
**audio
research
corporation**

MODEL SP9 MARK II PREAMPLIFIER

OWNER'S MANUAL

■ HIGH DEFINITION
SOUND EQUIPMENT

MODEL SP9 MARK II PREAMPLIFIER

OWNER'S MANUAL

6-1-89

audio research corporation

6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MINNESOTA 55430

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PREFACE

Please take the time to carefully read this Instruction Manual prior to installation or use of your SP9 Mark II preamplifier. Because it is a highly advanced electronic instrument, there are several facts and procedures you should know before you place it in operation.

Just as you would not purchase and attempt to operate an expensive camera, computer system or high-performance automobile without first learning something about performance parameters and correct operating procedures, so too your preamplifier requires some familiarization before you make it part of your music reproduction system. Your reward, in terms of maximum performance and a long service life, will be well worth the effort.

INTRODUCTION

The SP9 hybrid stereo preamplifier has been an overwhelming success since its introduction in June 1987, allowing a glimpse of truly high-end musical reproduction to thousands of music lovers on a budget. The original SP9 was a simplified adaptation of the hybrid technology which first appeared in the groundbreaking SP11, a two piece unit which strikingly redefined The State-of-the Art.

In the two years that have followed, the hybrid technology has been developed and refined further, as evidenced by the SP15 and SP14 preamplifiers which have picked up where the SP11 left off, and continue to define the state-of-the art.

With the knowledge gained during these two years, and sonic references redefined, we are proud to announce the Mark II revision to the SP9 preamplifier

Technically, the Mark II version of the SP9 preamplifier includes a group of 14 different improvements, utilizing 61 component and wire changes. These combine to provide enhanced reliability and flexibility, in addition to the sonic improvements.

- * In the CD input the gain has been reduced by 12 dB, allowing operation of the gain control in its mid rotation or high positions, while still leaving all other inputs with normal gain for lower input program sources.
- * Low-level hum in the line section is reduced 10-20 dB, which is noticeable primarily in systems with high-efficiency speakers, small "live" rooms, high-gain power amps, or low-noise CD program sources.
- * The power supply and phono sections are "beefed up" to prevent accidental damage if a CD source is mistakenly connected to the MC phono inputs and is played at a high level, even with the mute on.

Sonically, the perspective of the SP9 has changed. If one thought of the original SP9 as a simpler SP11, then the Mark II can be thought of as a junior SP14. The SP9 Mark II is sweeter and more lucid, exhibiting less electronic glare or grain, while resolving more detail than before. Images are better defined in a more three-dimensional soundstage, emerging from a blacker background. Combining this with greater dynamic contrasts makes the complete presentation much more vivid and lifelike.

A pleasant result of these refinements is that the SP9 Mark II can be interfaced more successfully with less expensive amplification. Introducing the SP9 Mark II into modest audio systems will bring startling improvements not previously thought possible with this level of investment. The exceptional value of the SP9 Mark II is refreshing in today's crowded marketplace.

In short, the SP9 Mark II hybrid preamplifier is a product you can be proud to own and enjoy for years to come, without fear that it will soon become technically obsolete or sonically dated. Taking the time to carefully read and understand the remainder of this Owner's Manual will help insure you get all the enjoyment your SP9 is capable of. Happy listening!

WARNINGS

1. To prevent fire, or shock hazard, do not expose your SP9 to rain or moisture.
2. This unit contains voltages which can cause serious injury or death. Do not operate with cover removed. Refer servicing to your authorized Audio Research dealer or other qualified personnel.
3. The power cord on your SP9 is equipped with an 18-gauge, 3-conductor cable and a standard three-prong grounding plug. In addition, your SP9 uses an isolating power transformer with 4 KV-rated insulation. For absolute protection, do not defeat the ground power plug. This provides powerline grounding of the SP9 chassis to provide absolute protection from electrical shock.
4. For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

PACKAGING

Save all packaging in a dry place away from fire hazard. Your SP9 preamplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return your unit to the factory for service, but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your SP9 from unnecessary damage or delay.

Note that your SP9 has been shipped with vacuum tubes installed in their proper high-retention sockets. You may do likewise if the complete original packaging is used for shipment.

DESCRIPTION OF CONTROLS

GAIN CONTROL: A high-quality, metal-film segmented control with 31 steps and accurate tracking. Use it to control loudness or volume. Rotation to the left attenuates gain, rotation to the right increases gain. Best sonic performance and best signal-to-noise ratio will result if the input signal and amplifier input sensitivity allow normal listening when GAIN is set between 10 o'clock and 2 o'clock.

With some high-efficiency loudspeakers, a high-output source such as a CD player, and with a high-gain amplifier lacking an input volume control, you may discover that normal listening is only possible with the GAIN control barely on, or in the 9 o'clock position. In such circumstances it is possible to reduce the overall gain of the SP9 by 6dB, by making a simple internal adjustment. See the ADJUSTMENTS Section of this Manual, or contact your Audio Research dealer for assistance.

BALANCE CONTROL: When rotated, adjusts the relative sound levels of the left and right channels. The 12 o'clock position marks the point of equal balance. Rotating the knob to the right decreases the level of the left channel proportionally, shifting the sonic image to the right. Rotating the knob to the left shifts the sonic image to the left.

MODE CONTROL: Allows selection of various single-channel (mono) and two-channel (stereo) listening modes. Detents mark each selection option during rotation of knob. "Mono" reproduces identical sonic information in both right and left channels. "Reverse" switches left-channel information to the right, right-channel information to the left. "Stereo" is the normally preferred mode for most program material, producing the most realistic spacial image. "Left" cancels all right-channel information and presents left-channel information to both channels. In the same way, "Right" cancels all left-channel information, etc.

INPUT SELECTOR: Detents mark selection of various source material options: "Phono" for phonograph record turntables; "Tuner" for AM/FM radio tuners; "CD" for compact digital disc players; "Video" for input from Beta or VHS videotape recorder/players; and "Spare" for any additional high level source: tape, tuner, CD, video, etc.

The signal source chosen by the input selector is fed to the Main and Recorder 1/Recorder 2 outputs when the Monitor/Source switch is set to "Source." (See description of Monitor/Source switch, next page.) The source chosen by the input selector is always fed to the Recorder 1/Recorder 2 outputs, and cannot be overridden.

POWER SWITCH: Supplies power from AC wall outlet to SP9 when in "Power" position. Although not strictly necessary, it is nonetheless good practice to put the SP9 in "Mute" before turning on power for maximum protection of your power amplifier(s) and speakers.

MUTE/OPERATE SWITCH: In "Mute" position, shorts the main outputs of the preamplifier to allow listening interruptions for telephone answering or other reasons. This switch should always be activated between listening uses or switching of inputs, in addition to turning the Gain (volume) control counter-clockwise. These two simple precautions will prevent inadvertent misuse of your SP9 and help protect your power amplifier(s) and speakers from unexpected transient signal pulses (tone arm mishandling, etc). In "Operate" position, this switch allows the signal to pass normally to the outputs.

CAUTION: Do not turn up the gain control beyond normal listening positions when the SP9 is in the Mute mode. Always turn the gain control down when changing program sources, even when it is muted. The SP9 has an extremely wide dynamic range, and switching to Operate at loud levels may be too much for amplifiers, speakers or ears. Furthermore, at extremely high signal levels (such as from a severe blow to the turntable or tone arm) in the Mute mode, the SP9 may overload internally. This will not harm the SP9, but it may take 10-15 seconds to stabilize from the overload. If you switch to Operate before the SP9 has recovered from the overload, you will hear a "pop" when the mute switch is actuated, indicating the presence of unwanted subsonic energy that may damage some amplifiers and poorly-fused speakers, if the SP9 is left in Operate. If you hear a "pop," switch immediately back to Mute, turn down the gain control and wait 15 seconds or so and try again. Under normal conditions the SP9 muting has no "pops." (Turntable rumble, record warp wow or other subsonic program energy may also cause small, harmless mute "pops." These "pops" may be eliminated by turning down the SP9 gain control before muting.)

POWER/MUTING CIRCUIT LED: Glows green to indicate unit is on and receiving power from the power supply. Note that for approximately 45 seconds after start-up or in "Mute" mode, this LED will glow more dimly, indicating proper operation of the muting circuit. In the "Operate" mode (after warm-up), the LED brightens and your SP9 is ready for normal operation.

MONITOR/SOURCE SWITCH: In "Monitor" position, this switch "bypasses" the Input Selector and presents the signal to the main outputs from sources (tape recorders, etc.) connected to the "Tape 1" or "Tape 2" input jacks on the rear panel. In the "source" position, the program source is controlled by the Input Selector (Phono, Tuner, CD, etc.).

TAPE 1/TAPE 2 SWITCH: Usable only when "Monitor" has been selected. Selects either "Tape 1" or "Tape 2" inputs and connects that choice to the main outputs (through the "high level" amplification circuitry).

CONNECTIONS

INPUT CONNECTORS: All are clearly marked to indicate use. All high level inputs are 50K ohms impedance. Remember that impedance of "Phono" input is controlled by soldered-in resistor values on the main circuit board (see INPUT IMPEDANCE ADJUSTMENT).

MAIN OUTPUT CONNECTORS: There is one (1) set of output connectors, which should be connected to your electronic crossover or power amplifier.

The input impedance (load) of the power amplifier or electronic crossover to the SP9 main outputs should be at least 20K ohms for maximum sonic benefit.

NOTE: At the performance level of the SP9, high-quality audio signal interconnect cables are critical to preserving maximum fidelity. Audio Research RFI-shielded or unshielded interconnect cables are highly recommended for connection to your power amplifier(s) and to other ancillary equipment. See your authorized Audio Research dealer for recommended lengths and prices.

RECORDER 1/RECORDER 2 OUTPUT CONNECTORS. Two (2) sets are provided. Recorder outputs should be connected to your recorder's "AUX" or "LINE" inputs. These outputs supply a source of whatever is selected by the Input Selector Control. Level is non-variable and approximately the same as the selected input source.

All input/output connectors have heavy gold plating and connect "ground" before "hot." (On disconnect, "hot" is first.)

INSTALLATION INSTRUCTIONS

While the SP9 does not dissipate an unusual amount of heat, it is important that it be provided with reasonable airflow to assure long, trouble-free operation. In addition, the following installation guidelines will help insure maximum sonic performance as well as reliable service.

1. Upright and horizontal mounting is suggested if extended operation (longer than one hour) is contemplated.

2. Do not "stack" the SP9 on top of a power amplifier. Not only could this cause overheating, but "hum" may be introduced into the phono circuits from the proximity of the amplifier's power transformer.
3. Do not place or operate your SP9 on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate your SP9 without the top and bottom covers installed. These are required both for safety as well as shielding from interference (except in service operations, obviously).
5. If rack mounting is employed, use Audio Research Rack Mount Ventilators (RMV-3) below and above your SP9.
6. If side-by-side mounting with other equipment is employed, place the SP9 to the right of the other chassis, so as to provide maximum spacing between another power transformer and the SP9's sensitive phono input circuitry.
7. In a cabinet or rack-mount installation which has an enclosed back, an exhaust fan is desirable so as not to operate the SP9 in overheated ambient air. Operation of vacuum tube equipment for long periods of time in hot ambient air will shorten tube life and increase chance of failure of other component parts.

OPERATING PROCEDURE

START-UP:

1. Make sure Power switch is set to "Off" position; Mute switch should be in "Mute" position; and "Gain" Control should be at minimum (full counter-clockwise rotation).
 2. Secure all rear-panel connections between SP9, power amplifier(s) and input sources. Note: Given the advanced performance capabilities of the SP9, it is extremely important that high-quality interconnects be used for connection to ancillary electronics. Audio Research brand interconnects, in either unshielded or RFI-shielded configurations, are strongly recommended. Your Audio Research dealer can assist you in determining optimal lengths for your system.
 3. Plug 3-prong powerline cord from rear of SP9 into grounded AC wall receptacle.
 4. Turn Power switch to "On." Green LED will glow dimly for approximately 45 seconds while power supply stabilizes, indicating operation of automatic muting circuit. After this warm-up muting period, the LED will brighten when "Operate" is selected, indicating that your SP9 is ready for operation.
- Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your SP9 may be safely left "on" continuously for maximum performance at all times, but at the expense of higher maintenance costs (more frequent tube replacement).
5. Rotate input selector to source desired; set switch options to positions desired.
 6. If "Phono" has been selected, make sure impedance is properly matched to your phono cartridge (see INPUT IMPEDANCE ADJUSTMENT).
 7. Activate input source, then deactivate Mute switch and adjust Gain Control as necessary

TAPE DUBBING PROCEDURE:

When using the SP9 as a control center for recording, the program source to be dubbed must be connected to one of the five inputs controlled by the front Input selector. This routes the selected program to the Recorder 1/Recorder 2 outputs, which should connect to the "aux" or "hi-level" inputs on the recorder(s). (Check to make sure your recorder doesn't short its inputs when it's not in "record" mode. If it does, it may severely load or distort the SP9's output signal.)

The Tape 1/Tape 2 inputs are for listening or monitoring only through the main outputs, and cannot be routed to the Recorder 1/Recorder 2 outputs for dubbing. When using these inputs, your tape recorder should be switched to "Tape" or "Monitor," if it has separate record and play heads. This allows true "A-B" comparison of signals before and after recording, using the Monitor/Source switch on the SP9.

Two recorders may be used simultaneously to record the same program. While dubbing is in process, the signal from either of the Tape 1 or Tape 2 inputs may be listened to by switching to "Monitor" and selecting the appropriate Tape 1 or Tape 2 input. Switching back to "Source" returns the listener to the program being dubbed.

Two different programs may be recorded simultaneously by routing one program directly from its source to the recorder (bypassing the SP9) and routing the other source through the SP9 and its Recorder outputs. Then, two different programs may be monitored through the Tape 1 and Tape 2 inputs.

If you wish to use a tape unit both as a program source to be dubbed and as a recorder with monitoring provisions, then use "Y" connectors to feed both Spare and Tape 1 inputs on the SP9 from the recorder outputs. Then either function may be selected without changing connections. Remember that if you accidentally select the output of your recorder as a signal source and send this same signal back to the same recorder's inputs, you may generate an "echo loop" or wild oscillations, depending on the gain settings on the recorder.

MUTING PROVISIONS:

The SP9 has several provisions to help protect against misuse of the exceptional dynamic range and wide bandwidth that it offers. It is not subject to damage itself, but some power amplifiers and speakers are more limited in their ability to withstand signal extremes. These provisions, both manual and automatic, are designed not to interfere with a flawless listening experience of unprecedented realism, while giving reasonable protection against warm-up surges and power line interruptions. However, for absolute protection of associated equipment some operator understanding, and responsibility, is required.

Initial "settling" time of all circuit parameters within the SP9 requires approximately 5 to 10 minutes. The automatic muting circuitry timer is adjusted for about 45 seconds. (This is because recurrent interruption "settling" time is much less. You would not want to wait for 5-10 minutes each time such an interruption occurred.)

The Mute/Operate Switch allows manual disabling of the SP9 outputs during any moving of the tonearm or switching of equipment. Use of this switch will minimize stress on your amplifier even if it is "off." It is also highly recommended that manual muting be employed during the initial 45 second warm-up period as well as during turn-off for maximum protection.

While it is true that the automatic muting will provide reasonably adequate protection against speaker burnout during these periods, it has limitations. At the 45 second point the automatic timer "releases" the output, and since full subsonic stabilization has not yet occurred, some sonic unpleasantness may occur. Although this is normally adequate protection, utilization of the manual mute provision will completely avoid this stress to your speakers, as well as the associated sonic unpleasantness.

Some solid-state power amplifiers have a DC offset present at their input connections. (This, of course, should not be.) Operation of the manual muting switch with such an amplifier connected will result in a "click" or "pop" in your loudspeaker (commensurate in level with the amount of the offset) each time the switch is activated. Repair or replacement of such amplifiers is suggested.

The automatic muting operates as follows:

1. The manual mute switch always disables both "main" outputs and overrides any automatic provisions, even when the SP9 is turned off. (The "Operate" position of the manual mute switch is functional only when the unit is not in the automatic mute mode.)
2. The 45 second warm-up timer will restart automatically and the LED will dim if the power is temporarily interrupted for 0.1 second or more. Note: Power supply regulation of the SP9 is effective down to 100VAC without serious sonic degradation.
3. The automatic muting of the SP9 is designed to be effective only against power line interruptions and power supply failures. It will not mute against subsonic signal transmissions from your turntable, etc. Proper fusing of speakers is essential to protect against excessive audio level or power amplifier faults.

SHUT-DOWN:

1. Set "Mute" switch to "mute" position.
2. Rotate "Gain" control counter-clockwise to minimum setting.
3. Deactivate power amplifier(s).
4. Deactivate all input sources.
5. Set SP9 Power Switch to "Off" position.

INPUT IMPEDANCE ADJUSTMENT

For the best sonic performance of your phono pickup cartridge, it should connect to the proper load impedance recommended by the cartridge manufacturer. Your SP9 comes wired with a standard load of 47K ohms for most high-output moving-coil, or moving magnet cartridges. A kit of precision load resistors is supplied with your SP9 for the more common low-impedance load requirements of 10, 33 or 100 ohms for typical low to medium output moving-coil cartridges. Consult your cartridge manufacturer or dealer to determine the optimum load impedance for your needs. You may wish to connect the load resistors at the output of your turntable, rather than in the SP9, especially if you may be using more than one turntable or cartridge, with different load requirements.

The use of precision fixed resistors provides better load accuracy and sonic performance at lower cost than most adjustable or switchable loads. Audio Research can supply audiophile grade non-standard load resistor and capacitor values upon request accompanied by \$10.00 to cover order processing costs (certified funds or money order).

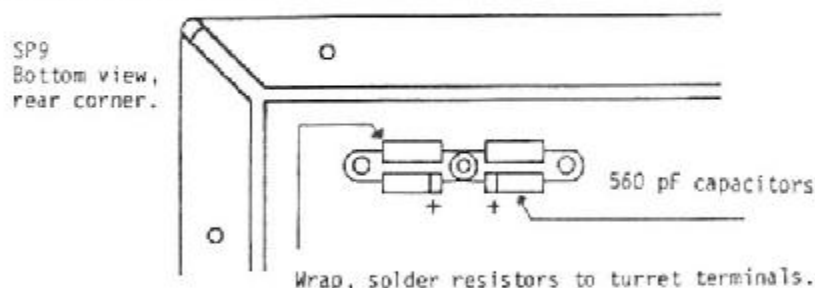
Solder the desired resistors to the turret terminal posts on the bottom of the main circuit board near the phono inputs (see illustration). First wrap the resistor leads around the posts 1/2 to 3/4 turn. Then solder using the special alloy solder supplied with the resistors. Connect one resistor between the left and center posts and the other resistor between the center and right posts.

For 10 ohms use brown-black-black-gold resistors. For 33 ohms use orange-orange-red-gold resistors. For 100 ohms use brown-black-black-black resistors.

NOTE: All SP9s have two 560 picofarrad capacitors mounted on the impedance loading pegs, one for each channel. When using moving coil cartridges these capacitors should not be removed when adding load resistors. The load resistors should be installed in parallel with these capacitors.

INPUT CAPACITANCE ADJUSTMENT

The SP9 has a total input capacitance of 600 Picofarrads with the 560 picofarrad capacitors installed and 40 picofarrads without them. Different value capacitors can be installed to match the requirements of your moving magnet cartridge. Observe the polarity as shown in diagram below when adding capacitors.



REDUCING GAIN

When using the SP9 with high-output cartridges or high-sensitivity power amplifiers or high-efficiency speakers, you may find that you typically set the SP9 Gain control at 9-11 o'clock, where the detented gain increments may be too large for setting the desired listening volume. For more precise setting of the desired listening level, the SP9 includes a simple internal provision to reduce the gain of the line section by 6dB. This affects all signal sources, when using the normal Main Output jacks. The signal level at the Recorder Output jacks is unaffected. Note: the CD input of the SP9 Mark II has a built-in gain reduction of 12 dB. Other line inputs have normal gain. To reduce the gain by 6dB, merely remove the bottom cover and unsolder the gain change connection for each channel. These connections are located in the central area of the bottom of the main circuit board near V2, where the pads identified by the letter "A" connect to the large central ground path.

To restore the SP9 to its original gain, merely resolder across these small gaps at "A." For best results use the special alloy solder supplied with the cartridge load resistor kit.

SERVICING

Because of its careful design and exacting standards of manufacture, your SP9 should normally require only minimal routine service to maintain its high level of performance.

CAUTION: Your SP9 contains sufficient levels of voltage and current to be lethal. Do not tamper with a component or part inside the unit. Refer any needed service to your authorized Audio Research dealer or other qualified technician.

The two (2) vacuum tubes inside your SP9 are quality 6DJ8 types, and with normal use should not need to be changed for approximately 5,000 to 10,000 hours of use. Replacement 6DJ8 tubes need not be low-noise or matched for gain characteristics, and are available from Audio Research.

At the back of the Manual you will find a schematic diagram for your SP9 which is fully annotated with operating voltages and component part values. Your service technician will require this information when servicing your unit.

CLEANING

To maintain the visual appearance of your SP9 preamplifier, occasionally wipe the front panel and top cover surfaces with a soft, damp (not wet) cloth to remove dust. A mild, non-alkaline soap solution may be used to remove fingerprints or similar smudges. Cleaners containing abrasives should not be used as they will damage the "brushed" grain of the front panel finish.

3-YEAR LIMITED WARRANTY TERMS AND CONDITIONS

1. **LIMITED WARRANTY.** Audio Research warrants the product designated herein to be free of manufacturing defects in material and workmanship, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser or no later than five (5) years from the date of shipment to the authorized Audio Research dealer, whichever comes first, excepting vacuum tubes which are warranted for 90 days only (See 6).
2. **CONDITIONS.** This Warranty is subject to the following conditions and limitations. The Warranty is void and inapplicable if the product has been used or handled other than in accordance with the instructions in the owner's manual, abused or misused, damaged by accident or neglect or in being transported, or the defect is due to the product being repaired or tampered with by anyone other than Audio Research or an authorized Audio Research repair center. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THE ORIGINAL PURCHASE RECEIPT. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and authorized dealer and the price paid by the purchaser. Audio Research reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.
3. **REMEDY.** In the event the above product fails to meet the above Warranty and the above conditions have been met, the purchaser's sole remedy under this Limited Warranty shall be to return the product to Audio Research or an authorized Audio Research repair center where the defect will be rectified without charge for parts or labor, except vacuum tubes (See 6).
4. **LIMITED TO ORIGINAL PURCHASER.** This Warranty is for the sole benefit of the original purchaser of the covered product and shall not be transferred to a subsequent purchaser of the product.
5. **DURATION OF WARRANTY.** This Warranty expires on the third anniversary of the date of purchase or no later than the fifth anniversary of the date of shipment to the authorized Audio Research dealer, whichever comes first.
6. **VACUUM TUBES.** Vacuum tubes are warranted for the original 90-day period only.
7. **DEMONSTRATION EQUIPMENT.** Equipment used by an authorized dealer for demonstration purposes is warranted to be free of manufacturing defects in materials and workmanship for a period of three (3) years from the date of shipment to the dealer. Vacuum tubes are warranted for 90 days. Demo equipment needing warranty service must be packed and returned to Audio Research by the dealer at his sole expense. Audio Research will pay return freight of its choice. A returned product must be accompanied by a written description of the defect on an AUDIO RESEARCH RETURNED GOODS AUTHORIZATION form. Dealer-owned demonstration equipment sold at retail within three (3) years of date of shipment to the dealer is warranted to the first retail customer to be free of manufacturing defects in materials and workmanship for the duration of the 3-Year Limited Warranty remaining (as measured from the date of shipment of the equipment to the dealer). Vacuum tubes are not warranted for any period under these conditions of sale. In the event warranty service is needed under the conditions, the owner of

the equipment must provide a copy of his purchase receipt, fulfilling the requirements described under "2. Conditions" above. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice.

8. MISCELLANEOUS. ANY IMPLIED WARRANTIES RELATING TO THE ABOVE PRODUCT SHALL BE LIMITED TO THE DURATION OF THIS WARRANTY. THE WARRANTY DOES NOT EXTEND TO ANY INCIDENTAL OR CONSEQUENTIAL COSTS OR DAMAGES TO THE PURCHASER. Some states do not allow limitations on how long an implied warranty lasts or an exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

9. WARRANTOR. Inquiries regarding the above Limited Warranty may be sent to the following address:

Audio Research Corporation
6801 Shingle Creek Parkway
Minneapolis, MN 55430

WARRANTY OUTSIDE THE USA

Audio Research has formal distribution in many of the countries of the free world. In each country the Audio Research Importer has contractually accepted the responsibility for product warranty. Warranty should normally be obtained from the importing dealer or distributor from whom you obtain your product.

In the unlikely event of service need beyond the capability of the Importer, Audio Research does, of course, back up the warranty. Such product would need to be returned to Audio Research, together with a photostatic copy of the bill of sale.

SP9 MARK II SPECIFICATIONS

Frequency response:

High level section: ± 0.5 dB, 5Hz to 50kHz
-3dB points below 1Hz and above 200kHz
Phono: ± 0.3 dB of RIAA, 30Hz to 40kHz

Distortion:

Less than .01% at 2V RMS output. (Typically less than .005% in midband)

Gain:

Phono input to tape output:	46dB	High level inputs to tape output:	0dB
Phono input to main output:	67dB	High level inputs to main output:	21dB
		C.D. input to main output:	9 dB

Input Impedance:

50K ohms Line Inputs; 47K phono (Phono provisions for any value below 47K ohms or added input capacitance for matching certain magnetic cartridges.)

Output Impedance:

250 ohms main output; 850 ohms recorder output. Recommended load 60K ohms and 100pF. (20K ohms minimum and 1000pF maximum)

Maximum Inputs:

Phono, 200mV at 1kHz (1000mV RMS, 10kHz). High level inputs essentially overload-proof.

Rated Outputs:

2V RMS 5Hz to 50kHz, all outputs, 60K ohm load (main output capability is 50V RMS output at 1/2% THD at 1kHz into a 100K ohm load with 5V RMS high level input)

Power Supplies:

Electronically-regulated low and high voltage supplies and electronic decoupling. Shielded toroid transformer. Line regulation better than .01%

Noise:

High Level

- (1) 70uV RMS maximum residual unweighted wideband noise at main output with gain control minimum (98dB below 5V RMS output)
- (2) More than 100dB below 1V RMS input (Less than 7uV equivalent input noise)

Phono:

0.12uV equivalent input noise, IHF weighted, shorted input (78dB below 1mV input)

Tube Complement:

2 - 6DJ8/ECC88 dual triodes
(Hybrid FET/Tube audio circuit, solid-state power supply)

Power Requirements:

100-135VAC 60Hz (200-270VAC 50/60Hz) 50 Watts

Dimensions:

19" (48 cm) W x 5 1/4" (13.4 cm) H (standard rack panel) x 10 1/4" (26 cm) D.
Handles extend 1 5/8" (4.1 cm) forward of front panel. Rear chassis fittings extend 7/8" (2.3 cm)

Weight:

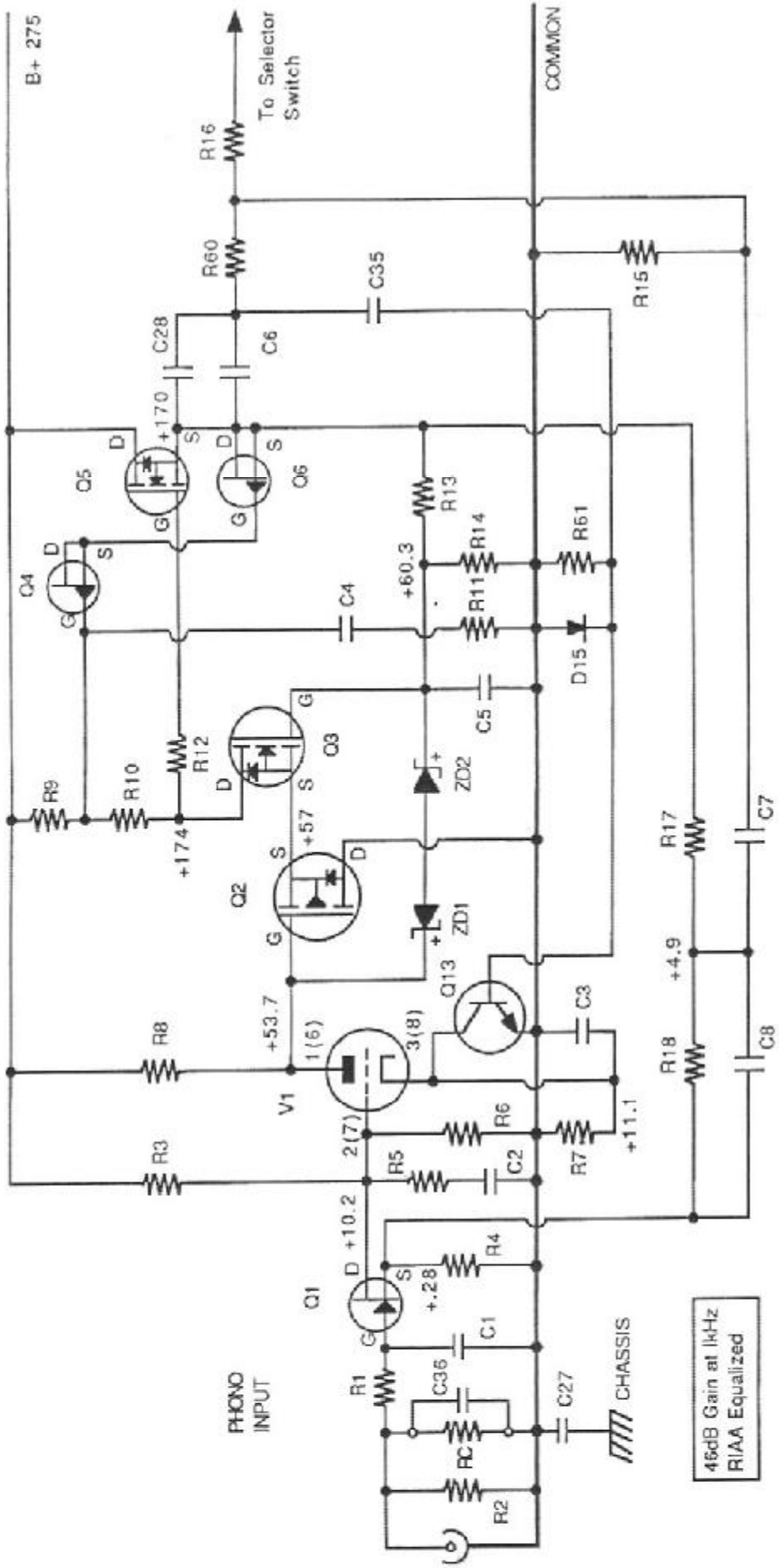
13 lbs. (5.9 kg) Net; 22 lbs. (10kg) Shipping

MODEL SP9 MARK II PREAMPLIFIER
SCHEMATIC AND PARTS LIST

6-20-89

audio research corporation

6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MINNESOTA 55430



B+ 275

PHONO INPUT

CHASSIS

COMMON

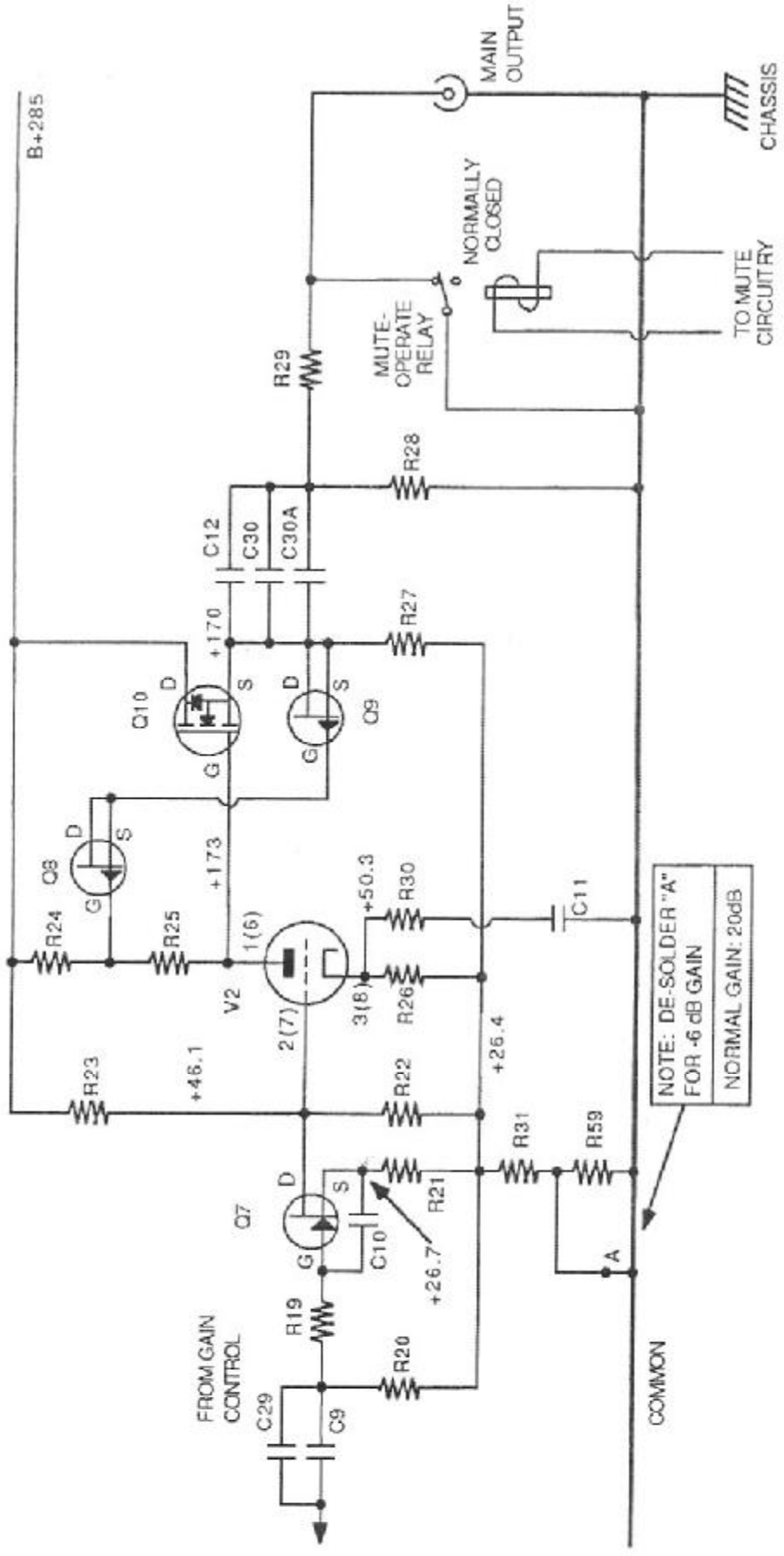
46dB Gain at 1kHz
RIAA Equalized

SP9MKII PREAMPLIFIER - (PHONO CIRCUITRY) - PAGE 1 of 4 PAGES

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6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MN 55430



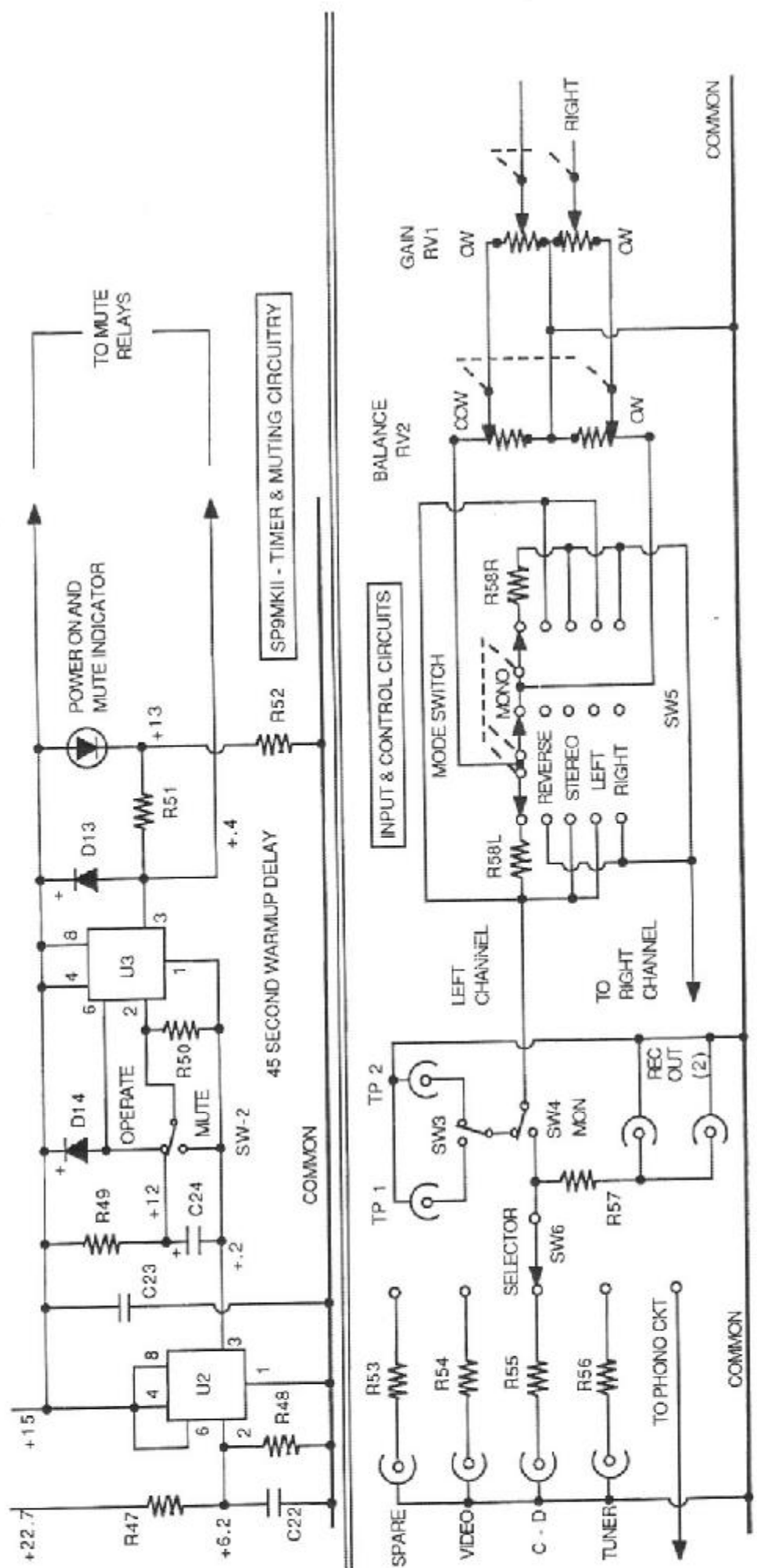
SP9MKII PREAMPLIFIER - (LINE SECTION CIRCUITRY) - PAGE 2 of 4 PAGES

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 MINNEAPOLIS, MN 55430

NOTE: DE-SOLDER "A"
 FOR -6 dB GAIN
 NORMAL GAIN: 20dB

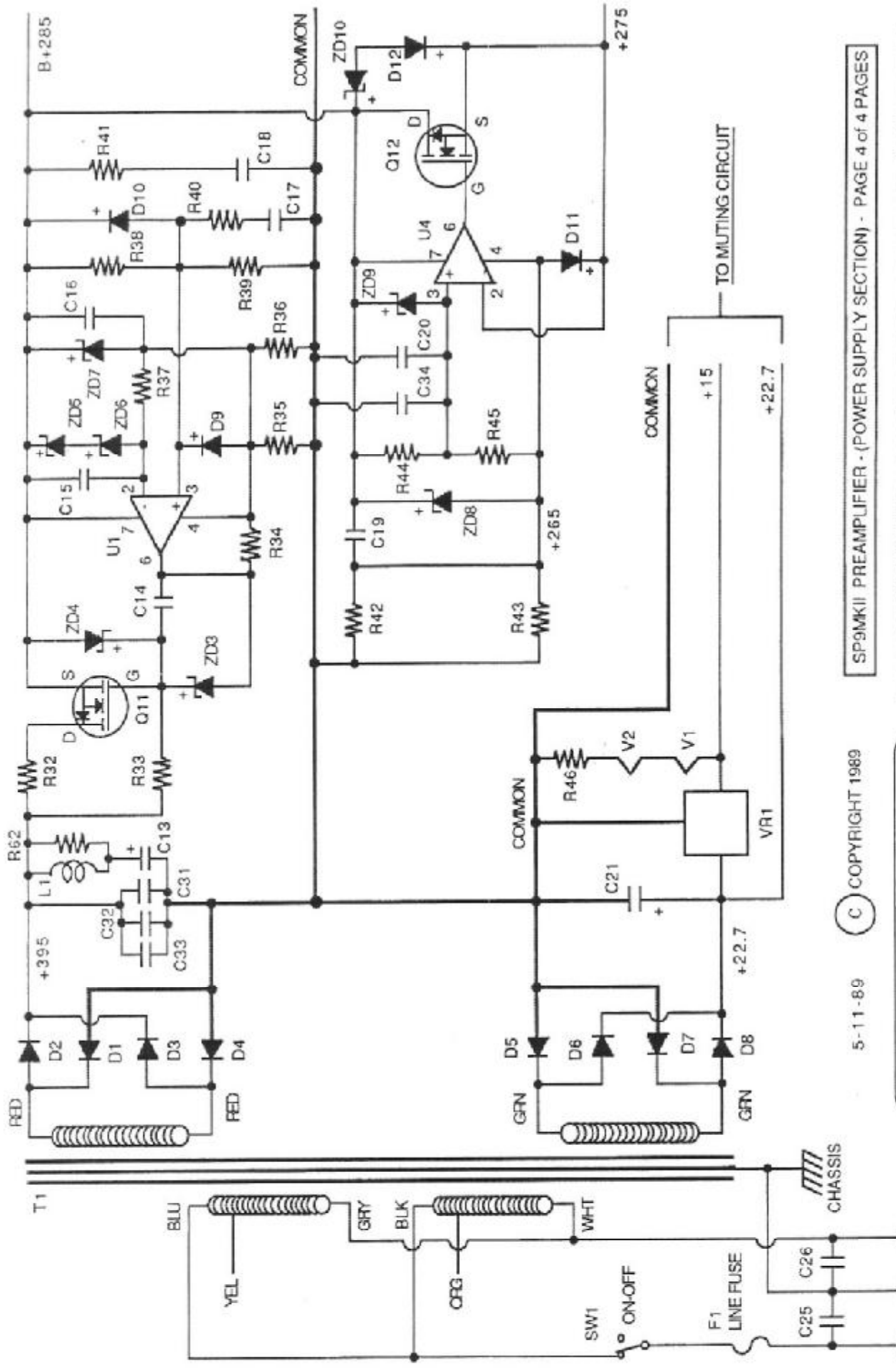


SP9MKII PREAMPLIFIER - (MUTING & SWITCHING CIRCUITRY) - PAGE 3 of 4 PAGES

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SP9MKII PREAMPLIFIER - (POWER SUPPLY SECTION) - PAGE 4 of 4 PAGES

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BLK GRN WHT
 100-135 VAC 50/60Hz

PARTS LIST

As of JUN 16 89

PRODUCT: SP9MK11

NOTES:

Schematic Symbol	Quantity	ARC Part #	Description
CAPACITORS			
C 1,2,10,11	8	53560103	CAP. 56 PF +/-2% 630V DPN
C 3	2	53100101	CAP. 10 PF +/-1 PF 630V PPN
C 4	2	53150202	CAP. 150 PF 2 1/2% 630V PPN
C 5	2	53270101	CAP. 27 PF +/-1PF 630V PNP
C 6,12	4	53500606	CAP. 5 UF +/-10% 250V
C 7	2	53156400	CAP. .0156 UF +/-2% 630V
C 8	2	53480300	CAP. .0048 UF +/-2% 630V
C 9	2	53470510	CAP. .47 UF 425V IAR
C 13	1	50100802	CAP. 100 UF 450V
C 14,15,16,19	4	53220507	CAP. .22 UF 10% 160V
C 17,28,29,30,30A,32,33,34	12	53100406	CAP. .01 UF +/-10% 630V
C 18,20	2	53200602	CAP. 2 UF +/-10% 450V
C 21	1	50150904	CAP. 1500 UF 35V
C 22,23	2	53220506	CAP. .22 UF 100V
C 24	1	51330702	CAP. 33 UF +/-10% 16V
C 25,26	2	52500300	CAP. .005 UF 20% CERAMIC DISC
C 27	2	52100300	CAP. 1000 PF 20% 1000V
C 31	1	53100608	CAP. 1.0 UF 1-20% 425V TYPE V
C 35	2	52680000	CAP. 6.8 PF +/- 1/2PF 1000V
C 36	2	53560201	CAP. 560 PF +/-2.5% 630V
DIODES			
D 1,2,3,4	4	30502200	IN4006
D 5,6,7,8	4	30500400	IN4005 GENERAL INSTRUMENT
D 9,10,11,12,13,14,15	8	30500910	FAIRCHILD IN916B
FUSES			
F 1(240V)	1	34500120	FUSE, MDX/MDC 3/10A SL BL 220
F 1(120V)	1	34500250	FUSE, BUSSMANN MDQ 6/10 A
CONNECTORS			
J 1-10	20	23202100	GOLD PHONO JACK, SP9
INDUCTORS			
L 1	1	61000160	CHOKE, 2.7 UH +/- 10%
PANEL INDICATOR			
LE 1	1	34300102	LED, COLLAR & RETAINING RING
TRANSISTORS			
Q 1,1A	4	30006535	FET, WHITE ORANGE GREEN
Q 2	2	30007006	FET, GRAY BLUE
Q 3,5	4	30006705	FET, ORANGE GREEN
Q 4,6,8,9	8	30005901	FET, RED BROWN
Q 7	2	30006503	FET, WHITE ORANGE

PARTS LIST

As of JUN 16 89

PRODUCT: SP9MK11

NOTES:

Schematic Symbol	Quantity	ARC Part #	Description
Q 10	2	30006716	FET, ORANGE, GREEN, BLUE
Q 11	1	30006811	FET, YELLOW
Q 12	1	30007102	FET, YELLOW RED
Q 13	2	30003100	TRANSIST., 2N5088, 2N5209, 2N5210

RESISTORS

R C	1	42182203	RES. 182 OHM 1% MK-3 50PPM
R 1,10,56	6	42549103	RES. 54.9 OHM 1% MK-3 50PPM
R 2	2	42499403	RES. 49.9K 1% MK-3 50PPM
R 3,23	4	42750405	RES. 75K 1% MK-8 50PPM
R 4B	2	42127303	RES. 1.27 1% MK-3 50PPM
R 4,25	4	42150203	RES. 150 OHM 1% MK-3 50PPM
R 4A	2	42205203	RES. 205 OHM 1% MK-3 50PPM
R 5	2	42121303	RES. 1.21K 1% MK-3 50PPM
R 6,6A	4	42100403	RES. 10K+/-1% MK-3 50PPM
R 6B	2	42100503	RES. 100K+/-1% MK-3 50PPM
R 7	2	42121403	RES. 12.1K 1% MK-350PPM
R 7A,26	4	42215403	RES. 21.5K 1% MK-3 50PPM
R 8	2	42150514	RES. 150K 1% MK-5 1W 50PPM
R 9,13,27A	6	42274405	RES. 27.4K 1% MK-8 50PPM
R 9A	2	42825405	RES. 82.5K 1% MK-8 50PPM
R 11	2	42357203	RES. 357 OHM 1% MK-3 50PPM
R 12	2	42274103	RES. 27.4 OHM 1% MK-3 50PPM
R 14	2	42150414	RES. 15K 1% MK-5 50PPM
R 15,20,28	6	42475503	RES. 475K 1% MK-3 50PPM
R 16,16A,16B	6	42100314	RES. 1K 1% MK-5 50PPM
R 17	2	42562513	RES. 562K 1% MK-4 50PPM
R 18	2	42274403	RES. 27.4K 1% MK-3 50PPM
R 18B	2	42357403	RES. 35.7K 1% MK-3 50PPM
R 18A	2	42619203	RES. 619 OHM 1% MK-3 50PPM
R 19,19A,40	5	42332203	RES. 332 OHM 1% MK-3 50PPM
R 21,32,32A	4	42200205	RES. 200 OHM+/-1% MK-8 50PPM
R 22,22A	4	42681303	RES. 6.81K 1% MK-3 50PPM
R 24,27,35,36,42,43	8	42100505	RES. 100K 1% MK-8 50PPM
R 29,29A	4	42475203	RES. 475 OHM 1% MK-3 50PPM
R 30	2	42392303	RES. 3.92K 1% MK-3 50PPM
R 31,31A	4	42221303	RES. 2.21K 1% MK-3 50PPM
R 31B	2	42237303	RES. 2.37K 1% MK-350PPM
R 31C	2	42287303	RES. 2.87K 1% MK-3 50PPM
R 33	1	42158513	RES. 158K 1% MK-4 50PPM
R 34,34A	2	42392403	RES. 39.2K 1% MK-3 50PPM
R 37	1	42499303	RES. 4.99K 1% MK-3 50PPM
R 38,61	3	42150403	RES. 15K 1% MK-3 50PPM
R 38A	1	42215503	RES. 215K 1% MK-3 50PPM
R 39	1	42280513	RES. 280K 1% MK-4 50PPM
R 41	1	43100002	RES. 1 OHM 2W 5% W.W.
R 44,45	2	42100703	RES. 10 MEG 1% MK-3 50PPM
R 46	1	43750001	RES. 7.5 OHM 2W W.W.
R 47,55,55A	5	42768403	RES. 76.8K 1% MK-3 50PPM
R 48	1	42324403	RES. 32.4K 1% MK-3 50PPM
R 49	1	42100603	RES. 1 MEG 1% MK-3 50PPM
R 50	1	41100702	RES. 10 MEG 1/4W 5%
R 51	1	42100303	RES. 1K 1% MK-3 50PPM

PARTS LIST

As of JUN 16 69

PRODUCT: SP9MK11

NOTES:

Schematic Symbol	Quantity	ARC Part #	Description
R 52	1	42511303	RES. 5.11K 1% MK-3 50PPM
R 53,54,57	6	42499203	RES. 499 OHM 1% MK-3 50PPM
R 58	2	42464303	RES. 4.64K 1% MK-3 50PPM
R 59,59A	4	42182303	RES. 1.82K 1% MK-3 50PPM
R 60,60A,60B,60C,C	10	42100203	RES. 100 OHM 1% MK-3 50PPM
CONTROLS			
RV 1	1	45100528	100K DUAL GAIN POT
RV 2	1	45100529	100K DUAL BALANCE POT
RELAYS			
RY 1	2	64101000	RELAY, 12V REED 51P 1200 OHM
SWITCHES			
SW 1	1	24100720	TOGGLE SW. SILVER PRE. SATIN
SW 2,3,4	3	24100420	TOGGLE SW.GOLD PRE. SATIN
SW 5	1	24000700	5 POS MODE SWITCH,SP11
SW 6	1	24001000	5 POS SOURCE SWITCH,SP11
TRANSFORMERS			
T 1	1	60007701	XFR. SP9(220/240V) TOROID
INTEGRATED CIRCUITS			
U 1	1	31002200	MC34071P MOTOROLA
U 2,3	2	31000801	TIMER MC1455P1
U 4	1	31001900	TL071CP
VACUUM TUBES			
V 1,2	2	32001110	VAC.TUBE, 6DJ8 RUSSIAN
VOLTAGE REGULATOR			
VR 1	1	31002000	MC7815CT
ZENER DIODES			
ZD 1	2	30504400	IN5240B
ZD 2	2	30501800	IN5245B
ZD 3	1	30504200	IN5535A
ZD 4	1	30500300	IN4740A
ZD 5,6	2	31000702	LM329DZ RED
ZD 7	1	30503500	IN5359 B
ZD 8,9,10	3	30503700	DIODE, Z20 10%