White	180 kΩ
425 Hz	Orange-Green	120 kΩ
600 Hz	Orange-White	82 kΩ
850 Hz	Blue-Green	62 kΩ
1200 Hz	Blue-White	43 kΩ
1700 Hz	Green-Green	30 kΩ
2400 Hz	Green-White	22 kΩ
3400 Hz	Violet-Green	15 kΩ
4800 Hz	Violet-White	11 kΩ

SOUNDSTREAM®
TECHNOLOGIES

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