

MODEL SP-5 PREAMPLIFIER
INSTRUCTION MANUAL

REV. B
10/78

audio research
HIGH DEFINITION®

5740 GREEN CIRCLE DRIVE / MINNETONKA, MINNESOTA 55343-4424
PHONE 612/939-0600 FAX 612/939-0604

INTRODUCTION

Congratulations on your purchase. The SP-5 stereo preamplifier was conceived and designed for audio perfectionists. "Analog Module" circuitry provides unequalled performance under actual dynamic listening conditions.

In addition to the basic audiophile features, the SP-5 has: provisions for an optional (*) low level head amp, controlled turn-on characteristics for minimum output "thump", 1600 watt relay controlled power outlets, high quality anodized aluminum panels, knobs, and handles, and a scuff-resistant chassis finish. Conservative design and extensive use of high quality industrial grade components insure many years of trouble-free performance.

WARRANTY

A limited 90-Day Warranty (from the date of purchase by the original purchaser) is provided by Audio Research Corporation. This warranty is subject to the conditions and limitations stated within the documents attached to the outer shipping carton.

LIMITED 3-YEAR WARRANTY

A 3-Year Limited Warranty Application is included with the documents attached to the outer shipping carton.

THIS LIMITED 3-YEAR WARRANTY WILL NOT BE ISSUED OR EFFECTIVE UNLESS WITHIN THIRTY DAYS AFTER THE DATE OF SALE THE PURCHASER MAILES TO AUDIO RESEARCH A LIMITED 3-YEAR WARRANTY APPLICATION FORM WHICH HAS BEEN COMPLETED, DATED AND SIGNED BY BOTH THE SELLING DEALER AND THE PURCHASER AND A COPY OF THE BILL OF SALE OR OTHER PROOF OF PURCHASE OF THE PRODUCT.

WARNING - FAILURE TO COMPLY WITH THE ABOVE CONDITIONS WILL RESULT IN THE WARRANTY BEING RESTRICTED TO THE LIMITED 90-DAY WARRANTY.

PACKAGING

Save All The Packaging - Your Audio Research component is a precision electronic instrument and should be properly cartoned any time shipment is made. You may never have occasion to return it to the factory for service, but if such should be necessary, or other occasion to ship it occurs, the original packaging may save your investment from unnecessary damage or delay.

ACCESSORIES

The following optional (*) accessories for your SP-5 preamplifier will be made available through your Audio Research dealer:

- * Walnut veneered oiled finish cabinet
- * Programmable low level head amp electronics

LINE VOLTAGE CONVERSION

This equipment can be operated from either 120 Volts or 240 Volts A.C., 50/60 Hz. Check the position of the line voltage selector switch on the rear panel. If necessary, remove the switch safety cover and set the switch to the proper voltage as indicated below the switch. Secure the switch position with the safety cover and screws with the word "fuse" showing. Install the appropriate fuse as indicated below if the line voltage is different than that set for at the factory.

Voltage	Fuse
120	1/4 Amp. Type 3AG or MDL Slo-Blo
240	1/8 Amp. Type 3AG or MDL Slo-Blo

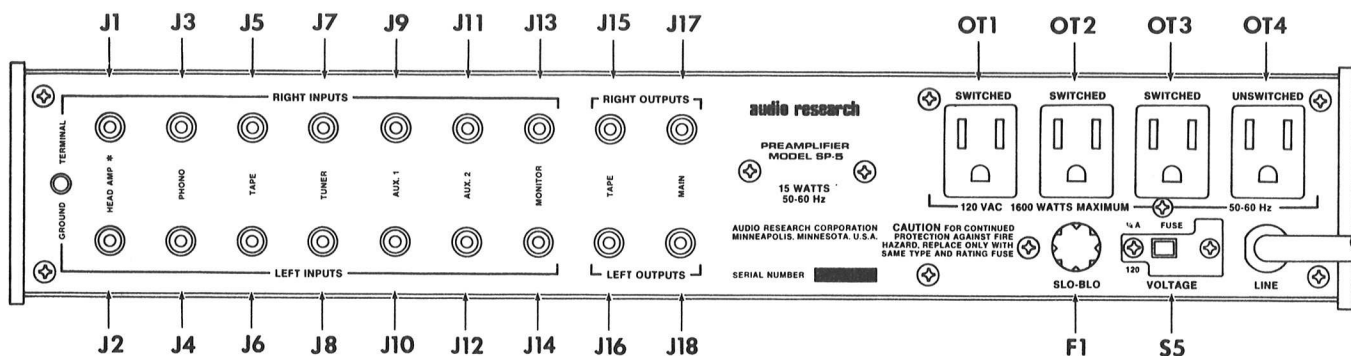
WARNING

To prevent fire or shock hazard, do not expose this equipment to rain or moisture.

This unit contains voltages which may be lethal. Do not operate this unit with covers removed. Refer servicing to qualified personnel.

CAUTION

For continued protection against fire hazard, replace only with same type and rating fuse.



REAR PANEL LAYOUT

REAR PANEL FUNCTIONS

Refer to the "Rear Panel Layout" diagram above.

Audio Inputs:

- J1 - Head Amp * (optional), Right Channel
- J2 - Head Amp * (optional), Left Channel

Provision for "optional" Head Amp electronics have been made within the SP-5 directly behind the Head Amp input connectors. These inputs and associated electronics will be required only for low output moving coil transducers. Consult your dealer for information and use of this special input feature. These inputs are not connected internally at the factory and are not used in systems employing moderate or high output magnetic cartridges.

- J3 - Phono, Right Channel
- J4 - Phono, Left Channel

Connect to tone arm/cartridge or record player. Nominal input impedance is 47K ohms and 200 PF shunt. Use with magnetic type cartridges requiring RIAA playback compensation. Note: Normally connect grounding wire from record player or arm to the "Ground Terminal" screw located next to and between J1 and J2. With certain systems this may add hum in which case no ground wire is required.

Note: The input characteristics and gain of the SP-5 have been factory set to accommodate most of the high quality magnetic cartridges on the market today. However, the SP-5 phono section can be altered by a technician for different (gain), input resistance (R), and capacitance (C), shown in the schematic diagram at the back of the manual. This feature allows "matching" of various cartridges to the magnetic preamp section for optimum performance. Consult your dealer for further information and use of this special input feature.

- J5 - Tape, Right Channel
- J6 - Tape, Left Channel

High level inputs. Connect to tape recorder line outputs. Nominal input impedance is 47K in the "stereo" or "reverse" mode, 30K in the "left" or "right" mode, and 20K in the "mono" mode. The input impedance is shunted by any load connected to the tape outputs J15 and J16.

- J7 - Tuner, Right Channel
- J8 - Tuner, Left Channel

High level inputs. Connect to the output of an AM and/or FM tuner component. Nominal input impedance is 47K in the "stereo" or "reverse" mode, 30K in the "left" or "right" mode, and 20K in the "mono" mode. The input impedance is shunted by any load connected to the tape outputs J15 and J16.

- J9 - Aux.1, Right Channel
- J10 - Aux.1, Left Channel

Provides high level inputs for any auxiliary system component. Nominal input impedance is the same as the "tuner" inputs J7 and J8 above.

- J11 - Aux.2, Right Channel
- J12 - Aux.2, Left Channel

Same as above. Allows use of a second auxiliary component.

- J13 - Monitor, Right Channel
- J14 - Monitor, Left Channel

High level inputs. Connect to tape monitor or main outputs of tape recorder if tape monitoring feature is desired. Permits tape monitoring during recording from front panel toggle switch (S2). If tape playback only is required, connect the tape recorder outputs to the tape inputs (J5 and J6) which will instead be selected by "source" switch (S4).

Audio Outputs:

- J15 - Tape, Right Channel
- J16 - Tape, Left Channel

Connect to tape recorder line inputs. Provides a program source for tape recording. Output signal is independent of "volume" control setting and equal to the source input level, i.e. "tape", "tuner", "aux.1", "aux.2", or magnetic phono preamplifier output. Nominal output impedance is 50 ohms plus the output impedance of the selected source. In general, the load impedance should be greater than 20K for optimum performance.

- J17 - Main, Right Channel
- J18 - Main, Left Channel

Connect to power amplifier (or electronic crossover) inputs. Nominal output impedance is 50 ohms. In general, the load impedance should be greater than 10K for optimum performance. The outputs are AC coupled through a 5 MF capacitor.

Power Circuits:

- OT1 - Switched AC Convenience Outlet
- OT2 - Switched AC Convenience Outlet
- OT3 - Switched AC Convenience Outlet

Connect to system components (power amplifier(s), tuner(s), electronic crossover, etc.) that are to be turned on by the front panel power switch (S1). Will accept 2 or 3 prong line plugs. Outlets are switched by an internal power relay. Capacity is 1600 watts total including the unswitched outlet (OT4). The outlets are not fuse protected.

Note: An internal .01 MF/1600 V capacitor is connected (for arc suppression) across the internal power relay contacts. If an Audio Research RPR-1 (Remote Power Receptacle) is used in the system to remotely turn on the power amplifier(s), the .01 MF capacitor must be removed. The small 60 Hz current passed by the capacitor is sufficient to turn-on the RPR-1 transmitter electronics continuously even with the SP-5 power switch (S1) off.

Since relay contact arcing is not a problem when using the RPR-1 (power amplifiers are instead connected to the RPR-1 outlets), this capacitor can be safely removed. To accomplish this, remove the SP-5 top cover and 8 holding screws. CAUTION: UNPLUG SP-5 POWER CORD BEFORE REMOVING TOP COVER AND CAPACITOR. Locate the .01 MF/1600 V capacitor nested between the power relay contacts - towards the rear panel next to the power transformer. Clip the leads off close to the solder joints, remove the capacitor, and replace the top cover. The SP-5 is now ready for use with an RPR-1.

- OT4 - Unswitched AC Convenience Outlet

Connect to record player, turntable, or tape recorder where power should be controlled by the component on-off switch only. This insures proper "cycling" and mechanism disengagement.

Note: The "grounding" type convenience outlets are provided to accommodate power amplifiers with 3 prong (grounded) line plugs. To avoid "system" ground loops, the ground circuits of the rear panel outlets are connected to the ground conductor of the SP-5 line cord only. The preamplifier chassis is not connected to the convenience outlet or line cord/plug ground circuit.

- F1 - Preamplifier Line Fuse Receptacle

Provides protection for preamplifier electronics only. Refer to page 2 for fuse replacement information.

- S5 - Line Voltage Selector Switch

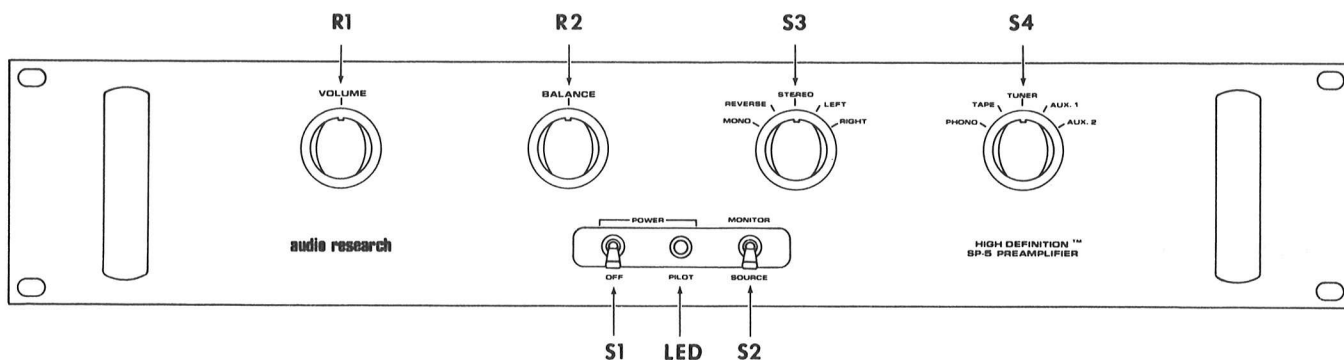
Selects for 120 or 240 volt input power. Refer to page 2 for "Line Voltage Conversion" procedure.

SYSTEM CONNECTION

Before connecting the SP-5 into your system, familiarize yourself with the rear panel functions by referring to the diagram and description of the rear panel in the previous section.

Use only high quality shielded phono cables when interconnecting the SP-5 with any signal sources, power amplifiers, or electronic crossovers. Avoid inexpensive cables which use "weak" or soft metal grounding shells as they may introduce hum and/or noise into the system. Keep audio cables neatly dressed and away from all power cords for minimum hum and noise interference.

It should be noted that the SP-5 line cord grounds the convenience outlet grounds only. The preamplifier chassis is not connected to the line cord ground in order to minimize system ground loops.



FRONT PANEL LAYOUT

FRONT PANEL FUNCTIONS

Refer to the "Front Panel Layout" diagram above.

Rotary Controls:

Volume (R1) - Controls preamplifier "main output" level. Power amplifier or source gain controls (if available) should be set such that normal listening levels occur at approximately a 1 or 2 o'clock setting. This will provide ideal volume control "resolution".

Balance (R2) - Controls the relative volume of each channel. Equal channel volume occurs when the control is centered at the indicator mark. Clockwise rotation from center position decreases left channel output. Counter-clockwise rotation decreases right channel output.

Rotary Switches:

Mode (S3) - Switch selects one of five "main output" modes:

"Mono" - Combines the left and right input channels internally to provide a monaural output (common output for both left and right main outputs).

"Reverse" - Provides stereophonic operation except channels are reversed, i.e. left input to right output, right input to left output.

"Stereo" - Provides normal stereophonic operation without channel reversal, i.e. left input to left output, right input to right output.

"Left" - Left channel input sources are coupled to both the left and right "main outputs" simultaneously. The "balance" control functions as normal.

"Right" - Same as above except right channel input sources are coupled to both the left and right "main outputs" simultaneously.

Note: The "tape outputs" are unaffected by the position of the "mode" switch.

Source (S4) - Switch selects one of five rear panel inputs (program sources) as marked. The selected source is also switched to the "tape outputs". All unused inputs are shorted to ground.

Note: Provisions for optional (*) Head Amp electronics have been made within the SP-5 directly behind the Head Amp input connectors. These inputs and associated electronics will be required only for low output moving coil transducers. Consult your dealer for information and use of this special input feature. These inputs are not connected internally at the factory and are not used in systems employing moderate or high output magnetic cartridges.

Toggle Switches:

Power (S1) - Preamplifier on-off switch. Move handle up for power "on". Also turns on the "switched" rear panel outlets. Green indicator (LED) illuminates when preamplifier is on.

Monitor (S2) - Allows instantaneous monitoring of tape recordings (inputs J13 and J14) in the "monitor" position. In the "source" position, selector switch (S4) controls the program source to the loudspeaker. Source switch (S4) is bypassed when (S2) is in the "monitor" position.

Indicator:

LED - Green light emitting diode. Illuminates when preamplifier power switch, S1, is "on".

GENERAL OPERATION

Before operating, familiarize yourself with the front panel control functions by referring to the diagram and control description in the previous section. To operate your music system proceed as follows:

1. Set "volume" control at minimum (full counter-clockwise).
2. Turn power switch "on" - green LED indicator should illuminate.

Note: A controlled warm-up (10 second nominal) is initiated at power turn-on. This minimizes warm-up pulses or thumps that would otherwise be heard through the speaker system.
3. Turn on desired source (record player, tuner, tape recorder, etc.).
4. Set "source" switch to program source desired, "mode" switch to "stereo", "balance" control to a 12 o'clock position, and the monitor toggle switch to the right of the power switch in a down position.
5. Turn "volume" control clockwise to desired listening level.
6. The tape monitor switch allows a recording monitor function for one recorder. The normal position is down when a tape recorder is not in use.
7. Refer to the previous section for a detailed description and operation of the front panel controls.

SYSTEM DIAGNOSTICS

In case of difficulty after connecting the SP-5 into your system, a list of common system problems and possible causes is provided below to aid in troubleshooting:

<u>Symptom</u>	<u>Possible Cause</u>
Both channels dead	<ul style="list-style-type: none">- Power amplifier off- Controls improperly set- Improper interconnect wiring- Defective signal source- Blown power amplifier fuse- Blown SP-5 fuse
One channel dead	<ul style="list-style-type: none">- Balance control not centered- Defective audio cable- Improper interconnect wiring- Defective signal source
Hum or noise	<ul style="list-style-type: none">- System ground loop- Turntable not grounded- Poor interconnect wiring- Defective audio cable- Excessive lead length- Defective signal source
High distortion	<ul style="list-style-type: none">- Low AC line voltage- Loudspeaker-Turntable mechanical feedback- Defective cartridge or source

FACTORY SERVICE

In the event that service becomes necessary, the SP-5 must be returned to the factory with return authorization. Please write or call Customer Service at Audio Research for return authorization. The original equipment packaging should be used any time shipment is made.

All shipments to the factory must be prepaid and insured for full value. All factory serviced equipment will be returned freight collect. In the event that chargeable repairs are required, you will be contacted prior to the return of your equipment.

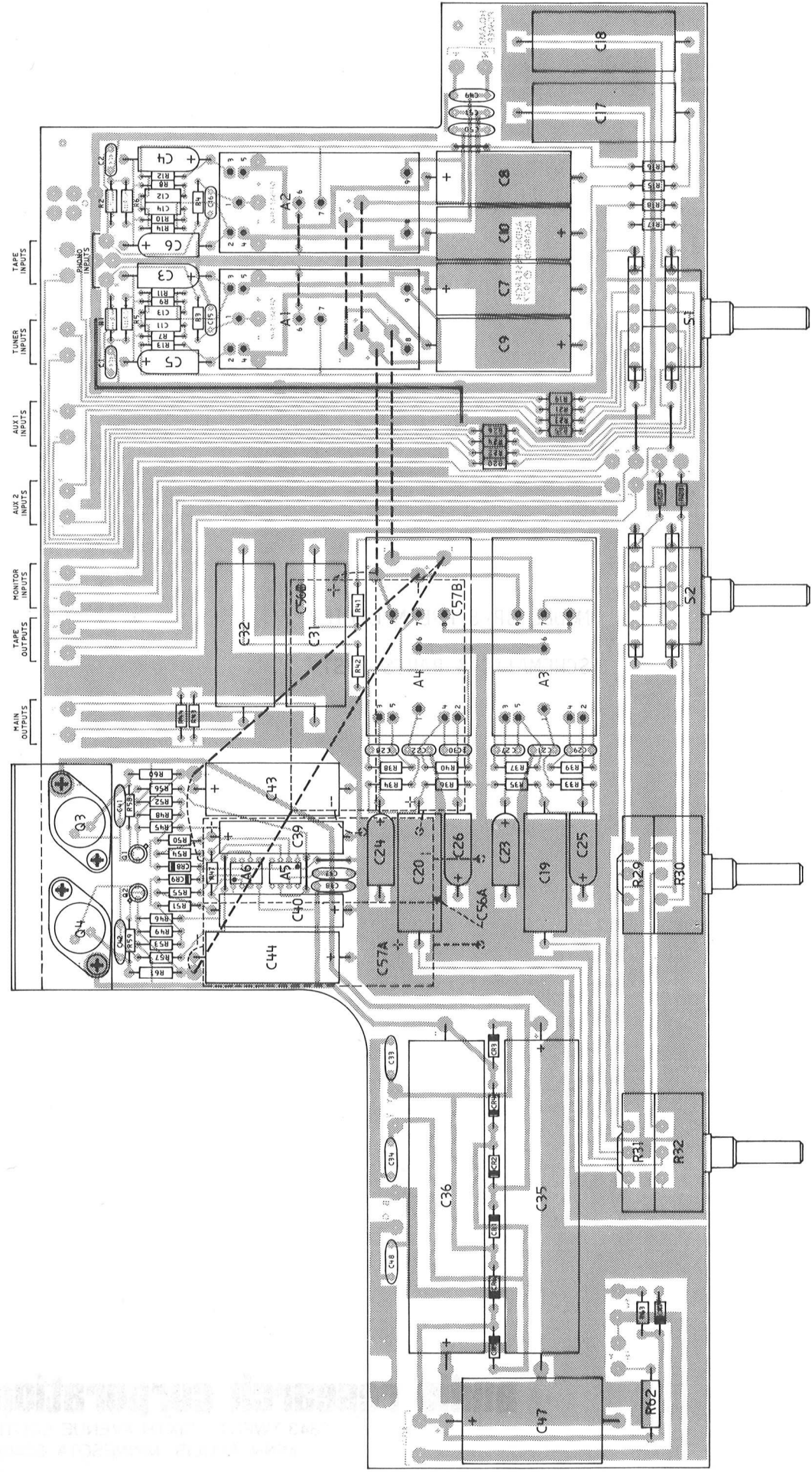
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MODEL SP-5 PREAMPLIFIER
SCHEMATIC & PARTS LIST

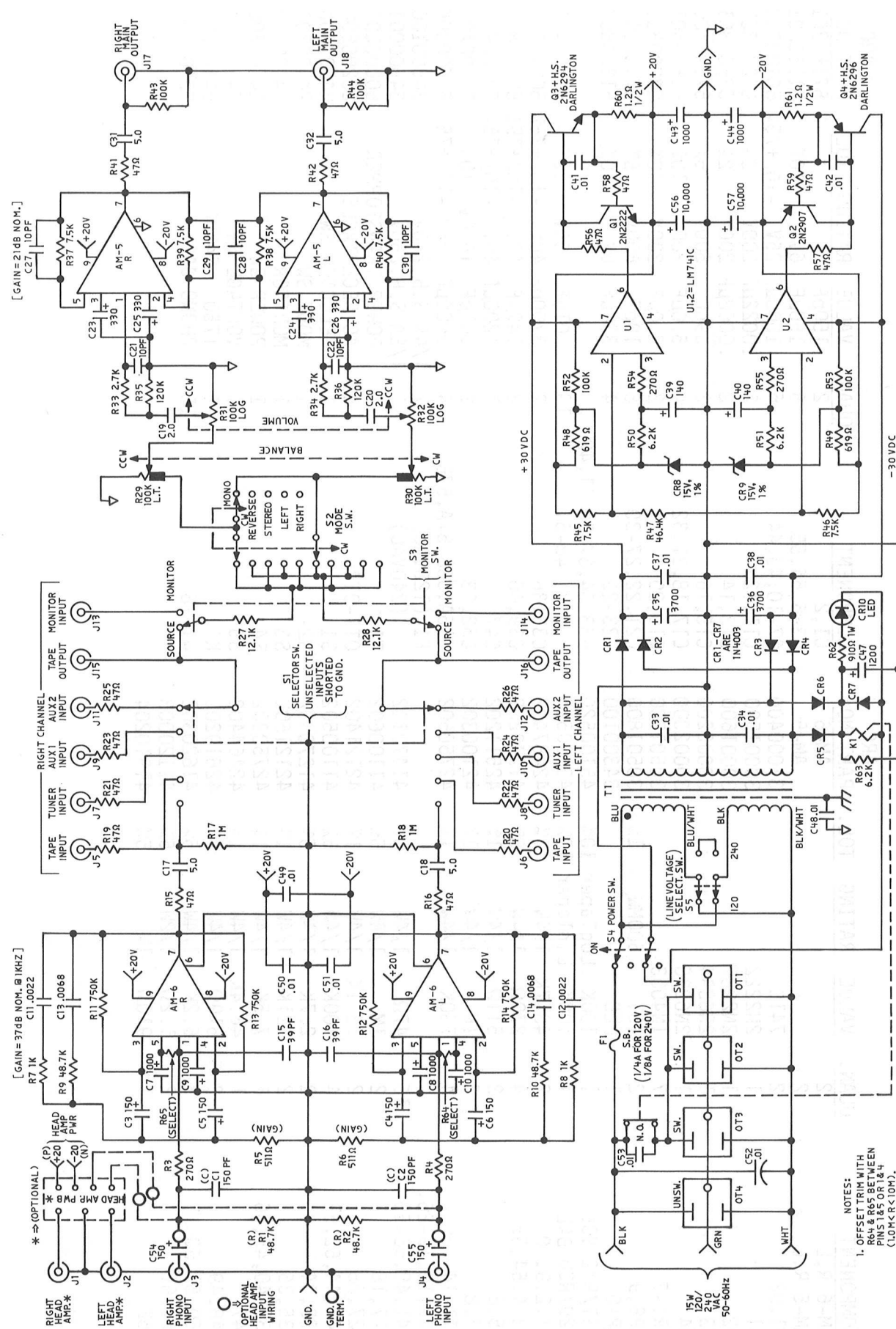
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audio research corporation

2843 TWENTY-SIXTH AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55406



SP-5 MOTHER BOARD



- NOTES:
1. OFFSET TRIM WITH R64 & R65 BETWEEN PINS 1&5 OR 1&4 (10K & R 10M).
 2. CR1, CR2, CR3, CR4, CR5, CR6, CR7, CR8, CR9, CR10, CR11, CR12, CR13, CR14, CR15, CR16, CR17, CR18, CR19, CR20, CR21, CR22, CR23, CR24, CR25, CR26, CR27, CR28, CR29, CR30, CR31, CR32, CR33, CR34, CR35, CR36, CR37, CR38, CR39, CR40, CR41, CR42, CR43, CR44, CR45, CR46, CR47, CR48, CR49, CR50, CR51, CR52, CR53, CR54, CR55, CR56, CR57, CR58, CR59, CR60, CR61, CR62, CR63, CR64, CR65, CR66, CR67, CR68, CR69, CR70, CR71, CR72, CR73, CR74, CR75, CR76, CR77, CR78, CR79, CR80, CR81, CR82, CR83, CR84, CR85, CR86, CR87, CR88, CR89, CR90, CR91, CR92, CR93, CR94, CR95, CR96, CR97, CR98, CR99, CR100, CR101, CR102, CR103, CR104, CR105, CR106, CR107, CR108, CR109, CR110, CR111, CR112, CR113, CR114, CR115, CR116, CR117, CR118, CR119, CR120, CR121, CR122, CR123, CR124, CR125, CR126, CR127, CR128, CR129, CR130, CR131, CR132, CR133, CR134, CR135, CR136, CR137, CR138, CR139, CR140, CR141, CR142, CR143, CR144, CR145, CR146, CR147, CR148, CR149, CR150, CR151, CR152, CR153, CR154, CR155, CR156, CR157, CR158, 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 3. ALL CAP. IN AF AND RES. 1/4W UNLESS NOTED.
 4. C56, C57 EFFECTIVE SERIAL 68904000 AND LATER.

AUDIO RESEARCH CORPORATION MINNEAPOLIS, MINNESOTA	
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DESIGNED BY	SCHEMATIC
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SP-5 PARTS LIST

COMPONENT	QUAN.	VALUE	RATING	TOL.	ARC PART NO.	COMPONENT	QUAN.	VALUE	RATING	TOL.	ARC PART NO.
AM-6 R,L	2				AM-6	C1,2	2	150pF			57150201
AM-5 R,L	2				AM-5	C3-6,54,55	6	150μF	6V	10%	51150801
U1,U2	2	741C			31000400	C7-10,43,44	6	1000μF	25V	-10/+75%	50100903
Q1	1	2N2222			30001500	C11,12	2	.0022μF	200V	2%	53220301
Q2	1	2N2907			30001600	C13,14	2	.0068μF	200V	2%	53680301
Q3	1	2N6294			30002200	C15,16	2	39pF	500V	5%	57390100
Q4	1	2N6296			30002300	C17,18,31,32	4	5.0μF	200V	10%	53500601
CR1-7	7	1N4003			30501700	C19,20	2	2.0μF	200V	10%	53200601
CR8,9	2	15V	500MW	1%	30501800	C21,22,27-30	6	10pF	500V	5%	57100100
CR10	1	LED			34300100	C23-26	4	330μF	6V	10%	51330800
R31/R32 VOL	1	100K	LogTaper	10%	45100520	C33,34,37,38,41,42	10	.01μF	500V	20%	52100402
R29/R30 BAL	1	100K	LinTaper	10%	45100523	C35,36	2	3700μF	40V	-10/+75%	50370901
R1,2,9,10	2	48.7K	1/4W	1%	42487402	C39,40	2	140μF	40V	-10/+75%	50140801
R3,4,54,55	4	270Ω	1/4W	5%	41270202	C47	1	1200μF	40V	-10/+75%	50120901
R5,6	2	511Ω	1/4W	1%	42511202	C52,53	2	.01μF	1600V	10%	53100403
R7,8	2	1K	1/4W	1%	42100302	C56A,56B,57A,57B	4	5000μF	25V	-10/+75%	50500900
R11-14	4	750K	1/4W	1%	42750502	F1 (120VAC)	1	1/4A S.B.250V			34500100
R15,16,19-26, 41,42,56-59	16	47Ω	1/4W	5%	41470102	F1 (240VAC)	1	1/8A S.B.250V			34500001
R17,18	2	1M	1/4W	5%	41100602	T1	1	POWER TRANSFORMER			60003201
R27,28	2	12.1K	1/4W	1%	42121402	OT1-OT4	4	AC RECEPTACLE			23200500
R43,44,52,53	4	100K	1/4W	5%	41100502	S1	1	SELECTOR SW			24001000
R33,34	2	2.7K	1/4W	5%	41270302	S2	1	MODE SW			24000700
R35,36	2	121K	1/4W	1%	42121502	S3	1	MONITOR SW			24100400
R37-40,45,46	6	7.5K	1/4W	1%	42750302	S4	1	POWER SW			24100700
R47	1	46.4K	1/4W	1%	42464402	S5	1	VOLTAGE SW			24100600
R48,49	2	619Ω	1/4W	1%	42619202	K1	1	1750 24VDC			64100300
R50,51,63	3	6.2K	1/4W	5%	41620302	J1-18	18	PHONO JACK			23201000
R60,61	2	1.2Ω	1/2W	5%	41120003						
R62	1	910Ω	1W	5%	41910204						