<R42-171-0>

Service Manual

STEREO AMPLIFIER

SA-1000/FVW, KUW

NOTE:

MODEL SA-1000 COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Round label on rear panel	Voltage
FVW	5-position selector
KUW	120V only

<71102F4IN>

PIONEER

CONTENTS

1. SPECIFICATIONS

SEMICONDUCTORS

FETs	2
Transistors	39
Diodes	18

POWER AMPLIFIER SECTION

Music Power Output (IHF)	240 Watts (4Ω) 170 Watts (8Ω)
Continuous Power Output (each channel driven)	94W/94W (4Ω) 67W/67W (8Ω)
Continuous Power Output (both channels driven)	82W + 82W (4Ω) 57W + 57W (8Ω)
Power Output in the range of 20Hz to 20kHz (both channels driven)	47W + 47W (8Ω, Harmonic Distortion Less than 0.3%
Harmonic Distortion	Less than 0.3% (Continuous power output)
Intermodulation Distortion	Less than 0.2% (Continuous power output)
Power Bandwidth (IHF)	5Hz to 50kHz (8Ω, Harmonic Distortion Less than 0.3%)
Frequency Response	5Hz to 80kHz, ± 1dB
Input Sensitivity/Impedance (1kHz, Continuous power output)	500mV/100kΩ
Speakers	4 to 16Ω
Damping Factor	More than 65 (8Ω, 1kHz)
Center Channel Output	500mV

PREAMPLIFIER SECTION

Output Voltage	3V (Rated output), 5V (Max.)	
Harmonic Distortion	Less than 0.1%	
Frequency Response	20Hz, to 60kHz, ± 1dB	
Input Sensitivity/Impedance	PHONO 1 MAG	2.9mV/50kΩ
	CER	58mV/100kΩ
	PHONO 2 MM	2.9mV/20kΩ, 50kΩ, 100kΩ
	MC	115μV/30Ω
	(with PHONO INPUT TRANSFORMER "PP-402")	
	MIC	2.2mV/50kΩ
	TUNER	200mV/200kΩ
	AUX 1,2	200mV/200kΩ
	TAPE MONITOR 1, 2	200mV/200kΩ
Recording Output	TAPE REC 1, 2 (Pin jack)	200mV
	TAPE REC (DIN connector)	30mV
BASS Control (3dB step)	−9dB, + 12dB (100Hz)	
TREBLE Control (3dB step)	−12dB, + 9dB (10kHz)	
LOW Filter	30Hz/−3dB 60Hz/−3dB	(12dB/oct.)
HIGH Filter	6kHz/−3dB 12kHz/−3dB	(12dB/oct.)
Equalization Curve	PHONO: RIAA	
Loudness Contour	+11.5dB/100Hz +6.5dB/10kHz with Volume Control set at −40dB position.	
Muting	−20dB	
Hum and Noise (IHF)	PHONO	More than 80dB
	TUNER, AUX	More than 100dB

Channel Separation (1kHz)	PHONO	More than 50dB
	TUNER, AUX	More than 55dB

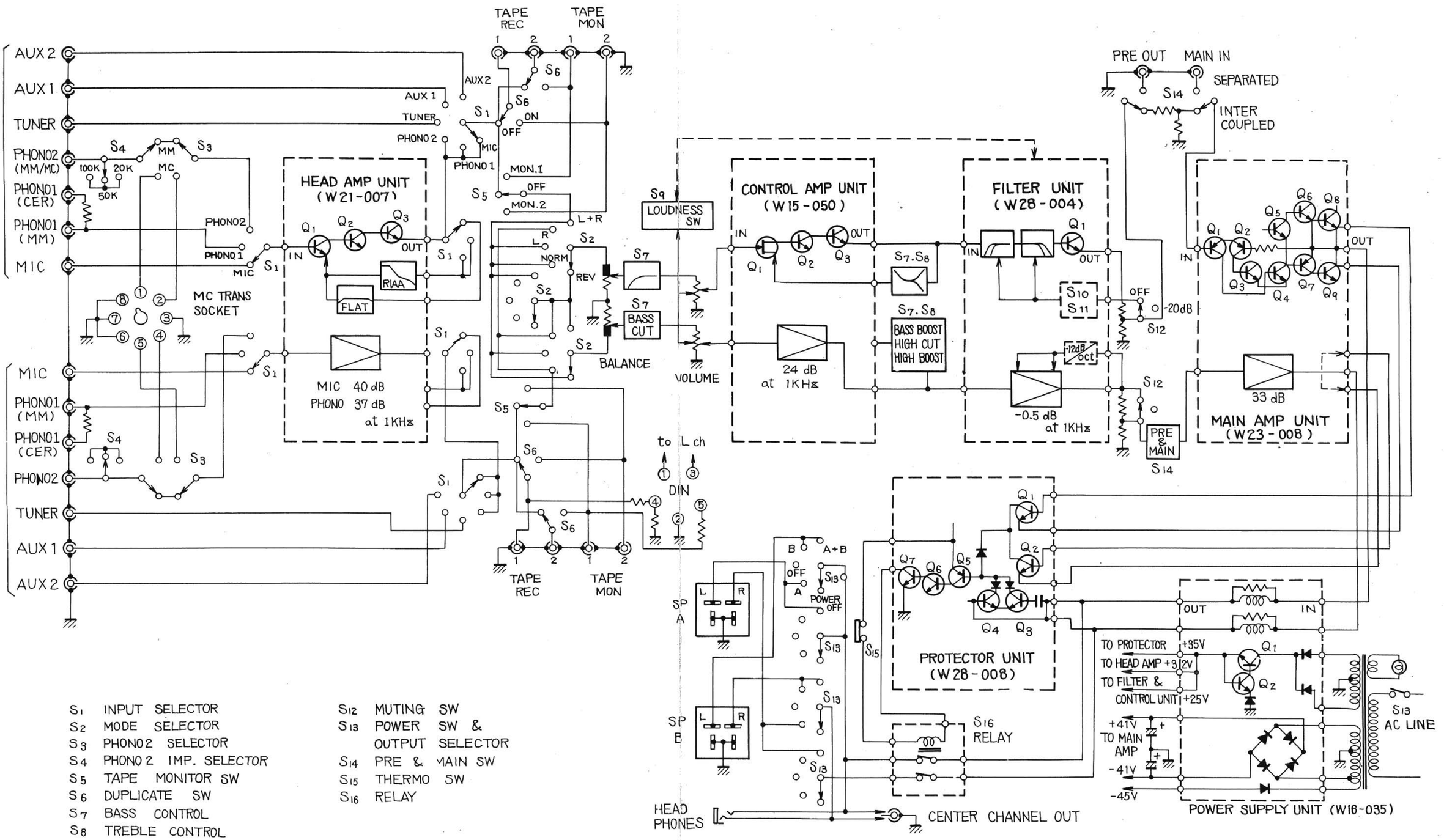
MISCELLANEOUS

Power Requirements	110V, 120V, 130V, 220V and 240V. (Switchable) ····· FVW model 120V ····· KUW model 50～60Hz
Power Consumption	340W (Max.)
Dimensions (overall)	$16\frac{15}{16}$″ /430mm (width) $5\frac{11}{16}$″ /145mm (height) $13\frac{1}{4}$″ /337mm (depth)

Weight	Without package	28 lb 3 oz/12.8kg
	With package	29 lb 5 oz/14.5kg

NOTE: Specifications and the design subject to possible modification without notice due to improvements

2. BLOCK DIAGRAM



S_1	INPUT SELECTOR	S_{12}	MUTING SW
S_2	MODE SELECTOR	S_{13}	POWER SW & OUTPUT SELECTOR
S_3	PHONO2 SELECTOR	S_{14}	PRE & MAIN SW
S_4	PHONO2 IMP. SELECTOR	S_{15}	THERMO SW
S_5	TAPE MONITOR SW	S_{16}	RELAY
S_6	DUPLICATE SW		
S_7	BASS CONTROL		
S_8	TREBLE CONTROL		
S_9	LOUDNESS SW		
S_{10}	HIGH FILTER SW		
S_{11}	LOW FILTER SW		

The block diagram shows the signal path in the SA-1000 as well as the auxiliary circuits such as the overload protector and power supply.

2-1. LOW LEVEL INPUT CIRCUIT

Low level signals such as outputs from phono cartridge or microphone are supplied into the PHONO 1/2 and MIC input jacks. The input impedance of the PHONO 2 inputs is selectable by S4, to obtain optimum load impedances for different types of magnetic cartridges. S3 selects between moving coil (MC) and moving magnet (MM) cartridges.
Low output MC cartridges can be accommodated with the help of an optional 14-time step-up transformer (Pioneer model PP-402) which can be plugged into the 8P connector. Program sources and their matched impedances are selected bv the input selector, S1.

2-2. HEAD AMPLIFIER

The complete head amplifier is contained on the W21-007 PCB, consisting of two voltage amplifiers and directly coupled emitter-follower circuitry. The overall negative feedback loop circuit for compensation is connected between the emitters of Q1 and Q3.
Compensation characteristics are: RIAA playback standard for PHONO, flat response for microphone.

2-3. HIGH LEVEL INPUTS AND CONTROL CIRCUITS

High level inputs such as AUX 1/2 and TUNER are also selected by S1. Input from tape deck and recording output signal (a head amplifier output or a direct output from a high level input) are switched by S5 and S6, respectively. The selected signal then passes to mode switch S2, balance and volume controls through the RC network which establishes the characteristic of the tone control bass cut side. This characteristic can be switched by part of S7.

2-4. CONTROL AMPLIFIER

This stage, consisting of one FET and two transistors, is embodied on PCB No. W15-050. The FET is used in the top amplifier to obtain stable, high impedance under all conditions; the Q3 emitter-follower circuit maintains good negative feedback conditions for the tone control circuits.
The output from this stage passes to the next filter stage and the switched RC network which determines the tone control characteristics, i.e. treble boost and cut and bass boost.

2-5. FILTERS

The filter stage is embodied in PCB No. W28-004. Filter design uses switchable RC factors with emitter-follower transistors. Basically, this variable filter operates according to the active filter principle; it features a steep-cut, 12dB/oct characteristic. The cut-off frequencies (—3dB) are selected by switches S10 and S11 — S10 selects the treble cut-off points (6 or 12 kHz), S11 selects the bass cut-off points (30 or 60 Hz).

2-6. MAIN AMPLIFIER

The main stereo amplifier stage consists of 4 power transistors mounted on heat sink and 14 other transistors. It is mounted on PCB No. W23-008. Of the seven transistors in each channel, Q1 and Q2, and Q3 and Q4 operate in pairs, forming a differential amplifier. This eliminates DC voltage and current drift in the transistors caused by fluctuations in the ambient temperature, thereby stabilizing the amplifier's total performance.
In the above-mentioned differential amplifier, the base of Q1 receives the signal input while the overall NFB voltage is applied to the base of Q2. The output of this stage, somewhat resembling a push-pull output, is taken from between the collectors of Q1 and Q2 and applied to the bases of the following differential amplifier, Q3 and Q4. The output from the Q3 emitter is applied to the emitter of Q4. On the other hand, an inverted emitter input is also applied to the base of Q4 so that Q4 amplifies the sum total of these input values. The output from Q4 drives the quasi-complementary Darlington output stage consisting of transistor pairs Q6/Q8 and Q7/Q9. Q5 does not serve for signal amplification but works in combination with diode to stabilize the bias of Q6, Q7 and Q8, Q4 against temperature fluctuations.

2-7. PROTECTOR CIRCUIT

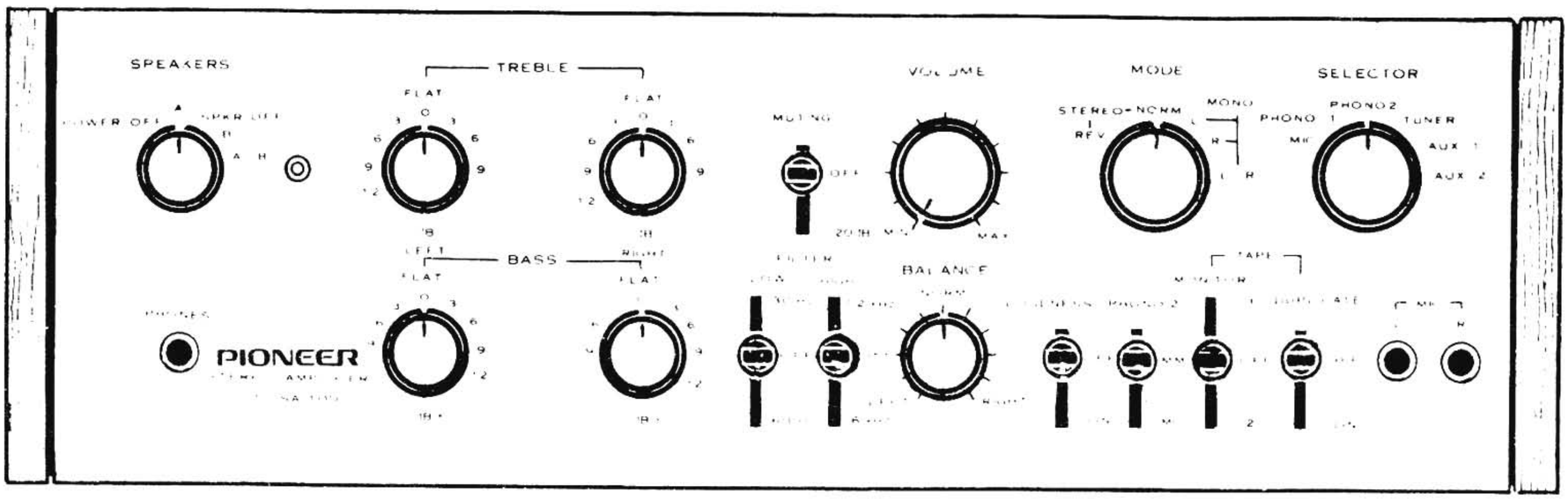
The protector consists of two types of detectors and a DC amplifier, all assembled on PCB No. W28-008.
Q1 is a detector for static overload exceeding the rated collector current limit and caused by thermal running of the power transistors or trouble in some part, and for dynamic overload caused by a drop in the output load impedance below 2 ohms. Q1 protects the left channel, Q2 the right channel. Q3 and Q4 form a differential amplifier which detects DC drift voltages present at the output. It serves both channels simultaneously.

Q5 — Q7 form a trigger circuit for the relay at the DC amplifier. In normal operation, the relay contacts are closed by the collector current of Q7 and the output signal is fed to the speakers. If the detector detects some trouble, the relay opens and disconnects the output terminals from the original output point in the circuit.

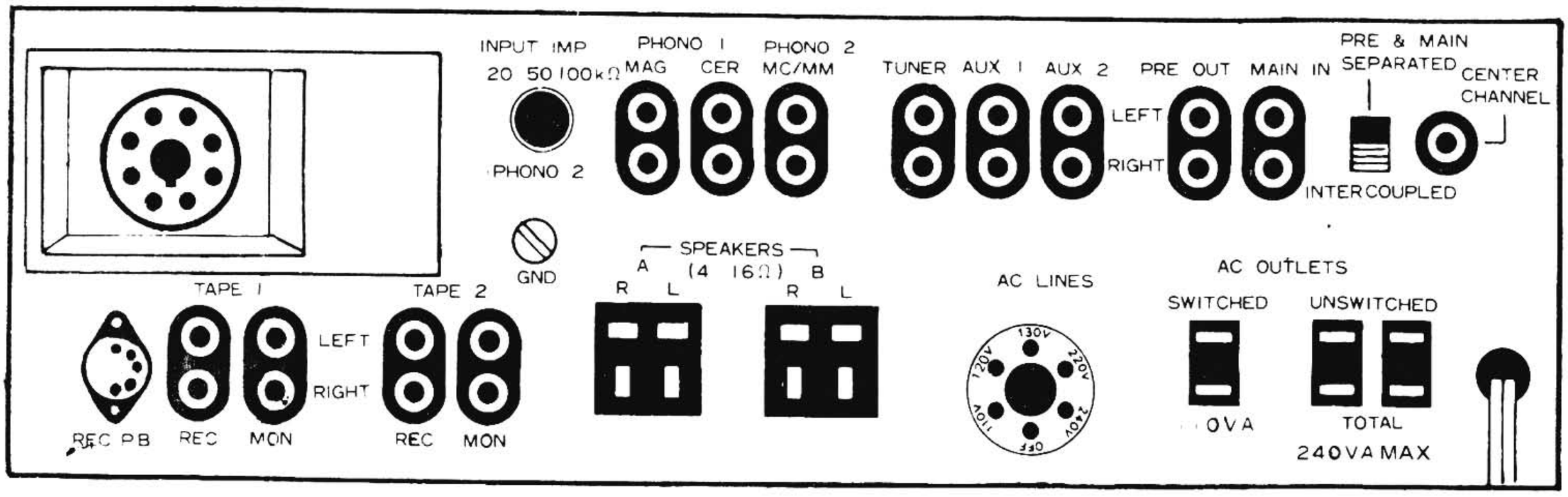
2-8. POWER SUPPLY

Q1 and Q2 are voltage regulators, supplying low-ripple rectified current to the preamplifier. The balanced voltage supply for the power amplifier is obtained from other power transformer taps via a bridged rectifier. All parts except the filter capacitor and power transformer are located on PCB No. W16-035.

FRONT VIEW



REAR VIEW



3. ANALYSIS OF SOME SELECTED CIRCUITS

Fig. 1 shows the main amplifier stage to be analyzed. Explanations of the operation theory follow the numbers in the hatch part of fig. 1.

3-1. QUASI-COMPLEMENTARY PUSH-PULL OUTPUT

(Block 1)

Figs. 2 and 3 illustrate how NPN + NPN and PNP + NPN transistors can be converted into the equivalent of a single transistor by connecting them in the Darlington mode. By this method, the stages from Q6 to Q9 can be considerably simplified, as shown in fig. 4.

However, because Q6 operates as emitter-follower, and Q7 as collector-follower, in the typical quasi-complementary circuit constituted by Darlington connection, their top and bottom transistor input impedances vary. Resistor R27 compensates for this difference.

Fig. 4 shows basic operation with zero DC operation bias. Because a crossover is produced in the output as shown in fig. 5, a DC voltage equal to the total base-emitter bias of Q6, Q7 and Q8 is applied between the bases of Q6 and Q7. The base of Q6 has, of course, + potential, the base of Q7 has — potential. In normal operation, this voltage is approximately 1.8 ~ 2.1V. The DC voltage between output terminal (i.e. junction of R28 and R29) and chassis would be approximately 0 if its top and bottom are balanced.

This distribution of DC voltages, vitally important for adjustments and trouble-shooting, is shown in fig. 6.

Voltage against chassis, at zero signal operation.

* E1, E2, E3 approximately 0V
* All VBE voltages approximately 0.7V

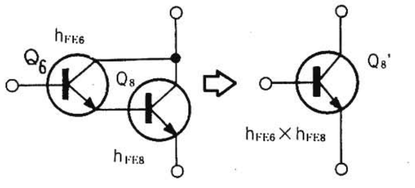


Fig. 2

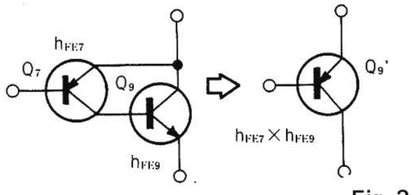


Fig. 3

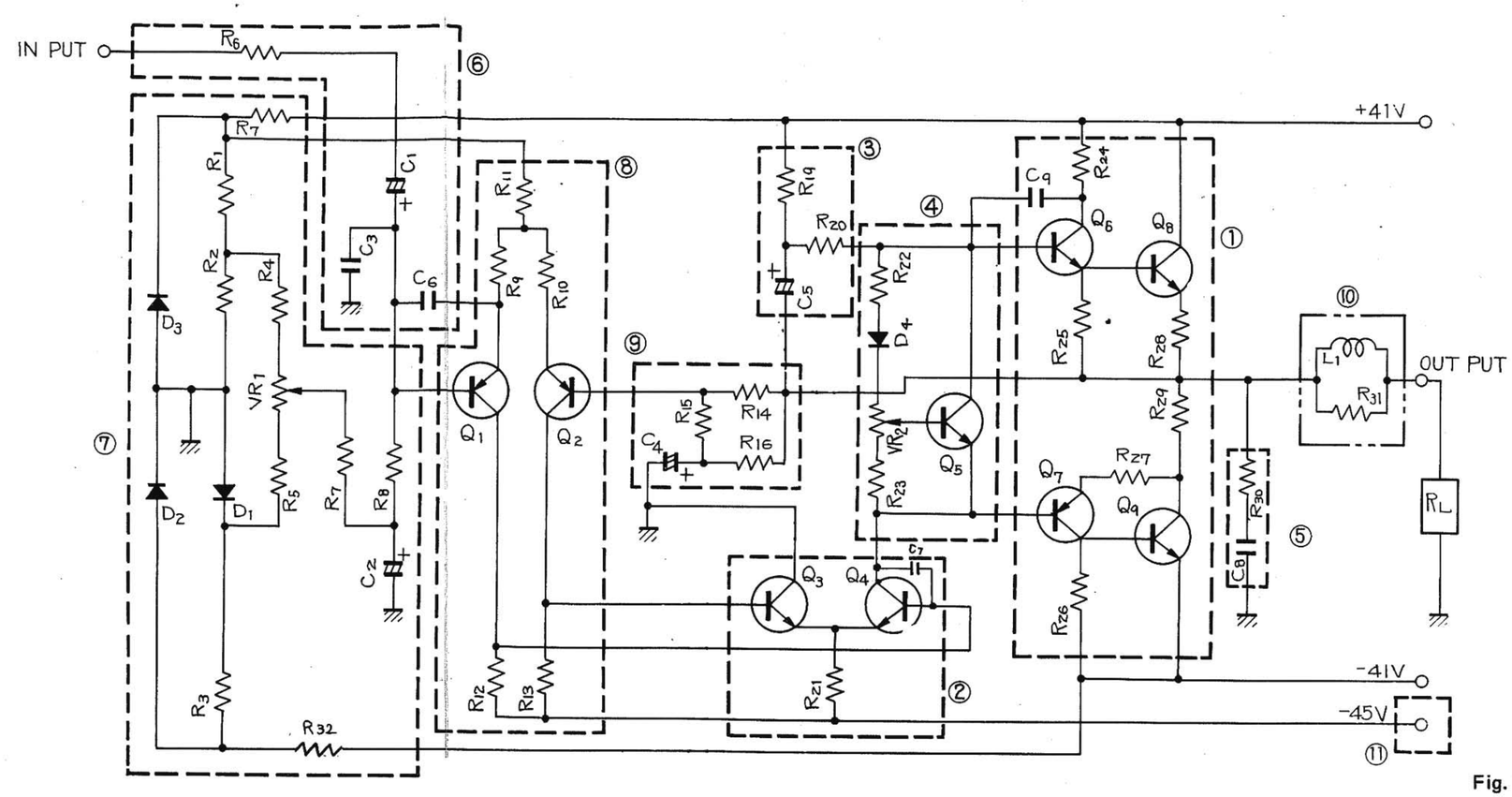


Fig. 1

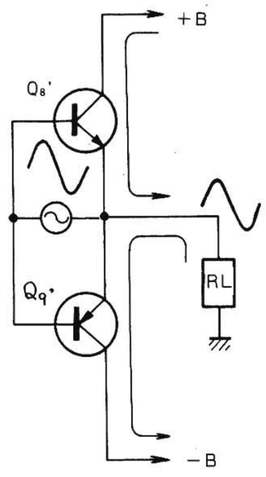


Fig. 4

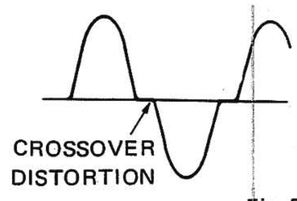


Fig. 5

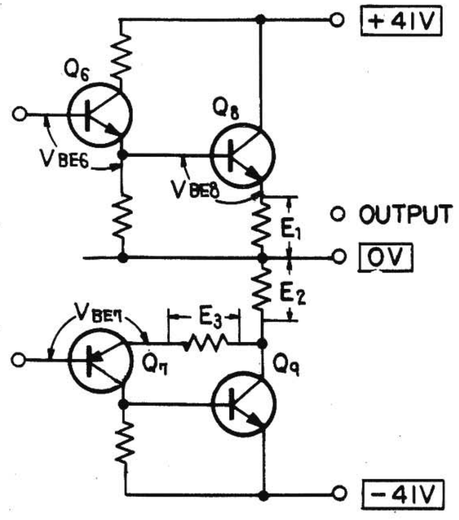


Fig. 6

3-2. DC BIAS APPLY CIRCUIT

(Block 4)

As shown in fig. 6, the total bias voltage is composed of the current through R22, D4, VR2, R23 and the collector current of Q4 which flows through Q5 (which is parallel to the above R22-R23 stretch).

The internal resistance of Q5 becomes close to infinite when the slider of VR2 is moved towards R23, because this reduces the bias at Q5. Thereby, the total bias voltage increases. On the other hand, if the slider is moved towards D4, the internal DC resistance of Q5 drops, and consequently the total bias is also reduced.

Adjustment of the total bias is chiefly determined by the idle current of Q8 and Q9 (i.e. the collector current at no signal). The reference value for this idle current is 100 mA.

The purpose of Q5 in this bias circuit is to compensate automatically for bias changes caused by temperature fluctuations. In addition, D2 helps to stabilize the bias of Q5.

3-3. DRIVE AMPLIFIER
(Blocks 2, 3, 4)

The Darlington connected final output stage operates as an emitter-follower with unity gain. The effective value of collector load R20 is greatly increased by bootstrap positive feedback through C5.
Fig. 7 shows the relation between driver and power amplifier in a simplified form. The input between base and emitter of Q6 and Q7 is the voltage across R20, because the return from R20 is connected to the emitter of Q6 and Q7 through C5. Also, the voltage gain in the total circuit can be increased, as the return point of R20 has the same high potential as the output signal. The use of a differential amplifier (make up of Q3 and Q4 has two effects: stability against temperature fluctuations is improved; and through effective use of the reverse phase output of Q1 and Q2 the total voltage gain can be increased by 6dB.

3-4. DC NEUTRAL POTENTIAL STABILIZER (Blocks 7, 8)

Fig. 8 is a simplified illustration of the DC loop circuit which, by means of Q1 and Q2, arrests the DC voltage at the signal output terminals at 0V level.
The supply voltage to the differential amplifier formed by Q1 and Q2 is first stabilized by the Zener diodes.
D3 and D2 so that no fluctuations can be caused by instabilities in the AC line voltage. The DC potential applied to the base of Q1 is regulated by VR1 and D1 in such a way that the DC potential (B') at the base of Q2 remains 0V — in other words, stabilization. If some undesirable DC voltage is present at (B'), the difference between these two base potentials becomes the effective input for the differential amplifier, whereby the DC voltage between the collectors of Q1 and Q2 is changed. This — changed — DC voltage changes the collector current of the next-stage differential amplifier Q3 and Q4 which, in turn, changes the bias of the power output stage Q6 — Q9. Thereby, the DC voltage at (B') is regulated back to 0V. This operation is based on the theory of negative feedback for DC, and it requires direct coupling without capacitors for all amplifier stages.
The purpose of D1 in this circuit is to prevent drift of the Q1 base DC potential (the reference voltage) caused by temperature fluctuations.

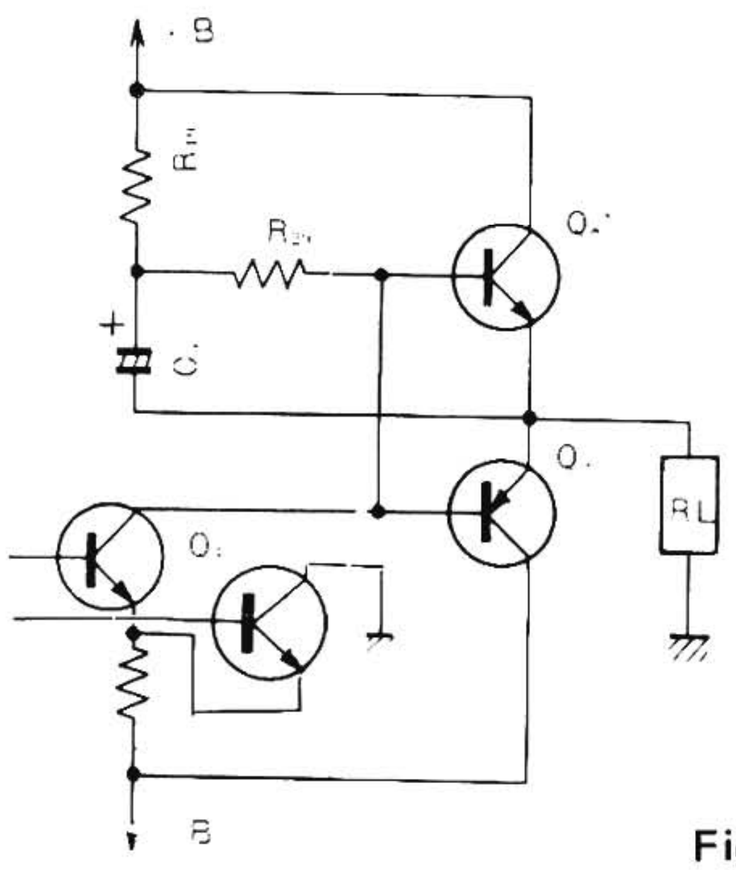


Fig. 7

3-5. SIGNAL NEGATIVE FEEDBACK CIRCUIT
(Blocks 5, 8, 9, 10)

The signal NFB voltage passes through the network of block 9, is divided by R14 and R15, and is then applied to the base of Q2. Appearing at the emitter of Q2, this voltage is applied to the emitter of Q1, cancelling the input at the base of Q1, i.e. acting as negative feedback. The closed loop gain of the amplifier with NFB applied is determined by the ratio $\frac{R15 + R14}{R15}$ at frequencies high enough for the impedance of C4 to be negligibly small in comparison with R15. With the values as given in the circuit described here, this gain is 48, i.e. a voltage gain of 48 times between the base of Q1 and the output terminal.
The network shown in blocks (5) and (10) is a phase compensator which improves stability against changes in the reactive load.

3-6. DC NEUTRAL VOLTAGE DETECTOR (Fig. 9)

The protector circuit, embodied in the protector unit PCB W28-008, consists of two varieties of detectors and a trigger circuit, as shown in fig. 9.

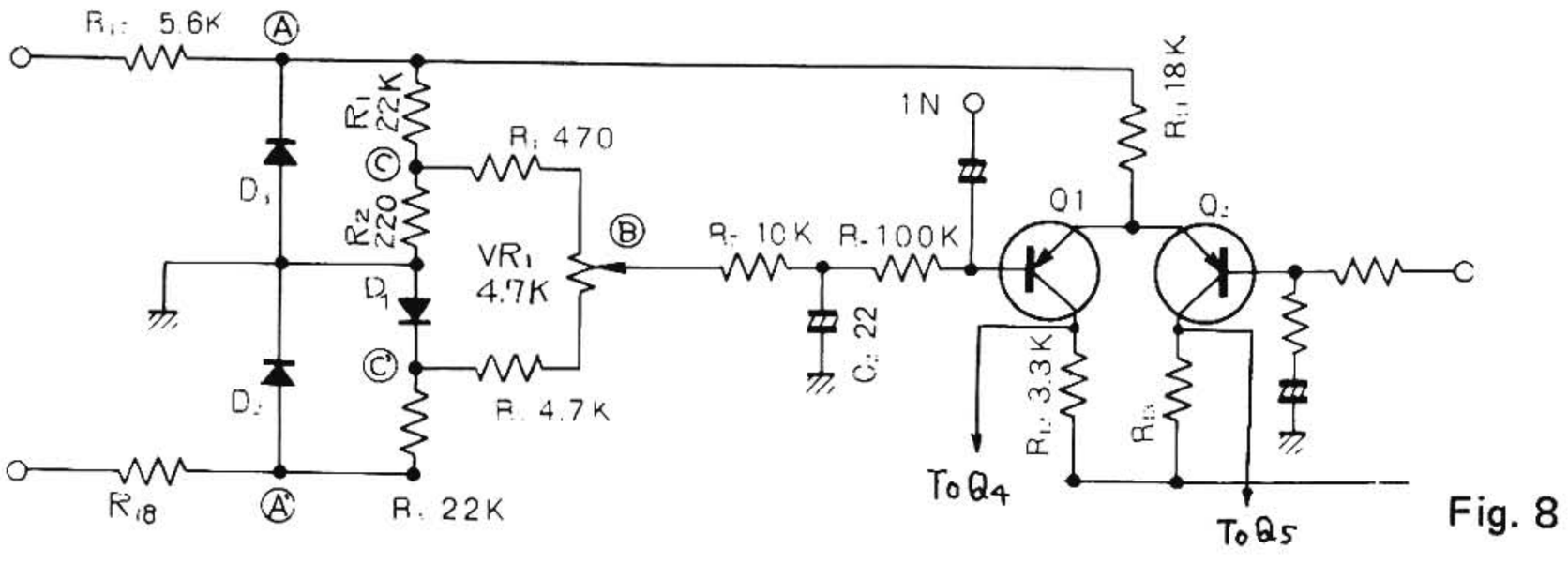


Fig. 8

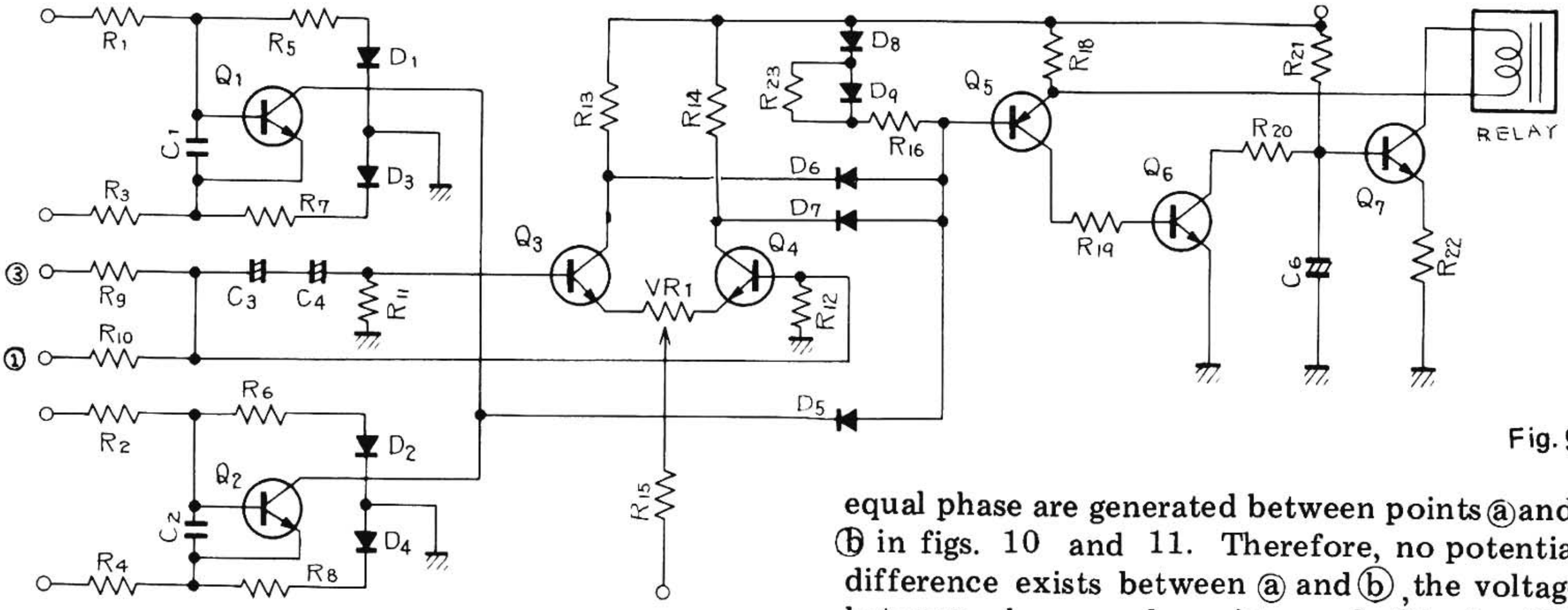


Fig. 9

The trigger circuit acts on both detectors. Its operation is as follows:

The current from the series circuit D8 to R16 lowers the base potential of Q5 below its emitter potential, which makes Q5 and, consequently, Q6 conductive. The collector current from Q6 through R21 lowers the base potential of Q7, and Q7 is cut off. No current flows in the relay, which means the output circuit is opened by the relay contacts.

The DC neutral voltage detector is essentially a differential amplifier formed by Q3 and Q4. This differential amplifier's effective input is the difference between the two inputs. Therefore, any signal input from pin ③ and pin ① is ineffective in this amplifier, but as soon as some DC voltage appears at these pins, the Q4 base has DC potential but the Q3 base circuit stops the DC flow with its capacitors, because DC input is effective in the differential amplifier, thus DC input voltage cause variations of collector current of Q3 or Q4 and serves to turn D6 or D7 on and off, triggering Q5.

3-7. OVERLOAD DETECTOR CIRCUIT

Two conditions can constitute overload: a short circuit (or extremely low impedance) between the output terminals; and a large DC current flow in the chained power transistors.

Fig. 10 shows the detector circuit including the chained power transistors and the output load (RL).

In the case of a static DC overcurrent, a larger voltage will appear across the two 0.5 ohm resistances. When this voltage becomes large enough to make Q1 or Q2 conductive, it will flow through these transistors and activate the trigger for Q5.

Next, let us examine the condition with a signal supplied and the chained transistors delivering power into the RL RL (see fig. 11).

If RL is at or above the specified value, and in case of positive half cycle voltages of equal phase are generated between points ⓐ and ⓑ in figs. 10 and 11. Therefore, no potential difference exists between ⓐ and ⓑ, the voltage between base and emitter of Q1 is 0V, and Q1 is cut off in the negative half cycle. Points ⓑ and ⓒ are 0V, as above. If, however, RL drops to 2 ohms or below, the bridge circuit shown in fig. 11 becomes unbalanced within half a signal cycle, a voltage is applied between base and emitter of Q1, Q1 becomes conductive, and Q5 is triggered.

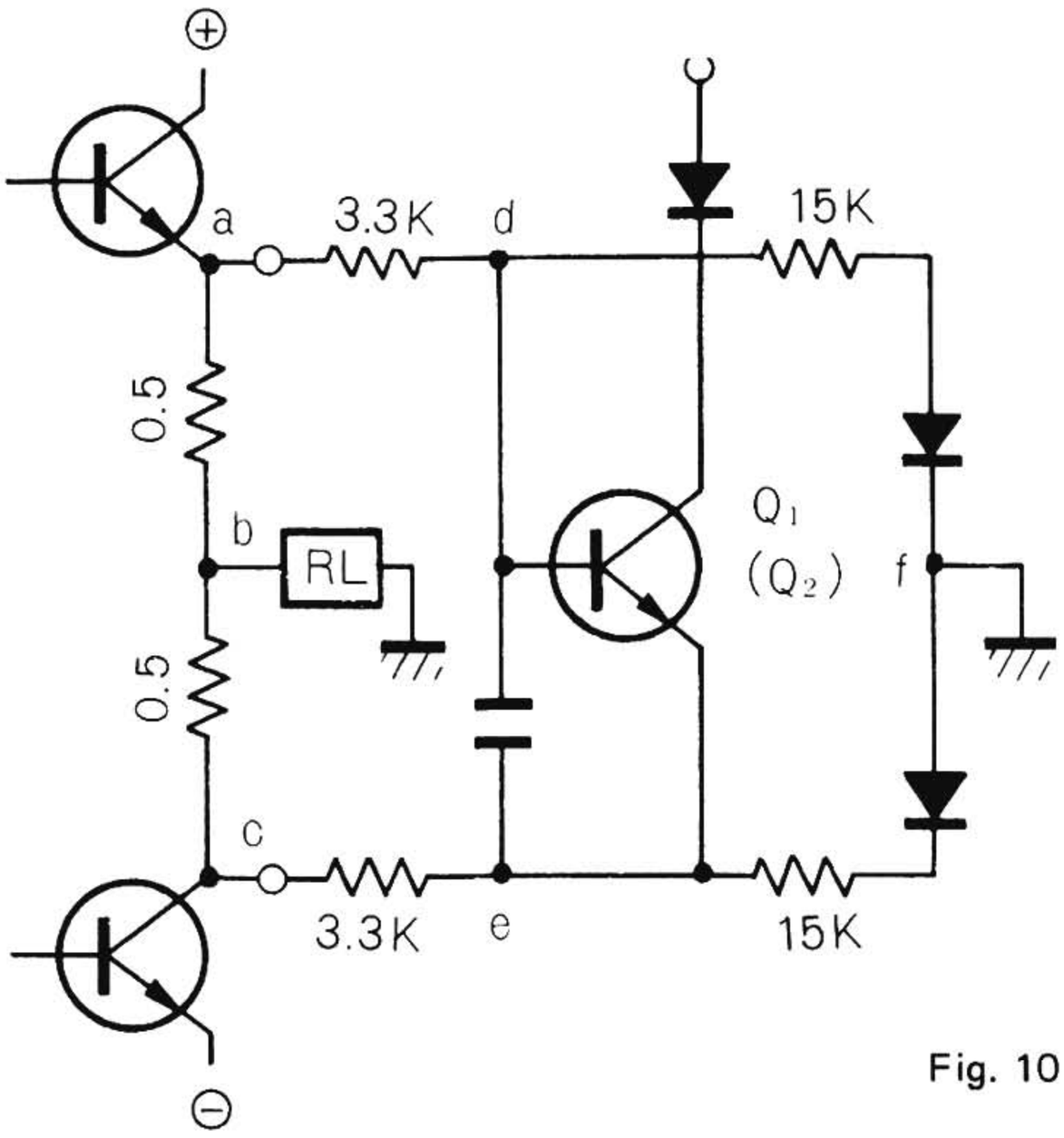


Fig. 10

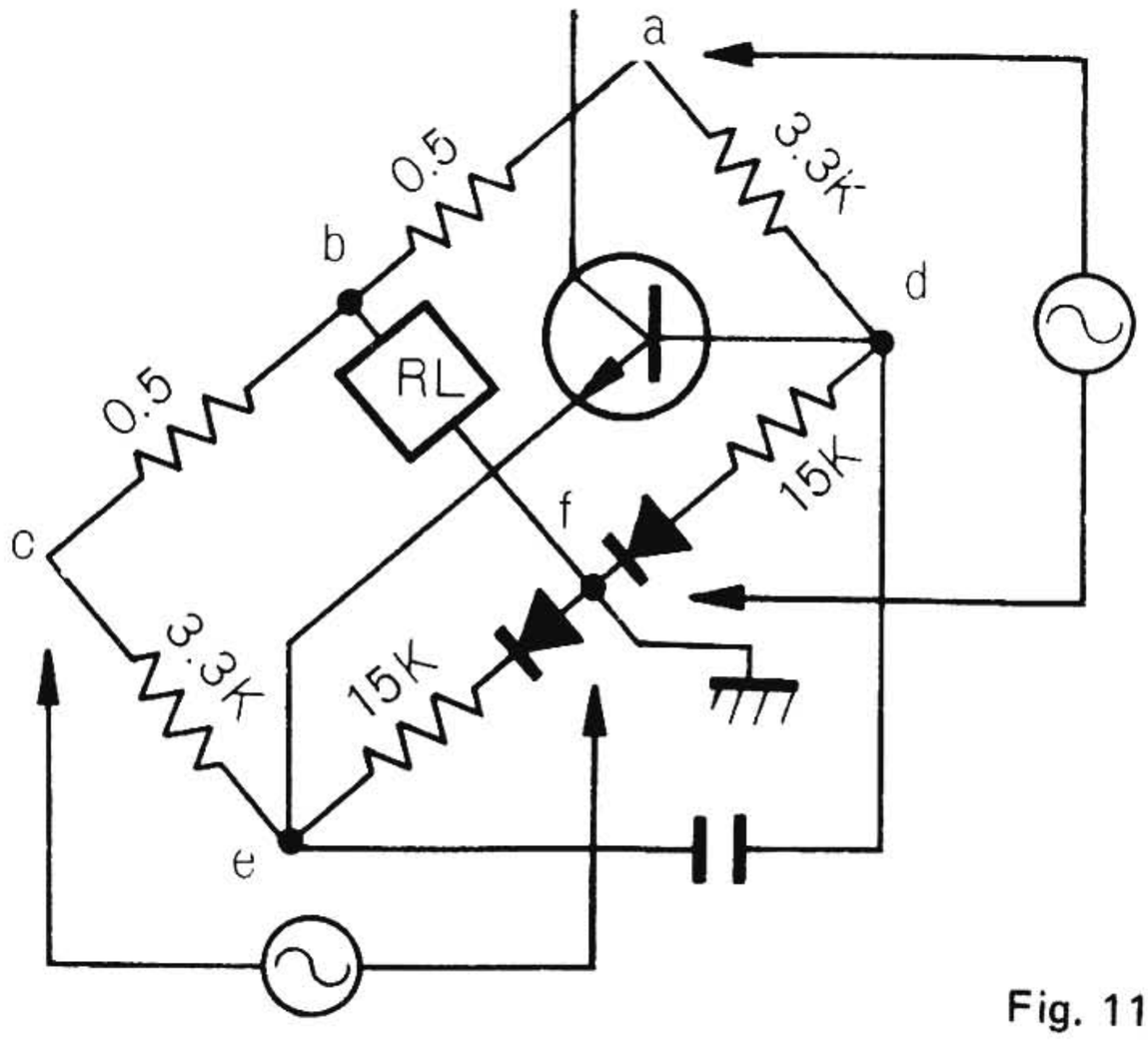


Fig. 11

4. DISASSEMBLY

4-1 REMOVAL OF THE COVER

Remove the two screws from each side of the cover, and pull the cover up.

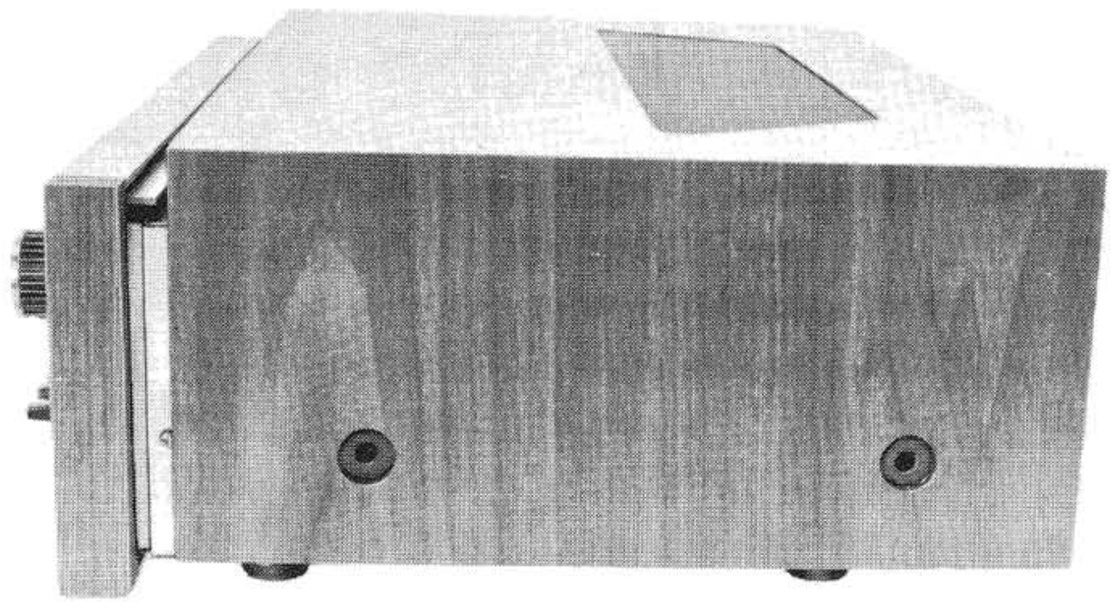


PHOTO 1

4-2 REMOVAL OF THE BOTTOM PLATE

Remove the ten screws from the bottom plate. The bottom plate will now come off.

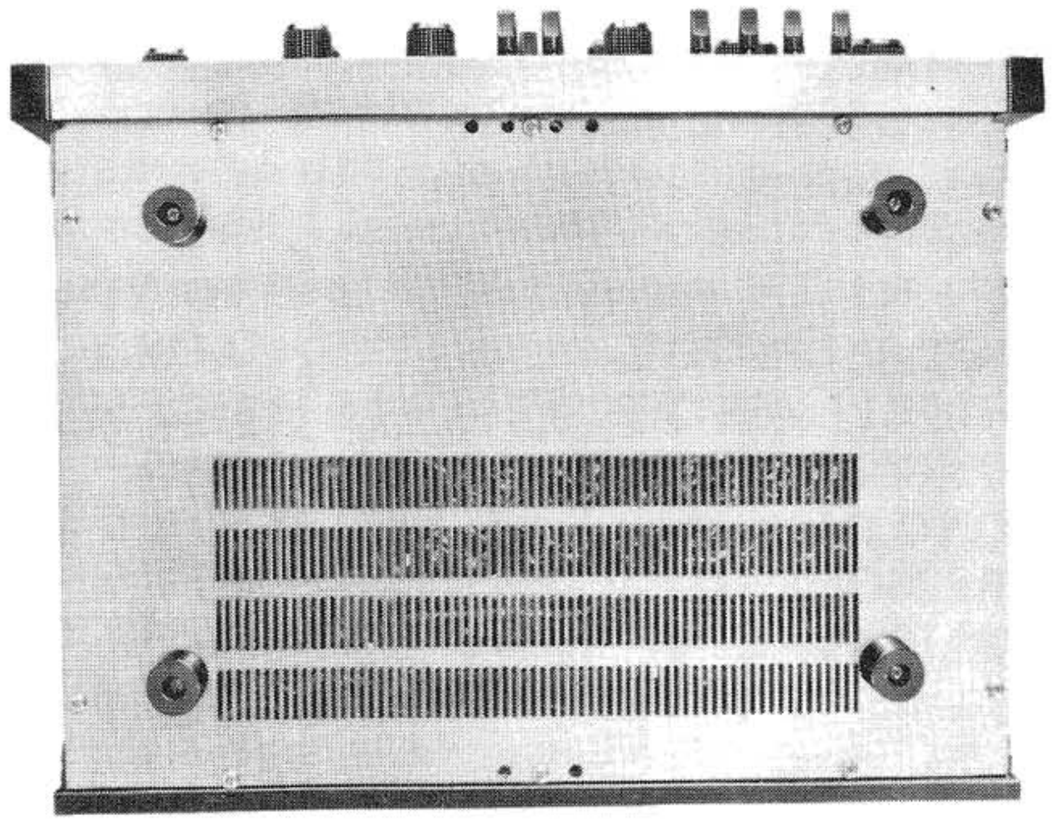


PHOTO 2

4-3 REMOVAL OF THE FRONT PANEL

Pull all the controls and switches knobs off from the shaft. Remove the nuts and washers from the shaft of the POWER switch, VOLUME control, BALANCE control and SELECTOR switch, and then remove the two screws from the bottom of the front panel. The front panel will now come off.

4-4 REMOVAL OF THE METAL HOUSING

Remove the two screws fixing the main amplifier cover to pull it.
Remove the four screws fixing the shield cover of the head amplifier and control amplifier units and pull the cover.

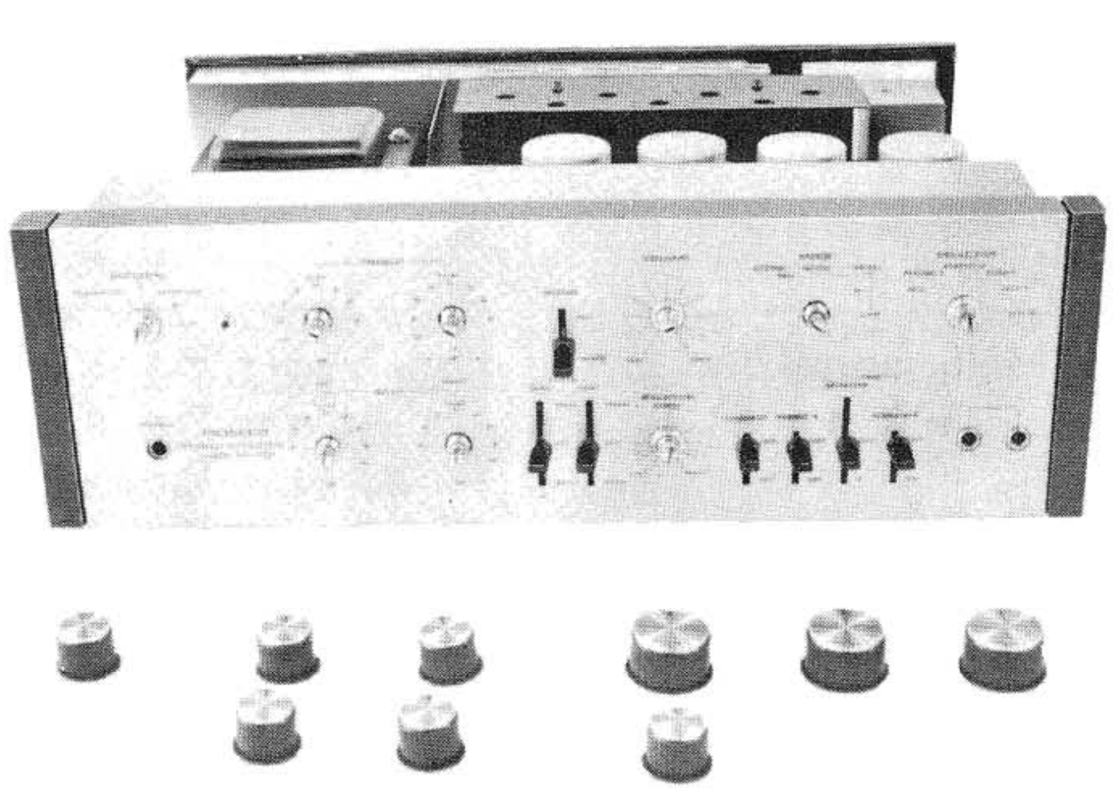


PHOTO 3

4-5 REMOVAL OF THE UNITS

When removing the unit, please observe:

1. Do not simply pull unit up to remove, as this may damage hole or fastener boss.
2. Squeeze upper part of fastener with small pliers as indicated by arrows in illustration, then pull unit upward (fig. 12).
3. Fasteners once removed from the chassis can not be used again as then lose strength.

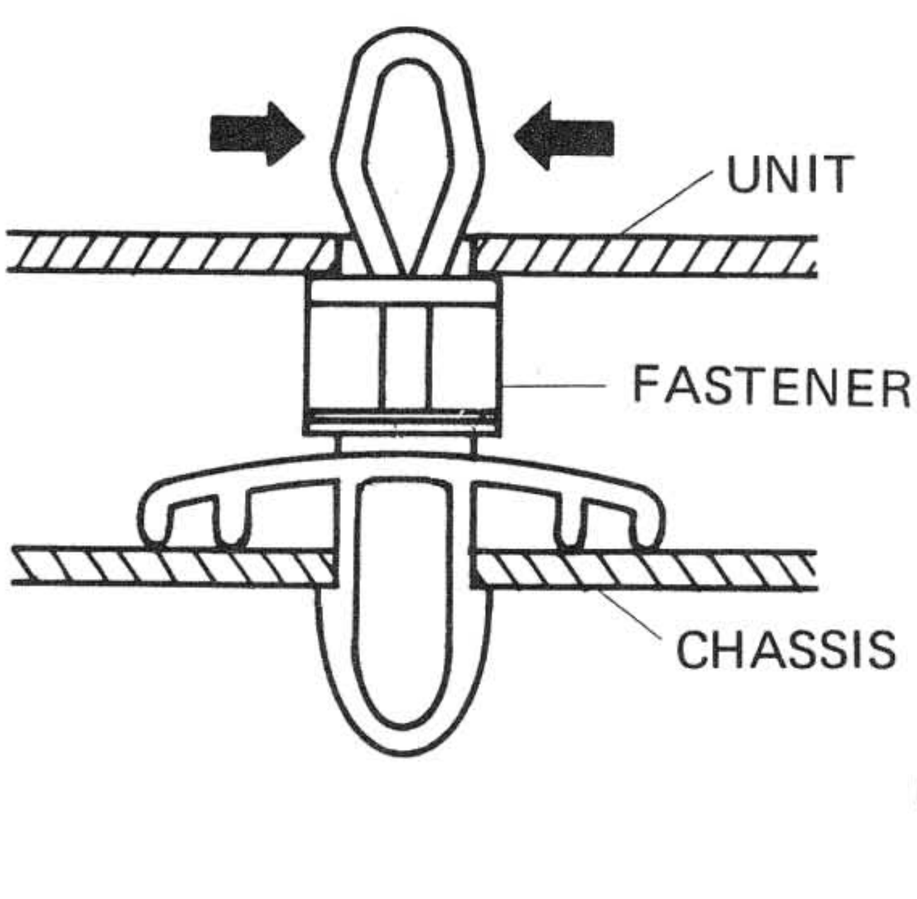


Fig. 12

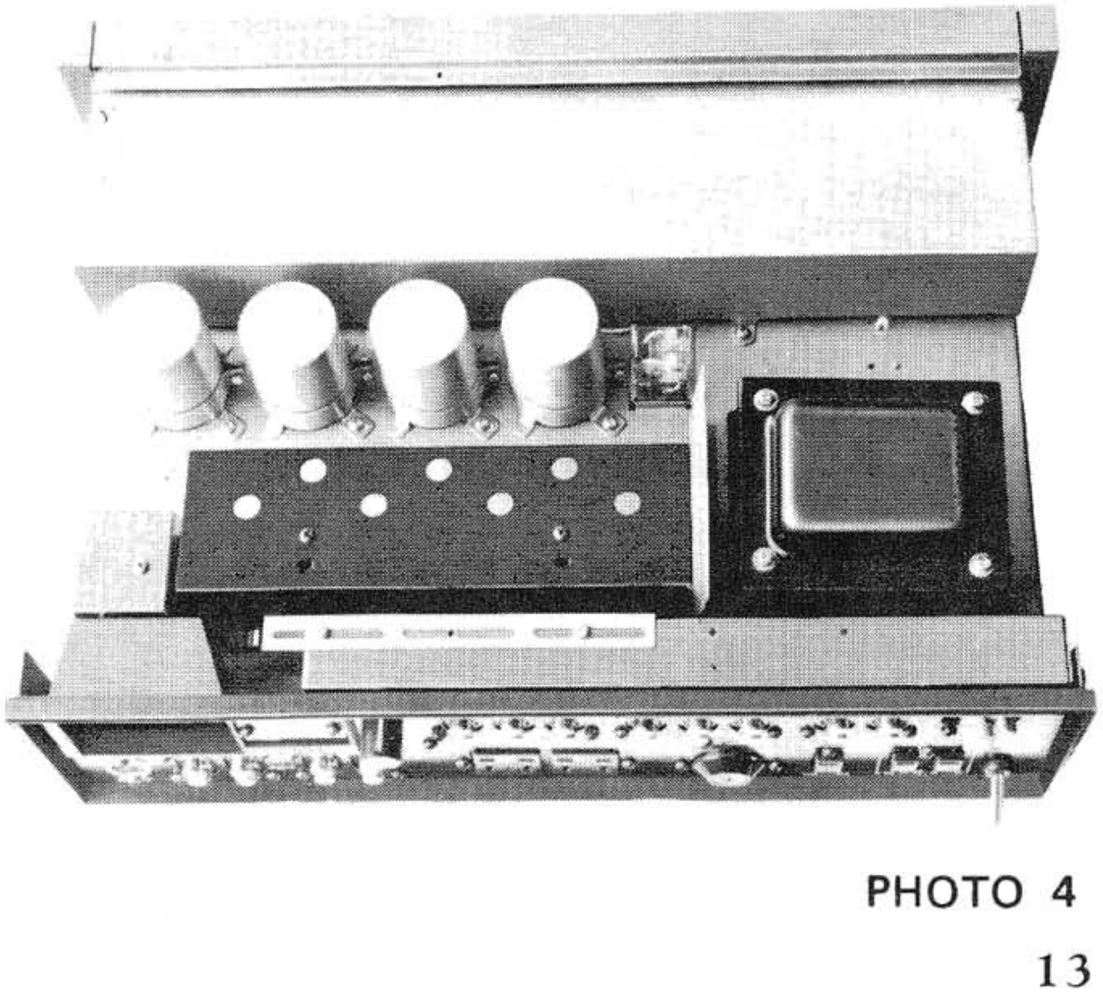


PHOTO 4

5. PERFORMANCE CHECKS AND ADJUSTMENTS

5-1. DC VOLTAGE CHECK

The following checks are basic performance checks of all circuit boards. If the AC line voltage is within ± 3% of rated value, all voltages at the checkpoints must be as specified, with a tolerance of ± 20%. Amplifier and controls must be in the following condition.

a) Disconnect all signal inputs and outputs.
b) Remove bottom plate and wooden case.
c) Remove metal housing.
d) Connect 8 ohm/30W dummy loads to each speaker A output.
e) Set controls as follows:

CONTROL	POSITION
INPUT SELECTOR	AUX 1
MODE SELECTOR	NORM
PHONO 2 SELECTOR	MM
PHONO IMPEDANCE SELECTOR	50 k Ω
TAPE MONITOR	OFF
DUPLICATE SWITCH	OFF
BASS, TREBLE CONTROLS	FLAT
LOUDNESS SWITCH	OFF
LOW, HIGH FILTER SWITCHES	OFF
MUTING SWITCH	0dB
PRE & MAIN SWITCH	SEPARATED
BALANCE CONTROL	CENTER
POWER & SPEAKER SELECTOR	OFF

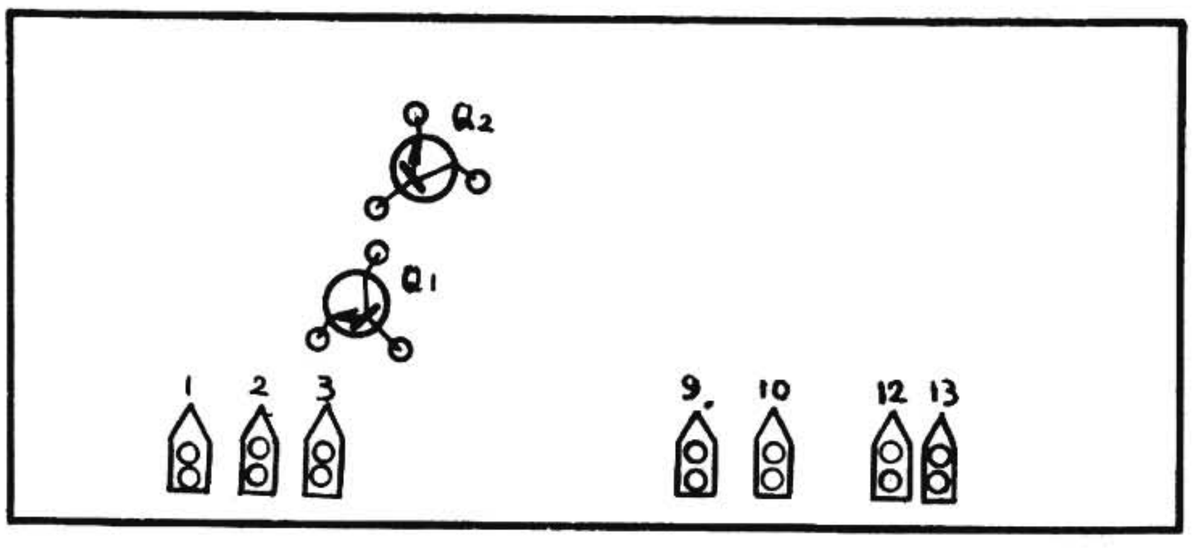
f) Connect AC cord to AC outlet.
g) Set POWER & SPEAKER SELECTOR to SPKR A position.
h) Allow a few minutes for amplifier to warm up.
i) Check voltages according to following tables and figures.

Measure voltages with high impedance voltmeter.

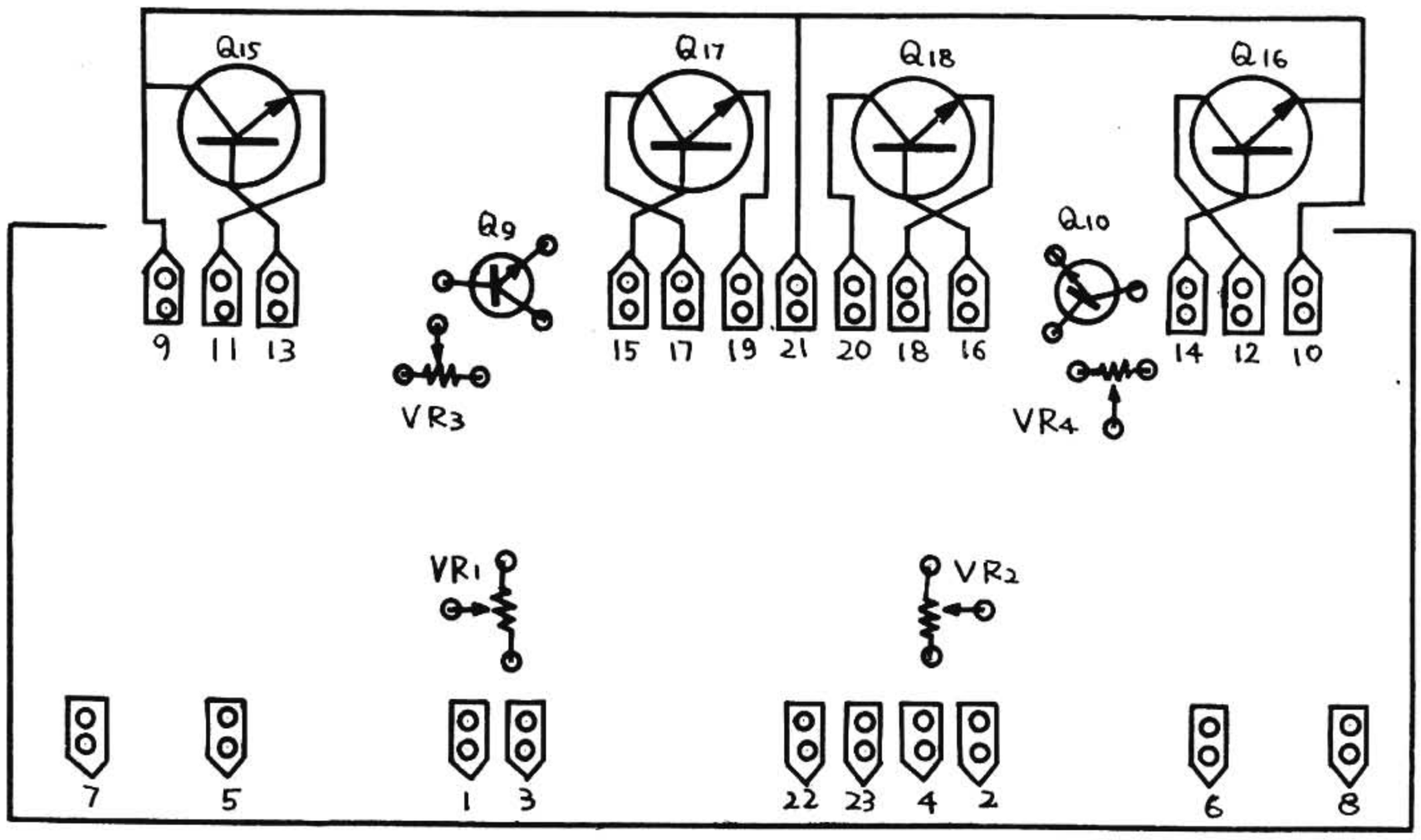
P.C.B. UNIT	CHECKPOINT	TYPICAL VOLTAGES
Power supply (W16—035)	Pin 2 ⟶ Pin 1 or 13 (GND)	+ 25V
	Pin 3 ⟶ Pin 1 or 13 (GND)	+ 35V
	Pin 9 ⟶ Pin 1 or 13 (GND)	+ 43V
	Pin10 ⟶ Pin 1 or 13 (GND)	— 43V
	Pin12 ⟶ Pin 1 or 13 (GND)	— 45V
Main amplifier (W23—008)	Pin 7 ⟶ Pin 5 (GND)	nearly 0V
	Pin 8 ⟶ Pin 6 (GND)	nearly 0V
	Pin13 ⟶ Pin11, Pin15 Pin19	+ 0.5 ~ + 0.7V all
	Pin16 ⟶ Pin20, Pin14 Pin12	
	Collector ⟶ Emitter of Q9, Q10	+ 1.8 ~ + 2.2V all
Protector (W28—008)	Pin 7 ⟶ Pin 8, Pin 6 ⟶ Pin 5	+ 0.1V all
	Q7 emitter ⟶ Pin 4	0V
	TP 1 ⟶ TP 2	0V
Filter (W28—004)	Q1 collector ⟶ Pin E	+ 20V
	Q1 and Q2 emitter ⟶ Pin E1	+ 1V
Control amplifier (W15—050)	Q5 and Q6 emitter ⟶ Pin E	+ 17V all
Head amplifier (W21—007)	Q5 and Q6 emitter ⟶ Pin E	+ 17V all

LOCATION FOR CHECKPOINT (COMPONENT SIDE)

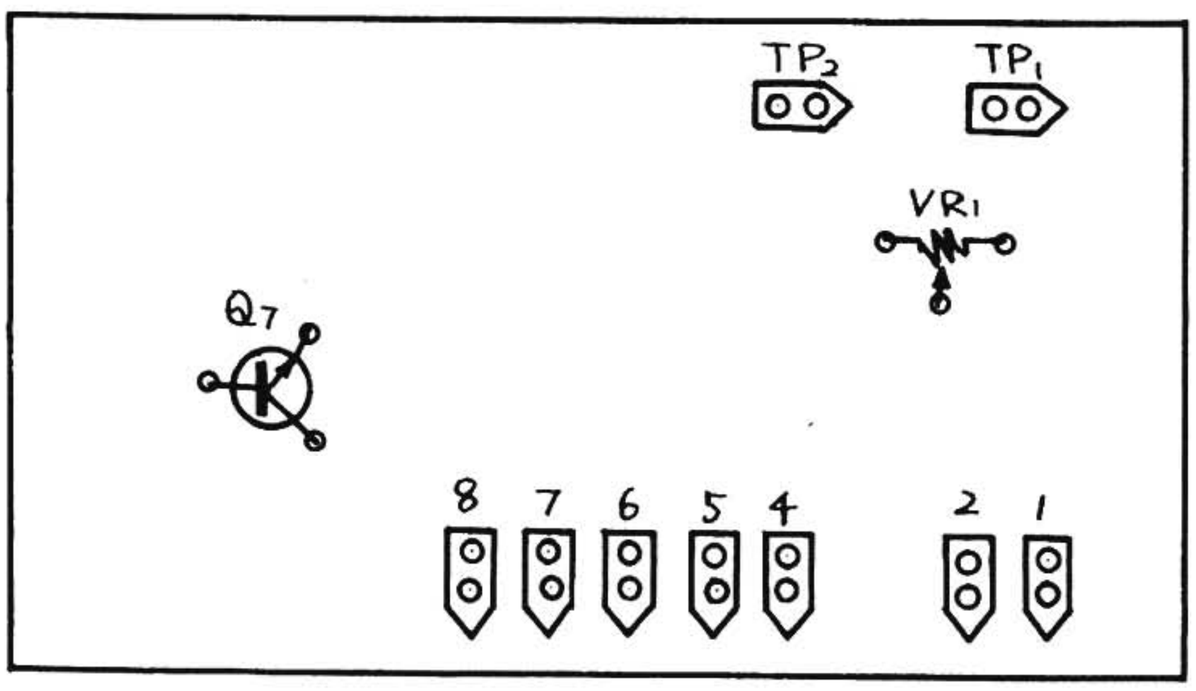
POWER SUPPLY UNIT



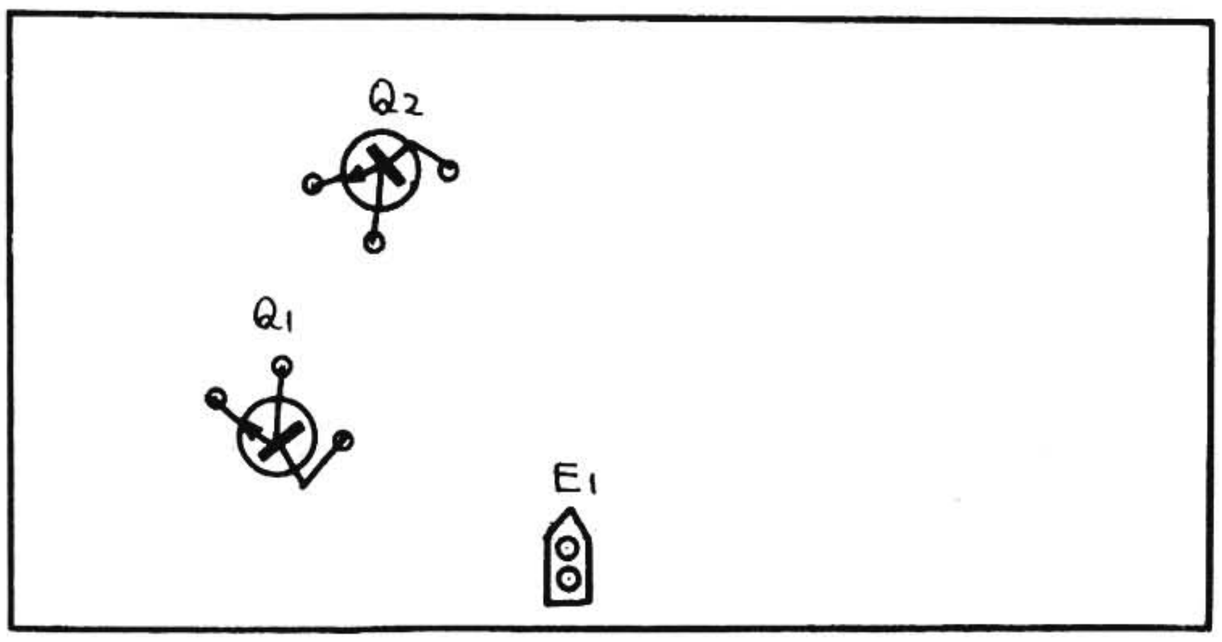
MAIN AMP UNIT



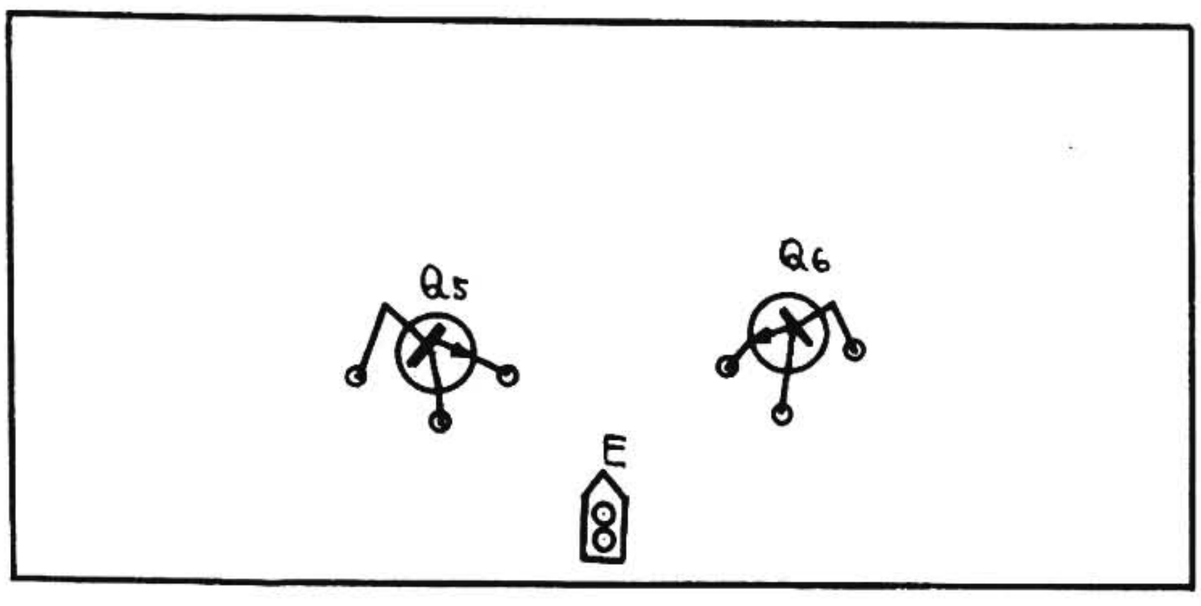
PROTECTOR UNIT



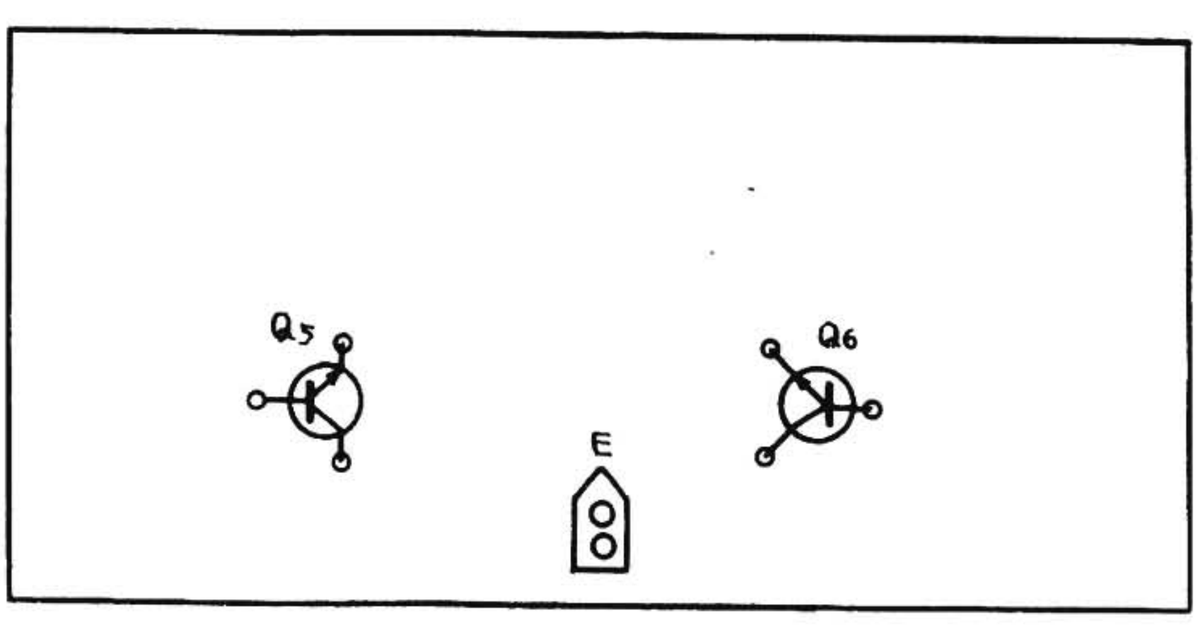
FILTER UNIT



CONTROL AMP UNIT



HEAD AMP UNIT



5-2. DC NEUTRAL VOLTAGE & DETECTOR CIRCUIT ADJUSTMENT (Figs. 13, 14)

The following adjustments are effective in case such as:
Protector cuts off output immediately when power is turned on, without obvious reason,
Clipping distortion at volume peaks,
Smothered sound at low peaks,
although pre-amplifier output is clean.

a) Set all controls as in 5-1 (e).
b) Observe relay located at top of chassis. Turn power on. Relay should be activated, without chattering, about 3-5 seconds later.
c) Disconnect lead wires from pins (1) and (3) on PCB W28-008.
d) Connect voltmeter between TP1 and TP2 on PCB W28-008.
e) Adjust VR1 on PCB W28-008 for 0V meter reading.
f) Re-connect lead wires to pin (3).
g) Adjust VR1 on main amplifier W23-008 for 0V meter reading.
h) Re-connect lead wire to pin (1).
i) Adjust VR2 on main amplifier PCB W23-008 to obtain 0V meter reading.

5-3. IDLE CURRENT ADJUSTMENT (Fig. 14)

a) Set all controls as in 5-1 (e). Also follow steps (f), (g) and (h) of 5-1.
b) Set voltmeter to lowest range, connect between pins (11) and (17) on PCB W23-008.
c) Adjust VR3 to obtain meter reading of 0.1V ± 20%.
d) Connect voltmeter between pins (12) and (18).
e) Adjust VR4 as in step (c).

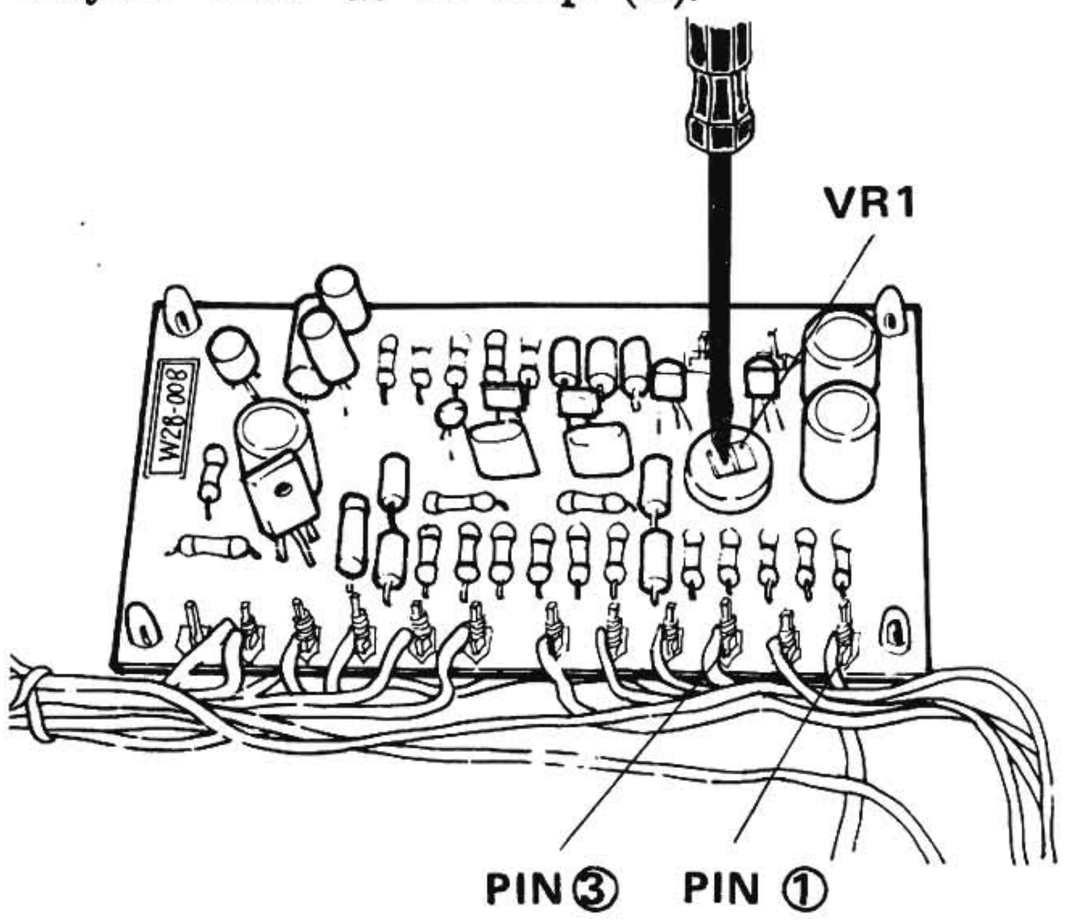


Fig. 13

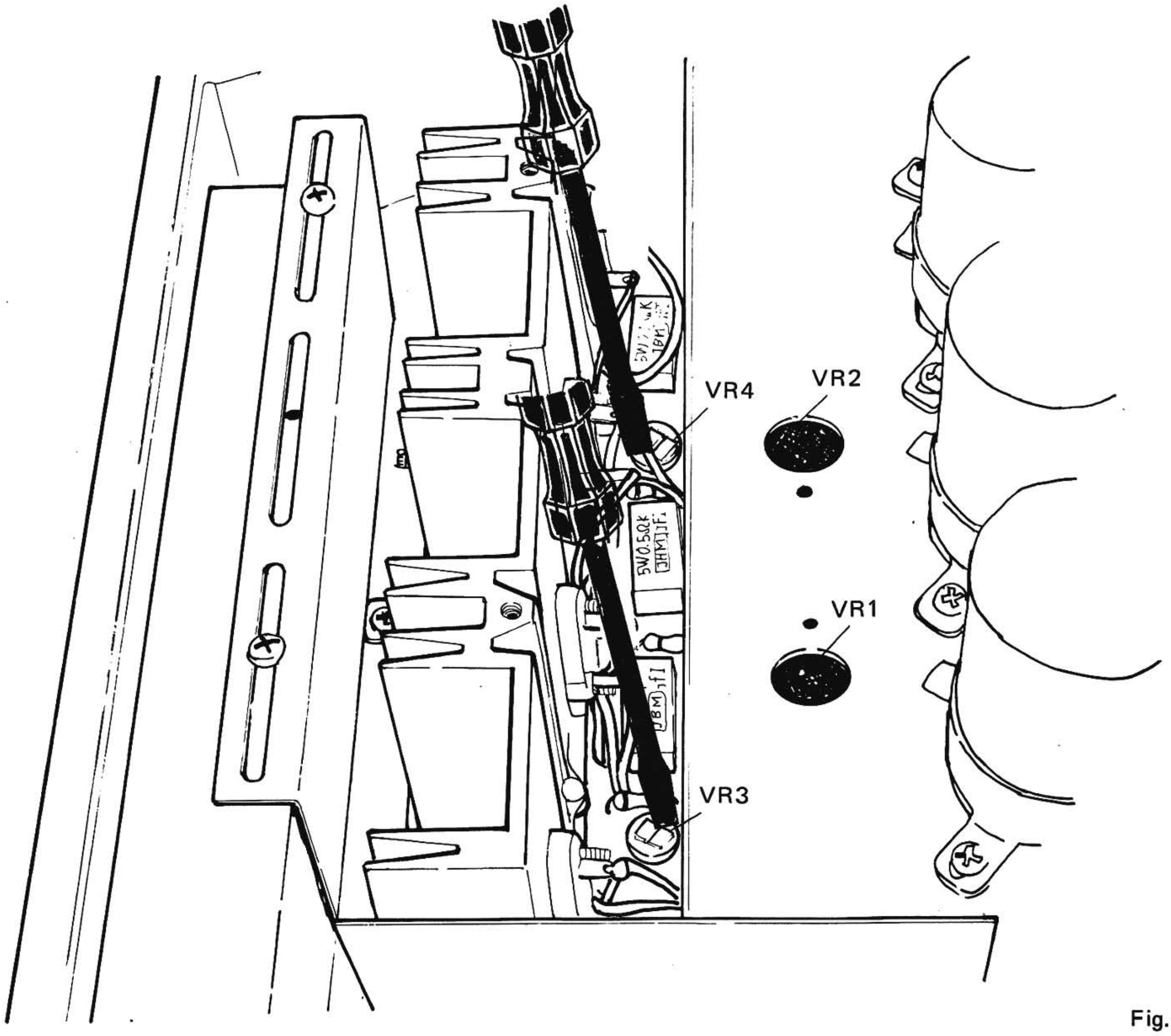
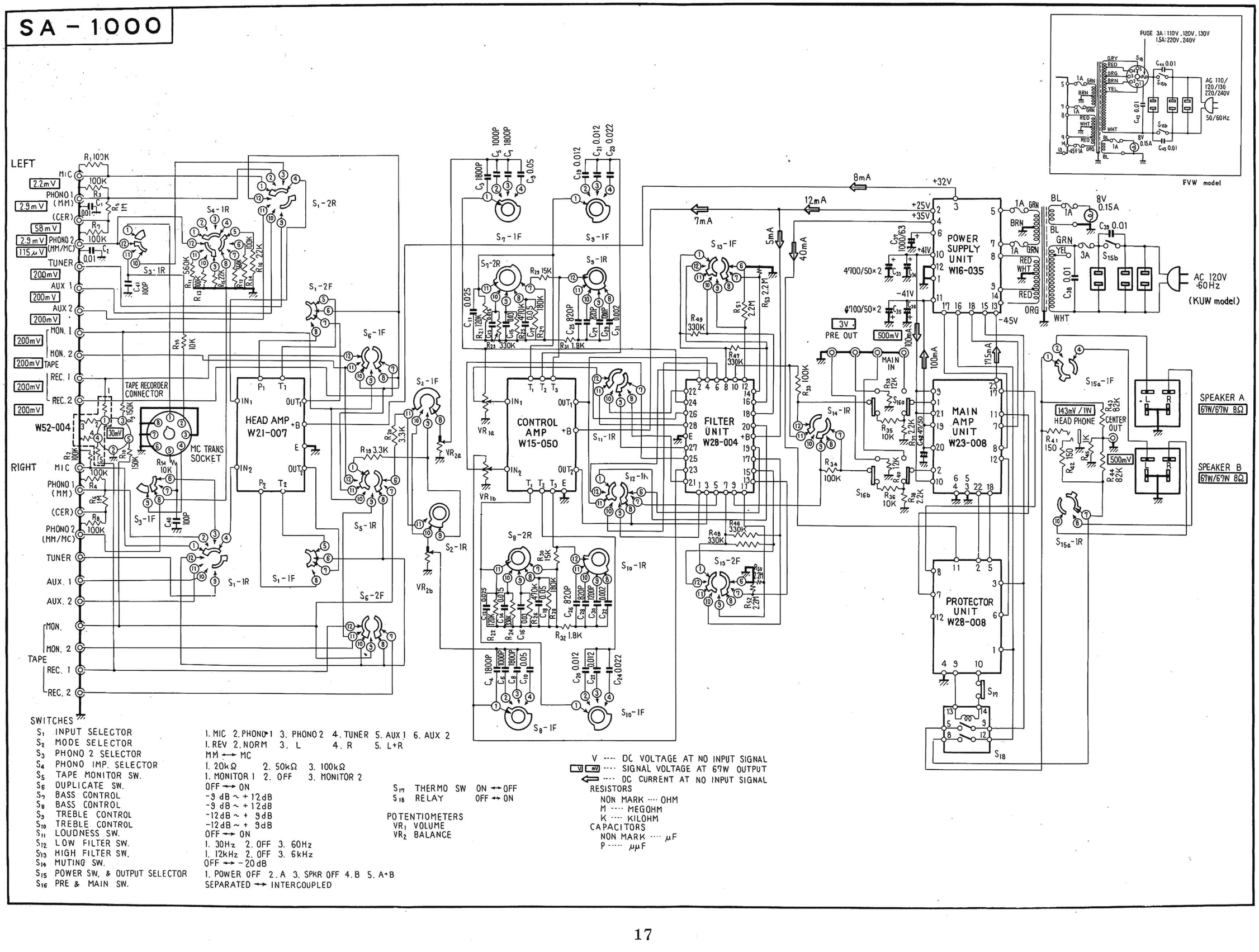


Fig. 14

6. SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARDS

6-1. UNIT CONNECTION DIAGRAM

SA - 1000



SWITCHES

S_1	INPUT SELECTOR	1. MIC 2. PHONO 1 3. PHONO 2 4. TUNER 5. AUX 1 6. AUX 2
S_2	MODE SELECTOR	1. REV 2. NORM 3. L 4. R 5. L+R
S_3	PHONO 2 SELECTOR	MM ⟷ MC
S_4	PHONO IMP. SELECTOR	1. 20kΩ 2. 50kΩ 3. 100kΩ
S_5	TAPE MONITOR SW.	1. MONITOR 1 2. OFF 3. MONITOR 2
S_6	DUPLICATE SW.	OFF ⟷ ON
S_7	BASS CONTROL	-9 dB ~ +12dB
S_8	BASS CONTROL	-9 dB ~ +12dB
S_9	TREBLE CONTROL	-12dB ~ + 9dB
S_{10}	TREBLE CONTROL	-12dB ~ + 9dB
S_{11}	LOUDNESS SW.	OFF ⟷ ON
S_{12}	LOW FILTER SW.	1. 30Hz 2. OFF 3. 60Hz
S_{13}	HIGH FILTER SW.	1. 12kHz 2. OFF 3. 6kHz
S_{14}	MUTING SW.	OFF ⟷ -20dB
S_{15}	POWER SW. & OUTPUT SELECTOR	1. POWER OFF 2. A 3. SPKR OFF 4. B 5. A+B
S_{16}	PRE & MAIN SW.	SEPARATED ⟷ INTERCOUPLED
S_{17}	THERMO SW	ON ⟷ OFF
S_{18}	RELAY	OFF ⟷ ON

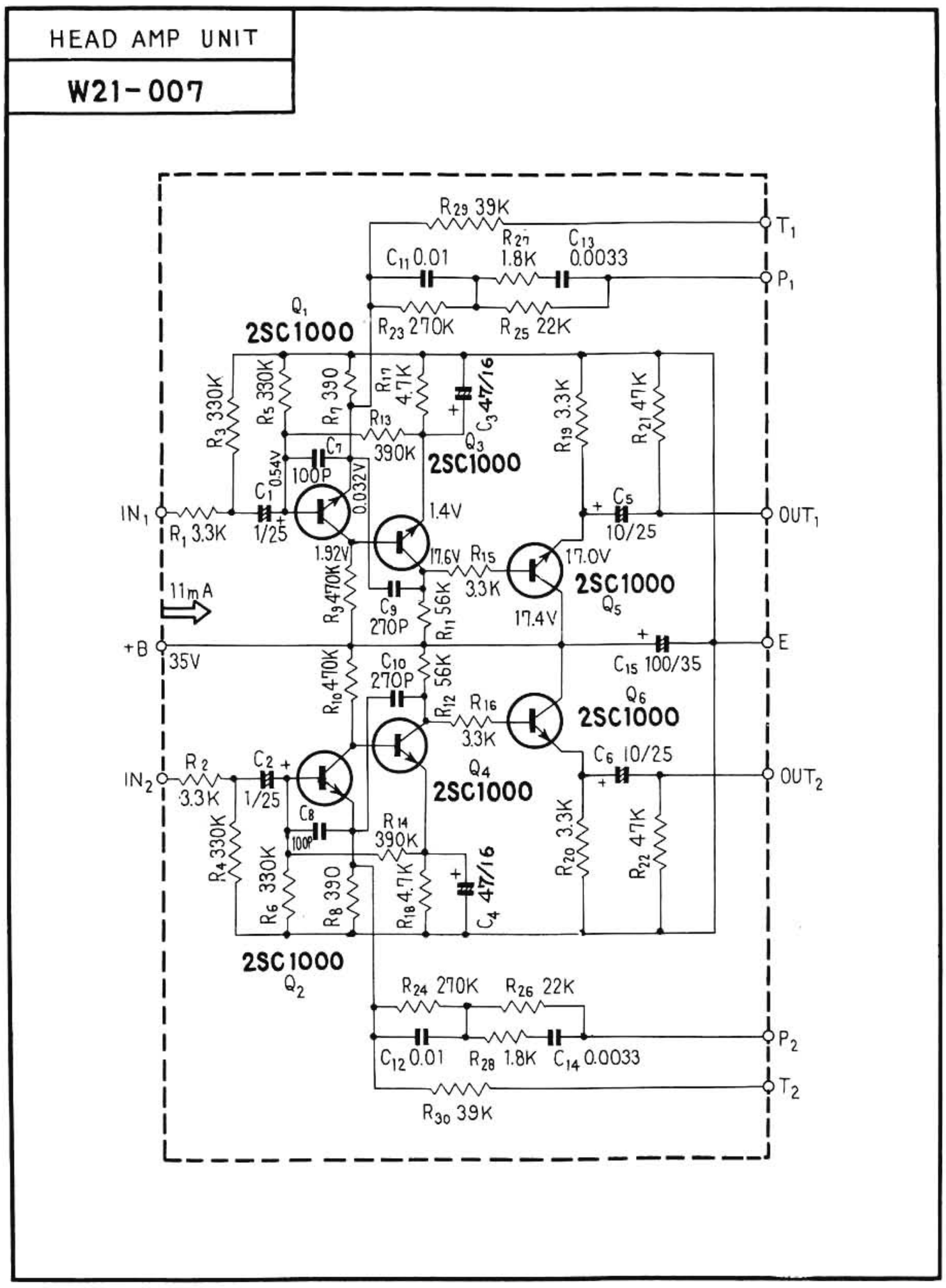
POTENTIOMETERS
VR_1 VOLUME
VR_2 BALANCE

V ···· DC VOLTAGE AT NO INPUT SIGNAL
[V] [mV] ···· SIGNAL VOLTAGE AT 67W OUTPUT
⇦ ···· DC CURRENT AT NO INPUT SIGNAL

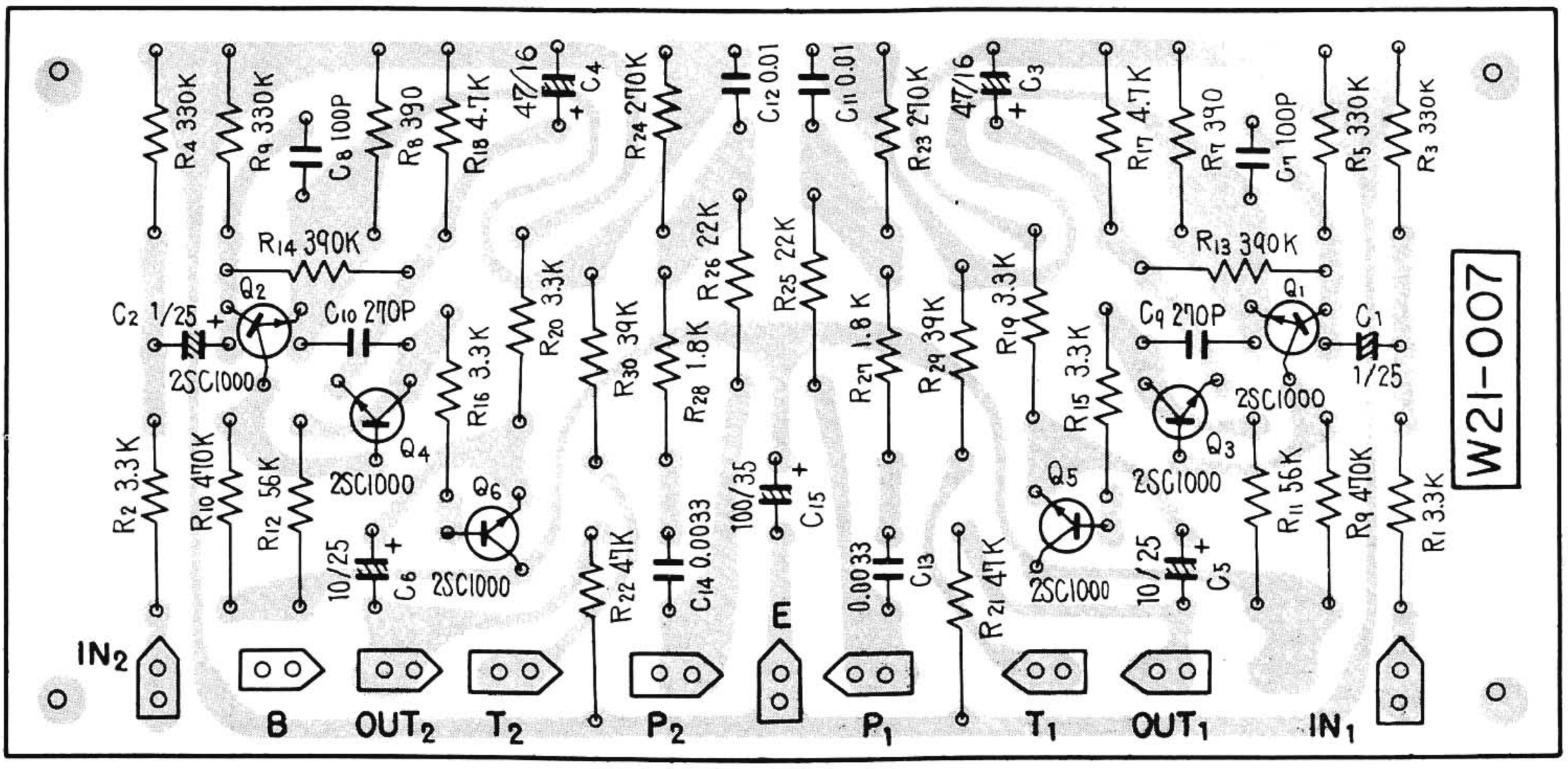
RESISTORS
NON MARK ···· OHM
M ···· MEGOHM
K ···· KILOHM

CAPACITORS
NON MARK ···· μF
P ···· μμF

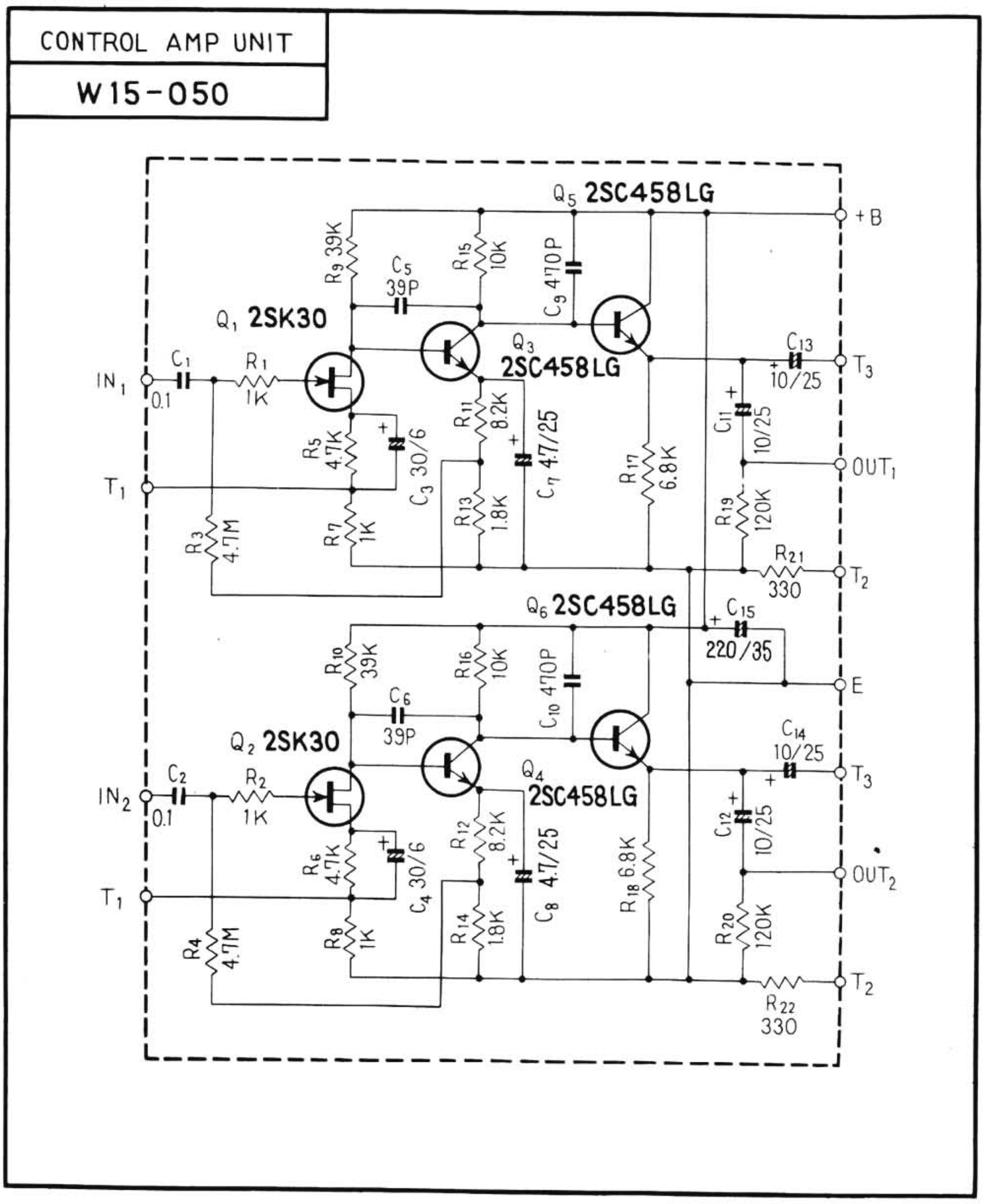
6-2 HEAD AMPLIFIER UNIT (W21-007)



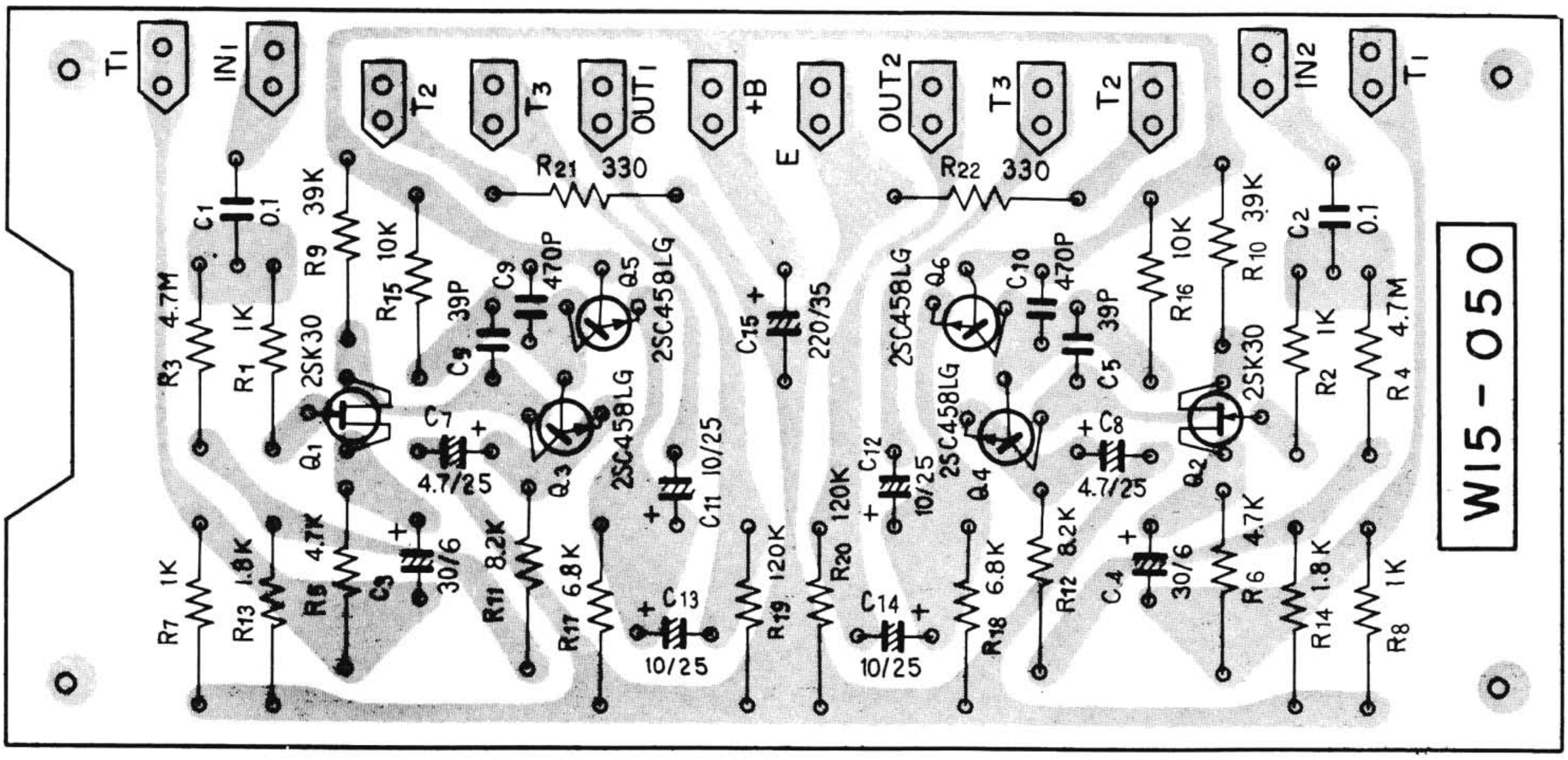
FOIL SIDE



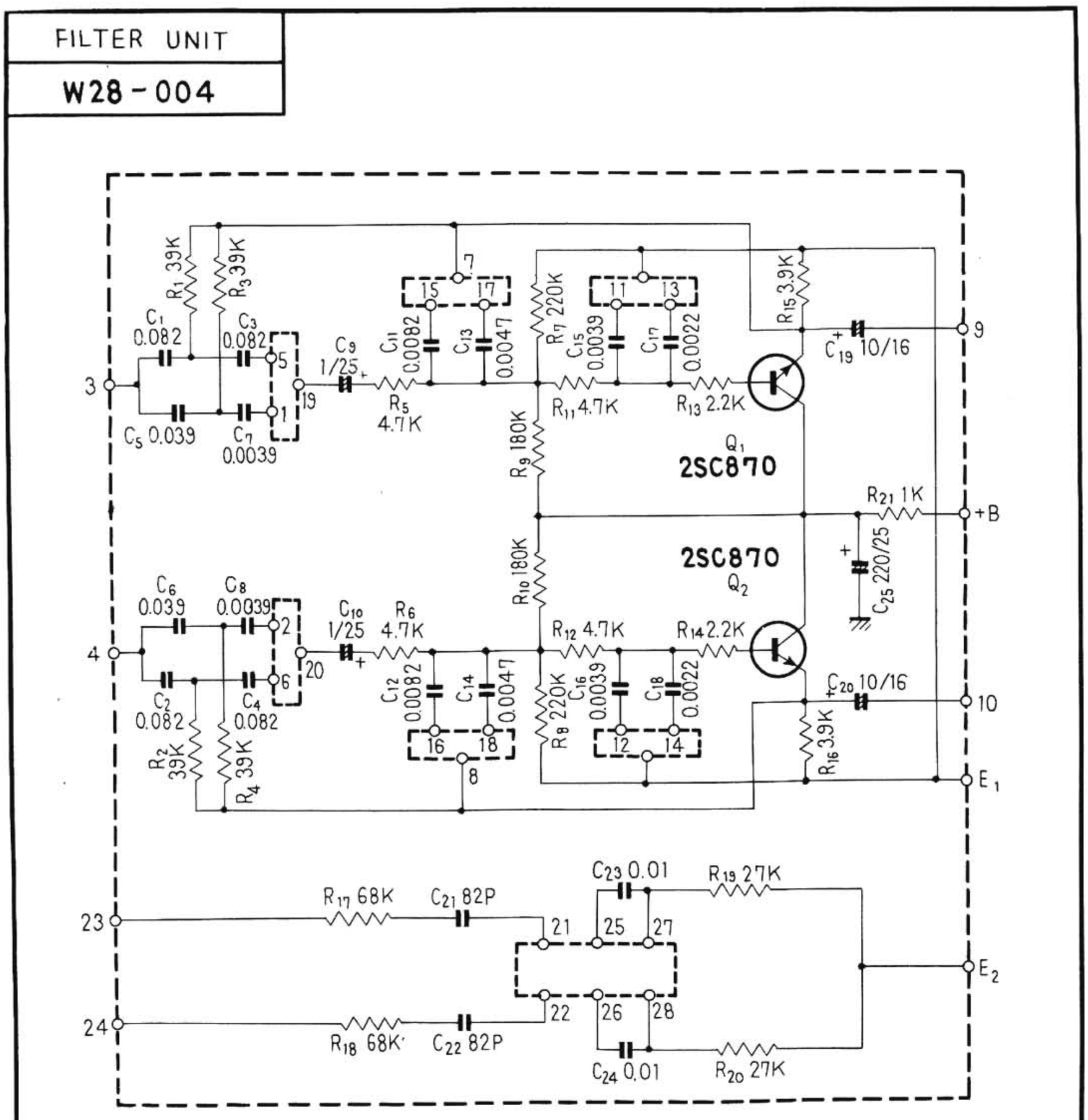
6-3 CONTROL AMPLIFIER UNIT (W15-050)



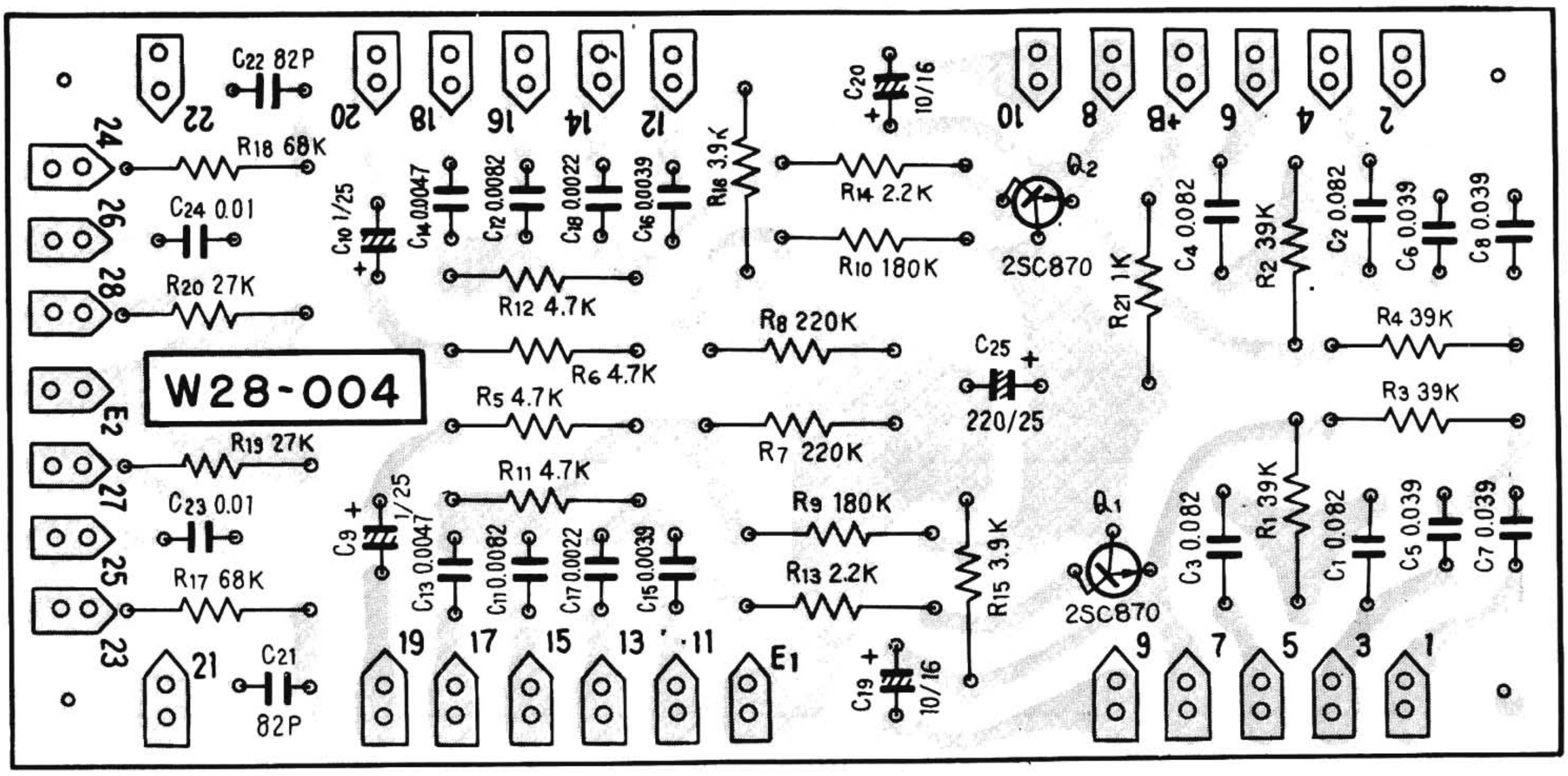
FOIL SIDE



6-4 FILTER UNIT (W28-004)



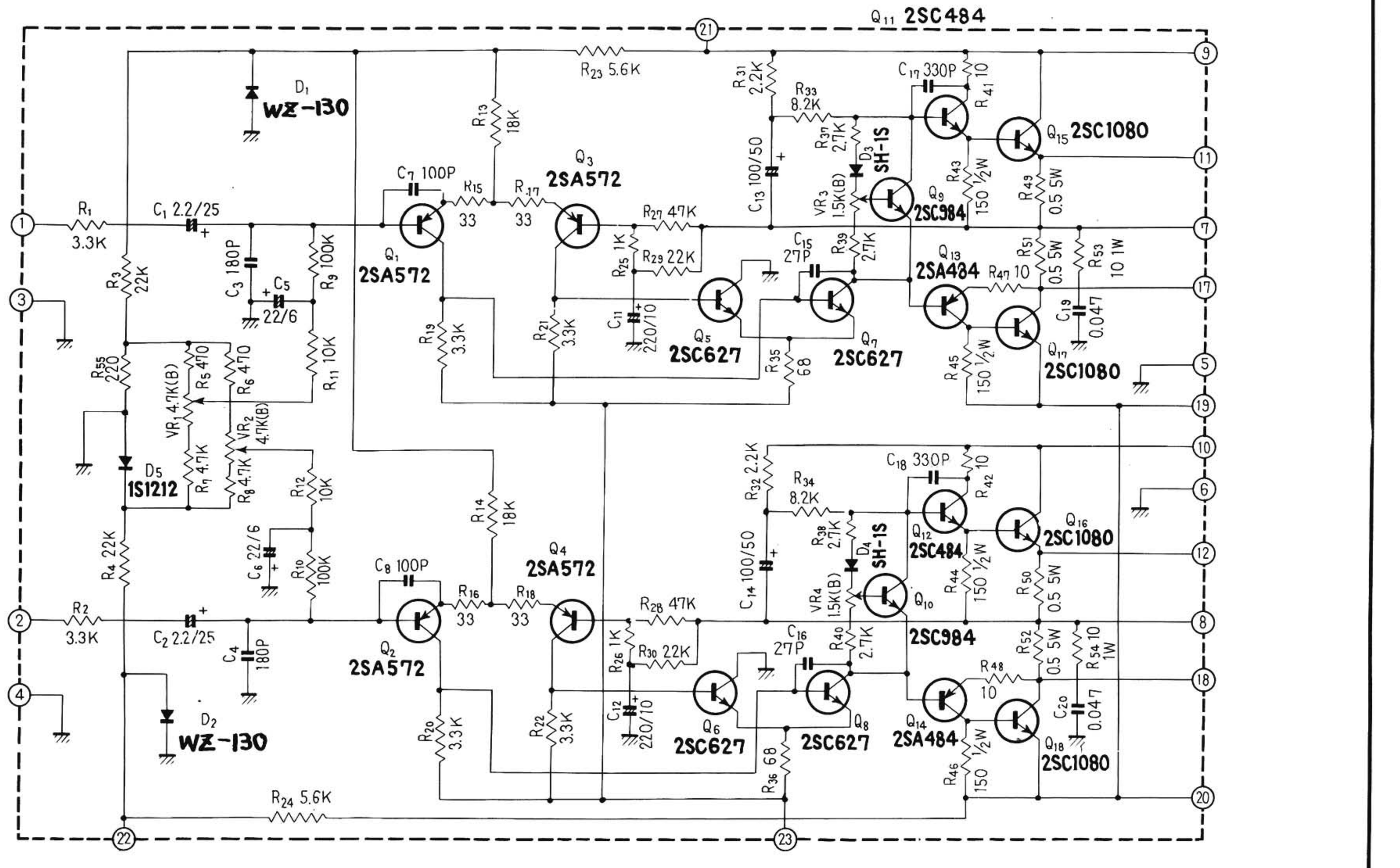
FOIL SIDE

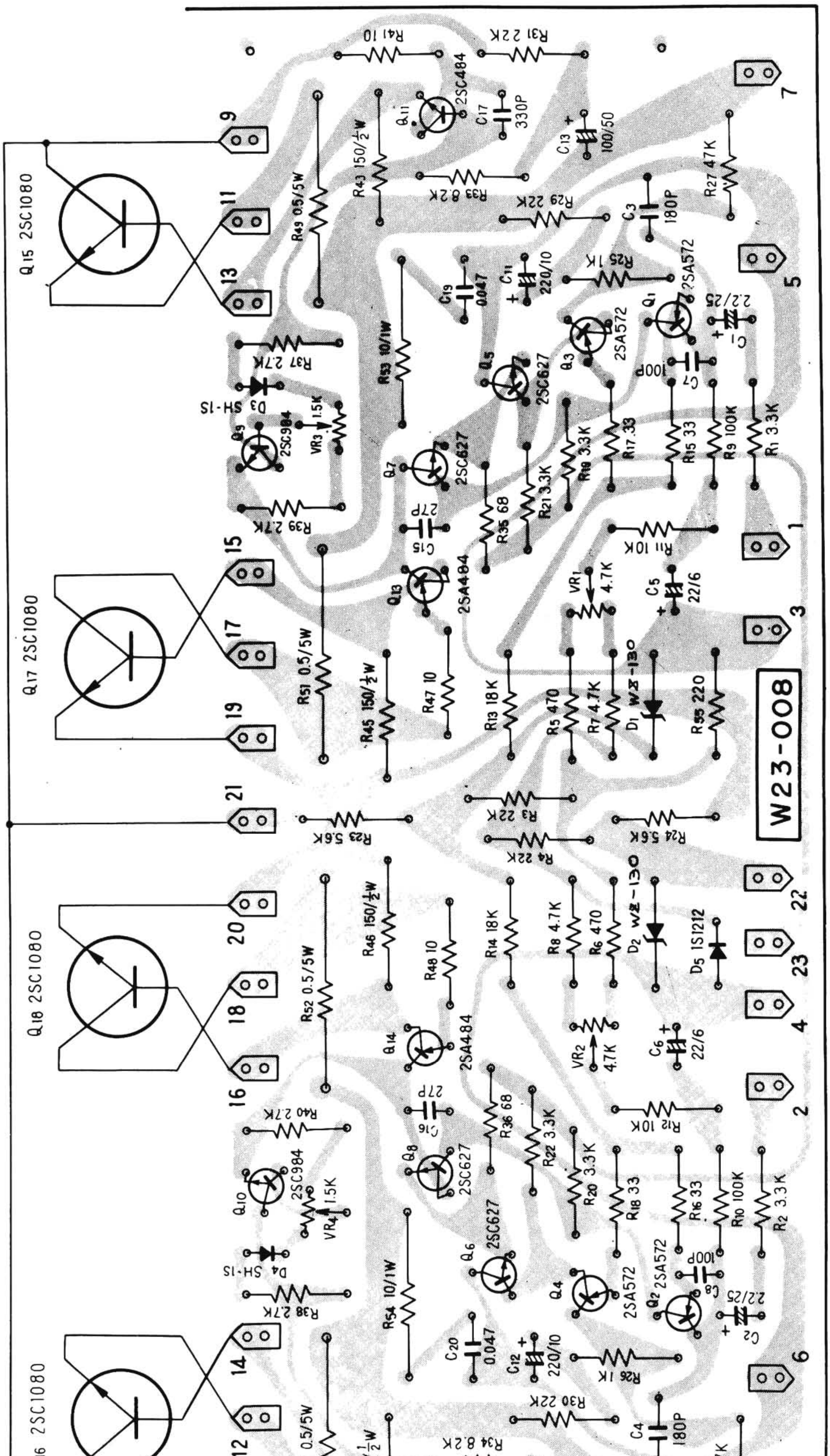


6-5 MAIN AMPLIFIER UNIT (W23-008)

MAIN AMP UNIT

W23-008

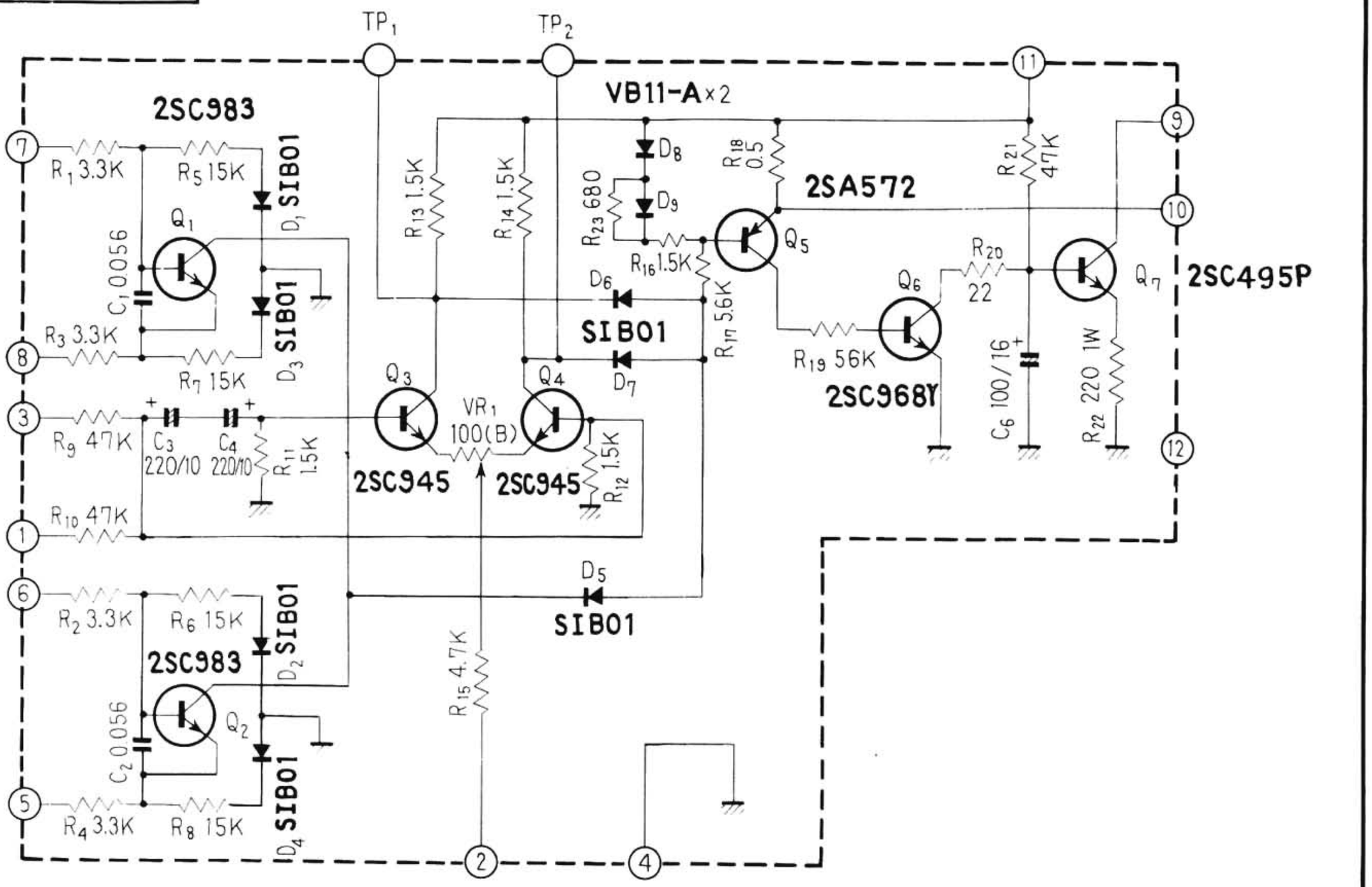



W23-008
FOIL SIDE

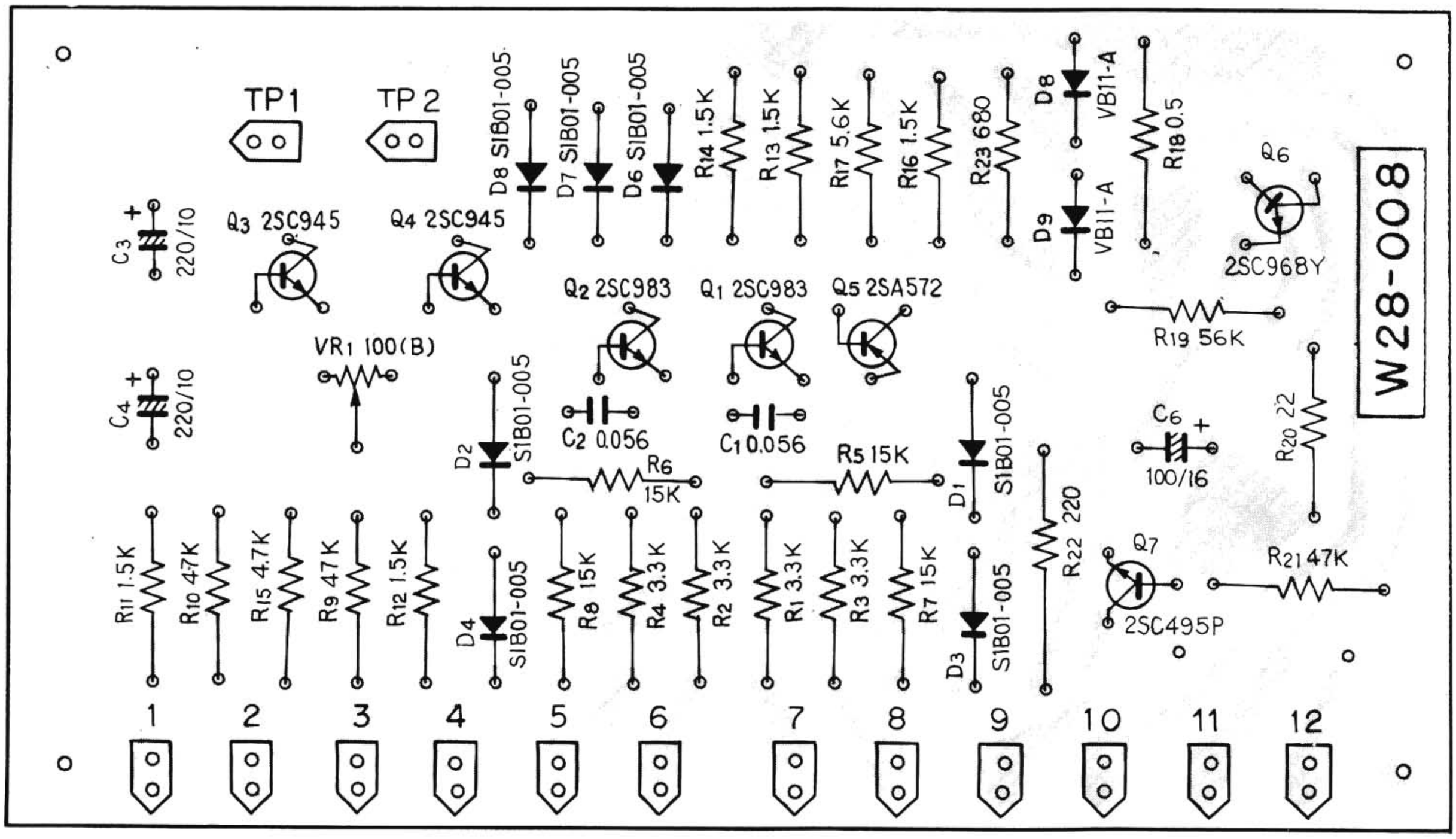
6-6 PROTECTOR UNIT (W28-008)

PROTECTOR UNIT

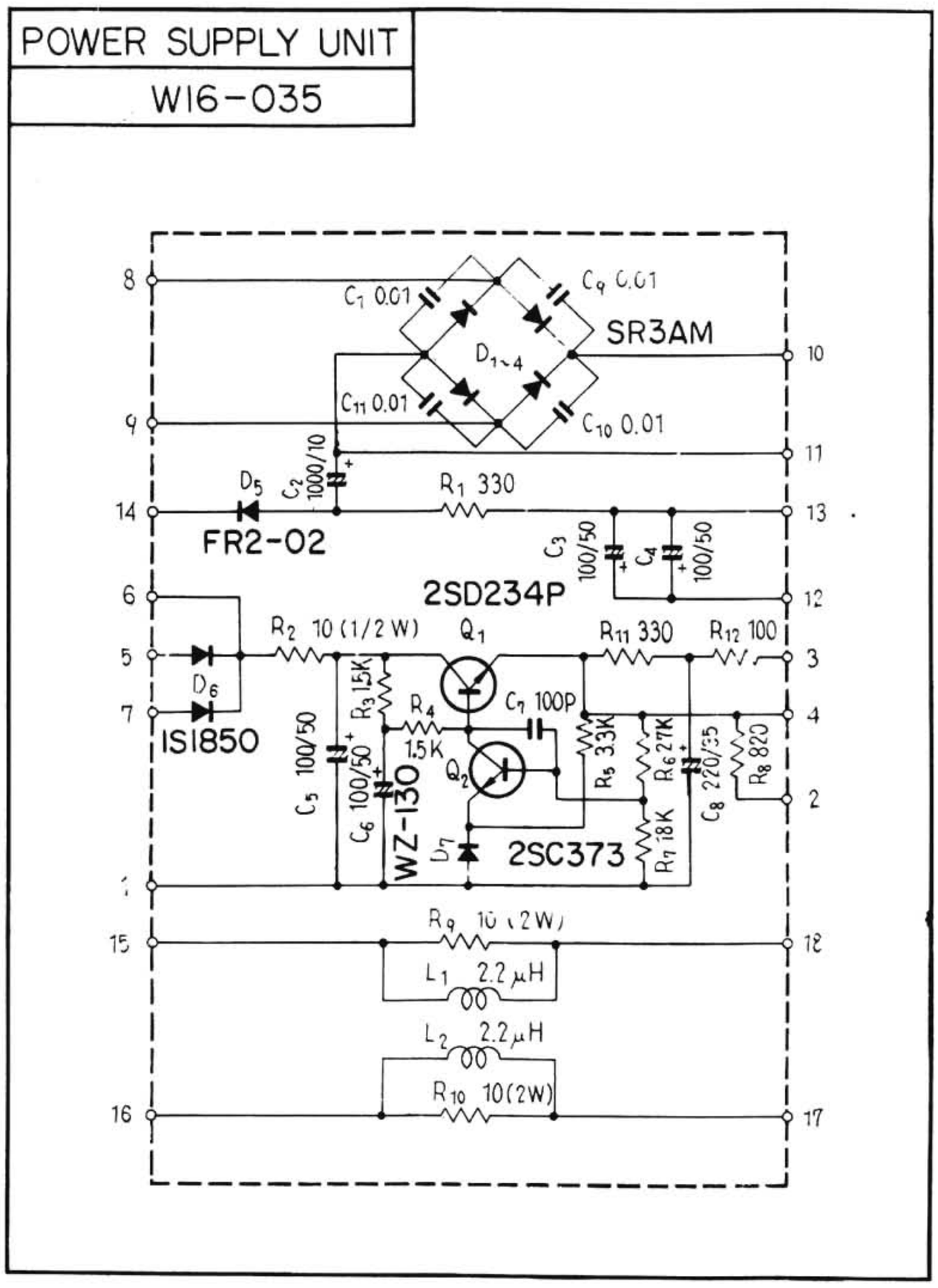
W28 - 008



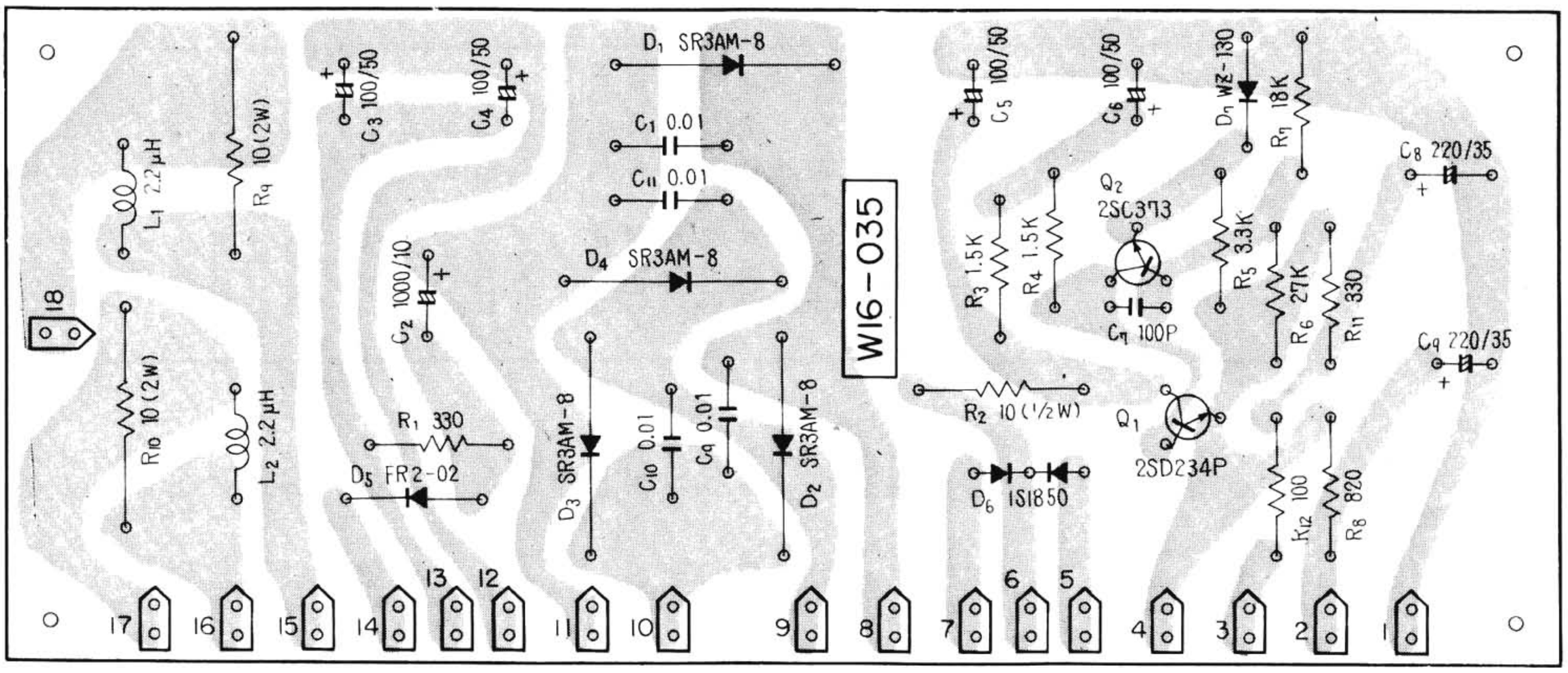
FOIL SIDE



6-7 POWER SUPPLY UNIT (W16-035)



FOIL SIDE



7. PARTS LIST

7-1 MISCELLANEOUS PARTS

CAPACITORS

Symbol	Description			Part No.		
C1	Ceramic	0.01	50V	CKDYF	103Z50	
C2	Ceramic	0.01	50V	CKDYF	103Z50	
C3	Styrol	0.0018	50V	CQSA	182K50	
C4	Styrol	0.0018	50V	CQSA	182K50	
C5	Styrol	0.001	50V	CQSA	102K50	
C6	Styrol	0.001	50V	CQSA	102K50	
C7	Styrol	0.0018	50V	CQSA	182K50	
C8	Styrol	0.0018	50V	CQSA	182K50	
C9	Mylar	0.05	50V	CQMA	503K50	
C10	Mylar	0.05	50V	CQMA	503K50	
C11	Mylar	0.025	50V	CQMA	253K50	
C12	Mylar	0.025	50V	CQMA	253K50	
C13	Mylar	0.015	50V	CQMA	153K50	
C14	Mylar	0.015	50V	CQMA	153K50	
C15	Mylar	0.03	50V	CQMA	303K50	
C16	Mylar	0.03	50V	CQMA	303K50	
C17	Mylar	0.05	50V	CQMA	503K50	
C18	Mylar	0.05	50V	CQMA	503K50	
C19	Mylar	0.012	50V	CQMA	123K50	
C20	Mylar	0.012	50V	CQMA	123K50	
C21	Mylar	0.012	50V	CQMA	123K50	
C22	Mylar	0.012	50V	CQMA	123K50	
C23	Mylar	0.022	50V	CQMA	223K50	
C24	Mylar	0.022	50V	CQMA	223K50	
C25	Styrol	820p	50V	CQSA	821K50	
C26	Styrol	820p	50V	CQSA	821K50	
C27	Styrol	820p	50V	CQSA	821K50	
C28	Styrol	820p	50V	CQSA	821K50	
C29	Styrol	0.0012	50V	CQSA	122K50	
C30	Styrol	0.0012	50V	CQSA	122K50	
C31	Mylar	0.002	50V	CQMA	202K50	
C32	Mylar	0.002	50V	CQMA	202K50	
C33	Electrolytic	4700	50V	C52-088-B		
C34	Electrolytic	4700	50V	C52-088-B		
C35	Electrolytic	4700	50V	C52-088-B		
C36	Electrolytic	4700	50V	C52-088-B		
C37	Electrolytic	1000	63V	ACH-001-B		
C38	Oil	0.01	AC 450V	ACE-001-A		KUW model
C39	Oil	0.01	AC 450V	ACE-001-A		KUW model
C40	Ceramic	100p	50V	CCDSL	101K50	
C41	Ceramic	100p	50V	CCDSL	101K50	
C42	Electrolytic	47	50V	CEA	470P50	
C43	Ceramic	0.01	DC 1.4kV	C43-003-O		FVW model
C44	Ceramic	0.01	DC 1.4kV	C43-003-O		FVW model
C45	Ceramic	0.01	DC 1.4kV	C43-003-O		FVW model

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	100k	RD¼PS	104K
R2	Carbon film	100k	RD¼PS	104K
R3	Carbon film	100k	RD¼PS	104K
R4	Carbon film	100k	RD¼PS	104K
R5	Carbon film	1M	RD¼PS	105K
R6	Carbon film	1M	RD¼PS	105K
R7	Carbon film	100K	RD¼PS	104K
R8	Carbon film	100k	RD¼PS	104K
R9	Carbon film	150k	RD¼PS	154K
R10	Carbon film	150k	RD¼PS	154K
R11	Carbon film	560k	RD¼PS	564K

Symbol	Description	Part No.	
R12	Carbon film 560k	RD¼PS 564K	
R13	Carbon film 100k	RD¼PS 104K	
R14	Carbon film 100k	RD¼PS 104K	
R15	Carbon film 22k	RD¼PS 223K	
R16	Carbon film 22k	RD¼PS 223K	
R19	Carbon film 3.3k	RD¼PS 332K	
R20	Carbon film 3.3k	RD¼PS 332K	
R21	Carbon film 120k	RD¼PS 124K	
R22	Carbon film 120k	RD¼PS 124K	
R23	Carbon film 330k	RD¼PS 334K	
R24	Carbon film 330k	RD¼PS 334K	
R25	Carbon film 470k	RD¼PS 474K	
R26	Carbon film 470k	RD¼PS 474K	
R27	Carbon film 180k	RD¼PS 184K	
R28	Carbon film 180k	RD¼PS 184K	
R29	Carbon film 15k	RD¼PS 153K	
R30	Carbon film 15k	RD¼PS 153K	
R31	Carbon film 1.8k	RD¼PS 182K	
R32	Carbon film 1.8k	RD¼PS 182K	
R33	Carbon film 100k	RD¼PS 104K	
R34	Carbon film 100k	RD¼PS 104K	
R35	Carbon film 10k	RD¼PS 103K	
R36	Carbon film 10k	RD¼PS 103K	
R37	Carbon film 2.2k	RD¼PS 222K	
R38	Carbon film 2.2k	RD¼PS 222K	
R39	Carbon film 12k	RD¼PS 123K	
R40	Carbon film 12k	RD¼PS 123K	
R41	Wire wound 150 5W	RT5B 151K	
R42	Wire wound 150 5W	RT5B 151K	
R43	Carbon film 82k	RD¼PS 823K	
R44	Carbon film 82k	RD¼PS 823K	
R45	Carbon film 1k	RD¼PS 102K	
R46	Carbon film 330k	RD¼PS 334K	
R47	Carbon film 330k	RD¼PS 334K	
R48	Carbon film 330k	RD¼PS 334K	
R49	Carbon film 330k	RD¼PS 334K	
R50	Carbon film 2.2M	RD¼PS 225K	
R51	Carbon film 2.2M	RD¼PS 225K	
R52	Carbon film 2.2M	RD¼PS 225K	
R53	Carbon film 2.2M	RD¼PS 225K	
R54	Carbon film 10k	RD¼PS 103K	
R55	Carbon film 10k	RD¼PS 103K	

POTENTIOMETERS

Symbol	Description	Part No.	
VR1	Dual-potentiometer 500k (B1)	C85-054-O	
VR2	Dual-potentiometer 500k (HB)	C85-048-B	

SWITCHES

Symbol	Description	Part No.	
S1	Input selector switch	S13-045-O	
S2	Mode switch	ASC-009-O	
S3	Lever switch	S42-013-A	
S4	Selector switch	S14-038-O	
S5	Lever switch	ASK-001-O	
S6	Lever switch	S42-015-O	
S7	Tone switch (BASS)	S15-037-O	
S8	Tone switch (BASS)	S15-037-O	
S9	Tone switch (TREBLE)	S15-034-A	
S10	Tone switch (TREBLE)	S15-034-A	

Symbol	Description	Part No.	
S11	Lever switch	S42-014-O	
S12	Lever switch	S42-005-B	
S13	Lever switch	S42-004-A	
S14	Lever switch	S42-014-O	
S15	Speaker selector with AC switch	ASA-001-A	KUW model
		S11-022-A	FVW model
S16	Slide switch	S41-025-O	
S17	Thermo switch	AST-001-O	KUW model
S18	Relay	S61-006-O	

OTHERS

Symbol	Description	Part No.	
	Head amplifier unit	W21-007-O	
	Control amplifier unit	W15-050-C	
	Filter unit	W28-004-O	
	Main amplifier unit	W23-008-O	
	Power supply unit	W16-035-A	
	Protector unit	W28-008-A	
	Front panel Ass'y	ANB-053-O	
	Wooden case	M52-139-C	
	Foot	AEC-012-O	
	Large knob	A12-299-A	
	Middle knob	A12-232-A	
	Lever switch knob	A19-096-O	
	Knob for Imp. switch	A12-240-O	
	1P input jack	K21-005-C	
	4P input jack	K21-010-E	
	6P input jack	K22-013-D	
	Power transformer	ATT-011-A	FVW model
		T52-211-C	KUW model
	Compound part for REC	W52-004-O	
	5P connecter socket	K93-003-B	
	Dual speaker socket	K72-031-O	
	Dual AC outlet	K82-014-O	FVW model
	AC outlet	K82-012-O	FVW model
	AC outlet	AKP-002-O	KUW model
	Headphone jack	K72-026-O	
	Microphone jack	K72-024-O	
	Swan type pilot lamp socket	K42-003-A	
	Fuse holder	AKR-001-O	FVW model
	Fuse holder	K96-007-B	KUW model
	Swan type pilot lamp	E22-020-O	
	3A fuse	E21-006-O	FVW model
	3A fuse	E21-021-O	KUW model
	1.5A fuse	E21-012-O	FVW model
	AC cord	D11-002-B	FVW model
	AC cord	D11-003-E	KUW model
	Fuse 1A	E21-020-O	FVW model
	Fuse 1A	AEK-004-O	KUW model
	Operating instructions	ARB-003-A	FVW model
	Operating instructions	ARB-002-A	KUW model
	Screw for ground	B11-012-A	
	Screw	B11-015-B	
	Tooth washer	B21-011-O	
	Tooth washer	ABE-001-O	
	Connection cord (White)	D51-003-B	
	Connection cord (Red)	D51-004-B	
	Pin plug	K72-015-A	
	Speaker plug	K72-007-B	
	8P socket	K24-002-A	
	Pilot lamp socket	K42-003-A	
	Packing case	AHD-011-O	FVW model
		AHD-012-O	KUW model
	Styrol	H11-070-B	
	Cardboard cushion	H11-078-O	

7-2 HEAD AMPLIFIER UNIT (W21-007)

CAPACITORS

Symbol	Description			Part No.	
C1	Electrolytic	1	25V	CSSA 010X 25	
C2	Electrolytic	1	25V	CSSA 010X 25	
C3	Electrolytic	4.7	25V	CEA 4R7P 25	
C4	Electrolytic	4.7	25V	CEA 4R7P 25	
C5	Electrolytic	10	25V	CEA 100P 25	
C6	Electrolytic	10	25V	CEA 100P 25	
C7	Ceramic	100P	50V	CCDSL 101K 50	
C8	Ceramic	100P	50V	CCDSL 101K 50	
C9	Ceramic	270P	50V	CCDSL 271K 50	
C10	Ceramic	270P	50V	CCDSL 271K 50	
C11	Mylar	0.01	50V	CQMA103K 50	
C12	Mylar	0.01	50V	CQMA103K 50	
C13	Mylar	0.0033	50V	CQMA332K 50	
C14	Mylar	0.0033	50V	CQMA332K 50	
C15	Electrolytic	100	35V	CEA 101P 35	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	3.3k	RD¼PS 332K	
R2	Carbon film	3.3k	RD¼PS 332K	
R3	Carbon film	330k	RD¼PS 334K	
R4	Carbon film	330k	RD¼PS 334K	
R5	Carbon film	330k	RD¼PS 334K	
R6	Carbon film	330k	RD¼PS 334K	
R7	Carbon film	330k	RD¼PS 331J	
R8	Carbon film	330k	RD¼PS 331J	
R9	Carbon film	470k	RD¼PS 474K	
R10	Carbon film	470k	RD¼PS 474K	
R11	Carbon film	56k	RD¼PS 563K	
R12	Carbon film	56k	RD¼PS 563K	
R13	Carbon film	390k	RD¼PS 394K	
R14	Carbon film	390k	RD¼PS 394K	
R15	Carbon film	3.3k	RD¼PS 332K	
R16	Carbon film	3.3k	RD¼PS 332K	
R17	Carbon film	4.7k	RD¼PS 472K	
R18	Carbon film	4.7k	RD¼PS 472K	
R19	Carbon film	3.3k	RD¼PS 332K	
R20	Carbon film	3.3k	RD¼PS 332K	
R21	Carbon film	47k	RD¼PS 473K	
R22	Carbon film	47k	RD¼PS 473K	
R23	Carbon film	270k	RD¼PS 274K	
R24	Carbon film	270k	RD¼PS 274K	
R25	Carbon film	22k	RD¼PS 223K	
R26	Carbon film	22k	RD¼PS 223K	
R27	Carbon film	1.8k	RD¼PS 182K	
R29	Carbon film	39k	RD¼PS 393K	
R30	Carbon film	39k	RD¼PS 393K	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SC1000-BL		
Q2	Transistor	2SC1000-BL		
Q3	Transistor	2SC1000-BL,GR		
Q4	Transistor	2SC1000-BL,GR		
Q5	Transistor	2SC1000-BL,GR		
Q6	Transistor	2SC1000-BL,GR		

7-3 CONTROL AMPLIFIER UNIT (W15-050)

CAPACITORS

Symbol	Description			Part No.	
C1	Mylar	0.1	25V	CQMA104K 50	
C2	Mylar	0.1	25V	CQMA104K 50	
C3	Electrolytic	30	6V	CEA 300P 6	
C4	Electrolytic	30	6V	CEA 300P 6	
C5	Ceramic	39p	50V	CCDSL 390K 50	
C6	Ceramic	39p	50V	CCDSL 390K 50	
C7	Electrolytic	4.7	25V	CEA 4R7P 25	
C8	Electrolytic	4.7	25V	CEA 4R7P 25	
C9	Ceramic	470p	50V	CKDYB471K50	
C10	Ceramic	470p	50V	CKDYB471K50	
C11	Electrolytic	10	25V	CEA 100P 25	
C12	Electrolytic	10	25V	CEA 100P 25	
C13	Electrolytic	10	25V	CEA 100P 25	
C14	Electrolytic	10	25V	CEA 100P 25	
C15	Electrolytic	220	35V	CEA 221P 35	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	1k	RD¼PS 102K	
R2	Carbon film	1k	RD¼PS 102K	
R3	Carbon film	4.7M	RD¼PS 475K	
R4	Carbon film	4.7M	RD¼PS 475K	
R5	Carbon film	4.7k	RD¼PS 472K	
R6	Carbon film	4.7k	RD¼PS 472K	
R7	Carbon film	1k	RD¼PS 102K	
R8	Carbon film	1k	RD¼PS 102K	
R9	Carbon film	39k	RD¼PS 393K	
R10	Carbon film	39k	RD¼PS 393K	
R11	Carbon film	8.2k	RD¼PS 822K	
R12	Carbon film	8.2k	RD¼PS 822K	
R13	Carbon film	1.8k	RD¼PS 182K	
R14	Carbon film	1.8k	RD¼PS 182K	
R15	Carbon film	10k	RD¼PS 103K	
R16	Carbon film	10k	RD¼PS 103K	
R17	Carbon film	6.8k	RD¼PS 682K	
R18	Carbon film	6.8k	RD¼PS 682K	
R19	Carbon film	120k	RD¼PS 124K	
R20	Carbon film	120k	RD¼PS 124K	
R21	Carbon film	330	RD¼PS 331K	
R22	Carbon film	330	RD¼PS 331K	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	F.E.T.	2SK30-GR		
Q2	F.E.T.	2SK17-Y		
Q3	Transistor	2SC458LG-C		
Q4	Transistor	2SC458LG-C		
Q5	Transistor	2SC458LG-C		
Q6	Transistor	2SC458LG-C		

7-4 FILTER UNIT (W28-004)

CAPACITORS

Symbol	Description			Part No.	
C1	Mylar	0.082	50V	CQMA823P 50	
C2	Mylar	0.082	50V	CQMA823P 50	
C3	Mylar	0.082	50V	CQMA823P 50	
C4	Mylar	0.082	50V	CQMA823P 50	
C5	Mylar	0.039	50V	CQMA393K 50	
C6	Mylar	0.039	50V	CQMA393K 50	
C7	Mylar	0.039	50V	CQMA393K 50	
C8	Mylar	0.039	50V	CQMA393K 50	
C9	Electrolytic	1	25V	CEA 010P 25	
C10	Electrolytic	1	25V	CEA 010P 25	
C11	Mylar	0.0082	50V	CQMA822K 50	
C12	Mylar	0.0082	50V	CQMA822K 50	
C13	Mylar	0.0047	50V	CQMA472K 50	
C14	Mylar	0.0047	50V	CQMA472K 50	
C15	Mylar	0.0039	50V	CQMA392K 50	
C16	Mylar	0.0039	50V	CQMA392K 50	
C17	Mylar	0.0022	50V	CQMA222K 50	
C18	Mylar	0.0022	50V	CQMA222K 50	
C19	Electrolytic	10	16V	CEA 100P 16	
C20	Electrolytic	10	16V	CEA 100P 16	
C21	Ceramic	82p	50V	CCDSL 820K 50	
C22	Ceramic	82p	50V	CCDSL 820K 50	
C23	Mylar	0.01	50V	CQMA103K 50	
C24	Mylar	0.01	50V	CQMA103K 50	
C25	Electrolytic	220	25V	CEA 221K 25	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	39k	RD¼PS 393K	
R2	Carbon film	39k	RD¼PS 393K	
R3	Carbon film	39k	RD¼PS 393K	
R4	Carbon film	39k	RD¼PS 393K	
R5	Carbon film	4.7k	RD¼PS 472K	
R6	Carbon film	4.7k	RD¼PS 472K	
R7	Carbon film	220k	RD¼PS 224K	
R8	Carbon film	220k	RD¼PS 224K	
R9	Carbon film	180k	RD¼PS 184K	
R10	Carbon film	180k	RD¼PS 184K	
R11	Carbon film	4.7k	RD¼PS 472K	
R12	Carbon film	4.7k	RD¼PS 472K	
R13	Carbon film	2.2k	RD¼PS 222K	
R14	Carbon film	2.2k	RD¼PS 222K	
R15	Carbon film	3.9k	RD¼PS 392K	
R16	Carbon film	3.9k	RD¼PS 392K	
R17	Carbon film	68k	RD¼PS 683K	
R18	Carbon film	68k	RD¼PS 683K	
R19	Carbon film	27k	RD¼PS 273K	
R20	Carbon film	27k	RD¼PS 273K	
R21	Carbon film	1k	RD¼PS 102K	
R22	Carbon film	1k	RD¼PS 102K	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SC870-E		
Q2	Transistor	2SC870-E		

7-5 MAIN AMPLIFIER UNIT (W23-008)

CAPACITORS

Symbol	Description			Part No.	
C1	Electrolytic	2.2	25V	CSSA 2R2X 25	
C2	Electrolytic	2.2	25V	CSSA 2R2X 25	
C3	Ceramic	180p	50V	CCDSL 181K 50	
C4	Ceramic	180p	50V	CCDSL 181K 50	
C5	Electrolytic	22	6V	CEA 220P 6	
C6	Electrolytic	22	6V	CEA 220P 6	
C7	Ceramic	100p	50V	CCDSL 101K 50	
C8	Ceramic	100p	50V	CCDSL 101K 50	
C11	Electrolytic	220	10V	CEA 221P 10	
C12	Electrolytic	220	10V	CEA 221P 10	
C13	Electrolytic	100	50V	CEA 101P 50	
C14	Electrolytic	100	50V	CEA 101P 50	
C15	Ceramic	27p	50V	CCDSL 270K 50	
C16	Ceramic	27p	50V	CCDSL 270K 50	
C17	Ceramic	330p	50V	CKDYB 331K 50	
C18	Ceramic	330p	50V	CKDYB 331K 50	
C19	Mylar	0.047	50V	CQMA 473M 50	
C20	Mylar	0.047	50V	CQMA 473M 50	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	3.3k	RD¼PS 332K	
R2	Carbon film	3.3k	RD¼PS 332K	
R3	Carbon film	22k	RD¼PS 223K	
R4	Carbon film	22k	RD¼PS 223K	
R5	Carbon film	470	RD¼PS 471K	
R6	Carbon film	470	RD¼PS 471K	
R7	Carbon film	4.7k	RD¼PS 472K	
R8	Carbon film	4.7k	RD¼PS 472K	
R9	Carbon film	100k	RD¼PS 104K	
R10	Carbon film	100k	RD¼PS 104K	
R11	Carbon film	10k	RD¼PS 103K	
R12	Carbon film	10k	RD¼PS 103K	
R13	Carbon film	18k	RD¼PS 183J	
R14	Carbon film	18k	RD¼PS 183J	
R15	Carbon film	33	RD¼PS 330K	
R16	Carbon film	33	RD¼PS 330K	
R17	Carbon film	33	RD¼PS 330K	
R18	Carbon film	33	RD¼PS 330K	
R19	Carbon film	3.3k	RD¼PS 332K	
R20	Carbon film	3.3k	RD¼PS 332K	
R21	Carbon film	3.3k	RD¼PS 332K	
R22	Carbon film	3.3k	RD¼PS 332K	
R23	Carbon film	5.6k	RD¼PS 562K	
R24	Carbon film	5.6k	RD¼PS 562K	
R25	Carbon film	1k	RD¼PS 102K	
R26	Carbon film	1k	RD¼PS 102K	
R27	Carbon film	47k	RD¼PS 473K	
R28	Carbon film	47k	RD¼PS 473K	
R29	Carbon film	22k	RD¼PS 223K	
R30	Carbon film	22k	RD¼PS 223K	
R31	Carbon film	2.2k	RD¼PS 222K	
R32	Carbon film	2.2k	RD¼PS 222K	
R33	Carbon film	8.2k	RD¼PS 822K	
R34	Carbon film	8.2k	RD¼PS 822K	
R35	Carbon film	68	RD¼PS 680K	

Symbol	Description			Part No.		
R36	Carbon film	68		RD¼PS	680K	
R37	Carbon film	2.7k		RD¼PS	272K	
R38	Carbon film	2.7k		RD¼PS	272K	
R39	Carbon film	2.7k		RD¼PS	272K	
R40	Carbon film	2.7k		RD¼PS	272K	
R41	Carbon film	10		RD¼PS	100K	
R42	Carbon film	10		RD¼PS	100K	
R43	Carbon film	150		RD½PS	151K	
R44	Carbon film	150		RD½PS	151K	
R45	Carbon film	150		RD½PS	151K	
R46	Carbon film	150		RD½PS	151K	
R47	Carbon film	10		RD¼PS	100K	
R48	Carbon film	10		RD¼PS	100K	
R49	Wire wound	0.5	5W	RS5B	0R5K	
R50	Wire wound	0.5	5W	RS5B	oR5K	
R51	Wire wound	0.5	5W	RT5B	0R5K	
R52	Wire wound	0.5	5W	RT5B	0R5K	
R53	Metal oxide	10	1W	RS1P	100K	
R54	Metal oxide	10	1W	RS1P	100K	
R55	Carbon film	220		RD¼PS	221K	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SA572-4B or 5A, 5B		
Q2	Transistor	2SA572-4B or 5A, 5B		
Q3	Transistor	2SA572-4B or 5A, 5B		
Q4	Transistor	2SA572-4B or 5A, 5B		
Q5	Transistor	2SC627-1		
Q6	Transistor	2SC627-1		
Q7	Transistor	2SC627-1		
Q8	Transistor	2SC627-1		
Q9	Transistor	2SC984-B		
Q10	Transistor	2SC984-B		
Q11	Transistor	2SC484-Y or BL		
Q12	Transistor	2SC484-Y or BL		
Q13	Transistor	2SA484-Y or BL		
Q14	Transistor	2SA484-Y or BL		
Q15	Transistor	2SC+080-R		
Q16	Transistor	2SC1080-R		
Q17	Transistor	2SC1080-R		
Q18	Transistor	2SC1080-R		
D1	Diode	WZ-130		
D2	Diode	WZ-130		
D3	Diode	SH-1S		
D4	Diode	SH-1S		
D5	Diode	1S1212		

SEMI-FIXED POTENTIOMETERS

Symbol	Description		Part No.	
VR1	Semi-fixed	4.7k-B	C92-051-O	
VR2	Semi-fixed	4.7k-B	C92-051-O	
VR3	Semi-fixed	1.5k-B	C92-066-O	
VR4	Semi-fixed	1.5k-B	C92-066-O	

7-6 PROTECTOR UNIT (W28-008)

CAPACITORS

Symbol	Description			Part No.	
C1	Mylar	0.056	50V	CQMA563K 50	
C2	Mylar	0.056	50V	CQMA563K 50	
C3	Electrolytic	220	10V	CEA 221P 50	
C4	Electrolytic	220	10V	CEA 221P 50	
C6	Electrolytic	100	16V	CEA 101P 50	

RESISTORS

Symbol	Description			Part No.	
R1	Carbon film	3.3k		RD¼PS 332K	
R2	Carbon film	3.3k		RD¼PS 332K	
R3	Carbon film	3.3k		RD¼PS 332K	
R4	Carbon film	3.3k		RD¼PS 332K	
R5	Carbon film	15k		RD¼PS 153K	
R6	Carbon film	15k		RD¼PS 153K	
R7	Carbon film	15k		RD¼PS 153K	
R8	Carbon film	15k		RD¼PS 153K	
R9	Carbon film	47k		RD¼PS 473K	
R10	Carbon film	47k		RD¼PS 473K	
R11	Carbon film	1.5k		RD¼PS 152K	
R12	Carbon film	1.5k		RD¼PS 152K	
R13	Carbon film	1.5k	± 5%	RD¼PS 152J	
R14	Carbon film	1.5k	± 5%	RD¼PS 152J	
R15	Carbon film	4.7k	± 5%	RD¼PS 472J	
R16	Carbon film	1.5k	± 5%	RD¼PS 152K	
R17	Carbon film	5.6k	± 5%	RD¼PS 562J	
R18	Wire wound	0.5	2W	RT2B 0R5K	
R19	Carbon film	56k		RD¼PS 563K	
R20	Carbon film	22		RD¼PS 220K	
R21	Carbon film	47k		RD¼PS 473K	
R22	Carbon film	220		RD¼PS 221K	
R23	Carbon film	680	± 5%	RD¼PS 681J	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SC983-O or Y		
Q2	Transistor	2SC983-O or Y		
Q3	Transistor	2SC945-R		
Q4	Transistor	2SC945-R		
Q5	Transistor	2SA572-4		
Q6	Transistor	2SC968Y-2 or 3		
Q7	Transistor	2SC495P-Y		
D1	Diode	SIB01-005		
D2	Diode	SIB01-005		
D3	Diode	SIB01-005		
D4	Diode	SIB01-005		
D5	Diode	SIB01-005		
D6	Diode	SIB01-005		
D7	Diode	SIB01-005		
D8	Diode	VB-11A		
D9	Diode	VB-11A		

SEMI-FIXED POTENTIOMETER

Symbol	Description		Part No.	
VR1	Semi-fixed	100-B	C92-063-O	

7-7 POWER SUPPLY UNIT (W16-035)

CAPACITORS

Symbol	Description			Part No.	
C1	Ceramic	0.01	DC 1.4kV	C43-003-O	
C2	Electrolytic	1000	10V	CEA 102P 10	
C3	Electrolytic	100	50V	CEA 101P 50	
C4	Electrolytic	100	50V	CEA 101P 50	
C5	Electrolytic	100	50V	CEA 101P 50	
C6	Electrolytic	100	50V	CEA 101P 50	
C7	Ceramic	100p	50V	CCDSL 101K 50	
C8	Electrolytic	220	35V	CEA 221P 50	
C9	Ceramic	0.01	DC 1.4kV	C43-003-O	
C10	Ceramic	0.01	DC 1.4kV	C43-003-O	
C11	Ceramic	0.01	DC 1.4kV	C43-003-O	

RESISTORS

Symbol	Description			Part No.	
R1	Carbon film	330		RD¼PS 331K	
R2	Carbon film	10	½W	RD½PS 100K	
R3	Carbon film	1.5k		RD¼PS 152K	
R4	Carbon film	1.5k		RD¼PS 152K	
R5	Carbon film	3.3k		RD¼PS 332K	
R6	Carbon film	18k		RD¼PS 183K	
R7	Carbon film	12k		RD¼PS 123K	
R8	Carbon film	820		RD¼PS 821K	
R9	Metal oxide	10	2W	RT2B 100K	
R10	Metal oxide	10	2W	RT2B 100K	

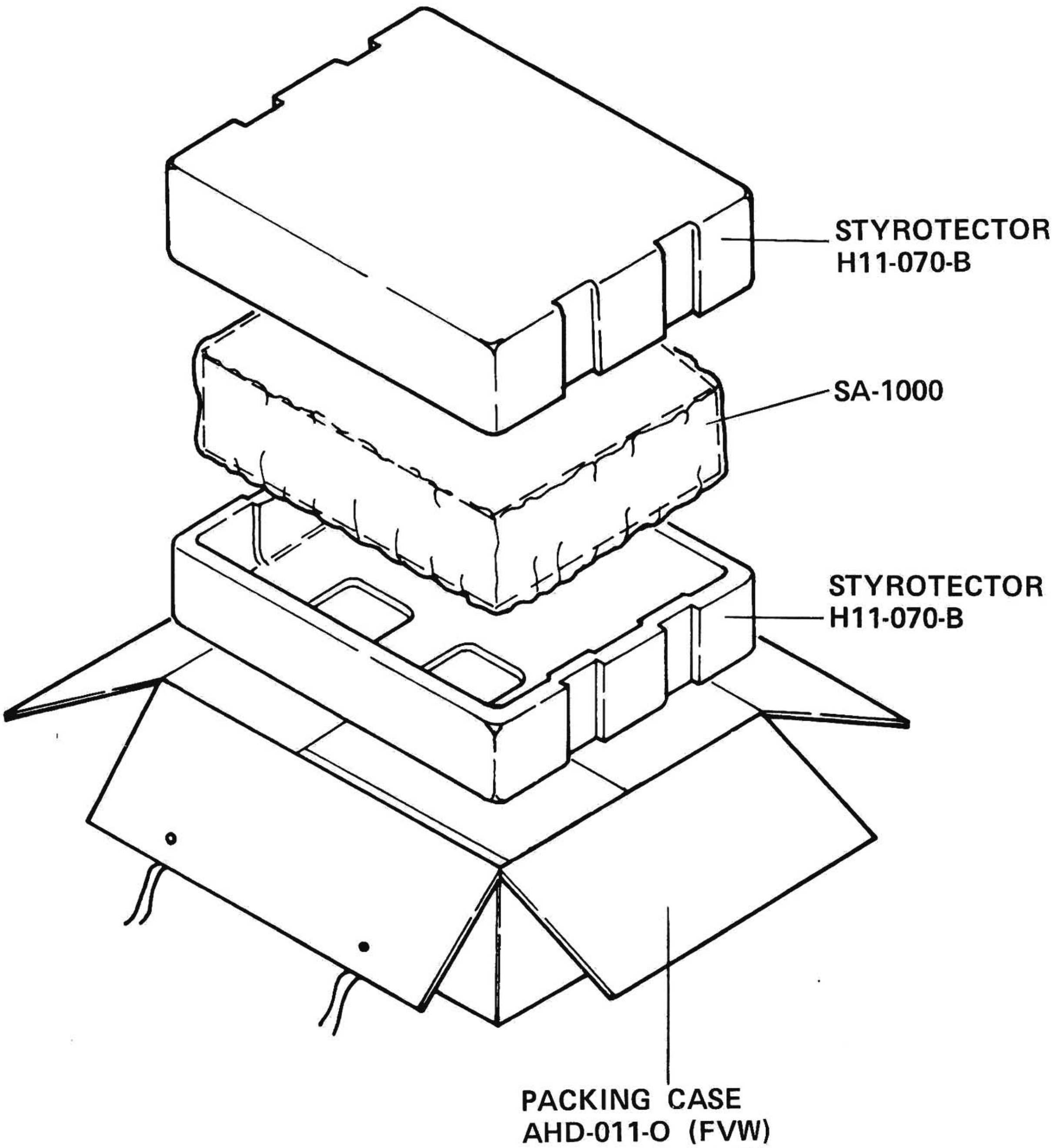
SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	Transistor	2SD234 P-0		
Q2	Transistor	2SD373		
D1	Diode	SR3AM-8		
D2	Diode	SR3AM-8		
D3	Diode	SR3AM-8		
D4	Diode	SR3AM-8		
D5	Diode	FR2-02		
D6	Diode	ISI850		
D7	Diode	WZ-130		

COILS

Symbol	Description	Part No.	
L1	AF choke coil	T63-009-A	
L2	AF choke coil	T63-009-A	

8. PACKING PARTS VIEW



9. ALTERATIONS

From serial No. 14901, some alterations have been made in parts and circuitry.
The new parts and circuit diagrams are as follows.

- UNIT CONNECTION DIAGRAM
- HEAD AMPLIFIER UNIT
- FILTER UNIT

7. PARTS LIST

7-1 MISCELLANEOUS PARTS

CAPACITORS

IN μF, 10% TOLERANCE

Symbol	Description			Part No.	
C19	Mylar	0.015	50V	CQMA153K 50	
C20	Mylar	0.015	50V	CQMA153K 50	
C21	Mylar	0.022	50V	CQMA223K 50	
C22	Mylar	0.022	50V	CQMA223K 50	
C23	Mylar	0.082	50V	CQMA823K 50	
C24	Mylar	0.082	50V	CQMA823K 50	
C42	Mylar	0.082	50V	CQMA823K 50	
C47	Mylar	0.082	50V	CQMA823K 50	

RESISTORS

IN OHM ¼W, 10% TOLERANCE, k:kΩ

Symbol	Description			Part No.	
R17	Metal oxide	560	2W	RS2P 561K	
R18	Metal oxide	560	2W	RS2P 561K	
R56	Carbon film	120k		RD¼PS 124K	
R57	Carbon film	120k		RD¼PS 124K	

OTHERS

Symbol	Description	Part No.	
	Head amplifier unit	W21-007-A	
	Filter unit	W28-004-A	

7-2 HEAD AMPLIFIER UNIT

RESISTORS

IN OHM ¼W, 10% TOLERANCE, k:kΩ

Symbol	Description			Part No.	
R7	Carbon film	330	± 5%	RD¼PS 331J	
R8	Carbon film	330	± 5%	RD¼PS 331J	
R23	Carbon film	200k		RD¼PS 204K	
R24	Carbon film	200k		RD¼PS 204K	
R25	Carbon film	18k		RD¼PS 183K	
R26	Carbon film	18k		RD¼PS 183K	
R27	Carbon film	1k		RD¼PS 102K	
R28	Carbon film	1k		RD¼PS 102K	

7-4 FILTER UNIT

CAPACITORS

IN μF, 10% TOLERANCE

Symbol	Description			Part No.	
C1	Mylar	0.15	50V	CQMA154K 50	
C2	Mylar	0.15	50V	CQMA154K 50	
C3	Mylar	0.15	50V	CQMA154K 50	
C4	Mylar	0.15	50V	CQMA154K 50	
C5	Mylar	0.082	50V	CQMA823K 50	
C6	Mylar	0.082	50V	CQMA823K 50	
C7	Mylar	0.082	50V	CQMA823K 50	
C8	Mylar	0.082	50V	CQMA823K 50	

RESISTORS

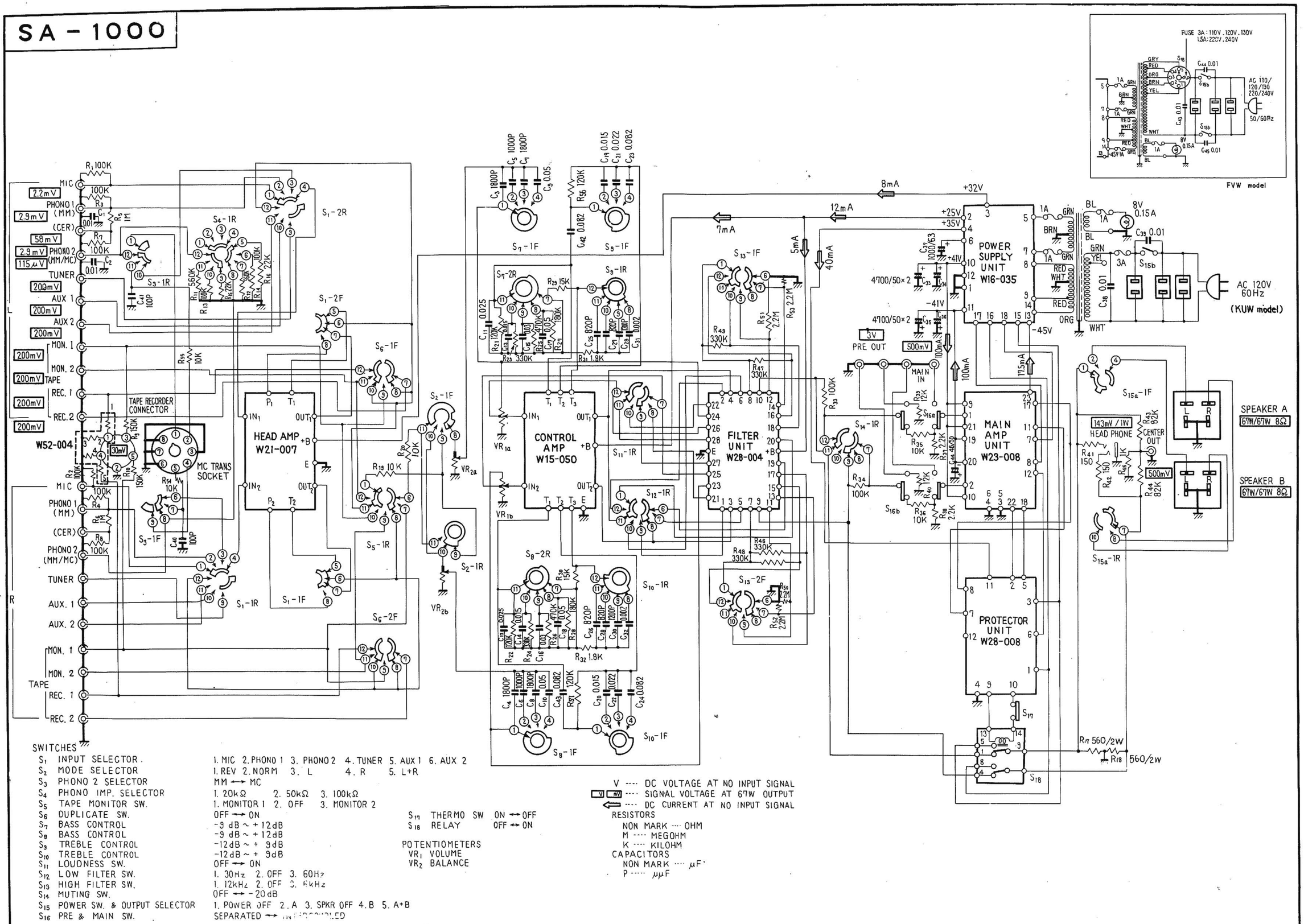
IN OHM ¼W, 10% TOLERANCE k:kΩ

Symbol	Description		Part No.	
R1	Carbon film	22k	RD¼PS 223K	
R2	Carbon film	22k	RD¼PS 223K	
R3	Carbon film	18k	RD¼PS 183K	
R4	Carbon film	18k	RD¼PS 183K	
R22	Carbon film	10k	RD¼PS 103K	
R23	Carbon film	10k	RD¼PS 103K	
R24	Carbon film	120k	RD¼PS 124K	
R25	Carbon film	120k	RD¼PS 124K	

6. SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARDS

6-1 UNIT CONNECTION DIAGRAM

SA - 1000



SWITCHES

S_1	INPUT SELECTOR	1. MIC 2. PHONO 1 3. PHONO 2 4. TUNER 5. AUX 1 6. AUX 2
S_2	MODE SELECTOR	1. REV 2. NORM 3. L 4. R 5. L+R
S_3	PHONO 2 SELECTOR	MM ⟷ MC
S_4	PHONO IMP. SELECTOR	1. 20kΩ 2. 50kΩ 3. 100kΩ
S_5	TAPE MONITOR SW.	1. MONITOR 1 2. OFF 3. MONITOR 2
S_6	DUPLICATE SW.	OFF ⟷ ON
S_7	BASS CONTROL	-9 dB ~ +12dB
S_8	BASS CONTROL	-9 dB ~ +12dB
S_9	TREBLE CONTROL	-12dB ~ + 9dB
S_{10}	TREBLE CONTROL	-12dB ~ + 9dB
S_{11}	LOUDNESS SW.	OFF ⟷ ON
S_{12}	LOW FILTER SW.	1. 30Hz 2. OFF 3. 60Hz
S_{13}	HIGH FILTER SW.	1. 12kHz 2. OFF 3. 6kHz
S_{14}	MUTING SW.	OFF ⟷ -20dB
S_{15}	POWER SW. & OUTPUT SELECTOR	1. POWER OFF 2. A 3. SPKR OFF 4. B 5. A+B
S_{16}	PRE & MAIN SW.	SEPARATED ⟷ INTEGRATED
S_{17}	THERMO SW	ON ⟷ OFF
S_{18}	RELAY	OFF ↔ ON

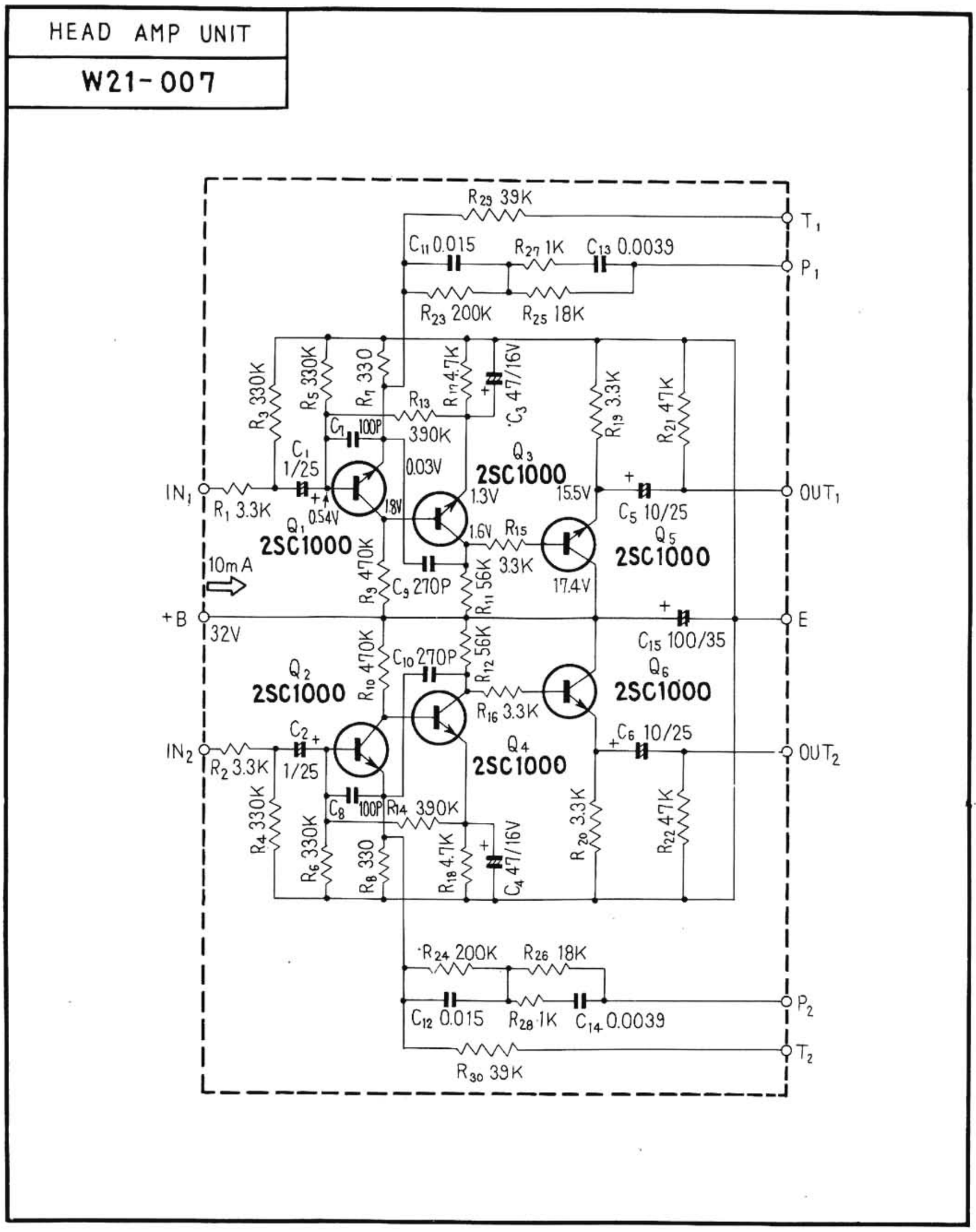
POTENTIOMETERS
VR_1 VOLUME
VR_2 BALANCE

V ···· DC VOLTAGE AT NO INPUT SIGNAL
V mV ···· SIGNAL VOLTAGE AT 6Ω OUTPUT
⇦ ···· DC CURRENT AT NO INPUT SIGNAL

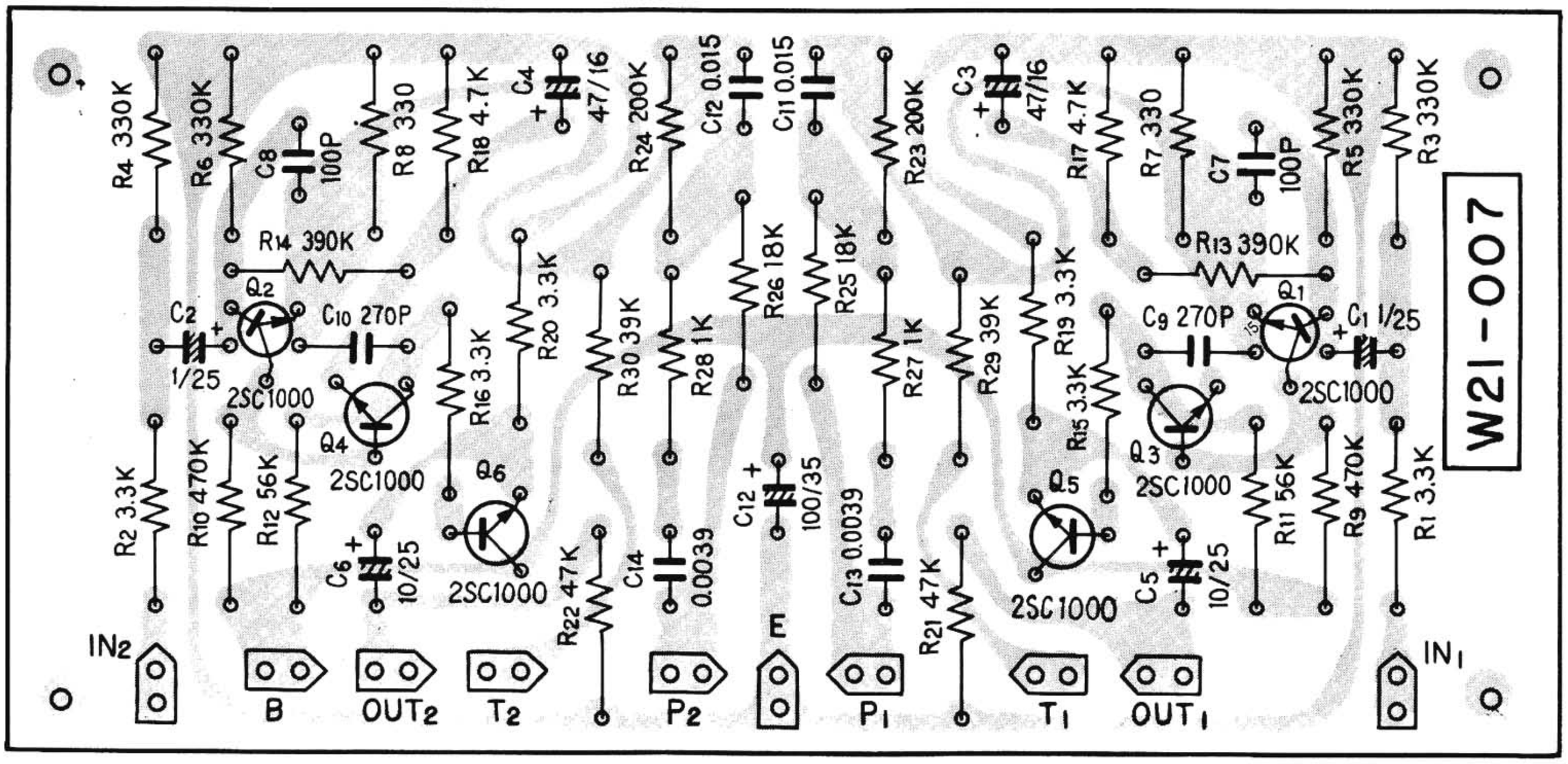
RESISTORS
NON MARK ···· OHM
M ···· MEGOHM
K ···· KILOHM

CAPACITORS
NON MARK ···· μF
P ···· μμF

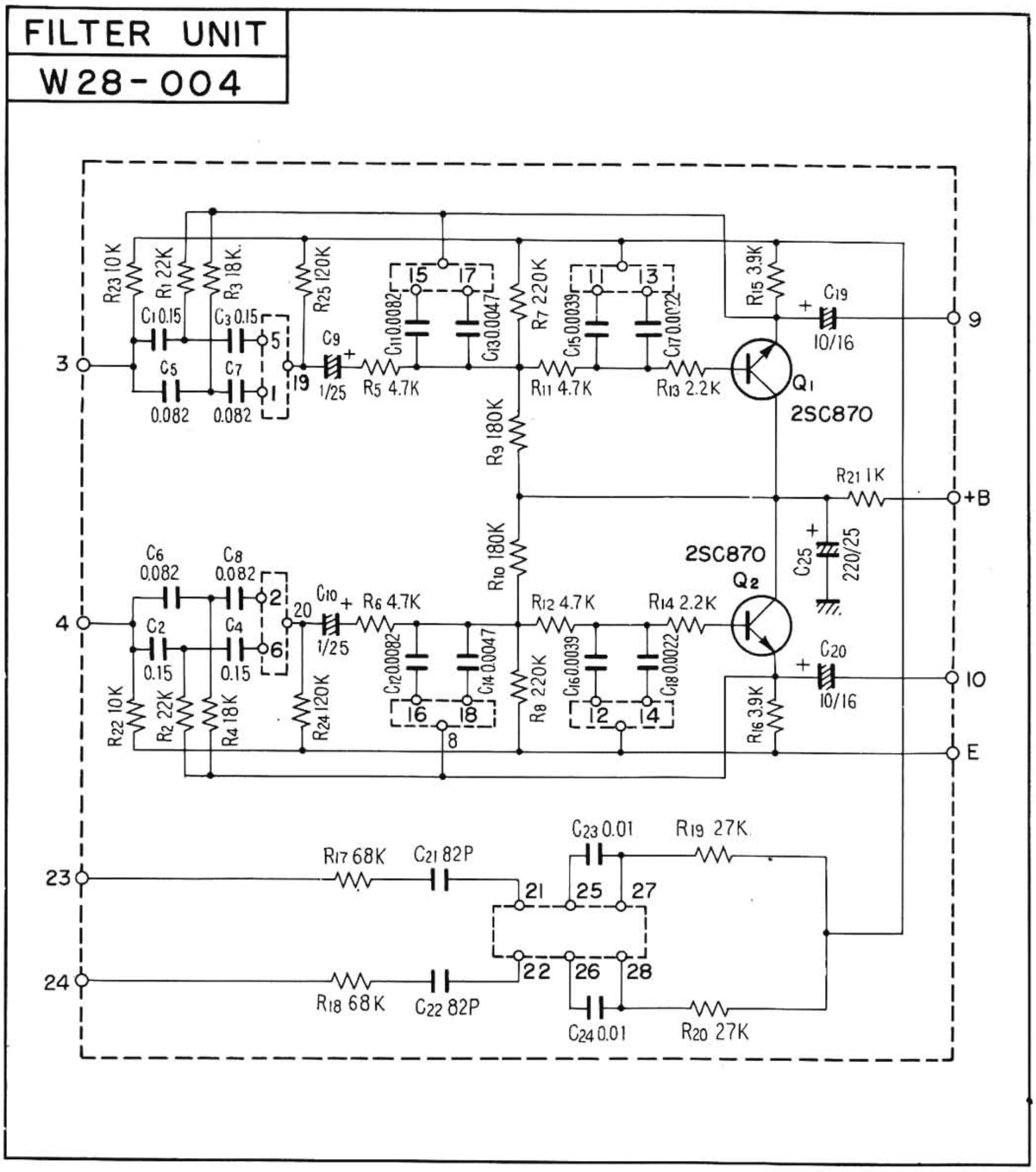
6-2 HEAD AMPLIFIER UNIT (W21-007)



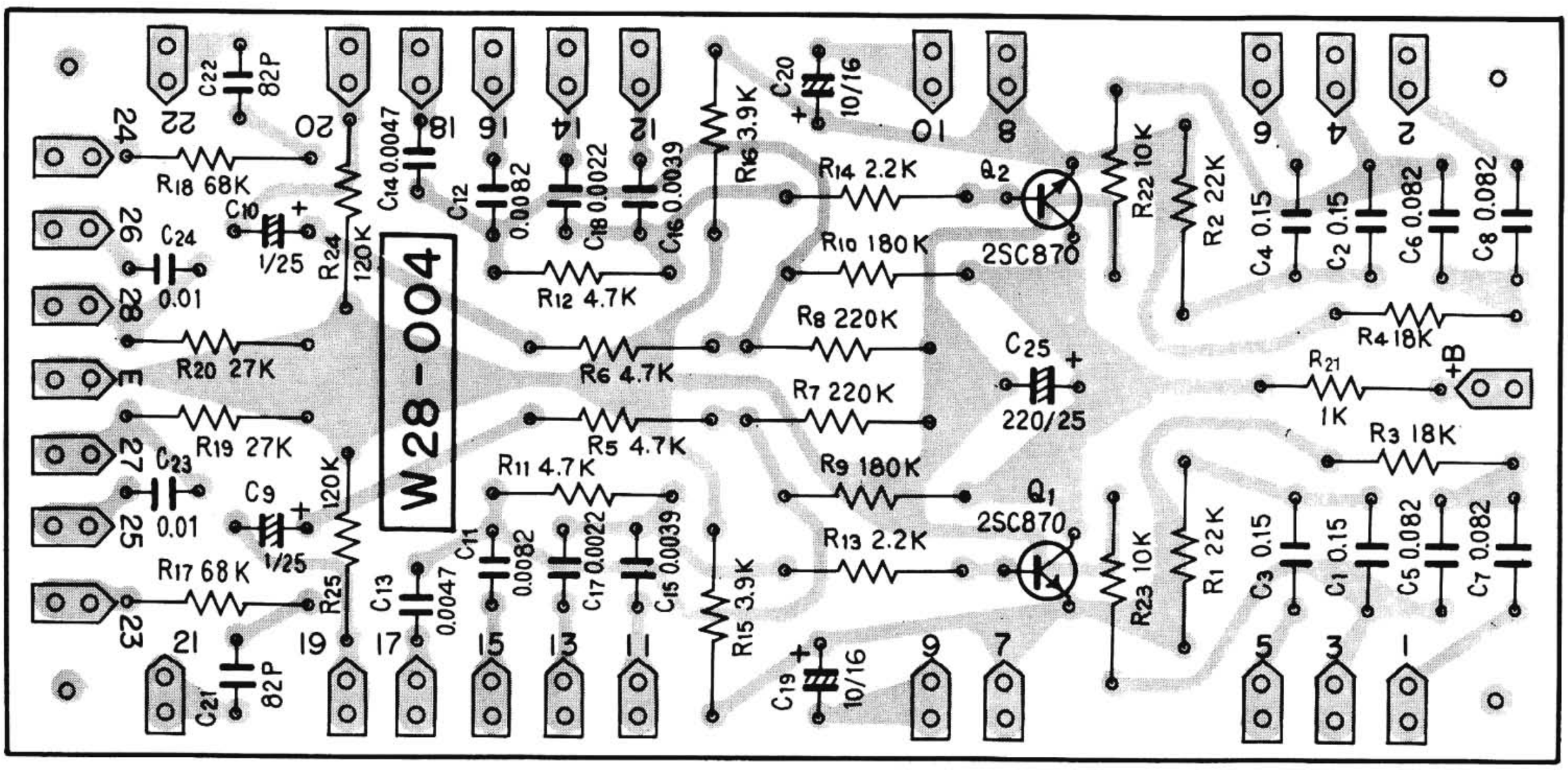
FOIL SIDE



6-4 FILTER UNIT (28-004)



FOIL SIDE



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