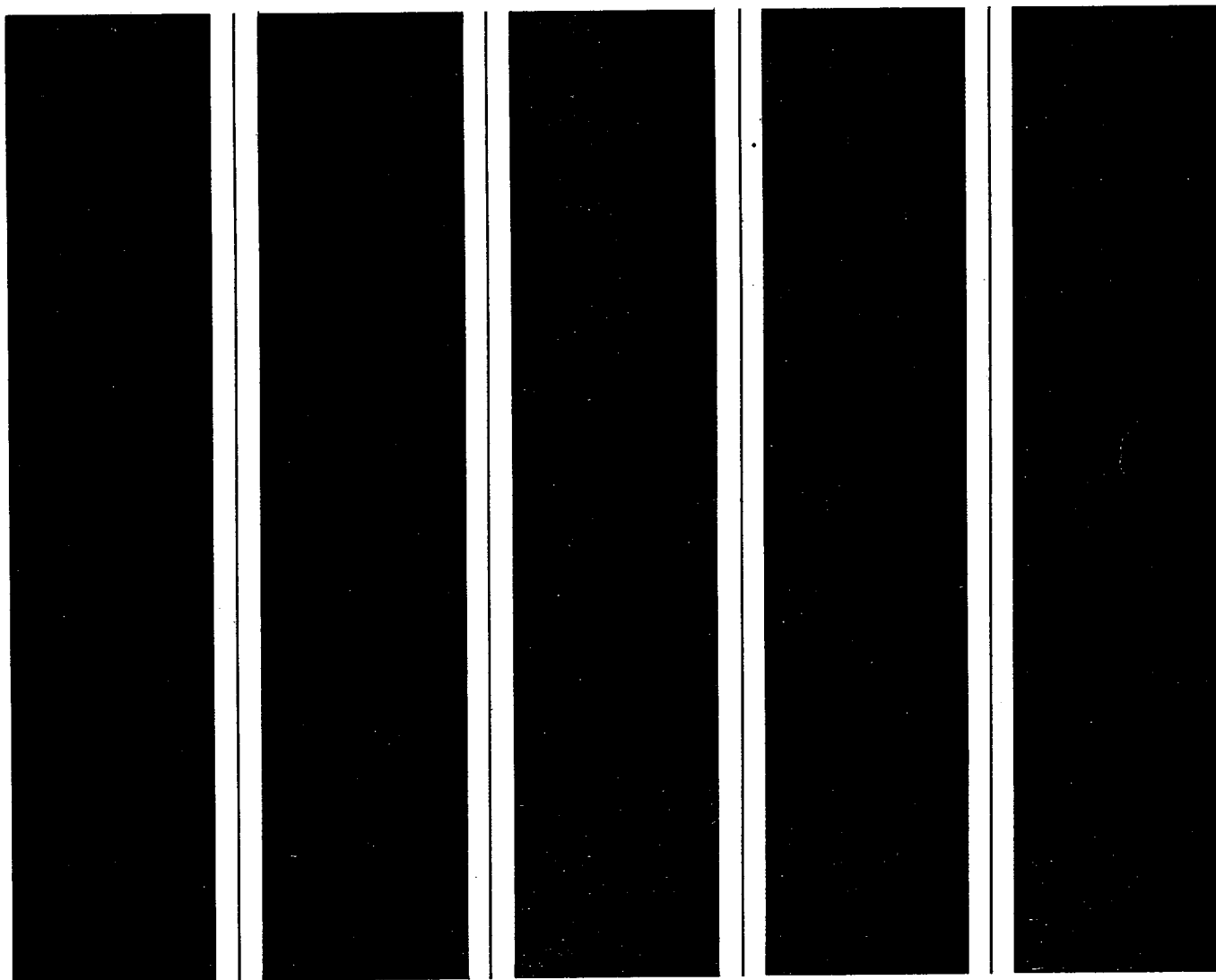


Service Manual Integrated Stereo Amplifier

440A



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CAUTION NOTICE

The following safety precautions must be followed to assure continued reliability and safety against fire and shock hazard:

1. Replacement parts used during servicing of this appliance must have identical characteristics as those offered and recommended by H. H. Scott, Inc.
 2. A dielectric test is to be performed on each appliance following the re-assembly and before returning the unit to the customer.
 3. The dielectric test to be performed on H. H. Scott, Inc. electric components serviced in the United States and Canada for use in these countries shall consist of not less than the following: *
 - 1) A dielectric tester designed to supply not less than 1100 volts at 60 Hz and employing leakage current indicator(s), is to be used.
 - 2) The tester is to be connected per the instructions enclosed with the instrument, or as follows:
 - a. The tester is connected to the power line receptacle and the power switch is turned on.
 - b. Sufficient time is allowed for the tester supply to stabilize and then the output voltage is adjusted for 1080V.
 - c. Leads of the tester, usually marked GND and HV, are connected between chassis ground and both blades of the male plug of the power cord.
 - d. Switch tester to "test" and observe leakage indicator. Leakage current must not exceed 5.0 mA.
- * Dielectric tests made by service personnel in countries other than USA and Canada must use test equipment and procedures specified by the safety agency serving that country.

SPECIFICATIONS

Minimum Continuous RMS Output Power per channel, both channels driven into 8 Ohms from 20 Hz – 20 kHz with no more than rated THD
55 watts

Total Harmonic Distortion [78 IHF rated, at 20 Hz – 20 kHz]
0.05%

Intermodulation Distortion [at rated output, 60:7000 Hz; 4:1]
0.08%

Frequency Response [at 1 watt output, ±0.5 dB]
20 Hz to 20 kHz

Power Bandwidth [at –3 dB]
10 Hz to 30 kHz

Damping Factor [at 1 kHz, for 8 Ohm load]
>100

Input Sensitivity [for rated output]
Phono: 2.5 mV
Aux, Tuner: 150 mV
Tape 1 and 2: 150 mV
Tape 2 DIN Input: 150 mV

Maximum Input Voltage
Phono: 180 mV
Aux, Tuner: 10V
Tape 1 and 2: 10V
Tape 2 DIN Input: 10V

Signal-to-Noise Ratio [shorted input, IHF A network]
Phono, Ref. 10 mV: 85 dB
Aux, Tuner: 90 dB
Tape 1 and 2: 90 dB
Tape 2 DIN Input: 90 dB

Tone Control Range
Bass (100 Hz): ±10 dB
Mid (1 kHz): ±6 dB
Treble (10 kHz): ±10 dB

High Filter Attenuation [6 dB/oct.]
8 kHz: –6 dB

Loudness Contour [Volume Control set to –30 dB]
100 Hz: +7 dB
10 kHz: +3.5 dB

Crosstalk
1 kHz: 80 dB

Channel Balance [maximum Volume Control]
0.5 dB

RIAA Tolerance [78 RIAA rated, 20 Hz to 20 kHz]
±0.5 dB

Channel Separation [78 IHF rated]
Phono 1 and 2 (1 kHz): 60 dB
Aux, Tuner, Accessory Input, Tape 1 and 2, Tape 2 DIN Input (1 kHz): 70 dB

Tape Recording Output Level [at rated input sensitivity level]
Tape 1 Rec: 150 mV
Tape 2 Rec: 150 mV
Tape 2 DIN Output: 30 mV

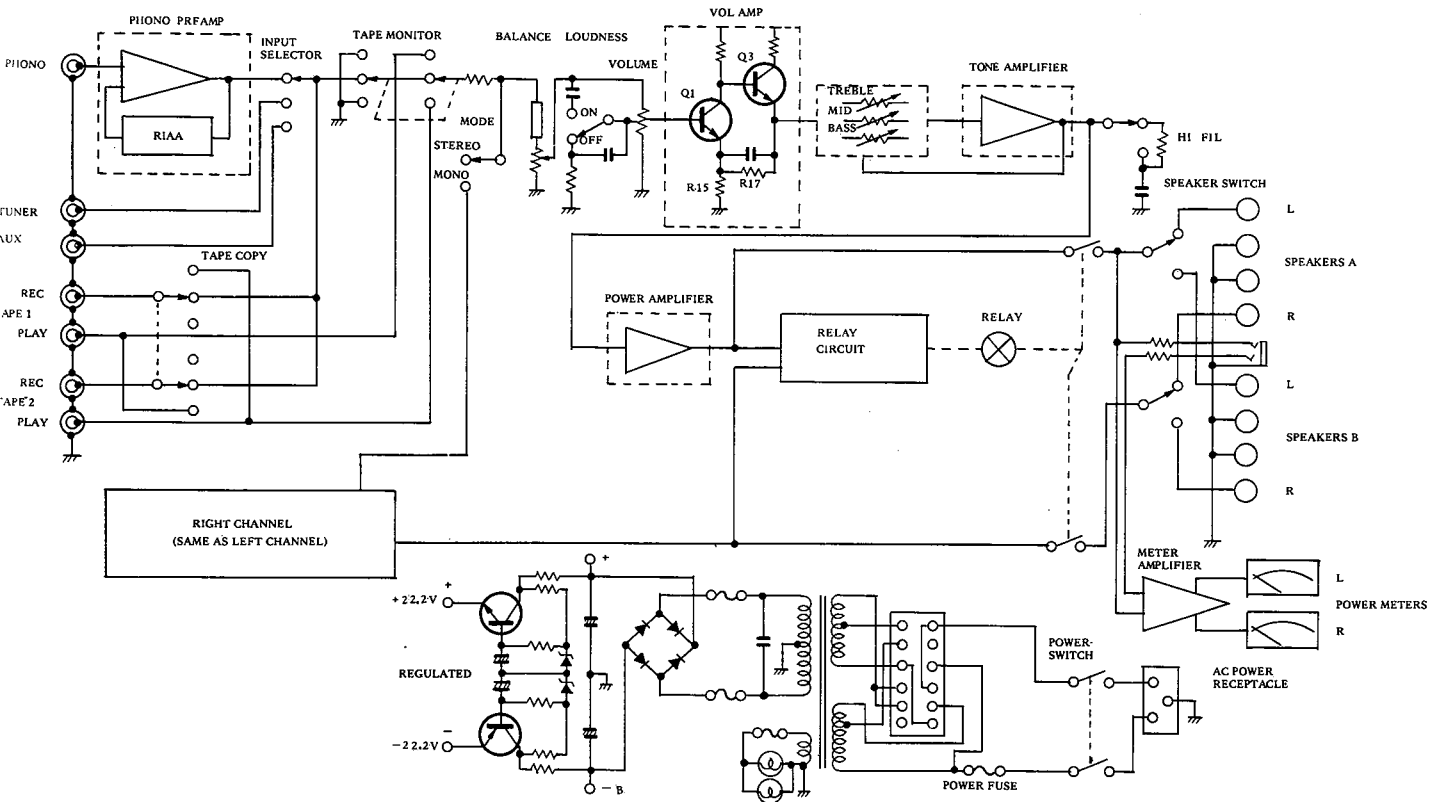
AC Power Requirement
117V AC 60 Hz (USA/Canada version)
100V/117V/220V/240V, switchable
AC 50/60 Hz (European version)

Power Consumption
160 Watts (USA/Canada), 430 Watts (Europe)

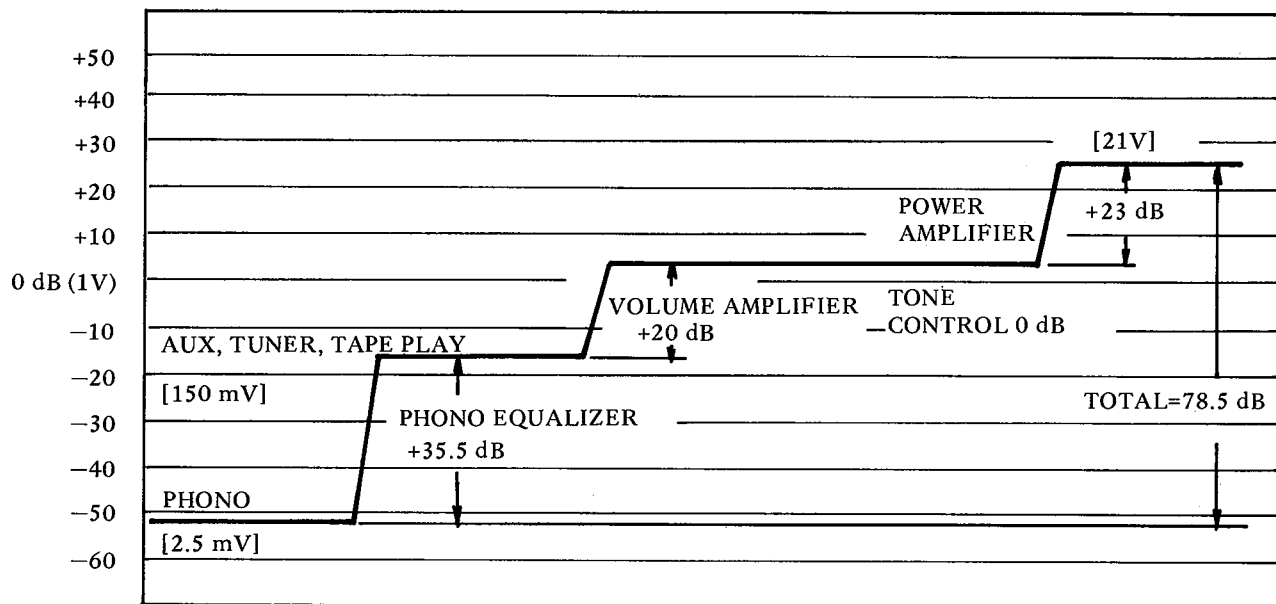
Dimensions
17"W, 5-1/4"H, 11-3/4"D
430W, 132H, 330D (mm)

Net Weight
23.5 lbs.
(10.6 kg)

BLOCK DIAGRAM



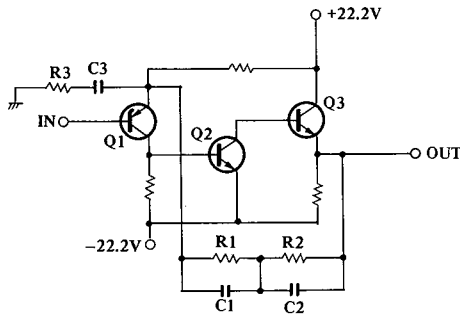
LEVEL DIAGRAM



CIRCUIT DESCRIPTION

Phono Preampifier

This is a negative feedback type RIAA equalizer. It consists of 3 low noise transistors per channel. Open loop gain of the circuit is 83 dB. Negative feedback consists of R1, R2, C1, and C2 is applied from the emitter of Q3 to the emitter of Q1 giving gain of 35.5 dB @ 1 kHz and correcting the response to the RIAA equalization standard (+12.9 dB @ 100 Hz, -13.7 dB @ 10 kHz). An additional rolloff below 30 Hz is provided by C3. The circuit is powered by split supply of $\pm 22\text{V}$, providing an overload capability of greater than 180 mV at 1 kHz.

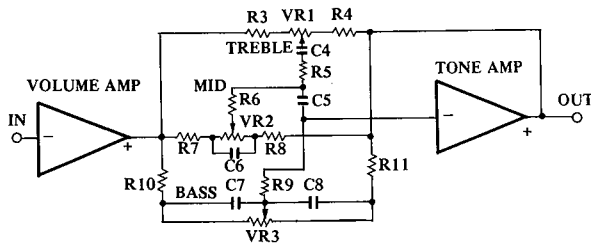


Volume Amplifier

The signal from the Volume control, VR2, is amplified 20 dB by the directly connected amplifier stage consisting of Q1 and Q3 (refer to the Block Diagram). Gain is set by the ratio of R17 to R15.

Tone Control

The tone control is a negative feedback type which utilizes common emitter amplifier Q5 and emitter follower Q7 as the active elements. That is, the gain of Q5 is controlled by the tone control circuitry.



Mid Tone Control: At 1 kHz, other two tone controls have little effect on the gain, as C4 impedance is high, removing VR1 from the circuit, and C7, C8 impedances are low, effectively short circuiting VR3. Thus at midrange frequencies near 1 kHz, the gain is mainly determined by the position of VR2.

Bass Tone Control: As the frequency decreases below 1 kHz, the impedance of C7, C8 increases proportionately. At very low frequencies, C4 and C5 are effectively open, removing VR1 and VR2 from the circuit. Thus at low frequencies, the

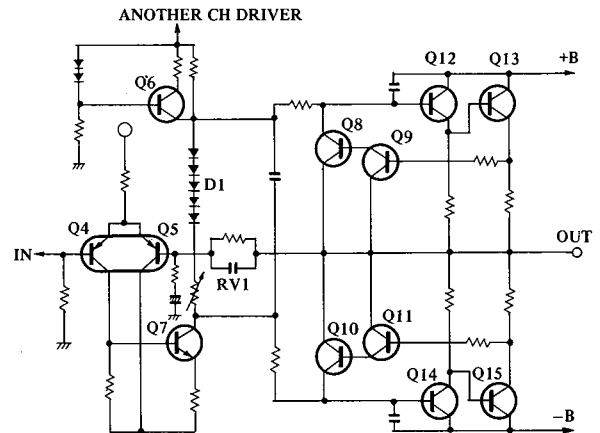
gain is mainly determined by the position of the Bass tone control VR3. Rotating VR3 toward R10 will boost the low frequencies, while turning it towards R11 will cut the bass.

Treble Tone Control: At high frequencies, as at 10 kHz, VR2 and VR3 are effectively short circuited. At these frequencies, however, C4 impedance decreases, so that VR1 becomes the main control of the circuit gain. Rotating VR1 towards R3 will boost the treble, while turning it towards R4 cuts the treble response.

Power Amplifier

This circuit is an OCL, fully complementary amplifier. The input stage consists of a differential amplifier (Q4 +5) and a voltage amplifier (Q7). The voltage amplifier provides voltage swing to nearly full plus and minus supply. Current gain is then provided by the fully complementary Darlington pairs of Q12 and Q13 for the positive swing, Q14 and Q15 for the negative swing. The output stage bias is set by the quadruple diode D1 and RV1.

The output stage is protected from short circuit and overload by transistors Q8 thru Q11, which short out the driving signal when current through the output transistors reaches an excessive level.

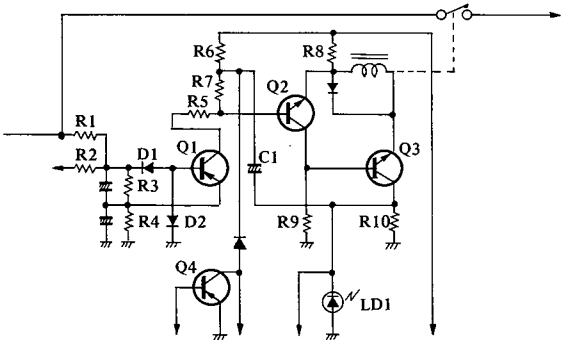


Relay Protection Circuit

The circuit protects the speakers from the possibility of DC potential at the amplifier outputs, as well as eliminating transients during turn on or turn off.

Turn On/Off: When the unit is first switched on, Q2 quickly turns on, holding Q3 off. Charging time of C1 through R6, Q2 turns off, thus turning on Q3 and activating the relay which connects the audio output to the speakers. At turn off, Q4 immediately turns on, which turns Q2 on and Q3 off instantly opening the speaker relay.

Center Point Potential Detect: This circuit, composed primarily of Q1, D1 and D2, protects the loudspeakers from DC at the amplifier output. When excessive plus or minus DC appears at R1 or R2, Q1 turns on, which activates Q2 and opens the speaker relay. At the same time, LD1, the front panel protection indicator, is activated.



Power Supply (Refer to Block Diagram)
 The main power supply ($\pm 48V$) consists of a full wave bridge rectifier and two 8,200 μF capacitors. The B+ and B- regulators (Q9 and Q10) supply $\pm 22V$ for the low level circuitry.

ADJUSTMENT

Equipment Required
 Audio Signal Generator.
 DC Voltmeter.
 Speaker load resistors, 8 ohm, 100 watt (noninductive).
 Digital voltmeter or DC milliammeter.

The following adjustments are the same for both the left and the right channels.

Bias Adjustment

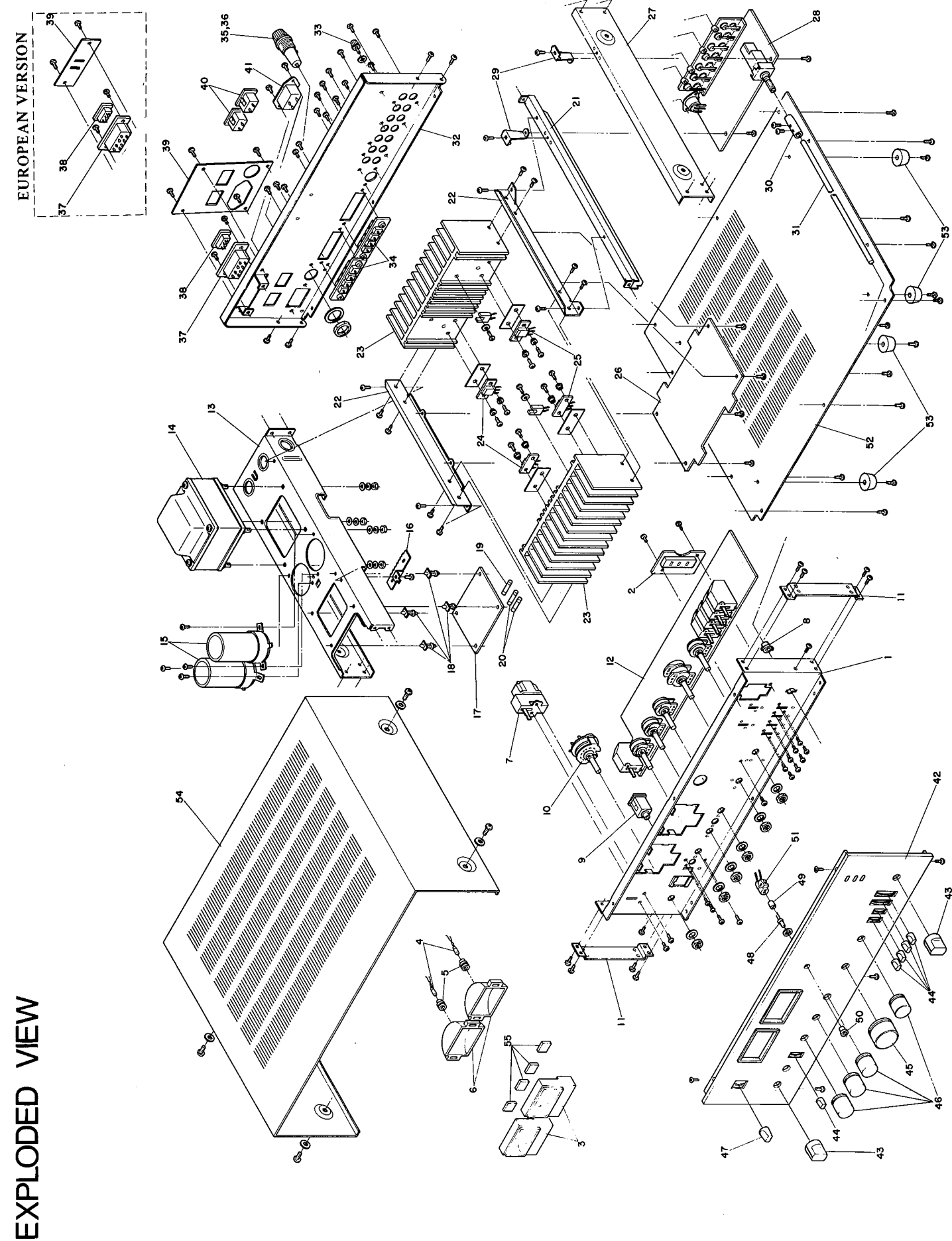
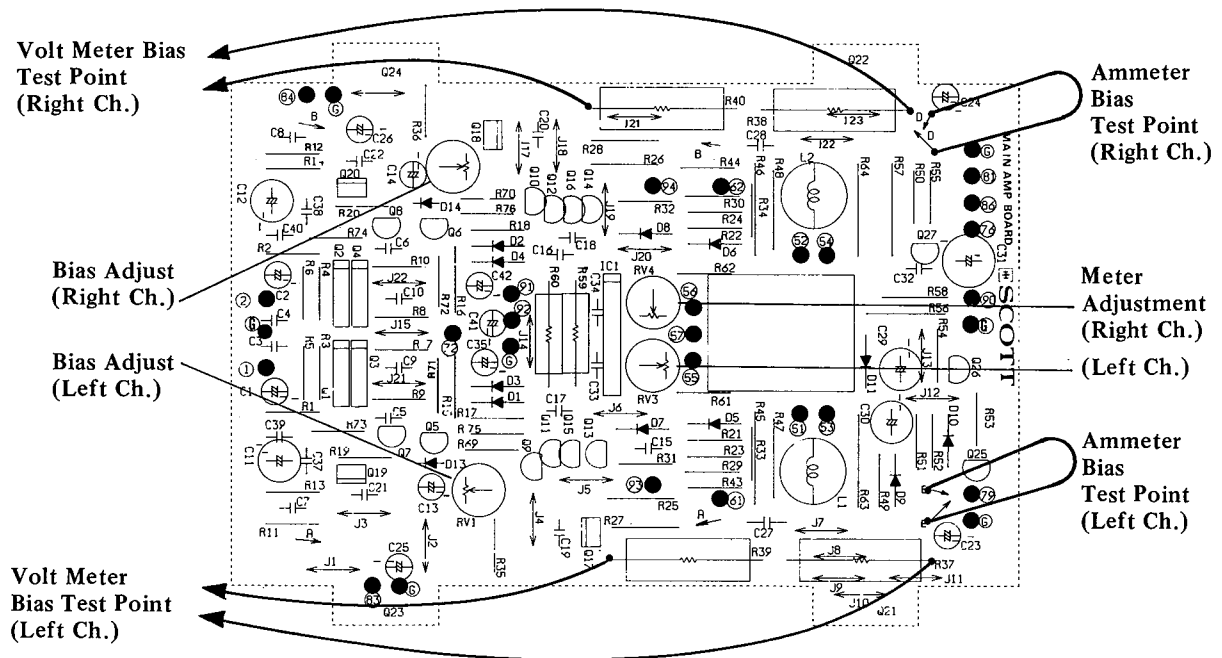
- 1) Connect 8 ohm resistors to the Speaker A terminals, and set the Speaker Mode switch to A position.
- 2) Turn the Volume control fully counterclockwise.
- 3) Turn RV1 fully counterclockwise.
- 4) Depending on available equipment, use A or B:
 - A. Set digital voltmeter to most sensitive range. Connect probes across R37 and R39 (Voltmeter bias test points, left channel).
Turn unit on. Let it idle for at least one minute. Adjust RV1 for 40 mV across the resistors.
 - B. With unit off, remove jumper between PC board terminals E and E, and connect ammeter, set to 100 mA range.

- Turn unit on and let it idle for at least one minute. Adjust RV1 for 40 mA.
- 5) Perform the same procedure for the right channel, except measure voltage across R38 and R40 (Voltmeter bias test points, right channel) or replace jumper from D to D with ammeter. Adjustment is made with RV2.
 - 6) Leave the amplifier on for about 30 minutes, then recheck measurement. A tolerance of $\pm 25\%$ is acceptable. Readjust if necessary.

Power Meter Calibration

- 1) Connect the audio signal generator to the amplifier and apply 1 kHz signal to Aux input, left channel.
- 2) Connect voltmeter across the left channel load resistor.
- 3) Turn power on.
- 4) Adjust the signal generator output so as to obtain 2.83 volts on the voltmeter.
- 5) Check that the left channel meter indicates 1 watt. If not, adjust RV3.
- 6) Perform above steps on the right channel, adjusting RV4 if necessary.

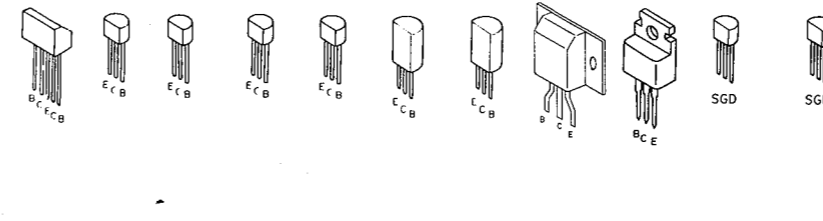
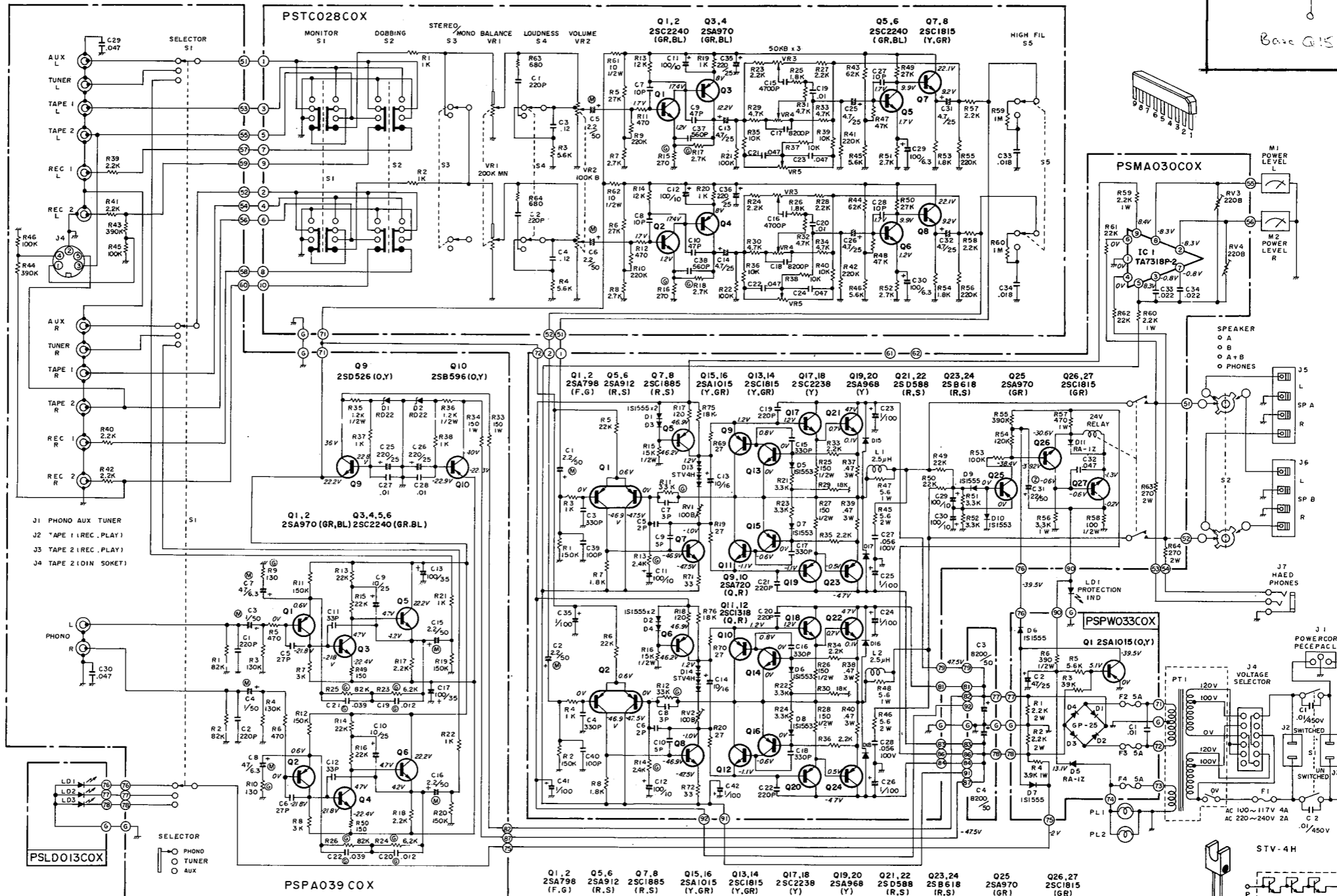
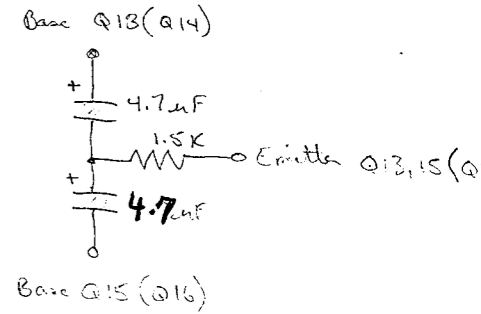
Adjustment Locations



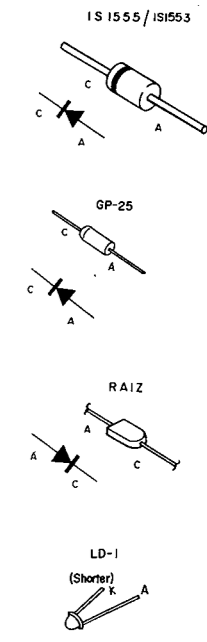
SCHEMATIC DIAGRAM

THE 440A PROTECTION
CKT.

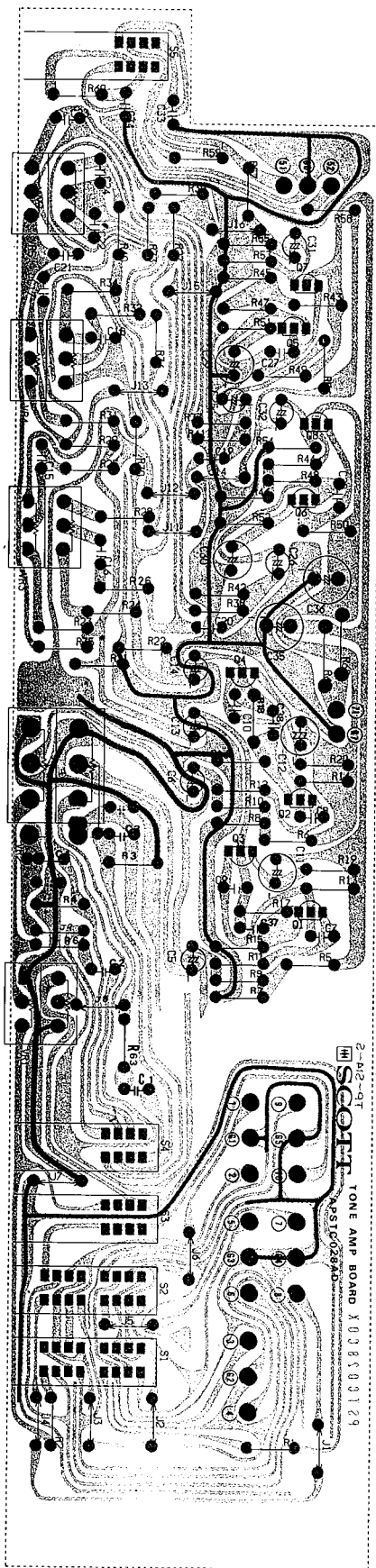
THIS SHOULD BE
ADDED TO THE FOIL SIDE
OF THE DRIVER
BOARD



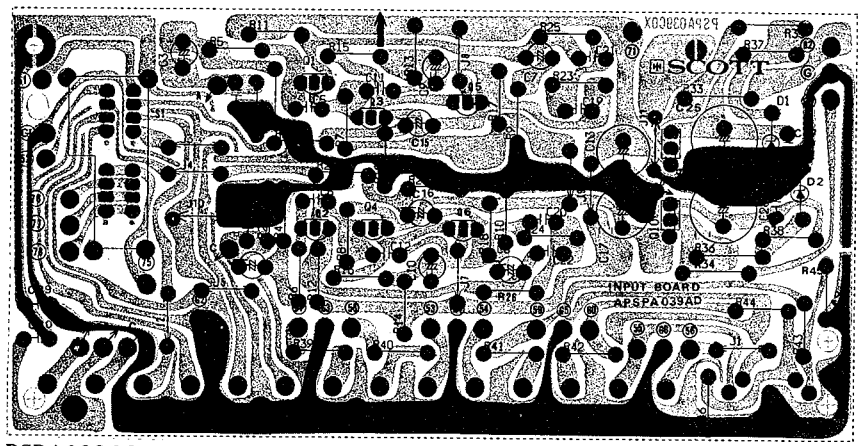
NOTE
1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE CHASSIS GROUND WITH VTVM AT NO SIGNAL
2. CAPACITOR'S VALUES ARE IN µF UNLESS OTHERWISE NOTED P=PICO FARAD
3. RESISTOR'S VALUES ARE IN OHM. K=K OHM



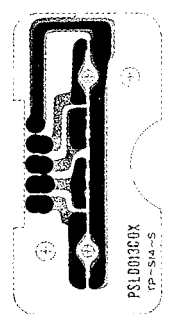
PARTS LOCATION DIAGRAM



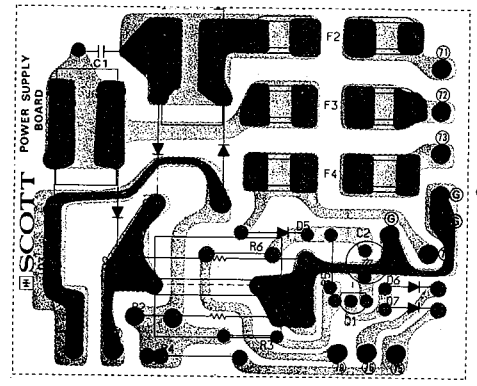
PSTC028AOX



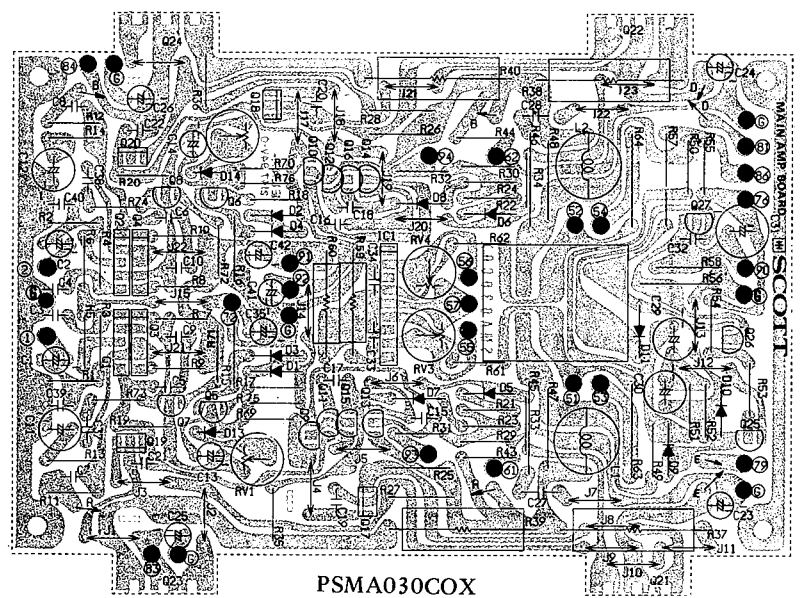
PSPA039COX



PSLD013COX



PSPW033COX



PSMA030COX

REPLACEMENT PARTS LIST

Symbol No.	Descrpton	Part Code
PSMA030COX		
C5, 6	Ceramic capacitor, 2p*, 50V	CCCB020COM
C7, 8	" 3p, 50V	CCCB030DOM
C9, 10	" 5p, 50V	CCCB050COM
C39, 40	" 100p, 50V	CCCB101KOM
C19-22	" 220p, 50V	CCCB221KOM
C3, 4	" 330p, 50V	CCCB331KOM
C1, 2	Elyt capacitor, 2.2, 50V	CEAG2R2ZMN
C31	" 22, 50V	CEAG220AMN
C23-26, 35, 41, 42	" 1, 100V	CEAK010ALX
C11, 12, 29, 30	" 100, 10V	CEEC101ALX
C13, 14	" 10, 16V	CEED100ALX
C15-18	Ceramic capacitor, 330p, 50V	CKCB331KBM
C33, 34	Mylar capacitor, 0.022, 50V	CQMB223KEH
C32	" 0.047, 50V	CQMB473KEH
C27, 28	Ceramic capacitor, 0.056, 50V	CQMC563KEH
L1, 2	2.5 μ H, AF out, w/R47, 48	LA3QH1323B
D11, 15-18	Silicon diode, RA-1Z	QDSRA1ZXXD
D5-10	" 1S1553	QDSS1553XT
D1-4	" 1S1555	QDSS1555XT
IC1	IC, TA7318P-2	QQM07318AT
Q9, 10	Transistor, 2SA720	QTA0720XBN
Q1, 2	" 2SA798	QTA0798XEE
Q5, 6	" 2SA912	QTA0912XAN
Q19, 20	" 2SA968	QTA0968XBT
Q25	" 2SA970	QTA0970XBT
Q15, 16	" 2SA1015	QTA1015XAT
Q11, 12	" 2SC1318	QTC1318XDN
Q13, 14	" 2SC1815 (R, S)	QTC1815XAT
Q26, 27	" 2SC1815 (GR)	QTC1815XBT
Q7, 8	" 2SC1885	QTC1885XAN
Q17, 18	" 2SC2238	QTC2238XBT
D13, 14	TR-diode, 4-gang, STV-4H	QVFSTV4HXD
R58	Metal-oxide-film resistor, 100**, 1/2W	RGHANJ101N
R25-28	" 150, 1/2W	RGHANJ151N
R15, 16	" 15k, 1/2W	RGHANJ153N
R59, 60	" 2.2k, 1/4W	RG1ANJ222N
R56	" 3.3k, 1W	RG1ANJ332N
R57	" 470, 1W	RG1ANJ471N

* Capacitors are rated in μ F (micro-Farad) unless otherwise specified as p (pico-Farad).

** Resistors are rated in ohm.