Soundcraftsmen

SERVICE MANUAL
FOR BASIC AMPLIFIERS
MODELS: PA5001, MA5002, EA5003

WHEN YOU HAVE ANY PROBLEM OR QUESTION,

FOR REPAIR ASSISTANCE

NOTE: CALL PERSON-TO-PERSON COLLECT,
TO 714-556-6191, AND ASK FOR:

"AMPLIFIER REPAIR MANAGER"
OR
"PRE-AMP REPAIR MANAGER"
OR
"EQUALIZER REPAIR MANAGER"

OUR TELEPHONE GIRL THEN WILL FIND A TECHNICIAN IN THE CORRECT DEPARTMENT TO ACCEPT THE CALL, AND IF HE IS NOT AVAILABLE OR BUSY AT THE MOMENT, HE WILL CALL YOU BACK IN A FEW MINUTES.

WE BELIEVE WE CAN HELP YOU SOLVE ANY REPAIR PROBLEM MORE QUICKLY AND MORE EASILY, BY HAVING OUR TECHNICIAN DISCUSS THE SITUATION DIRECTLY WITH YOU, WHILE YOU ARE WORKING ON THE UNIT REQUIRING SERVICE.

Soundcraftsmen

POWER AMPLIFIERS

SERVICE MANUAL

MODELS: PA5001, MA5002, EA5003

SOUNDCRAFTSMEN
2200 So. Ritchey Street
Santa Ana, CA 92705
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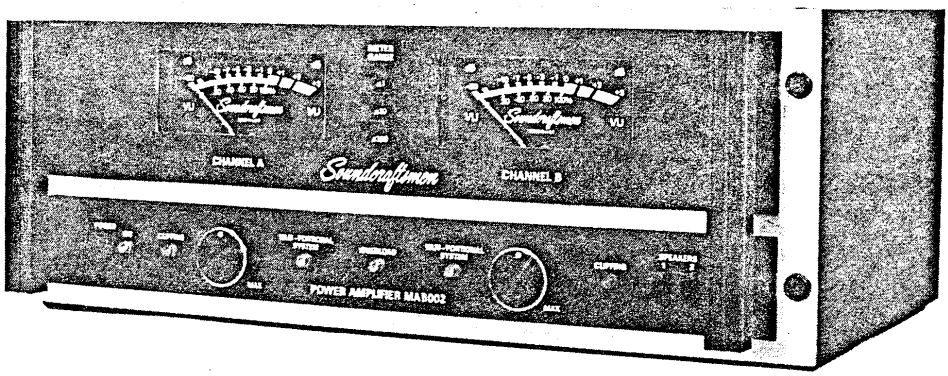
Soundcraftsmen amplifiers

New Class "H" Design Invention/Vari-Portional® Analog Logic Circuitry/250 watts per channel/ Auto-Crowbar® protection/Exceptional Sound/Outstanding Specifications.

MA5002 • The Analog Logic Vari-Portional® circuit, combined with 250 watts per channel and the Auto-Crowbar® protection circuit, add up to value and performance only available through the New Class amplifier design invention. Important features also include input level controls, adjustable range meters, stereo speaker selection, clipping indicators, Vari-Portional® indicators and speaker protection. The black and silver overlay front panels are complemented with satin black handles and sculptured walnut grained side panels.

$799.00

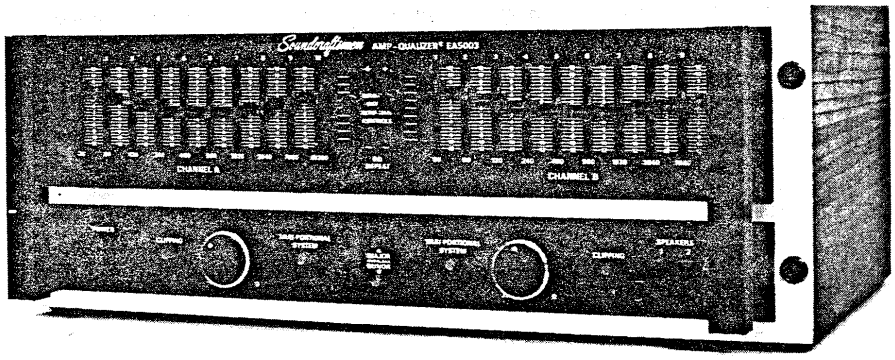


PA5001 • The Analog Logic Vari-Portional® circuit, combined with 250 watts per channel and the Auto-Crowbar® protection circuit, add up to value and performance only available through the New Class amplifier design invention.

$649.00

EA5003 • What better place for an environmental equalizer but at the final component stages of a system! The EA5003 combines the MA5002 amplifier circuitry with our proven equalizer technology to create the Amp-Qualizer® a component that is capable of delivering the interaction that your speakers, listening room, system and ears demand.

$949.00



AMPLIFIER SPECIFICATIONS AND DESIGN FEATURES

POWER OUTPUT: 250 watts per channel, min RMS at 8 ohms, both channels driven from 20 Hz to 20K Hz, total harmonic distortion less than 0.1% THD. **I.M. DISTORTION:** Less than .05%. **SIGNAL TO NOISE:** Better than 105 dB down. **SLEW RATE:** 50V per microsecond or greater. **DAMPING FACTOR:** Greater than 100. **INPUT SENSITIVITY:** 1.3V for 250W output. **INPUT IMPEDANCE:** 15 ohms to 50K ohms. **OVERLOAD PROTECTION DC:** AUTO-CROWBAR® through SCR circuitry, no relays or circuit breakers—automatic reset. **OVERLOAD PROTECTION AC:** Instant disconnect through TRIAC circuitry. **SPEAKER PROTECTION:** No current limiting, no-thump turn on, instant turn off. **EQUALIZER SPECIFICATIONS:** See equalizer section of this brochure. **LEVEL CONTROLS:** Input level controls—each channel—0 to full. **METER RANGE:** Meter range control—X1—X10—X100. **SPEAKERS:** Speaker selection for two separate stereo speaker systems. **POWER:** Front panel on/off switch with TRIAC-activated surge-delay for remote turn-on. **METERS:** Monitor output of amplifier in % of power at 8 ohms. **VARI-PORTIONAL® LED's:** Peak reading green L.E.D.'s indicate operation of second supply. **CLIPPING LED's:** Peak reading red L.E.D.'s indicate amplifier exceeding rated power output. **OVERLOAD LED's:** Red L.E.D. actuates through auxiliary 12V power supply when AUTO-CROWBAR® circuit has turned off amplifier. Resets approximately every 2 to 3 seconds. **INPUT JACKS:** RCA pin plug configuration. **SPEAKER OUTPUTS:** Standard banana plugs—both pair speakers. **LINE CORD:** Heavy duty 3-wire grounded plug—AC. **DIMENSIONS:** 19" × 7" × 15" (front panel also notched for rack mounting). **WEIGHT:** 58 lbs. **FINISH:** Front panel—brushed silver-anodized 3/16" aluminum main panel with black-anodized 1/8" overlay panels. Ferrous chassis, zinc-plated with black satin finish. Walnut-grain sculptured side panels included (as pictured).

CLASS "H"–VARI-PORTIONAL®

Soundcraftsmen's revolutionary new Patent Pending VARI-PORTIONAL® system uses Analog Logic Circuitry to anticipate power demands, then supplies only a proportional amount of power, as required by varying input signal voltages.

The advantages of the VARI-PORTIONAL® system are obtained through its continuous monitoring of output power requirements for optimum efficiency. This results in direct and measurable energy savings by reducing the amount of energy dissipated as heat loss, yet with controlled full power always available, standing by, and supplied as needed. This higher powered amp can be sold at a price even lower than ordinary Class AB amplifiers through cost savings made possible by the Patent Pending VARI-PORTIONAL® circuitry. For example, no fan is needed even under most severe operating conditions.

An added advantage is a substantial savings in power consumption. Class AB amplifiers of the same power rating, operating at 1/3 power in accordance with FTC test requirements, will consume over 40% more energy than the Soundcraftsmen "NEW CLASS" amplifier. Thus, the "NEW CLASS" amp provides savings in heat dissipation of approximately 200 watts. Progressively greater percentages of savings may be obtained at lower power levels.

AUTO-CROWBAR® PROTECTION

This AUTO-CROWBAR® protection circuitry is unique among amplifiers. It uses no relays, no circuit breakers. It is all-solid-state, and is instantaneous-acting in triggering an SCR (silicon controlled rectifier), which discharges the amplifier's DC power supply in a few micro-seconds; simultaneously the AC power is de-coupled by a TRIAC, leaving the amp with no power applied. (An auxiliary low voltage (12VDC) power supply, used for meter lights and L.E.D.'s, remains activated. This supply turns on the overload L.E.D. and also resets the full AUTO-CROWBAR® circuit after approximately 2 or 3 seconds delay.) When the overload is minor, such as over-driving or shorted speaker wiring. The AUTO-CROWBAR® circuit will automatically and continuously attempt to reset itself every second or two, until the overlooaded condition is removed. . . . This same AUTO-CROWBAR® protection circuit will also cut off the amplifier's output when an overheating condition exists. (This is extremely unlikely, because the VARI-PORTIONAL® SYSTEM enables the Soundcraftsmen amp to operate so efficiently that it is barely warm to the touch, even when operating at very loud music level.)

Theory and Operation–Class H Amplifier
by Paul Rolfes–Chief Engineer, Soundcraftsmen

The class H amplifier is a new class of audio amplifier which is suitable for, and specifically designed for, the reproduction of hi fidelity sound. The major advantage in using the class H design over other methods for reducing dissipation on output transistors is that there is no switching or changing of signal paths within the basic amplifier itself. All the controls for increased power requirements act only within the power supply and therefore are outside of the feedback loop and have no effect on the distortion, stability or slew rate of the basic amplifier.

The first thing one would notice when looking at the differences in the class H amplifier is the fact that it has two positive and two negative power supplies. The ratio of the voltages in these power supplies is arranged such that the low voltage supply is two thirds of the high voltage supply. In operation the amplifier appears to work exactly like a conventional class AB amplifier at low volume output, however as the signal level approaches the limit of the low voltage supplies a difference begins to become obvious.

Referring to FIG. 1, the oscilloscope picture shows two horizontal lines which are the B+ and B– supplies to the output stages, and a 1 KHz sine wave operating within the limits of these supplies. As the output signal increases, one would expect that clipping would occur when the output level reaches the supply voltage level. However, as seen in FIG. 2, the VARI-PORTIONAL® circuit anticipates the sine wave's approach to the supply level and begins to increase the B+ to allow for additional head room. This process continues as required, until the VARI-PORTIONAL® system reaches its maximum, which is the limit of the high voltage supply. As seen in FIG. 3 the VARI-PORTIONAL® system has reached its limit and the sine wave has entered the opening made when the VARI-PORTIONAL® system increases the B+ supply to provide more head room to the amplifier. If the output level continues to increase, clipping finally will occur against the high voltage supply, as seen in FIG. 4.

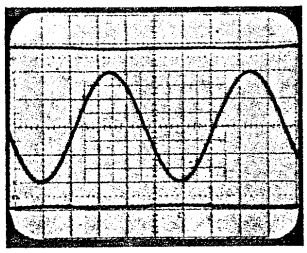


FIG. 1

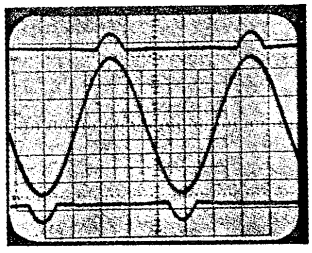


FIG. 2

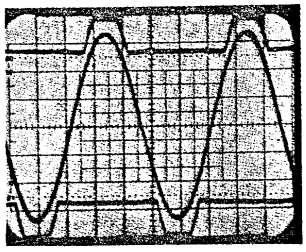
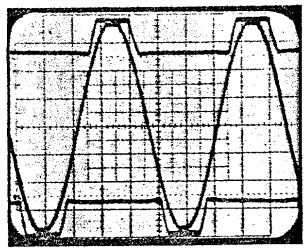


FIG. 3 ◀

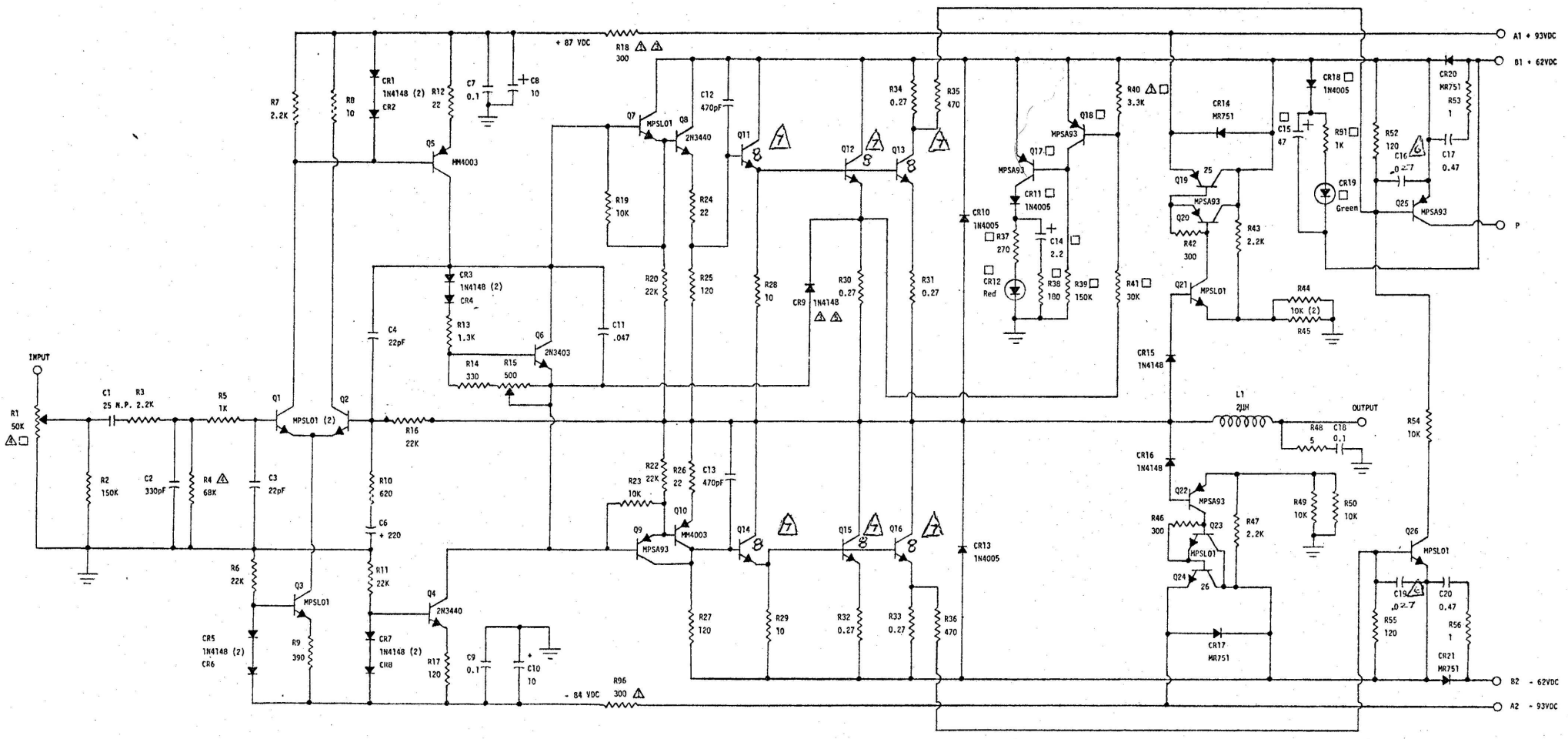
FIG. 4 ▶



The obvious advantage of such a system is that the amplifier is operating at a lower voltage most of the time. This lower voltage operation saves energy because it substantially reduces the dissipation of the amplifier, since the dissipation of the power output stage is directly proportional to the voltage applied across the output transistors. It should be noted, however, that there is an energy saving at all times even under high power sine wave conditions. Referring to FIG. 3 and 4 it can be seen that although the high voltage supply is being turned on to its maximum, it is only on during that period of time when it is required. It is still off for a substantial portion of the sine wave, consequently the amplifier is operating on the low voltage–(the more efficient supply)–during this period of time.

Going back and reviewing the sequence of these pictures again, it can be noted in FIG. 1 that the hi voltage supply is not required and therefore not used. In FIG. 2, the hi voltage supply is actually not yet required because of the selection of the output voltage, however the VARI-PORTIONAL® logic circuitry has detected a rising wave shape, is anticipating the fact that the supply may become required, and therefore is beginning to turn the supply on in advance of the sine wave actually reaching the supply level. In FIG. 3 it can be noted that the slope or rate of rise of the upper wave shape (which shows the positive supply turning on) is greater than the slope of the sine wave that is entering into the upper supply. Because of this fact, the sine wave can never "catch up" with the upper supply since the "turn on" gain of the upper supply is greater than the gain of the amplifier. It should also be noted that the inherent slew rate of the upper supply is greater than the slew rate of the amplifier, which is approximately 50 volts per micro-second. Therefore, regardless of wave shape (even a hi frequency square wave) the VARI-PORTIONAL® supply logic is fast enough to anticipate the rising wave shape and turn the supply on with a gain and slew rate that are higher than the amplifier and therefore move out of the way of the oncoming output signal.

From the above description of the operation it can readily be seen that the amplifier using the VARI-PORTIONAL® control system, or class H, achieves a substantial savings in dissipation or heat loss on the output transistors.



NOTES:

1. RESISTANCES IN OHMS, CAPACITANCES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2. 2N3403, 8, 25, 26 TRANSISTORS MOUNTED ON HEAT SINK.
3. TO-5 HEAT SINKS MOUNTED ON MM4003, 2N2440 TRANSISTORS.
4. LEAD DIAGRAM: 2N3403 TOP VIEW

ECB

5. △ IDENTIFIES COMPONENTS INVOLVED IN MODIFICATIONS. SEE DRAWING 1506 AND PARTS LIST FOR DETAILS.
6. □ IDENTIFIES COMPONENTS DELETED IN MODEL PA5001

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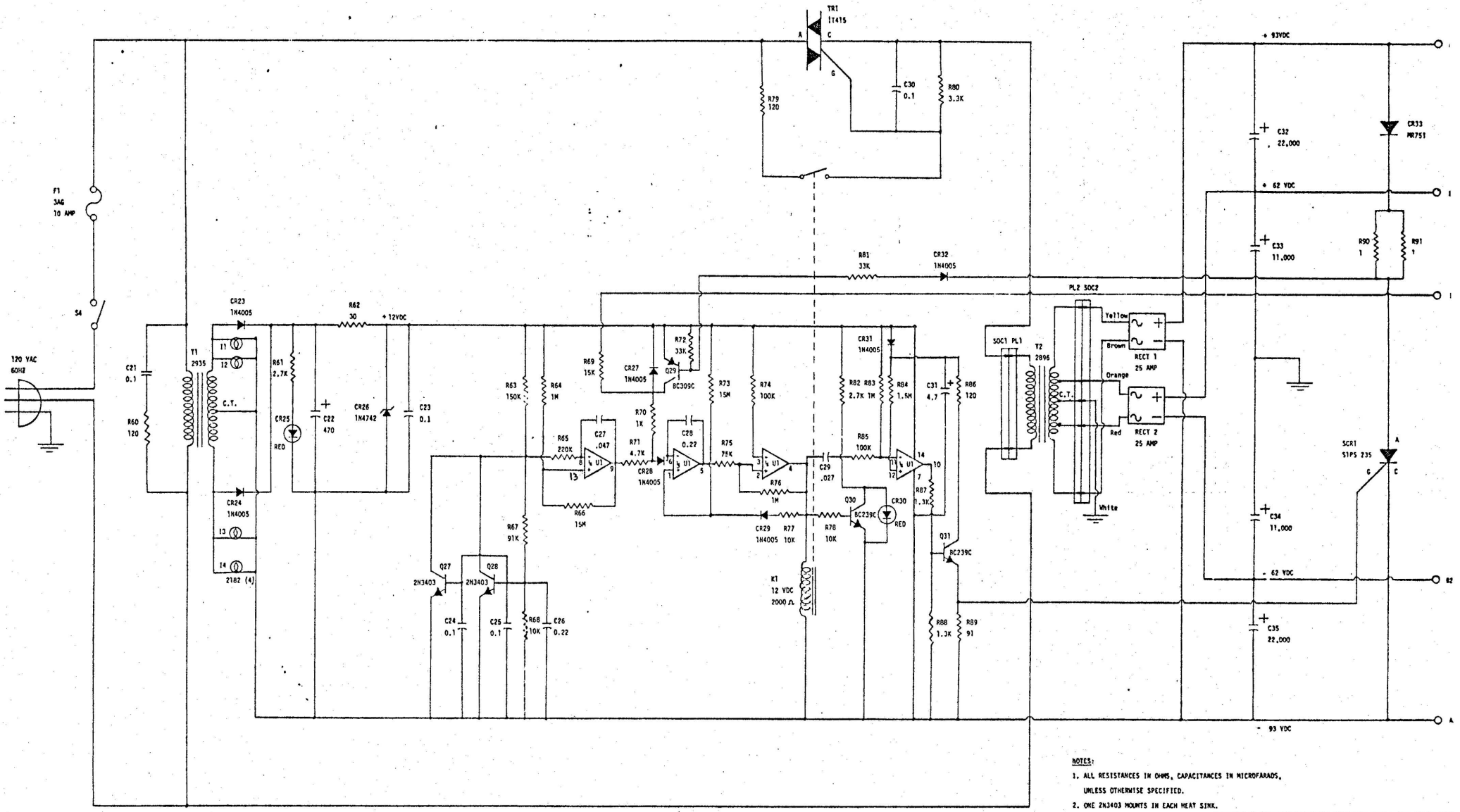
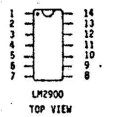
SCALE:	APPROVED BY:	DRAWN BY J.H.
DATE: 7-17-78		REVISED
SCHEMATIC - AMPLIFIER		
MODELS: PA5001, MA5002, EA5003		DRAWING NUMBER 1503

FOR AMPLIFIERS WITH 'B' OR 'T' PREFIX TO SERIAL NUMBER



NOTES:

1. ALL RESISTANCES IN OHMS, CAPACITANCES IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. ONE 2N3403 MOUNTS IN EACH HEAT SINK.



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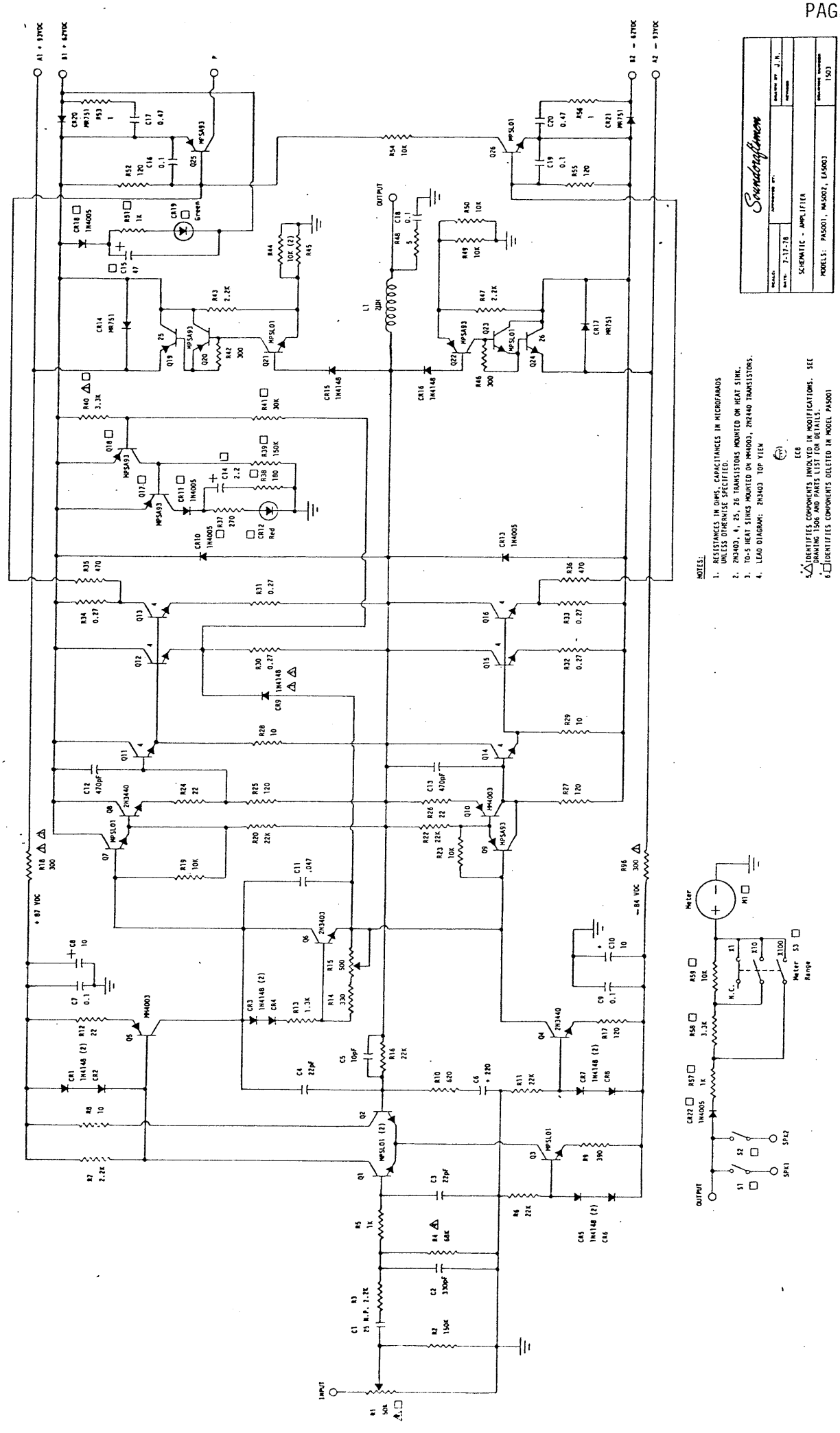
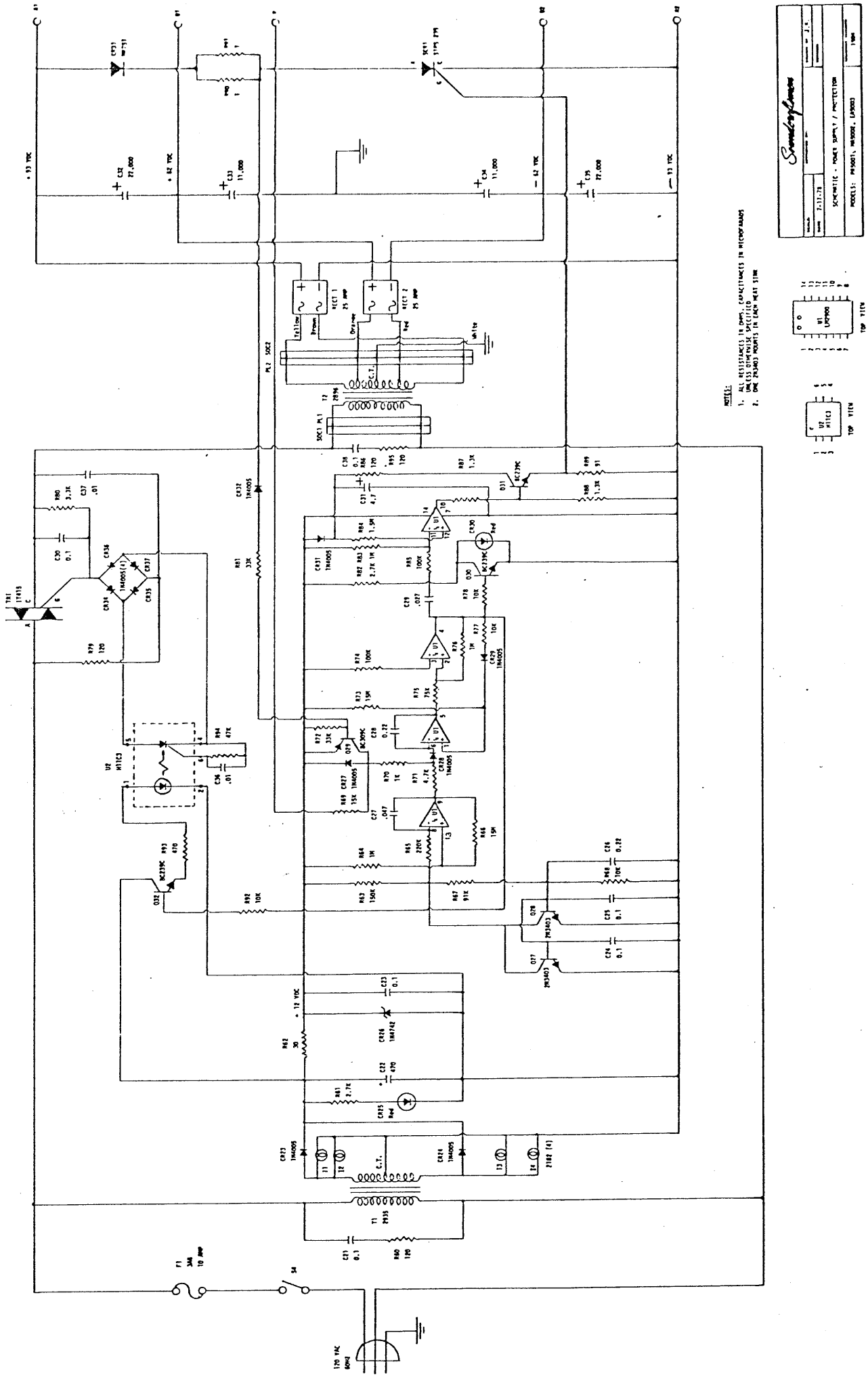
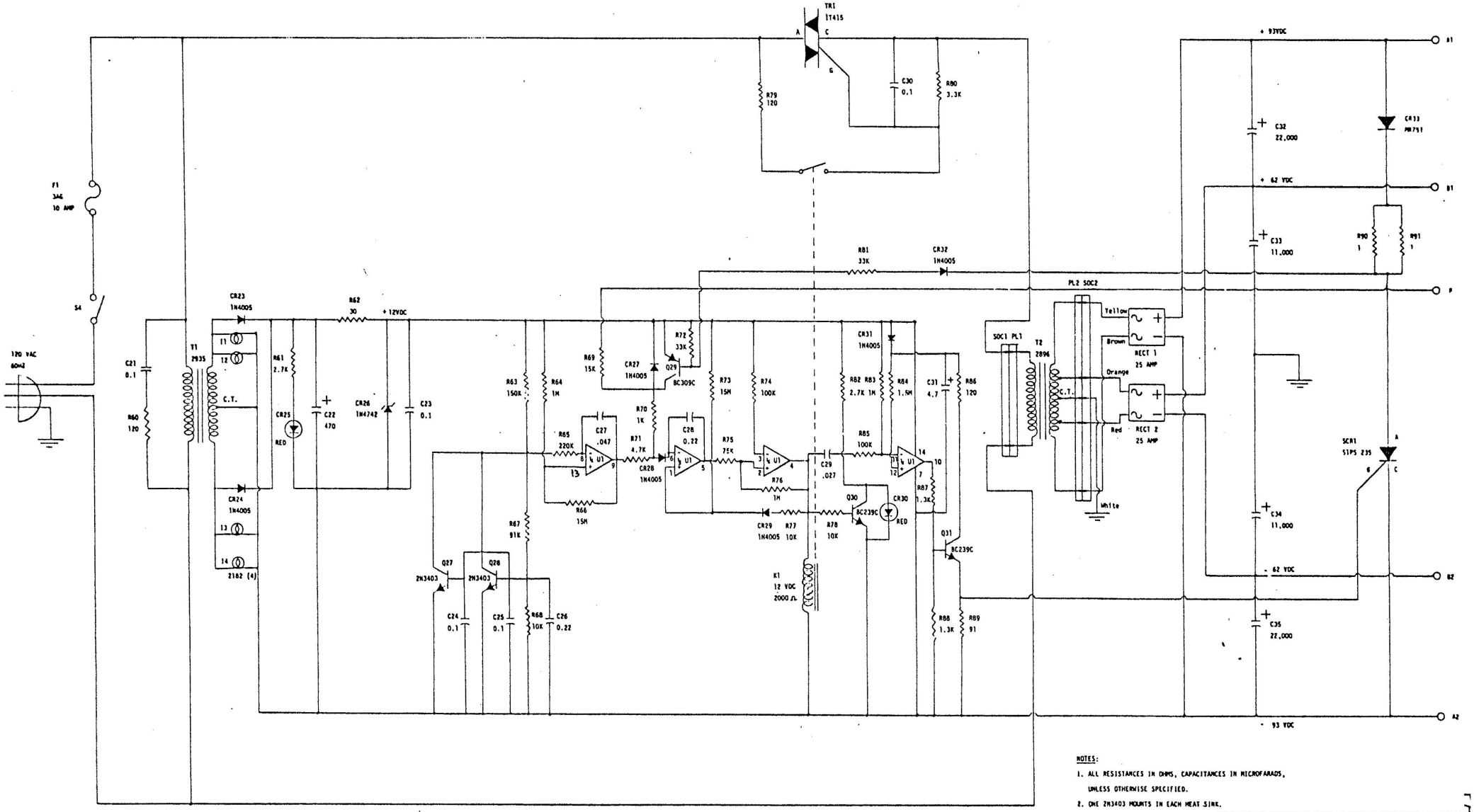
SCALE:	APPROVED BY:	DRAWN BY J.H.
DATE: 7-17-78		REVISED
SCHEMATIC: POWER SUPPLY/PROTECTION		
MODELS: PA 5001, MA 5002		DRAWING NUMBER 1505

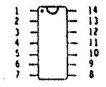

Soundcraftsmen
SCHEMATIC - AMPLIFIER
MODELS: PA5001, MA5002, EA5003
1503
NOTES:
1. RESISTANCES IN OHMS, CAPACITANCES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2. 2N3403, 4, 25, 26 TRANSISTORS MOUNTED ON HEAT SINK.
3. TO-5 HEAT SINKS MOUNTED ON MM4003, 2N2440 TRANSISTORS.
4. LEAD DIAGRAM: 2N3403 TOP VIEW
ECB
5. IDENTIFIES COMPONENTS INVOLVED IN MODIFICATIONS. SEE DRAWING 1500 AND PARTS LIST FOR DETAILS.
6. IDENTIFIES COMPONENTS DELETED IN MODEL PA5001
+87 VDC
-84 VDC
INPUT
OUTPUT
Meter
Meter Range
SPK1
SPK2


SCHEMATIC - POWER SUPPLY / PROTECTION
MODELS: PM3001, PM3002, LAB3003
NOTES:
1. ALL RESISTANCES IN OHMS, CAPACITANCES IN MICROFARADS UNLESS OTHERWISE SPECIFIED
2. ONE PM3403 MOUNTS IN EACH HEAT SINK
TOP VIEW
TOP VIEW
170 VAC 60Hz



NOTES:

1. ALL RESISTANCES IN OHMS, CAPACITANCES IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. ONE 2N3403 MOUNTS IN EACH HEAT SINK.



LM2900
TOP VIEW

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SCALE:	APPROVED BY:	DRAWN BY J. H.
DATE: 7-17-78		REVISED
SCHEMATIC: POWER SUPPLY/PROTECTION		
MODELS: PA 5001, MA 5002		DRAWING NUMBER 1505

PAGE 3

DESCRIPTION	MODELS AFFECTED	SERIAL NUMBERS	CIRCUIT BOARD	PARTS REMOVED/COMPUTER NUMBER	PARTS ADDED/COMPUTER NO.
(1) POWER SUPPLY FILTER COILS REPLACED WITH RESISTORS.	MA5002 MA5002/240	A-188321 A-178320	PRE-DRIVER LEFT AND RIGHT	L1,2 POT-CORE COIL/40956018 M-2869-8 R40 RESISTOR-4.7K OHM/41820289	R18 RESISTOR-390 OHM/41820263 (RIGHT BOARD) R96 RESISTOR-300 OHM/41820260 (LEFT BOARD) R40 RESISTOR-3.3K OHM/41820285
(2) REED SWITCH IN POWER SUPPLY/PROTECTION CIRCUIT REPLACED WITH OPTICAL COUPLER.	PA5001 MA5002 MA5002/240V	L-208111 A-248556 A-128903	POWER SUPPLY/PROTECTION	CIRCUIT BOARD/40336161 1451E K1 REED SWITCH/41817015 12VDC 2000 OHM	CIRCUIT BOARD/40336161 1451F U2 OPTO-COUPLER/41436040 H11C3 Q32 TRANSISTOR-BC239C/41923200 CR34, 35, 36, 37 DIODE IN4005/41920600 C36, 37 CAPACITOR-.01MF/40312519 C38 CAPACITOR-0.1MF/40312658 R92 RESISTOR-10K OHM/41820297 R93 RESISTOR-470 OHM/41820265 R94 RESISTOR-47K OHM/41820313 R95 RESISTOR-120 OHM/41820251
(3) A SERIES DIODE AND RESISTOR PAIR WERE ADDED AROUND THE NEGATIVE PRE-DRIVER TRANSISTOR Q9 FROM PIN 8 TO PIN 9 (CATHODE) ON THE PRE-DRIVER BOARD.	MA5002 PA5001	FROM: A-308727 TO: A-841031 FROM: L-288380	PRE-DRIVER LEFT AND RIGHT	R18 RESISTOR-390 OHM/41820263	R18,21 RESISTOR-300 OHM/41820260 CR9 DIODE-IN4148/41920620
(4) IN EARLIER AMPS, THE VOLUME CONTROL, R1 WAS IN THE POSITION OF R4, AND THE INPUT JACK WAS WIRED TO THE JUNCTION OF C1 AND R2.	MA5002	A-328836	PRE-DRIVER LEFT AND RIGHT	NONE	R4 RESISTOR-68K OHM/41820317
(5) TAKES THE PLACE OF: (3) A DIODE IS ADDED FROM THE EMITTER OF Q6 TO THE EMITTER OF Q12 (CATHODE)	MA5002	A-841032	PRE-DRIVER LEFT AND RIGHT	R21 RESISTOR -300 OHM/41820260	NONE

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SCALE:	APPROVED BY:	DRAWN BY J.H.
DATE: 7-17-77		REVISED

IN PROCESS MODIFICATIONS

MODELS: PA 5001, MA 5002 | DRAWING NUMBER 1506

SOUNDCRAFTSMEN AMPLIFIER

MODIFICATION NOTICE

It has been found that under certain conditions, it is possible for the Amplifier Overload circuitry to be falsely triggered by transients in the 120 Volt A.C. line.

Two types of modification have been developed to cure this situation. Type A or Type B, which are shown on the following pages, have been factory installed on all MA5002 amplifiers from serial number A-308727, and all PA5001 amplifiers from serial number L-288380. Unmodified amplifiers before these numbers should have the Type B mod kit added.

This kit may be obtained free of charge from the factory..

SOUNDCRAFTSMEN AMPLIFIER SERVICE NOTICE:

It has been found that under certain abnormal conditions, it is possible for the Amplifier Overload circuitry to be falsely triggered by transient spikes generated by customer's other electrical equipment in the 120 Volt A.C. line. The symptoms of this type of false triggering are as follows:

1. The overload lite will come on, the amp will shut off, then automatically reset in 2-3 seconds and continue to play normally.
2. This may occur at zero volume, at very low volume, at medium or at high levels, as it has no relationship at all to the audio amplifying circuitry, or the audio inputs or outputs.
3. It may occur once a week, once a day, or many times an hour, because the shut-down is a result of transient spikes (noise) on the AC line, ususally caused by the switching, on or off, of certain non-filtered electrical equipment on the same AC line. For example, a refrigerator, air conditioner, high wattage lights, large tape recorder, etc.
4. Thus, the amp may turn off when that particular piece of "same AC line" equipment turns on or off, but sometimes may not turn off, since a spike may not be generated at every on-off cycle.

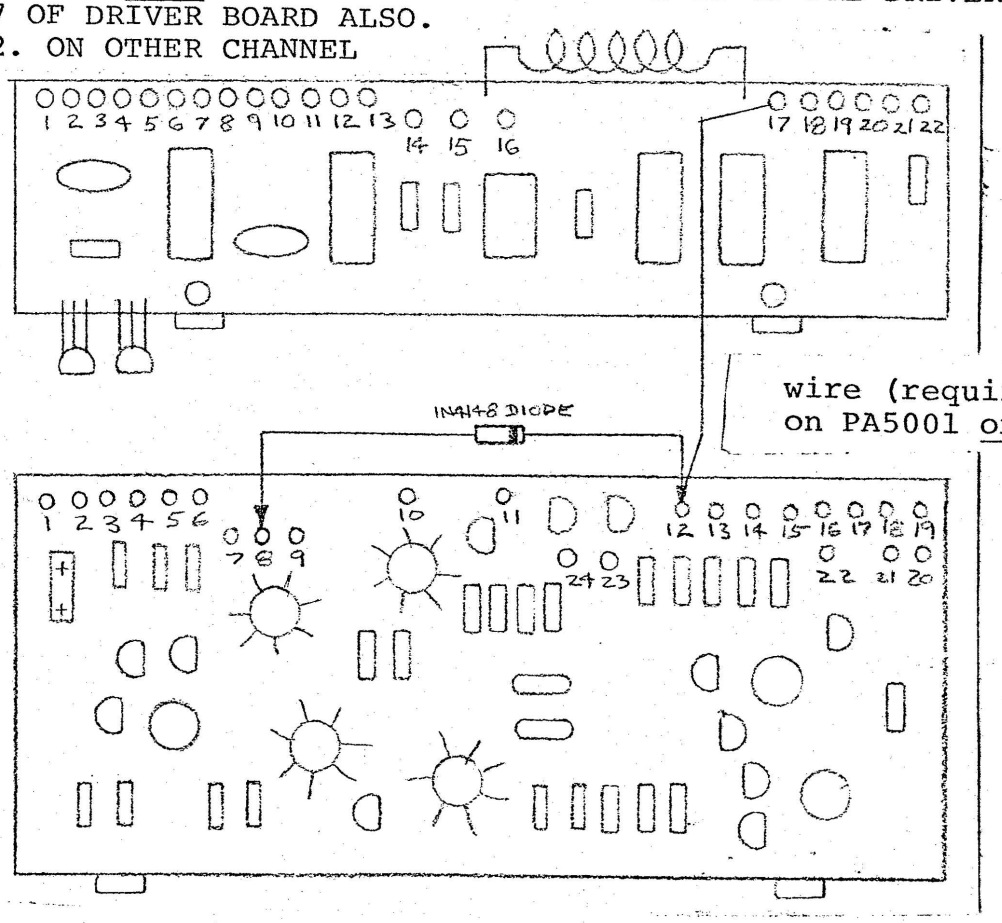
A simple repair can be made in this case, by installing one diode on each channel.

TRANSIENT SPIKE OVERLOAD SERVICE BULLETIN

1. ATTACH 1N4148 DIODE BETWEEN PINS 8 and 12 OF PRE-DRIVER BOARD.
2. ON PA5001 AMPLIFIERS ONLY, ATTACH A WIRE FROM PIN 12 OF PRE-DRIVER BOARD TO PIN 17 OF DRIVER BOARD ALSO.
3. REPEAT 1. AND 2. ON OTHER CHANNEL

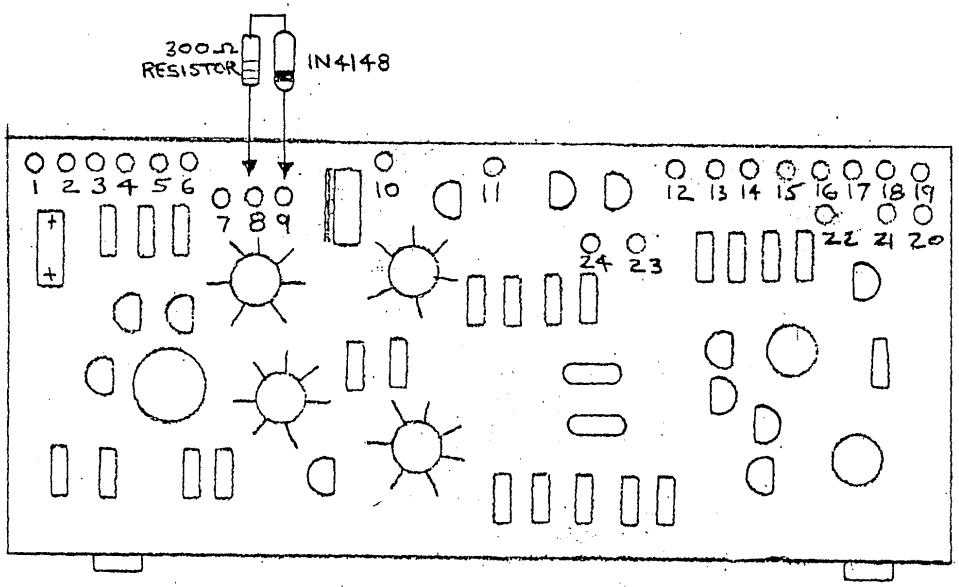
DRIVER: 1449L

PRE-DRIVER: 1450L



TRANSIENT OVERLOAD MODIFICATION: TYPE A

Some amplifiers have this modification kit installed, and it is effective in stopping false triggering of the amplifier because of line transients. The single diode kit (type B) should be installed on un-modified amplifiers.



1450L PRE-DRIVER BOARD

TRANSIENT OVERLOAD MODIFICATION: TYPE B

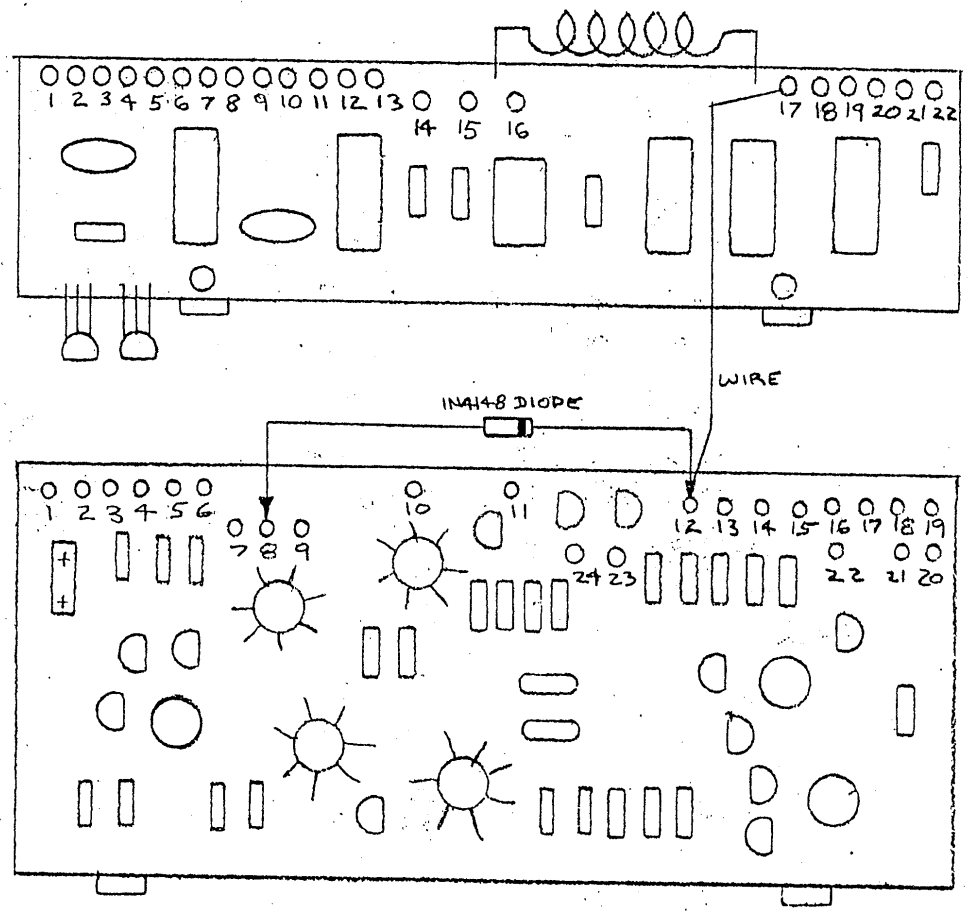
1.) ATTACH DIODE SUPPLIED BETWEEN PINS 8 AND 12 OF PRE-DRIVER BOARD AS SHOWN.

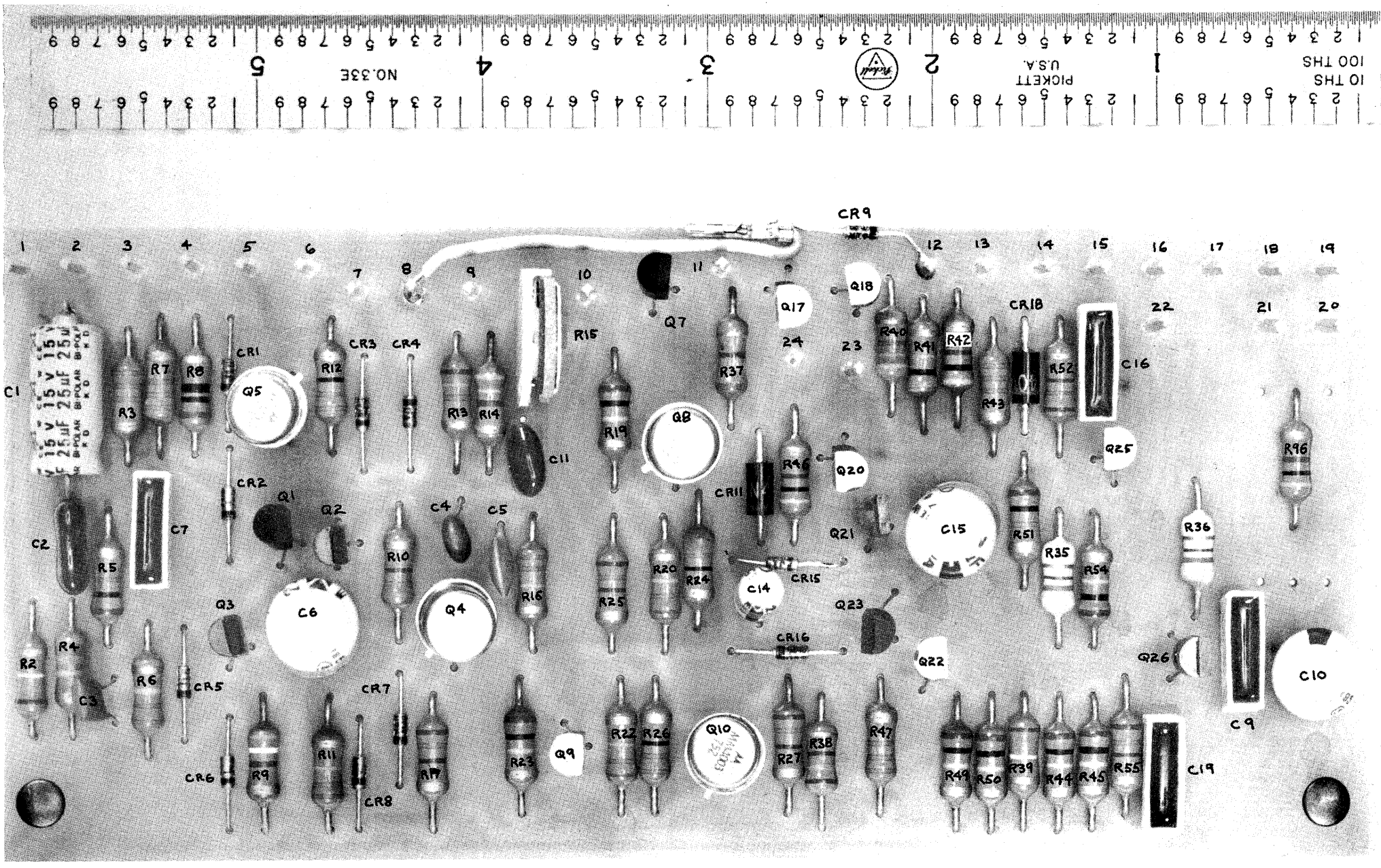
2.) ON PA5001 AMPLIFIERS ONLY, ATTACH A WIRE FROM PIN 12 OF PRE-DRIVER BOARD TO PIN 17 OF DRIVER BOARD ALSO.

3.) REPEAT 1.) AND 2.) ON OTHER CHANNEL.

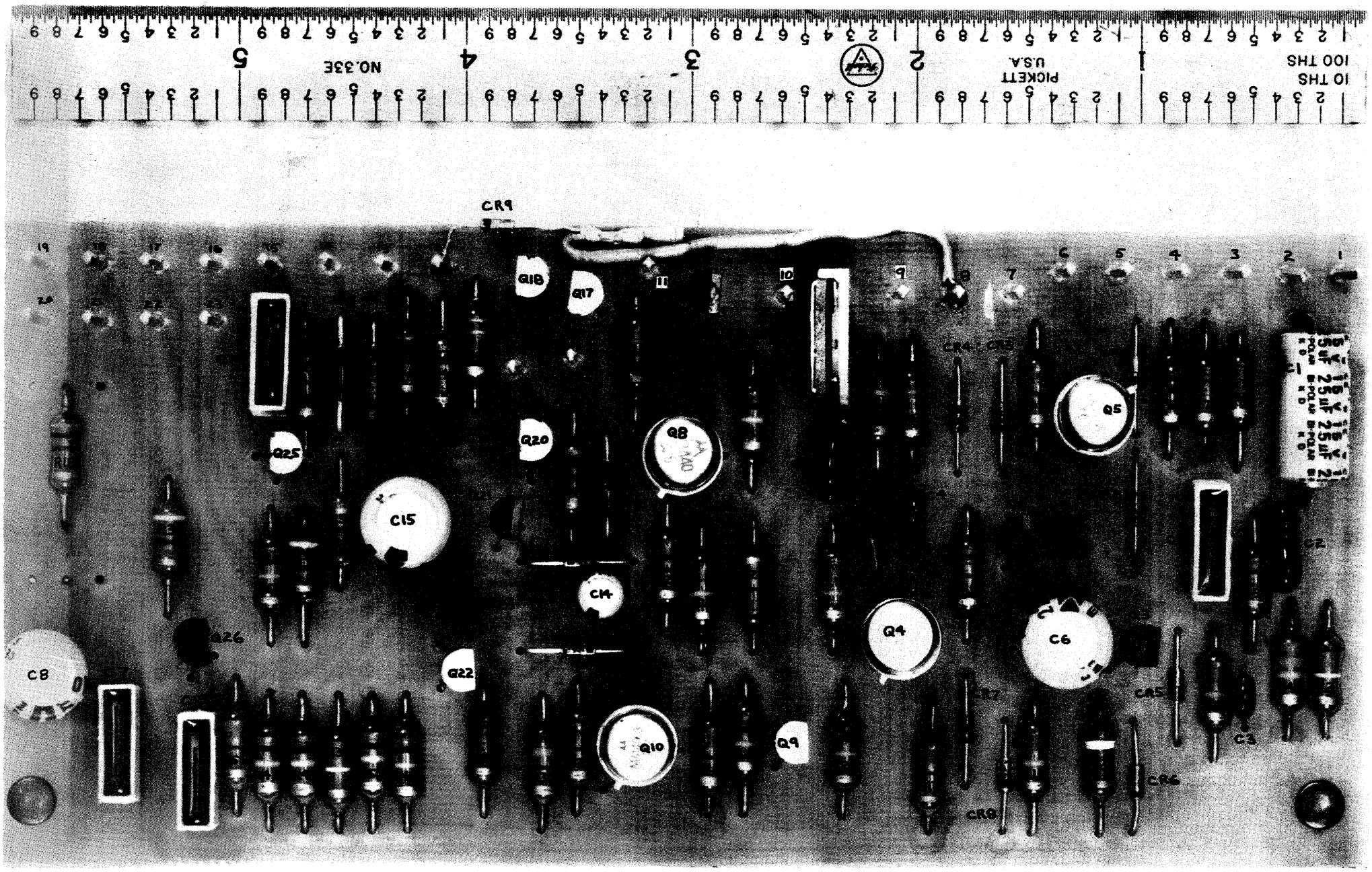
DRIVER: 1449L

PRE-DRIVER: 1450L

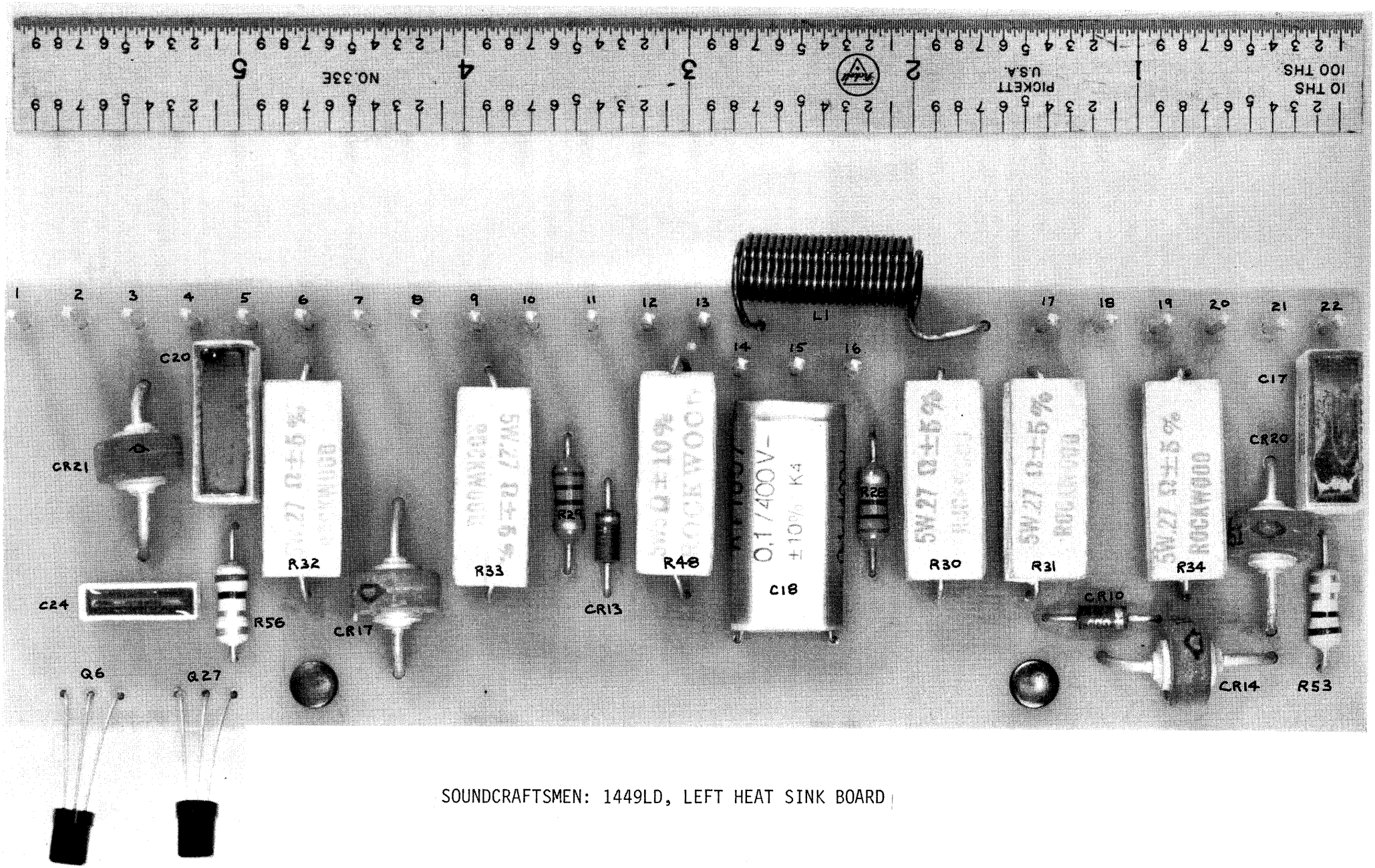




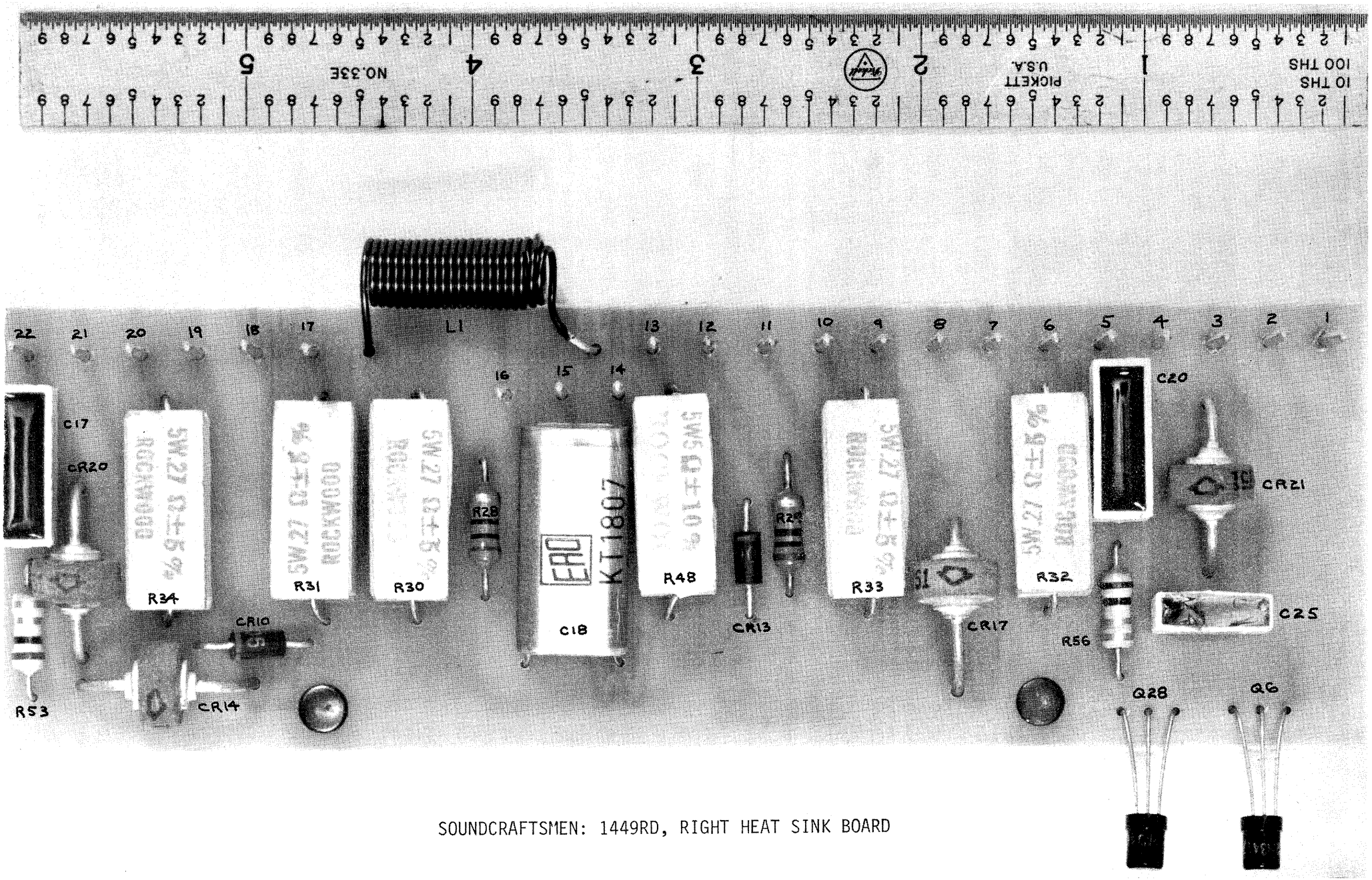
SOUNDCRAFTSMEN: 1450LD, LEFT PRE-DRIVER BOARD



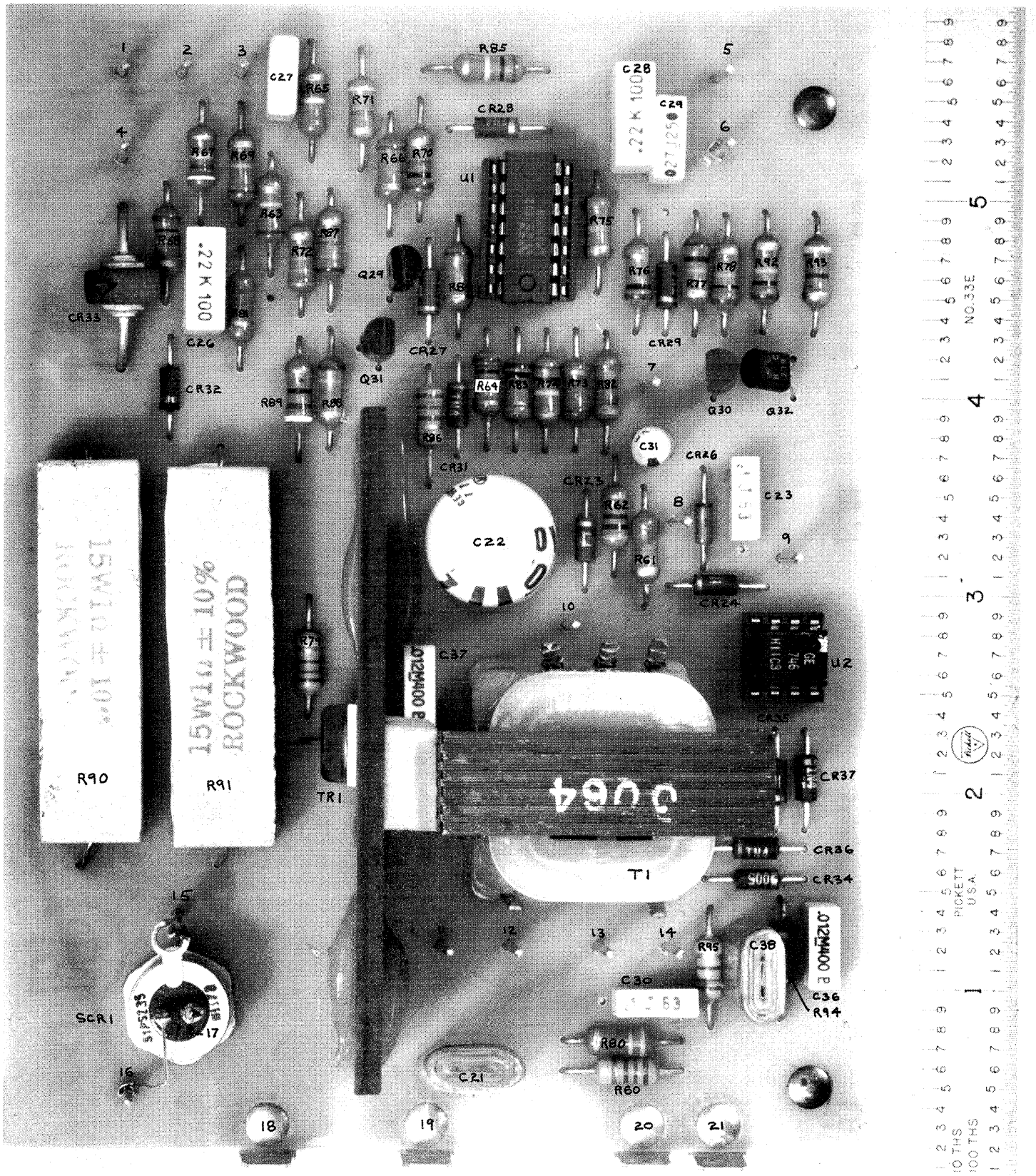
SOUNDCRAFTSMEN: 1450RD, RIGHT PRE-DRIVER BOARD



SOUNDCRAFTSMEN: 1449LD, LEFT HEAT SINK BOARD



SOUNDCRAFTSMEN: 1449RD, RIGHT HEAT SINK BOARD



SOUNDCRAFTSMEN: 1451F, POWER SUPPLY/PROTECTION BOARD

SOUNDCRAFTSMEN AMPLIFIER

PARTS ORDERING INFORMATION

When ordering replacement parts, please include the following information so that the order may be processed as quickly as possible:

A. Amplifier model number (i.e., MA5002, PA5001, EA5003).

B. Amplifier serial number (located on rear panel of unit).

C. Soundcraftsmen part number.

D. Description of part.

Address orders or inquiries to:

Customer Service
Soundcraftsmen
2200 So. Ritchey Street
Santa Ana, CA 92705

PHONE: (714) 540-4961

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
30672066		1	LEFT PRE-DRIVER BRD. S/S ASSEMBLY
40801570		2	MOUNTING ANGLE
40336169		1	CKT. BRD. #1450-LD (PRE-DRIVER)
41920620		11	DIODE 1N4148 FAST RECOVERY CR1,2,3,4,5,6,7,8,9,15,16
41920600		2	DIODE-RECTIFIER-1N4005 CR11,18
41923214		2	TRANSISTOR MM4003 Q5,10
41923212		2	TRANSISTOR 2N3440 Q4,8
41923210		6	TRANSISTOR MPS-A93 Q9,17,18,20,22,25
41923566		7	TRANSISTOR MPS-L01 Q1,2,3,7,21,23,26
40312423		1	CAPACITOR-ELECTRO-25MF-15VDC-NON-POLAR C1
40312343		1	CAPACITOR-ELECTRO-10MF -100VDC C10
40312330		1	CAPACITOR-ELECTRO-47MF -50VDC C15
40312261		1	CAPACITOR-ELECTRO-220MF -16VDC C6
40312322		1	CAPACITOR-ELECTRO-2.2MF-50VDC C14
40313330		2	CAPACITOR-S-MICA-22PF-1000V C3,4
40313401		1	CAPACITOR-S-MICA-330PF-500VDC C2
40312530		1	CAPACITOR-FILM-.047MF-100VDC C11
40312536		4	CAPACITOR-FILM-.1MF-100VDC C7,9,16,19
40808220		4	HEAT SINK WAKEFIELD TO-5
40312022		1	CAPACITOR-CERAMIC-10PF-1000VDC C5
41660425		1	POTENTIOMETER-TRIM-500 OHM R15
41820225		1	RESISTOR-10 OHM-1/2W-5% R8
41820230		3	RESISTOR-22 OHM-1/2W R12,24,26
41820251		5	RESISTOR-120 OHM-1/2W-5% R17,25,27,52,55
41820255		1	RESISTOR-180 OHM-1/2W-5% R38
41820259		1	RESISTOR-270 OHM-1/2W-5% R37

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
41820260	1	3	RESISTOR-300 OHM-1/2W-5% R42,46,96
41820261		1	RESISTOR-330 OHM-1/2W-5% R14
41820263		1	RESISTOR-390 OHM-1/2W-5% R9
41820265		2	RESISTOR-470 OHM-1/2W-5% R35,36
41820268		1	RESISTOR-620 OHM-1/2W-5% R10
41820273		2	RESISTOR-1K OHM-1/2W-5% R5,51
41820276		1	RESISTOR-1.3K OHM-1/2W-5% R13
41820281		4	RESISTOR-2.2K OHM-1/2W-5% R3,7,43,47
41820285	1	1	RESISTOR-3.3K OHM-1/2W-5% R40
41820297		7	RESISTOR-10K OHM-1/2W-5% R19,23,44,45,49,50,54
41820305		5	RESISTOR-22K OHM-1/2W-5% R6,11,16,20,22
41820308		1	RESISTOR-30K OHM-1/2W-5% R41
41820317	4	1	RESISTOR-68K-OHM-1/2W-5% R4
41820325		2	RESISTOR-150K OHM-1/2W-5% R2,39
30672071		1	RIGHT PRE-DRIVER BRD. S/S ASSEMBLY
40801570		2	MOUNTING ANGLE
40336170		1	CKT BRD #1450-RD (PRE-DRIVER)
41920620	3 5	11	DIODE 1N4148 FAST RECOVERY CR1,2,3,4,5,6,7,8,9,15,16
40920600		2	DIODE-RECTIFIER-1N4005 CR11,18
41923214		2	TRANSISTOR MM4003 Q5,10
41923212		2	TRANSISTOR 2N-3440 Q4,8
41923210		6	TRANSISTOR MPS-A93 Q9,17,18,20,22,25
41923566		7	TRANSISTOR MPS-L01 Q1,2,3,7,21,23,26
40312423		1	CAPACITOR-ELECTRO-25MF-15VDC-NON-POLAR C1
40312343		1	CAPACITOR-ELECTRO-10MF-100VDC C8

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
40312330		1	CAPACITOR-ELECTRO-47MFD-50VDC C15
40312261		1	CAPACITOR-ELECTRO-220MFD-16VDC C6
40312322		1	CAPACITOR-ELECTRO-2.2MF-50VDC C14
40313330		2	CAPACITOR-S-MICA-22PF-1000V C3,4
40313401		1	CAPACITOR-S-MICA-330PF-500VDC C2
40312530		1	CAPACITOR-FILM-.047MF-100VDC C11
40312536		4	CAPACITOR-FILM-.1MF-100VDC C7,16,19
40808220		4	HEAT SINK-TO-5
40312022		1	CAPACITOR-CERAMIC-10PF-1000VDC C5
41660425		1	POTENTIOMETER-TRIM-500 OHM R15
41820225		1	RESISTOR-10 OHM-1/2W-5% R8
41820230		3	RESISTOR-22 OHM-1/2W R12,24,26
41820251		5	RESISTOR-120 OHM-1/2W-5% R17,25,27,52,55
41820255		1	RESISTOR-180 OHM-1/2W-5% R38
41820259		1	RESISTOR-270 OHM-1/2W-5% R37
41820260	△1 △3 △5	3	RESISTOR-300 OHM-1/2W-5% R18,42,46
41820261		1	RESISTOR-330 OHM-1/2W-5% R14
41820263		1	RESISTOR-390 OHM-1/2W-5% R9
41820265		2	RESISTOR-470 OHM-1/2W-5% R35,36
41820268		1	RESISTOR-620 OHM-1/2W-5% R10
41820273		2	RESISTOR-1K OHM-1/2W-5% R5,51
41820276		1	RESISTOR-1.3K OHM-1/2W-5% R13
41820281		4	RESISTOR-2.2K OHM-1/2W-5% R3,7,43,47
41820285	△1	1	RESISTOR-3.3K OHM-1/2W-5% R40

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
41820297		7	RESISTOR-10K OHM-1/2W-5% R19,23,44,45,49,50,54
41820305		5	RESISTOR-22K OHM-1/2W-5% R6,11,16,20,22
41820308		1	RESISTOR-30K OHM-1/2W-5% R41
41820317	4	1	RESISTOR-68K OHM-1/2W-5% R4
41820325		2	RESISTOR-150K OHM-1/2W-5% R2,39
30672056		1	LEFT HEAT SINK BRD.S/S ASSEMBLY
40336159		1	CKT/BRD.#1449LD (HT. SINK BRD.)
40801555		2	MOUNTING ANGLE
41920600		2	DIODE-1N4005 CR10,13
41923207		4	DIODE-MR751 CR14,17,20,21
40312658		1	CAPACITOR-FILM-.1MF-400VDC C18
40312536		1	CAPACITOR-FILM-.1MF-100VDC C24
40312556		2	CAPACITOR-FILM-.47MF-100VDC C17,20
41820800		5	RESISTOR (PWR) .27 OHM-5W-5% R30,31,32,33,34
41820220		2	RESISTOR 1 OHM-1/2W-5% R53,56
41821011		1	RESISTOR 5 OHM-5W R48
41820225		2	RESISTOR-10 OHM-1/2W-5% R28,29
41923204		2	TRANSISTOR 2N3403,2N3417 (3/4" LEADS) Q6,27
42336206		1	COIL-2 MICROHENRY-#20 MAGNET WIRE L1
30672061		1	RIGHT HEAT SINK BRD. S/S ASSEMBLY
40336160		1	CKT/BRD.#1449RD (HT. SINK BRD.)
40801555		2	MOUNTING ANGLE
41920600		2	DIODE-1N4005 CR10,13
41923207		4	DIODE-MR751 CR14,17,20,21
40312658		1	CAPACITOR-FILM-.1MF-400VDC C18

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
40312536		1	CAPACITOR-FILM-.1MF-100VDC C25
40312556		2	CAPACITOR-FILM-.47MF-100VDC C17,20
41820800		5	RESISTOR (PWR) .27 OHM-5W-5% R30,31,32,33,34
41820220		2	RESISTOR-1 OHM-1/2W-5% R53,56
41821011		1	RESISTOR-5 OHM-5W R48
41820225		2	RESISTOR-10 OHM-1/2W-5% R28,29
41923204		2	TRANSISTOR 2N3403,2N3417 (3/4" LEADS) Q6,28
42336206		1	COIL-2 MICROHENRY-#20 MAGNET WIRE L1
20672031		1	REAR CHASSIS SUB ASSEMBLY
40808215		2	HEAT SINK
40808250		16	MICA INSULATORS
41922202		16	SOCKET-TRANSISTOR-M-1609
41922200		12	TRANSISTOR-POWER #4 Q11,12,13,14,15,16
41923202		2	TRANSISTOR-POWER #25 Q19
41923565		2	TRANSISTOR-POWER #26 Q24
40312094		2	CAPACITOR-CERAMIC-470PF-1000VDC C12,13
41929050		1	REAR PANEL
41004065		1	JACK-2 PIN
10672026		1	REAR ASSEMBLY
42020015		4	BANANA TERMINAL-RED
42020020		4	BANANA TERMINAL-BLACK
40687599		1	FUSEHOLDER
40360333		1	CORD-AC-6FT.
41980008		1	STRAIN RELIEF
30672051		1	POWER SUPPLY/PROTECTION BOARD S/S ASSEMBLY
40336161	⚠2	1	CKT. BRD. #1451-F(PWR/A-PWR SUP)
40801570		2	MOUNTING ANGLE
40801550		4	TERM/FAST ON-AMP
41823207		1	DIODE MR751 CR33

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
41920600	(2)	11	DIODE-RECTIFIER-1N4005 CR23,24,27,28,29,31,32,34,35,36,37
41920902		1	QUAD OP AMP LM-3900,LM-2900 U1
41920899		1	SOCKET-14 PIN DIP
41436040	(2)	1	OPTO COUPLER H11C-3 (120 VOLT UNITS) U2
41436050	(2)	1	OPTO COUPLER H11C-4 (240 VOLT UNITS) U2
42072424		1	TRANSFORMER-#3064 (2935) (120 VOLT UNITS) T1
42072433		1	TRANSFORMER-#3041 (240 VOLT UNITS) T1
41436051		1	SOCKET-8 PIN DIP
41920678		1	DIODE, ZENER 1N4742A CR26
41923200	(2)	3	TRANSISTOR-NPN-BC239C Q30,31,32
41923410		1	TRANSISTOR-PNP-BC309C Q29
41920855		1	SILICON CONTROLLED RECTIFIER SIPS 235 SCR1
41923840		1	TRIAC Q4015L5, IT-415 (120 VOLT UNITS) TR1
41923845		1	TRIAC Q6015L5, IT-615 (240 VOLT UNITS) TR1
40808171		1	HEAT SINK #1455
40312519	(2)	2	CAPACITOR-FILM-.01MF-400 VDC C36,37
40312530		1	CAPACITOR-FILM-.047MF-100VDC C27
40312536		2	CAPACITOR-FILM-.1MF-100VDC C23,30
40312544		2	CAPACITOR-FILM-.22MF-100VDC C26,28
40312524		1	CAPACITOR-FILM-.027MF-100VDC C29
40312336		1	CAPACITOR-ELECTRO-470MF-50VDC C22
40312300		1	CAPACITOR-ELECTRO-4.7MF-35VDC C31
40312658	(2)	2	CAPACITOR-.1/400 V C21,38
41821115		2	RESISTOR-1 OHM-15W-5% R90,91
41820235		1	RESISTOR-30 OHM-1/2W-5% R62
41820248		1	RESISTOR-91 OHM-1/2W-5% R89

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
41820251	(2)	4	RESISTOR-120 OHM-1/2W-5% R60,79,86,95
41820265	(2)	1	RESISTOR-470 OHM-1/2W-5% R93
41820273		2	RESISTOR-1K OHM-1/2W-5% R70
41820276		1	RESISTOR-1.3K OHM-1/2W-5% R87,88
41820283		2	RESISTOR-2.7K OHM-1/2W-5% R61,82
41820285		1	RESISTOR-3.3K OHM-1/2W-5% R80
41820289		1	RESISTOR-4.7K OHM-1/2W-5% R71
41820297	(2)	1	RESISTOR-10K OHM-1/2W-5% R68,77,78,92
41820301		4	RESISTOR-15K OHM-1/2W-5% R69
41820309		2	RESISTOR-33K OHM-1/2W-5% R72,81
41820313	(2)	1	RESISTOR-47K OHM-1/2W-5% R94
41820318		1	RESISTOR-75K OHM-1/2W-5% R75
41820320		1	RESISTOR-91K OHM-1/2W-5% R67
41820321		2	RESISTOR-100K OHM-1/2W-5% R74,85
41820325		1	RESISTOR-150K OHM-1/2W-5% R63
41820329		1	RESISTOR-220K OHM-1/2W-5% R65
41820345		3	RESISTOR-1MEG OHM-1/2W-5% R64,76,83
41820349		1	RESISTOR-1.5MEG OHM-1/2W-5% R84
41820386		2	RESISTOR-15MEG OHM-1/2W-5% R66,73
30672021		1	POWER TRANSFORMER S/S ASSEMBLY
42072423		1	TRANSFORMER #2270,2896 (120 VOLT UNITS) T2
42072425		1	TRANSFORMER #2302 (240 VOLT UNITS) T2
40819504		7	MALE PIN

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
40819503		1	MALE 5 PIN HOUSING
40819500		1	MALE 2 PIN HOUSING
41929080		4	TRANSFORMER BRACKET
41929082		4	PLATE/TRANSFORMER BRACKET
30672046		1	CAPACITOR S/S ASSEMBLY
41929090		1	CAPACITOR MOUNTING PLATE
41929070		1	CAPACITOR MOUNTING FRAME
41920500		2	BRIDGE RECTIFIER MDA-990-3 RECT1,2
40312174		2	CAPACITOR-ELECTRO-11,000MFD-60VDC C33,34
40312180		2	CAPACITOR-ELECTRO-22,000MFD-30VDC C32,35
40819502		1	FEMALE 5 PIN HOUSING SOC2
40819505		5	FEMALE PIN
20672026		1	SUPPORT SUB ASSEMBLY
41929131		1	MOUNTING FRAME
41929110		1	TRANSFORMER SUPPORT
41992110		1	SWITCH-MICRO S4
42296042		1	TUBING-SHRINK 1/2".010 (1-1/4 INCH)
40819501		1	FEMALE 2 PIN HOUSING SOC1
40819505		2	FEMALE PIN
30672036		1	LOWER PANEL S/S ASSEMBLY
41929020		1	LOWER PANEL #1426-EXTRUSION
40337016		4	CLIPLITE-RED
40337015		2	CLIPLITE-GREEN
41920803		4	DIODE-LED-RED CR12,25,30
41920802		2	DIODE-LED-GREEN CR19
30672041		1	SWITCH & VOLUME POT S/S ASSEMBLY
41929120		1	SWITCH MOUNTING FRAME
41660415		2	POTENTIOMETER-AUDIO TAPER-50K OHMS
41992205		2	SWITCH-PUSHBUTTON-SPEAKER S1,2
41992225		1	SWITCH-PUSHBUTTON-ON/OFF

COMPUTER PART NUMBER	CODE	QTY	----------DESCRIPTION----------
30672031		1	METER SWITCH S/S ASSEMBLY
40336167		1	CKT. BRD. #1457 (SW/BRD)
41992207		1	SWITCH-PUSHBUTTON-METER S3
41920600		2	DIODE-RECTIFIER-1N4005 CR22
41820273		2	RESISTOR-1K OHM-1/2W-5% R57
41820285		2	RESISTOR-3.3K OHM-1/2W-5% R58
41820297		2	RESISTOR-10K OHM-1/2W-5% R59
30672026		2	METER LIGHT BOARD S/S ASSEMBLY
40336166		1	CKT. BRD. #1456 (METER LIGHT BRD.)
41264005		2	LAMP #2182 I1,2,3,4
20672021		1	FRONT PANEL SUB ASSEMBLY
41929164		2	METER MOUNTING TAB
41929174		2	METER MOUNTING BRACKET
41364040		2	METER-0-1MA M1
40239942		2	BOX-METER
41929100		1	METER SWITCH MOUNTING BRACKET
41929040		1	FRONT PANEL
41929030		1	UPPER PANEL
41156020		6	KNOB-MPN-1324
10672021		1	FRONT ASSEMBLY
41929150		4	1461-STANDOFF TUBING
41929140		2	HANDLE
01672021		1	FINAL ASSEMBLY
40684008		1	FUSE-CERAMIC-ABC10-10AMP F1
41929000		2	TOP/BOTTOM PLATE
41929060		2	SIDE PANEL
41150655		2	KNOB-VOLUME
10672031		1	HARDWARE
40283995		4	BUSHING-SB-437-5
40283996		3	BUSHING-OCB-875

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
40283997		1	BUSHING-OCB-500
40819152		8	SCREW-CAP-1/4-20x3/8"
40819153		8	WASHER-1/4"
40819133		50	SCREW-BLK.-#6x1/4"
40819136		4	SCREW-CAP-1/4-20x1 3/4"
40819149		2	SCREW-6-32x1/2"
40819140		6	SCREW-6-32x1/4"
40819145		8	SCREW 440x3/8"
40818350		1	BOLT-CARRIAGE-1/4-20x5"
4081360		1	HEX NUTS 1/4-20
40819144		32	SCREW 4-40x3/4"
42206041		5	VINYL TUBING INCHES
40819506		2	TERMINAL-FASTON
40819507		12	TERMINAL-FASTON
40819508		26	RING-#10
40819150		2	SCREW-6-32x3/4"
40823050		2	WASHER-#6 STAR
40819151		2	NUT-6-32
40819138		8	SCREW-10-32x1/2"
40819142		8	LOCK WASHERS-#10 SPLIT
40819200		8	SCREW/ROLLOC 10-24x1/2"
42020021		8	TERMINAL/WASHERS
40818373		4	RIVET-1/8"x1/8"
40818382		2	RIVET-1/8"x3/16"
40823360		120	WIRE WRAP PINS
40819642		2	CLEAR END SPLICE

SUPERSEDED PARTS (MANUFACTURING CHANGE)

30672051			POWER SUPPLY/PROTECTION BOARD S/S ASSEMBLY
41817015	2	1	REED SWITCH-12 VOLT 2000 OHM K1
30672066	1	1	LEFT PRE-DRIVER BRD. S/S ASSEMBLY
40956018	1	1	COIL, POT-CORE M-2869-B L2
41820260	5	1	RESISTOR-300 OHM-1/2W-5% R21
41820289	1	1	RESISTOR-4.7K OHM-1/2W-5% R40
30672071			RIGHT PRE-DRIVER BRD. S/S ASSEMBLY
40956018	1	1	COIL-POT-CORE M-2869-B L3

COMPUTER PART NUMBER	CODE	QTY	DESCRIPTION
41820263	3	1	RESISTOR-390 OHM-1/2W-5% R18
41820263	5	1	RESISTOR-390 OHM-1/2W-5% R21
41820289	1	1	RESISTOR-4.7K OHM-1/2W-5% R40

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
RESISTORS		
R1	41660415	POTENTIOMETER-AUDIO TAPER-50K OHMS
R2	41820325	RESISTOR-150K OHM-1/2W-5%
R3	41820281	RESISTOR-2.2K OHM-1/2W-5%
R4	41820317	RESISTOR-68K OHM-1/2W-5%
R5	41820273	RESISTOR-1K OHM-1/2W-5%
R6	41820305	RESISTOR-22K OHM-1/2W-5%
R7	41820281	RESISTOR-2.2K OHM-1/2W-5%
R8	41820225	RESISTOR-10 OHM-1/2W-5%
R9	41820263	RESISTOR-390 OHM-1/2W-5%
R10	41820268	RESISTOR-620 OHM-1/2W-5%
R11	41820305	RESISTOR-22K OHM-1/2W-5%
R12	41820230	RESISTOR-22 OHM-1/2W-5%
R13	41820276	RESISTOR-1.3K OHM-1/2W-5%
R14	41820261	RESISTOR-330 OHM-1/2W-5%
R15	41660425	POTENTIOMETER-TRIM-500 OHM
R16	41820305	RESISTOR-22K OHM-1/2W-5%
R17	41820251	RESISTOR-120 OHM-1/2W-5%
R18	41820260	RESISTOR-300 OHM-1/2W-5%
R19	41820297	RESISTOR-10K OHM-1/2W-5%
R20	41820305	RESISTOR-22K OHM-1/2W-5%
R22	41820305	RESISTOR-22K OHM-1/2W-5%
R23	41820297	RESISTOR-10K OHM-1/2W-5%
R24	41820230	RESISTOR-22 OHM-1/2W-5%
R25	41820251	RESISTOR-120 OHM-1/2W-5%
R26	41820230	RESISTOR-22 OHM-1/2W-5%
R27	41820251	RESISTOR-120 OHM-1/2W-5%
R28	41820225	RESISTOR-10 OHM-1/2W-5%
R29	41820225	RESISTOR-10 OHM-1/2W-5%
R30	41820800	RESISTOR-.27 OHM-5W-5%
R31	41820800	RESISTOR-.27 OHM-5W-5%
R32	41820800	RESISTOR-.27 OHM-5W-5%
R33	41820800	RESISTOR-.27 OHM-5W-5%
R34	41820800	RESISTOR-.27 OHM-5W-5%
R35	41820265	RESISTOR-470 OHM-1/2W-5%
R36	41820265	RESISTOR-470 OHM-1/2W-5%
R37	41820259	RESISTOR-270 OHM-1/2W-5%
R38	41820255	RESISTOR-180 OHM-1/2W-5%
R39	41820325	RESISTOR-150K OHM-1/2W-5%
R40	41820285	RESISTOR-3.3K OHM-1/2W-5%
R41	41820308	RESISTOR-30K OHM-1/2W-5%
R42	41820260	RESISTOR-300 OHM-1/2W-5%
R43	41820281	RESISTOR-2.2K OHM-1/2W-5%
R44	41820297	RESISTOR-10K OHM-1/2W-5%
R45	41820297	RESISTOR-10K OHM-1/2W-5%
R46	41820260	RESISTOR-300 OHM-1/2W-5%
R47	41820281	RESISTOR-2.2K OHM-1/2W-5%

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
RESISTORS (CONT.)		
R48	41821011	RESISTOR-5 OHM-5W-5%
R49	41820297	RESISTOR-10K OHM-1/2W-5%
R50	41820297	RESISTOR-10K OHM-1/2W-5%
R51	41820273	RESISTOR-1 K OHM-1/2W-5%
R52	41820251	RESISTOR-120 OHM-1/2W-5%
R53	41820220	RESISTOR-1 OHM-1/2W-5%
R54	41820297	RESISTOR-10K OHM-1/2W-5%
R55	41820251	RESISTOR-120 OHM-1/2W-5%
R56	41820220	RESISTOR-1 OHM-1/2W-5%
R57	41820273	RESISTOR-1K OHM-1/2W-5%
R58	41820285	RESISTOR-3.3K OHM-1/2W-5%
R59	41820297	RESISTOR-10K OHM-1/2W-5%
R60	41820251	RESISTOR-120 OHM-1/2W-5%
R61	41820283	RESISTOR-2.7K OHM-1/2W-5%
R62	41820235	RESISTOR-30 OHM-1/2W-5%
R63	41820325	RESISTOR-150K OHM-1/2W-5%
R64	41820345	RESISTOR-1MEG OHM-1/2W-5%
R65	41820329	RESISTOR-220K OHM-1/2W-5%
R66	41820386	RESISTOR-15MEG OHM-1/2W-5%
R67	41820320	RESISTOR-91K OHM-1/2W-5%
R68	41820297	RESISTOR-10K OHM-1/2W-5%
R69	41820301	RESISTOR-15K OHM-1/2W-5%
R70	41820273	RESISTOR-1K OHM-1/2W-5%
R71	41820289	RESISTOR-4.7K OHM-1/2W-5%
R72	41820309	RESISTOR-33K OHM-1/2W-5%
R73	41820386	RESISTOR-15MEG OHM-1/2W-5%
R74	41820321	RESISTOR-100K OHM-1/2W-5%
R75	41820318	RESISTOR-75K OHM-1/2W-5%
R76	41820345	RESISTOR-1MEG OHM-1/2W-5%
R77	41820297	RESISTOR-10K OHM-1/2W-5%
R78	41820297	RESISTOR-10K OHM-1/2W-5%
R79	41820251	RESISTOR-120 OHM-1/2W-5%
R80	41820285	RESISTOR-3.3K OHM-1/2W-5%
R81	41820309	RESISTOR-33K OHM-1/2W-5%
R82	41820283	RESISTOR-2.7K OHM-1/2W-5%
R83	41820345	RESISTOR-1MEG OHM-1/2W-5%
R84	41820349	RESISTOR-1.5MEG OHM-1/2W-5%
R85	41820321	RESISTOR-100K OHM-1/2W-5%
R86	41820251	RESISTOR-120 OHM-1/2W-5%
R87	41820276	RESISTOR-1.3K OHM-1/2W-5%
R88	41820276	RESISTOR-1.3K OHM-1/2W-5%
R89	41820248	RESISTOR-91 OHM-1/2W-5%
R90	41821115	RESISTOR-1 OHM-15W-5%
R91	41821115	RESISTOR-1 OHM-15W-5%
R92	41820297	RESISTOR-10K OHM-1/2W-5%
R93	41820265	RESISTOR-470 OHM-1/2W-5%
R94	41820313	RESISTOR-47K OHM-1/2W-5%

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
RESISTORS (CONT.)		
R95	41820251	RESISTOR-120 OHM-1/2W-5%
R96	41820260	RESISTOR-300 OHM-1/2W-5%
CAPACITORS		
C1	40312423	CAPACITOR-ELECTRO-25MF-15VDC-NON-POLAR
C2	40313401	CAPACITOR-S-MICA-330PF-500VDC
C3	40313330	CAPACITOR-S-MICA-22PF-1000VDC
C4	40313330	CAPACITOR-S-MICA-22PF-1000VDC
C5	40312022	CAPACITOR-CERAMIC-10PF-1000VDC
C6	40312261	CAPACITOR-ELECTRO-220MF-16VDC
C7	40312536	CAPACITOR-FILM-.1MF-100VDC
C8	40312343	CAPACITOR-ELECTRO-10MF-100VDC
C9	40312536	CAPACITOR-FILM-.1MF-100VDC
C10	40312343	CAPACITOR-ELECTRO-10MF-100VDC
C11	40312530	CAPACITOR-FILM-.047MF-100VDC
C12	40312094	CAPACITOR-CERAMIC-470PF-1000VDC
C13	40312094	CAPACITOR-CERAMIC-470PF-1000VDC
C14	40312322	CAPACITOR-ELECTRO-2.2MF-50VDC
C15	40312330	CAPACITOR-ELECTRO-47MF-50VDC
C16	40312536	CAPACITOR-FILM-.1MF-100VDC
C17	40312556	CAPACITOR-FILM-.47MF-100VDC
C18	40312658	CAPACITOR-FILM-.1MF-400VDC
C19	40312536	CAPACITOR-FILM-.1MF-100VDC
C20	40312556	CAPACITOR-FILM-.47MF-100VDC
C21	40312658	CAPACITOR-FILM-.1MF-400VDC
C22	40312336	CAPACITOR-ELECTRO-470MF-50VDC
C23	40312536	CAPACITOR-FILM-.1MF-100VDC
C24	40312536	CAPACITOR-FILM-.1MF-100VDC
C25	40312536	CAPACITOR-FILM-.1MF-100VDC
C26	40312544	CAPACITOR-FILM-.22MF-100VDC
C27	40312530	CAPACITOR-FILM-.047MF-100VDC
C28	40312544	CAPACITOR-FILM-.22MF-100VDC
C29	40312524	CAPACITOR-FILM-.027MF-100VDC
C30	40312536	CAPACITOR-FILM-.1MF-100VDC
C31	40312300	CAPACITOR-ELECTRO-4.7MF-35VDC
C32	40312180	CAPACITOR-ELECTRO-22,000MF-30VDC
C33	40312174	CAPACITOR-ELECTRO-11,000MF-60VDC
C34	40312174	CAPACITOR-ELECTRO-11,000MF-60VDC
C35	40312180	CAPACITOR-ELECTRO-22,000MF-30VDC
C36	40312519	CAPACITOR-FILM-.01MF-400VDC
C37	40312519	CAPACITOR-FILM-.01MF-400VDC
C38	40312658	CAPACITOR-FILM-.1MF-400VDC
SEMICONDUCTORS		
Q1	41923566	TRANSISTOR MPS-L01
Q2	41923566	TRANSISTOR MPS-L01

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
SEMICONDUCTORS (CONT.)		
Q3	41923566	TRANSISTOR MPS-L01
Q4	41923212	TRANSISTOR 2N3440
Q5	41923214	TRANSISTOR MM4003
Q6	41923204	TRANSISTOR 2N3403,2N3417
Q7	41923566	TRANSISTOR MPS-L01
Q8	41923212	TRANSISTOR 2N3440
Q9	41923210	TRANSISTOR MPS-A93
Q10	41923214	TRANSISTOR MM4003
Q11	41922200	TRANSISTOR-POWER #4
Q12	41922200	TRANSISTOR-POWER #4
Q13	41922200	TRANSISTOR-POWER #4
Q14	41922200	TRANSISTOR-POWER #4
Q15	41922200	TRANSISTOR-POWER #4
Q16	41922200	TRANSISTOR-POWER #4
Q17	41923210	TRANSISTOR MPS-A93
Q18	41923210	TRANSISTOR MPS-A93
Q19	41923202	TRANSISTOR-POWER #25
Q20	41923210	TRANSISTOR MPS-A93
Q21	41923566	TRANSISTOR MPS-L01
Q22	41923210	TRANSISTOR MPS-A93
Q23	41923566	TRANSISTOR MPS-L01
Q24	41923565	TRANSISTOR-POWER #26
Q25	41923210	TRANSISTOR MPS-A93
Q26	41923566	TRANSISTOR MPS-L01
Q27	41923204	TRANSISTOR 2N3403,2N3417
Q28	41923204	TRANSISTOR 2N3403,2N3417
Q29	41923410	TRANSISTOR BC309C
Q30	41923200	TRANSISTOR BC239C
Q31	41923200	TRANSISTOR BC239C
Q32	41923200	TRANSISTOR BC239C
TR1	41923840	TRIAC Q4015L5,IT415 (120 VOLT UNITS)
TR1	41923845	TRIAC Q6015L5,IT615 (240 VOLT UNITS)
INTEGRATED CIRCUITS		
U1	41920902	QUAD OP AMP-LM-3900,LM-2900
U2	41436040	OPTO COUPLER-H11C3 (120 VOLT UNITS)
U2	41436050	OPTO COUPLER-H11C4 (240 VOLT UNITS)
DIODES		
CR1	41920620	DIODE-FAST RECOVERY 1N4148
CR2	41920620	DIODE-FAST RECOVERY 1N4148
CR3	41920620	DIODE-FAST RECOVERY 1N4148
CR4	41920620	DIODE-FAST RECOVERY 1N4148
CR5	41920620	DIODE-FAST RECOVERY 1N4148

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
DIODES (CONT.)		
CR6	41920620	DIODE-FAST RECOVERY 1N4148
CR7	41920620	DIODE-FAST RECOVERY 1N4148
CR8	41920620	DIODE-FAST RECOVERY 1N4148
CR9	41920620	DIODE-FAST RECOVERY 1N4148
CR10	41920600	DIODE-RECTIFIER-1N4005
CR11	41920600	DIODE-RECTIFIER-1N4005
CR12	41920803	DIODE-LED-RED
CR13	41920600	DIODE-RECTIFIER-1N4005
CR14	41923207	DIODE-RECTIFIER-MR751
CR15	41920620	DIODE-FAST RECOVERY 1N4148
CR16	41920620	DIODE-FAST RECOVERY 1N4148
CR17	41923207	DIODE-RECTIFIER-MR751
CR18	41920600	DIODE-RECTIFIER-1N4005
CR19	41920802	DIODE-LED-GREEN
CR20	41923207	DIODE-RECTIFIER-MR751
CR21	41923207	DIODE-RECTIFIER-MR751
CR22	41920600	DIODE-RECTIFIER-1N4005
CR23	41920600	DIODE-RECTIFIER-1N4005
CR24	41920600	DIODE-RECTIFIER-1N4005
CR25	41920803	DIODE-LED-RED
CR26	41920678	DIODE-ZENER-1N4742A
CR27	41920600	DIODE-RECTIFIER-1N4005
CR28	41920600	DIODE-RECTIFIER-1N4005
CR29	41920600	DIODE-RECTIFIER-1N4005
CR30	41920803	DIODE-LED-RED
CR31	41920600	DIODE-RECTIFIER-1N4005
CR32	41920600	DIODE-RECTIFIER-1N4005
CR33	41823207	DIODE-RECTIFIER-MR751
CR34	41920600	DIODE-RECTIFIER-1N4005
CR35	41920600	DIODE-RECTIFIER-1N4005
CR36	41920600	DIODE-RECTIFIER-1N4005
CR37	41920600	DIODE-RECTIFIER-1N4005
RECT1	41920500	BRIDGE RECTIFIER-MDA-990-3
RECT2	41920500	BRIDGE RECTIFIER-MDA-990-3
SCR1	41920855	SILICON CONTROLLED RECTIFIER SIPS235
INDUCTORS		
L1	42336202	COIL-2 MICROHENRY-#20 MAGNET WIRE
TRANSFORMERS		
T1	42072424	TRANSFORMER #3064 (2935) (120 VOLT UNITS)
T1	42072433	TRANSFORMER #3041 (240 VOLT UNITS)
T2	42072423	TRANSFORMER #2270 (2896) (120 VOLT UNITS)
T2	42072425	TRANSFORMER #2302 (240 VOLT UNITS)

CROSS REFERENCE: SCHEMATIC DESIGNATION/PART NUMBER

SCHEMATIC DESIGNATION	SOUNDCRAFTSMEN PART NUMBER	DESCRIPTION
METERS		
M1	41364040	METER 0-1MA
LIGHTS		
I1	41264005	LAMP #2182
I2	41264005	LAMP #2182
I3	41264005	LAMP #2182
I4	41264005	LAMP #2182
SWITCHES		
S1	41992205	SWITCH-PUSHBUTTON-SPEAKER
S2	41992205	SWITCH-PUSHBUTTON-SPEAKER
S3	41992207	SWITCH-PUSHBUTTON-METER
S4	41992110	SWITCH-MICRO-ON-OFF
FUSES		
F1	40684008	FUSE-ABC10-CERAMIC-10AMP
SUPERSEDED PARTS		
R18	41820263	RESISTOR-390 OHM-1/2W-5%
R21	41820263	RESISTOR-390 OHM-1/2W-5%
R21	41820260	RESISTOR-300 OHM-1/2W-5%
R40	41820289	RESISTOR-4.7K OHM-1/2W-5%
L2	40956018	COIL-POT-CORE M-2869-B
L3	40956018	COIL-POT-CORE M-2869-B
K1	41817015	REED SWITCH-12 VOLT-2000 OHM

MOST COMMON AMPLIFIER REPLACEMENT PARTS

SOUNDSCRAFTSMEN PART NUMBER	DESCRIPTION
RESISTORS	
41820800	RESISTOR-.27 OHM-5W-5%
41821115	RESISTOR-1 OHM-15W-5%
41821011	RESISTOR-5 OHM-5W-5%
41660415	POTENTIOMETER-VOLUME-50K OHMS
CAPACITORS	
40312658	CAPACITOR-FILM-.1MF-400VDC
40312423	CAPACITOR-ELECTRO-25MF-15VDC-NON-POLAR
SEMICONDUCTORS	
41923566	TRANSISTOR MPS-L01
41923210	TRANSISTOR MPS-A93
41923204	TRANSISTOR 2N3403,2N3417
41923212	TRANSISTOR 2N3440
41923214	TRANSISTOR MM4003
41922200	TRANSISTOR-POWER #4
41923202	TRANSISTOR-POWER #25
41923565	TRANSISTOR-POWER #26
41923200	TRANSISTOR BC239C
41923410	TRANSISTOR BC309C
41923840	TRIAC Q4015L5,IT415 (120 VOLT UNITS)
41923845	TRIAC Q6015L5,IT615 (240 VOLT UNITS)
INTEGRATED CIRCUITS	
41920902	QUAD OP AMP-LM2900,LM3900
41436040	OPTO COUPLER-H11C3 (120 VOLT UNITS)
41436050	OPTO COUPLER-H11C4 (240 VOLT UNITS)
DIODES	
41920620	DIODE-FAST RECOVERY-1N4148
41920600	DIODE-RECTIFIER-1N4005
41923207	DIODE-RECTIFIER-MR751
41920803	DIODE-LED-RED
41920802	DIODE-LED-GREEN
41920855	SILICON CONTROLLED RECTIFIER SIPS235

INDUCTORS

42336202	COIL-2 MICROHENRY-#20 WIRE
40956018	COIL-POT CORE M-2869-B

METERS

41364040	METER 0-1MA

LAMPS

41264005	LAMP #2182

SWITCHES

41992205	SWITCH-PUSHBUTTON-SPEAKER
41992207	SWITCH-PUSHBUTTON-METER
41992110	SWITCH-PUSHBUTTON-MICRO-ON-OFF
41817015	REED SWITCH-12 VOLT-2000 OHM

FUSES

40684008	FUSE-ABC10-CERAMIC-10AMP

SOUNDCRAFTSMEN AMPLIFIER

TROUBLESHOOTING HINTS

MODELS MA5002, PA5001, EA5003

1.) Symptom: Unit completely dead, i.e., no meter lights, no sound, but fuse O.K.

Cause: Open primary to small transformer on power supply board, or open trace at same point.

2.) Symptom: Blows fuses as soon as power switch is activated.

Cause: Triac shorted; replace.

3.) Symptom: Blows fuses after turn-on delay (approximately three seconds).

Cause: S.C.R. on power supply board shorted; replace.

4.) Symptom: Overload light goes out after delay, but no sound.

Check: A.C. to transformer primary. If not present, either triac or reed relay (if unit has one) is open: replace.

Note: Open triac may destroy a 120 OHM resistor on same board.

5.) Symptom: Overload light stays on all the time, no sound.

Check: Unplug transformer primary. Overload light still on: proceed to "A". Overload goes out: proceed to symptom "6".

Check A: Pin from meter lights shorting to chassis. To correct, insulate with suitable material.

Check B: Remove two wires from heat sensing circuit on power supply board (brown and beige next to pink). If overload light goes out, replace one or both 2N3403 transistors in heat sink drillings. If light stays on, check reed relay for shorted turns on coil (resistance should be 1500-2000 OHM. Replace.

6.) Symptom: Overload light cycles every few seconds.

Check A: Remove all loads and check #4 output transistors for a collector-emitter short. If all O.K., proceed to "B".

Check B: Insert variac between power supply board and transformer primary. Slowly bring up variac while monitoring outputs on oscilloscope. If one or the other appears to be missing half of waveshape, remove the three drive wires from pre-driver board to output stage (blue,

Check C: Unit does not have Motorola 2N3440 transistors in two places on each pre-driver board.

white, orange). Again watch output for D.C. offset which would indicate a faulty connection to the heat sink board or output transistors.

7.) Symptom: Overload light comes on, amp shuts down occasionally.

Cause: Amp is working into a very low impedance or is being tripped off by transients in the A.C. line.

Cure: Add "transient filter" network to each pre-driver board.

Note: This network can be obtained from the factory and should be added to all MA5002 amps before serial number A308727 and all PA5001 amps before serial number L308381.

8.) Symptom: Very high D.C. offset at output.

Cause: Pinched wire to chassis from pre-driver board, open toroid coil L2 or L3 pre-driver board.

Check: Resistance of coils should be 100-200 OHM.

Cure: Replace defective coil, pinched wire and insulate area before securing back panel.

9.) Symptom: Distorted output.

Check: Bad high frequency load (0.1MF capacitor and 5 OHM resistor) on heat sink board. If O.K. check for distorted pre-driver output by removing three drive wires (blue, white, orange) and check these points with an oscilloscope. Correct as necessary.

10.) Symptom: Vari-portional light on at all times.

Check: Positive supply to output stage is in high mode (90 volts).

Cause: Shorted #25 transistor for channel affected.

11.) Symptom: Vari-portional light does not come on.

Check: Power supplies have both positive voltage levels when driven to clipping.

Cause: #25 transistor for channel affected is open.

12.) Symptom: Sound fades out slowly when amplifier is turned off.

Cause: Open 1 OHM 15 Watt resistors (R90,R91), broken trace around MR751

rectifier CR33 on the power supply board, bad MR751, bad S.C.R. (SCR1).

13.) Symptom: Meter jumps when amplifier is turned on.

Cause: Non-polarized 25MF capacitor (C1) at input stage is leaky, or MPS-L01 transistors in differential front end pair (Q1,Q2) have gain mismatch. Replace as necessary.

14.) Symptom: Loud pop when changing Volume pot setting.

Cause: Faulty pot (R1); replace.

15.) Symptom: Heat sinks unusually hot after idling for approximately one half hour.

Check A: Negative supply to output stage is in high mode (-90 volts).

Cause: Shorted #26 transistor for channel affected.

Check B: Bias potentiometer (R15) out of adjustment.

Cure: Readjust bias.

Procedure: With top plate removed and outputs terminated into 8 OHM 250 Watt resitive loads, apply a low distortion 20khz sine wave to the inputs. Adjust output to 25 Watts (14.14V.R.M.S.) and allow the amplifier to warm up for about three minutes.

Reduce signal to a level of 0.25 Watt (1.41V.R.M.S.) and adjust bias pots for each channel with an insulated screwdriver to give a reading of 0.1% on the distortion analyzer. The pots are located on the pre-driver boards and can be reached from the top of the unit.

16.) Symptom: Mechanical vibration when amp is operating.

Cause: Faulty triac; replace.

RECOMMENDED SERVICE EQUIPMENT: AMPLIFIERS

SOUNDCRAFTSMEN MODELS: MA5002, PA5001, EA5003

1.) Oscilloscope: Wide-band (at least 1 Megahertz bandwidth) 2 or 3 trace preferred.

2.) Signal Generator: Low distortion sine, square waves.

3.) Load Resistors: 8 OHM, 250 Watt rated. 2 or 4 required.

4.) Ammeter: For monitoring A.C. line input, 0 to 15 Amperes.

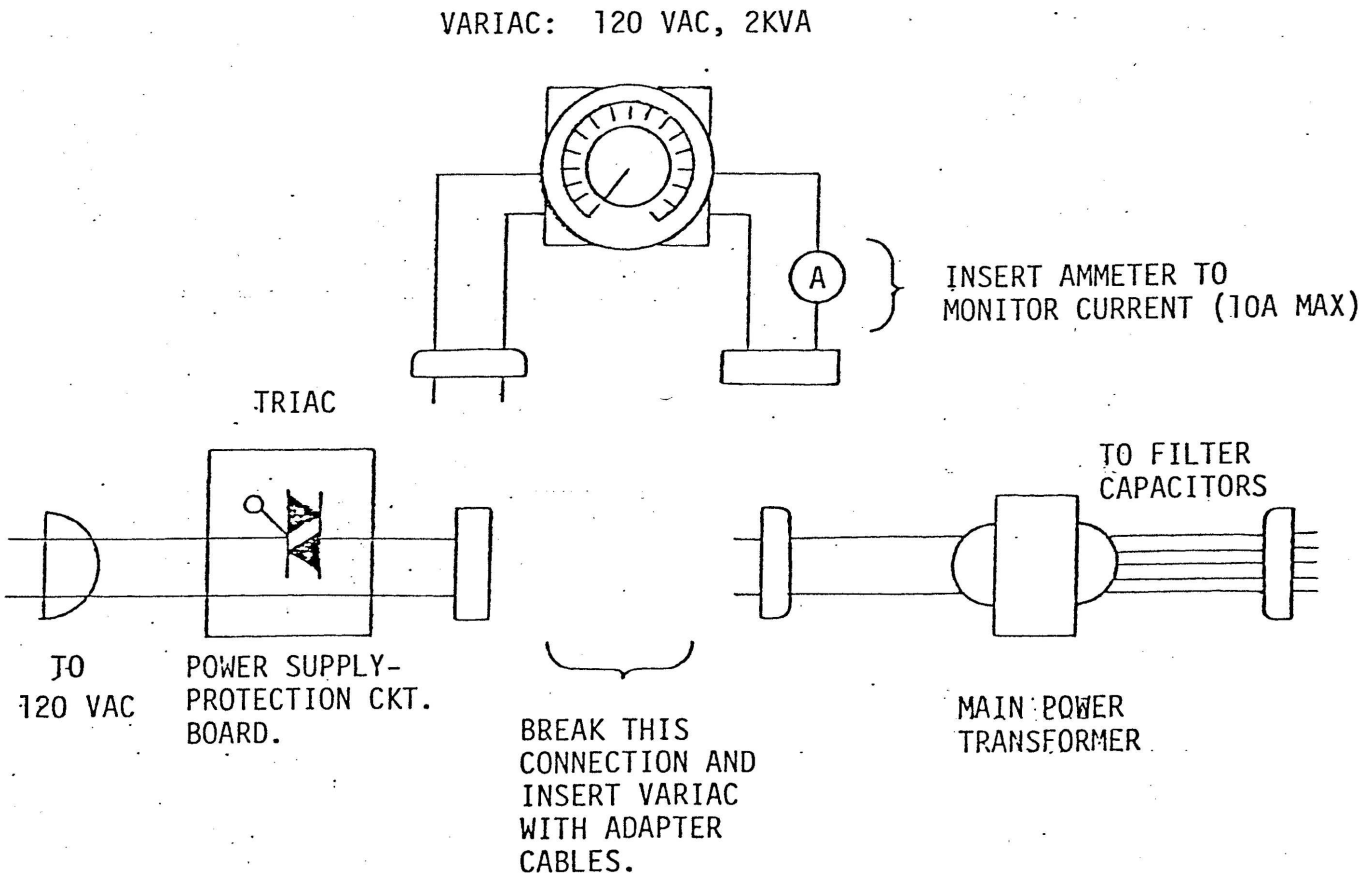
5.) Variac: 1.5KVA rated, 120 Volts A.C. or 240 Volts A.C. This should be connected between power supply board and main power transformer.

6.) Distortion analyzer: Sound Technology model 1700B or equivalent.

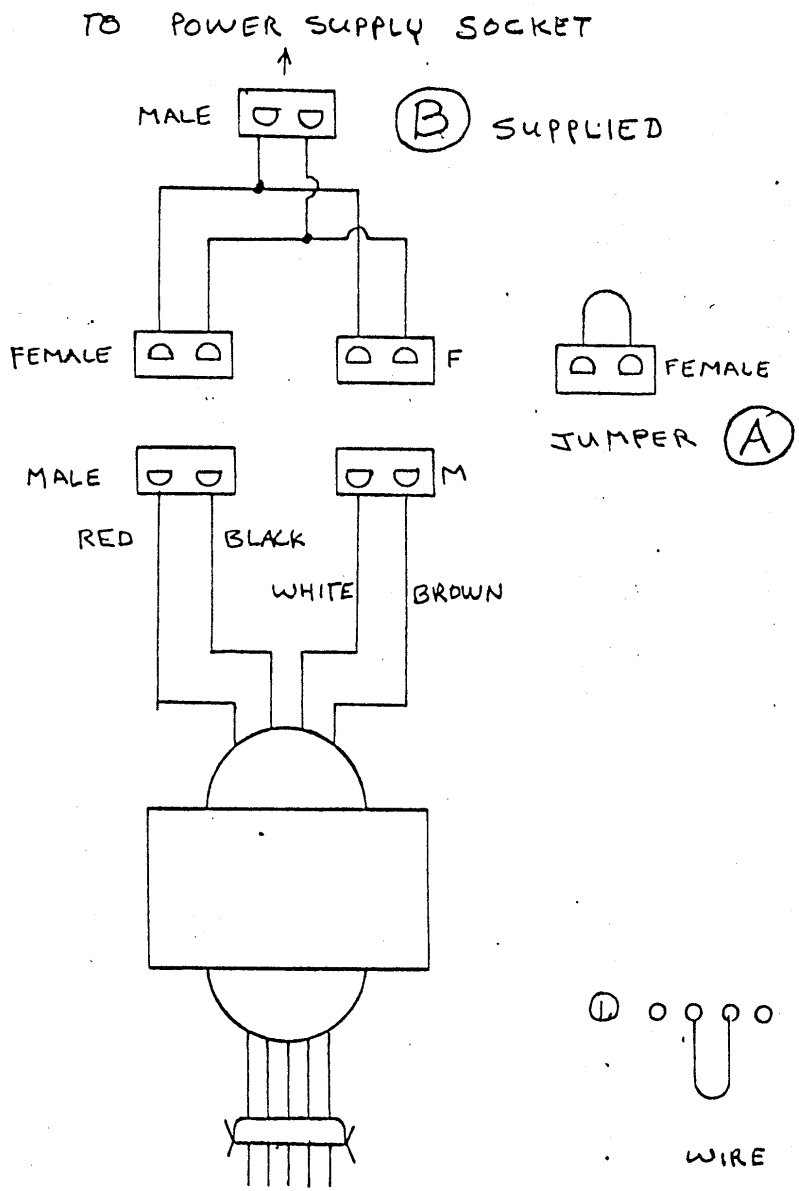
7.) Multimeter: For measuring A.C., D.C. voltage and resistance (Simpson, fluke, etc.).

AMPLIFIER TESTING WITH VARIAC

Due to the high power capability of Soundcraftsmen amplifiers, it is desirable that troubleshooting and testing be done with a variac/ammeter combination so that any faults can be detected while slowly bringing up the A.C. Voltage and monitoring the current meter. However, the amplifier should not simply be plugged into the variac via the line cord. There is a separate 12 Volt D.C. supply that powers turn-on delay and protection circuitry. This circuitry controls gate triggering of a triac in the amplifier's main transformer primary and needs full line voltage to operate properly. This can be accomplished by breaking the socket connection between the power supply board and power transformer primary and inserting the variac/ammeter as shown in the diagram:



SOUNDCRAFTSMEN AMPLIFIER CONVERSION
240 VOLT TO 120 VOLT
MODELS PA5001, MA5002



1. REMOVE JUMPER (A) FROM POWER TRANSFORMER PRIMARY.
2. CONNECT ADAPTER (B) TO PRIMARY PLUGS AND INPUT SOCKET FROM POWER SUPPLY BOARD.
3. CLIP OFF WIRE (C) FROM PINS ON POWER SUPPLY BOARD.
4. REPLACE WITH JUMPERS (D) AS SHOWN.