MODEL SP-6B PREAMPLIFIER

OWNER'S MANUAL

Rev. F
1/2/81

audio research
HIGH DEFINITION®

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TABLE OF CONTENTS

Congratulations on your purchase! You have what is widely recognized to be the finest stereo preamplifier ever offered for the reproduction of music.

SP-6B DISCUSSION

With the introduction of power amplifiers such as the D79, D60 and D120, and the availability of a number of brands of high performance recordings, pickups and speaker systems, the need for a new and higher level of preamplifier for the best systems has occurred.

After a significant amount of research and study, we have determined that from performance and cost-effectiveness standpoints once again, the vacuum tube must be used.

We then felt that if such a project were to be undertaken, it would be desirable to execute it to the highest standards reasonable, recognizing that in all probability it would be the last significant vacuum tube preamp offered to the music world.

One of the expensive (and little recognized) requirements for such a concept would be power supplies capable of providing isolated and regulated voltages to each circuit section. This has been accomplished in the SP-6B by utilizing individual, highly stable, electronically regulated solid state power supplies for each amplification stage.

With such power supplies available, it now becomes possible to increase the bandwidth of an AC coupled vacuum tube design without compromising the all-important circuit stability. We have done this, drawing upon the SP-3 basic circuit design. Increased interstage time constants, larger sonically selected output coupling capacitors, bias adjustments and "DC concept" feedback circuit innovations, all conbine with new power supplies to provide a new standard of sound reproduction.

For best results, only high quality turntables with stable pickup arms and cartridges should be used with this preamplifier.

We suggest that the SP-6B preamplifier will provide state-of-the-art reference well into the '80s. We further suggest that inclusion of this unit in any otherwise good music reproducing system will effect more improvement than any other single component change.

For further discussion of performance and system requirements, we encourage you to see your Audio Research dealer.

SP-6B INSTRUCTIONS

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

GAIN: This controls volume or loudness, and is a special metal film segmented control with approximately 2dB steps and accurate tracking. Although useable results can be obtained with settings anywhere in the operating range, more convenient control, best sound quality and signal-to-noise ratio will be obtained if the input signal levels and amplifier input sensitivity allow normal listening to occur in the 11 o'clock to 2 o'clock range of the volume control.

In the case of some high efficiency speakers (such as Klipschorn, etc.) and/or high output cartridges, it may be found with some high gain amplifiers (that do not have an input volume control) that normal listening will occur with the gain control just barely on, or up to the 9 o'clock position. If this proves to be the case, move the gain range switch on the rear chassis panel to the "low" or 50dB gain setting. This will reduce the overall gain by 10dB and allow better use of the front panel gain control. (Caution: Only operate this switch with the unit turned off, and be sure to lock it back in position so that it cannot be accidentally moved while in use. Moving this switch with the unit on will almost certainly cause damage to your amplifier and/or speakers.)

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

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

INPUT SELECTOR: Chooses between various possible source material for listening choice.

The "phono" input is an RIAA compensated high gain input for use with most magnetic cartridges. The input is 50K ohms, with very low (40 pF) input capacitance. If your cartridge needs more capacitance, there is built-in provision to add whatever is required. Contact your dealer or our customer service department if you need help with this.

PRE-AMP ON SWITCH AND INDICATOR: Turns the unit on in the up position, and the associated green LED will light up indicating that power is reaching the unit. During the 2 minute warmup period the green LED will blink slowly indicating that the output is muted.

OUTLETS ON: Turns the power receptacles on the rear chassis panel on in the up position, and the associated LED will light up indicating that they are on. This switch is specifically provided to allow the amplifier to be turned on after the preamplifier is "warmed up." A vacuum tube device requires up to several minutes to fully stabilize its operating parameters. Power amplifiers should be turned off with the outlet switch before the SP-6B is turned off to avoid turn-off thumps. The SP-6B mutes just after turn-off to minimize any excessive output surges.

MUTE OPERATE SWITCH: Shorts the output of the preamplifier for the warmup (and cooldown) period; also to allow changing records (and maintaining a previous gain setting), answering the telephone and the like.

INPUT MONITOR: Primarily aimed for use with tape recorders, but may be used with any line level signal source where bypassing the input selector is desirable.

The rear panel has one switch, 4 power receptacles, a fuse holder, a ground terminal, 4 output jacks, 12 input jacks and a pair of banana jacks.

RECEPTACLES: There is one unswitched outlet which may be used for a turntable, or the like, where switching is not needed or wanted. There are 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 3 conductor, #14 gauge providing ample safe grounded power to these 3 outlets.)

It should be noted that the SP-6B 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.

FUSE: Always use the same size and type as indicated on the rear of the chassis for safety. For best results use Buss MDL or MDX fuses.

GAIN SWITCH: See discussion under "Gain" on Page 2. Note that this switch must be locked in place when unit is operating.

OUTPUT CONNECTORS:

Main outputs should be connected to your power amplifier inputs.

Tape outputs should be connected to your tape recorder AUX inputs.

INPUT CONNECTORS: These are all clearly marked and are all 50K ohms.

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 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-6B is ever removed from the rack, be sure to remember that a jumper must be reinstalled.

Discussion, feature and specification sheets are also included herewith to provide you with additional information you may want or need.

A schematic diagram, complete with voltages, references, values, etc., is also included. These three items should provide all the basic information you will need.

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 filter for some time.)

Basically, this unit is constructed to the highest commercial standards and should require a very minimum amount of service over the years.

The vacuum tubes, however, are another matter. Some of them (all are premium grade ECC83/12AX7) will have to be changed every few thousand hours of use.

If excessive noise should develop in the phono section only, it is most likely V1.

If degraded sound should occur in the phono section only, it is most likely V2.

V3 is not normally critical, although occasionally excessive hum can be caused by failure of this tube.

If excessive noise developes in the high level section (ie, inputs other than phono), it is most likely V4.

If degraded sound developes in the high level section, it is most likely V5.

V6 is also not normally critical, although it also can introduce hum.

If tube changing is to be done, the unit should be disconnected from the amplifier and turned off while the change is made.

BIAS ADJUSTMENTS (Refer to Schematic Diagram)

These adjustments are for best linearity to match individual tube characteristics. Readjust only if V1, V2, V4 of V5 are changed, or after at least 1000 hours of operation.

Allow 1 hour warmup prior to adjustments. Some selection of tubes may be needed to achieve low distortion.

Phono Section: Adjust TP-1, TP-2 for minimum 2nd harmonic distortion at 2V RMS 1 kHz at tape output jacks, from phono input. (Typical .0002% to .0008%.) Use "phono" position of SP-6B input selector switch.

Line Section: Adjust TP-3, TP-4 for minimum 2nd harmonic distortion at 2V RMS 1 kHz at main output jacks, from tape input. (Typical .0002% to .0008%.) Short C25 and C26 to disable auto-mute for this test. Use "tape" position of SP-6B input selector switch.

If an ultra-low distortion oscillator, distortion meter, and selective wave analyzer are not available, adjust TP-1, TP-2 for approximately 160V DC at V3 cathodes, and adjust TP-3, TP-4 for approximately 165V DC at V6 cathodes. Allow up to 60 seconds for V6 voltages to stabilize after each adjustment.

If V1, V2, V4 and V5 are not ARC "India" ECC83 tubes, adjust to 150V DC for V3 and 155V DC for V6.

CAUTION: Do not trim for these DC voltages if the pots have been recently optimized for low distortion. DC voltages may vary ±10 volts on some tubes at lowest distortion.

DISCUSSION OF SP-6B MUTING PROVISIONS

The SP-6B has 5 provisions to guard against possible misuse of the exceptional dynamic range and wide bandwidth that it offers. The SP-6B 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 to give a flawless listening experience with unprecedented realism, while giving protection against operator error or other improper conditions beyond the operator's control.

1. OUTLET SWITCH to allow the power amplifier to be off during warmup or shutdown of the SP-6B. A minimum of 5 minutes warmup time is recommended to insure optimum performance.

2. MUTE/OPERATE SWITCH to manually disable the SP-6B outputs during any moving of the tone arm of switching of equipment. This will minimize stress on your power amplifier even when it is off.

3. AUTOMATIC MUTING of the SP-6B outputs to sense and limit unwanted subsonic output, without restricting the useable dynamic range for program material. These unwanted signals could result from:

   A. Severe power line disturbances or poor wall receptacles.
   B. Disconnecting input cables, or bad cables.
   C. Failure to use the manual mute switch when moving a tone arm or when switching equipment.
   D. Changing the SP-6B gain switch while it is operating.
   E. Driving the preamp momentarily into clipping, such as by connecting a line level program source into the phono input.
   F. Residual subsonic output from pre-preamps, tuners or other signal sources.
   G. Servicing procedures such as tube changing or tube defects.

4. WARMUP TIMER that mutes the SP-6B outputs for 2 minutes after the power switch is turned "ON," to ensure complete circuit stabilization to well within the limits of the automatic muting threshold, before the outputs come "ON."

5. IMPROVED POWER SUPPLY to tolerate power line disturbances or "brown-outs" down to 100VAC or less, without degredation of circuit performance.

The automatic muting operates as follows:

1. The main pilot lamp slowly blinks between dim and bright at about 1/2 second in each state to indicate that the outputs are automatically disabled by either the warmup timer or the output "fault sensors." This visual indication occurs independent of the position of the manual mute switch, so you will know if the SP-6B is ready to perform before the mute switch is set to "Operate."

2. The manual mute switch always disables both outputs and overrides any automatic provisions, even when the SP-6B is turned off. There is no visual indication of manual mute condition other than the position of the switch handle. (The "Operate" position of the manual mute switch is functional only after the unit is no longer in automatic mute mode.)

3. The main outputs of both channels are switched off and on simultaneously even if an unwanted signal is sensed in only one channel. The tape outputs are not muted.

4. 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 in the tubes.

5. Automatic output sensing thresholds are designed to limit both amplitude and duration of unwanted subsonic signals, so that heating effects in power amplifiers or speakers are kept well within safe limits. High amplitude disturbances are muted much more quickly than those of lower amplitude. Slowly changing disturbances of $\pm$one volt at the SP-6B output are muted in about 1 second, and 2 volt signals in less than .5 seconds, etc. Large surges are muted in less than .05 seconds. Disturbances of less than $\pm$0.2 volts are not muted at all.

6. The automatic output sensors detect only "silent" subsonic energy below 1Hz, and they do not sense excessive output in the normal audio or ultrasonic spectrum that could damage speakers. Proper fusing of speakers is essential to protect against excessive audio level or power amplifier faults.

7. Assymetrical program wavefronts or single "DC step" signals are not muted regardless of duration if they are one volt or less in amplitude at the SP-6B outputs. The gradual decay of these signals due to the .05Hz low frequency limit of the amplifier presents a sufficiently low average level during the sensor's one second time constant to prevent reaching the .2V threshold at the output sensors. Very short assymetrical transients of as high as 60 volts are unmuted.

8. The muting is accomplished without clicks by "soft-switching" photocouplers, with pure resistive photoconductive elements. Series-shunt switching is used to provide better than 100dB of signal attenuation during muting. No electrical contacts or moving parts are used in the audio path to insure no degredation of sonic performance. All photocoupler lamps are light-emitting diodes to provide essentially infinite service life.

9. Qualified service personnel may wish to disable the warmup muting and output sensor muting for testing purposes. This may be done by desoldering jumper J16 near the mute switch. Manual mute is still operational.

SUMMARY OF SP-6B FEATURES

As expected with a product of this caliber, the SP-6B offers many outstanding features to the audiophile perfectionist.

AUTOMATIC MUTING - A two minute warmup timer insures muting of undesirable subsonic output during circuit stabilization. Continuous protection against unwanted DC output due to any cause is provided by four output sensors that automatically mute both main outputs. No troublesome relays or electrical contacts are used. A blinking front-panel LED provides a visual indication when the automatic mute is activated.

MANUAL MUTING - A front panel mute switch is included for repeat settings, interruptions, etc.

HIGH ACCURACY, CLOSE TRACKING, SEGMENTED GAIN CONTROL - A metal-film stereo volume control assures trouble free, close tracking volume selection in 2dB steps (guaranteed 1.5dB tracking, .5dB typical).

DISTORTION - NULL ADJUSTMENTS - Four internal trim-pots allow for optimizing circuit linearity for individual tube characteristics, both initially and throughout tube life.

SELECTABLE GAIN "RANGE" SWITCH - A rear panel switch allows for better gain matching of high efficiency loudspeakers, high output cartridges, transformers, etc.

SEPARATE FRONT PANEL POWER RECEPTACLE SWITCH - A front panel switch operates 3 relay-controlled outlets with a 1600 watt capacity for power amplifiers and other outboard devices.

SPECIAL OFF-CHASSIS CONSTRUCTION - The special isolated ground construction floats all inputs and outputs from the chassis. Special rejection filters are also included to minimize or eliminate RFI, TVI and CB interference.

SONICALLY SELECTED CONPONENTS - Extensive use of selected low-noise premium grade tubes, special metal film reisstors and multiple shunt capacitors provide optimum sonic accuracy.

OTHER FEATURES INCLUDE a rear panel provision for disconnecting the common ground from the chassis so that rack mount installations may be accomplished without ground loop induced hum. Front and rear panels are of two-color anodized aluminum construction for permanent finish and lettering. Industrial grade components and construction are used for long service life.

This unit is offered with a limited warranty as follows:

1. 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. To obtain this Warranty, THE ORIGINAL PURCHASER MUST MAIL TO ADUIO RESEARCH WITHIN THIRTY (30) DAYS OF THE DATE OF PURCHASE THIS WARRANTY REGISTRATION FORM COMPLETED, DATED, AND SIGNED BY BOTH THE PURCHASER AND THE SELLING DEALER TOGETHER WITH A COPY OF THE BILL OF SALE OR OTHER PROOF OF PURCHASE OF THE PRODUCT. Audio Research will then validate the Warranty and return the validated Warranty to the purchaser.

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. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THIS VALIDATED WARRANTY. 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 sold remedy 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 7 below).

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. During the first ninety (90) day period following the date of purchase by the original purchaser, the Audio Research Limited 90-Day Warranty supersedes this Warranty.

6. Vacuum Tubes. Vacuum tubes and replacement thereof are warranted for the original 90-day period only.

7. 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.

SP-6B SPECIFICATIONS

Frequency Response:
High level section: ±.25dB, 5Hz to 30Hz
-3dB points below 1Hz and above 100kHz
Matnetic phono: ±.25dB of RIAA, 30Hz to 40kHz

Harmonic Distortion:
Less than .01% at 2V RMS output, 20Hz to 20kHz.
(Typically about .0005% in the midband)

Intermodulation Distortion:
Less than .002% at 2V RMS output

Gain:
Magnetic phono input to tape output: 34dB
Magnetic phono input to main output: 60dB
High level inputs to tape output: 0dB
High level inputs to main output: 26dB

Input Impedance:
50K ohms, all inputs (Magnetic phono may have any value from 10 ohms to 100K ohms substituted. Also has provision to add to the 40pF input capacitance for matching certain magnetic cartridges.)

Output Impedance:
Less than 500 ohms main output, 1000 ohms tape output. Recommended minimum load for maximum audio quality 50K ohms and 250pF maximum capacitance.

Maximum Inputs:
Magnetic phono, 500 mV at 1kHz. (1.5V 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 500K ohm load with 3V RMS high level input)

Power Supplies:
Four electronically-regulated solid state supplies. Frequency-compensated high-voltage supplies have a total equivalent low-frequency stability of greater than 3 farads of capacitance. Line regulation better than .001%.

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 20µV equivalent input noise)

Magnetic Phono
5µV equivalent input noise, wideband RMS (-66dB reference 10mV input)

Tube Compliment:
6 - premium grade ECC83 dual triodes

Power Requirements:
100-125VAC 60Hz (190-240VAC 50 Hz) 35 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:
22 lbs (10 kg) net, 30 lbs (13.75 kg) shipping

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MINNEAPOLIS, MINNESOTA 55430
AREA CODE 612 / 566-7570

GENERAL DESCRIPTION OF SP-6B MUTING PROVISIONS

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3. The main outputs of both channels are switched off and on simultaneously even if an unwanted signal is sensed in only one channel. The tape outputs are not muted.

4. 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 in the tubes.

5. Automatic output sensing thresholds are designed to limit both amplitude and duration of unwanted subsonic signals, so that heating effects in power amplifiers or speakers are kept well within safe limits. High amplitude disturbances are muted much more quickly than those of lower amplitude. Slowly changing disturbances of ±one volt at the SP-6B output are muted in about 1 second, and 2 volt signals in less than .5 seconds, etc. Large surges are muted in less than .05 seconds. Disturbances of less than ±0.2 volts are not muted at all.

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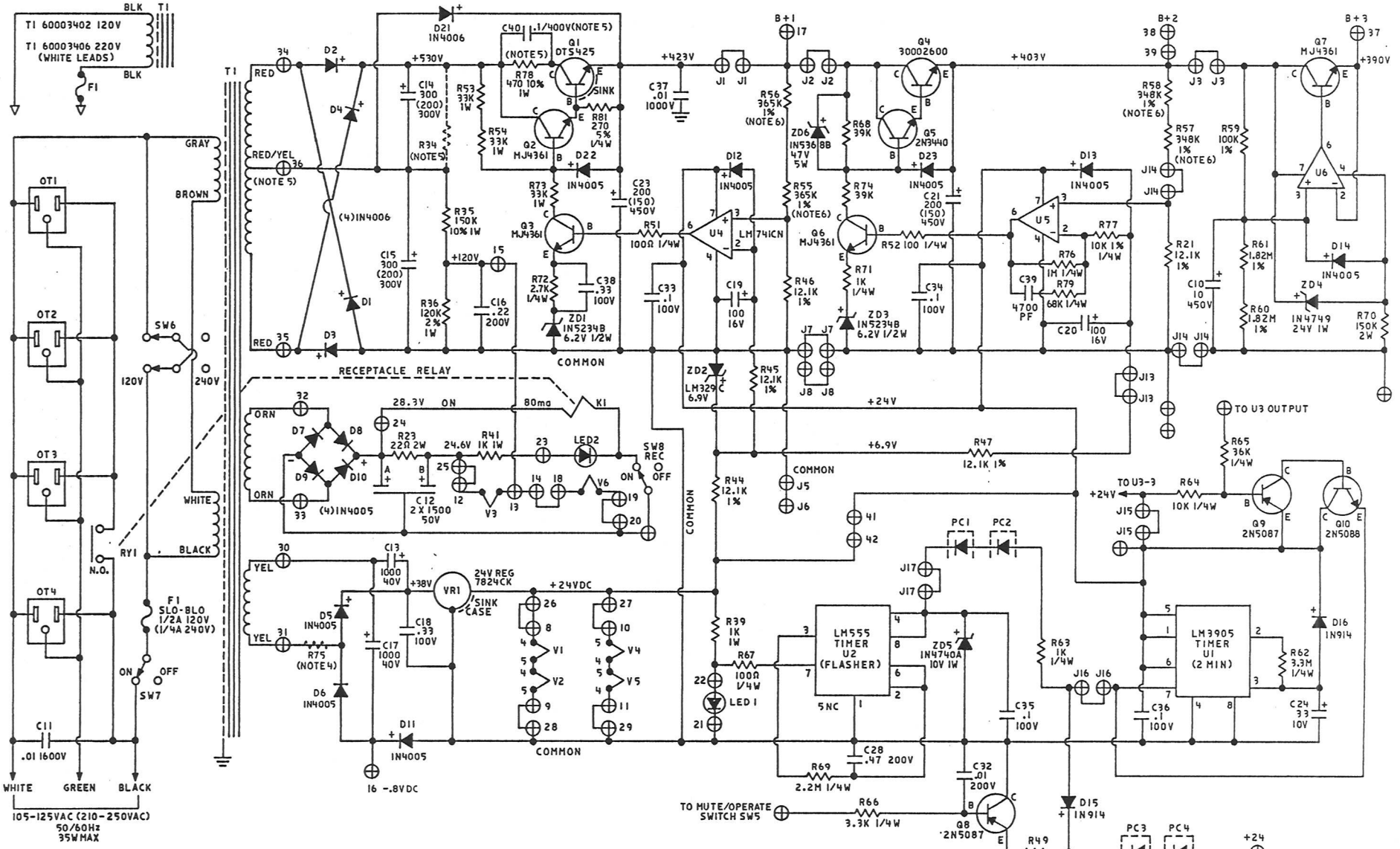
9. Qualified service personnel may wish to disable the warmup muting and output sensor muting for testing purposes. This may be done by desoldering jumper J16 near the mute switch. Manual mute is still operational.

MODEL SP-6B PREAMPLIFIER

SCHEMATIC & PARTS LIST

Rev. D
1/8/81

audio research corporation
6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MINNESOTA 55430



NOTES:

1- ALL CAP. IN μF; RES. 1/2W AND 5% TOLERANCE UNLESS NOTED.

2- USE CAUTION WHEN SERVICING HIGH VOLTAGE COMPONENTS. CONTACT WITH STORED ENERGY EVEN WITH POWER OFF COULD BE LETHAL.

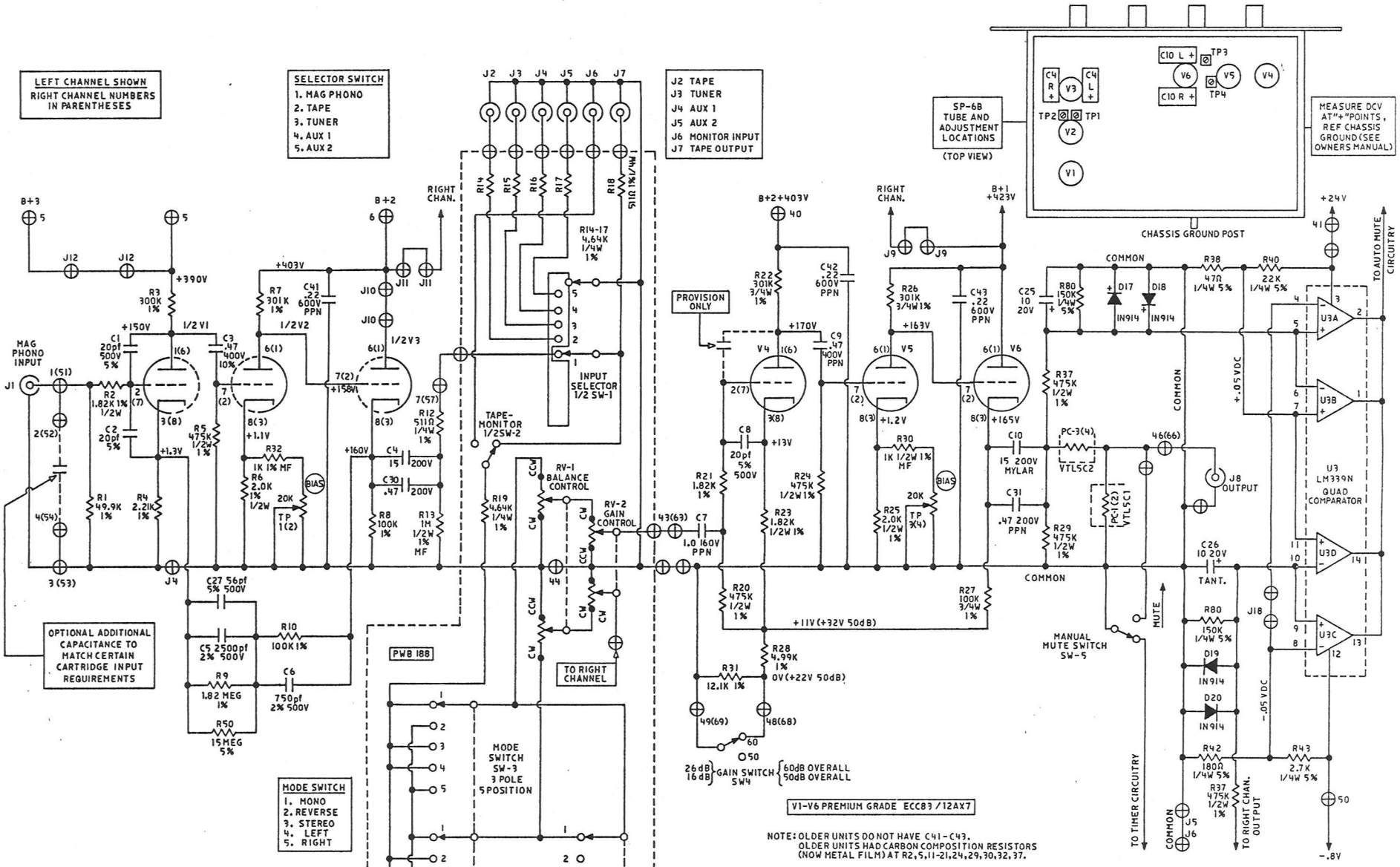
3- ALL VOLTAGES AT 120VAC 60Hz LINE.

4- R75 5Ω 5-7W WITH 60003400 TRANSFORMER, 0Ω WITH 60003402 OR 60003406.

5- R34 WAS 270K 2W WITHOUT C-TAP ON T1; R78 WAS 100Ω. C40 ONLY WITH 470Ω FOR R78.

6- R55, R56 MAY BE 348K; R57, R58 MAY BE 332K FOR PROPER B+ WITH SOME ZD2.

TOLERANCES (EXCEPT AS NOTED)	AUDIO RESEARCH CORPORATION MINNEAPOLIS, MINNESOTA
DECIMAL ±	SCALE
	DRAWN BY JC
	APPROVED BY RDL
FRACTIONAL ±	TITLE: SCHEMATIC SP-6B POWER SUPPLY & TIMERS
ANGULAR ±	DATE: 1-31-80
	DRAWING NUMBER: 910065-10 C


LEFT CHANNEL SHOWN
RIGHT CHANNEL NUMBERS IN PARENTHESES
SELECTOR SWITCH
1. MAG PHONO
2. TAPE
3. TUNER
4. AUX 1
5. AUX 2
J2 TAPE
J3 TUNER
J4 AUX 1
J5 AUX 2
J6 MONITOR INPUT
J7 TAPE OUTPUT
SP-6B TUBE AND ADJUSTMENT LOCATIONS
(TOP VIEW)
CHASSIS GROUND POST
MEASURE DCV AT "+" POINTS, REF CHASSIS GROUND (SEE OWNERS MANUAL)
MAG PHONO INPUT
INPUT SELECTOR 1/2 SW-1
TAPE-MONITOR 1/2SW-2
RV-1 BALANCE CONTROL
RV-2 GAIN CONTROL
PROVISION ONLY
OPTIONAL ADDITIONAL CAPACITANCE TO MATCH CERTAIN CARTRIDGE INPUT REQUIREMENTS
PWB 188
MODE SWITCH SW-3 3 POLE 5 POSITION
MODE SWITCH
1. MONO
2. REVERSE
3. STEREO
4. LEFT
5. RIGHT
FROM RIGHT CHANNEL TAPE MONITOR SWITCH
TO RIGHT CHANNEL
GAIN SWITCH SW4
26dB 16dB
60dB OVERALL
50dB OVERALL
MANUAL MUTE SWITCH SW-5
MUTE
TO AUTO MUTE CIRCUITRY
TO TIMER CIRCUITRY
TO RIGHT CHAN. OUTPUT
J8 OUTPUT
U3 LM339N QUAD COMPARATOR
V1-V6 PREMIUM GRADE ECC83/12AX7
NOTE: OLDER UNITS DO NOT HAVE C41-C43. OLDER UNITS HAD CARBON COMPOSITION RESISTORS (NOW METAL FILM) AT R2,5,11-21,24,29,30,32,37.
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910064-10 D

SP-6B PARTS LIST

COMPONENT	QUAN.	DESCRIPTION	VALUE	RATING	TOL.	ARC PART NO.
V1,2,4,5	6	ECC83/12AX7A				32000700
D1-4,21	5	IN4006		800V		30502200
D5-14,22,23	12	IN4005		600V		30500400
D15-20	6	IN914		100V		30500900
ZD1,3	2	IN5234B Zener		6.2V	1/2W	30502100
ZD2	1	LM329CZ Ref.		6.9V		31000700
ZD4	1	IN4749 Zener		24V	1W	30502500
ZD5	1	IN4740A Zener		10V	1W	30500300
ZD6	1	IN5368B Zener		47V	5W	30500100
LED1,2	2	LED Green				34300100
Q1	1	DTS425 Transistor				30004501
Q2,7	2	MJ4361 Transistor				30004400
Q3,6	2	MJ4361 Transistor				30004401
Q4	1	NPN Transistor				30002600
Q5	1	2N3440 Transistor				30001100
Q8,9	2	2N5087 Transistor				30003000
Q10	1	2N5088 Transistor				30003100
RV1	1	Balance Control	100K	LinTaper	10%	45100525
RV2	1	Gain Control	100K	LogTaper	10%	45100523
VR1	1	MC7824CK Voltage Reg.	24V	1A		31001200
U1	1	LM3905N IC Timer				31000900
U2	1	LM555CN IC Timer				31008000
U3	1	LM339N IC QuadComparator				31001000
U4-6	3	LM741CN IC Op Amp				31000400
PC1,2	2	VTL5C1 Photo Coupler		100V		34400100
PC3,4	2	VTL5C2 Photo Coupler		200V		34400101
TP1-4	4	Trim Pot.	20K	LinTaper	10%	45200412
R1	2	Metal Film	49.9K	1/2W	1%	42499403
R2,21	4	Metal Film	1.82K	1/2W	1%	42182303
R3	2	Wirewound	300K	2/10W	1%	43300501
R4	2	Metal Film	2.21K	1/2W	1%	42221303
R5,20,24,29,37	10	Metal Film	475K	1/2W	1%	42475503
R6,25	4	Metal Film	2.0K	1/2W	1%	42200303
R7,22,26	6	Metal Film	301K	3/4W	1%	42301504
R8,27	4	Metal Film	100K	3/4W	1%	42100504
R9,60,61	4	Metal Film	1.82Meg	1/2W	1%	42182603
R10,59	3	Metal Film	100K	1/2W	1%	42100503
R11,14-17,19	10	Metal Film	4.64K	1/4W	1%	42464302
R12,18	4	Metal Film	511	1/4W	1%	42511202
R13	2	Metal Film	1.0Meg	1/2W	1%	42100603
R23	2	Metal Film	1.82K	1/2W	1%	42182303
R28	2	Metal Film	4.99K	1/2W	1%	42499303
R30,32	4	Metal Film	1K	1/2W	1%	42100303
R31,44-48	7	Metal Film	12.1K	1/2W	1%	42121403
R33	1	Carbon	22Ω	2W	5%	41220105
R34	1	Carbon	270K	2W	10%	40270505
R35	1	Carbon	150K	1W	10%	40150504
R36	1	Metal Film	120K	1W	2%	46120501
R38	1	Carbon	47Ω	1/4W	5%	41470402
R39,41,49	3	Carbon	1K	1W	5%	41100304
R40	1	Carbon	22K	1/4W	5%	41220402
R42	1	Carbon	180Ω	1/4W	5%	41180202
R43,72	2	Carbon	2.7K	1/4W	5%	41270302
R50	2	Carbon	15Meg	1/2W	5%	41150703
R51,52,67	3	Carbon	100Ω	1/4W	5%	41100202
R53,54,73	3	Carbon	33K	1W	5%	41330404
R55,56	2	Metal Film	365K	1/2W	1%	42365503

SP-6B PARTS LIST

COMPONENT	QUANT.	DESCRIPTION	VALUE	RATING	TOL.	ARC PART NO.
R57,58	2	Metal Film	348K	1/2W	1%	42348503
R62	1	Carbon	3.3Meg	1/4W	5%	41330602
R63,71	2	Carbon	1K	1/4W	5%	41100302
R64	1	Carbon	10K	1/4W	5%	41100402
R65	1	Carbon	36K	1/4W	5%	41360402
R66	1	Carbon	3.3K	1/4W	5%	41330302
R68,74	2	Carbon	39K	1/2W	5%	41390403
R69	1	Carbon	2.2Meg	1/4W	5%	41220602
R70	1	Carbon	150K	2W	5%	41150505
R75	1	Wirewound	5Ω	7W	5%	43500002
R76	1	Metal Film	1.0Meg	1/4W	1%	42100602
R77	1	Metal Film	10K	1/4W	1%	42100402
R78	1	Carbon	100Ω	1W	10%	40100204
		Carbon	470Ω	1W	10%	40470204
R79	1	Carbon	68K	1/4W	5%	41680402
R80	2	Carbon	150K	1/4W	5%	41150502
R81	1	Carbon	270Ω	1/4W	5%	41270202
C1,2,8	6	Dipped Mica	20pF	500V	5%	57200100
C3,9	4	Polypropylene	.47μF	400V	20%	53470506
C4,10	4	Polyester	15μF	200V	20%	53150700
C5	2	Dipped Mica	2500pF	500V	2%	57250301
C6	2	Dipped Mica	750pF	500V	2%	57750201
C7	2	Polypropylene	1.0μF	160V	20%	53100606
C12	1	Electrolytic	2x1500μF	50V		50150900
C13,17	2	Electrolytic	1000μF	40V		50100904
C14,15	2	Electrolytic	300μF	300V		50300800
C16	1	Polyester	.22μF	200V	10%	53220501
C18,38	2	Ceramic Monolythic	.33μF	100V	20%	52330500
C19,20	2	Electrolytic	100μF	16V		50100801
C21,23	2	Electrolytic	200μF	450V		50200801
C24	1	Dipped Tantalum	33μF	10V	10%	51330700
C25,26	2	Dipped Tantalum	10μF	20V	10%	51100700
C27	2	Dipped Mica	56pF	500V	5%	57560100
C28	1	Polyester	.47μF	200V	10%	53470504
C29	1	Electrolytic	10μF	450V		50100702
C30,31	4	Polypropylene	.47μF	200V	20%	53470507
C32	1	Ceramic Monolythic	.01μF	200V	10%	52100400
C33-36	4	Ceramic Monolythic	.1μF	100V	10%	52100500
C37	1	Ceramic Disc	.01μF	1000V	GMV	52100401
C39	1	Ceramic Monolythic	4700pF	100V	10%	52470300
C40	1	Polyester	.1μF	400V	10%	53100502
C41-43	3	Polypropylene	.22μF	600V	10%	53220505
F1	1	Slo-Blo 120V	1/2A	250V		34500200
		240V	1/4A	250V		34500100
T1	1	Transformer	(See Schematic)	120/240V		60003400
		Transformer	(See Schematic)	120V		60003402
		Transformer	(See Schematic)	220V		60003406
OT1-4	4	AC Receptacle				23200500
SW1	1	Input Selector Switch		2Pole5Pos		24001000
SW2	1	Tape Monitor Switch		DPDT Gold		24100400
SW3	1	Mode Switch		3Pole5Pos		24000700 ~~24000700~~
SW4	1	Gain Switch		DPDT Slide		24100100
SW5	1	Mute-Operate Switch		DPDT Gold		24100400
SW6	1	120V-240V Switch		DPDT Slide		24100600
SW7,8	2	On-Off Switch		DPDT Silver		24100700 ~~24000700~~
K1	1	Relay 24V		SPST N.O.		64100300
J1-16	16	Phono Jack				23201000