

audio research
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3900 ANNAPOLIS LANE NORTH / PLYMOUTH, MINNESOTA 55447-5447 / PHONE: 763-577-9700 FAX 763-577-0323

MODEL SP10 PREAMPLIFIER

OWNER'S MANUAL

(Contains all revisions)

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
INTRODUCTION	1
DISCUSSION	1-2
USE CAUTIONS	2
PACKAGING	2
GENERAL	3
USE INSTRUCTIONS	4-6
GROUNDING INSTRUCTIONS	6-7
INSTALLATION CAUTIONS	7
SERVICING	8
MUTING PROVISIONS	8-9
WARRANTY TERMS AND CONDITIONS	10-11
WARRANTY OUTSIDE THE USA	11
SPECIFICATIONS	12
ADDENDUM: SCHEMATIC	

INTRODUCTION

Please take the time to read this manual prior to attempting installation or use of this unit. Because it is a totally unconventional preamplifier there are several points you need to know prior to placing it in operation.

You would not purchase an expensive and sophisticated racing automobile and drive off at high speed without a preliminary checkout. Please apply this same rationale to your new SP-10, and learn about it before attempting its use.

DISCUSSION

For several years Audio Research Corporation has contemplated the possibility of introducing an essentially "no holds barred" preamplifier for the reproduction of music. We believe the current state-of-the-art of phonograph records, pickup systems, amplifiers and speaker systems demands such a unit for the finest systems. It is for this need that the SP-10 preamplifier is offered. While we have not disregarded cost effectiveness in the manufacturing process, we have also not compromised at any point where long-term reliability, serviceability and the ultimate reproduction of sound quality is concerned. It is intended that the SP-10 will establish an all-time reference standard for the reproduction of music.

In order to allow the use of most of the better moving coil pickup cartridges without the need for an additional preamplification system (head-amp or transformer) the SP-10 has been designed to have 12dB more gain (72dB overall) than conventional units such as the SP-6, SP-7 and SP-8 preamplifiers. A remarkable .2 microvolt equivalent input noise (above 1kHz) has been achieved, allowing a 74dB signal-to-noise ratio below a one (1) millivolt input signal. To accomplish this a new circuit approach (proprietary and patent pending) had to be developed. We believe this new circuit provides a combination of low noise, high gain and low distortion for audio never before achieved with vacuum tubes (as a practical unit outside the laboratory).

While not all low output moving-coil cartridges can be successfully used with the SP-10, those that provide at least 200-400 microvolts or more at 5cm/sec recorded velocity will give satisfactory results. (A 200uV RMS input signal provides for a nominal 60dB signal-to-noise ratio with .8V RMS output for driving an electronic crossover or power amplifier.) This would include such cartridges as the Dynavectors, Koetsus, Denons, EMTs, Accuphase, etc.

As with any honest gain in performance, certain conditions of necessity go along with those gains. When dynamic range and bandwidth are essentially unlimited, it becomes very important that the signal to be amplified is free of sonic and subsonic disturbances since these will be amplified with the same vigor as is the audio signal. These can cause not only aural discomfort, but possible damage to your amplifier and/or speaker system. Because of this, and because of the very high current capability of several solid-state amplifiers on the market, including ARC's D-111, we recommend that the SP-10 be used only with vacuum tube amplifiers which are transformer coupled. If a solid-state amplifier must be used, it is essential that the speaker system be properly fused to prevent possible damage.

Such things as plugging and unplugging audio cables with the gain up or switching inputs with the gain up (many times "winked at" in using lesser equipment) can provide immediate and catastrophic results to associated equipment.

If you have experienced feedback, hum, noise or instability problems with the turntable/arm/cartridge combination you are presently using, be sure to resolve these problems prior to placing your SP-10 in use. Your authorized Audio Research dealer can provide help with these kinds of problems.

When these use conditions are met, we believe you will experience a new revelation of the beauty of recorded music; and probably discover that many of your records are significantly better than you believed.

Your SP-10 has many special features aimed at providing you with maximum performance capability. Further discussion of these will be found as you continue to read through this manual.

USE CAUTIONS

1. Please be certain to read this manual over to familiarize yourself with your new preamplifier before placing it in service.
2. The power cord on your SP-10 is equipped with a standard three-prong grounding plug which, if used normally, will provide a safe earth ground connection of the chassis and all equipment plugged into its AC receptacles. While this procedure provides the maximum possible safety in use it will, in some cases, cause your audio system to have a small residual hum.

It is usually best to keep the SP-10 "earth grounded" and "float" the grounds of power amplifiers and other equipment to eliminate ground loop hum. The audio interconnect cables then keep the power amplifiers at safe earth ground potential. For further information on grounding, see RECEPTACLES and GROUND TERMINAL on Page 7 of this manual. If there is any question as to the safety of grounding procedures, be certain to seek competent help with the installation.

WARNING

- A. To prevent fire or shock hazard, do not expose this equipment to rain or moisture.
- B. This unit contains voltages which can be lethal. Do not operate this unit with its covers removed. Refer servicing to qualified personnel.

CAUTION

For continued protection against fire hazard, replace the fuses only with the same type and rating of fuses as specified at the fuse holder.

PACKAGING

Save all packaging. Your Audio Research® preamplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return it to the factory for service, but if that should prove necessary, or other occasion to ship it occurs, the original packaging may save your investment from unnecessary damage or delay.

GENERAL

The SP-10 is constructed on two chassis, utilizing aircraft-quality connectors and an interconnect cable of one (1) meter length. The unit is essentially divided into an active amplification chassis (SP-10) and a power supply chassis (SP-10PS). (A custom interconnect cable of longer length can be obtained from ARC at extra cost, although some degrading of performance will occur as the cable lengthens.)

POWER SUPPLY CHASSIS: The separate power supply assembly (SP-10PS) contains the on-off switches and convenience receptacles, keeping all AC power isolated from the active chassis. Electronic regulation of all heater voltages, as well as the main "B+" voltage, is accomplished within the SP-10PS. There are six (6) "packaged" solid-state electronic regulators to provide regulated "DC" to the 12 vacuum tube heaters contained in the SP-10. Each pair of tubes has resistive isolation from its regulator to prevent thermal shock to either the tubes or the regulators during "turn on." Thus, all signal amplifying vacuum tube heaters are maintained at a constant optimum operating temperature for all conditions of power line voltage from 90 to 135 volts RMS. (180 to 270V RMS for "240" volt units.)

A pair of 6L6WGC power tubes is used (together with associated circuitry) to provide the main "B+" electronic regulation, as well as reliability from failure for most power line transients.

INTERCONNECT CABLE: The interconnect cable utilizes gold-plated machined connections of aircraft quality. Each connector is keyed. That is, it can only be inserted in its mating socket in one position. This, of course, is to assure the correct connections. Take care to align the connectors properly before rotating the locking ring so that no pins will be damaged by a forced misalignment.

A clockwise rotation of the locking ring until a slight "click" is felt will assure locking of the connector for uninterrupted use.

While it will not harm the power supply to operate it without being connected to the active amplification chassis, we recommend that you do not operate it in this way, to avoid any possibility of shock hazard. Note that while both the sockets and the cable connectors are "polarized," some possibility of electrical shock could exist under certain conditions with the sockets exposed.

ACTIVE CIRCUIT CHASSIS: The SP-10 active circuitry chassis contains 12-ECC88 (6DJ8) twin triode vacuum tubes in a "dual mono" construction. Six (6) tubes are used in each channel. This helps minimize cross-channel phase anomalies and contributes to the precise imaging, staging and musical depth achievable from the unit.

Extensive use has been made of state-of-the-art audio materials, including such items as polypropylene dielectric capacitors, polystyrene dielectric capacitors, metal film resistors, wire-wound resistors, proprietary interconnect "hookup" wires, gold-plated input and output connectors, heavily gold-plated switches, etc.

Each of the five levels of circuitry amplification is provided with its own electronic regulation in the form of a "capacitance multiplier," providing essentially "zero" impedance power supplies with essentially "infinite" isolation between circuit sections. Thus, the active circuitry is allowed to operate near theoretical performance levels.

Feedback circuits for both hi-level and phono sections are of the ARC "DC feedback concept." Only one interstage "time constant" is enclosed within each of these circuit sections, resulting in absolute low-frequency stability. This, together with the power supply electronic regulation, provide unprecedented low frequency musical definition and dynamic bandwidth.

USE INSTRUCTIONS

The front panel has a total of 6 controls and 4 switches:

GAIN CONTROL: This controls volume or loudness, and is a special metal film segmented control with approximately 2dB steps and accurate tracking. It is highly recommended that the user develop the habit of always turning the gain control to its fully counter-clockwise position (minimum) between any listening uses (between records, whenever switching inputs or impedance or prior to turning the unit "on" or "off" are examples). This will insure no inadvertent misuse of the unit with possible damage to amplifier and/or speaker.

While the SP-10 will function linearly at any gain setting, it is possible that in the case of some high efficiency speakers (such as Klipshorns, etc.) and/or high output cartridges it may be necessary to use a power amplifier having input level controls to avoid "bunching up" your (gain) control use in the counter-clockwise corner of its rotation. Proper power amplifier input level adjustment should be accomplished as follows: With the SP-10 gain control in the 10 to 2 o'clock position range advance the amplifier input level controls for normal listening level.

BALANCE CONTROL: A conventional stereo control. Moves the sound from left to right or vice versa when rotated. Normally should remain centered.

MODE CONTROL: Also a conventional stereo control. Allows operation as indicated.

INPUT SELECTOR: Chooses between various possible source material for your listening choice. In the "phono" position the "Input Impedance" and the "Phono 1/OFF/Phono 2" controls are activated.

INPUT IMPEDANCE CONTROL: This control allows front panel selection of impedance to match a wide range of phono pickup cartridges. The standard positions include:

47K ohm for MM cartridges
10K ohm for Grado cartridges
100 ohm for MC cartridges
30 ohm for MC cartridges
10 ohm for MC cartridges

Although a choice of 10, 30 and 100 ohms will reasonably match most MC cartridges, a provision has been made on the circuit board for one special impedance to match any cartridge of your choice. This circuit is active in the "10K" position. Determine the value of resistor needed by summing the reciprocals of 10K and a resistor of "X" value to equal the reciprocal of the value you desire.

As an example, suppose you want 800 ohms for an EMT cartridge. Then:

$$\frac{1}{10,000} + \frac{1}{X} = \frac{1}{800} \quad \text{or}$$

$$\frac{10,000 + X}{10,000X} = \frac{1}{800} \quad \text{or}$$

$$10,000 = 800 (10,000) + 800 (X) \quad \text{or}$$

$$9,200X = 8,000,000 \quad \text{or}$$

$$X = 870 \text{ ohm (869.565)}$$

The switch used for this impedance control is a special, heavily gold-plated unit which progressively adds contacts, adding more or less resistors in parallel for this circuit. The reason for all this is to avoid sonic degradation. Remember, you are switching microvolt-level analog signals. If you use this "special" provision, the lower impedances, 100, 30 and 10 ohms, will also be modified in the same way the 10K position was modified. To follow the above example the 100 ohm position would become 89 ohms, etc.

$$\frac{1}{800} + \frac{1}{100} = \frac{1}{X} \quad \text{or}$$

$$\frac{800 + 100}{800(100)} = \frac{1}{X} \quad \text{or}$$

$$\frac{900}{80,000} = \frac{1}{X} \quad \text{or}$$

$$900X = 80,000 \quad \text{or}$$

88.888 ohms

PHONO 1/OFF/PHONO 2 CONTROL: Allows a choice of two pickup systems without disconnecting input leads. This is also a very special, heavily gold-plated multiple-contact switch to accomplish switching the microvolt level signals with minimum sonic degradation.

BYPASS SWITCH This switch directly connects the Gain Control to the output of the RIAA compensated phono amplification circuitry. All other controls and circuit switches are removed from the active circuit path when this switch is activated. It is provided for use in those systems where ultimate performance from phonograph records is desired.

HI-LO GAIN SWITCH: Reduces overall gain by 12dB in the "up" position. May be found useful with high output cartridges and/or high efficiency speakers. Note that this switch is defeated and gain is returned to maximum when the Bypass switch is activated.

LEFT LED: Indicates unit on.

RIGHT LED: Indicates operation of the automatic muting circuitry by varying in intensity at approximately a one (1) second interval.

MANUAL MUTE SWITCH: Shorts the output of the preamplifier (while isolating the signal circuits by a photo-resistive coupler) to allow listening interruptions for telephone, etc. It is suggested that this switch always be activated between listening uses in addition to turning the volume control counter-clockwise. These two simple precautions will assure no inadvertent misuse of the unit (with possible resultant damage to amplifier and/or speakers).

MONITOR INPUT SWITCH: Provides an input to bypass the input selector switch. Can be useful in conjunction with some tape recorders or other signal processing equipment for signal monitoring or modifying.

The signals present at the "tape output" connectors are not affected by this switch. That is to say that whatever is selected by the Input Selector will be present at all times at the "tape output" connectors. Note also that this switch is not usable when the Bypass switch is activated.

SP-10 REAR PANEL

MAIN OUTPUT CONNECTORS: There are two sets of "output" connectors which are simply connected internally in parallel. One set should be connected to your electronic crossover or power amplifier. The additional set is provided for such uses as to an additional amplifier for remote or "background" use, or "bi-wire" amp systems (where separate power amps are used for bass and treble, but no electronic crossover is used).

The minimum total "load" for the output connectors should not be less than 20K ohms for maximum fidelity.

A word about audio signal interconnect cables is in order here. At the performance level of the SP-10 most audio interconnect cables will indeed degrade the sound quality. Only the very best available are really suitable for this application. Be sure to discuss this with your authorized Audio Research dealer.

TAPE OUTPUT CONNECTORS: Tape outputs should be connected to your tape recorder "AUX" or "LINE" inputs. Provides a low impedance source of whatever is selected by the "input selector control." Level is non-variable and approximately 1dB less than selected input source.

INPUT CONNECTORS: These are all clearly marked and all high level inputs are 50K ohms. "Phono inputs" are also clearly marked. Their input impedance is a function of the setting of the front panel "impedance" control. Phono 1 input has provision on the printed wiring board to add additional input capacitance for some MM cartridges.

SP-10PS REAR PANEL

RECEPTACLES: There is one (1) unswitched outlet which may be used for a turntable and the like, where switching is not needed or wanted. There are three (3) outlets, relay controlled, capable of providing power to large amplifiers and the like. Incidentally, the "click" you hear internally when activating the receptacle switch is the relay operating. (The line cord is a #16 gauge 3 conductor, providing ample safe grounded power to these outlets.)

It should be noted that the SP-10 line cord not only grounds the convenience outlet grounds. The preamplifier chassis is also connected to the line cord ground.

FUSES: Always use the same size and type as indicated on the rear of the chassis for safety. For best results use Buss line fuses and Littlefuse 3AB high voltage fuses.

GROUNDING DISCUSSION

GROUND TERMINAL: To be used for "grounding" associated input equipment, such as tonearms, turntables and the like. Should not be connected to tape recorders and/or power amplifiers.

"CHASSIS" AND "B-" BANANA JACKS: Special emphasis has been placed in the design of this product to reduce and/or eliminate "hum," "TVI," "RFI" and "CB" type interferences.

For normal use a jumper MUST be placed between these connectors. Otherwise, severe hum and/or oscillation will occur. (Special off-chassis construction is employed to accomplish these interference reduction methods, and this connection is the only one from the "common" or "B-" circuit to the chassis so that it can act as a shield to outside interferences.)

For rack cabinet mounting, when ground connections are used (via inputs/outputs), this jumper may be removed to allow only one shield ground path, thereby eliminating what is known as "ground-loop" induced hum. Note that this may or may not necessarily be helpful in a given system.

If your SP-10 is ever removed from the rack, be sure to remember that a jumper MUST be reinstalled.

INSTALLATION CAUTIONS

Because of the unique nature of the SP-10 more ventilation is required than for conventional preamplifiers. A total of approximately 130 watts of heat is required to be dissipated. While this is not a great amount, it is more than a "conventional" preamplifier and it is important that the units have a reasonable airflow to assure long, trouble-free operation.

The SP-10 (and SP-10PS) will function in any position, however, it is essential for long-term reliable service that the following precautions be observed:

1. Upright and horizontal mounting is required for both units if extended operation (longer than 1 hour) is contemplated.

2. Do not "stack" the units one on top the other. Not only will this prevent proper ventilation, but "hum" will be introduced into the phono circuits from the proximity of the power transformer.

3. Do not place or operate either unit on a soft or irregular surface such as a rug. This will prevent the units from having proper ventilation.

4. Do not operate either unit 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 ARC Rack Mount Ventilators (RMV-3) below, between and above the units.

6. If the units are stacked in a wooden shelf type of "rack mount," allow a minimum of 5 inches between units for ventilation and hum-field isolation.

7. If side-by-side mounting is employed, place the power supply to the left of the active chassis, so as to provide maximum spacing of the power transformer from the hum sensitive phono input circuitry.

8. Normally it will be impossible to obtain satisfactory results from the SP-10 with very low output cartridges. If the cartridge you have has less than 200 microvolts output at 5 centimeters per second recorded velocity, we recommend that you either use a different cartridge or consider a different preamplifier.

It will also not normally be possible to obtain satisfactory results utilizing an additional preamplification device (transformer or head-amp). Such an arrangement will normally result in one or more of hum, noise and/or distortion problems.

SERVICING

First of all, a very serious caution: This unit contains over 500 volts of DC, with sufficient voltage and current available to be lethal. So, please do not poke around inside the unit. Refer any needed service to a qualified technician. (Even with the unit turned off, a charge remains in the energy storage capacitors for some time.)

Basically, this unit is constructed to the highest of commercial standards and should normally require only routine service to maintain its high level of performance.

The vacuum tubes furnished with your SP-10 are quality tubes and should not have to be changed for approximately two thousand hours of use.

A schematic diagram is appended hereto which is fully annotated with operating voltages and component part values. Your service technician will require this information when working on your unit.

DISCUSSION OF THE MUTING PROVISIONS

The SP-10 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 warmup 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 SP-10 requires approximately 10 to 15 minutes. The automatic muting circuitry timer is adjusted for about 2 1/2 minutes. (This is because recurrent interruption "settling" time is much less. You would not want to wait for 10-15 minutes each time such an interruption occurred.)

This long "settling" time exists because the main power line electronic "B+" regulator has a "controlled warmup" circuit so that the vacuum tubes utilized in the signal circuits will not be overstressed during warmup.

1. OUTLET SWITCH to allow the power amplifier to be off during warmup or shutdown of the SP-10. A minimum of 10 minutes warmup time is recommended for the SP-10.

2. MUTE/OPERATE SWITCH allows manual disabling of the SP-10 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 10 minute warmup period as well as during turnoff 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. Consider the following: Suppose the power amplifier is "on" (although this should not be) when the SP-10 is turned on (without manual muting). There is a finite period of time prior to the energizing of the automatic muting circuitry which will allow a few milliseconds of warmup settling at the output. The result is sonic and subsonic output to the amplifier and speaker. While this won't normally cause loudspeaker or amplifier failure, it will be sonically unpleasant. Again, at the 2 1/2 minute point the automatic timer "releases" the output, and since full stabilization has not yet occurred, the sonic unpleasantness is repeated. 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.

3. WARMUP TIMER that mutes the SP-10 outputs for approximately 2 1/2 minutes after the power switch is turned "ON," to minimize subsonic output during warmup stabilization. Will also mute power line interruptions. See discussions above and below.

4. POWER SUPPLY REGULATION to tolerate power line disturbances or "brown outs" down to about 90VAC without degradation of circuit performance.

The automatic muting operates as follows:

1. The manual mute switch always disables both outputs and overrides any automatic provisions, even when the SP-10 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 2-minute warmup timer will restart automatically if the power is temporarily interrupted for 0.2 seconds or more, which is sufficient time to disturb the heater temperature of the tubes.

3. The automatic muting of the SP-10 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.

4. The muting is accomplished by "soft-switching" photocouplers, having purely resistive photoconductive elements. No electrical contacts or moving parts are used in the audio path to insure minimum degradation of sonic performance. All photocoupler lamps are light-emitting diodes to provide essentially infinite service life.

5. Qualified service personnel may wish to disable the automatic muting for testing purposes. This may be done by reconnecting the output leads to the other side of the photocouplers.

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.

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 these 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.

SP-10 SPECIFICATIONS

Frequency Response:

High level section: $\pm .25\text{dB}$, 5Hz to 30kHz
-3dB points below 1Hz and above 100kHz

Magnetic phono: $\pm .25\text{dB}$ of RIAA, 30Hz to 40kHz

Harmonic Distortion:

Less than .01% at 2V RMS output, 20Hz to 20kHz (Typically less than .002% in midband)

Intermodulation Distortion:

Less than .002% at 2V RMS output

Gain:

Magnetic phono input to tape output: 46dB High level inputs to tape output: 0dB
Magnetic phono input to main output: 72dB High level inputs to main output: 26dB

Input Impedance:

50K ohms, all high level inputs (2 Magnetic phono inputs have front panel selectable impedances of 47K, 10K, 100, 30 and 10 ohms. Also has provision to add to the 40pF input capacitance for matching certain magnetic cartridges.)

Output Impedance:

1000 ohms main output and tape output. Recommended minimum load for maximum audio quality 20K ohms and .001uF maximum capacitance.

Maximum Inputs:

Magnetic phono, 300mV at 1kHz. (900mV RMS, 10kHz) High level inputs essentially overload-proof.

Rated Outputs:

2V RMS 5Hz to 30kHz, all outputs; 60K ohm load (main output capability is 60V RMS output at 1/2% THD at 1kHz into a 100K ohm load with 3V RMS high level input).

Power supplies:

All signal circuits are powered by electronically regulated power supplies, including vacuum tube heater circuits. Line regulation is better than .001% and is effective between 90 and 135 volts RMS (180 and 270 volts for "240" volt units).

Noise:

High Level

(1) 250uV RMS maximum residual unweighted wide band noise at main output with gain control minimum (86dB below 5V RMS output)

(2) More than 90dB below 1V RMS input (less than 20uV equivalent input noise)

Magnetic Phono

Approximately .2uV equivalent input noise, RMS above 1kHz (-94dB reference 10mV input)

Tube Complement:

12 - reference grade ECC88 (6DJ8) or equivalent dual triodes
2 - 6L6WGC
1 - 12AT7

Power Requirements:

95-135VAC 60Hz (190-270VAC 50Hz) 130 Watts

Dimensions: (Each chassis)

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" (2.3cm)

Weights: (2 Cartons)

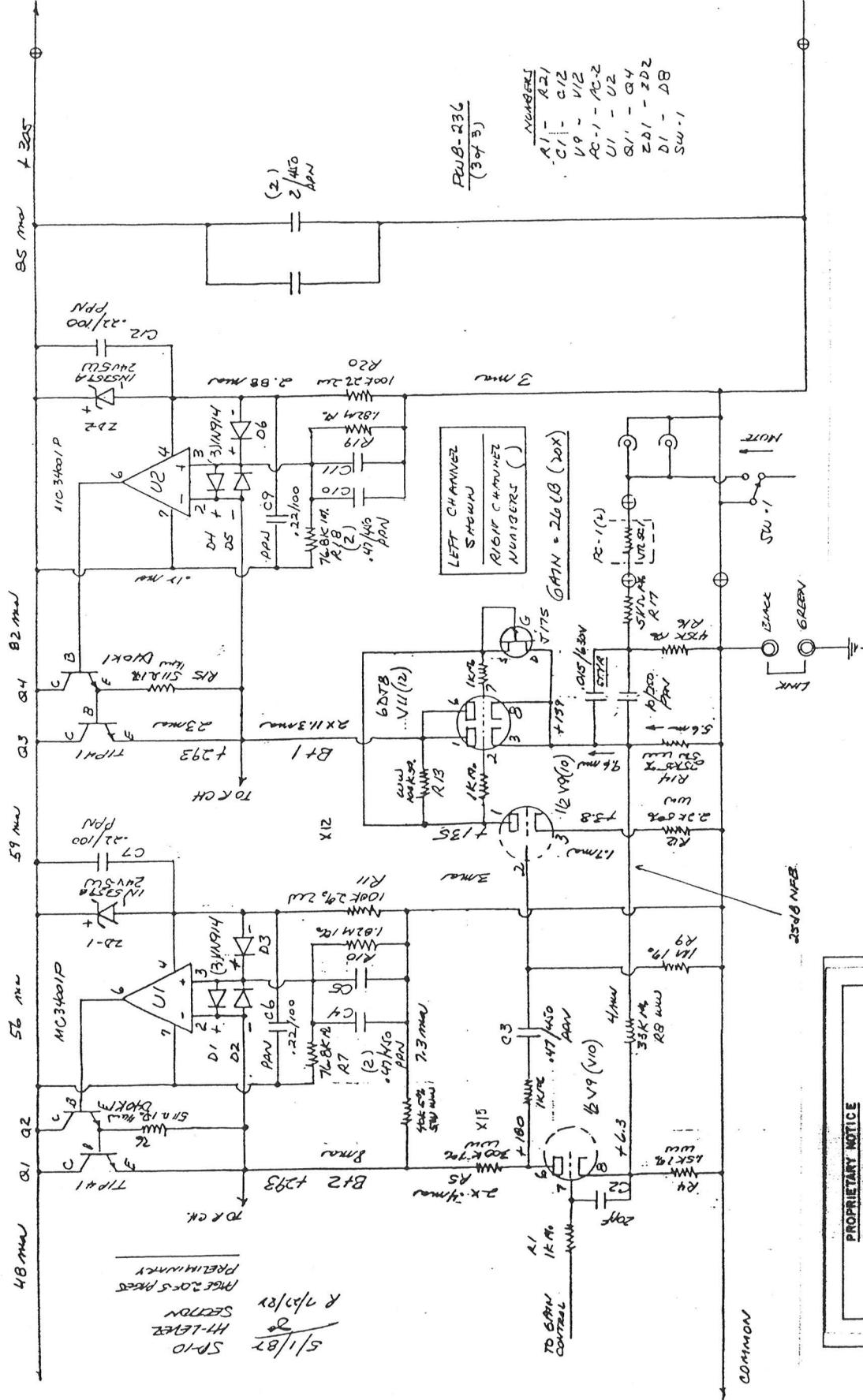
SP-10: Net 13 lbs. (5.9 kg); Shipping 22 lbs. (10 kg)
SP-10PS: Net 18 lbs. (8.2 kg); Shipping 27 lbs. (12.3 kg)
TOTALS: Net 31 lbs. (14.1kg); Shipping 49 lbs. (22.3 kg)

MODEL SP-10 PREAMPLIFIER

PRELIMINARY SCHEMATIC

audio research
H I G H D E F I N I T I O N[®]

5740 GREEN CIRCLE DRIVE / MINNETONKA, MINNESOTA 55343-4424
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audio research corporation
 6801 SHINGLE CREEK PARKWAY
 MINNEAPOLIS, MINNESOTA 55430

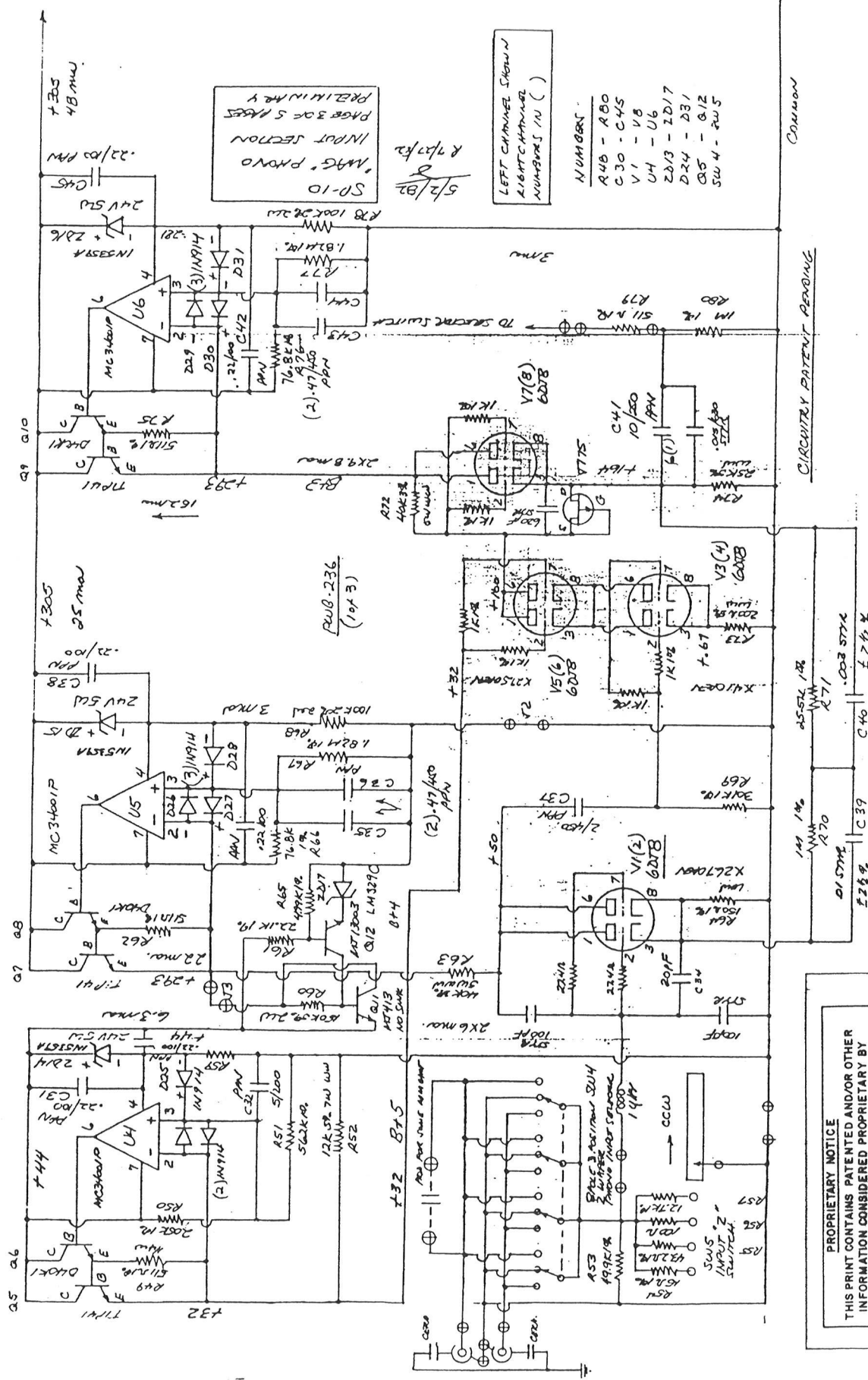
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 PURPOSES ONLY.

- NUMBERS
- A1 - R21
 - C1 - C12
 - V1 - V12
 - AC-1 - AC-2
 - U1 - U2
 - Q1 - Q4
 - ZD1 - ZD2
 - D1 - DB
 - SW-1

FWB-236
 (3 of 3)

SP-10
 HT-LEVEL
 SECTION
 R 7/27/67
 5/1/67
 PRELIMINARY
 PAGE 2 OF 5 PAGES

COMMON



SP-10
 MAG. PHONO
 INPUT SECTION
 PAGE 3 OF 5 PAGES
 PREZIMIN.ME.Y

5/2/82
 R 7/27/82

LEFT CHANNEL SIGNAL
 RIGHT CHANNEL
 NUMBERS IN ()

- NUMBERS -
- R4B - R60
 - C30 - C45
 - V1 - V8
 - U4 - U6
 - D2/3 - D3/1
 - D24 - D31
 - D35 - D42
 - SW4 - SW5

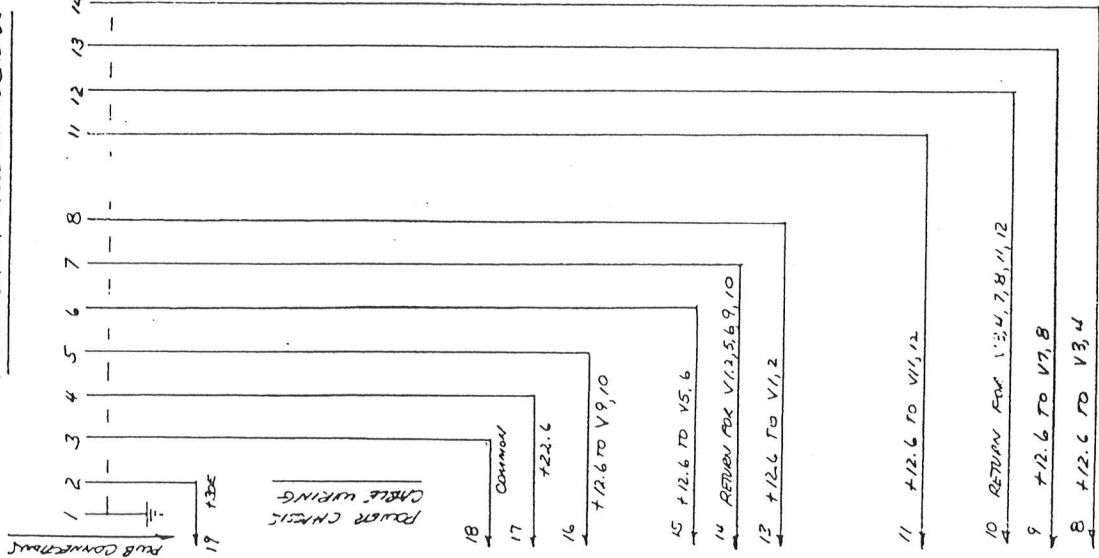
Common

CIRCUITRY PATENT PENDING

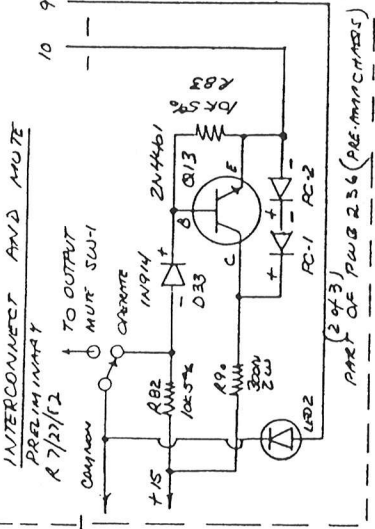
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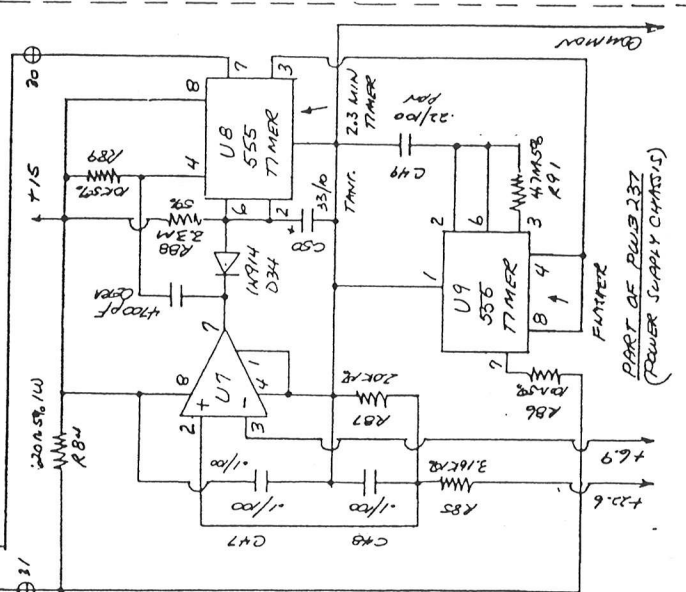
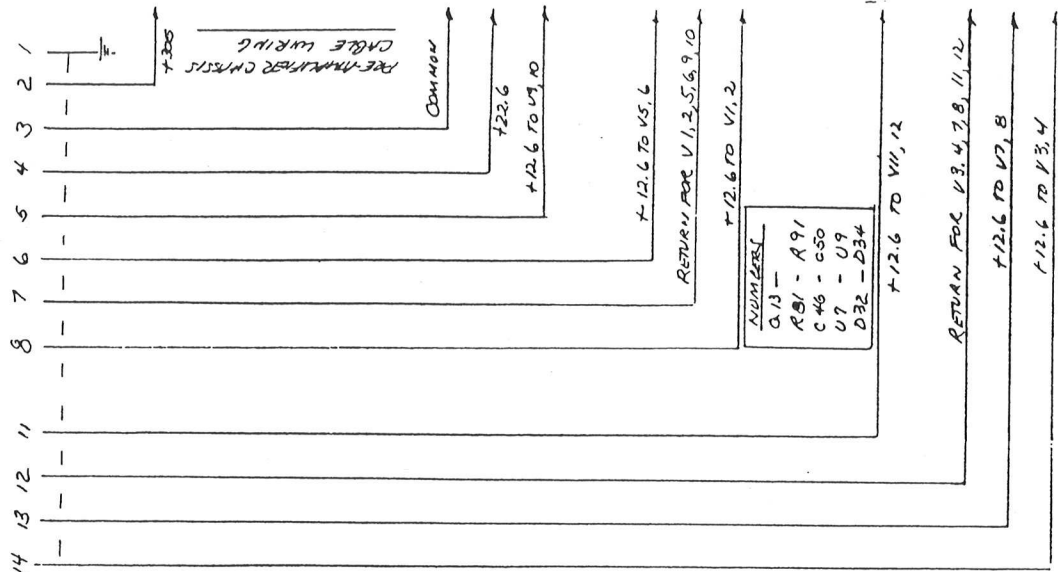
POWER SUPPLY CABLE CONNECTIONS (16)



5/17/82 SA 10 P40F JAMES
INTERCONNECT AND MUTE

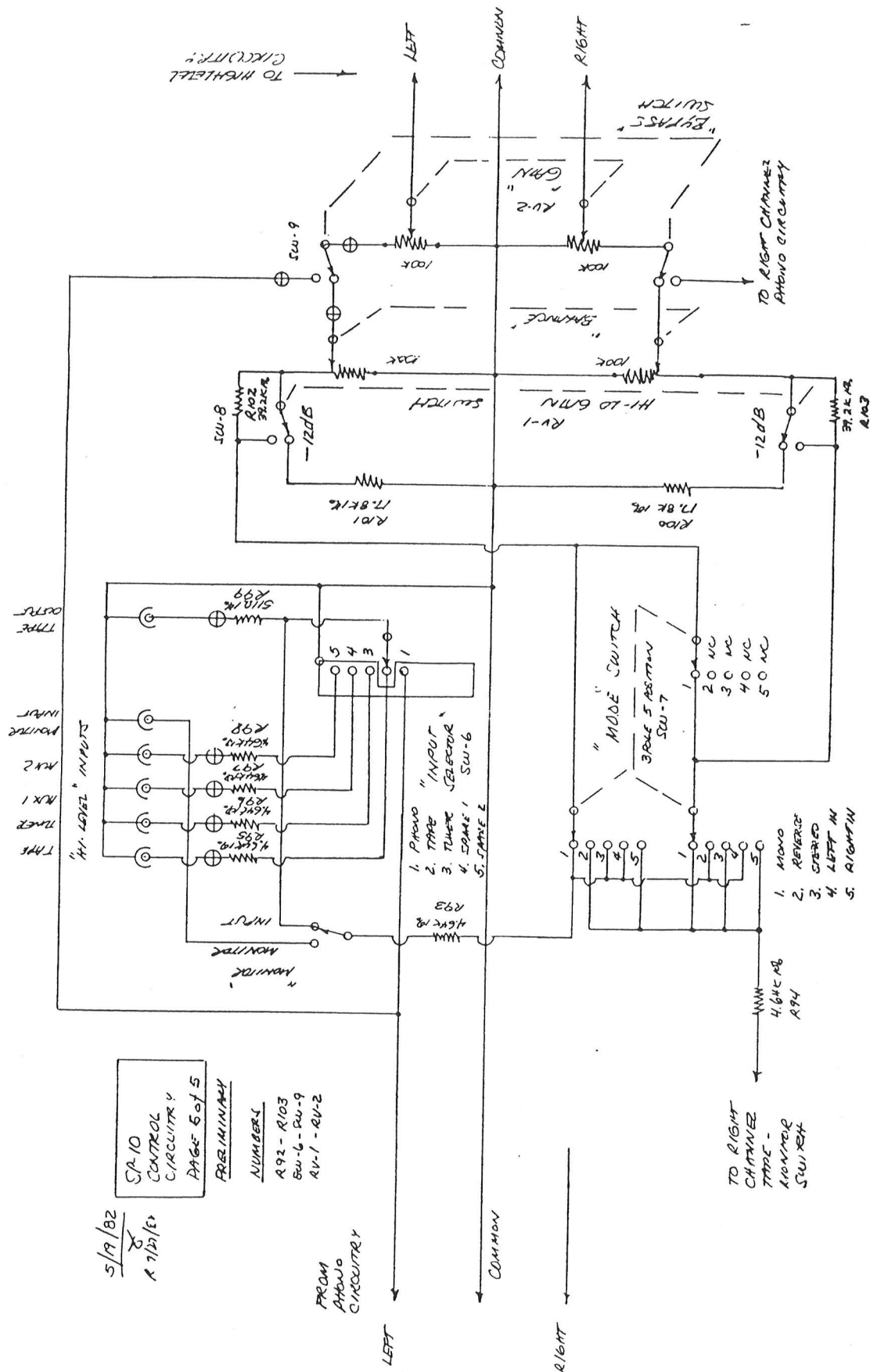


PREAMPLIFIER CABLE CONNECTIONS (14)



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5/19/82
R 7/25/83

SA-10
CONTROL
CIRCUITRY
PAGE 5 of 5

PRELIMINARY

NUMBERS
R92 - R103
SW-6 - SW-9
RV-1 - RV-2

FROM
AUDIO
CIRCUITRY

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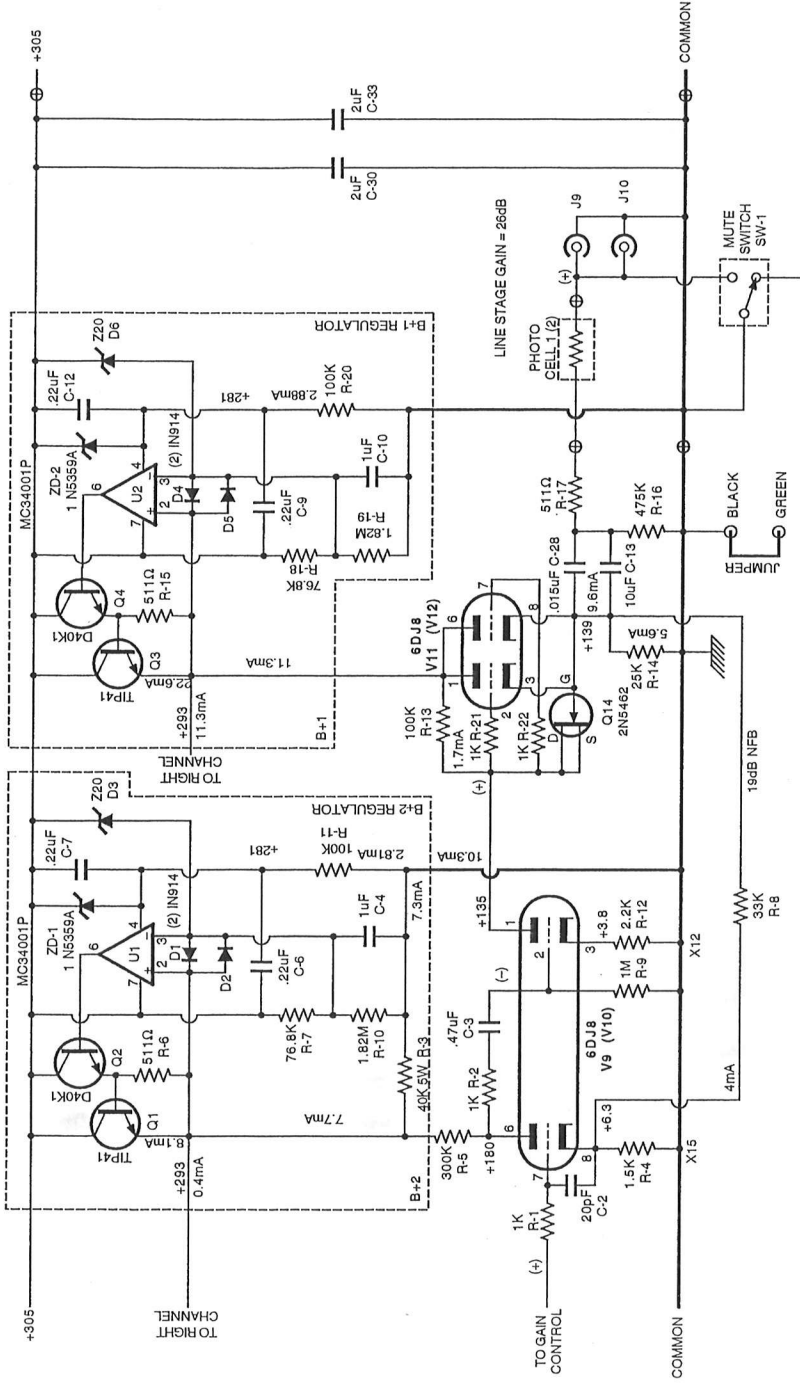
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SP-10 PREAMPLIFIER

SCHEMATICS

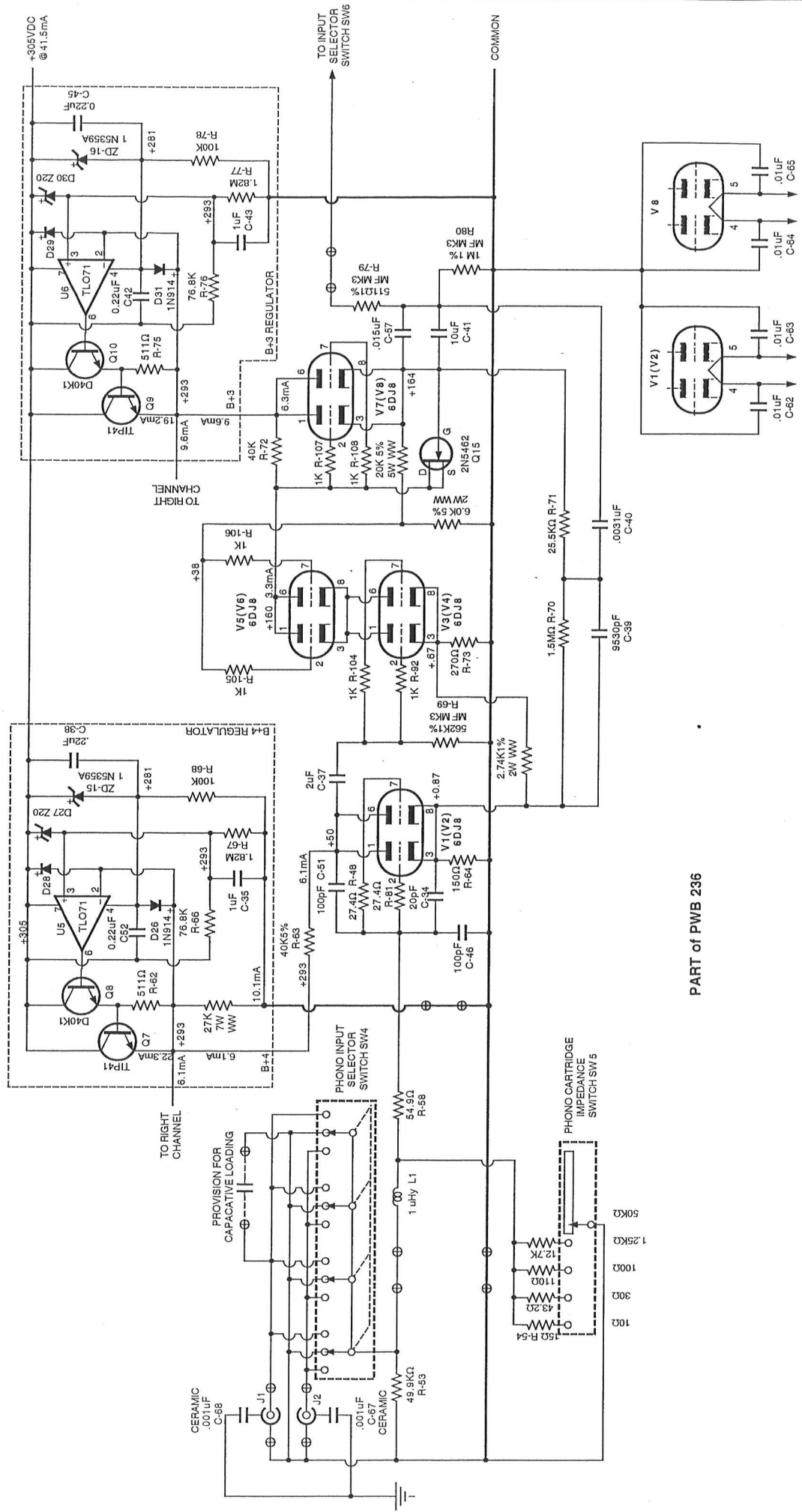
**REVISION C - JANUARY 6, 1986
REDRAWN APRIL 2003**

**SEPTEMBER 27, 1997
APRIL 8, 2003**



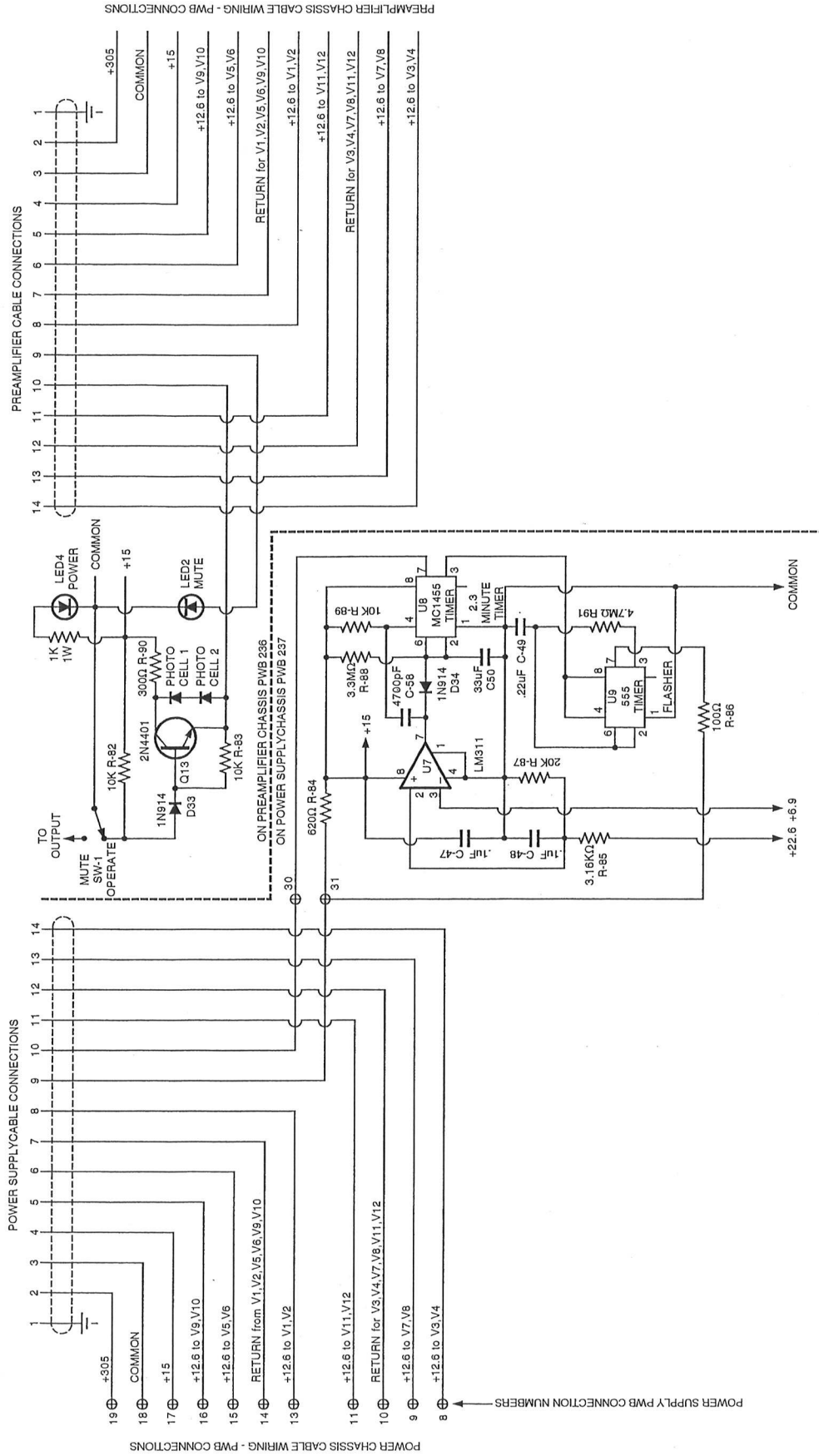
PART of PWB 236

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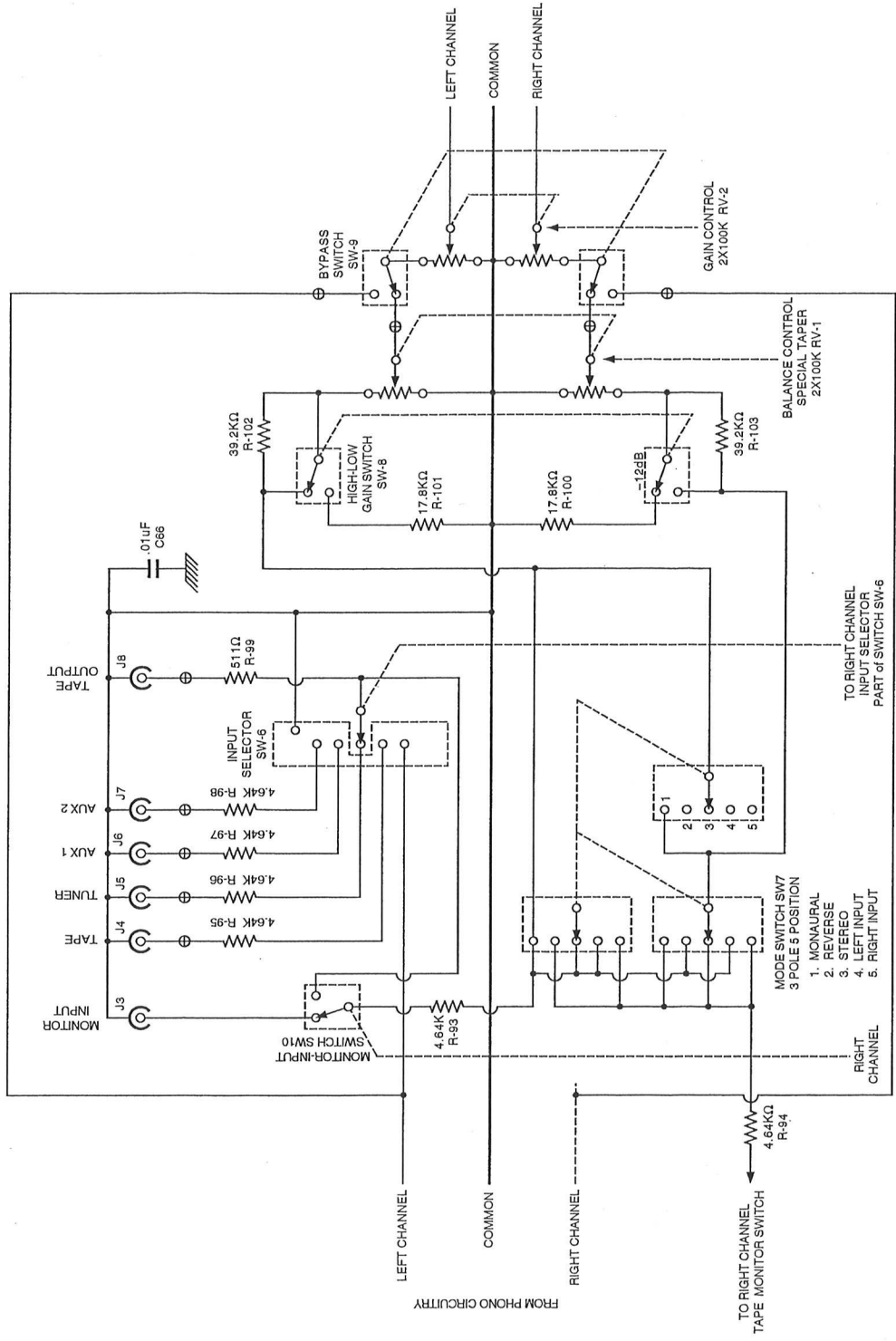
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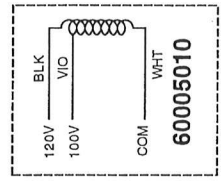
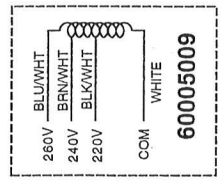
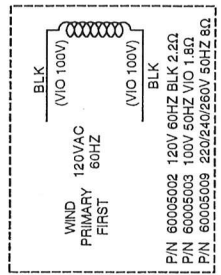
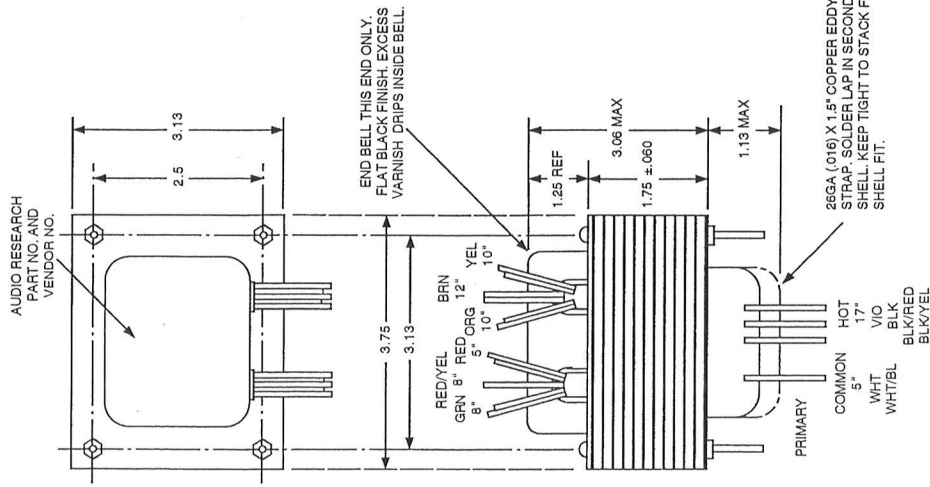
PAGE 4 OF 5.
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4-15-03



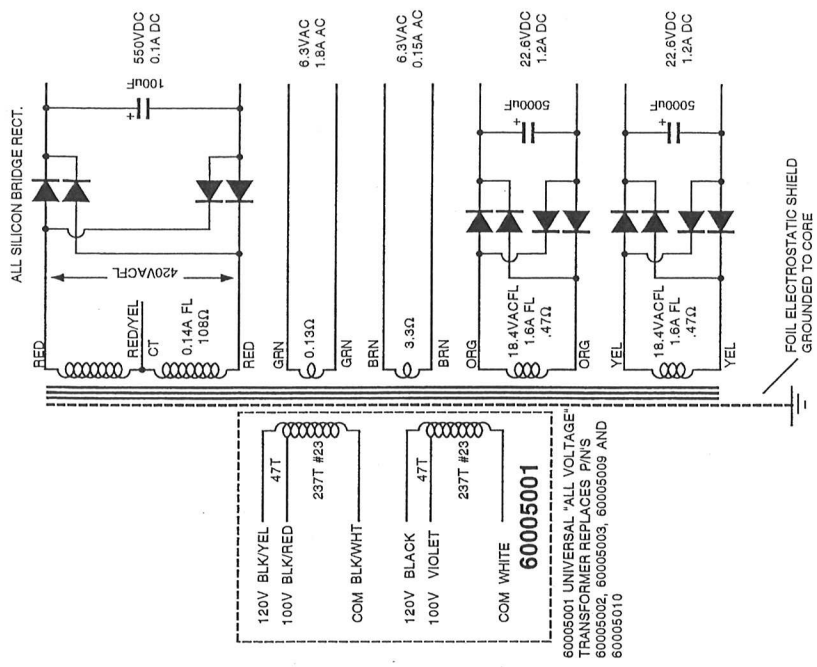
WIRING INSTRUCTIONS FOR UNIVERSAL "ALL VOLTAGE" TRANSFORMER PIN 60005001

120V UNITS: CONNECT WHITE AND BLACK/WHITE TO CENTER BUSS BAR ON RECEPTACLES (AC CORD WHITE).
TIE OFF UNUSED VIOLET AND BLACK/RED WIRES.

220V UNITS: SPLICE AND SLEEVE BLACK AND BLACK/WHITE LEADS TOGETHER. CONNECT WHITE TO CENTER BUSS BAR ON RECEPTACLES (AC CORD WHITE).
TIE OFF UNUSED BLACK/YELLOW AND VIOLET WIRES.

240V UNITS: SPLICE AND SLEEVE BLACK AND BLACK/WHITE LEADS TOGETHER. CONNECT WHITE TO CENTER BUSS BAR ON RECEPTACLES (AC CORD WHITE).
CONNECT BLACK/YELLOW TO AC SWITCH.
TIE OFF UNUSED BLACK/RED AND VIOLET WIRES.

WINDING SEQUENCE:
PRIMARY (SEE DETAIL)
FOIL SHIELD
ORANGE 47T #21 19.86VAC/NL
YELLOW 47T #21 19.86VAC/NL
RED 1106T #30 467VAC/NL
C TAP AT 563T
BROWN 32T #30 13.52VAC/NL
GREEN 16T 2X#22 6.76VAC/NL



- 60005001 100/120/220/240V 50/60HZ PRI
- 60005002 120V 60HZ PRI
- 60005003 100V 50HZ PRI
- 60005009 220/240/260V 50HZ PRI
- 60005010 100/120V 50/60HZ PRI

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- NOTES:**
- CORE 1.25 X 1.75 26GA M6 GRAIN ORIENTED LAMINATIONS. STACKED 2X2 12KG FLUX DENSITY AT 120V 60HZ.
 - LAYER WOUND. IMPREGNATE WITH DOLPHIS BB353 HEAVY BLACK VARNISH, OR APPROVED EQUIVALENT, LESS END SHELLS. MUST NOT BUZZ.
 - LEADS STRANDED UL/CSA FF-1 105°C PVC INSULATED. STRIPPED 1/4" ALL LEADS 20GA. LENGTHS AS SHOWN.
 - ALL LOADS CONSTANT CURRENT. DESIGN FOR LOWEST HEAT RISE AT 12KG.
 - END SHELL FLAT BLACK FINISH. INSTALL (2) SCREWS. HEX NUTS. INSULATED WASHERS.
 - HI POT TEST 1750V RMS ALL WINDINGS.

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- REV A ORIGINAL ISSUE
- REV B 1.75 WAS 2.0 2.5 WAS 2.25
- NOTE CHANGES 3.13 WAS 3.0 3.75 WAS 3.0
- REV C GREEN WAS 100A. REDRAW
- REV D ADD 5003. SHORTER LEADS
- REV E 5-8-84. ADD 5010 SPECS.
- 1-16-88. ADD 5001. CHANGE LEADS TO VENDOR DESIGN.
- GREEN WAS 117.