



SR8520 SR6520
OWNER'S MANUAL

P/N 033305

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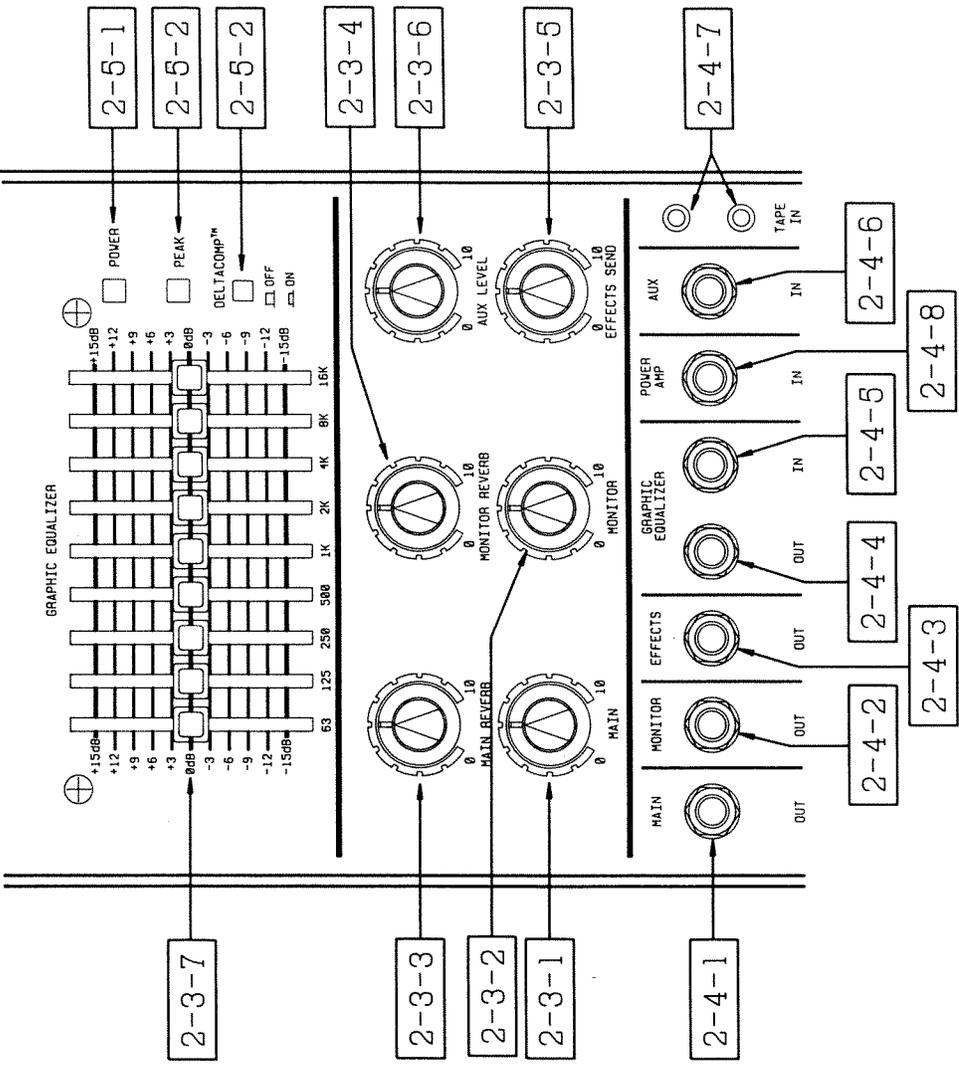
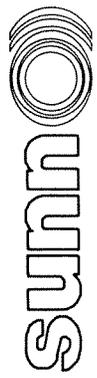
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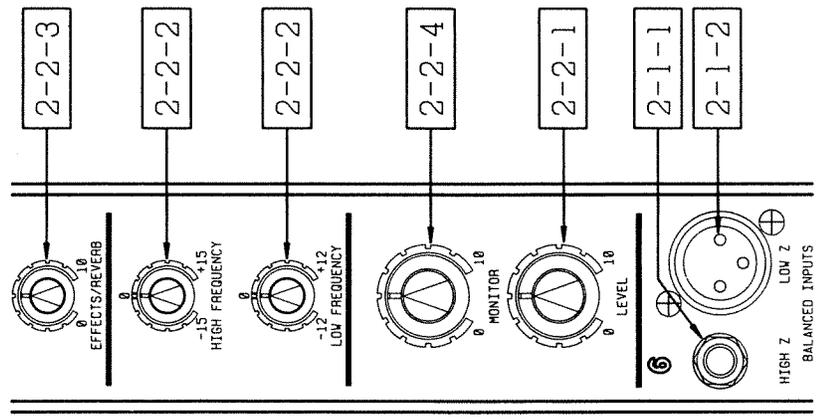
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CHANNEL CONTROLS



1. OVERVIEW.

1-1. INTRODUCTION.

The Sunn SR Series integrated mixer/amplifiers have been designed for easy setup and simple but versatile operation. Requiring only addition of microphones and speakers, the SR powered mixers are self-contained sound reinforcement systems with features and performance generally found only in units costing much more.

Each preamp channel is provided with XLR and 1/4" phone inputs, Level, Low and High frequency controls, Monitor and Effects/Reverb level controls. The master section features Main, Monitor and Reverb level controls, a graphic Equalizer, a power amplifier and a versatile patch bay.

The power amplifiers in the SR6520 and SR8520 are capable of driving a four ohm load to 350 Watts and a two ohm load to a very potent 520 Watts. In addition, the SR6520 and SR8520 feature DELTACOMP™ adaptive compression systems, a high performance power amp limiter that senses amplifier error due to clipping, and automatically reduces the gain until the distortion is minimized. A front panel PEAK LED indicates the status of the limiter. A green indication on peaks means that DELTACOMP is active, and a red indication on peaks signifies that DELTACOMP is inactive.

To make setup as simple as possible, the mixer, graphic equalizer and power amplifier are pre-patched in a standard configuration that requires only the microphones and speakers to be plugged in in order to be "on the air." To make the system as versatile as possible, this "normalized" patch may be bypassed by using the inputs and outputs of the patch bay. These allow the individual components of the system to be used in various combinations, and for external equipment to be added into the system as the need arises.

The SR Series has been designed to meet the needs of professionals, and can be counted on to provide reliable service in the most demanding situations.

2. FRONT PANEL CONTROLS, JACKS AND LEDs.

2-1-1. 1/4" JACKS. The 1/4" phone jacks are intended for high impedance balanced or unbalanced inputs whose amplitude is under 8 VRMS. When used as a balanced input, the tip connection of the 1/4" jack is the non-inverting (+) input and the ring connection is the inverting (-) input. This input is ideal for high impedance microphones, keyboards, effects, returns, acoustic guitar or other units with 1/4" outputs.

2-1-2. XLR JACKS. The three-pin audio connectors (often called "XLR" or "Cannon" connectors) on the front panel are intended for balanced input signals from low impedance microphones. To avoid clipping in the input stage, signal levels should not exceed 0.8 VRMS. Higher amplitude signals, such as balanced line levels signals, may also be patched into these jacks if an input pad is used (see Section 4-4).

The XLR jack is wired according to the following standard:

- Pin 1 is ground.
- Pin 2 is the inverting (+) input.
- Pin 3 is the non-inverting (-) input.

Signals at the XLR jacks experience 20 dB more gain than those at the 1/4" channel input jacks.

2-2. CHANNEL CONTROLS.

2-2-1. CHANNEL LEVEL CONTROL. The channel LEVEL control determines how much of the channel's signal is sent to the Main Level Control (2-3-1) and to the EFF/REV control. For best signal to noise ratio, this control should be set relatively high; usual settings are between 6 and 8, except when input signal levels are great enough to cause clipping. See Section 4-1-2.

2-2-2. CHANNEL TONE CONTROLS. The LOW and HIGH controls on each channel may be adjusted to enhance the qualities of its particular audio signal and to control excessive boominess or sibilance ("s" sounds) by using the LOW and HIGH controls. When these controls are at 0, or straight up, the channel is "flat" (no frequencies cut or boosted). The most natural sound is achieved by avoiding extreme tone control settings.

2-2-3. EFF/REV CONTROL. This control determines how much signal from each channel goes onto the Effects/Reverb buss. All signals on this buss are combined in the master mixer section, and sent both to the EFFECTS OUT jack and to the internal reverb system. The EFF/REV control is wired post-LEVEL control and post-EQ; thus, the level and tone of the EFF/REV signal are altered by the settings of the LEVEL, LOW and HIGH controls.

2-2-4. MONITOR CONTROL. The MONITOR control determines how much of a channel's signal is sent to the Monitor Level Control (2-3-2). This allows a separate mix to be created for stage monitoring. The control is wired pre-LEVEL control and pre-EQ; thus, the monitor signal is independent of other channel controls.

2-3. MASTER SECTION CONTROLS.

2-3-1. MAIN LEVEL CONTROL. This is the master level control for the main mix. It controls the signal level present at the MAIN OUT jack, if nothing is patched into the GRAPHIC IN jack or the POWER AMP IN jack, the MAIN LEVEL control also determines the graphic equalizer and power amplifier input levels.

2-3-2. MONITOR LEVEL CONTROL. This is the master level control for the monitor mix. It controls the signal level present at the MONITOR OUT jack.

2-3-3. MAIN REVERB CONTROL. This control determines how much of the signal from the reverb system is added to the main mix.

2-3-4. MONITOR REVERB CONTROL. The MONITOR REVERB control determines how much of the signal from the reverb system is added to the monitor mix. Many vocalists like to hear some reverb on their voices in the monitor system; be aware that reverb in the monitors increases the likelihood of feedback in the monitor system.

2-3-5. EFF SEND CONTROL. The mix created by the settings of the channel EFF/REV controls appears at the EFFECTS OUT jack, as well as being sent to the reverb system. The signal level at the EFFECTS OUT jack is adjusted with the EFF SEND control.

2-3-6. AUX LEVEL CONTROL. Signals patched into the AUX IN jack and/or the tape in jacks are sent to the Main Level Control via the AUX LEVEL control. This control determines how much of the AUX input signal appears in the main mix.

2-3-7. GRAPHIC EQUALIZER. The SR6520 and SR8520 each have a nine band graphic equalizer. The equalizer consists of active band pass/band reject filters spaced at octave intervals. The lowest frequency filter is at 63Hz while the highest frequency filter is centered at 16kHz. All others are centered on the frequencies indicated below their sliders. Moving the sliders up or down boosts or cuts the gain at the indicated frequencies. This allows the sound engineer to suppress feedback by compensating for room resonances encountered in live sound reinforcement applications. The EQ controls are accurately scaled in dB to indicate the amount of cut or boost applied at each frequency.

NOTE: It is possible for distortion to occur in the Graphic Equalizer if excessive attenuation is used (slider well below center) while also trying to achieve significant level within the bands attenuated.

2-4. PATCH BAY.

2-4-1. MAIN OUT. Signals from each of the channels are combined with Effects In signal and the Main Reverb signal to form the final main mix. The overall level of the mix is controlled by the MAIN Level Control and this mix appears at the MAIN OUT jack. The mix is also normally passed on to the Graphic EQ and to the power amplifier (see Sections 2-4-5 and 2-4-8). Inserting a plug into the MAIN OUT jack does not interrupt the normal signal flow. The jack is useful for recording a live performance, and for inserting signal processing equipment into the signal path (see Section 4-5).

2-4-2. MONITOR OUT. Signals present on the Monitor buss are combined and sent to the MONITOR OUT jack. The signal level present at this output is determined by the MONITOR LEVEL Control.

2-4-3. EFFECTS OUT. Signals present on the Effects/Reverb buss are sent both to the Reverb driver and to the effects output amplifier. Thus the mix created by the settings of the EFF/REV level controls on each of the preamp channels is present at the EFFECTS OUT jack. The overall level at this output is determined by the master mix section EFF LEVEL Control. This output may be used to drive external effects (echo units, phase shifters, flangers, digital delays, etc.). The return signal from the effect may be patched into the mixer through the AUX IN jack, or by way of a Channel 1/4" Input Jack. Use of a preamp channel as a return gives you the ability to shape the frequency response of the signal; however, care must be taken to insure that the EFF/REV control on that channel is turned all the way down—otherwise a feedback loop will exist which could cause oscillation and possible damage to speakers. Care must also be taken to insure that the amplitude of the return signal is not too great for the preamp channel input; an input pad may be used if needed.

2-4-4. GRAPHIC OUT. The output of Graphic Equalizer is present at the GRAPHIC OUT Jack; inserting a plug into this jack does not interrupt the normal signal path. The jack is useful for patching more power amplifiers into the system, for post-equalizer recording and for inserting signal processing equipment (limiters, parametric equalizers and the like) between the equalizer and the power amplifier (see Section 4-5).

2-4-5. GRAPHIC IN. The Graphic Equalizer is prepatched to the main output signal. However, the GRAPHIC IN Jack allows this "normalized" patch to be defeated; inserting a 1/4" phone plug into the jack disconnects the equalizer from the main signal and instead connects it to any signal carried by the phone plug. This allows the equalizer to be patched to other SR outputs or to other pieces of audio equipment.

2-4-6. AUX IN. This input is generally used as a return from an external signal processing device (flanger, phase shifter, etc.). Signals present at this input are routed to the Main buss by way of the AUX LEVEL control. In emergencies, it is possible to use the AUX IN as a line level preamp channel, although it lacks the preamp channels' equalization, monitor and effects sends.

2-4-7. TAPE IN. Patching the output of a tape deck into the phono (RCA) jacks produces monophonic image of the signal in the main mix. This is useful for playing music during breaks in the performance. TAPE IN signal level is controlled by the AUX LEVEL control.

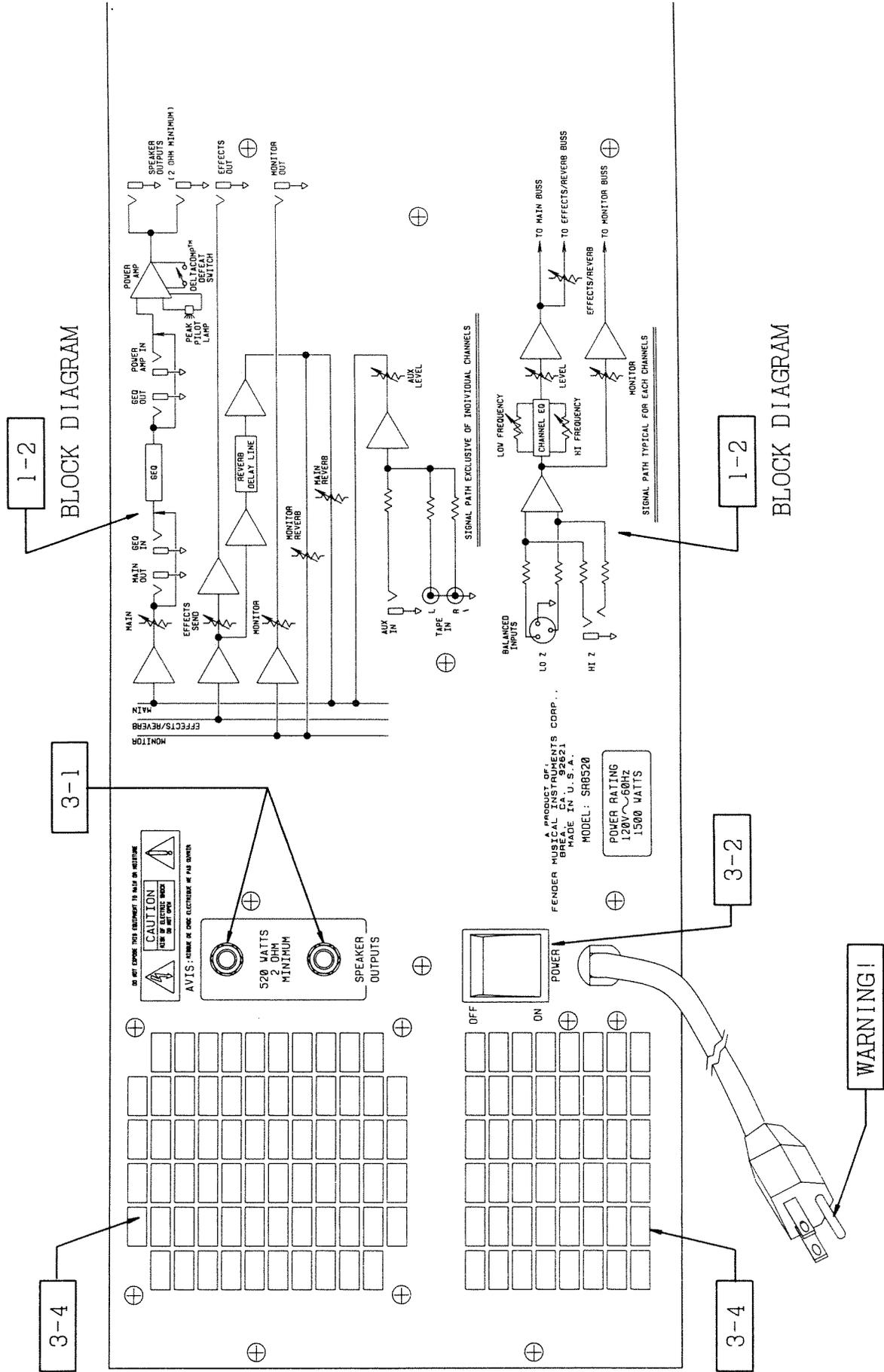
2-4-8. POWER AMP IN. Under normal circumstances, the power amplifier receives its input from the Graphic Equalizer. However, by inserting a 1/4" phone plug into the POWER AMP IN Jack, the normal signal path is broken and any signal carried by the phone plug becomes the power amplifier's input. This allows the power amplifier to be used independently from the rest of the SR powered mixer. Possible uses of this feature include dedicating the power amp to the monitor system while employing an auxiliary power amplifier for the mains, or using the SR power amp as one of the two power amplifiers in a biamped system (this would require the addition of an external crossover). See Section 4-5.

2-5. LEDS.

2-5-1. POWER LED. The red LED (Light Emitting Diode) is the front panel "power on" indicator.

2-5-2. PEAK LED. The dichroic (dual color) LED comes on when excessive signal levels are being sent to the power amp. The PEAK LED illuminates red on signal peaks that cause clipping (distortion) with DELTACOMP™ not activated, or green for signal peaks that cause DELTACOMP™ to reduce level (DELTACOMP active). If the limiter is on for a large percentage of the time the dynamic range of the system is reduced and the overall sound suffers; for this reason, level controls should be adjusted so that the LIMIT light only flashes on occasional signal peaks.

BACK PANEL



3. BACK PANEL.

3-1. **SPEAKER OUTPUT JACKS.** These are the speaker outputs for power amplifier. The SR6520 and SR8520 power amplifiers can drive a 4 ohm load to 350 watts, and 2 ohm loads to 520 Watts. Do not connect loads with impedances lower than 2 ohms to the SPEAKER OUTPUT, as this may result in amplifier overheating which will cause the SR mixer to eventually "turn off" for a period of time. (To calculate the speaker impedance, see Section 4-3-2.). In addition, be sure that the speaker cable you use is of adequate gauge; otherwise, power will be lost in the wire instead of being delivered to the speaker, and the damping factor will be impaired (see Section 4-3-2).

3-2. **POWER SWITCH.** AC POWER to the SR powered mixer is turned on and off by a rocker switch located on the back panel. If you have any external signal processing devices patched to the system, turn them on *first* to avoid pops in the loudspeakers. Also, when you turn on the mixer, make sure that the main fader is down—this eliminates the risk of the system immediately feeding back when it is turned on, and also minimizes turn-on-pops.

WARNING! Do not remove the grounding prong of the AC plug. To do so risks exposure to potentially lethal voltages and voids the warranty.

3-3. **FUSE.** The SR mixers have no external fuses, and replacement of the internal fuses requires qualified service personnel. With modern solid state equipment, a blown fuse usually means something has failed and will require service attention.

3-4. **FAN.** The rear mounted fan exhausts through the upper left rear panel, while cool air is drawn in the openings on the left lower rear panel. **BE SURE TO PROVIDE ADEQUATE VENTILATION BEHIND THE UNIT.**

4. SETUP AND OPERATION.

FIGURE 1 illustrates the simplest way to set up your PA system.

4-1. **INITIAL CONTROL SETTINGS.** When you first set up the sound system, initial settings are critical for arriving at a satisfactory mix quickly. Often, to the distress of many soundmen, the show must begin without a preliminary sound check. The following recommendations should help to alleviate some of the soundman's headaches.

4-1-1. Set the channel high frequency and low frequency controls to their mid positions, and also set the GRAPHIC EQUALIZER to its mid or flat position. Set the main and monitor MASTER controls to around 4. Set all other controls to zero.

4-1-2. **LEVEL CONTROL.** Adjust the level controls to the approximate level you desire, with a mix that you feel will be acceptable.

4-1-3. **MONITOR CONTROLS.** Most groups like to hear their voices in the monitors; some also like to hear certain instruments as well (bass drum, bass guitar, and so forth). A good initial MONITOR control setting is 5, or straight up. Assuming that the various vocalists use similar miking techniques and sing at similar volumes, the levels appearing in the monitor mix should be fairly matched. Further adjustments can be made as needed.

4-1-4. **CHANNEL EQUALIZATION.** For starters, most vocal, keyboard and other full range signals are best left flat (controls at 0, or straight up). For signals having a great deal of low frequency content, such as drums and bass guitars, the LOW control should initially be backed off slightly (rotated to the left) from the 0 position to reduce boominess. Naturally, all controls should be set to achieve the most pleasing sounds, but the settings listed above should help in achieving good results quickly. In general, extreme settings cause the sound to be unnatural and should be avoided.

4-1-5. **GRAPHIC EQUALIZERS.** Start out with equalizers set "flat" (0 dB). On the SR6520 and SR8520, the 64 Hz control may be set initially 3 to 6 dB below the center position, since excessive low frequencies rob power from the rest of the system and low-end feedback can damage loudspeakers. Section 4-2 gives hints on making further adjustments to the equalizers.

4-2. USING THE GRAPHIC EQUALIZER TO ELIMINATE ACOUSTIC FEEDBACK.

4-2-1. **THE CAUSE OF ACOUSTIC FEEDBACK.** Acoustic feedback in a sound system is the result of coupling between the speakers and microphones. The microphones will always pick up a certain amount of signal from the speakers; how much they pick up depends on the room acoustics, the frequency response of the microphones-speakers, microphones and speaker placement. If the received signal is amplified enough (in the mixer and power amplifier) the speakers will continue to produce the signal, and the characteristic howl of acoustic feedback will begin. This feedback will occur at the frequency which receives the largest amount of gain from the sound system (including the room). If the signal can be attenuated at that frequency, more gain can be added to the rest of the signal frequencies before feedback occurs. This is the primary role of an equalizer in a sound system.

4-2-2. TYPICAL PROCEDURE FOR ROOM EQUALIZATION.

1. Set up your entire sound system the way it will be used, including all auxiliary equipment, and adjust it the way you would normally use it. If feedback occurs during setup, reduce the gain of the mixer with the MAIN and MONITOR level controls. Follow the procedure outlined in the paragraphs below, first for the main system and then for the monitors (assuming you are using an equalizer in your monitor system — highly recommended).
2. Set the controls on the graphic equalizers to the “flat” position, indicated as “0 dB” on the panel.
3. Slowly increase the output level (using the appropriate level control) until the sound system is on the threshold of feedback — a ringing sound will occur when you tap on the microphones.
4. Slowly attenuate the Equalizer control which has the greatest effect on reducing the ringing. This will take some trial and error — the first ringing usually occurs between 1 kHz and 4 kHz. Continue until the ringing has stopped.
5. Again, slowly increase the output level control until the system is on the verge of feeding back. Adjust the equalizer to remove the potential feedback. Continue this procedure until you have achieved sufficient gain for your application or until the equalizer becomes ineffective at removing the ringing. (It is best to back off the gain once maximum gain before feedback has been established). Avoid extreme settings or settings which require a large amount of cut in the middle frequency bands, as such settings impair intelligibility.
6. “Fine tune” the equalizer settings as the performance progresses to achieve the best overall sound from the system.

4-3. CORDS AND CABLES.

4-3-1. MICROPHONE CORDS. On the SR mixers, use balanced two-conductor shielded cable for all long runs. Balanced systems are capable of rejecting noise introduced from such sources as cash registers, electric motors and triac-controlled lights. If a balanced cable is connected to an unbalanced output (e.g., a keyboard mixer output) or microphone, use a balancing transformer close to the unbalanced device. This ensures maximum common-mode noise rejection for the entire system.

If you have no choice and must use unbalanced cables, use the shortest cables possible and keep them away from AC power mains, lighting cables and speaker wires. If you want the quietest system possible, you should follow these rules with balanced lines as well.

4-3-2. SPEAKER CABLES. Use two conductor zip cord to connect the amplifier outputs to your speakers. The gauge of the wire is important; wire that is too light in gauge causes a loss in damping factor (the ability of the amplifier to control the motion of the speaker) and also consumes power (the power from the amplifier heats up the wire for your particular situation. To calculate your speaker impedance, use Figure 3).

4-4. INPUT PADS. If input signal levels are too great, the input stage may be overdriven and cause distortion. The solution in such cases is to use an input pad. A 30 dB pad can be made by using a Switchcraft connector (part #S3FM) with the resistor network shown in Figure 4.

4-5. PATCHING. Figures 5 through 8 show possible ways of patching external equipment into the SR mixer. They are by no means the only patches possible. If you want to try a patch that is not illustrated, consult the Block Diagram to determine if your patch is possible. When patching external equipment into the signal chain, best results will be obtained by following these rules:

Use the highest quality patch cords available and keep them as short as possible.

Avoid patching a buss output back into its input (an example of this is patching a phase shifter from the EFFECTS OUT and returning it to the input of a channel which has its EFF/REV control turned up; doing so may result in oscillation (possibly inaudible) that can damage loudspeakers and create distortion.

FIGURE 1

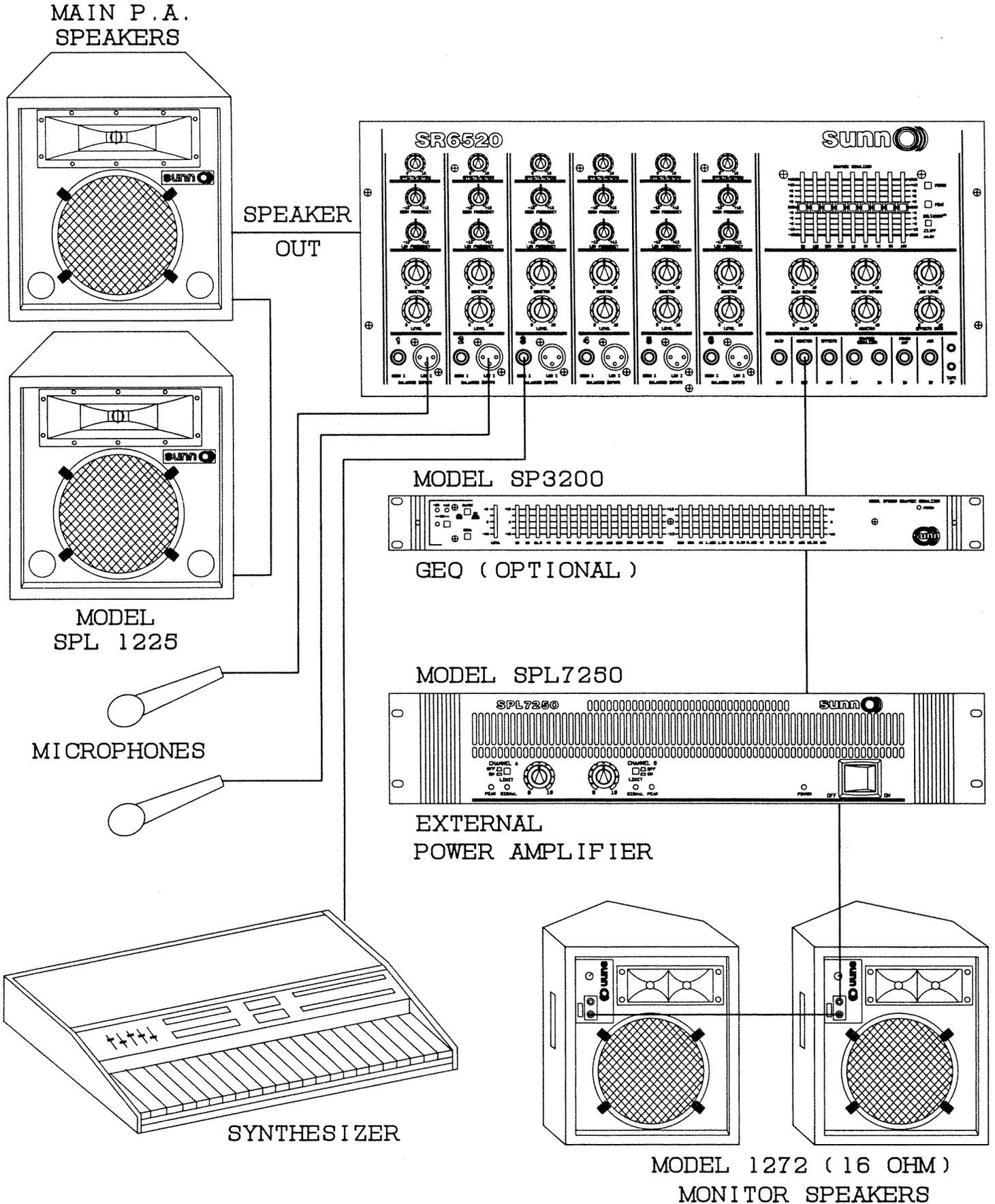


FIGURE 2

Speaker Wire Length	100'-UP	8	10	12	14
	50'-100'	10	12	14	16
	*25'-50'	12	14	*16	18
	10'-25'	14	16	18	18
	0'-10'	16	18	18	18
		2Ω	4Ω	*8Ω	16Ω
		Speaker Impedance			

*Example- The length of speaker wire required is between 25 and 50 feet and the speaker impedance is 8 ohms. The minimum recommended gauge speaker wire is 16 gauge.

FIGURE 3

CHART A

Parallel Impedance

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_t}}$$

Cabinet B Impedance	16	1.8	3.2	5.3	8
	8	1.6	2.7	4	5.3
	4*	1.3	2	2.7*	3.2
	2	1	1.3	1.6	1.8
		2	4	8*	16
		Cabinet A Impedance			

* Example- Cabinet A is 8 ohms. Cabinet B is 4 ohms. The total impedance when connected in parallel is = $\frac{1}{\frac{1}{8} + \frac{1}{4}} = 2.7$ ohms.

$$\frac{1}{\frac{1}{8} + \frac{1}{4}}$$

CHART B

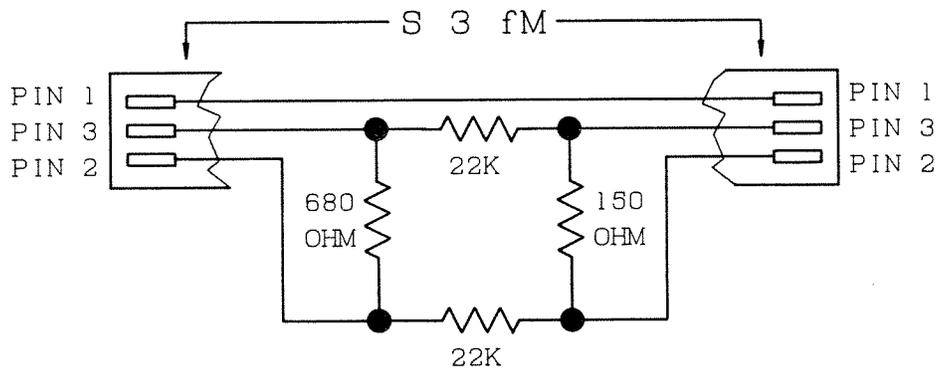
Series Impedance

$$R_T = R_1 + R_2 + \dots + R_t$$

Cabinet B Impedance	16*	18	20*	24	32
	8	10	12	16	24
	4	6	8	12	20
	2	4	6	10	18
		2	4*	8	16
		Cabinet A Impedance			

* Example- Cabinet A is 4 ohms. Cabinet B is 16 ohms. The total impedance when connected in series is = 4 + 16 = 20 ohms.

FIGURE 4

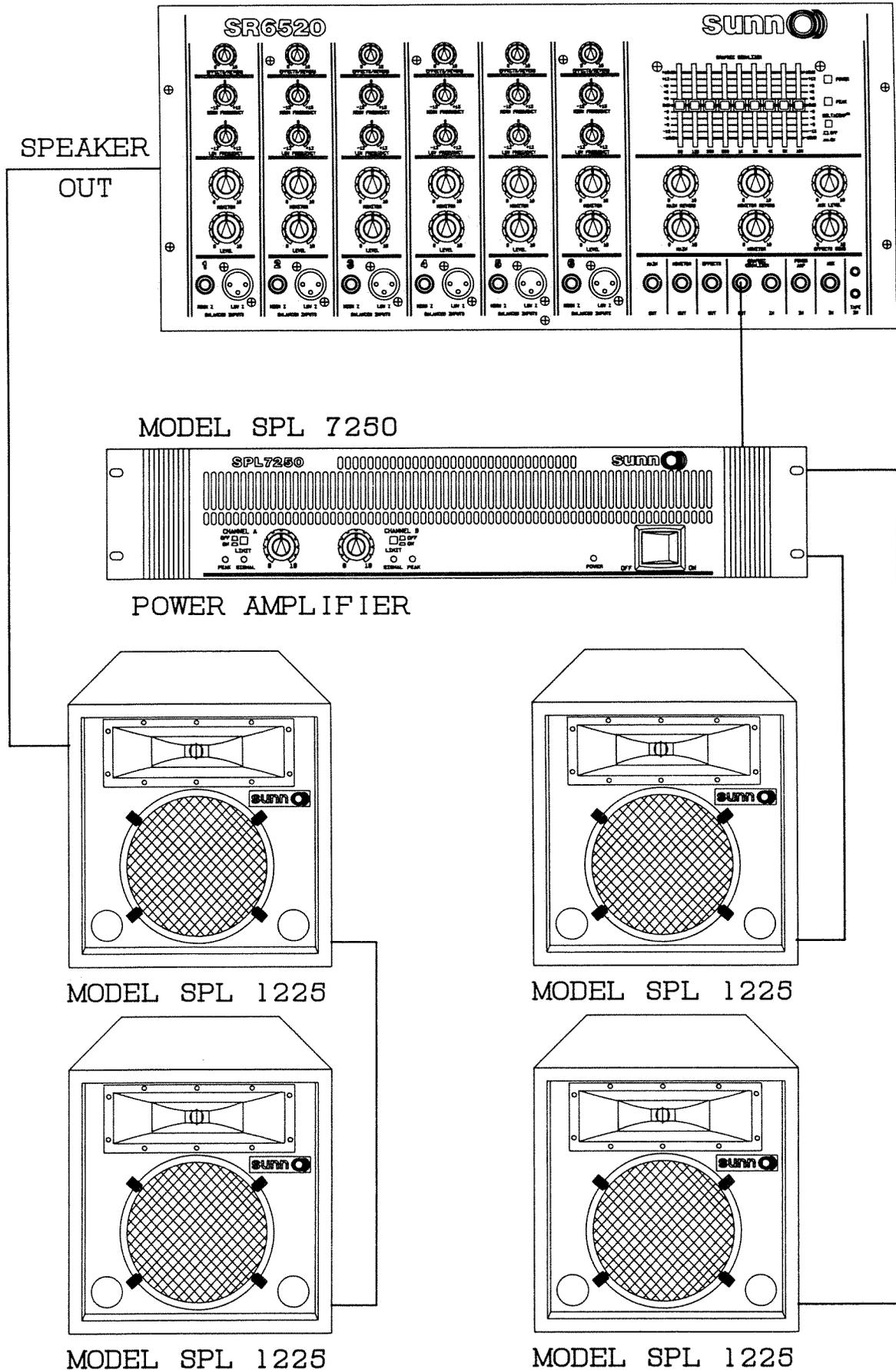


30dB PAD

ALL RESISTORS 5%, 1/4 WATT

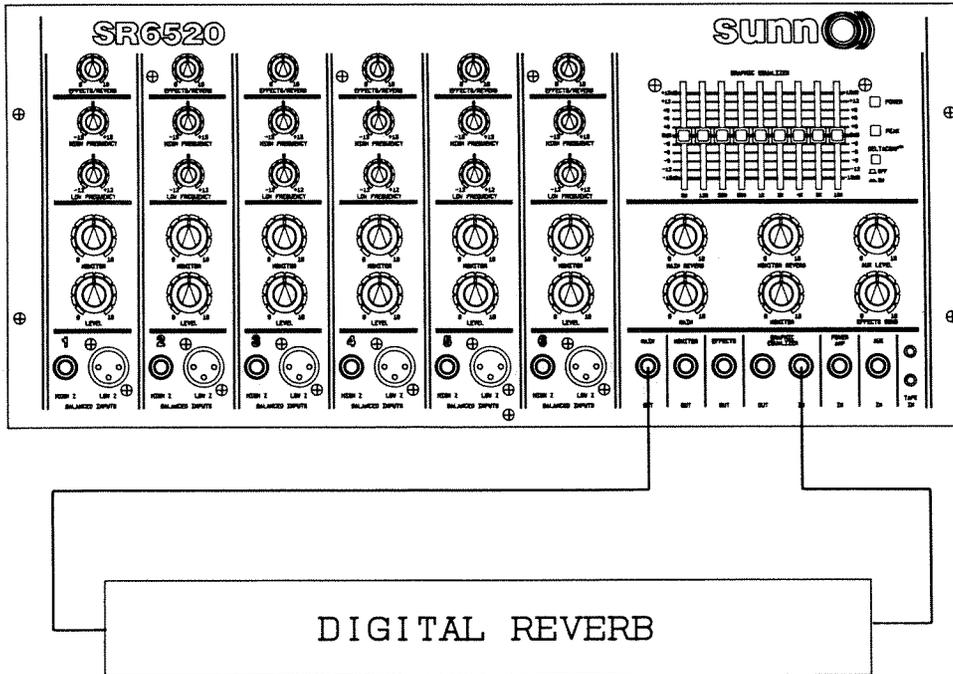
FIGURE 5

USING AUXILIARY POWER AMP FOR MORE POWER



USING A SIGNAL PROCESSING DEVICE
IN LINE WITH THE MAIN SIGNAL PATH.

FIGURE 6



PATCHING AN EFFECT BETWEEN THE
EFFECTS OUT AND THE AUX IN.

FIGURE 7

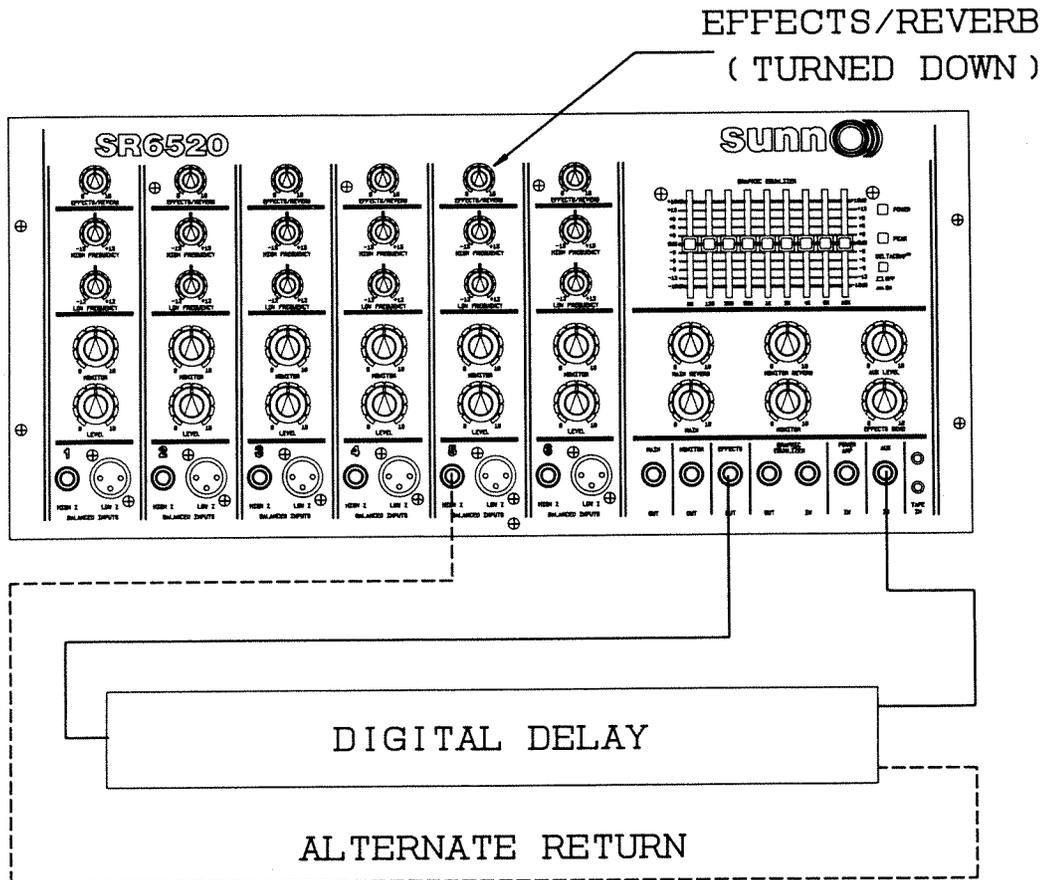
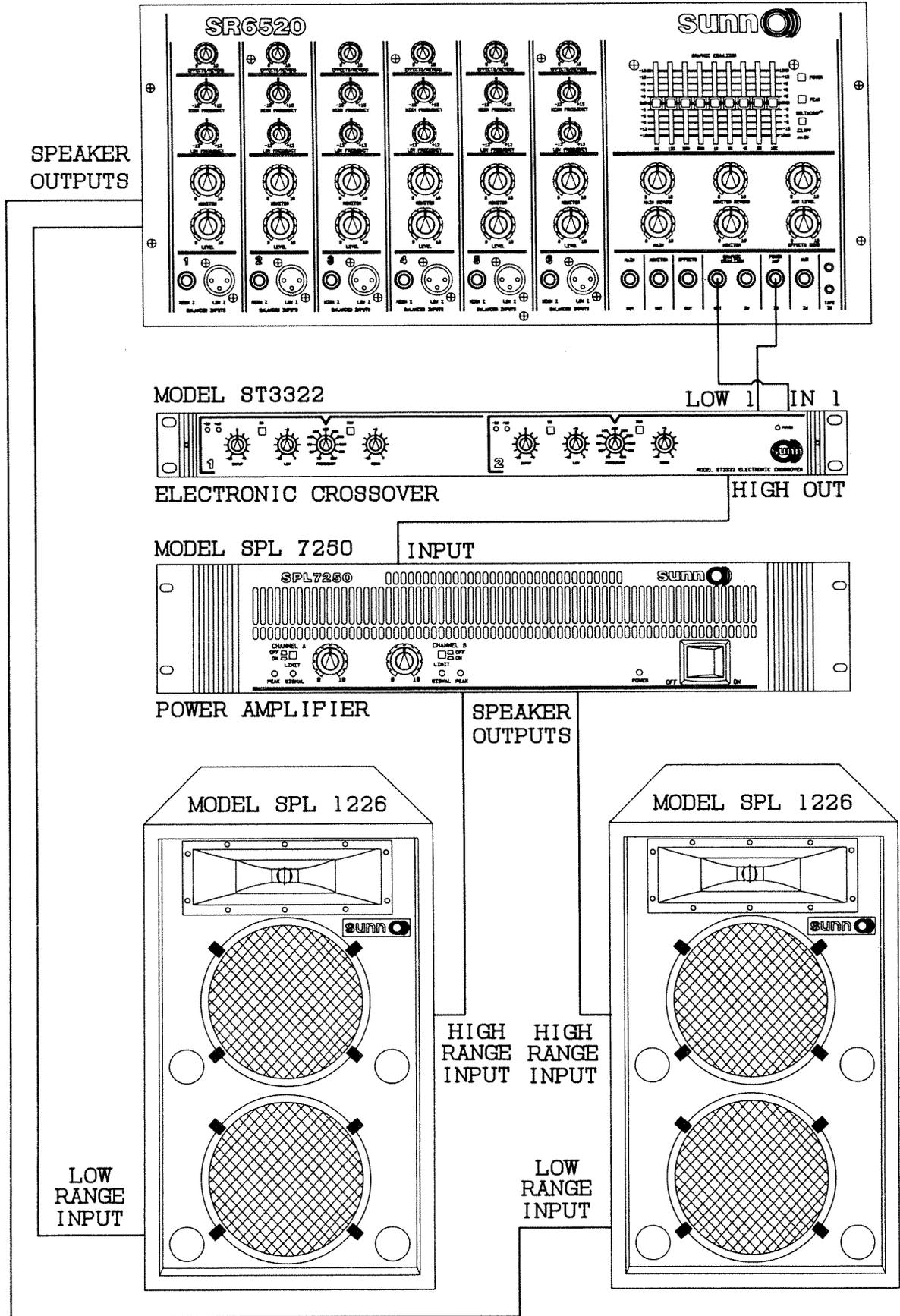


FIGURE 8

BIAMPING THE MAIN P.A. SYSTEM



(MAKE SURE CROSSOVER IS SET TO EXTERNAL)
 ANY LOUDSPEAKER IN THE SPL SERIES MAY BE USED THIS WAY.

Do not use a mic level effect, such as an effect intended for guitar, with a line level signal, such as the Main or Graphic EQ output.

5. SPECIFICATIONS

GAIN

	AT MAIN OUT	AT SPEAKER JACK
Gain, LO Z in	45dB	73dB
HI Z in	25dB	53dB
Aux in	14dB	42dB
Tape in gain	14dB	42dB
Power amp in	—	28dB

CHANNEL EQUALIZER

Low frequency range: +/- 12dB at 100Hz.
High frequency range: +/- 15dB at 10kHz.

GRAPHIC EQUALIZER

Graphic equalizer range +/- 15dB at 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, and 16kHz.

POWER AMPLIFIER

Power output: 520 Watts, at T.H.D. less than 0.2%, at 2 Ohms.
350 Watts, at T.H.D. less than 0.1%, at 4 Ohms.

Frequency response: 20Hz to 20kHz +0dB, -1dB, at 4 Ohms.

Damping factor: Greater than 100, at 1kHz using a 4 Ohm load.

Sensitivity: 1.19 Volts required for 520 Watts at 2 Ohms.
1.39 Volts required for 350 Watts at 4 Ohms.

Slew factor: 1.8

Signal to noise ratio: 98dB

OVERALL SIGNAL TO NOISE RATIO

Main at 5, all equalizers set to "flat" and all channels at zero and, reverb at zero: 88dB

6. UPKEEP AND SERVICE

The SUNN SR powered mixers have been designed to give years of trouble-free service. With a few precautions you can help to insure its continued reliable service.

Do not obstruct the air vents on the rear panel.

Transport the mixer with care.

Periodically inspect the mixer for damage which may occur during transportation.

If you leave the mixer set up when you are not using it, protect it from dust with a soft cover.

DO NOT SET FOOD OR BEVERAGE on the SR powered mixer — this cannot be overemphasized. Spilling a drink can be the quickest way to ruin a potentiometer (fader, level control, EQ control) or switch.

When using the mixer outdoors, protect it from moisture (rain, sprinklers, beer, etc.).

Periodically clean the mixer by wiping the front and rear panels with a soft cloth and a small amount of furniture polish.

Sunn is a product line of
FENDER MUSICAL INSTRUMENTS
1130 Columbia Street, Brea, California 92621