crown

Serial No. _____

Issued To _____

INSTRUCTION MANUAL

STRAIGHT LINE ONE
PREAMPLIFIER

CROWN INTERNATIONAL, INC. 1718 W. MISHAWAKA RD. ELKHART, INDIANA 46514

crown

The information furnished in this manual does not include all of the details of design, production, or variations of the equipment. It does not cover all the possible contingencies which may arise during operation, installation, or maintenance. Should special problems arise, or further information be desired, please contact the Crown International Customer Services Department.

Crown International
1718 W. Mishawaka Rd.
Elkhart, Indiana 46514
Ph: (219) 294-5571

WARNING

TO PREVENT SHOCK OR FIRE HAZARD DO NOT EXPOSE TO RAIN OR MOISTURE!

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION 1
GENERAL INFORMATION

1.1 Introduction

This manual is intended to familiarize you with the CROWN SL-1 stereo preamplifier (Fig. 1.1), including its installation, operation and maintenance. While this text is divided for quick reference, a careful reading of the entire manual will assist you in obtaining optimum performance and enjoyment from the unit. We also suggest that at this time you read the Crown warranty (located just inside the title page), and become familiar with its requirements and conditions. Adherence to the terms of the warranty will help to assure your satisfaction with the CROWN SL-1 stereo preamplifier.

Fig. 1.1 SL-1 Stereo Preamplifier

1.2 Purpose of Equipment

The SL-1 is a control device designed to interface a power amplifier with various signal sources in a stereo system: tuners, tape machines and auxiliary signal processing equipment. While its styling and performance makes it a perfect companion to the CROWN PL-1 power amplifier, the SL-1 complements virtually any high quality stereo power amplifier.

Behind its modest 19″ x 3½″ rack-mountable front panel, the SL-1 is a truly sophisticated, high-performance preamplifier, created for the audiophile. The functional no-frills design of this unit has emerged from Crown's long-established audio expertise and our strong desire to further advance state-of-the-art audio. The CROWN SL-1 is the closest yet we have come to the ideal "switchable wire with gain". That is, the unit contributes very little to the input signal as it manipulates the program level, balance and input selection.

1.3 Features

Ultra-low harmonic & intermodulation distortion.

Excellent signal to noise ratio (very quiet).

Higher slew rate for low TIM and wide frequency response.

Left and right channel Overload indicators monitor signal level at critical circuit points to help avoid distortion.

Remote SL-1PM Phono Preamplifier Module minimizes hum, and avoids high frequency losses by reducing cartridge-turntable distance; also optimizes phono performance through selectable gain and input impedance.

Stepped, calibrated VOLUME and BALANCE controls that allow for precise, repeatable settings; the controls are designed to reduce noise as the level is reduced, and to maintain full headroom at all settings.

Handsome 19″ rack mountable package with machined front panel, carrying handles and nickel-plated chassis parts.

Turn-ON delay blocks transients to protect speakers.

1.4 Units and Accessories Supplied

1 instruction manual
1 SL-1PM remote phono preamp module
(includes stereo phono output cables
and umbilical cable)
1 rack mounting hardware kit
- 1 allen wrench
- 4 cable ties
- 6 shorting input plugs
- 2 pin-pin cables
- 1 2-3 AC ground adapter

1.5 Service Policies

Due to the sophisticated circuitry of your unit, only qualified, fully trained technicians should be allowed to service it. Please observe the following label on the rear panel. **CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT OPEN. NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO A QUALIFIED TECHNICIAN.**

For service, return the unit to the factory in the original packing or in replacement packing obtainable from the Crown factory. For warranty service, the unit must be returned to the factory or an approved service station. In either case, enclose a brief letter explaining the problem you are experiencing. This will help to insure a speedy and effective response.

Crown will pay shipping costs for warranty service upon receiving copies of all shipping receipts.

Before returning your unit to the factory for service, authorization should be obtained from the Technical Service Department . All shipments should be sent by either UPS or truck freight (insured). The factory will then return your serviced unit by the above method.

Upon receipt of the warranty registration card from your dealer, Crown will automatically send you the Crown Care Card. This is a plastic, wallet-sized card. This is your warranty certificate.

Embossed on it will be your name and current address, the model number and serial number of your new Crown unit, and the expiration date of the warranty on that product.

Crown will replace lost Care Cards at no charge and will issue new cards for repurchased units.

When you need service for your unit from an authorized Crown Service Station, simply present your Crown Care Card. It is all the identification you need. With it, the service station can promptly initiate any needed paperwork. It will save you time and effort.

The Crown Care Card is also your proof of ownership should you need it for insurance or legal reasons. It is also a convenient place to look for the serial number should you want to write to the factory for any reason.

1.6 Glossary of Terms

A-B Test: Evaluating relative performance of two (or more) components or systems by changing quickly from one to the other. Most high fidelity dealers have A-B test facilities.

AGC: Automatic Gain Control. A type of circuit used to maintain the output volume of a receiver constant, regardless of variations in the signal strength applied to the receiver.

Attenuation: A decrease in signal magnitude from one point to another, or the process causing this decrease.

Balanced Input: A three wire input system where the voltages and currents in two of the wires are equal in magnitude but opposite in polarity with respect to ground which is the third wire. The impedance of a balanced input is usually low. (600 ohms or less)

Balun: A device used for the transformation from an unbalanced line or system to a balanced line or system, or vice versa. The term is derived from balance to unbalance transformer.

Bandpass Filter: A filter that allows transmission of alternating signals whose frequencies are between given upper and lower cutoff values, while substantially attenuating all frequencies outside this band.

Biamp: The use of independent amplifiers to feed the bass and treble portions of a loudspeaker or loudspeakers with a crossover network. The purpose is to help reduce intermodulation between bands when a system is overloaded. It also reduces the cost of implementing good, low loss precision crossover networks.

Butterworth Filter: A filter that exhibits the flattest possible response in the passband. The response rolls off smoothly into the stop band, where it approaches a constant slope of 6**n** db/octave; where **n** is the number of poles in the network,i.e. a single pole is 6dB, two pole 12dB, 3 pole 18dB, etc.

Capture Ratio: The ability of a receiver to reject a weaker station whose frequency is the same as that of the desired station. This measurement will be in dB. The smaller the figure, the better the spec.

Ceramic Filter: A bandpass filter using a piezoelectric substrate material.

Channel: A channel is a complete sound path. A single channel, or monophonic system, has one channel. A stereophonic system has at least two full channels designated as left (A) and right (B). Monophonic material may be played through a stereo system; both channels will carry the same signal. Stereo material, if played on a monophonic system, mixes and emerges as a monophonic sound.

Channel Separation: Specified in dB, channel separation is the ratio of the measurable output of one channel to the unwanted output of the (undriven)opposite channel.

Clipping: The truncation of peaks of a signal due to exceeding the operating range of an electronic circuit. Normally, it refers to the result of voltage limitations in the circuit.

Corner Frequency: The frequency at which a filter goes from a condition of passing the signal unattenuated to "rolling off" or attenuating the signal according to its frequency. It is sometimes referred to as the "cutoff" frequency or the "break" frequency. It is also defined as 3dB below the unattenuated output level of the signal.

Cross Modulation: In FM signals, a type of intermodulation that occurs when the carrier of the desired signal is modulated by an undesirable signal. Each signal is of independent origin.

Crossover Frequency: The frequency at which a dividing network delivers equal power to the upper and lower frequency channels when both are terminated in specified loads.

Crossover Network: A selective network used to divide the audio frequency output of an amplifier into two or more bands of frequency. The band below the crossover frequency is fed the woofer loudspeaker while the high frequency band is fed to the tweeter. Also called dividing network and loudspeaker dividing network.

Crosstalk: Signal leakage from one signal source into another.

Damping: Controlling of vibrations, response, or resonances which if unchecked, would cause coloration of the sound.

Damping Factor: A numerical indication of an amplifier's ability to decrease unwanted loudspeaker movements. Damping factor can be found by dividing the load impedance by the amplifier's output impedance.

Decibel: A numerical expression of acoustic or electrical ratios, such as the relative intensity of a sound or the relative strength of a signal. One (dB) is about the smallest change in sound perceptible to the ear.

Decoder: A matrix of logic elements that selects one or more output channels according to the combination of input signals present. Can be used in FM to recover stereo signals of a stereo encoded multiplex transmisssion.

De-emphasis: In FM signals, restoring the pre-emphasized (for proper transmission characteristics) signal to result in a "flat" frequency response curve.

Distortion: Unwanted noise, or sounds which didn't exist in the studio when the original recording was made. Harmonic distortion produces tones harmonically related to a single, pure tone. Intermodulation distortion (IM) introduces new tones caused by mixing of two or more original tones. Phase distortion, or non-linear phase shift, disturbs timing sequence between a tone and its related overtones. Distortion which create new spectra are expressed in percentages and phase distortion in degrees of phase shift or seconds of group delay vs. frequency errors.

Dynamic Range: The difference between the most intense and the least intense levels in a sound system.

EAROM: EAROM stands for Electrically Alterable Read Only Memory which is an integrated circuit chip used to store information without power applied (used in the FM-1).

Equalization: Frequency response manipulation to meet the requirements of recording, and an inverse manipulation on playback to restore the original Also known as compensation for acoustic problems of listening rooms.

Feedback: Sending a "part" of a system's output back to the input. Positive feedback may lead to unstable conditions such as PA system "howling" due to sound from the speakers being fed back thru the microphone and amplified again. Another form is low frequency interference created when vibrations from loudspeakers are picked up by the cartridge and amplified again. However, carefully controlled negative feedback in electronic circuits can be used to help reduce distortion and control stability.

Flutter: Rapid variation in the speed of a turntable or tape transport. Flutter causes a wavering of musical pitch.

Frequency Response: This term indicates any amplitude variations in a system output signal with respect to frequency. This measurement is made with a constant level input signal.

Gain: The ratio of an amplifer's output voltage to its input voltage.

Headroom: Stated in dB, headroom is the difference between the signal level and the limits of the sound system ie; the ratio of power available to power used.

Hertz: As in cycles-per-second, not rental agency.

High Pass/Low Pass Filter: High pass - a filter having a single transmission band extending from some critical, or cutoff, frequency other than zero, up to infinite frequency. Low pass - a filter network which passes all frequencies below a specified frequency with little or no loss but discriminates strongly against higher frequencies.

IF: An Intermediate Frequency is a frequency to which a signal wave is shifted locally as an intermediate step in FM transmission or reception.

Image Response: Response of a superheterodyne receiver to the image frequency, as compared to the response to the desired frequency.

Input Sensitivity: The input voltage required to drive an amplifier to its rated output.

IOC™: Stands for Input-Output Comparator. An extremely sensitive Crown circuit used to indicate, via a front panel LED, the fact that the operating limits of an amplifier are being exceeded resulting in output non-linearity.

LED: Light Emitting Diode. A PN junction that emits light when biased in the forward direction.

Limiter: A circuit in which the output amplitude is substantially linear with regard to the input up to as pre-determined value and substantially constant thereafter.

Load: A device that absorbs power and converts it into the desired form.

LSI: Large Scale Integration is an integrated circuit chip housing a large number of active devices.

Mixer: A device having two or more inputs, usually adjustable, and a common output, which operates to combine linearly in a desired proportion the separate input signals to produce an output signal.

Monitoring Amplifier: A power amplifier used primarily for evaluation and supervision of a program.

Multipath Delay: In FM the existence of more than one signal path between transmitter and receiver The two signals arriving at different time causes distortion.

Music Power: This rating expresses the ability of an amplifier to handle short duration power peaks, as opposed to sustained power levels. An amplifier may only be capable of putting out 45 watts if that level is continuous, but it may be able to handle 60 watt peaks (such as might occur in a musical passage), if the peaks do not last too long.

Muting Circuit: In FM, a circuit which cuts off the receiver output when the r-f carrier reaching the first detector is at or below a pre-determined intensity.

Pre-emphasis: A process in a system designed to emphasize the magnitude of some frequency components with respect to the magnitude of others, to reduce adverse effects, such as noise, in subsequent parts of the system.

PLL: Phase Lock Loop; a circuit for synchronizing a variable local oscillator with the phase of a transmitted signal.Can be used in FM as a synthesizer circuit as well as a stereo decoder in the multiplex system.

Polar Curve: A pattern used to show the directional characteristics of antennas, microphones or speakers.

Quartz Crystal: A complete assembly, comprising a piezoelectric quartz-crystal element mounted, housed, and adjusted to the desired frequency. Such a device is commonly employed for purposes of frequency control, frequency measurment and electric wave filtering.

Rotor: A motor driven assembly which turns an antenna so that it can be aimed in the direction of best reception.

SAW Filter: Surface Acoustic Wave; commonly used as a bandpass filter. Device transmitts surface acoustic waves on a piezoelectric substrate. Used in the FM-1 for low FM distortion.

Selectivity: In FM a measure of the extent to which a receiver is capable of differentiating between the desired signal and disturbances at other frequencies.

Sensitivity: A receiver specification indicating the smallest input signal strength required to produce an output signal whos characteristics are standardized and used as a reference.

Signal: A visible, audible or other conveyor of information.

Signal-To-Noise Ratio: Measured in dB, signal to noise ratio is a relative term meaning the ratio between the desired output signal and the interference or noise. A typical figure would be 60dB which stands for a ratio of 1000-1.

Superheterodyne: A method of receiving radio waves in which the process of heterodyne reception is used to convert the voltage of the received wave into a voltage of an intermediate, but usually superaudible frequency, that is then detected.

Synthesizer: A Phase Lock Loop (PLL) system which constructs an oscillator signal by phase locking it to a reference times (X) the ratio of two integers (reference is usually a quartz crystal osciallator).

Triamp: The use of three separate amplifers to drive the high, middle and low frequency sections of a speaker system.

Varactor: A two terminal semiconductor device in which the electrical characteristic of primary interest is a voltage-dependent capacitance. Used in FM tuner inputs for voltage controlled timing.

Wow: Distortion caused in sound reproduction by slow variation in speed of the turntable or tape. (See flutter).

SECTION 2

SPECIFICATIONS/PERFORMANCE

2.1 Performance Specifications

Frequency Response: Tape, Aux, Tuner or Phono In to Main Out, ±.1dB from 10Hz to 20KHz. Sl-1 remote module alone, within 0.5dB of RIAA curve, 20Hz-20KHz.

Hum and Noise: From 20Hz to 20KHz the hum and noise level is 97dB below the rated output; 101dB below rated output A weighted.

Phase Response: ±10°, 20Hz to 20KHz with IHF load.

Harmonic Distortion: Less than 0.0009% from 10Hz to 20KHz maximum rated output. Less than 0.0003% at 1KHz with IHF load.

Intermodulation Distortion (IM): Less than 0.00055% at rated output; 60Hz & 7KHz, 4:1.

Slewing Rate: 12 volts per microsecond.

Low Cut Filter: 18dB per octave slope, down 3dB at 33Hz.

2.2 Input and Output Characteristics

Input Impedance (RCA pin jacks, unbalanced): SL-1 rear panel jacks, 25K ohms ±10%. SL-1PM remote phono module, 47,000 ohms or 100,000 ohms in parallel with 5pf (switch selectable).

Input Sensitivity: At maximum VOLUME, 20dB (250mv RMS) applied to any SL-1 INPUT jack yields full rated output.

Output Impedance (RCA pin jacks, unbalanced): SL-1 Main Outputs, 600 ohms actual; will drive low or high impedance terminations.

Output Level: SL-1 Main Outputs, rated at 2.5V. SL-1 Tape Outputs carry same level as the output of the device selected with the SL-1 INPUT switches.

Transient Surge Protection: Relay grounds Main Outputs for 7 second delay when AC POWER is switched ON, and immediately when AC POWER is switched OFF.

2.3 General Physical and Electrical Specifications

Controls: SL-1; POWER On/Off, INPUT selector switches (Phono, Tuner, Aux 1, Aux 2), low cut FILTER switch, stepped output BALANCE control (15dB in 1dB increments, plus full kill of either channel), stepped output VOLUME control (60dB range in 2dB increments, plus full kill of both channels).

Indicators: One POWER ON LED (light emitting diode); Left and Right OVERLOAD LED's flash ON whenever signal levels reach threshold of clipping in either channel (a peak hold circuit aids visibility in the event of brief transient overloads).

AC Mains Requirements: Power supply may be restrapped to any of 5 nominal line voltages: 100, 120, 200, 220 and 240 volts AC (±10%); line frequencies of 50Hz, 60Hz or 400Hz.
Total accessory AC outlet consumption is rated at 1500 watts (1200 watts maximum for all switched outlets, together).

Mains Fuse: Power transformer primary is protected by a series connected fuse, ⅛ amp.

Circuitry: All solid state, discrete transistors and diodes plus integrated circuits.

Construction: Machined front panel with black annodized finish; nickel-plated chassis parts; handles included.

Dimensions: SL-1 has 3½" high x 19" wide rackmountable front panel and measures 7¾" deep behind the face of the rack. (8.89cm H x 48.26cm W x 19.69cm D).
SL-1PM is 1¾" high x 4½" wide x 5¾" dep (4.5cm x 10.8cm x 14.6cm), excluding cables.

Net Weight: 10 pounds (4.55kg), including SL-1PM.

2.4 Performance Graphs

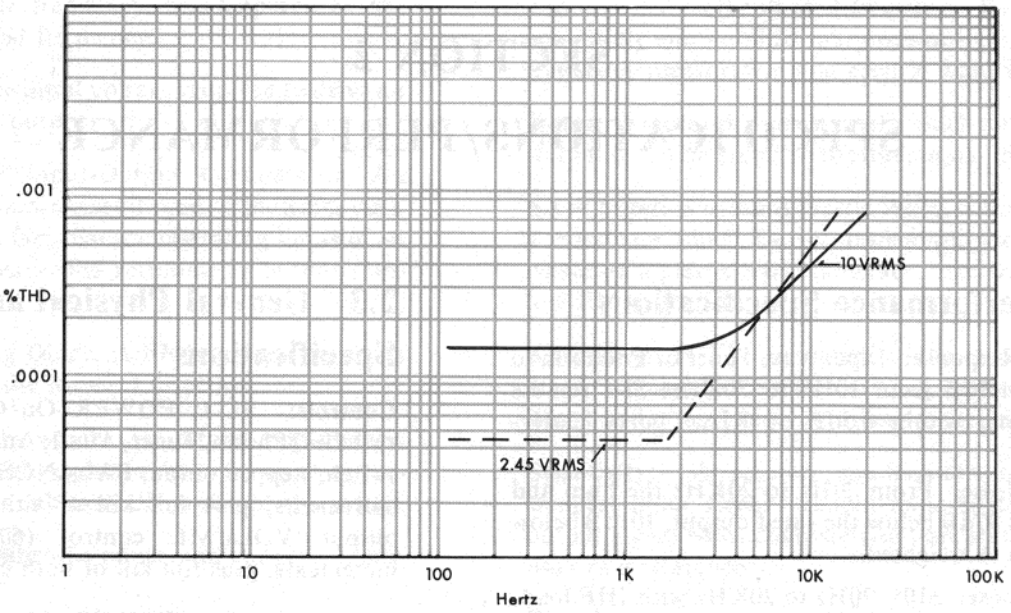


Fig. 2.1 THD

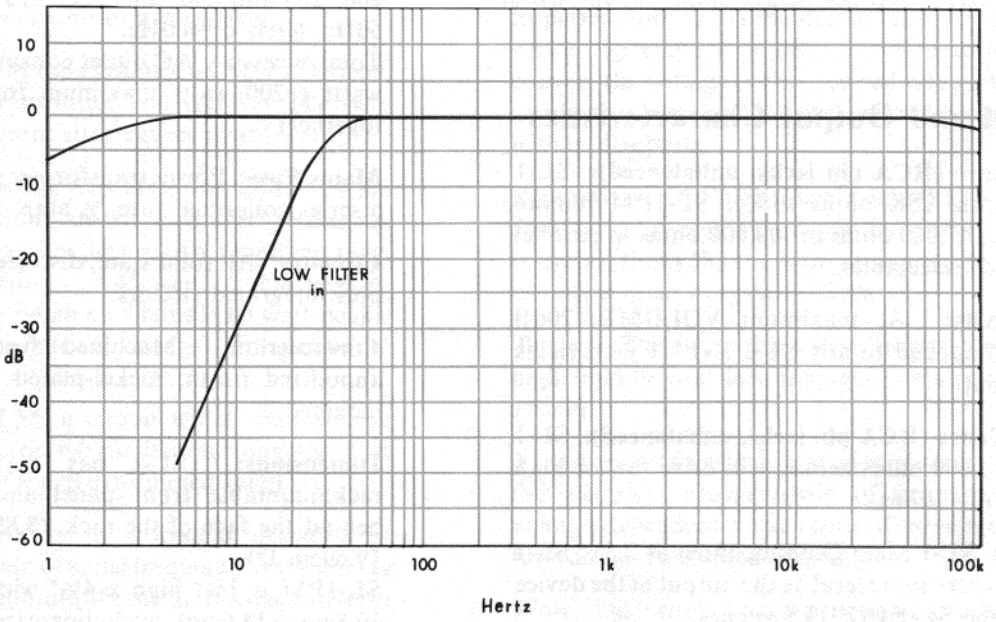


Fig. 2.2 FREQUENCY RESPONSE

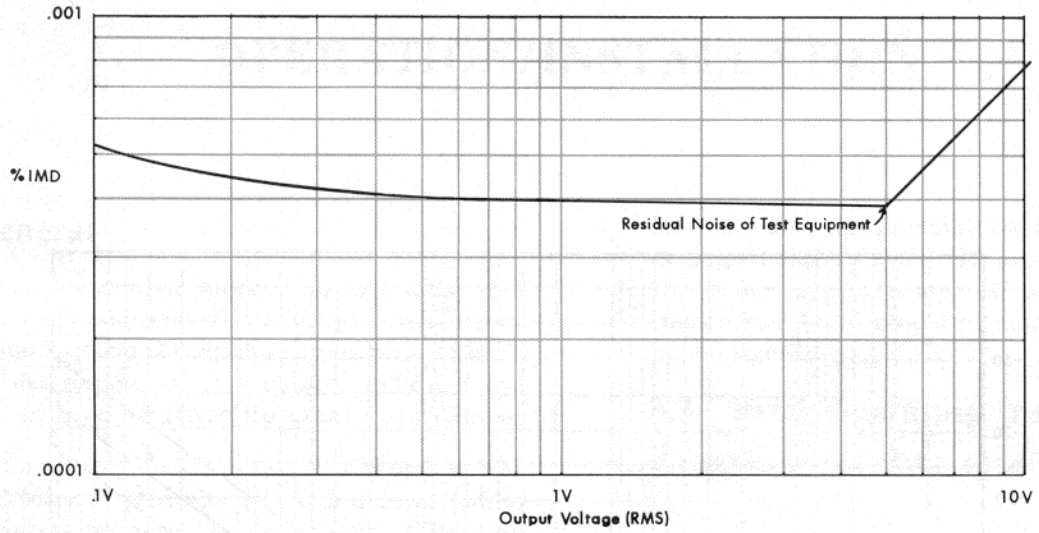


Fig. 2.3 IM DISTORTION

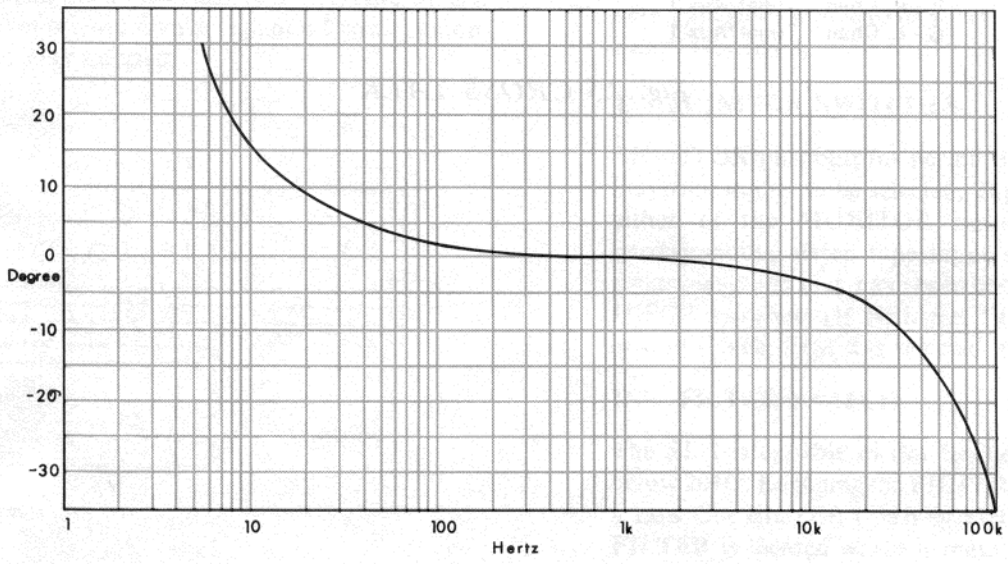
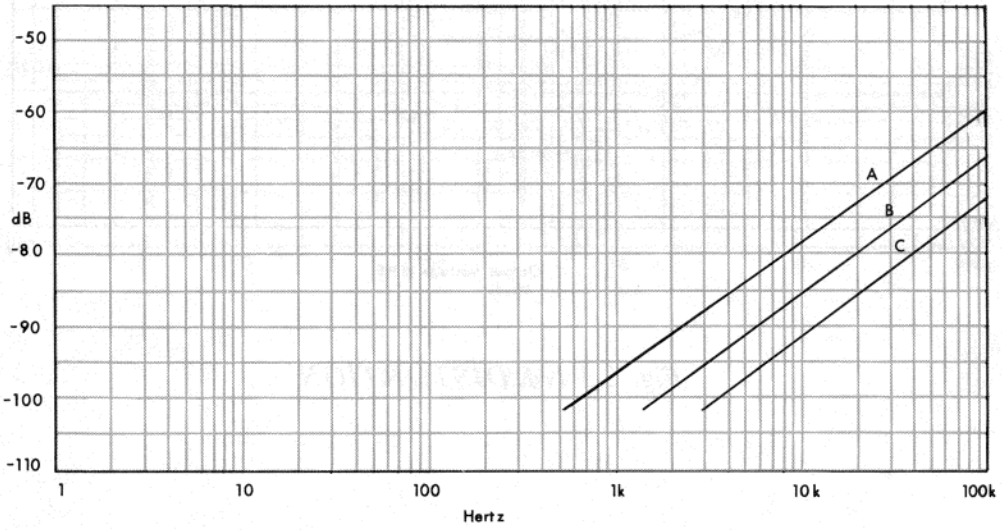


Fig. 2.4 PHASE RESPONSE



A - L. Chan. Tuner/Phono
B - R. Chan. Tuner/Aux 1
C - L. Chan. Tuner/Aux 1

Fig. 2.5 CROSS TALK

SECTION 3

OPERATION/INSTALLATION

3.1 General

This section contains basic information on how the SL-1 can be mounted and installed as an integral part of your existing sound system. Diagram callouts provide basic functional descriptions of each control, indicator and jack. Also included are several operating precautions.

Note: The term "tuner" refers to an AM, FM or AM/FM radio. A "receiver" generally refers to a combination radio and integrated amplifier/preamplifier. Generally, it would be superfluous to use the SL-1 with a receiver. For this reason, we use only the term "tuner" when discussing radio inputs, even though the line level output of a receiver could serve the same purpose.

3.2 Physical Installation

The SL-1 front panel is 19" wide, and includes mounting holes that line up with the holes in standard Western Electric style equipment rack rails. (Fig. 3.1) Alternately, a custom cabinet of your own design or a Crown custom walnut cabinet may be used.

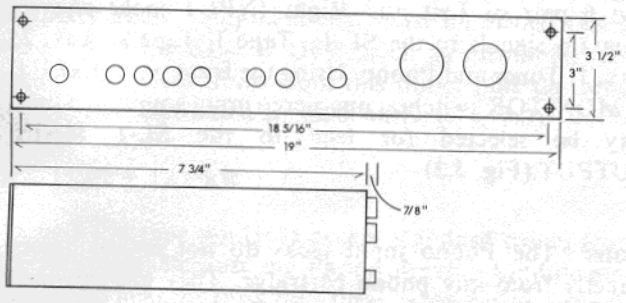


Fig. 3.1 SL-1 Mounting Dimensions

Ideally, the SL-1PM remote phono preamplifier module should be located as close as possible to the turntable. Not only does this minimize the length of cartridge-to-preamp cables (to avoid HF losses), it also avoids the chance of stray electromagnetic radiation from the power transformer being amplified along with the low level phono signal.

3.3 Brief Operating Instructions

A. POWER SWITCH & INDICATOR

When the POWER switch is engaged, the SL-1's internal circuitry mutes the Main outputs for 7 seconds. Also, the muting removes the outputs as soon as power is turned OFF. This prevents any possible turn-ON or turn-OFF transients ("pops" or "thuds") from reaching the power amplifier, and hence offers an extra degree of speaker protection.(Fig. 3.2)

B. INPUT SELECTOR SWITCHS

Interlocking INPUT pushbuttons permit the desired stereo program source to be selected; Phono, Tuner, Aux 1 and Aux 2.(Fig. 3.2)

C. MONITOR SWITCHES

MONITOR pushbuttons permit one of two stereo tape playback inputs to be selected, Tape 1 or Tape 2. When either of the MONITOR buttons is engaged, the corresponding stereo tape input will replace whatever program source may have been chosen with the adjacent INPUT switches. (If both the Tape 1 and Tape 2 are engaged, only Tape 2 is selected.)(Fig. 3.2)

D. FILTER SWITCH

The SL-1 is capable of flat frequency response to well below 20Hz. Engaging the FILTER pushbutton activates a Low Cut FILTER (-3dB @ 33Hz, 18dB/octave). The FILTER is located where it removes subsonic program content from the Main Outputs, but not the Tape Outputs. The FILTER is particularly useful for preventing turntable rumble or warped records from excessively driving the power amplifier at very low frequencies which are themselves inaudible, but which might otherwise create audible distortion by "using up"

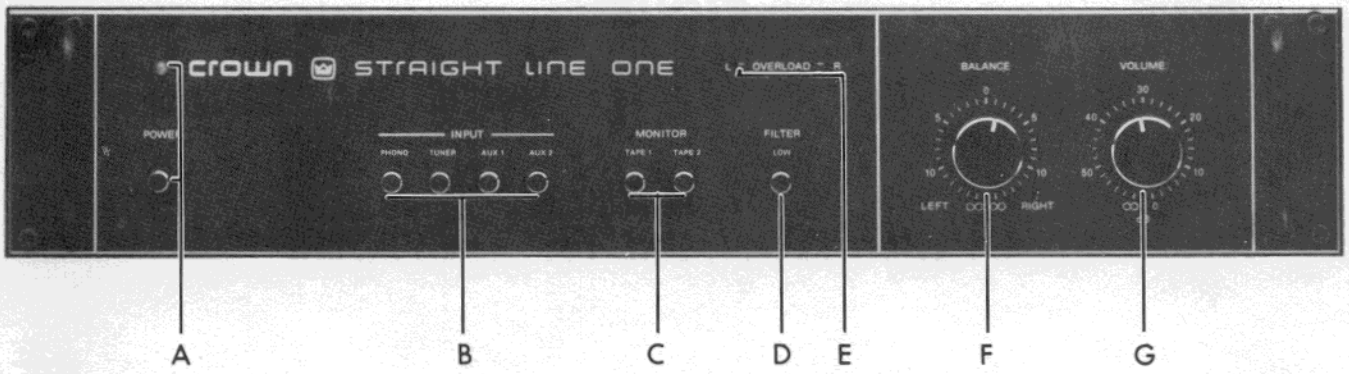


Fig. 3.2 SL-1 Front Panel

available amplifier power. Because it also lessens the chance of woofer damage in the event a phonograph tone arm is dropped, it is suggested that the FILTER always be engaged when playing records.(Fig. 3.2)

E. OVERLOAD INDICATORS

Separate Left and Right OVERLOAD lights (LED's) provide an immediate visual indication whenever the signal level is high enough to clip (causing harmonic distortion). Critical circuit points are monitored by each indicator, and a peak hold circuit ensures that even a brief transient overload condition will be visible. The operator thus has an opportunity to reduce gain before distortion reaches offending levels.(Fig. 3.2)

F. BALANCE CONTROL

When the BALANCE control is centered, the gain is the same for the left and right sides of the Main Outputs. The control-switch is detented and calibrated in precise 1dB steps over a 15dB range, plus there is complete shut-off of alternate channels at the two "infinity" settings. Thus, the program balance may be changed as required to correct the stereo perspective for input source inbalances, assymmetrical speaker location, or testing purposes. (Fig. 3.2)

G. VOLUME CONTROL

This detented control-switch is calibrated in precise 2dB steps over a 60dB range, which fully removes the output program when set at "infinity". Because the control is detented, VOLUME settings may be repeated with precision in critical listening situations. At the same time, the 2dB increments are sufficiently fine that VOLUME changes during a program will be heard as smooth transitions.(Fig. 3.2)

Note: All audio inputs and outputs are brought to standard RCA-type pin jacks (also known as phono jacks).

H. MAIN OUT JACKS

The SL-1 has two pair of identical Left/Right MAIN OUTPUT jacks. Labeled "1" and "2", the two pair of jacks enable the SL-1 to be connected simultaneously to two different stereo devices such as: a pair of stereo power amplifiers, one stereo power amp and one stereo output meter, etc. When a single stereo power amplifer is used, it makes no difference which MAIN OUTPUT is employed, 1 or 2.(Fig. 3.3)

I. TAPE OUT JACKS

The SL-1 has two pair of Left/Right TAPE OUTPUT jacks. Both carry the same program signal -- as selected with the front panel INPUT switches. (The "1" and "2" designations bear no direct relationship to the MAIN OUTPUT "1" and "2" jacks.) The TAPE OUTPUTS may be fed to the inputs of two different stereo tape machines, to one tape machine and one auxiliary signal processing device, etc.(Fig. 3.3)

J. INPUT JACKS

The 6 pair of Left and Right INPUT jacks convey program signals to the SL-1: Tape 1, Tape 2, Aux. 2, Aux. 1, Tuner and Phono. Using the front panel INPUT or MONITOR switches, one stereo input source at a time may be selected for feed to the SL-1 MAIN OUTPUT.(Fig. 3.3)

Note: The Phono input jacks do not accept cables directly from any phono cartridge. They are intended specifically for use with a preamplified, RIAA equalized phono input signal, such as that provided by the CROWN SL-1PM remote phono module. Crown designed the SL-1 around a remote phono preamplifier rather than building one into the unit. Long an established practice in professional broadcast and disc mastering studios, locating the phono preamp at the turntable minimizes hum and optimizes frequency response.

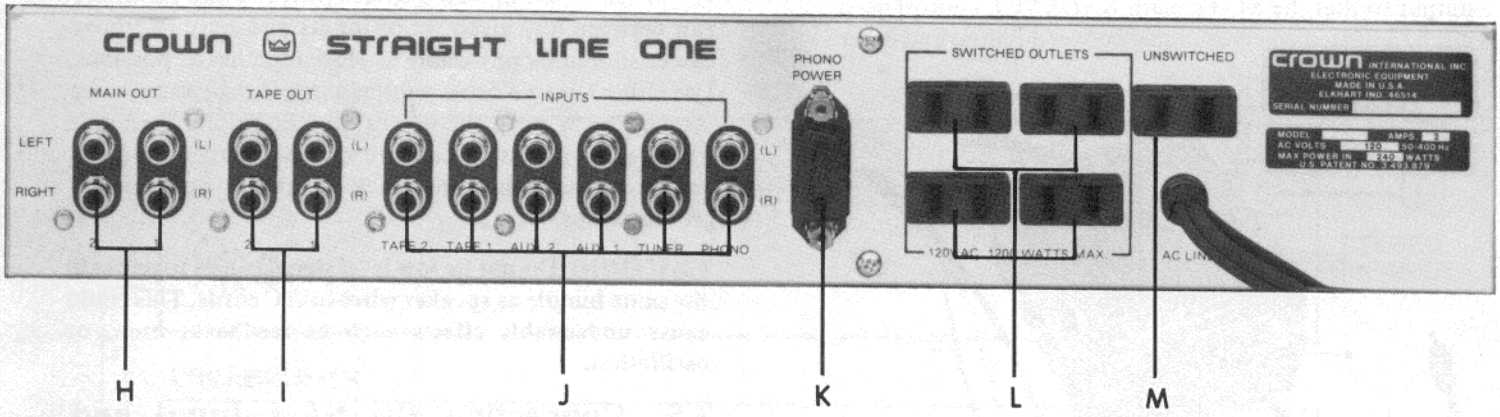


Fig. 3.3 SL-1 Rear Panel

K. PHONO POWER CONNECTOR

This 24 pin female connector supplies regulated bipolar 18v DC power to the SL-1PM remote phono preamp module via its permanently attached "umbilical" cable.(Fig. 3.3)

L. SWITCHED AC OUTLETS

These four AC power outlets are switched ON and OFF by the SL-1's front panel POWER switch. Since the SL-1 includes output muting (delayed ON) circuitry, it is safe to simultaneously switch ON the unit and other input devices such as: a tuner, a tape machine, an equalizer, a noise reduction system, etc. (Fig. 3.3)

M. UNSWITCHED AC OUTLET

This UNSWITCHED AC OUTLET is not subject to the SL-1 POWER switch. It should be used to power any auxiliary audio equipment that must be turned ON at times when the SL-1 is OFF (such as turntable). The maximum power drain from this outlet plus the other four should be limited to 1500 watts. (Fig. 3.3)

N. INPUT JACKS

These RCA-type pin jacks accept standard cables from the turntable. Because the Phono Preamp Module may be located near the turntable, these cables can and should be as short as possible.(Fig. 3.4)

O. OUTPUT CABLES

One set of output cables carries a preamplified, RIAA equalized stereo program to the SL-1's PHONO jacks. These are assembled with the DC supply cables in the umbilical cable. (Fig. 3.4)

CAUTION: THE SL-1PM OUTPUT CABLE MUST NOT BE CONNECTED TO THE PHONO INPUT OF ANY CONVENTIONAL STEREO PREAMP. The signal level is higher than that which conventional phono inputs are designed to accept, and will cause distortion and possible damage to equipment. If, for some reason, it is desired to power the SL-1PM from the SL-1 but to feed the SL-1PM's output to another preamplifier, connect the SL1-PM outlet cables to that preamplifier's AUX input jacks.

P. UMBILICAL CABLE

This permanently attached cable supplies bipolar 18v DC from the SL-1 to operate the SL-1PM. It also includes the two output cables from the phono module. (Fig. 3.4)

R. INPUT IMPEDANCE SWITCH

This switch selects either of two standard terminations for the cable from the turntable to the SL-1PM: 47,000 or 100,000 ohms. Proper cartridge termination is essential if the cartridge is to perform as specified, particularly with regard to high frequency characteristics. Consult the phono cartridge specifications to determine which load is best suited for your system.

S. GAIN CONTROLS

The SL-1PM provides separate GAIN controls for the left and right channels. These controls enable the gain to be adjusted from 30dB to 50dB for matching the output level of different cartridges to the nominal sensitivity of the preamp (this minimizes changes in level when switching the INPUT source). Conventional preamplifiers have a fixed phono gain stage followed by the main volume control, and are therefore apt to introduce excess noise or distortion. The SL-1PM permits the GAIN to be set properly in the first place,

avoiding the disadvantages of unnecessary signal manipulation. Further, the GAIN controls can be used to balance channel-to-channel differences in cartridge output so that the SL-1's main BALANCE control need not be adjusted when changing between Phono and other input sources.(Fig 3.4)

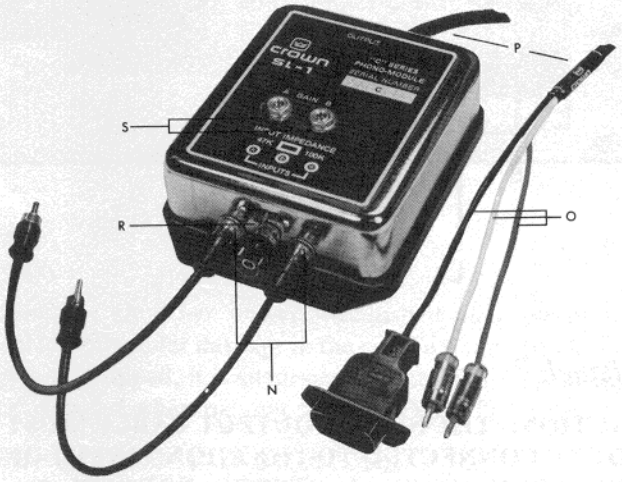


Fig. 3.4 SL-1PM Phono Preamp Module

3.4 Signal Cables

There is a friendly but active debate among many consumers and engineers as to the virtues of certain "ultra-audiophile" shielded signal cables, i.e., whether gold plated connectors are really necessary, whether 18 gauge center conductors make a difference, and so forth. There is, however, solid technical support for several areas of agreement:

1. Only shielded cables should be used, and there are significant differences between various makes.

2. The higher the density of the shield (the outer conductor), the better. Braiding is usually preferred over wrapping, and some braids are tighter (more dense) than others.

3. Center conductors should be at least 22 gauge or if possible even heavier. With a given wire gauge, the more individual strands the better.

4. Low capacitance cable is desirable (fewer pf/foot).

5. Connectors should be provided with strain relief, either by molded-on construction or via spring or sleeve style reliefs on non-molded cables.

6. Use cables that are only as long as necessary. NEVER USE CABLES LONGER THAN 10 FEET in unbalanced, high impedance circuits such as those between the SL-1 and its input and output devices. This prevents high frequencies from being attenuated by cable capacitance, and also avoids the likelihood of oscillations, or induced hum and noise.

7. When a pair of stereo cables (i.e., left and right) are run between any given set of inputs and outputs, those cables should be physically as close together as possible. Use either a stereo cable pair held together by their outer insulation, or keep the cables together along their full length using accessory cable ties. This greatly lessens the chance of hum and noise pick up due to assymetrical ground loops.

CAUTION: Do not tie low level signal cables together in the same bundle as speaker wires or AC cords. This could cause undesirable effects such as feedback, hum, or oscillation.

3.5 Connecting the SL-1 Input and Output Lines

Input and output connectors are located on the SL-1 rear panel, as shown in Fig. 3.3. (Connections to and from the SL-1PM remote phono preamplifier module are described in Section 3.6, and Fig. 3.4.)

It is always wise to remove power from the unit and to turn the VOLUME controls off (infinite attenuation) while making connections. In particular, make sure the power amplifier is turned OFF. Crown is not liable for damage incurred at any transducer due to its being overdriven by a loud signal. The use of speaker fuses is recommended.

Before making connections, consult Section 3.9 entitled "Operating Precautions".

In any installation, it is important to strive for compatibility between the input and output characteristics of the various equipment. Check the specifications if you are unsure whether the levels and impedances of interconnected equipment are compatible. Remember that "impedance" and "level" describe different things. In simple terms, "impedance" describes the amount of current an output will supply and how much opposition to current an input presents to the flow of an AC (audio) signal; impedance is similar to resistance, which describes opposition to the flow of DC current. "Level" describes the actual signal power (or voltage). As a rule, a low impedance output will drive a low or high impedance input, but a high impedance output will not drive a low impedance input.

Figs. 3.5, 3.6 and 3.7 depict a few typical stereo system configurations utilizing the SL-1 preamplifier.

3.6 Connecting the SL-1PM Remote Phono Preamp Module

The SL-1PM comes with one "umbilical cord" to take

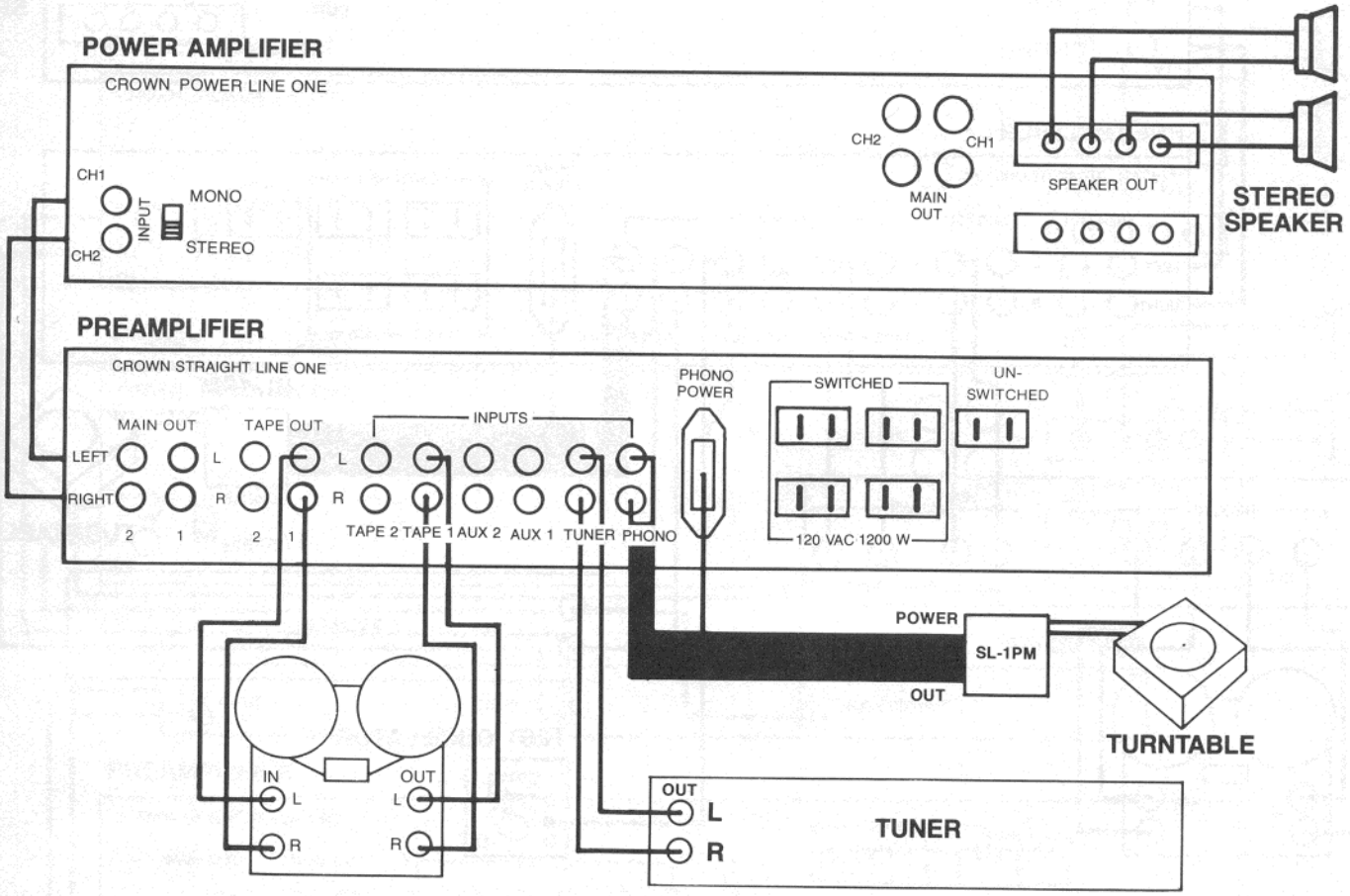


Fig. 3.5 Hook Up of Sl-1 in a Basic Stereo Sound System

power from the SL-1, and also to convey the preamplified phono signal to the SL-1 (Fig. 3.4). This cable should be plugged into its respective jack on the SL-1 rear panel (Fig. 3.3).

A short, low-capacitance type stereo cable should be connected between the turntable output and the SL-1PM input jacks.

When the SL-1PM is located as recommended, (next to the turntable), it should not be necessary to connect a separate ground wire between the two units. If, after the system is connected and tested, hum is heard only when the Phono INPUT is selected, a ground wire may have to be connected between the SL-1PM and the turntable chassis.

Move the SL-1PM's impedance selector to the setting that is closest to the recommended load for your phono cartridge, either 47k ohms or 100k ohms.

Before turn-on set the SL-1's GAIN controls at minimum (fully counterclockwise). Later, when the stereo system is turned ON, the GAIN may be adjusted as required (see Section 3.8).

Note: The SL-1PM input impedance and nominal sensitivity are adjustable to cover most conventional phonograph cartridges including dynamics, electrostatics, moving magnet types, and certain high impedance moving coil cartridges. Most moving coil cartridges, however, have a very low output impedance (from 3 to 50 ohms) and a low output voltage level. In order to obtain satisfactory results when using the SL1PM with this type of MC cartridge, an additional accessory is required -- preferably a Crown moving coil preamp (available late 1979).

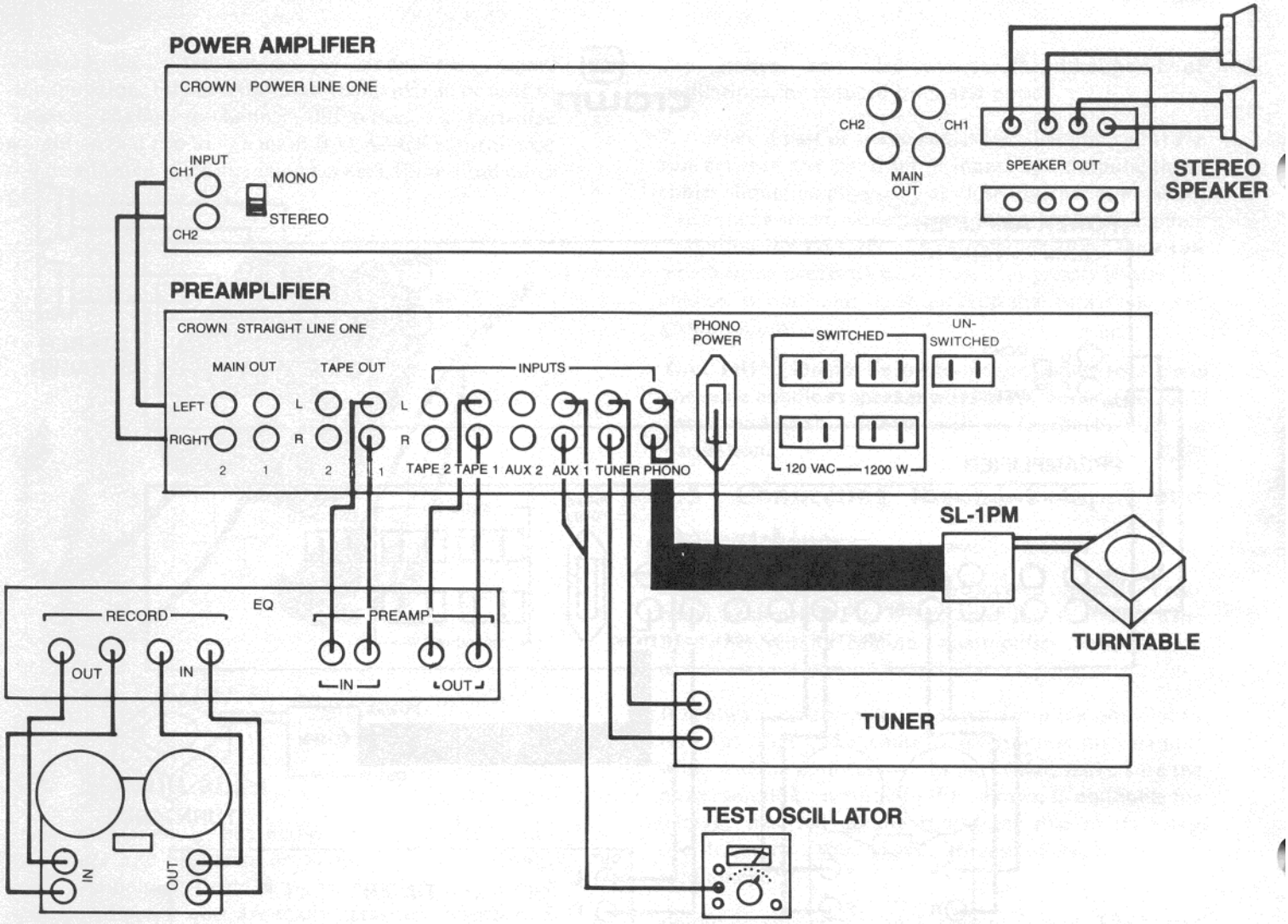


Fig. 3.6 Hook Up of SL-1 in a Stereo System Having an External Equalizer

3.7 Connecting the AC Power

The preamplifier is furnished with a two-wire AC plug as standard equipment. Rear panel accessory outlets are also intended for two-wire AC plugs. Adapters for 3-wire plugs are readily available commercially, if required. Stereo sound systems tend to function audibly better when the various components are not connected to the AC mains ground, or when only one component is so connected (typically the power amplifier). This is because "ground loops" -- electronic jargon for undesirable circulating currents flowing in a grounding system -- are avoided. Crown assumes no liability whatsoever for operation of ungrounded auxiliary equipment, nor for violation of UL or local electrical codes.

The SL-1 power supply may be connected for any of five AC mains voltages. Converting from one to another can be accomplished in minutes by a qualified technician using a soldering iron and a pair of wire cutters. The procedure for AC mains voltage modification is given below, and in the illustration in Fig. 3.8.

1. Remove the top cover of the SL-1.

2. With the unit right side up and the front panel toward you, locate the terminal strip.

3. Make the appropriate change in jumpers to obtain the desired nominal mains voltage (Fig. 3.8).

4. Change the line cord label to indicate the proper voltage.

5. Replace the top cover, securing it with its screws.

Only a qualified service technician should attempt alteration of the line voltage connections. When testing the amplifier, the line voltage must be peak equivalent to a sinusoid of the indicated line voltage (when at full load).

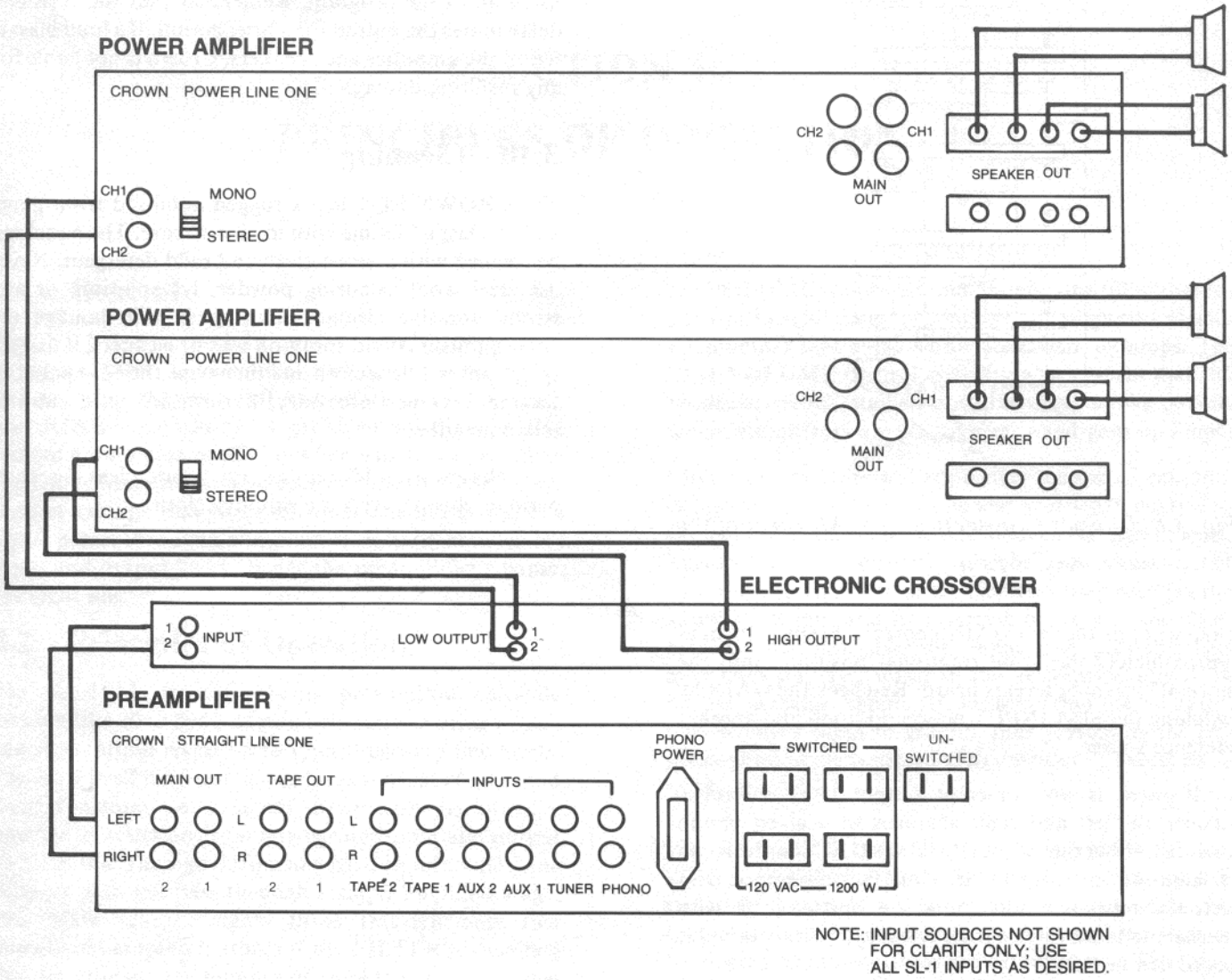


Fig. 3.7 Hook Up of SL-1 in a Biamplified Stereo System, Utilizing an Electronic Crossover

alteration of the line voltage connections. When testing the amplifier, the line voltage must be peak equivalent to a sinusoid of the indicated line voltage (when at full load).

3.8 SL-1PM Gain Adjustment

When the audio and AC cables are connected, the equipment turned ON, and proper operation has been verified with a tuner, tape machine and/or some auxiliary signal source such as a test oscillator, you are ready to test the PHONO input. First, note the SL-1 VOLUME control setting for a listening level which you consider to be "normal".

1. Turn down (counterclockwise) the SL-1 VOLUME most of the way, switch IN the Low cut FILTER, and play a record (normal program or test record).

2. Gradually increase the VOLUME control until the previously noted "normal" mark is reached. If the sound level at the "normal" VOLUME setting is the same for phono and other sources, then an overall GAIN adjustment is not necessary (go straight to step 4 below).

3. If the Phono level is insufficient at a "normal" VOLUME setting, then the SL-1PM's GAIN controls must be adjusted. Gradually increase the setting

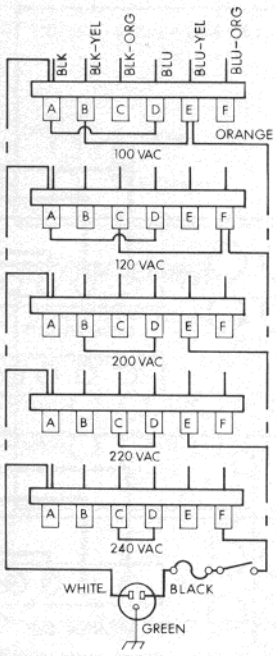


Fig. 3.8 Jumper Connections for Modifying the AC Mains Voltage

(clockwise) of the two GAIN controls, keeping them at approximately the same rotational position, until the "normal" listening level is heard. Re-check the GAIN by switching the SL-1 INPUT between Phono and another reference source.

4. If there is any inherent output level difference between the left and right channels of a given phono cartridge, either one of the SL-1PM's GAIN controls can be adjusted to compensate for the difference and perfectly rebalance the sound. A test record with alternate left and right signals is handy, but any familiar record can be used.

3.9 Operating Precautions

1. Use care in making connections, selecting signal sources, and laying out overall connection schemes. Crown is not liable for any damage due to feedback, overdriving sensitive inputs, etc.

2. Never connect the output of a power amplifier to any of the SL-1 inputs.

3. Operate the preamplifier from AC mains not more than 10% above or below the selected line voltage, and only at 50, 60 or 400Hz AC. Failure to comply with these limits will void the warranty.

4. Do not expose the preamplifier to corrosive chemicals, including but not limited to lye, salt water, soft drinks, milk, etc., nor to harmful solids such as potato chips, oils, grease, etc.

5. When using input sources of uncertain level, or any audio components which have not previously been used with the SL-1, always begin with the SL-1 VOLUME control at minimum and gradually increase it while listening to the program. Remember that the turn-ON delay mutes the output for a brief period. If a loud blast is fed to the amplifier and speakers, Crown is not liable for any resulting damage.

3.10 Cleaning

The CROWN SL-1 has a rugged anodized front panel and will last a lifetime with moderate care. The panel can be cleaned with a moist cloth and mild detergent. Never use steel wool, scouring powder, lye solution, or any strong abrasive cleaner, since these will damage the panel's finish. Avoid spray-on wax or cleaners; if using a spray, apply it to a cloth and then wipe the SL-1 panel. If waxing becomes necessary, a furniture paste wax is recommended.

The chassis should require no more cleaning than periodic dusting with a clean, dry cloth.

SECTION 4
PRINCIPLES OF OPERATION

4.1 General

The SL-1 has a built-in power supply, plus input switching, filter, level control and output circuitry for two program channels (left and right). Additional gain and RIAA equalization is provided by the SL-1PM remote phono preamplifier module which is powered by the SL-1. Modern discrete and integrated circuitry are used in a design that yields uncompromised fidelity. The signal passes through a minimum of circuitry between the input and output jacks...hence the preamplifier's name, "straight line".

4.2 Principles of Operation

The SL-1PM remote phono preamplifier module provides the 30 to 50dB of gain necessary to bring phono cartridge output levels up to typical preamp line levels. The SL-1 itself need not have a large amount of gain, and often functions as a signal attenuator. Its primary function is selection from any various input and output signal paths. The signal from any SL-1 input to the Tape Outputs does not pass through a single amplifier stage. The Main Output signal flows through only two operational amplifiers (three if the FILTER is switched IN). In reducing the number of amplifier stages, Crown also eliminated potential sources of noise and distortion. (Fig. 4.1)

A dual operational amplifier is set up as an active low cut FILTER. Only a very small portion of the signal actually flows through the SL-1 low cut filter, unlike conventional passive filters where the entire signal passes through the filter's circuit components. The SL-1 cuts the low frequencies by mixing the filter op amp's output back into the main program in a way that phase cancels the lows while leaving the rest of the program undisturbed.

The VOLUME control is a dual-gang precision switch, one side per channel. Each side is wired into the feedback loop of a separate operational amplifier. As the VOLUME setting is decreased, the gain of the op amp is lowered, reducing the signal level at the amplifier output. This configuration assures that the noise level drops as the VOLUME is lowered, maintaining the full signal-to-noise ratio at all times, in contrast to configurations with attentuators that come before fixed gain op amps. The SL-1 VOLUME control circuitry also ensures that full headroom is maintained at all settings, unlike circuits where attenuators are placed after fixed gain op amps.

Circuit design buffs will appreciate the use of coupling capacitors around the op amp and VOLUME control to eliminate DC noise and ensure smooth changes in level. There are two identical 5% precision resistors associated with each op amp; one in the feedback loop between the amplifier output and its inverting input, and the other between the non-inverting input and ground. This minimizes any DC offset in the amplifier's output. A bypass capacitor shunts AC current from the op amp's non-inverting input to ground, thus preventing the DC offset-eliminating resistor from contributing excess noise to the amplifier.

The BALANCE control circuitry is similar to the VOLUME control circuitry, with this exception: the left and right channels are at maximum level when the control is centered, then one channel or the other is attenuated as the control is moved off center. The same advantages are obtained: full headroom at all settings, and a noise floor that decreases with decreasing gain.

A separate peak level sensing circuit is provided for each channel. It continuously monitors the positive and negative peak levels at each of two circuit points: after the FILTER and after the VOLUME control. As long as the level is above a set threshold, chosen to be the point at which clipping (distortion) occurs, the OVERLOAD LED is energized. An R-C circuit ensures that the LED will remain ON long enough to be visible even if the overload is momentary. The input of the peak level sensor is considerably higher in impedance than the circuit it measures, so it has no discernable effect on the audio signal.

A normally closed relay is connected between the Main output signal conductor and audio ground so that when the relay coil is not energized, the SL-1's outputs are

"dead". As soon as power is turned OFF, the relay closes and the outputs are muted to preclude any possibility that turn-OFF transients could be sent through the power amplifier and speakers. When the SL-1 power is first turned ON, the relay is not energized immediately; instead, a delay circuit blocks current to the relay coil for approximately 7 seconds. This provides a safe period during which the Sl-1 power supply and audio circuitry can settle into stable operation. The same relay thereby prevents turn-ON transients from reaching the power amplifier and speakers, and protects the other input sources also.

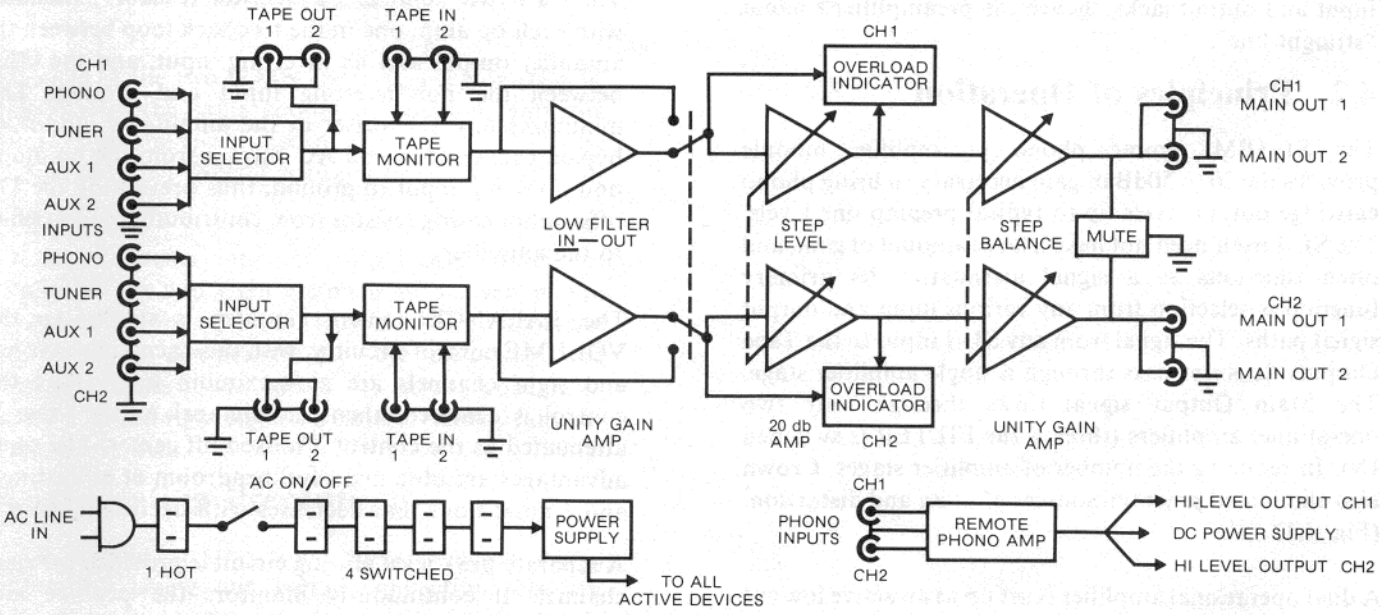


Fig. 4.1 SL-1 Block Diagram

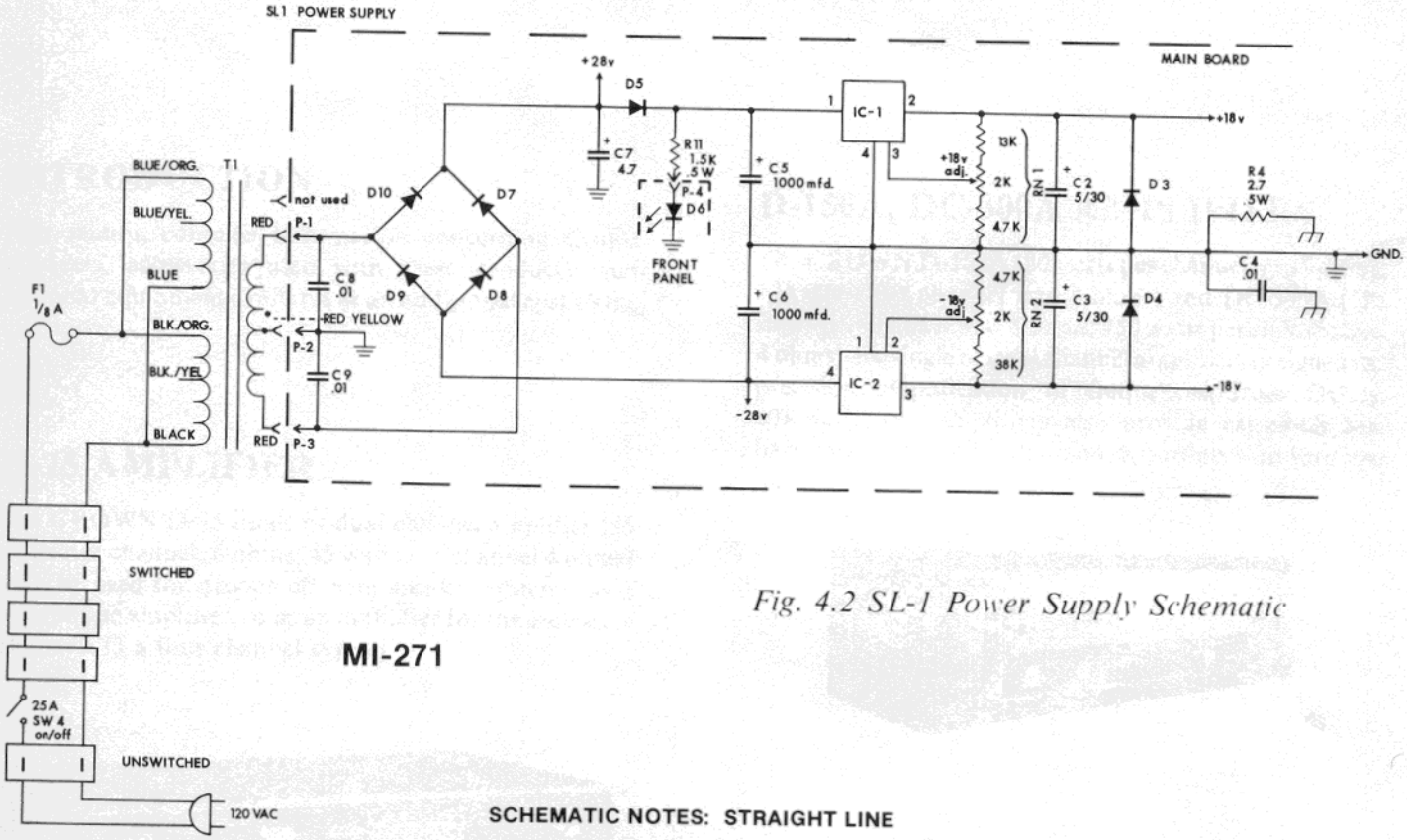


Fig. 4.2 SL-1 Power Supply Schematic

MI-271

SCHEMATIC NOTES: STRAIGHT LINE

- CIRCUIT SHOWN STARTS WITH SN 5370 AND APPLIES ONLY TO PC BOARD #9813 (MAIN BOARD).
- ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE NOTED.
- ALL RESISTORS ARE .25 WATT UNLESS OTHERWISE NOTED.
- COMPONENTS COMMON TO BOTH CHANNELS ARE NUMBERED 10 TO 99.
- LEFT CHANNEL COMPONENTS ARE NUMBERED FROM 100 TO 199.
- RIGHT CHANNEL COMPONENTS ARE NUMBERED FROM 200 TO 299.
- WIRE COLOR CODES ARE GIVEN FOR THE MAIN POWER SUPPLY.
- MUTE RELAY SHOWN ACTIVE (NORMALLY CLOSED).
- TAPE MONITOR SWITCHES INACTIVE (OUT).
- RESISTOR NETWORKS ARE INDICATED WITH "RN" PREFIXES.
- PHONO MODULE SCHEMATIC NOT SHOWN (CONTACT CROWN FOR SERVICE INFORMATION).
- LOW FILTER SW3A,B SHOWN INACTIVE (OUT).

SL 1 MAIN BOARD
9813

MI-272

TAPE MONITOR
TAPE 1
TAPE 2
SW 1 A
SW 2 A
TAPE OUTPUT
TAPE INPUT
AUX 2
AUX 1
TUNER
PHONO
R 123 200K
R 126 200K
R 127 200K
R 128 200K
R 129 200K
R 130 200K
SW 100
SW 101
SW 102
SW 103
PHONO POWER
+18v
-18v
GND.
R 100 82K 1%
C 100 .068
C 101 .068
R 101 51K
C 103 .068
R 132 20K 1%
TO OVLD. 1
C 102 220
R 102 STEP LEVEL
TO OVLD. 2
R 103 STEP BALANCE
R 104 604 .5W
R 105 5.6K
mute
C 109 220
CHANNEL 1 MAIN OUTPUT
R 108 10M
SW 3 A LOW FILTER
C 114 .47
R 110 5.1M
R 114 348K 1%
C 115 27pF
C 116 .1
C 122 .1
C 123 4.7
R 115 348K 1%
D102
D103
D104
D105
IC 100
C 104 4.7
C 105 20 pF
R 106 360K
C 110 10pF
R 111 360K
IC 101
C 111 .1
C 117 47
C 118 .1
R 113 75
C 119 .001
D 100
C 106 220
C 107 4.7
R 107 360K
R 109 470
C 112 200pF
R 112 360K
IC 102
C 113 .1
C 124 *10pF
C 120 47
C 121 .1
R 131 75
C 108 .001
D 101
OVLD. 1
OVLD. 2
D 106
D 107
R 120 3.9K
R 116 2.4M
R 117 47K
IC 103 A
R 121 3M
R 118 33K
R 122 3.9K
R 119 47K
D 108
D 109
D 110
IC 103 B
IC 103 C
IC 103 D
no connection
C 124 .047
R 123 10K
Q 100
R 124 1.5K
LED 100
FRONT PANEL
OVLD. 4
OVLD. 3
D 209
D 208
D 207
D 206
D 210
R 219 47K
R 222 3.9K
R 221 3M
R 218 33K
R 220 3.9K
R 217 47K
R 216 2.4M
IC 203 B
IC 203 A
IC 203 C
IC 203 D
C 224 .047
R 223 10K
Q 200
R 224 1.5K
LED 200
R 1 12K
R 2 3.9K
Q1
MUTE RELAY
D1
FET 1
C1 .22
R 3 100M
D2
-28v
+28v
C 223 4.7
R 215 348K 1%
C 222 .1
D 204
D 205
D 202
D 203
IC 200
R 214 348K
R 210 5.1M
C 215 27pF
C 216 .1
C 214 .47
out
SW 3 B LOW FILTER
in
R 208 10M
R 200 82K 1%
C 200 .068
R 201 51K
C 201 .068
C 203 .068
R 232 20K 1%
TO OVLD. 3
C 202 220
R 202 STEP LEVEL
TO OVLD. 4
R 203 STEP BALANCE
D 200
D 201
C 217 4.7
C 218 .1
C 219 .001
R 213 75
R 211 360K
IC 201
C 211 .1
C 210 10pF
R 206 360K
C 205 20pF
C 204 4.7
C 206 220
C 220 4.7
C 221 .1
R 212 360K
IC 202
R 231 75
C 208 .001
C 212 200pF
C 213 .1
*C 224 10pF
R 209 470
R 207 360K
C 207 4.7
C 209 220
R 205 5.6K
R 204 604 .5W
mute
CHANNEL 2 MAIN OUTPUT
SW 1 B
SW 2 B
TAPE 1
TAPE MONITOR
TAPE 2
R 230 200K
R 229 200K
R 228 200K
R 227 200K
R 226 200K
R 225 200K
SW 203
SW 202
SW 201
SW 200

Fig. 4.3 SL-1 Schematic Diagram

SECTION 5
ACCESSORIES/OPTIONS

INTRODUCTION

This section contains information concerning Crown products, accessories used with these products, and optional equipment available at an additional cost to the consumer.

D-75 AMPLIFIER

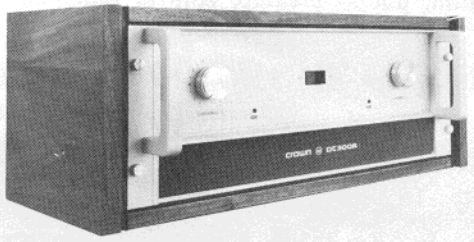
The CROWN D-75 single or dual channel amplifier (35 watts per channel, 8 ohms; 45 watts per channel 4 ohms) may be used for driving efficient speaker systems, as a headphone amplifier, or as an amplifier for the ambience channels in a four channel system.

M-600 AMPLIFIER

The CROWN M-600 power amplifier provides 600 watts of continuous power into 8 ohms, and 1000 watts into 4 ohms. An adaptable input module format fits the varied need and operating environments of industrial and commercial audio uses.

D-150A, DC-300A AMPLIFIERS

The CROWN D-150A (80 watts per channel into 8 ohms; 125 watts per channel into 4 ohms) and DC-300A (155 watts per channel into 8 ohms; 250 watts per channel into 4 ohms) are single or dual channel amplifiers designed for precision amplification of frequencies from DC to 20KHz. These amplifiers also provide extremely low harmonic and intermodulation distortion with very low noise.



IC-150A CONTROL CENTER

The CROWN IC-150A is an input control center and preamplifier designed for the professional user and the sophisticated audiophile.

STRAIGHT LINE ONE PREAMPLIFIER

The CROWN SL-1 is a sophisticated high performance pre-amplifier. The superior technology and "straight wire" approach provide precise signal control for any sound system.

POWER LINE ONE AMPLIFIER

The CROWN PL-1 is a high quality audio power amplifier (50 watts per channel into 8 ohms; 80 watts per channel into 4 ohms) designed to compliment the SL-1 stereo preamplifier.

DL-2 DISTINCTION SERIES CONTROLLER/PREAMPLIFIER

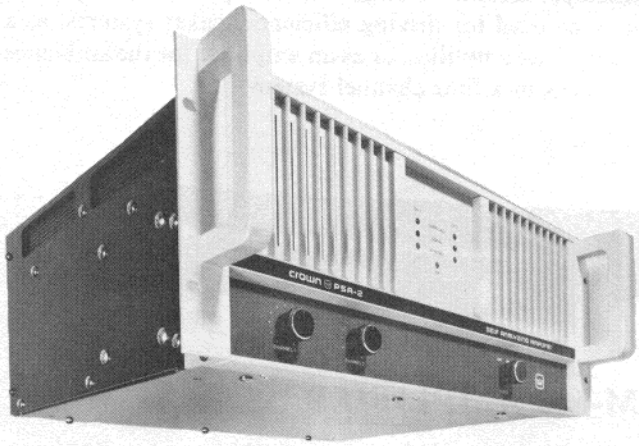
The CROWN DL2 is a digital control center and preamplifier designed for the highest sonic qualities attainable by today's technology. It incorporates numerous unique features including 3 module construction; phono preamp, control unit and power supply.

SA2 AMPLIFIER

The CROWN SA2 is a 220 watts per channel power amplifier designed for the highest sonic quality and reliability attainable by today's technology. It employs the Crown Self-Analyzing output system, which uses analog computers to continually adjust the amplifier's output limits.

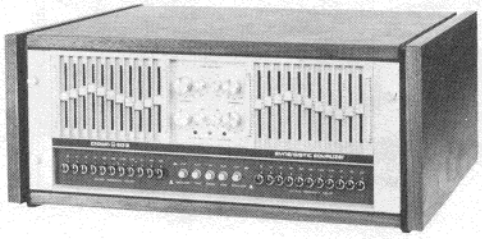
PSA-2 AMPLIFIER

The CROWN PSA-2 is the professional counterpart of the SA2 power amplifier. It incorporates many unique features for use in today's demanding sound systems.



EQ2 EQUALIZER

The CROWN EQ2 is designed to take care of frequency amplitude problems due to room acoustics, poor loudspeaker response, and poor cartridge response. A flexible tone control system is combined with 22 half octave width filters with movable center frequencies.



FM-1 TUNER

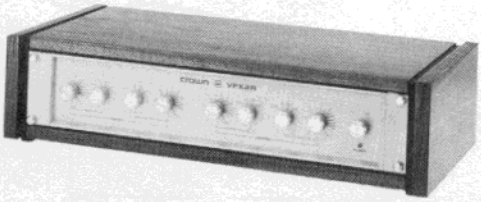
The CROWN FM-1 is a precision Stereo FM Tuner including such features as digitally-synthesized tuning superior sound quality, precise tuning, and ease of use make the FM-1 unique.

OC-150A CONTROL CENTER

The CROWN OC-150A is designed for precision output monitoring and amplifier/speaker switching.

VFX-2A CROSSOVER/FILTER

The CROWN VFX-2A provides two sets of continuously variable filters which can be used to perform either crossover or bandpass functions.

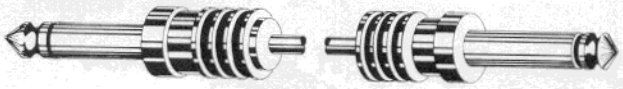


RTA-2 REAL TIME AUDIO ANALYZER

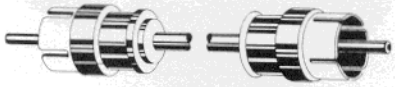
The CROWN RTA-2 is an audio band Real Time Analyzer designed to measure acoustical and actual frequency responses in third octave bands from 16Hz to 20KHz.

6′ PIN TO PHONE CABLES — CPN 3339

6′ PHONE TO PHONE CABLES — CPN 4363



6′ PIN TO PIN CABLES — CPN 3338



1¾" RACK EARS — CPN 4800

Use with the D-75.

3" RACK EARS — CPN 41667

Used with the VFX-2A and DL2 POWER module.

5" RACK EARS — CPN 4802

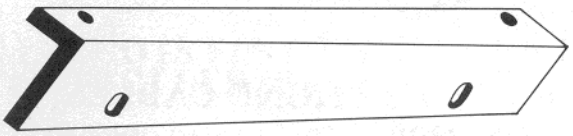
Used with the D-150A, IC-150A, OC-150A, FM1.

7" RACK EARS — CPN 20037

Used with the DC-300A.

7" RACK EARS — DISTINCTION SERIES — CPN 4267

Used witht he DL2, SA2, EQ2 and RTA-2.



MOUNTING SCREWS — CPN 20032

Used with Crown equipment to secure equipment to rack mounts.

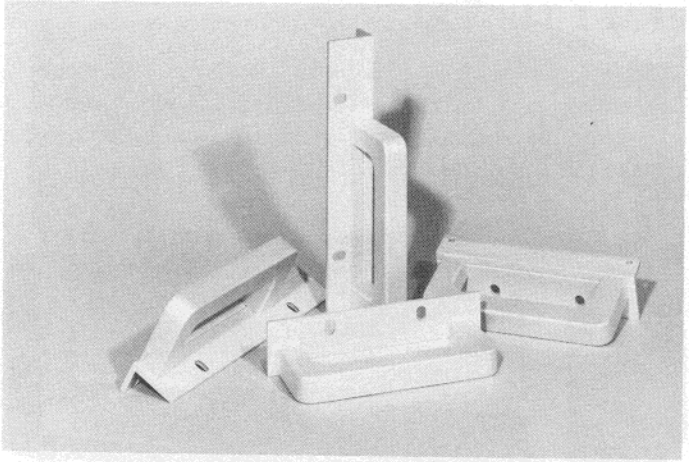
ALLEN WRENCH — CPN 3454

Used with Crown equipment to remove end bars and secure rack ears to equipment.

HANDLES

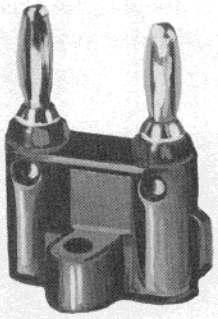
5" — CPN 41855 (D-150A, FM-1)
7" — CPN 41887 (DC-300A)
DISTINCTION — CPN 41889 (EQ2, DL2, and SA2)

These handles are used with Crown equipment for easier handling.



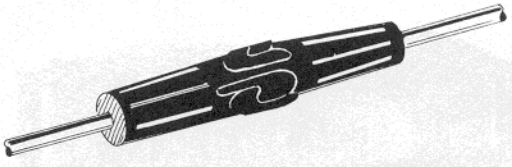
DUAL BANANA PLUGS — CPN 2981

Used with the D-75, D-150A, DC-300A, PL-1, OC-150A, and SA2 as part of the HiFi kit.



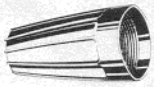
FUSEHOLDER — CPN 4245

Used with the D-75, D-150A, DC-300A, OC-150A, PL-1, and SA2 as part of the HiFi kit.

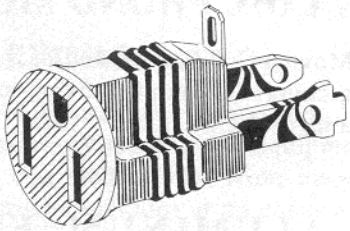


WIRE NUTS — CPN 3069

Used with the D-75, D-150A, DC-300A, PL-1, and SA2 as part of the HiFi kit.

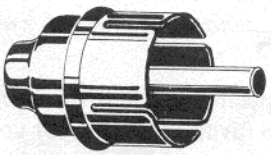


3-2 ADAPTERS — CPN 2939



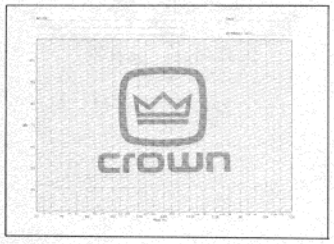
SHORTING PLUGS — CPN 3230

Used with the IC-150A, DL2 and SL-1 to short UNUSED input jacks for noise control.



GRAPH PAPER — CPN 4383

Used with the EQ2 for charting room response.



TEST RECORD — CPN 4416

Used with the EQ2 for testing room response.

HI FI ADAPTER KIT — CPN 40377

Used with the D-75, D-150A, DC-300A, PL-1, and SA2 amplifiers.

UMX-300 TRANSFORMER

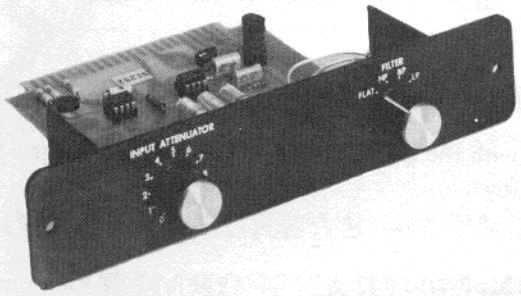
The CROWN UMX-300 transformer offers a maximum 300 watts of power with IM distortion of less than .015%. Frequency response is rated +0 to -1dB, 20Hz to 20KHz at 300 watts. The UMX-300 can be used with any Crown amplifier.

FN-1 FAN PACKAGE — CPN 41682

The CROWN FN-1 Fan Package is meant to provide cool ambient air for cooling any Crown amplifier which requires additional cooling due to operating conditions.

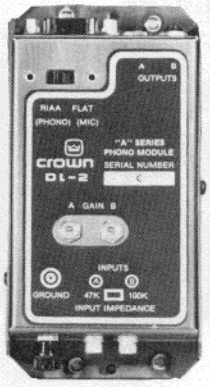
M-600 PA MODULE — CPN 41744

The CROWN M-600 PA Module is a special plug-in board developed to fit into the M-600 amplifier front panel. The module, developed for commercial sound public address systems, provides balanced inputs, filtering, and a continuously adjustable gain from 0 to 20dB at the front panel.



DL2 "A" PHONO MODULE

The CROWN DL2 "A" Phono Module is a separate phono preamp designed to eliminate RF interference and the problems of cable capacitance loading on phono cartridges.



SL-1 "C" PHONO MODULE

The CROWN SL-1 "C" Phono Module is a separate phono preamp similar in function and performance to the DL2 phono module, however designed specially for the SL-1.

*MOVING COIL PHONO MODULE

The CROWN Moving Coil Phono Module is specifically designed for matching a low output moving coil cartridge with the DL2 and/or the SL-1.

BLANK ALUMINUM FILLER PANELS

Standard 1P (1.75″), 3P (3.75″), and 5P (5.25″) aluminum panels are available in "satin bead" or brushed aluminum finish.

CABINETS

Designed and specifically built for Crown is a complete line of fine audio furniture. Write for your free brochure.

*Available Fall 1979