

REALISTIC[®]

Service Manual

STA-2200

**DIGITAL SYNTHESIZED
AM/FM STEREO RECEIVER**

Catalog Number: 31-2085



CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

CONTENTS

	PAGE
(1) ELECTRICAL PERFORMANCE SPECIFICATIONS	3 – 5
(2) DISASSEMBLY INSTRUCTIONS	6 – 7
(3) BLOCK DIAGRAM	8
(4) PRINCIPLES OF OPERATION	
1. PLL CIRCUITRY	9 – 10
2-1 SCHEMATIC DIAGRAM OF MICROPROCESSOR SECTION	11
2-2 MICROPROCESSOR CIRCUITRY	12 – 15
3. AUTO STOP CIRCUIT FOR AUTO TUNING	16 – 17
4. FREQUENCY AND CLOCK DISPLAY CONTROL CIRCUIT	18
5. PROTECTOR CIRCUIT DESCRIPTION	19 – 21
6. SIGNAL LEVEL METER DESCRIPTION	21 – 23
7. POWER LED METER DESCRIPTION	23
(5) LEVEL DIAGRAM	24
(6) AM/FM PLL CIRCUIT OPERATION CHECK	25
(7) VCO OUTPUT FREQUENCY, IC401 INPUT FREQUENCY AND CODE TABLE	26 – 27
(8) VCO VS FM BAND FREQUENCY CURVE	26
(9) VCO VS AM BAND FREQUENCY CURVE	27
(10) ALIGNMENT INSTRUCTIONS	28 – 37
(11) TROUBLESHOOTING	37 – 42
(12) IC & TRANSISTOR LEAD IDENTIFICATION	43 – 44
(13) SEMICONDUCTOR VOLTAGE READINGS	45 – 50
(14) IC INTERNAL DIAGRAM	51 – 58
(15) FM FRONT END P.C.B. (TOP & BOTTOM VIEWS)	59
(16) SIGNAL METER P.C.B. (TOP & BOTTOM VIEWS)	59
(17) FM IF & MPX P.C.B. (TOP & BOTTOM VIEWS)	60
(18) AMRF & IF P.C.B. (TOP & BOTTOM VIEWS)	61
(19) CONTROLLER P.C.B. (TOP & BOTTOM VIEWS)	62 – 63
(20) DISPLAY P.C.B. (TOP & BOTTOM VIEWS)	64
(21) DOLBY FM P.C.B. (TOP & BOTTOM VIEWS)	65
(22) PROTECTOR P.C.B. (TOP & BOTTOM VIEWS)	66
(23) RELAY P.C.B. (TOP & BOTTOM VIEWS)	67
(24) CLOCK SWITCH P.C.B. (TOP & BOTTOM VIEWS)	67
(25) TAPE SWITCH P.C.B. (TOP & BOTTOM VIEWS)	68
(26) SPEAKER SWITCH P.C.B. (TOP & BOTTOM VIEWS)	68
(27) MEMORY & TIME SET P.C.B. (TOP & BOTTOM VIEWS)	68
(28) TONE AMP P.C.B. (TOP & BOTTOM VIEWS)	69 – 70
(29) POWER METER P.C.B. (TOP & BOTTOM VIEWS)	69 – 70
(30) MAIN AMP LEFT P.C.B. (TOP & BOTTOM VIEWS)	71
(31) MAIN AMP RIGHT P.C.B. (TOP & BOTTOM VIEWS)	72
(32) PRE AMP P.C.B. (TOP & BOTTOM VIEWS)	73
(33) PRE-SCALER P.C.B. (TOP & BOTTOM VIEWS)	73
(34) POWER SUPPLY P.C.B. (TOP & BOTTOM VIEWS)	74
(35) ELECTRICAL PARTS LIST	75 – 87
(36) EXPLODED VIEW PARTS LIST	87 – 88
(37) MISCELLANEOUS PARTS LIST	91 – 92
(38) EXPLODED VIEW	89 – 90
(39) SCHEMATIC DIAGRAM (TUNER & DISPLAY SECTION)	SEPARATE SHEET
(40) SCHEMATIC DIAGRAM (AUDIO SECTION)	SEPARATE SHEET

(1) ELECTRICAL PERFORMANCE SPECIFICATIONS

AM BAND

1. Output readings are taken across a non-reactive 47K load termination.
2. Output is measured at TAPE OUT 1 terminals.
3. The Generator output shall terminate in an IRE loop antenna.
4. Standard modulation : 400 Hz, 30% modulation.

	UNIT	NOMINAL	LIMIT
Frequency Coverage	(kHz)	530-1610	530-1610
IF	(kHz)	450	----
Antenna Sensitivity for S/N 20dB			
at 600 kHz	(μ V/m)	250	500
at 1000 kHz	(μ V/m)	250	500
at 1400 kHz	(μ V/m)	250	500
Terminal Sensitivity	(μ V)	10	----
S/N Ratio at 5 mV/m Input, 1000 kHz	(dB)	45	38
Selectivity at S/N 20 dB Sens. 1000 kHz \pm 10 kHz	(dB)	35	25
AGC Distortion at 1000 kHz, 100 mV/m Input, 80% Mod.	(%)	1.8	5
AGC Figure of Merit at 1000 kHz	(dB)	47	40
IF Rejection at 600 kHz	(dB)	32	27
Image Rejection Ratio at 1400 kHz	(dB)	45	35
Band Width at 6 dB down, 1000 kHz	(kHz)	6.0	4.5-8
Distortion at 30% Mod. 5 mV/m Input	(%)	1	3
Tape Out Level at 30% Mod. 5 mV/m Input	(mV)	200	200 \pm 2 dB
Fidelity 5 mV/m Input (1 kHz = 0 dB) -6 dB Point	(Hz)	40-3 k	50-2.7 k
Whistle Modulation of 2nd and 3rd Harmonic			
at 1 mV/m, 5 mV/m and 100 mV/m Input	(%)	5	15
Spurious Response at 1000 kHz referred to 20 dB			
S/N Input	(dB)	60	40
Auto Tuning Stop Level	(mV/m)	1	0.5-2
Overload: With a radiated signal of 1 V/m Input, the signal shall be tunable without under distortion or breakup.			

The set shall operate in satisfactory manner through a temperature range from 0 degrees C through plus 45 degrees C.

FM BAND

1. Output readings are taken across a non-reactive 47K load termination.
2. Output is measured at TAPE OUT 1 terminals.
3. The signal voltage in this specification is the voltage appearing across the tuner input terminals (IHF).
4. Standard modulation : 1000 Hz, 75 kHz deviation.

	UNIT	NOMINAL	LIMIT
Frequency Coverage	(MHz)	88.1-107.9	88.1-107.9
IF	(MHz)	10.7	----
IHF Sensitivity at 90.1, 98.1 and 106.1 MHz	(μ V)	1.8	2.8
	(dBf)	(10.33)	(14.17)
50 dB Quieting Sensitivity at 90.1 98.1 and 106.1 MHz	(μ V)	3.1	4.5
	(dBf)	(16.11)	(18.29)
S/N Ratio at 1 mV Input, 98.1 MHz	(dB)	68	65
Limiting Sensitivity at -3 dB, 98.1 MHz	(μ V)	1.5	2.0
IF Rejection Ratio at 90.1 MHz	(dB)	95	80
Image Rejection Ratio at 106.1 MHz	(dB)	75	65
Spurious Response	(dB)	80	70
Capture Ratio	(dB)	1.5	2.5
ACA at \pm 400 kHz, 50 μ V Input	(dB)	75	60

	UNIT	NOMINAL	LIMIT
FM Mono Distortion, 75 kHz dev.	(%)	0.2	0.5
AM Suppression (AM 30% Mod., FM 75 kHz Dev.)	(dB)	55	48
Maximum Signal Handling Capacity	(mV)	200	100
Tape Out Level at 1 mV, 75 kHz Dev.	(mV)	640	640 ± 2 dB
Auto Tuning Stop Level LOW	(μV)	5-10	----
HIGH	(μV)	50	
Frequency Response at 10 kHz	(dB)	-13.66	-13.66 ± 2 dB
Temperature Range for Satisfactory Operation	(degree C)		0-45

All Sets must meet radiation regulation requirements (FCC).
Frequency response must meet the 75 μ sec de-emphasis.

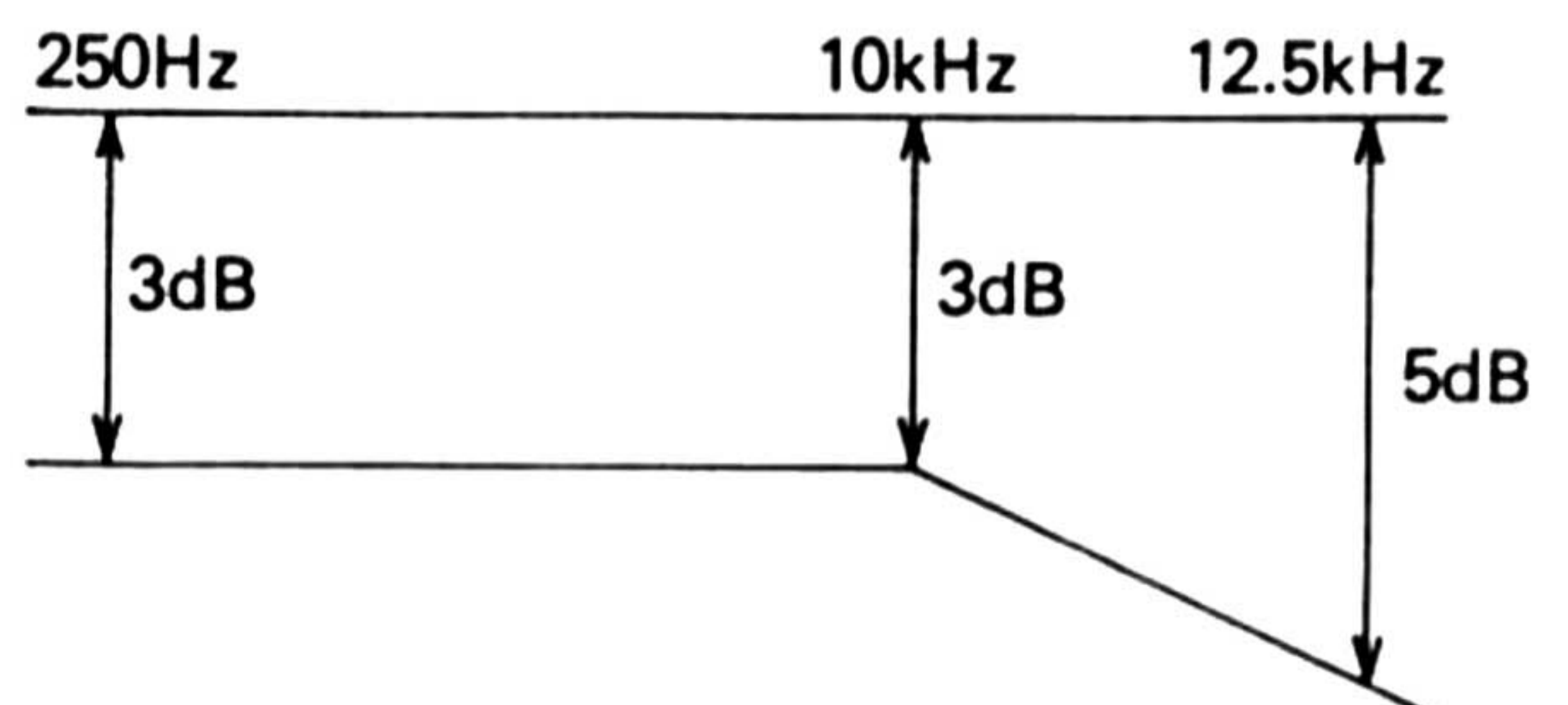
FM MPX SECTION

- Output readings are taken across a non-reactive 47K load termination.
- Output is measured at TAPE OUT 1 terminals.
- The signal voltage in this specification is the voltage appearing across the tuner input terminals (IHF).
- Standard Deviation : Main carrier (L + R) 33.75 kHz (45%)
Sub carrier (L - R) 33.75 kHz (45%)
19 kHz Pilot 6 kHz (8%)
Modulation Frequency 1000 Hz

	UNIT	NOMINAL	LIMIT
Stereo Indicator Sensitivity	(μV)	4	2-8
Stereo Separation at 1 mV Input			
at 100 Hz	(dB)	35	30
at 1 kHz	(dB)	48	33
at 10 kHz	(dB)	33	28
Stereo Distortion at 1 mV Input	(%)	0.3	0.7
Sub Carrier Rejection Ratio	(dB)	60	54
SCA Rejection Ratio	(dB)	60	54
Stereo Tape Out Level	(mV)	600	600 ± 2 dB
FM MPX Filter (Separation at 10 kHz)	(dB)	10	10 ± 2.5

DOLBY FM SECTION

	UNIT	NOMINAL	LIMIT
Signal to Noise Ratio in Stereo Mode, 400 Hz 37.5 kHz Dev., 9% Pilot with CCIR Filter, NR = OFF	(dB)	65	60
Dolby FM NR Effect (Same condition as above) NR = ON	(dB)	4	4 +0.5 -1.5
Frequency Response at Dolby NR = ON (Tone at electrical flat position) Dolby level at -15 dB and -25 dB points			Must meet Group "B" (see illustration below)



AUDIO SECTION

		UNIT	NOMINAL	LIMIT
Input Impedance	PHONO	(K Ω)	50	---
	AUX	(K Ω)	100	----
	TAPE IN 1	(K Ω)	100	----
	TAPE IN 2	(K Ω)	100	----
Output Power THD 0.02% Both Channels Driven from 20 Hz to 20 kHz into 8 Ω load		(W)	65	60
Output Power 0.03% THD Both Channels Driven at 1 kHz into 8 Ω Load		(W)	68	63
Audio Distortion at Rated Power (60W) from 20 Hz to 20 kHz into 8 Ω Load, one Channel Driven		(%)	0.018	0.03
Harmonic Distortion at 30 W, from 20 Hz to 20 kHz volume controlled from 60W max. position to 30 W position		(%)	0.018	0.03
Sensitivity for Rated Power at 8 Ω				
	PHONO	(mV)	2.2	3.5
	AUX	(mV)	160	160 \pm 2 dB
	TAPE IN 1	(mV)	160	160 \pm 2 dB
	TAPE IN 2	(mV)	160	160 \pm 2 dB
Frequency Response at AUX, 5 W \pm 2 dB Range		(Hz)	15-25 k	20-20 k
Bass Action at 100 Hz		(dB)	\pm 10	\pm 10 \pm 2
	at 50 Hz	(dB)	\pm 10	\pm 10 \pm 2
Treble Action at 10 kHz		(dB)	\pm 10	\pm 10 \pm 2
	at 20 kHz	(dB)	\pm 10	\pm 10 \pm 2
Minimum Volume Hum and Noise		(mV)	0.8	1.5
Maximum Volume Hum and Noise at AUX (4.7 K Ω termination)		(mV)	15	35
Signal to Noise Ratio (4.7 K Ω termination)				
	PHONO (Input shorted)	(dB)	65	60
	AUX (Input shorted)	(dB)	75	65
	TAPE IN 1 (Input shorted)	(dB)	75	65
	TAPE IN 2 (Input shorted)	(dB)	75	65
Cross Talk at 1 kHz, AUX (Input 4.7 K Ω termination)		(dB)	65	55
Bass Compensation at 100 Hz (-30 dB volume)		(dB)	+ 6	+ 6 \pm 2
	at 10 kHz (-30 dB volume)	(dB)	+ 4.5	+ 4.5 \pm 2
Level Difference of Each Channel at Volume max.		(dB)	0	1.5
Tape Out Level (47 K Ω termination)				
	PHONO (2.2 mV Input)	(mV)	140	140 \pm 2 dB
	AUX (160 mV Input)	(mV)	140	140 \pm 2 dB
	TAPE IN 1 (160 mV Input)	(mV)	140	140 \pm 2 dB
	TAPE IN 2 (160 mV Input)	(mV)	140	140 \pm 2 dB
PHONO EQ. Response at 100 Hz		(dB)	RIAA	RIAA \pm 1.5 dB
	at 10 kHz	(dB)	RIAA	RIAA \pm 1.5 dB
PHONO Overload at 1 kHz		(mV)	200	150
Tape Out Level (DIN Jack) (3.3 K Ω termination)				
	AM : 400 Hz, 30% mod. 5 mV/m input	(mV)	3.3	3.3 \pm 2.5 dB
	FM : 1000 Hz, 22.5 kHz dev. 1 mV input	(mV)	3.3	3.3 \pm 2.5 dB
	PHONO : 3.3 mV input	(mV)	3.3	3.3 \pm 2.5 dB
	AUX : 250 mV input	(mV)	3.3	3.3 \pm 2.5 dB

Notes: 1. The supply voltage is 120 volts AC from a regulated power supply.

2. The power source must be insulated from other equipment connected antenna or output.

3. The room temperature is 25 degrees C.

4. Nominal Specs represent the design specs; all units should be able to approximate these — some will exceed and some may drop slightly below these specs.

Limit Specs represent the absolute worst condition which still might be considered acceptable; in no case should a unit perform to less than within any Limit Spec.

(2) DISASSEMBLY INSTRUCTIONS

1. To remove the Cabinet

a) Remove two screws from each side of Cabinet (Figure A).

b) Remove one screw from upper Back Panel as shown in Figure B. Pull off cabinet toward rear of unit.

Be careful not to lose inserts when the screws are removed.

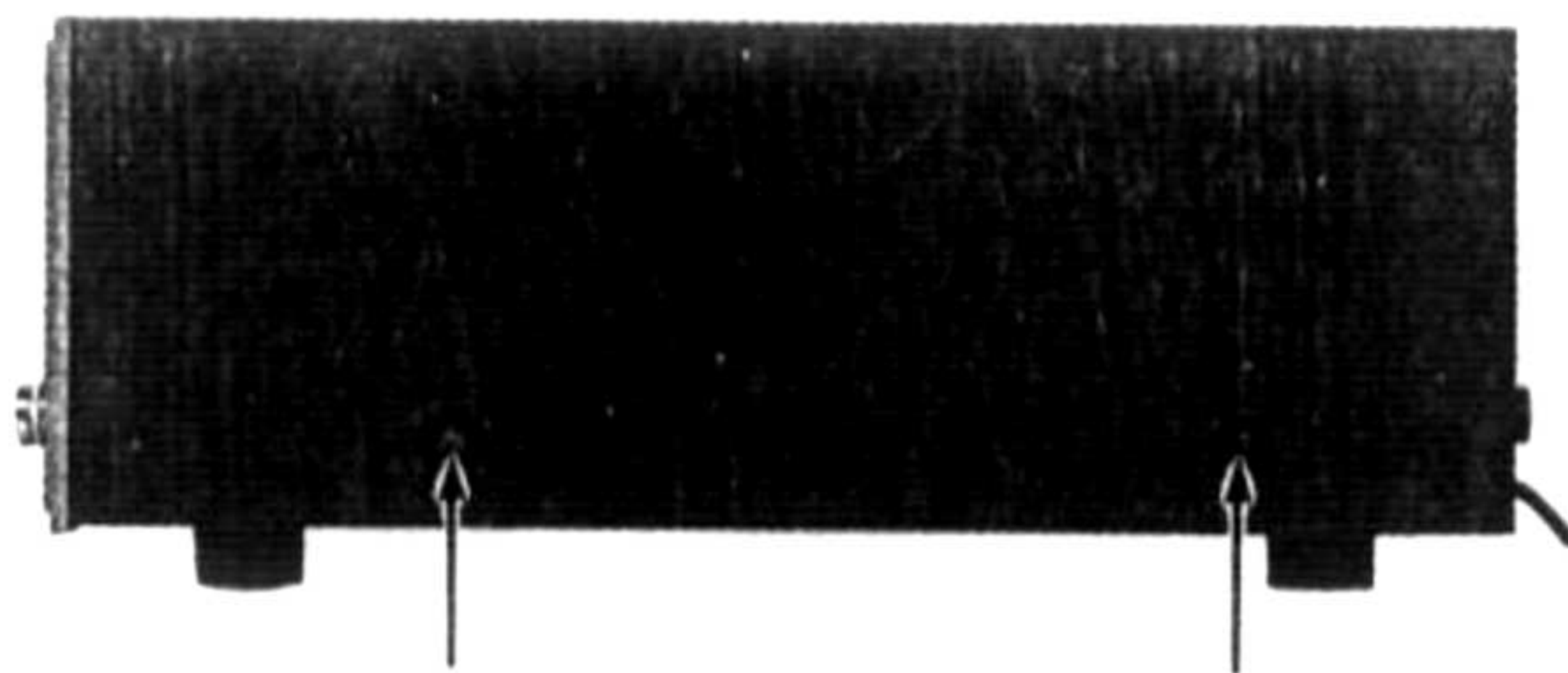


Fig. A



Fig. B

2. Remove the Bottom Cover

Turn the Receiver up side down and remove eleven screws from the bottom as shown in Figure C.

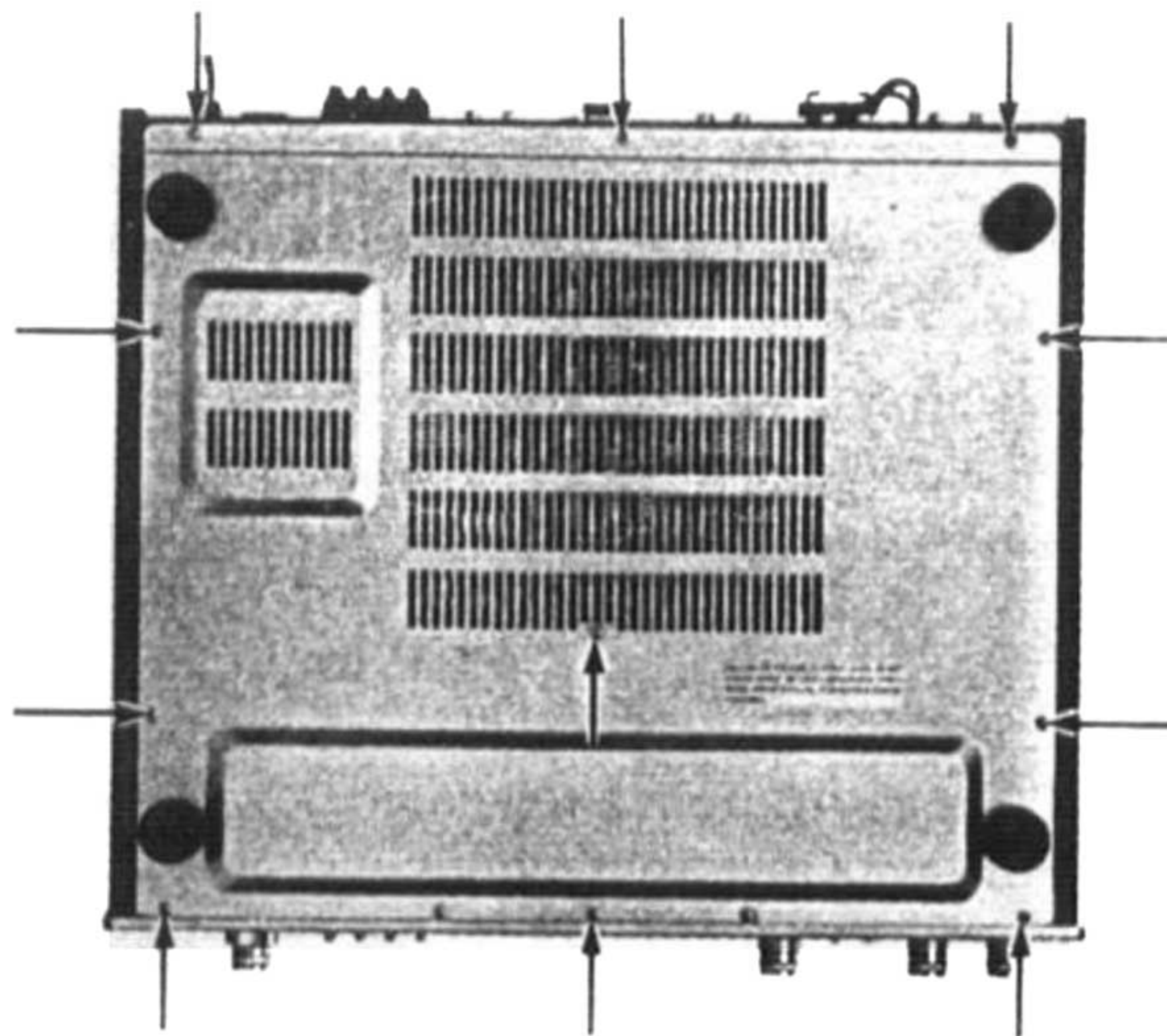


Fig. C

3. To remove the Front Panel

- a) Remove the Cabinet and Bottom Cover as described in 1 and 2.
- b) Remove four screws from top (Figure D) and two screws from bottom (Figure E) of the Front Panel.
- c) Remove knobs and pull off panel.

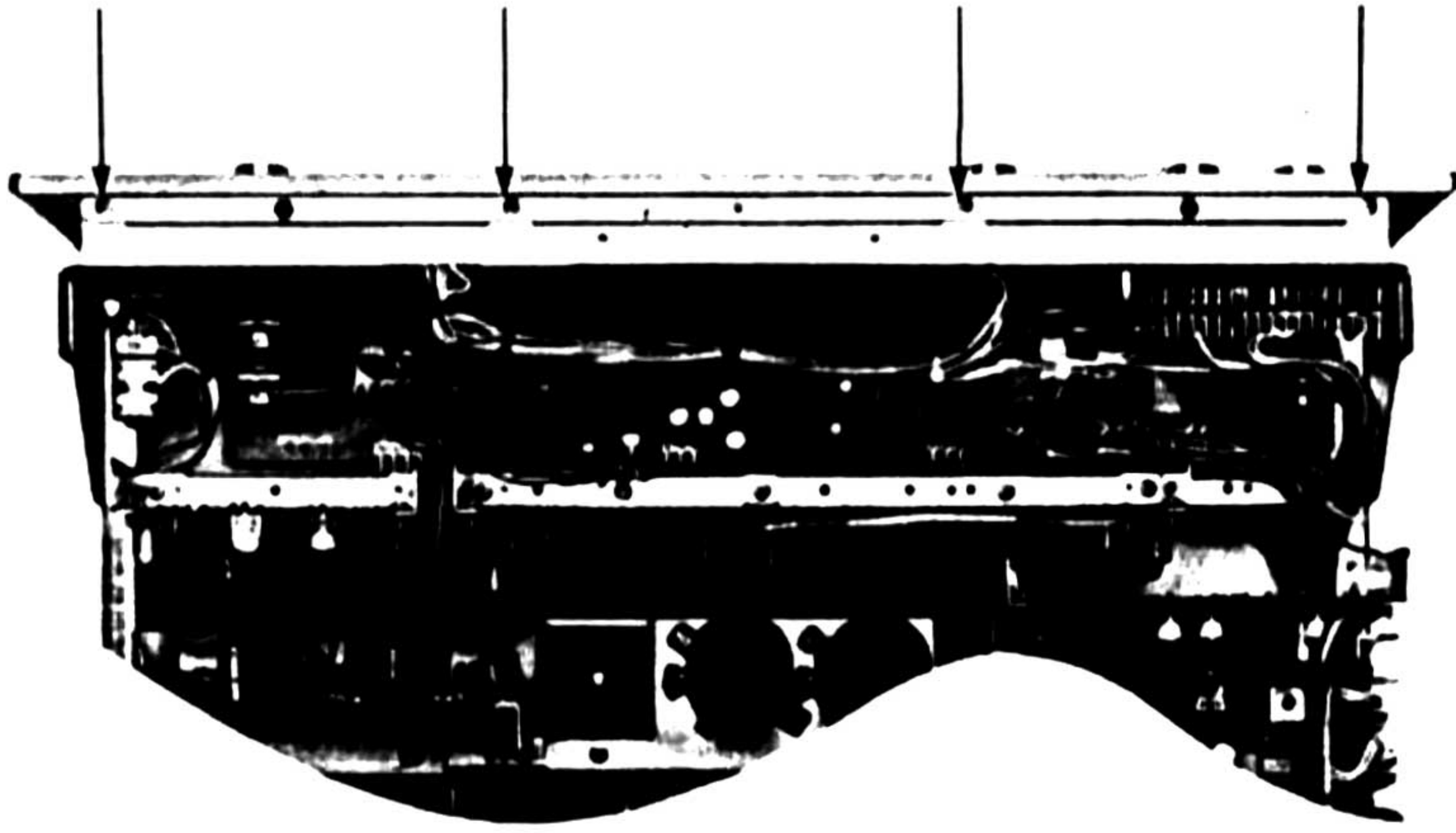


Fig. D

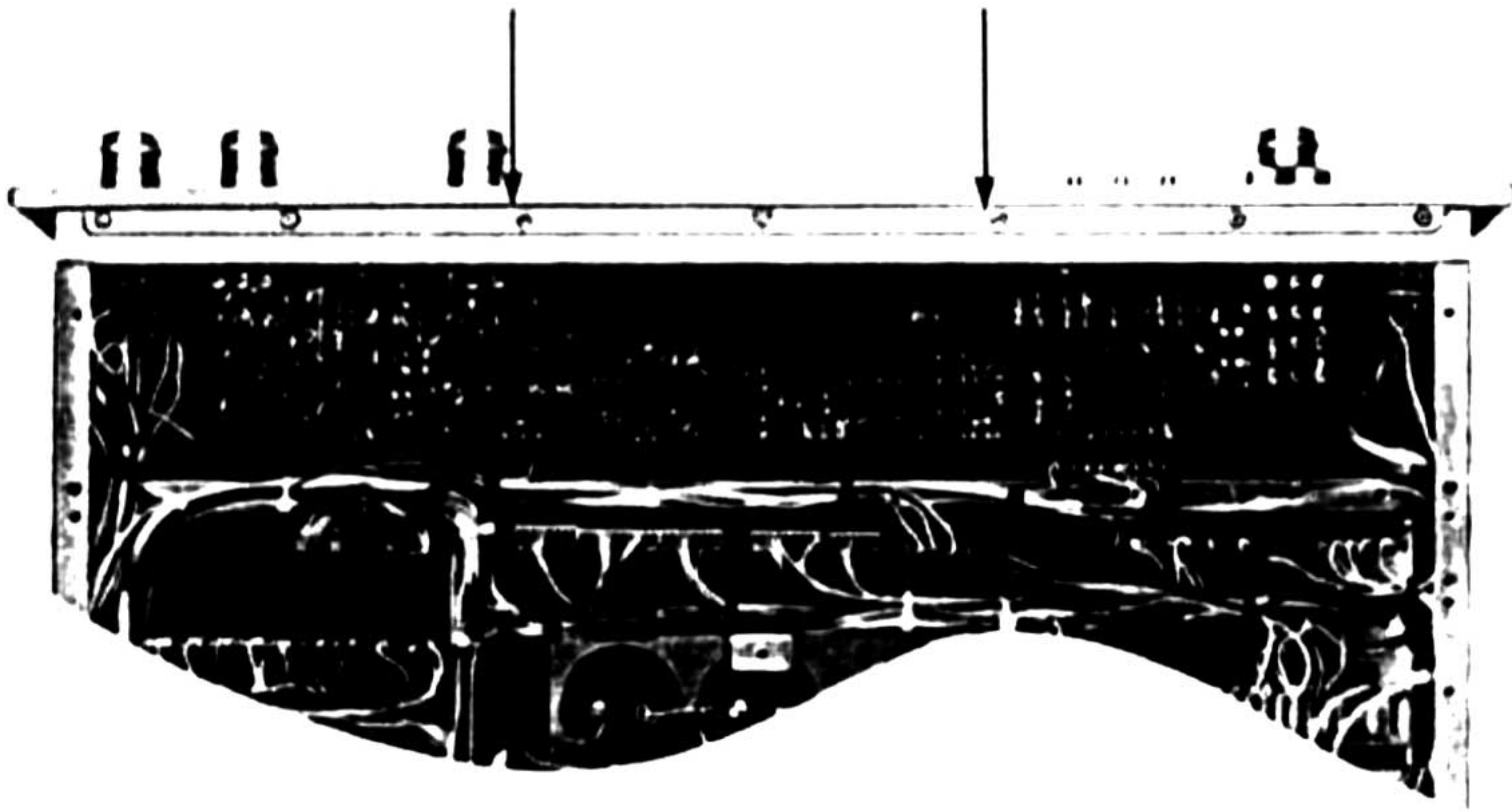


Fig. E

4. To remove Rear Panel from Chassis

Remove four screws from Rear Panel (Figure F).

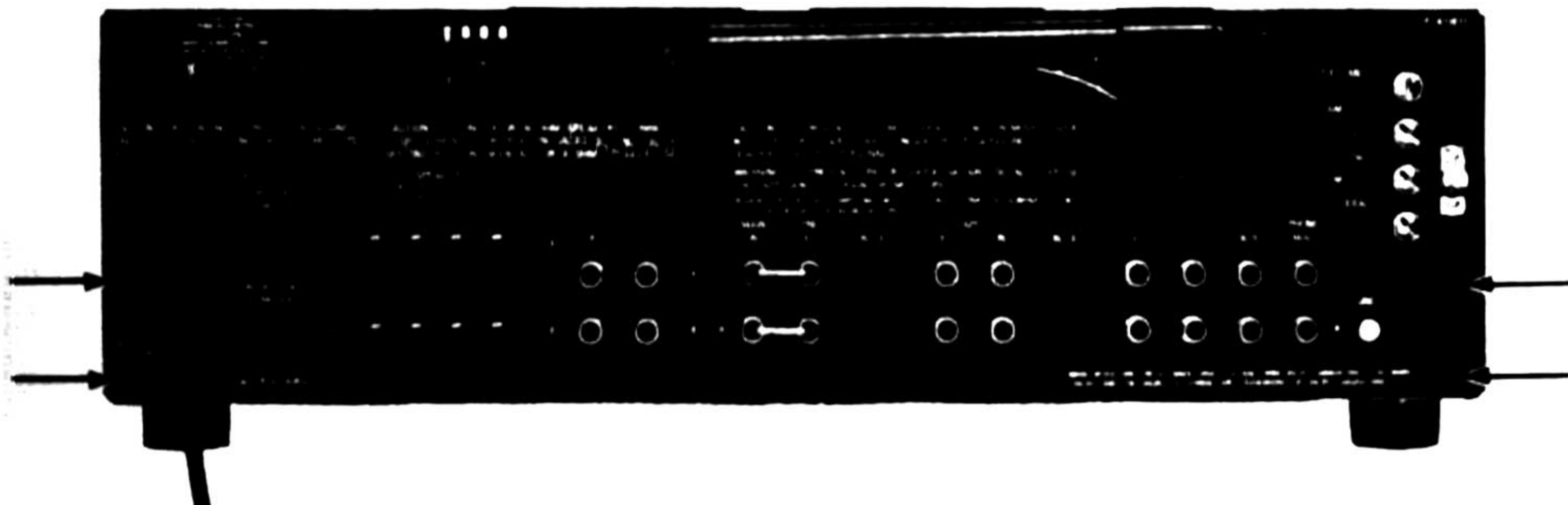
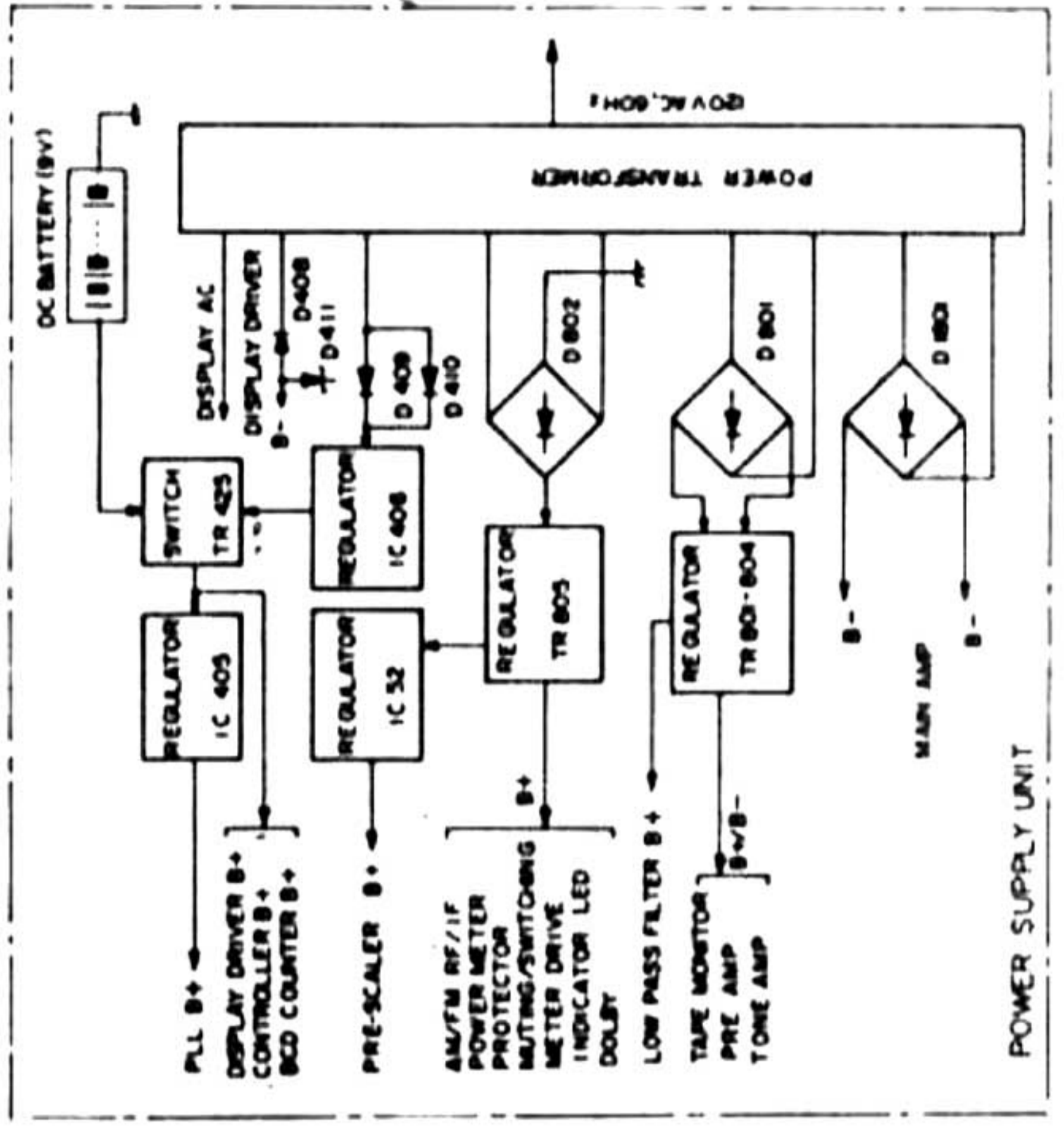
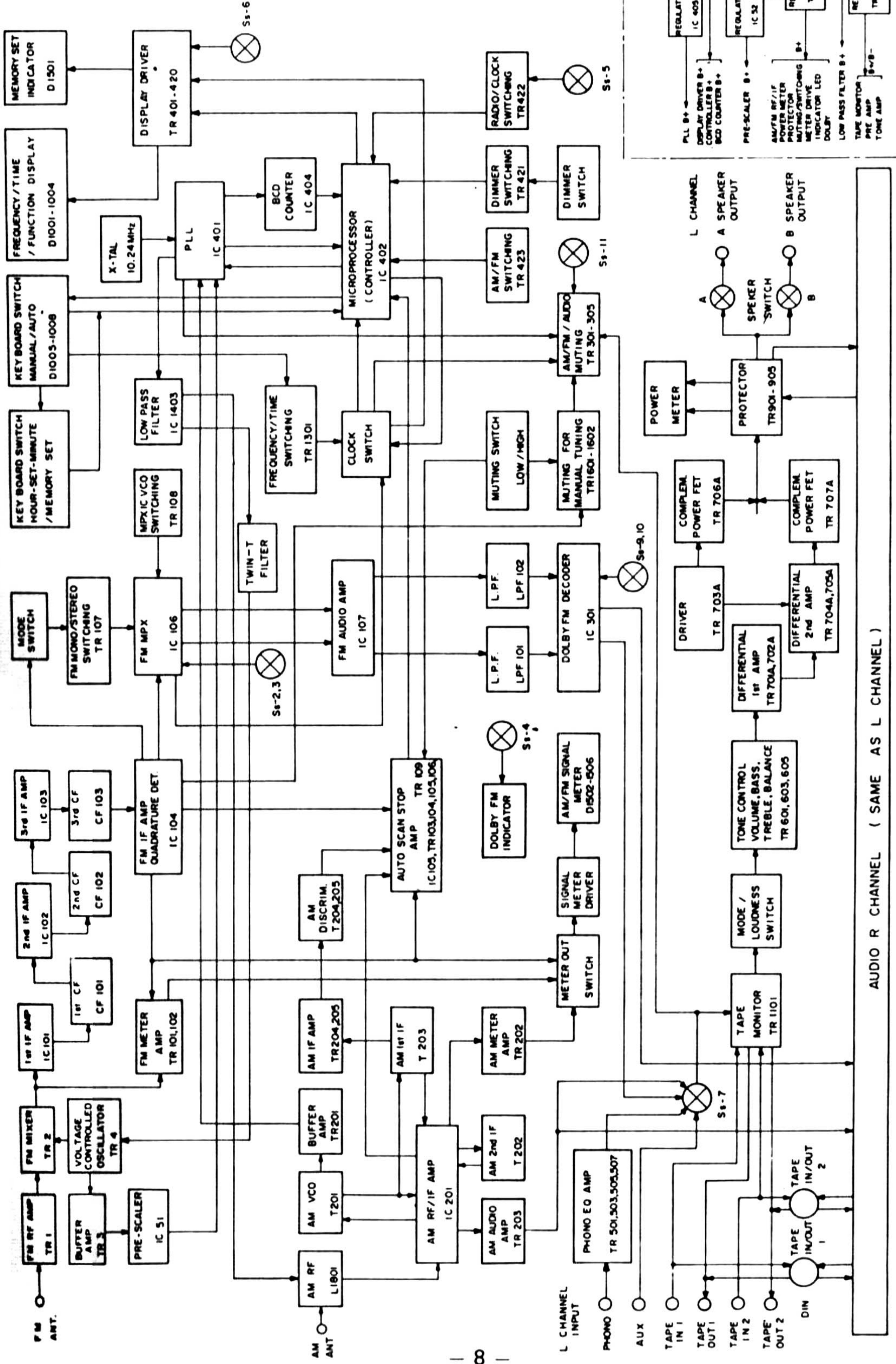


Fig. F

(3) BLOCK DIAGRAM



(4) PRINCIPLES OF OPERATION

This section of the Service Manual provides a brief technical description of unique or special circuits which you might otherwise find a little hard to understand, may not notice or be able to troubleshoot.

1.P.L.L. CIRCUITRY

The STA-2200 uses Digital Phase Locked Loop circuitry to synthesize AM and FM local oscillator frequencies.

For FM mode, the PLL circuitry consists of IC401 (Programmable Divider, Reference Frequency Divider and Phase Detector), Reference Frequency Osc. (Xtal: 10.24 MHz), IC403 (Low Pass Filter), Twin-T Filter, IC51 (Pre-Scaler) TR4 (VCO) and TR3 (Buffer Amp).

For AM mode, the PLL circuitry consists of IC401, Reference Freq. Osc. (10.24 MHz), IC403, IC201 (AM VCO and IF Amp) and TR201 (Buffer Amp).

Refer to the PLL Block Diagram as you read the following description.

A 10.24 MHz Crystal is used as a reference frequency. The Crystal is connected between Pins 17 and 18 of the PLL IC, IC401.

The MPU (Microprocessor Unit) IC402 provides a Binary Code output in accordance with the selected AM or FM station via the Tuning Key, which is connected to Pins 3 through 9 of IC401. The code determines "N", the divisor, which produces the required output frequency for each AM/FM station (precisely spaced 200 kHz apart for FM station and 10 kHz apart for AM station).

Example of FM Operation

When receiving 98.1 MHz, the VCO generates 108.8 MHz [98.1 + 10.7 (IF) MHz]. The Pre-Scaler divides to 1/40 and produces a signal of 2.72 MHz which passes through Buffer Amp TR3 and then is applied to Pin 1 of PLL IC, IC401.

This frequency is divided by N (= 544) internally at IC401; the resulting output will be 5 kHz.

The Reference Oscillator 10.24 MHz is divided by 2048 (again by IC401) resulting in another 5 kHz frequency.

These two 5 kHz signals are fed to the Phase Detector. An error voltage is generated by the Phase Detector, which is proportional to the phase difference between these two 5 kHz signals. This error voltage appears at Pin 24 of IC401 and passes through the LPF and Twin-T Filter where the error voltage is integrated, and harmonics and noise are filtered out. The resulting DC voltage is applied to the Varicap Diodes (part of VCO) whose capacity varies with applied DC voltage. Thus the output frequency of VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise when the system is "locked", meaning the Phase Detector senses no phase differences between the two 5 kHz signals and the VCO generates a frequency which is as accurate and stable as the reference crystal oscillator.

Example of AM Operation (The basic PLL circuitry system is same as in FM mode.)

When receiving 1000 kHz, VCO generates a 1450 kHz signal [1000 + 450 (IF) kHz]. The AM VCO output signal, 1450 kHz, which passes through Buffer Amp TR201 is applied to Pin 2 of PLL IC401. This frequency is divided by N (= 145). The resulting output will be 10 kHz.

The Reference Oscillator 10.24 MHz, is divided by 1024, resulting in another 10 kHz frequency.

These two 10 kHz signals are fed to the Phase Detector. An error voltage is generated by the Phase Detector, which is in proportion to the phase difference between these two 10 kHz signals. This error voltage appears at Pin 24 of IC401 and passes through the LPF where the error voltage is integrated, and harmonics and noise are filtered out. The resulting DC voltage is applied to the Varicap Diode D202 (part of VCO) whose capacity varies with applied DC voltage. Thus the output frequency of VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise.

When the system is "locked", the phase detector senses no phase differences and generates a frequency which is as accurate and stable as the reference crystal oscillator.

NOTE:

1. Pre-Scaler---- In FM mode, the maximum frequency of a Local Oscillator is about 120 MHz, while the Programmable Divider of IC401 operates under 3.6 MHz frequency range. Thus, the Pre-Scaler is necessary in the front stage of a Programmable Divider. The resulting FM VCO frequency is divided by 1/40 pre-scaler (2.470 – 2.965 MHz).

2. The value of Programmable Divider ratio "N" can be calculated as follows: (See Table on page 24 and 25).

FM Band : $N = \text{VCO frequency (= Receiving Frequency + 10.7 MHz) } \div 5 \text{ kHz} \text{ --- } N = 494 \sim 593$

AM Band : $N = \text{VCO frequency (= Receiving Frequency + 450 kHz) } \div 10 \text{ kHz} \text{ --- } N = 98 \sim 206$

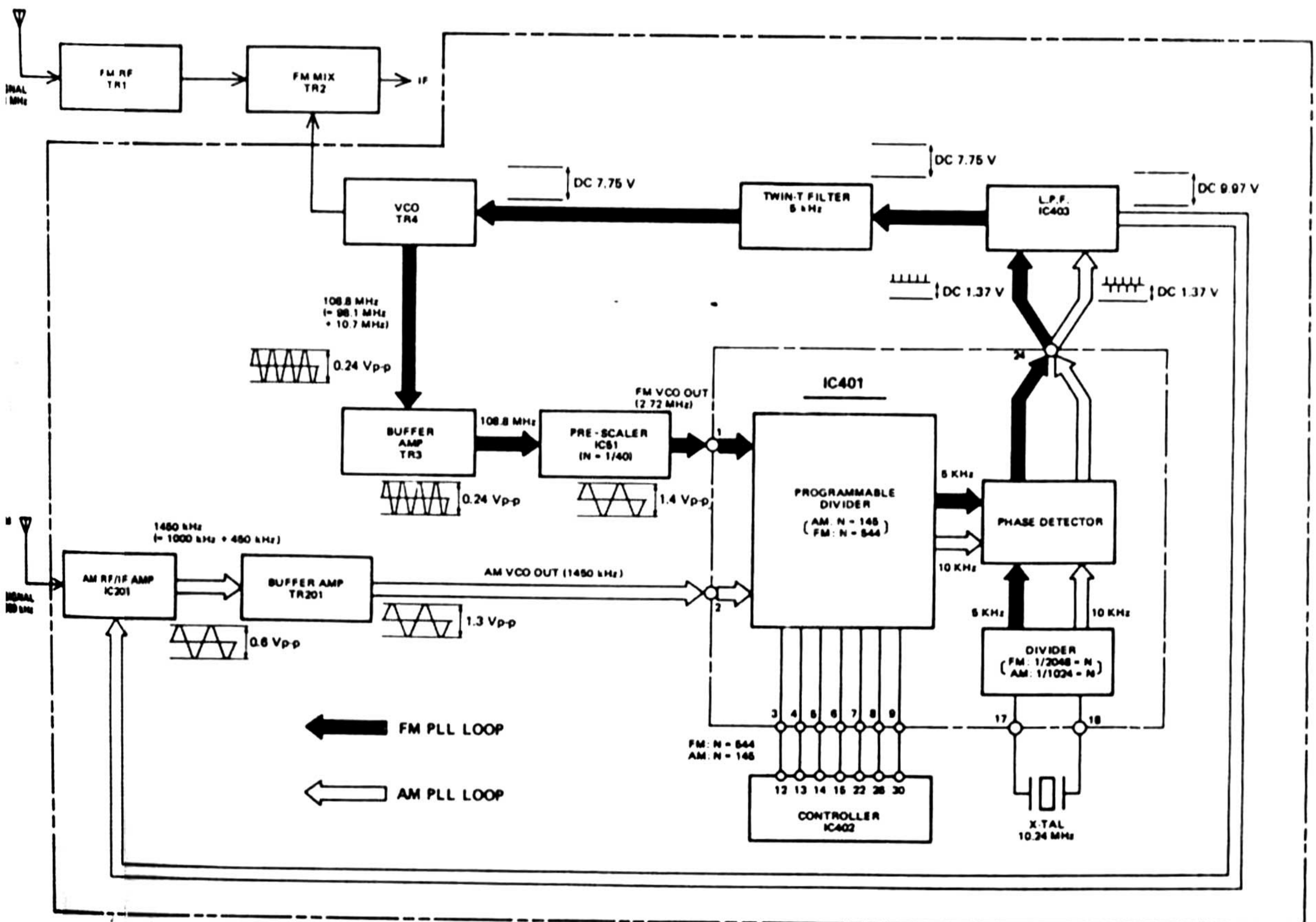
3. Reference Oscillator 10.24 MHz is divided by Divider of IC401.

FM Band ----- $2048 = 10.24 \text{ MHz } \div 5 \text{ kHz}$

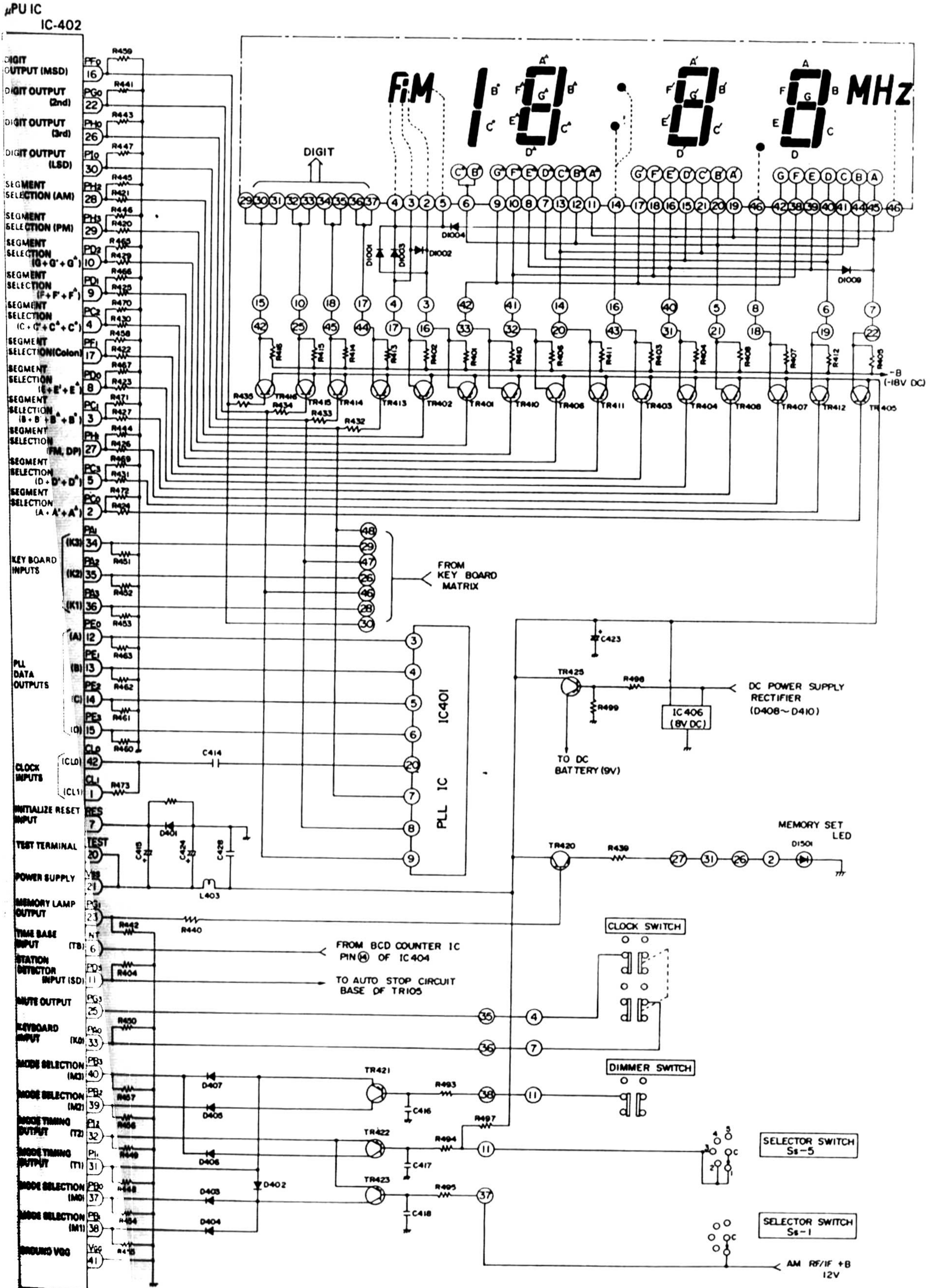
AM Band ----- $1024 = 10.24 \text{ MHz } \div 10 \text{ kHz}$

4. LPF circuitry applies the DC voltage to VCO circuitry which is converted from the output signal (5 kHz for FM, 10 kHz for AM) of Phase Detector (internally IC401).

PLL CIRCUITRY BLOCK DIAGRAM



2-1 SCHEMATIC DIAGRAM OF MICROPROCESSOR SECTION



2-2 MICROPROCESSOR CIRCUITRY (CONTROL CIRCUIT)

- The Control Circuit uses a 4-bit Microprocessor, μ PD 547LC-513 which is P-channel MOS and can be used with a power supply voltage of 8 volts.

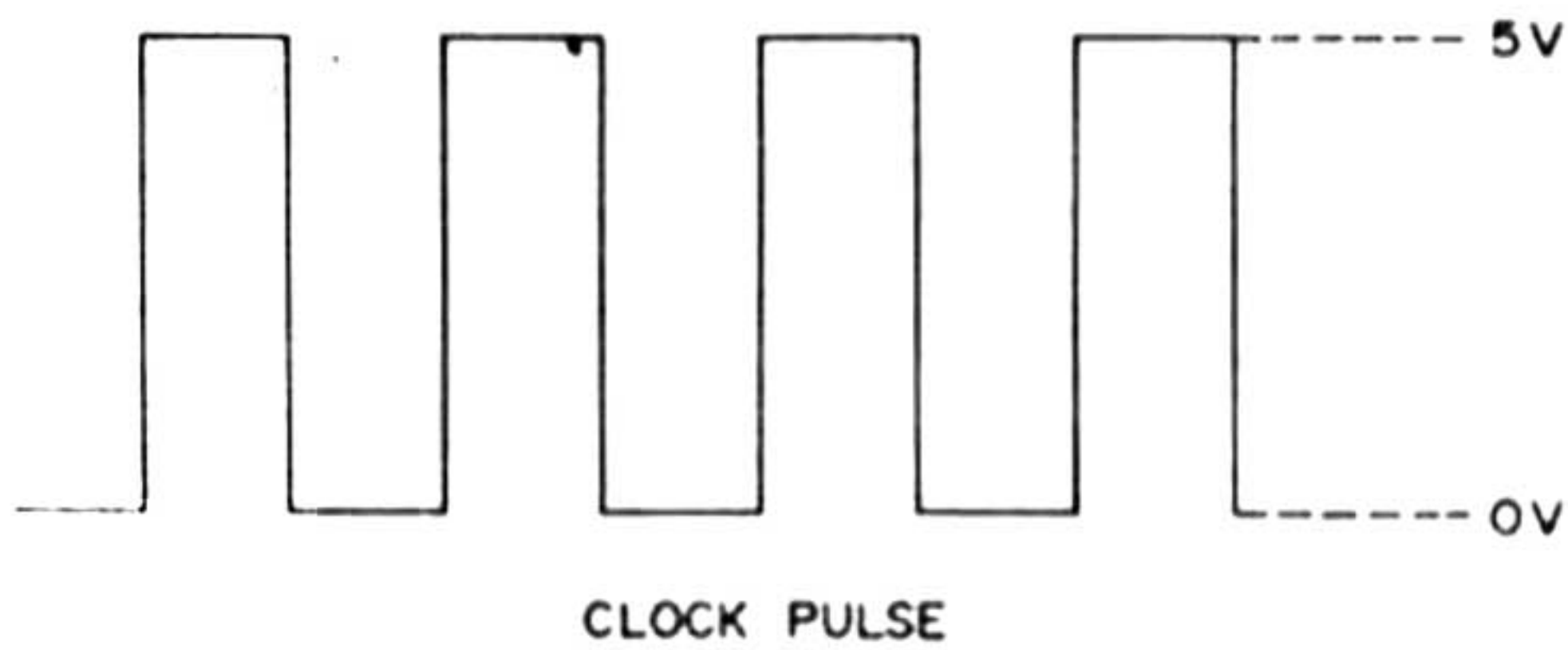
MICROPROCESSOR'S CLOCK OSCILLATOR FREQUENCY CIRCUIT

All functions of the microprocessor are controlled from a clock pulse.

With PLL IC, IC401, the clock oscillator frequency applied to the microprocessor chip, IC402.

Clock Oscillator Frequency: 160 kHz.

From Pin 20 of IC401 to Pin 42 of IC402.



All orders in STA-2200 are completed within 4 clock cycles.

The microprocessor ceases to function if the clock stops.

KEYBOARD ENTRY

The MPU generates 4 kinds of timing pulses, labeled D0, D1, D2 and D3, to search the KEYBOARD. These outputs appear at Pins 16, 22, 26 and 30 respectively and are transferred to Input Pins 33, 34, 35 and 36 by the KEYBOARD MATRIX. The MPU determines which key is pressed by input timing and 4 input combinations as illustrated below.

KEY MPU INPUT PIN	MANUAL DOWN/ HOUR	MANUAL UP/ MINUTE	AUTO DOWN	AUTO UP	MEMORY SCAN	MEMORY SET	HOLD	MEMORY					
								1	2	3	4	5	6
K3 Pin 36	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON
K2 Pin 35	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
K1 Pin 34	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
K0 Pin 33	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
TIMING OUTPUT PIN	D3 Pin 30	D2 Pin 26	D1 Pin 22	D0 Pin 16	D2 Pin 26	D1 Pin 22	D0 Pin 16	D2 Pin 26	D3 Pin 30	D0 Pin 16	D1 Pin 22	D2 Pin 26	D3 Pin 30

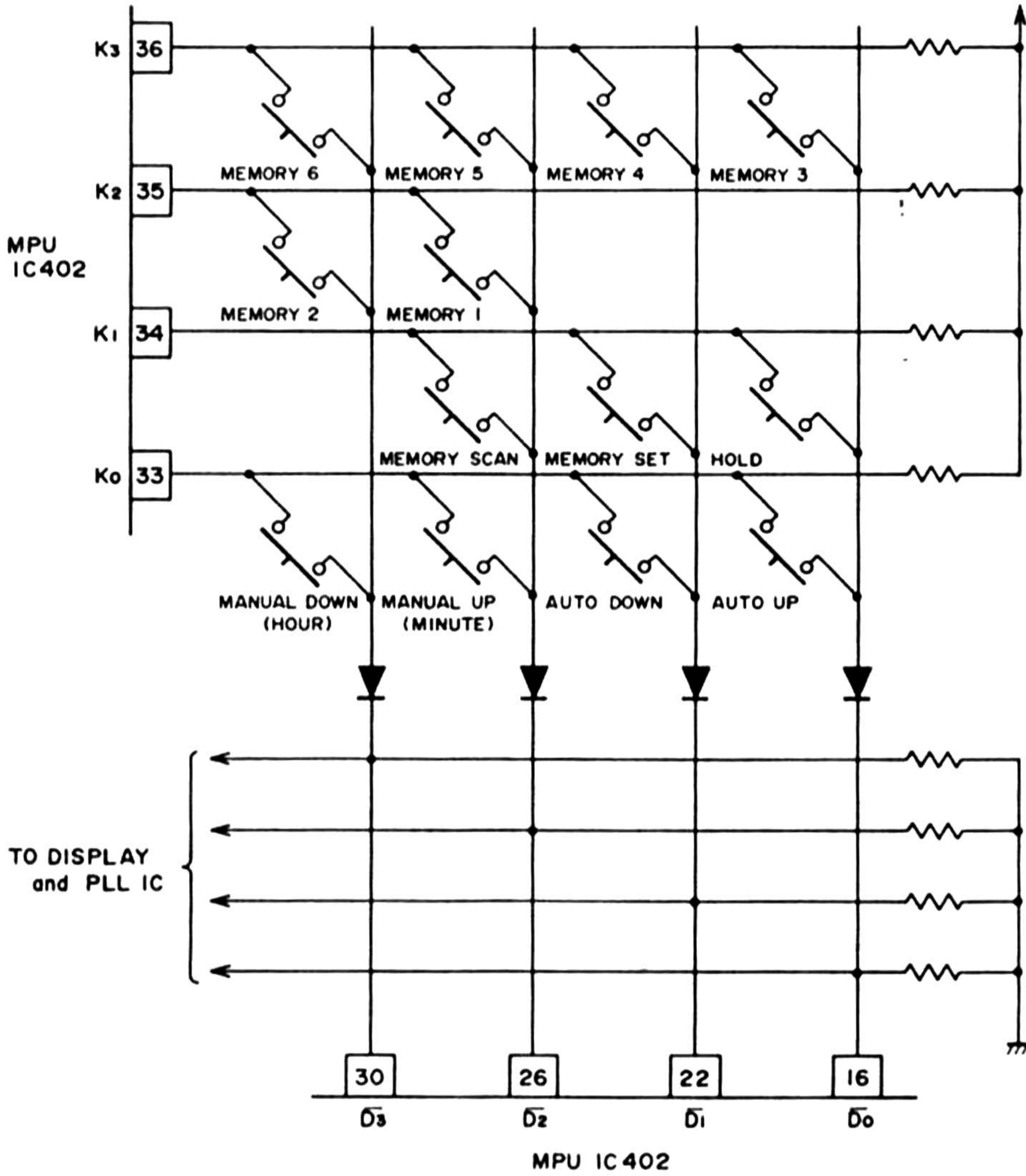
(ON: 8V
(OFF: GROUND)

MODE SWITCH

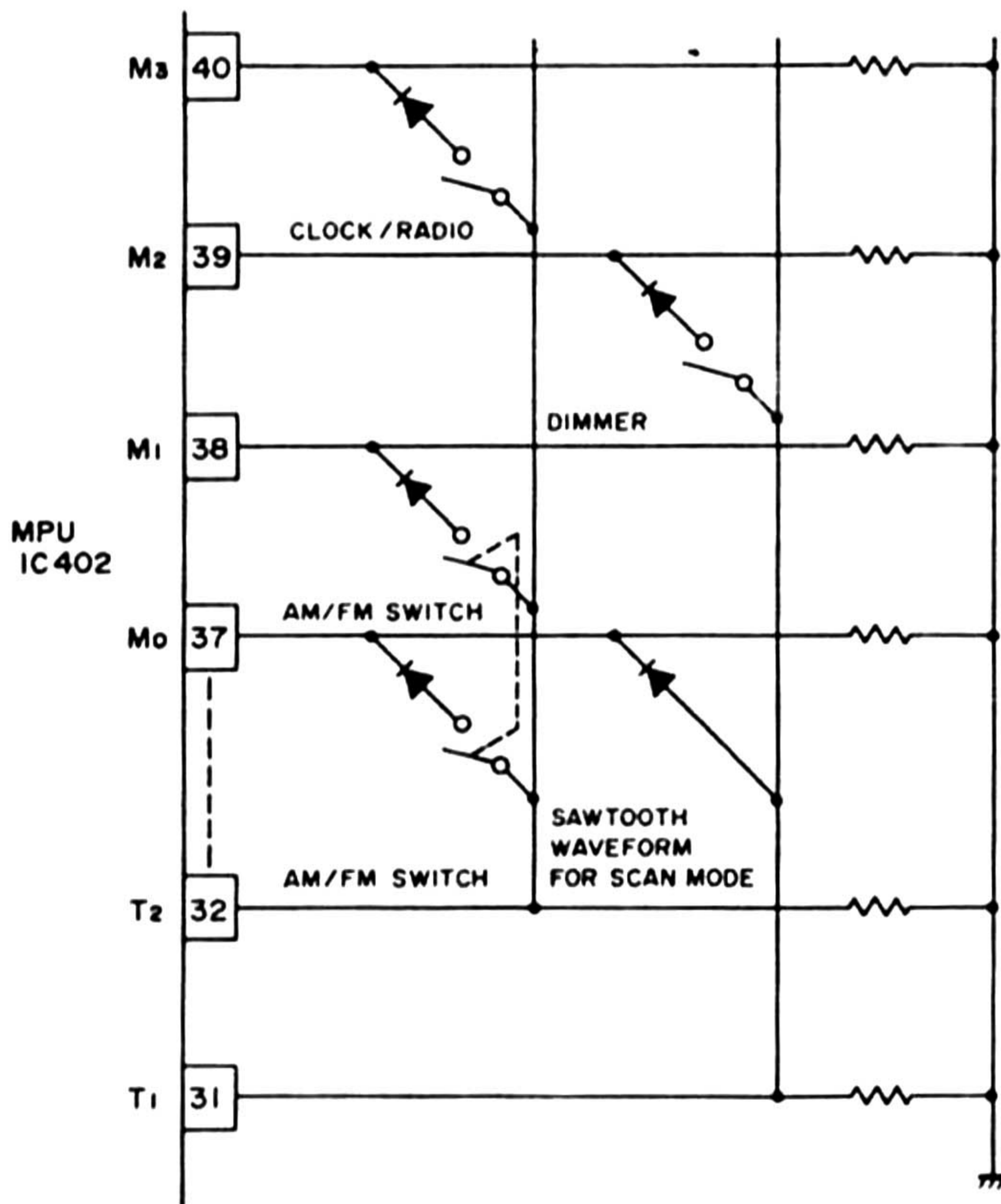
MODE SWITCH consists of TR421, 422, 423 and D402-407.

MODE MPU INPUT PIN	CLOCK		RADIO		AM		FM		DIMMER	
	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31
M3 Pin 40	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
M2 Pin 39	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
M1 Pin 38	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
M0 Pin 37	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
MPU OUTPUT	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31	T2 Pin 32	T1 Pin 31

KEYBOARD MATRIX



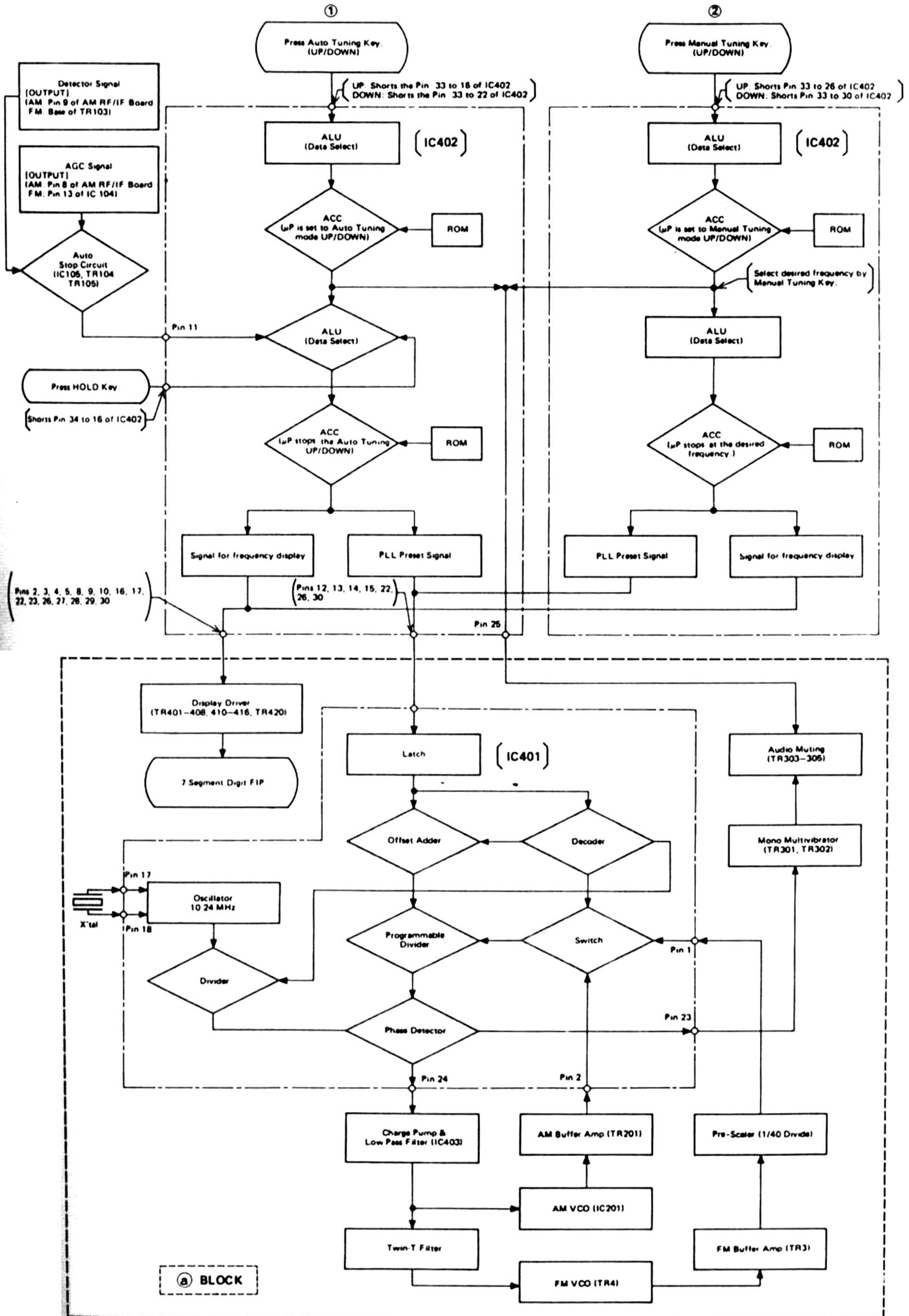
MODE SWITCH CONNECTION



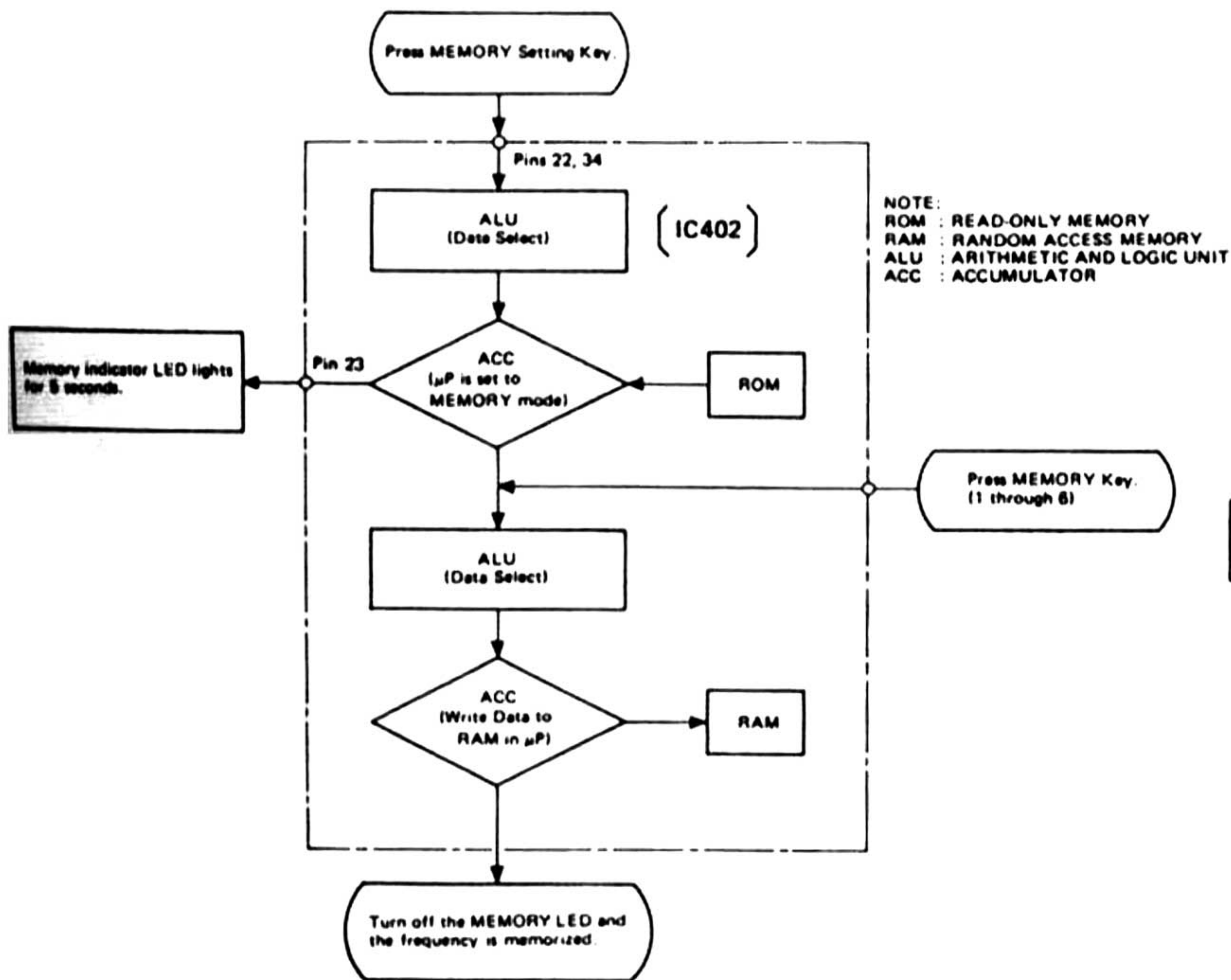
GENERAL LOGIC FLOW CHART

(1) AUTO TUNING MODE

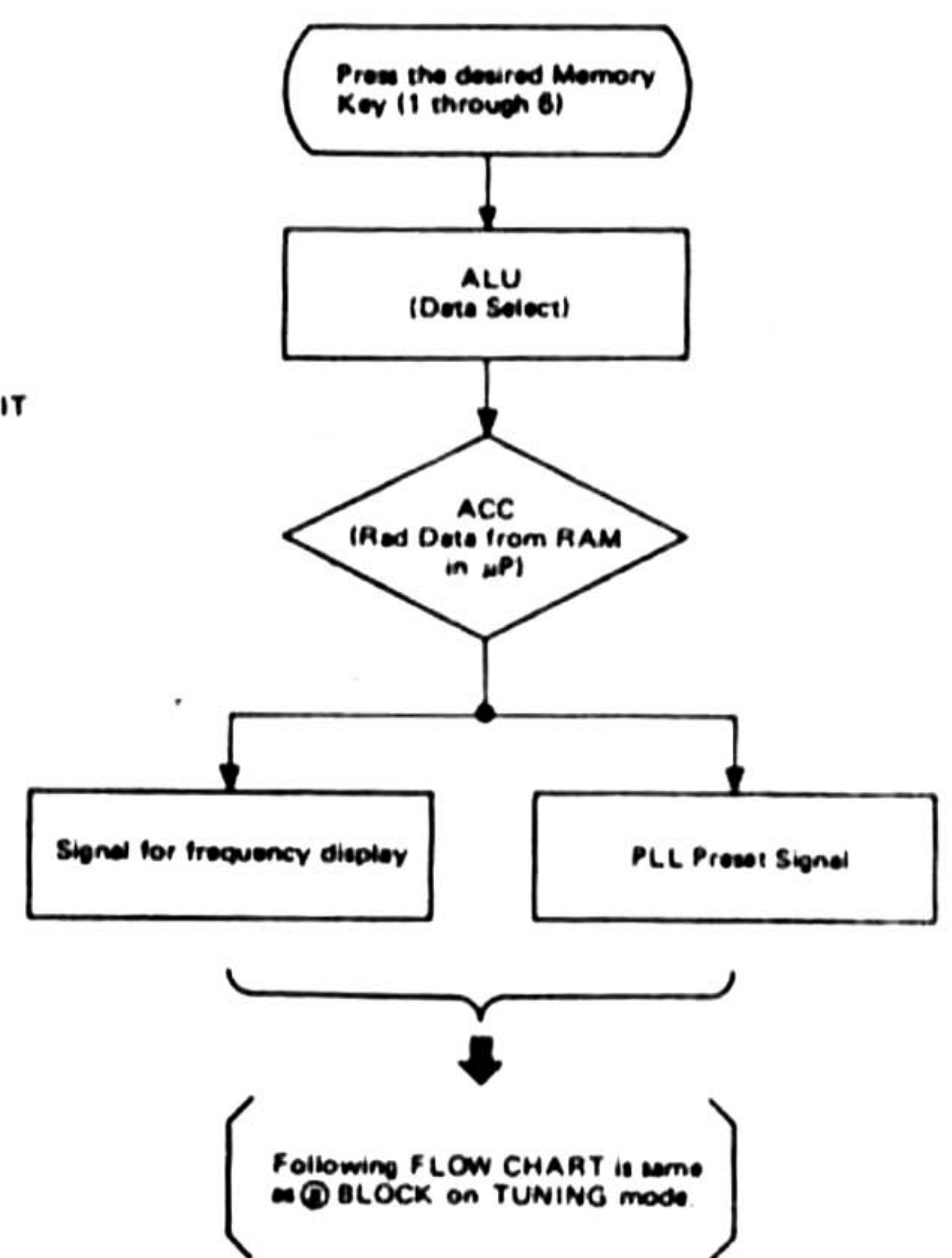
(2) MANUAL TUNING MODE



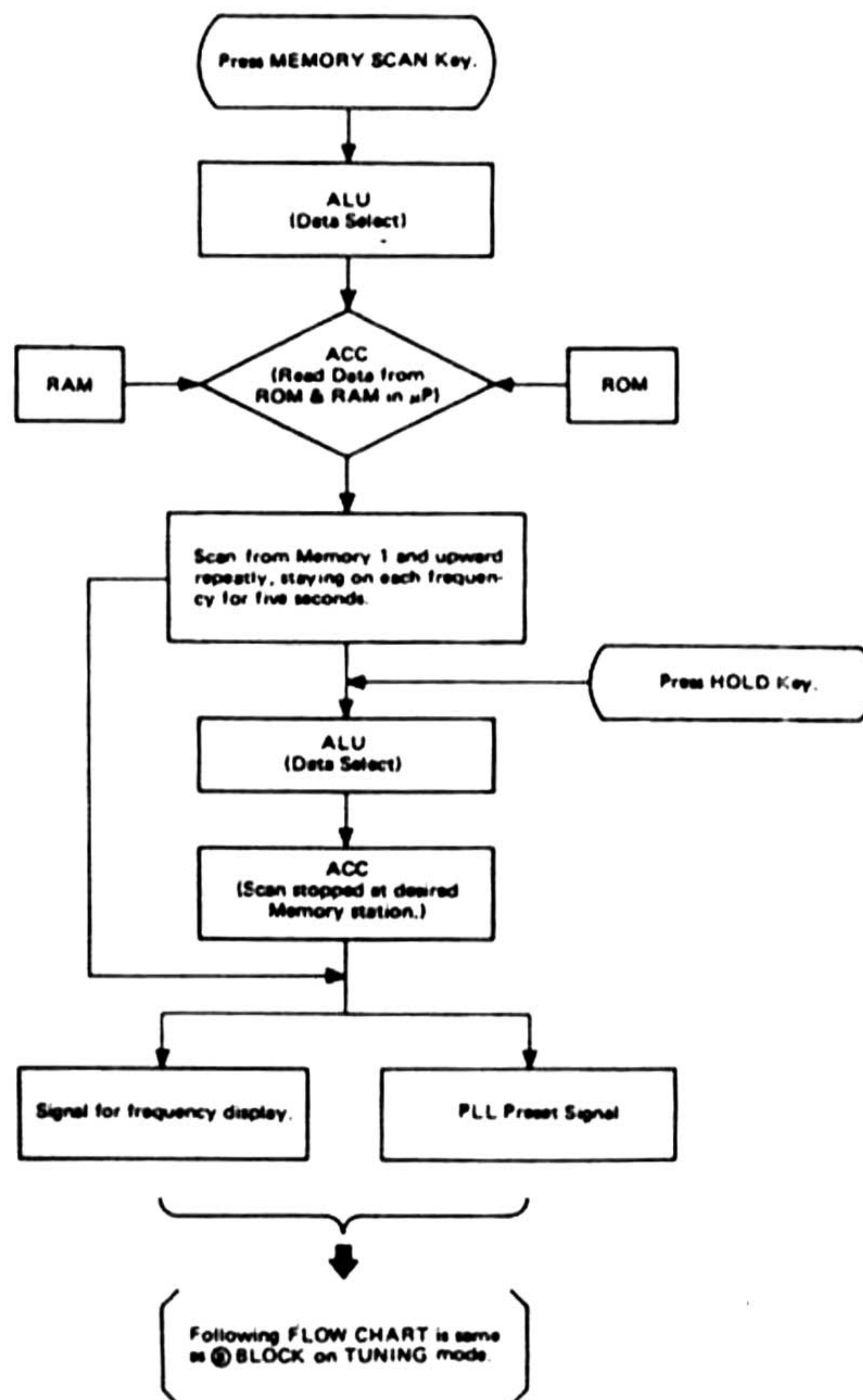
(3) MEMORY SETTING MODE



(4) MEMORY RECEIVE MODE



(5) MEMORY SCAN MODE



3. AUTO STOP CIRCUIT FOR AUTO TUNING

The Automatic Stop circuit consists of IC104, 105, TR103, 104, 105, 106, 109, TR1601 and 1602. Refer to Figure A.

(1) In FM Mode:

When receiving an FM station, the IF signal from Pin 7 of IC103 is applied to pin 1 of IC104.

(Input signal level:

FM MUTE Switch LOW: $6 \mu\text{V}$

HIGH: $60 \mu\text{V}$)

Pin 12 of IC104 will become Low (from 5V to 0V) and TR109 will be turned off.

Pin 13 of IC104 will become High (from 0V to approx. 2.5V by $6 \mu\text{V}$ input, to approx. 5.5V by $60 \mu\text{V}$ input), then output of Pin 13 is applied to Pin 1 of IC105 (Comparator) through D106 and

Pin 5 will become High (from 0.5V to 10V) and TR105 will be turned on.

At the same time TR104 will be turned on.

Under these conditions, the Low level (from 8V to 0.2V) is provided to Pin 11 of IC402.

This causes that Auto Tuning mode in the microprocessor to stop.

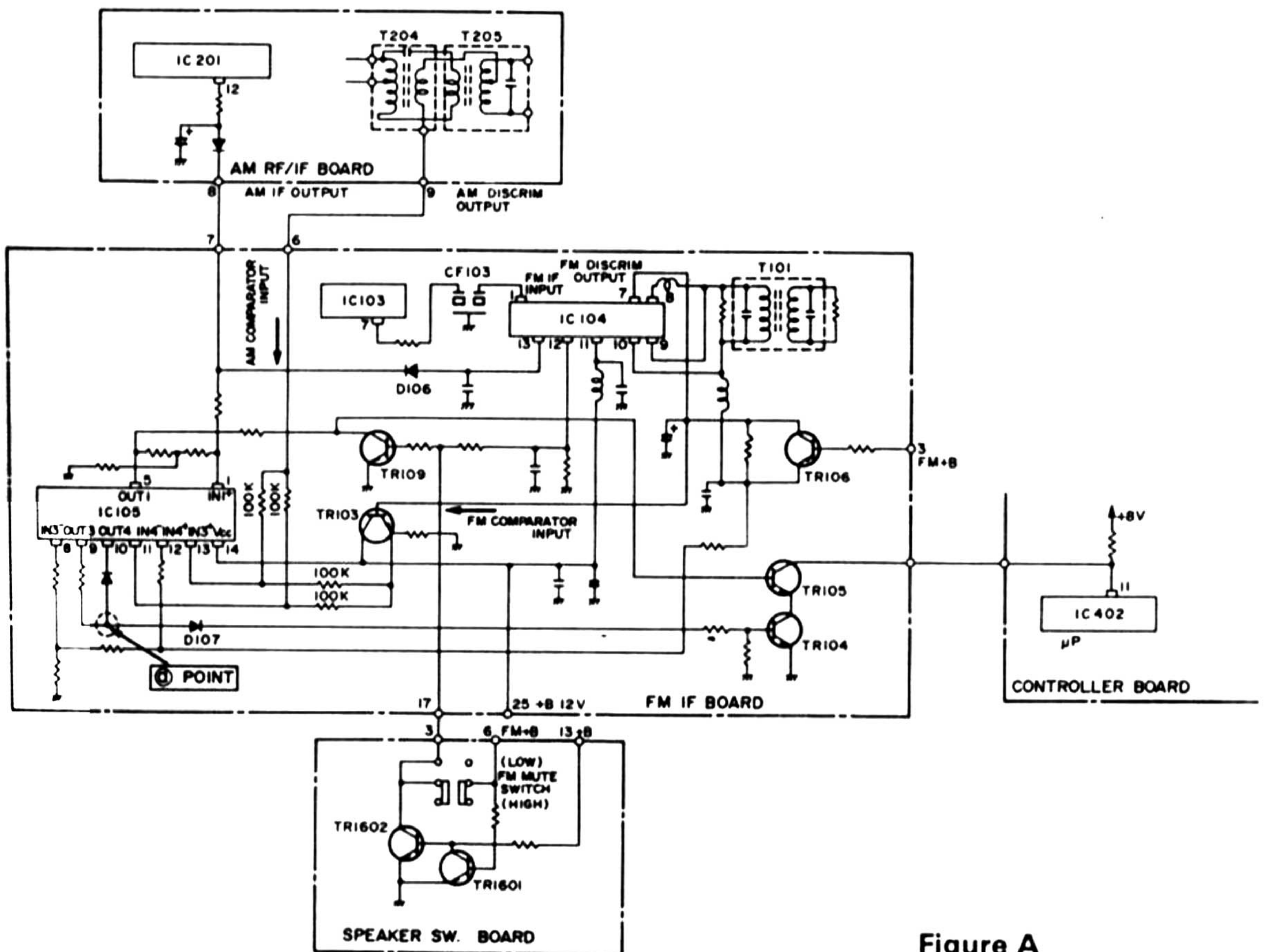


Figure A

NOTE

To prevent the Auto Stop circuit from tuning unwanted frequencies, TR104 has been incorporated. The switching of TR104 is a combination of the Comparator circuit (IC105) and S-center detection from the FM discrimination circuit.

Refer to Figure B.

When no signal applied (discriminator output is at ① or ⑤ point) ② point on Figure A will be at a High level and TR104 is kept on.

When receiving a station, detection occurs at ③ point and ② point on Figure A will be High level compared with Pin 9 and Pin 10 of IC105. Thus TR104 will be on.

However, if detection is at ④ point or ⑤ point, ② point on Figure A becomes low and TR104 will be turned off.

The result is Auto Stop circuit does not function when tuned to either side of required station.

FM DISCRIM S CURVE

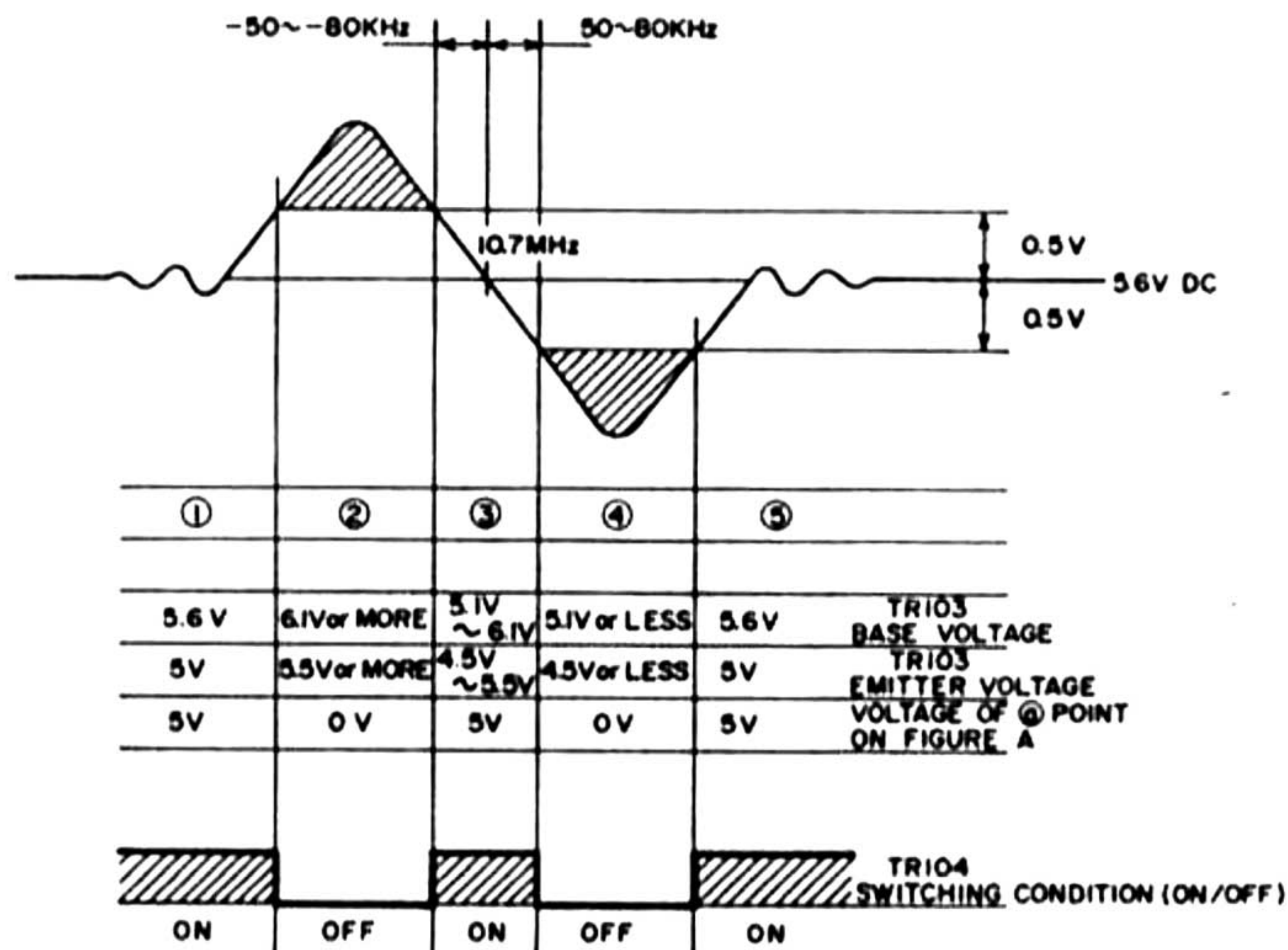


Figure B

(2) In AM mode:

Refer to Figures A and C.

When receiving an AM station, IF signal from Pin 12 of IC201 is applied to Pin 1 of IC105 and Pin 1 will become High level.

Thus Pin 5 of IC105 will become High (from 0 V to approx. 5 V) and turn TR105 on.

In AM mode, TR109 is always off because TR1601 is kept off and TR1602 is kept on.

TR104 is combination Comparator circuit (IC105) and S-center detection from AM discriminator circuit.

Ⓐ point voltages and TR104 switching are operating in similar condition as in FM mode (see Figure C).

AM DISCRIM S CURVE

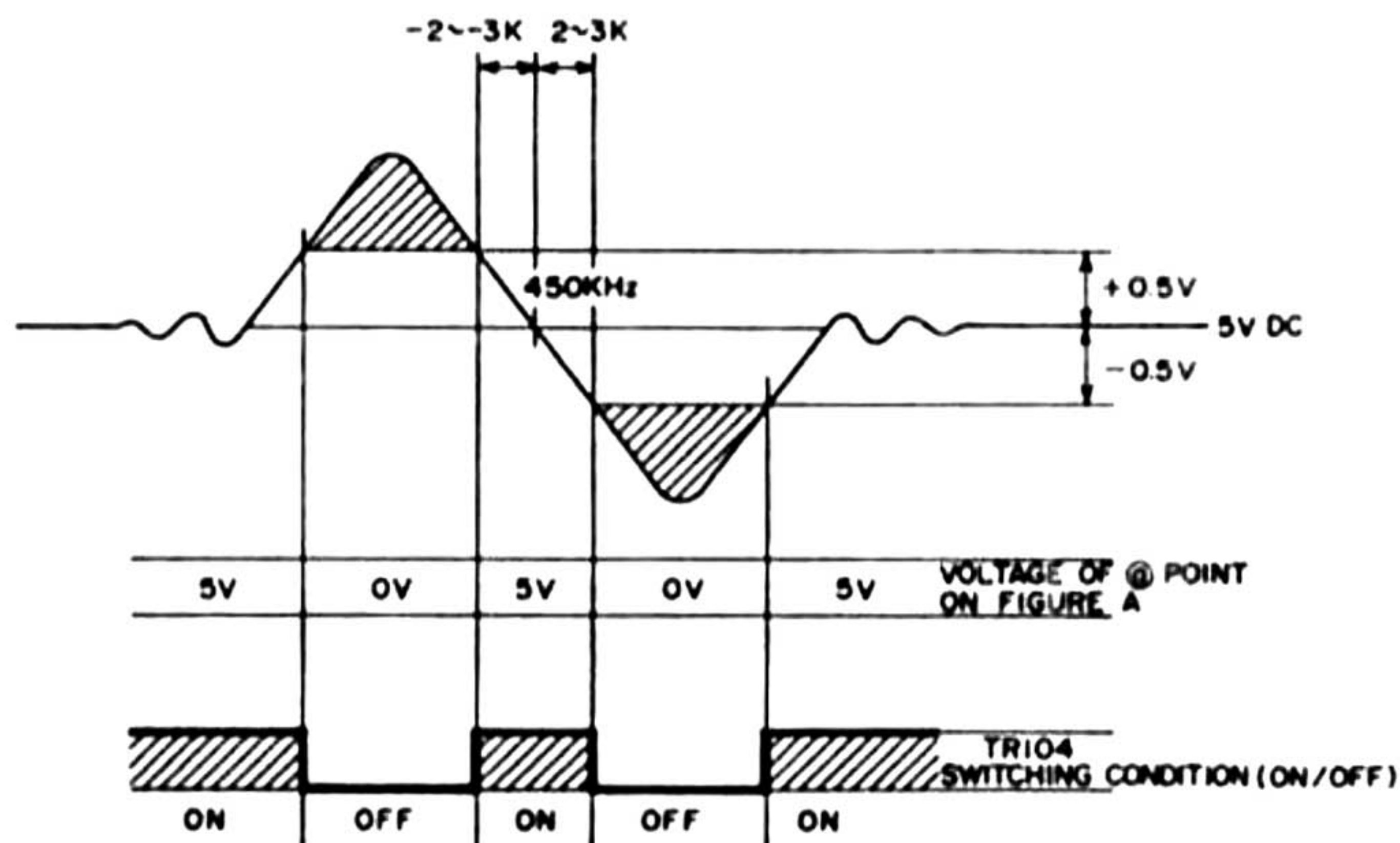


Figure C

NOTE:

In FM mode, TR106 is always off [because emitter voltage (5.6V) is lower than base voltage (12V)]
 In AM mode, emitter voltage is always 5.6V and Pin 3 on FM IF board is grounded, TR106 will kept on.

4. FREQUENCY AND CLOCK DISPLAY CONTROL CIRCUIT

Frequency and Clock Display circuit consists of IC402, D1001-1004, D1009, TR401-408 and TR410-416.

MPU IC402 sends frequency or clock display information from Pins 2, 3, 4, 5, 8, 10, 16, 17, 22, 26, 27, 28, 29 and 30 to Pins 2-21, 23, 25, 26, 29-42 and 44 on Display P.C.B.

Digit Section

Output of Pin 30 selects the Least Significant Digit (LSD), Pin 26 selects the 2nd Digit, Pin 22 selects the 3rd Digit and Pin 16 the Most Significant Digit (MSD), respectively, at D3, D2, D1 or D0 timing.

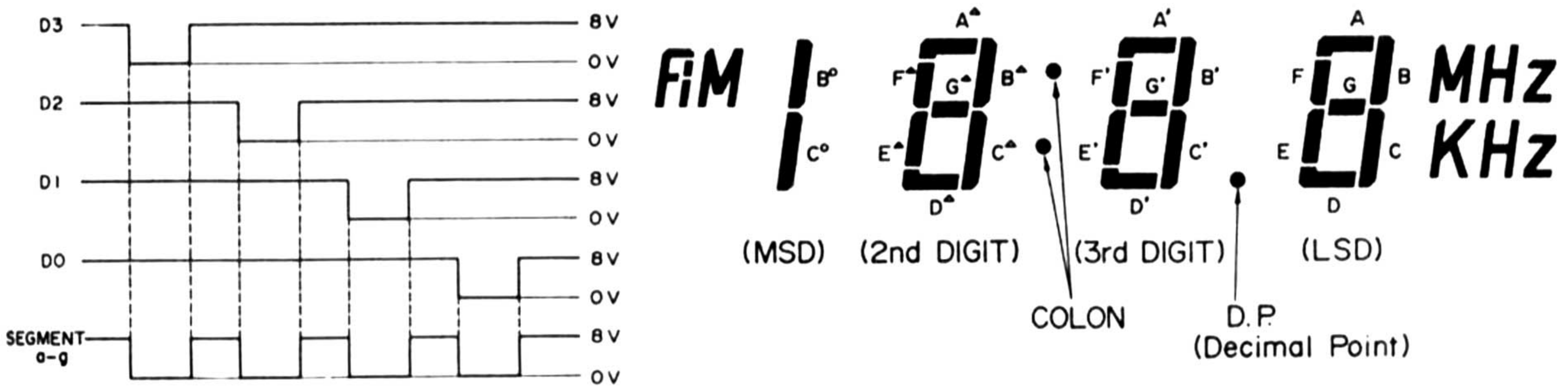
Segment Section

Output of Pins 2-5 and 8-10 of IC402 selects 7 Segments (a) through (g).

Display Indication

The Segments are lit when both outputs of Digit and Segment go to low level timing.

IC402 OUTPUT TIMING CHART



(Pin 16) D0	--	B'	C'	--	--	--	--	AM	FM	--	PM	MSD
(Pin 22) D1	A ^Δ	B ^Δ	C ^Δ	D ^Δ	E ^Δ	F ^Δ	G ^Δ	--	--	COLON	--	2nd DIGIT
(Pin 25) D2	A'	B'	C'	D'	E'	F'	G'	--	D.P.	--	--	3rd DIGIT
(Pin 30) D3	A	B	C	D	E	F	G	kHz	MHz	--	--	LSD
MPU Pin Nos.	a Pin 2	b Pin 3	c Pin 4	d Pin 5	e Pin 8	f Pin 9	g Pin 10	AM kHz Pin 28	FM MHz D.P. Pin 27	COLON Pin 17	PM Pin 29	

Note: "PH" and "AUX" are displayed by Mode Selector switch position.

"ST" is lit when received FM stereo signal via Pin 6 of IC106---same way as ordinary stereo indicator lamp found on most Receivers/Tuners.

5. PROTECTOR CIRCUIT DESCRIPTION

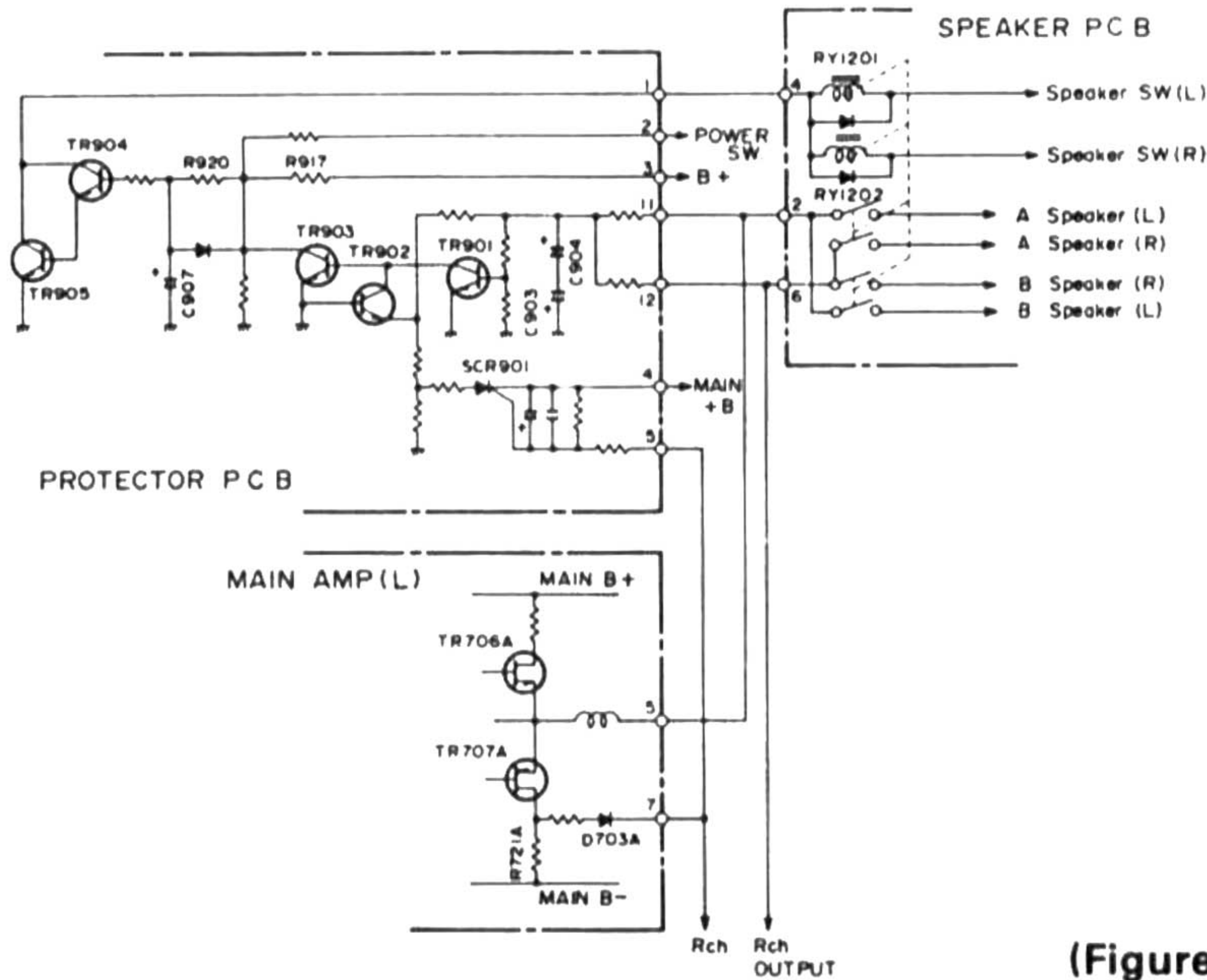
(1) PROTECTIVE CIRCUIT IN CASE OF SHORTED OUTPUT TERMINALS

If speaker terminals are shorted (or load impedance of one channel, left or right, is less than 4 ohms), excessively high current flows from source to drain of TR707A (TR707B) and a high voltage appears across R721A (R721B). This high voltage goes to gate of SCR901 after being rectified by D703A (D703B).

When the voltage between cathode and gate increases to about 0.7V, SCR901 will be turned on. TR902 and TR901 will then be turned on, and TR904 and TR905 will be turned off.

Relay RY1201 and RY1202 will shut off output to the speaker terminals and output will drop to zero protecting Main Amp and Speaker.

Turn the Receiver off to reset the protective circuit. Wait approximately 30 seconds. When the problem is corrected, the Receiver can be turned on again. (see Figure D)



(Figure D)

(2) MAIN AMP PROTECTIVE CIRCUIT

If center voltage of Main Amp goes to $\pm 3v$ (normal condition within $\pm 30 mV$), TR901 or TR902 will be turned on and TR904 and TR905 will be turned off.

If this should occur, Relay RY1201 and RY1202 will shut off output to the speaker terminals and output will drop to zero, protecting Main Amp and Speaker. (See Figure D)

NOTE: To prevent AC voltages from upsetting these circuits, capacitors C903 and C904 have been incorporated. If AC voltage is applied to the base of TR901, it will be grounded through C903 and C904; thus, TR901 is immune to AC voltages.

(3) ABNORMAL TEMPERATURE RISE PROTECTION

If the temperature of Main Amp heat sink rises to $100^{\circ} C$, the thermal protector switch will shut off and secondary supply voltage of power transformer T1802 will drop to zero.

If this should occur, turn the Receiver off. When the temperature of the Main Amp heat sink falls to within the operating limits of the Receiver, the thermal protector switch will reset itself.

When the problem is corrected, the Receiver can be operated again.

(4) SPEAKER PROTECTIVE CIRCUIT

With power switch "on", a 4.5 second signal delay is provided to the speaker output terminal by Relay RY1201 and RY1202.

This is to protect speakers from switching transients.

With power switch "on", TR904 and TR905 will be turned on through time constant circuit R917, 920 and C907. (See Figure D)

(5) AM/FM NOISE AND SWITCHING/MUTING CIRCUIT

This circuit performs two functions (See Figure E)

- A) To eliminate the interstation "hiss" noise and switching noise of the digital circuit when PLL circuit is unlocked.

PLL circuit is unlocked when

- (1) Manual/Auto Tuning button is pressed
- (2) In Memory mode (Memory recall or memory scan)

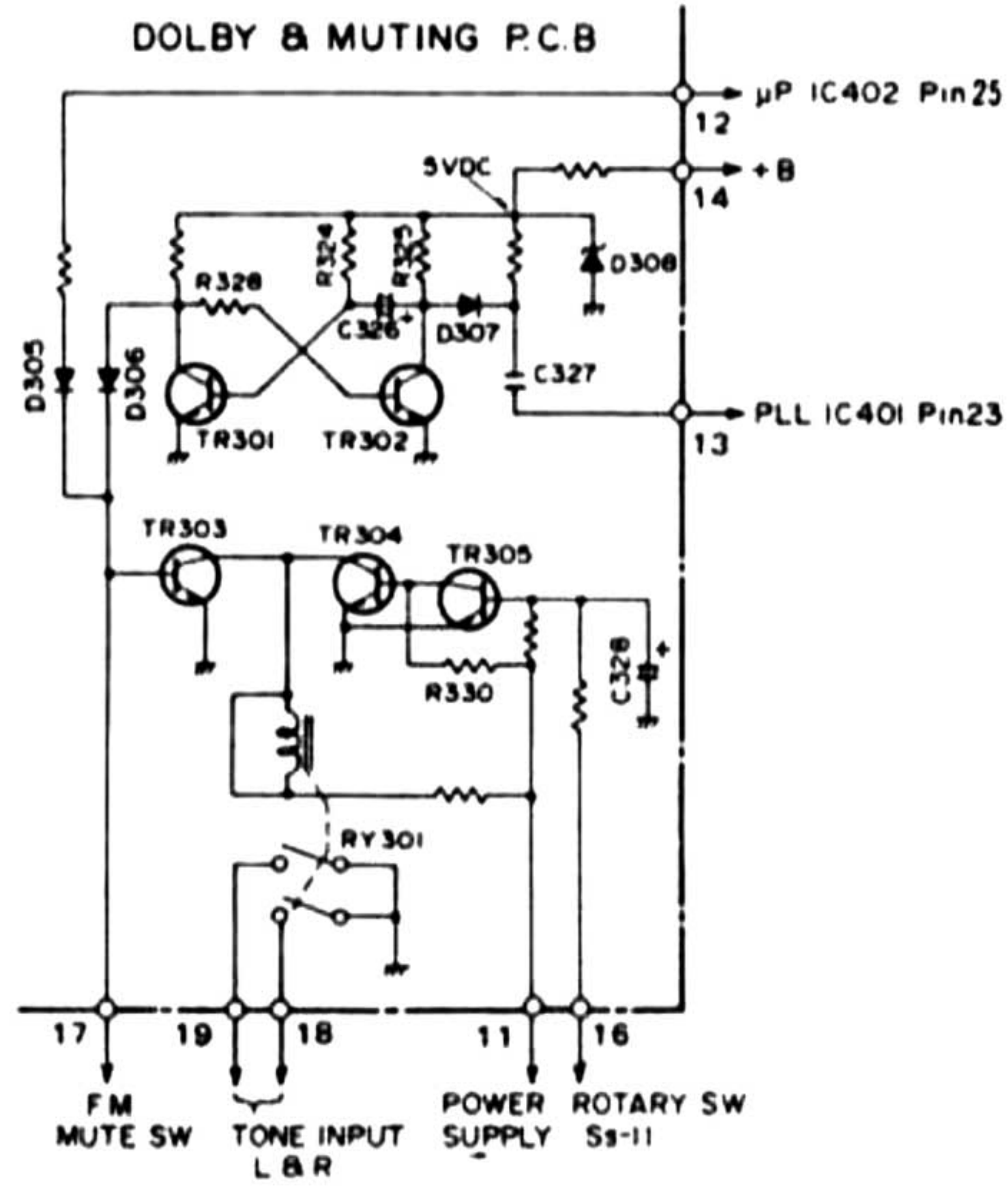


Figure E

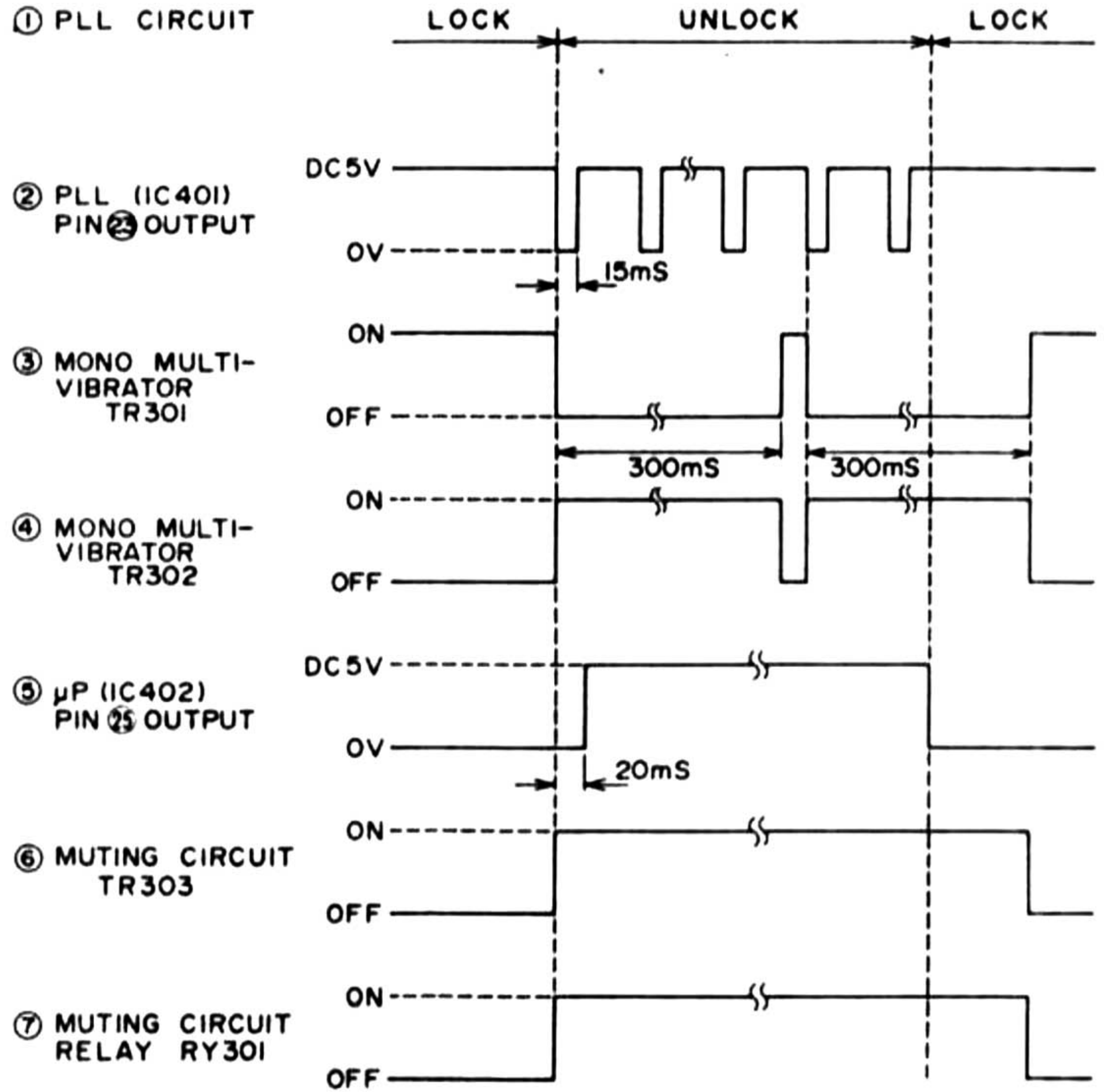


Figure F

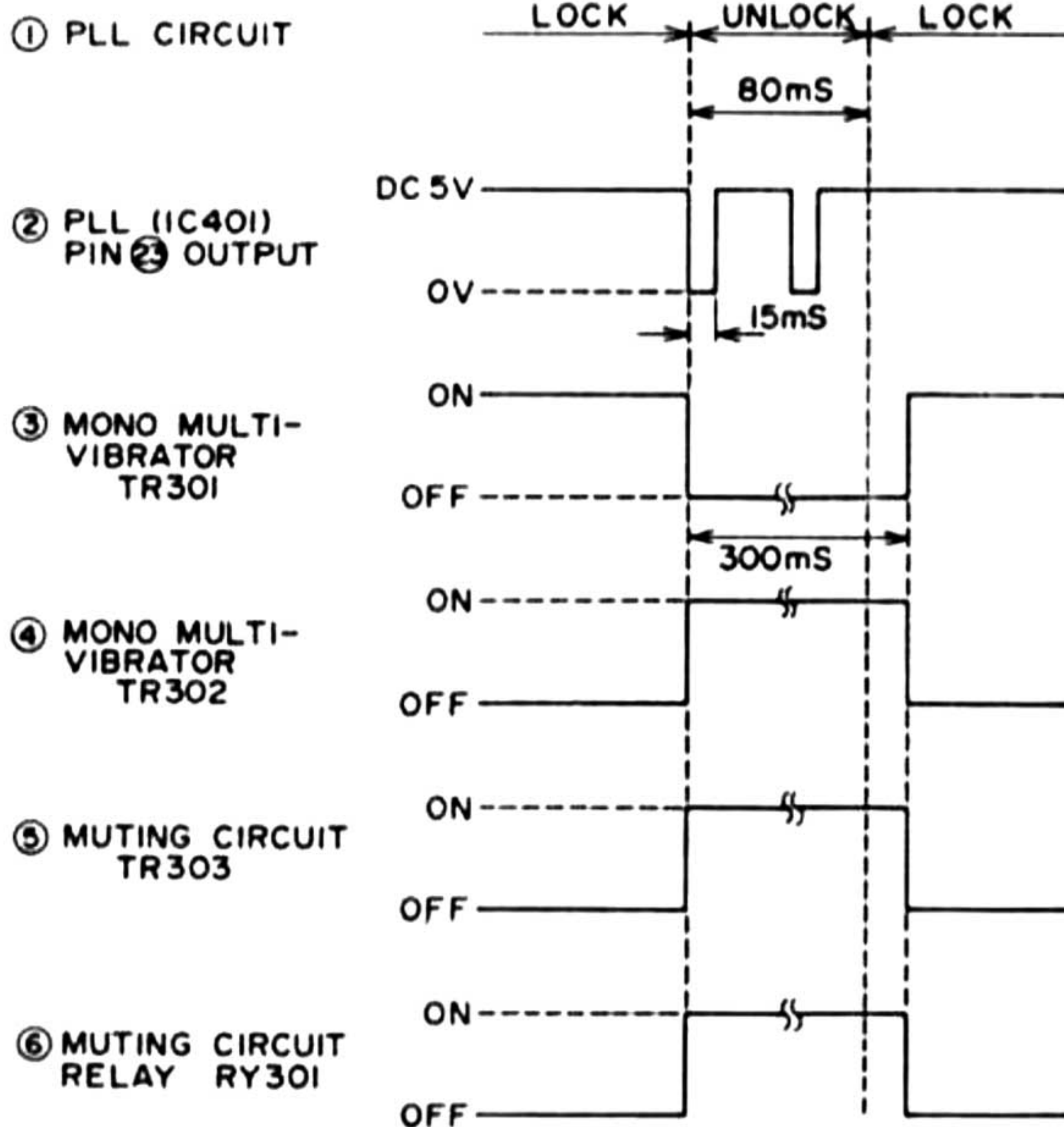
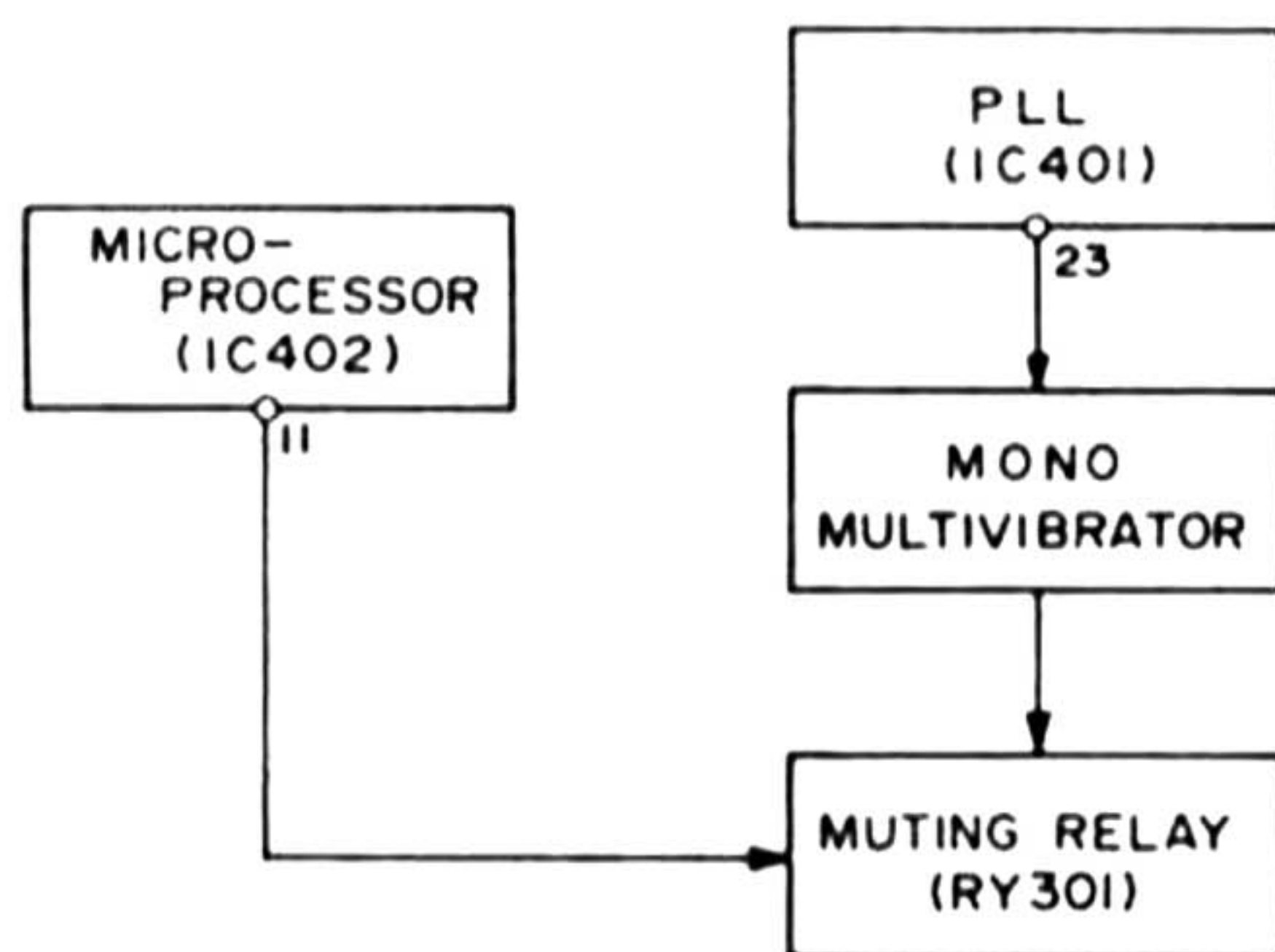


Figure G



When PLL circuit is unlocked, the square wave voltage (15 msec pulse) from Pin 23 of PLL IC, IC401 is applied to the cathode of D307 via C327.

This turns TR301 off, and TR302 turns on. This in turn causes TR303 to turn on and Muting Relay RY301 is activated and output is shut off.

Now, TR301 and TR302 form a Mono Multivibrator with about 300 msec cycle. But while the Tuning button is pressed, MPU IC402 senses this and outputs a signal from Pin 25 within 20 msec after the button is pressed. This is applied to the base of TR303 via D305. Thus TR303 is always on, regardless of the status of Multivibrator. During Memory operation, the software is so designed that unlock status should not last more than 80 msec, which is far shorter period than the Multivibrator cycle (300 msec).

When PLL is locked, Pin 23 of IC401 outputs a stable 5V and Pin 11 of IC402 drops to zero, thus muting circuit deactivated.

B) To eliminate the clicking noise when function switch is turned from AM to FM (or Dolby FM to PHONO, etc.).

The switch Ss-11 is a shorting type, goes through a short-circuit condition when turning from 1(AM) to 2(FM), etc. (It is momentarily grounded.) This turns TR305 off and TR304 on. Relay RY301 is activated and output is cut off.

The time constant of R330 and C328 allows the cut off condition to last for about 0.5 second (before C328 charges up to a point where TR301 turns on again, etc.). (Figure E)

6. SIGNAL LEVEL METER DESCRIPTION

AM/FM Signal Meter circuit consists of Comparator IC IC1501 and LEDs D1502 through D1506.

(1) AM SIGNAL METER

AGC voltage from Pin 14 of IC201 (approx. 1.2-2.4V) is applied to the base of TR202.

The emitter voltage of TR202 (approx. 0.45-0.65V) is applied to the Pin 3 of IC1501 after being set by VR202. It is applied to internal comparator.

On the other hand, a reference voltage is inputted from Pin 5, divided by resistors (internally to IC1501) and fed to another input of each comparator. Each LED lights when the level of input signal is higher than the reference voltage of each comparator. (Figure H)

LED METER INDICATION LEVEL

Signal Meter LED	Antenna Input Level	Input Voltage at Pin 3 of IC1501
D1502	700 μ V	0.02 V
D1503	1.12 mV	0.05 V
D1504	1.78 mV	0.08 V
D1505	10 mV	0.11 V
D1506	100 mV	0.13 V

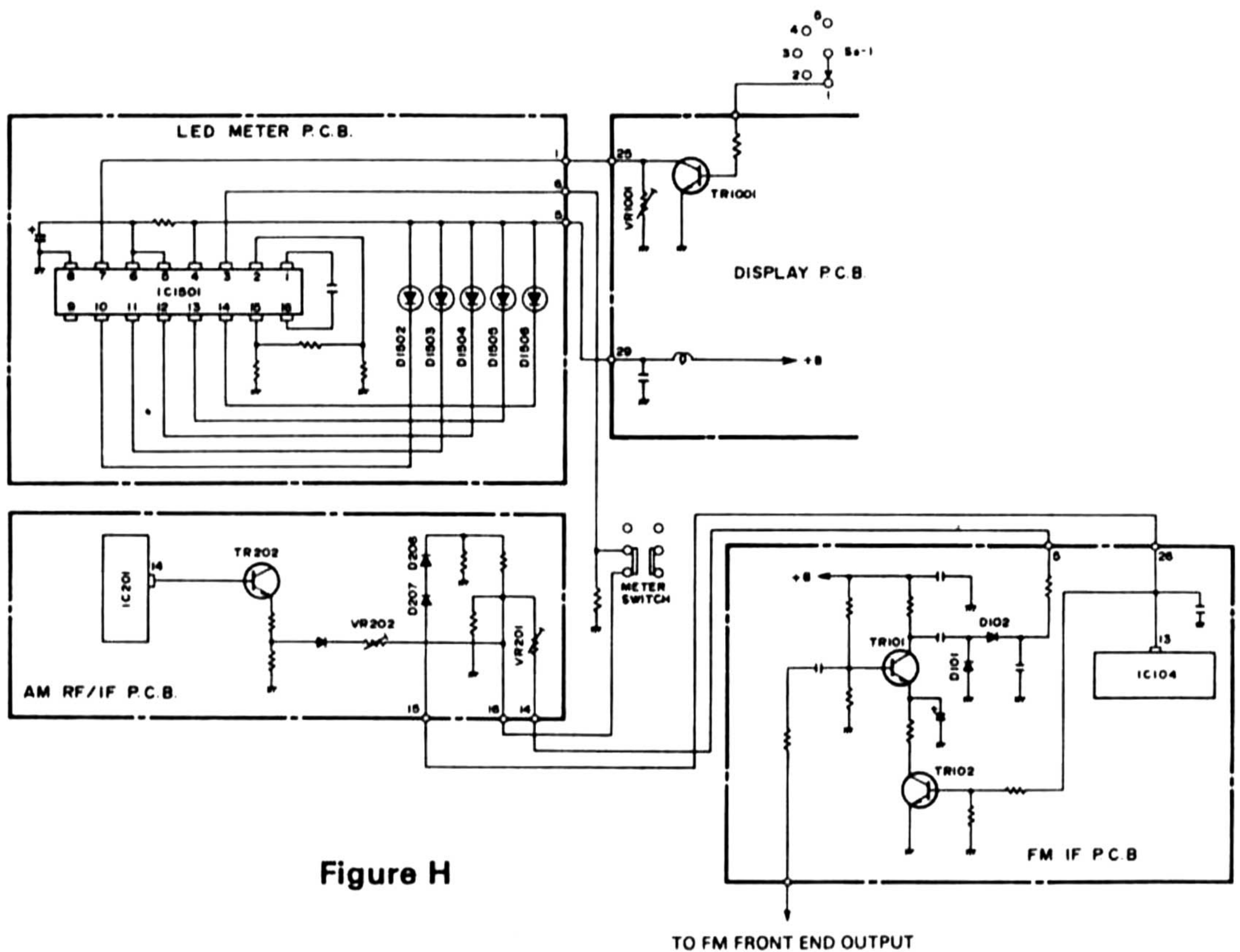
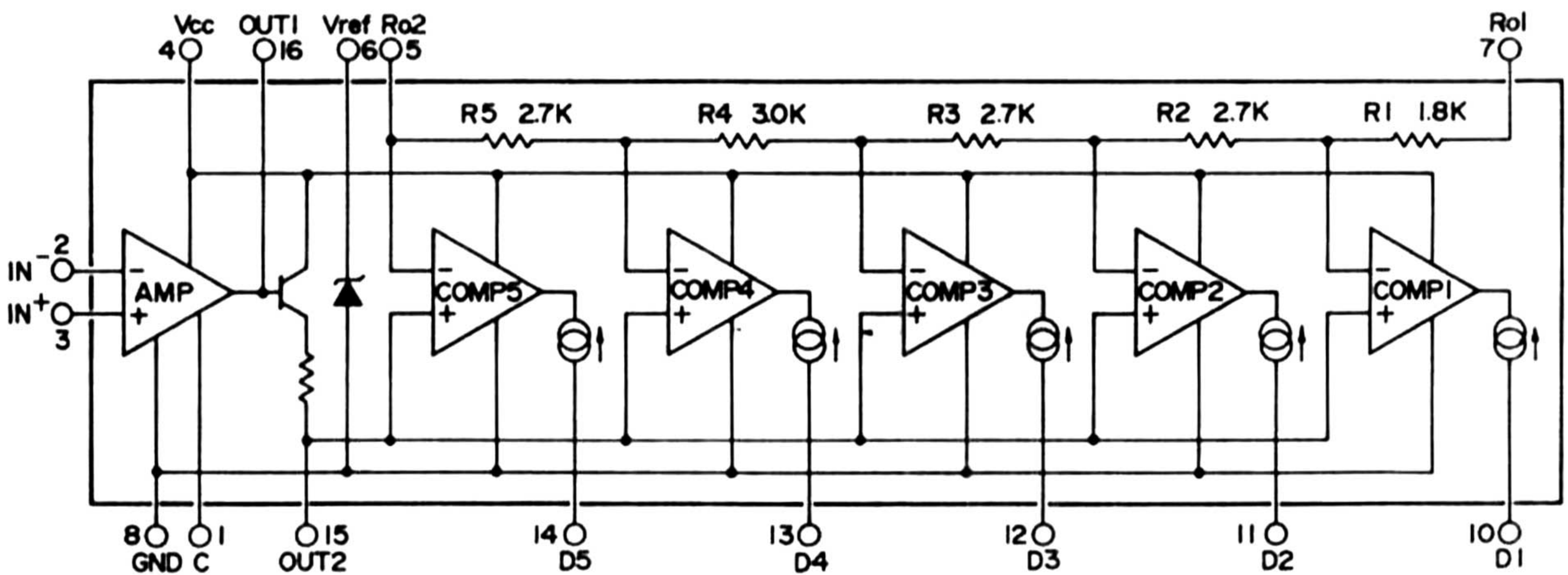


Figure H



LB1405 BLOCK DIAGRAM

(2) FM SIGNAL METER

Basically, Signal Meter circuit functions the same as in AM mode, but several additional components are added to smooth out the operation.

Output from Pin 13 of IC104 is used to apply to the input to the IC 1501, but this output is saturated at $250 \mu\text{V}$ antenna input, at this level only upto 3rd LED will be lit. So, for more than $250 \mu\text{V}$ input, TR101 and TR102 have been added. TR102 is designed to operate when the output level from Pin 13 of IC104 is more than 0.6V (when antenna input level exceeds $250 \mu\text{V}$). As TR102 turns on, TR101 also turns on and amplifies the signal from the FM front-end output. This signal is further rectified by D101/102, and fed to input pin of IC1501.

Also, VR1001 is provided to turn the first LED on at $6 \mu\text{V}$ antenna input, by adjusting the reference input voltage of IC1501.

LED METER INDICATION LEVEL

Signal Meter LED	Antenna Input Level	Input Voltage at Pin 3 of IC1501
D1502	6 μ V	0.02 V
D1503	80 μ V	0.05 V
D1504	250 μ V	0.08 V
D1505	630 μ V	0.11 V
D1506	1 mV	0.13 V

7. POWER LED METER DESCRIPTION

Power LED Meter circuit consists of Comparator IC IC1701, IC1702 and LEDs D1703 through D1722.

Output of Main Amp is provided to D901 (D902). A DC voltage [rectified by D901 (D902)] is provided to Pin 17 of IC1701 (IC1702) after being set by VR901 (VR902).

Via internal comparator of IC1701 (IC1702), each LED is lit in order from D1703 to D1721 (D1704 to D1722). (Figure I)

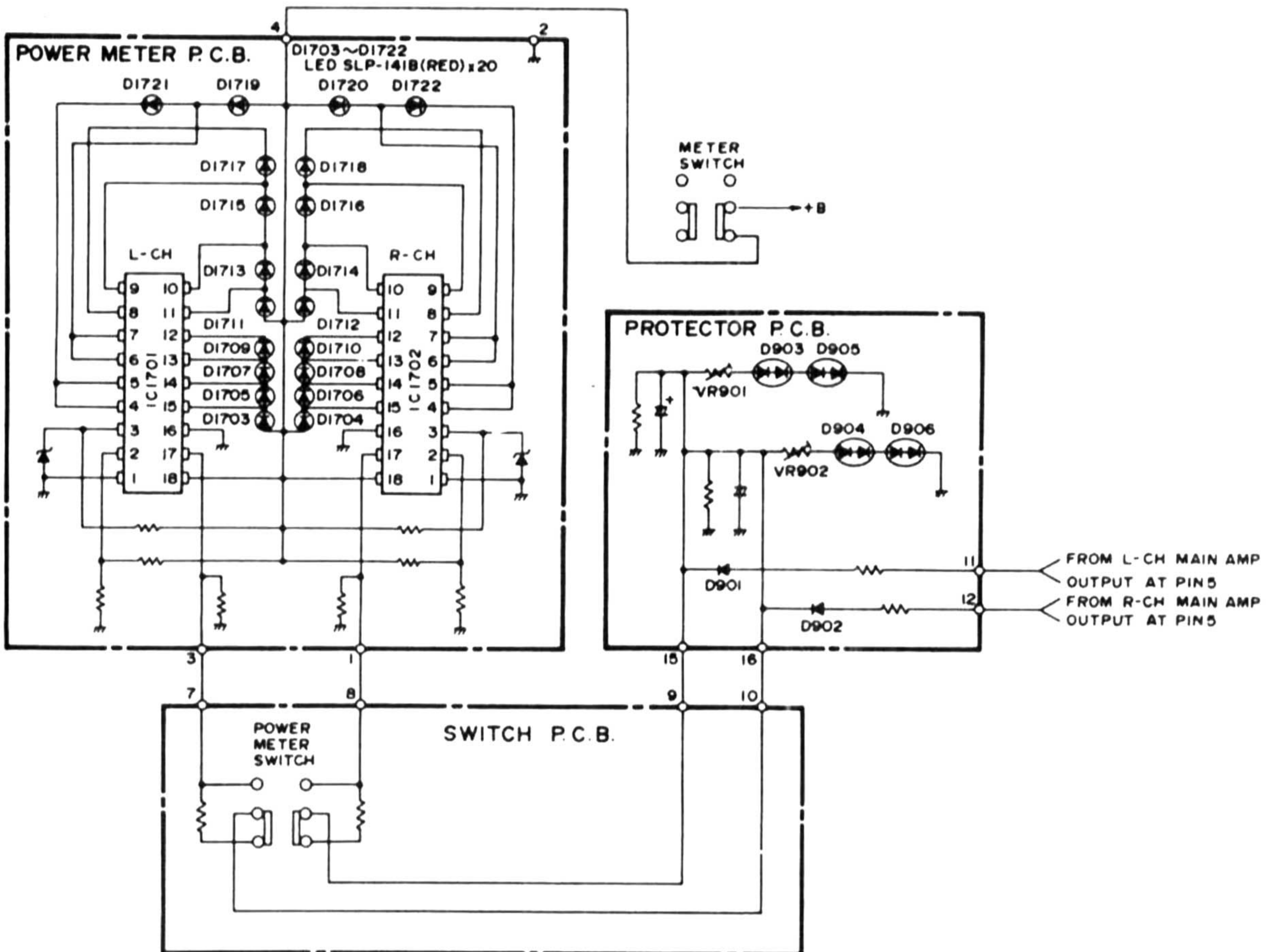
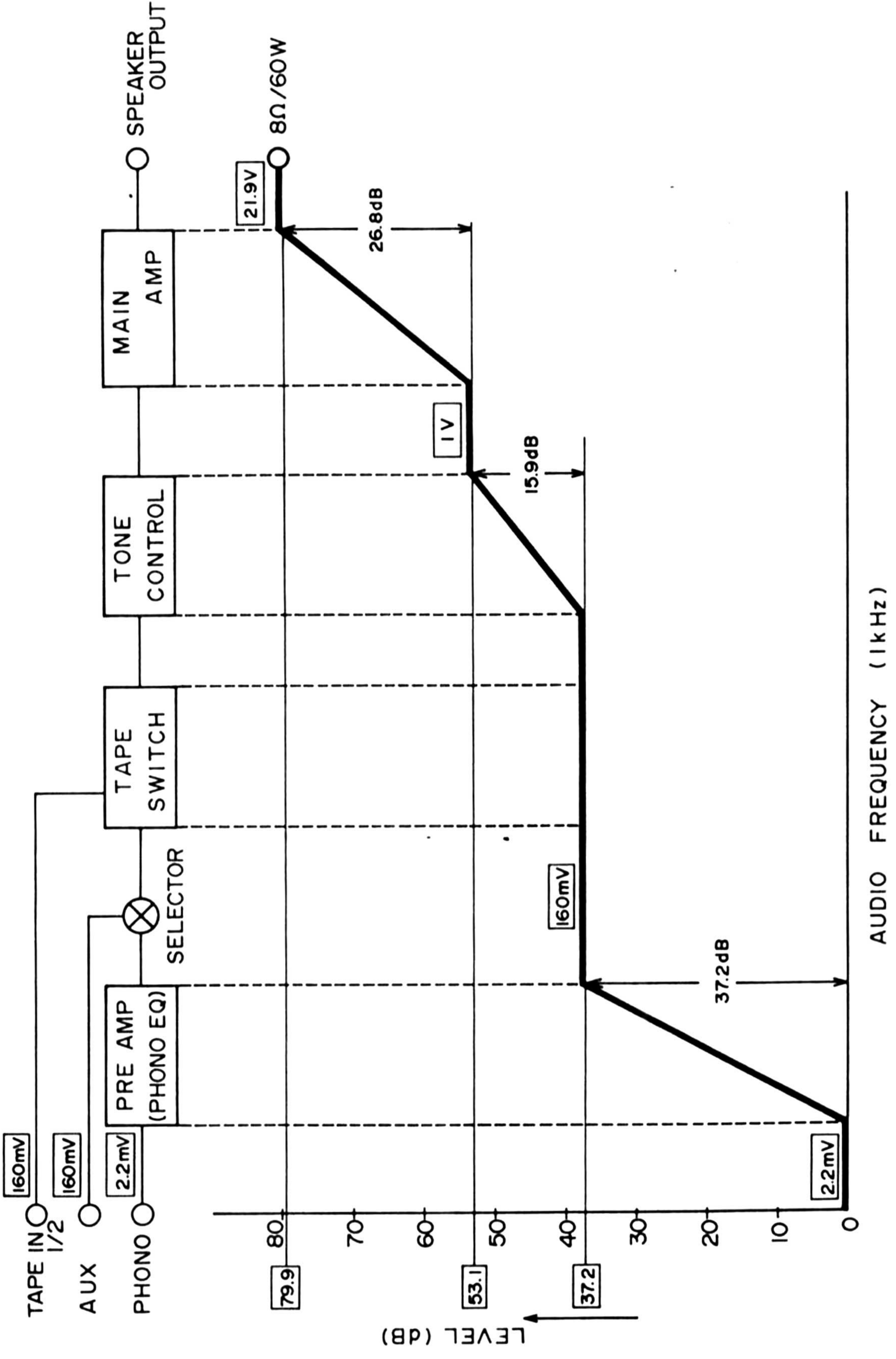


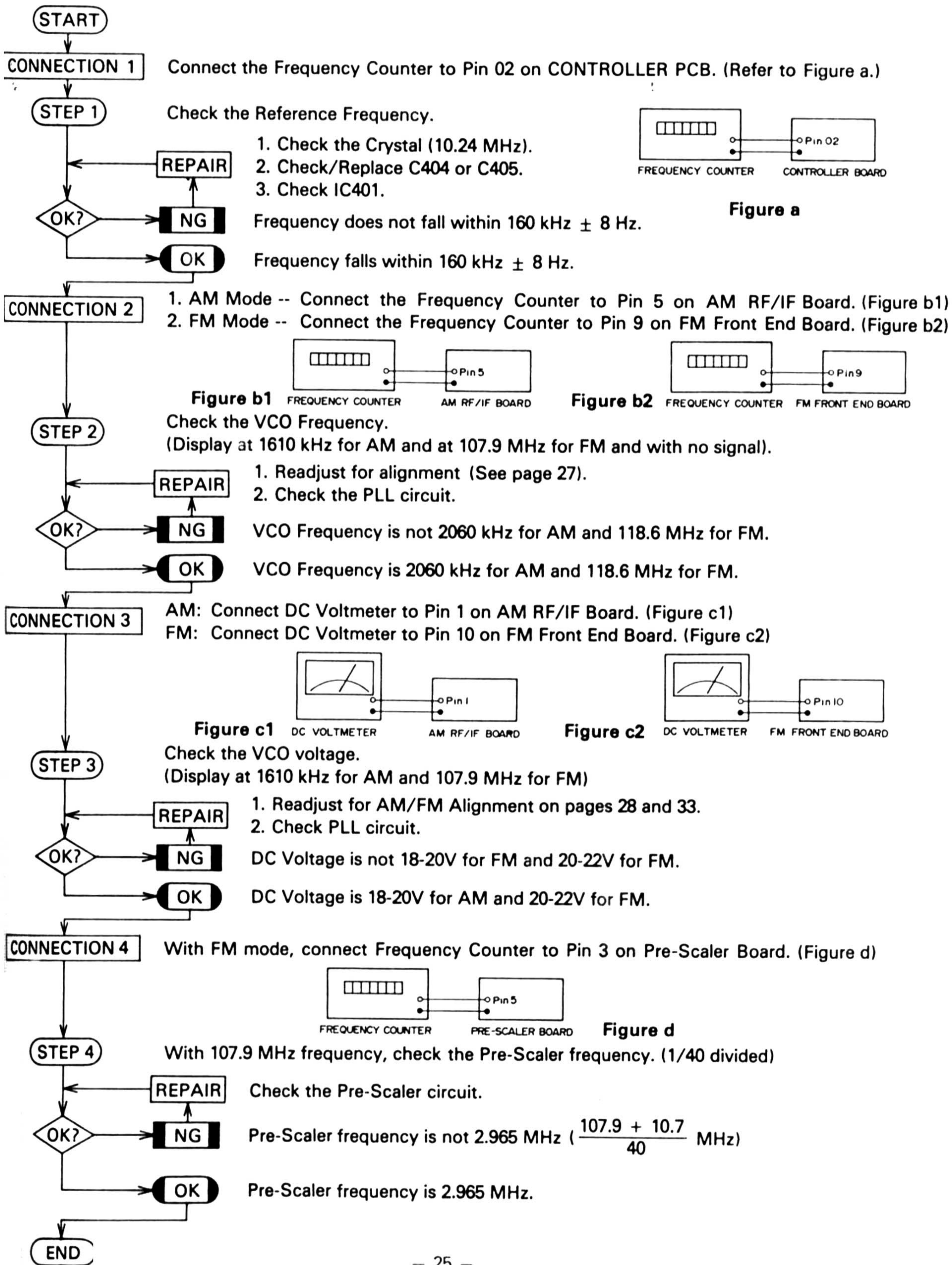
Figure I

(5) LEVEL DIAGRAM



(6) AM/FM PLL CIRCUIT OPERATION CHECK

Refer to PLL CIRCUITRY BLOCK DIAGRAM on page 10.



(7) VCO OUTPUT FREQUENCY, IC401

INPUT FREQUENCY AND CODE TABLE

1. FM BAND

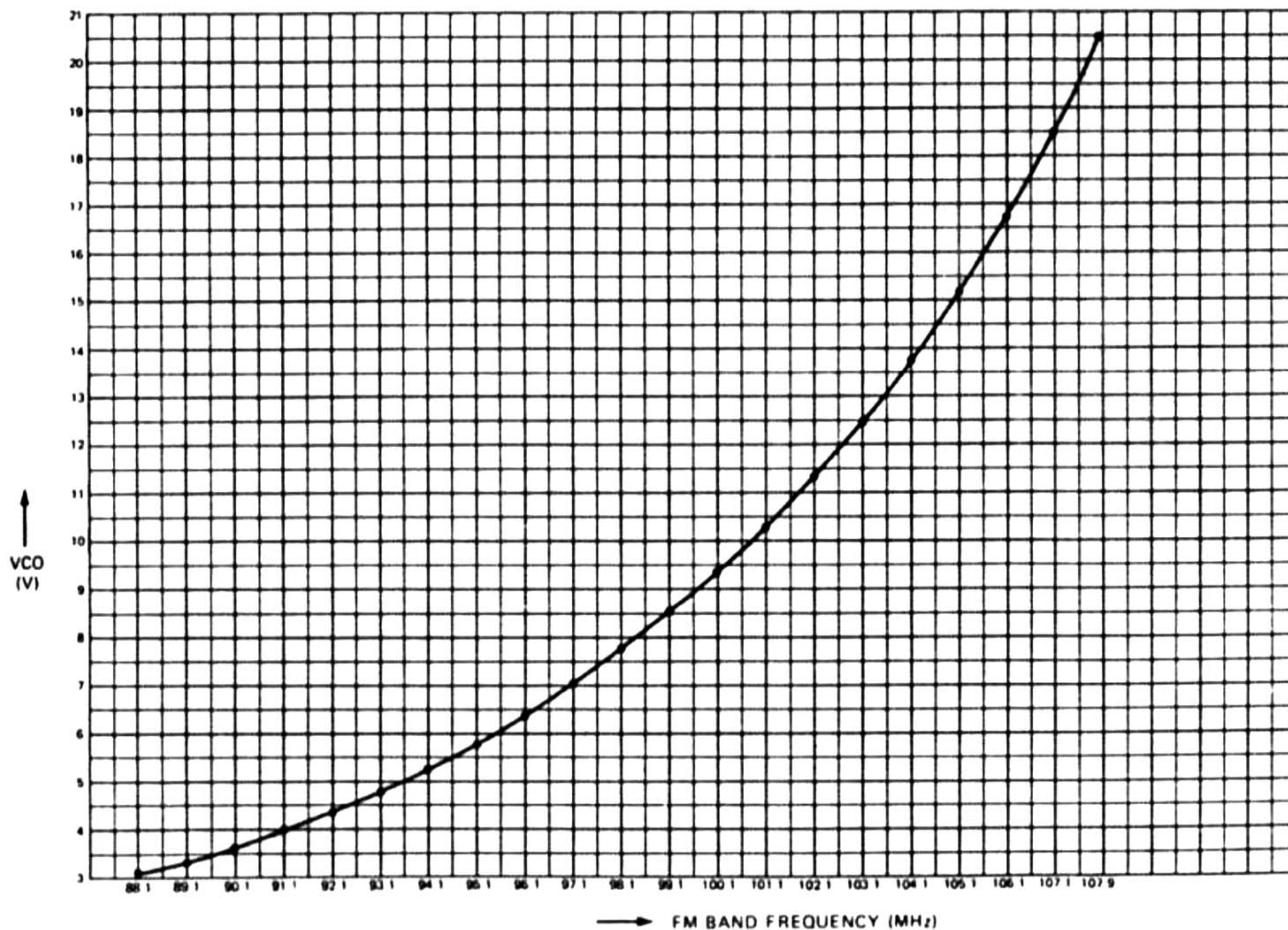
Reference Frequency : 5 kHz

Intermediate Frequency : 10.7 MHz

Pre-Scaler Divider Ratio : 40

INPUT PROGRAM DATA	RECEIVING FREQUENCY (MHz)	VCO FREQUENCY (MHz)	IC401 INPUT FREQUENCY (MHz)	PROGRAMMABLE DIVIDER RATIO
000,001	88.1	98.8	2.470	494
002,003	88.3	99.0	2.475	495
004,005	88.5	99.2	2.480	496
006,007	88.7	99.4	2.485	497
008,009	88.9	99.6	2.490	498
096,097	97.7	108.4	2.710	542
098,099	97.9	108.6	2.715	543
100,101	98.1	108.8	2.720	544
102,103	98.3	109.0	2.725	545
104,105	98.5	109.2	2.730	546
190,191	107.1	117.8	2.945	589
192,193	107.3	118.0	2.950	590
194,195	107.5	118.2	2.955	591
196,197	107.7	118.4	2.960	592
198,199	107.9	118.6	2.965	593

(8) VCO VS FM BAND FREQUENCY CURVE



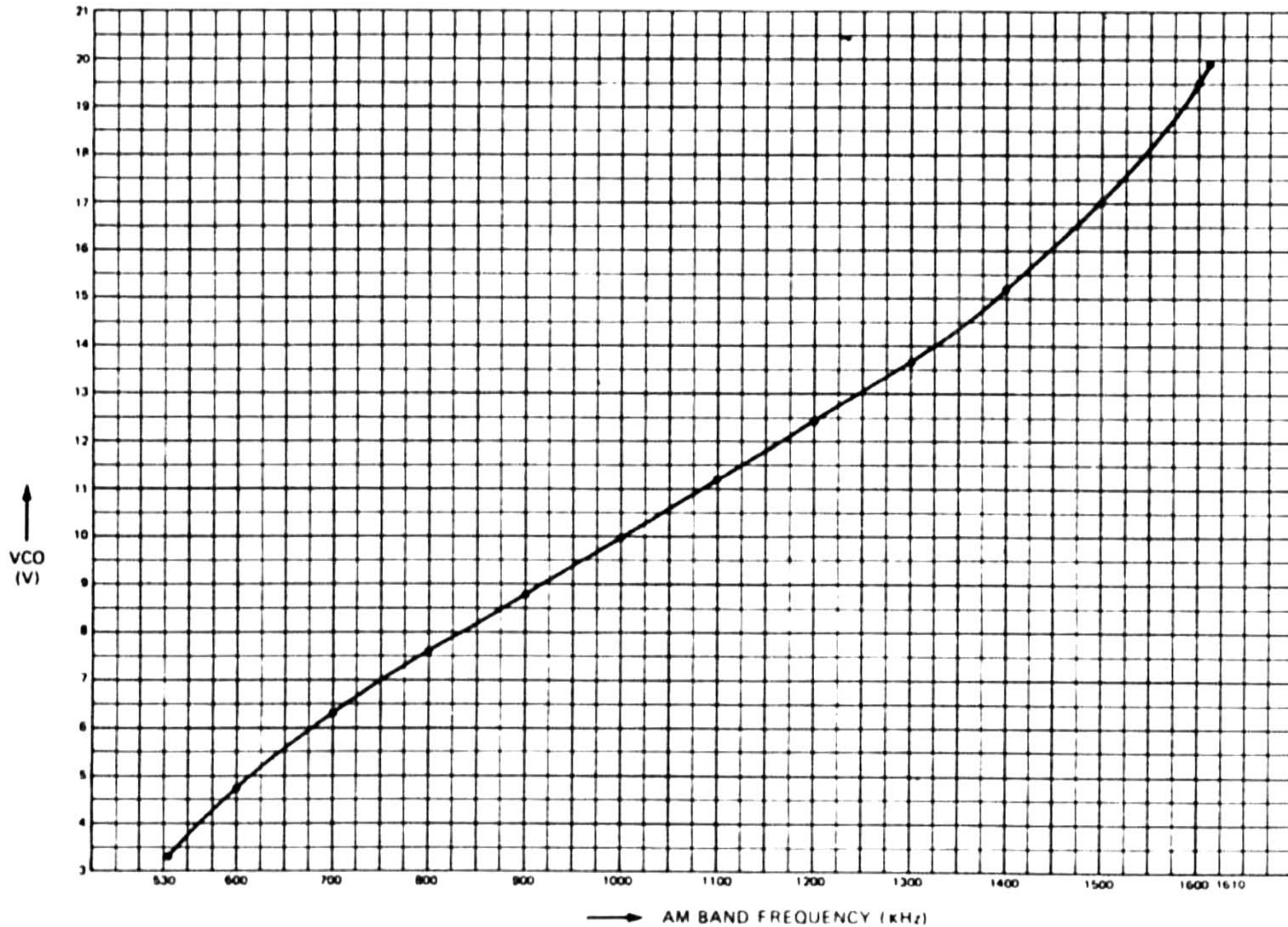
2. AM BAND

Reference Frequency : 10 kHz

Intermediate Frequency : 450 kHz

INPUT PROGRAM DATA	RECEIVING FREQUENCY (kHz)	VCO FREQUENCY (kHz)	IC401 INPUT FREQUENCY (KHz)	PROGRAMMABLE DIVIDER RADIO
003	530	980	980	98
004	540	990	990	99
005	550	1000	1000	100
006	560	1010	1010	101
007	570	1020	1020	102
∕	∕	∕	∕	∕
048	980	1430	1430	143
049	990	1440	1440	144
050	1000	1450	1450	145
051	1010	1460	1460	146
052	1020	1470	1470	147
∕	∕	∕	∕	∕
107	1570	2020	2020	202
108	1580	2030	2030	203
109	1590	2040	2040	204
110	1600	2050	2050	205
111	1610	2060	2060	206

(9) VCO VS AM BAND FREQUENCY CURVE



(10) ALIGNMENT INSTRUCTIONS

AUDIO CIRCUIT ADJUSTMENT/CHECK

EQUIPMENT REQUIRED

1. DC Voltmeter
2. Audio Oscillator
3. Oscilloscope
4. AC Voltmeter

NOTE:

- Maintain voltage at 120 volts, 60 Hz AC
- Set SELECTOR switch to AUX.
- Set Mode switch to Stereo.
- See P.C.B. illustration for alignment points/adjustments.

For location of connection points and trimmer resistors, see P.C.B. view.

MAIN AMP ADJUSTMENT/CHECK

STEP	ADJUSTMENT	EQUIPMENT	CONNECTION	AUDIO FREQ.	LEVEL	ADJUSTMENT
1	Check balance by measuring DC voltage across Output terminal of L and R channel.	DC volt-meter	See Fig. 1	No signal	DC voltage should be within ± 30 mV.	-----
2	Idling current adjustment	DC volt-meter	See Fig. 2	No signal	Adjust voltage across emitter resistors R720A (L ch) and R720B (R ch) to 50 mV (8Ω load)	VR701A (L ch) VR701B (R ch)

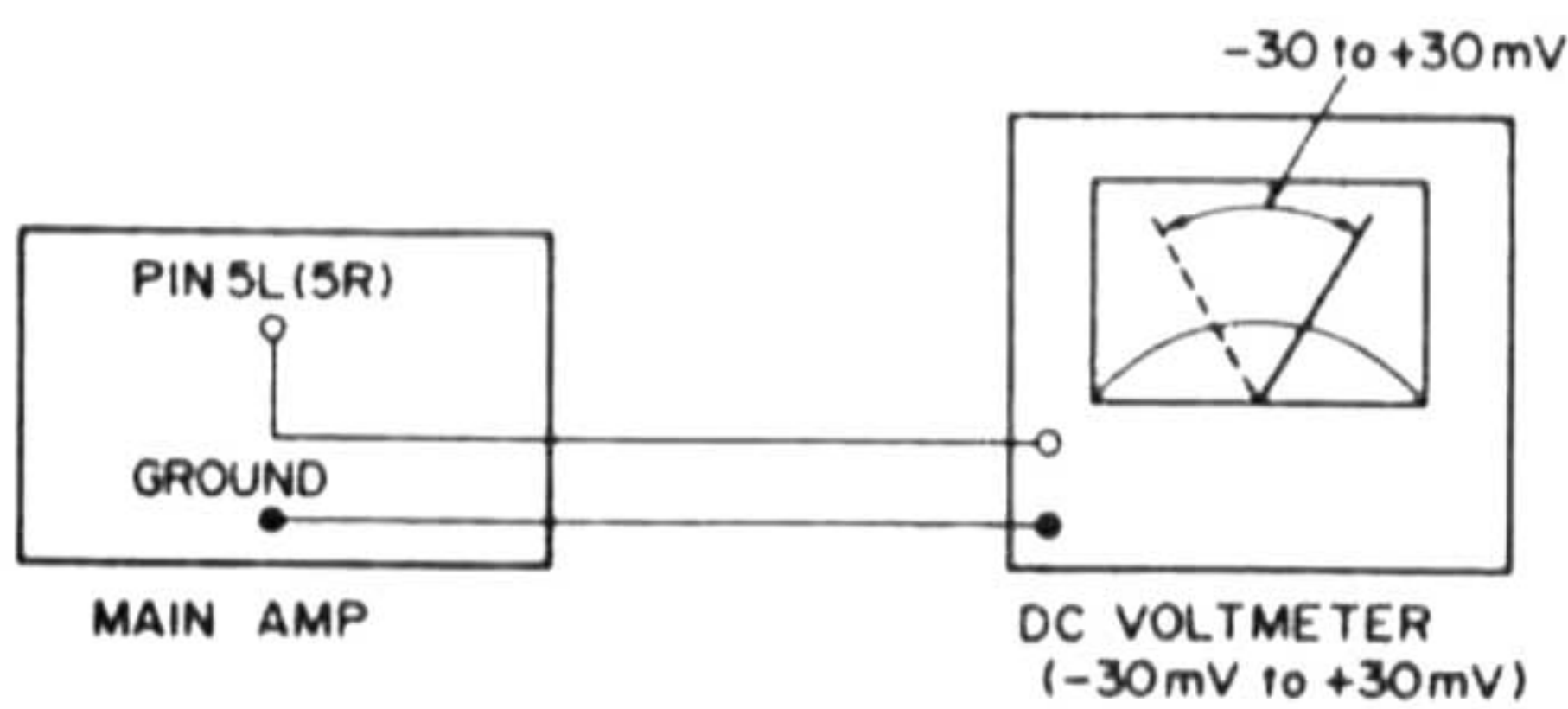


Figure 1

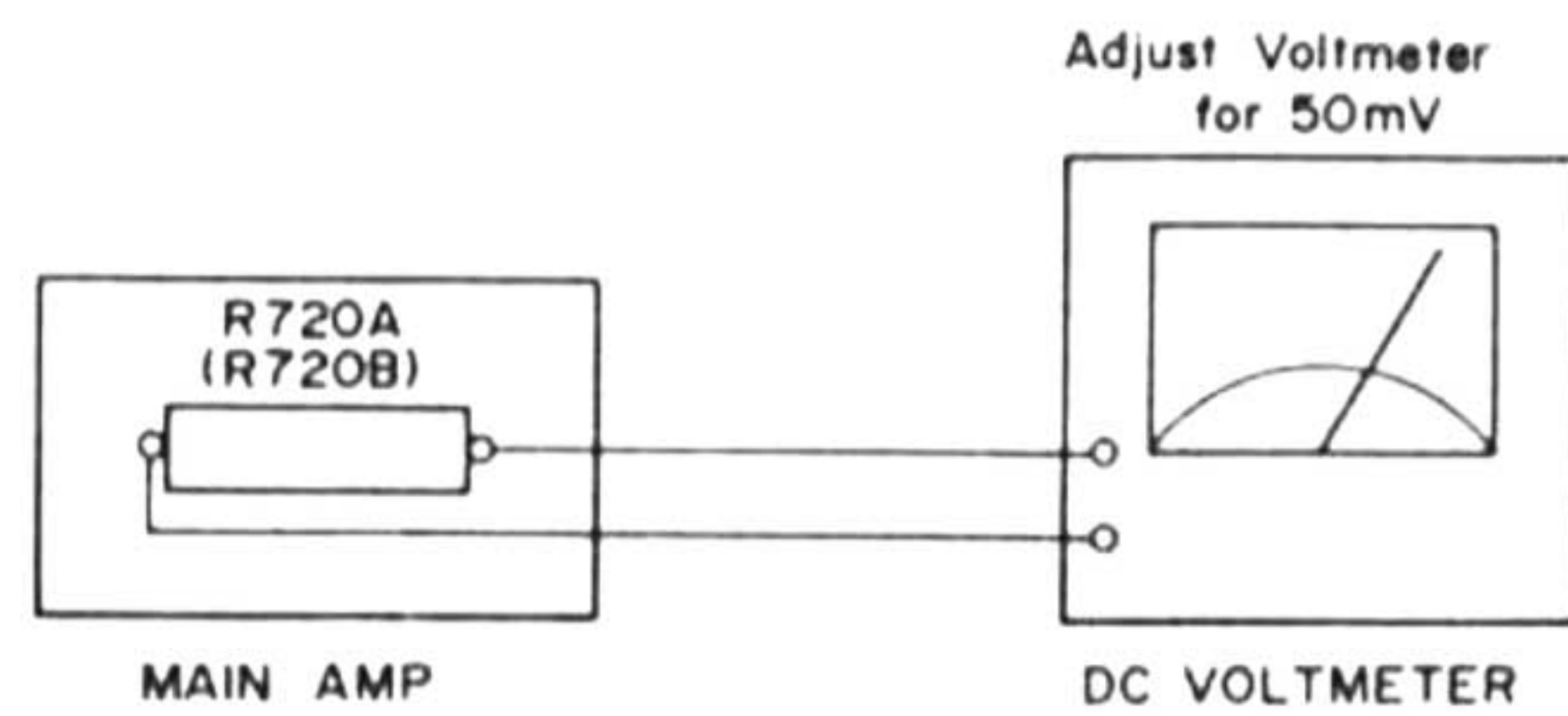


Figure 2

For location of connection points and trimmer resistors, see P.C.B. view.

POWER METER ADJUSTMENT

STEP	ADJUSTMENT	EQUIPMENT	CONNECTION	AUDIO FREQ.	SETTING	LEVEL	ADJUSTMENT
1	Power Meter level adjustment Power Meter SW: LOW position	Audio Osc. VTVM Oscilloscope	See Fig. 3.	1000 Hz	VOLUME: max. BASS, TREBLE BALANCE: center	Adjust input to AUX to get output level of 4 V (2 W) (8Ω load).	VR901 (L ch) VR902 (R ch) so the power Meters indicate 2W.
2	Check the Power Meter level Power Meter SW: High position	Same as above	See Fig. 3.	1000 Hz	Same as above	Adjust input to AUX to get output level of 28.2 V. (no load)	Check to see if Power Meters indicate 100 W.

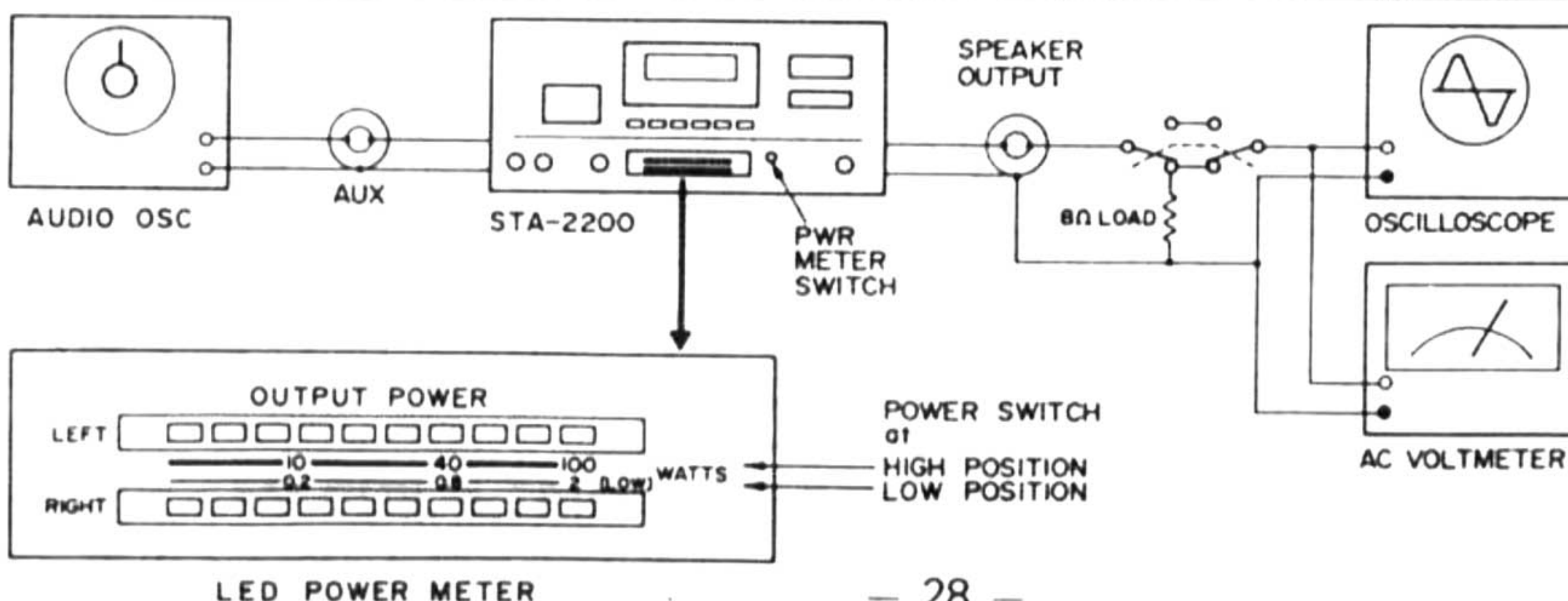


Figure 3

PLL REFERENCE FREQUENCY CHECK

EQUIPMENT REQUIRED

1. Frequency Counter

NOTE:

- Set the desired SELECTOR position.
- Maintain voltage at 120 volts, 60 Hz AC.

EQUIPMENT	CONNECTION	AUDIO FREQUENCY	CHECK	REMARKS
Frequency Counter	Connect Frequency Counter to Pin 02 on Controller board. (Fig. 4)	No signal	Check that Frequency Counter is 160 kHz \pm 8 Hz on Counter.	If necessary, select value of C404/C405. (Fig. 4)

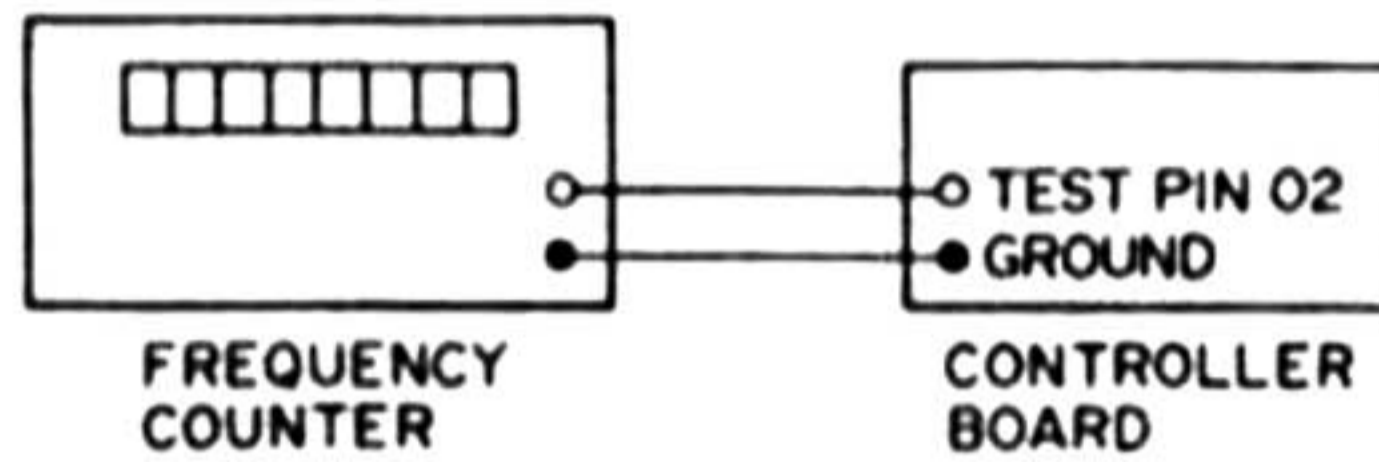


Figure 4

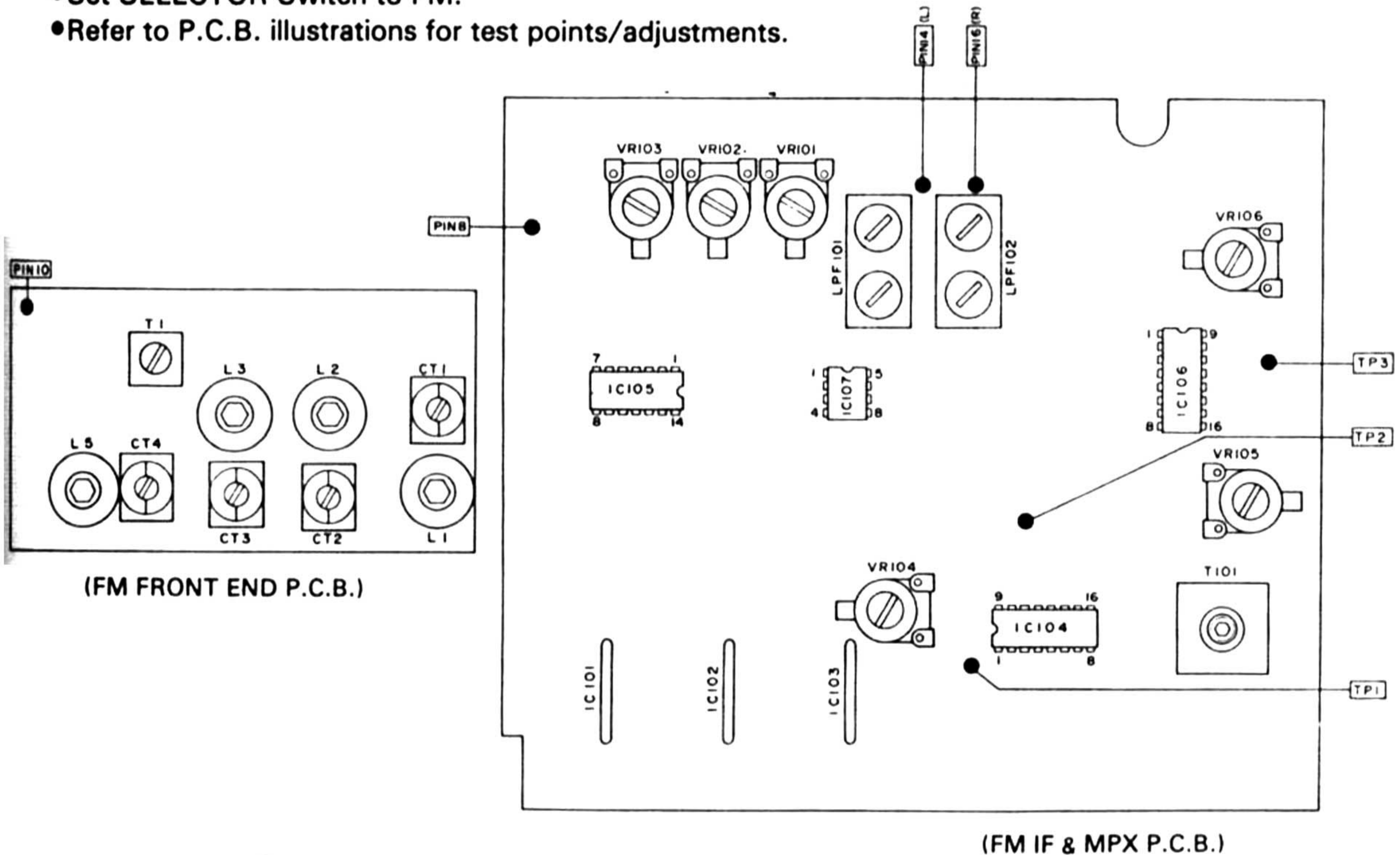
FM RF & IF ALIGNMENT

EQUIPMENT REQUIRED

1. FM Signal Generator
2. AC Voltmeter
3. Oscilloscope
4. DC Voltmeter (Input impedance: over 1M Ω /V)
5. Distortion Meter

NOTE:

- Signal output should be no higher than necessary to obtain an output reading.
- Maintain line voltages at 120 volts, 60 Hz AC.
- Set SELECTOR Switch to FM.
- Refer to P.C.B. illustrations for test points/adjustments.



FM COIL & TRIMMER LOCATION

FM FRONT END ADJUSTMENT

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Signal Generator to FM Ant. Terminal thru FM Dummy Ant. (300 Ω)	90.1 MHz (1000 Hz, 75 kHz dev.) Input: about 2-3 μV	90.1 MHz	Connect DC Voltmeter to Pin 10 on FM END board	L5 (FM OSC Coil)	Adjust for 3.7 ± 0.1 V DC reading on DC Voltmeter. (Fig. 5)
2	Same as above	Same as above	90.1 MHz	AC Voltmeter and Scope to TAPE OUT 1 jack	L1 (Ant. Coil) L2 (RF 1 Coil) L3 (RF 2 Coil)	Adjust for maximum reading on AC Voltmeter. (Fig. 6)
3	Same as above	106.1 MHz (1000 kHz, 75 kHz dev.) Input: about 2-3 μV	106.1 MHz	Connect DC Voltmeter to Pin 10 on FM FRONT END board	CT4 (FM OSC trimmer)	Adjust for 17 ± 0.3 V DC reading on DC Voltmeter. (Fig. 5)
4	Same as above	Same as above	106.1 MHz	AC Voltmeter and Scope to TAPE OUT 1 jack	CT1 (Ant. trimmer) CT2 (RF 1 trimmer) CT3 (RF 2 trimmer)	Adjust for maximum reading on AC Voltmeter. (Fig. 6)
5	Repeat STEPs 1 through 4 until no further improvement is noticed.					
6	Same as STEP 1	107.9 MHz (1000Hz, 75 kHz dev.) Input: about 2-3 μV	107.9 MHz	Same as STEP 1	-----	Check that DC voltage is under 22 V on DC Voltmeter. (Fig. 5)

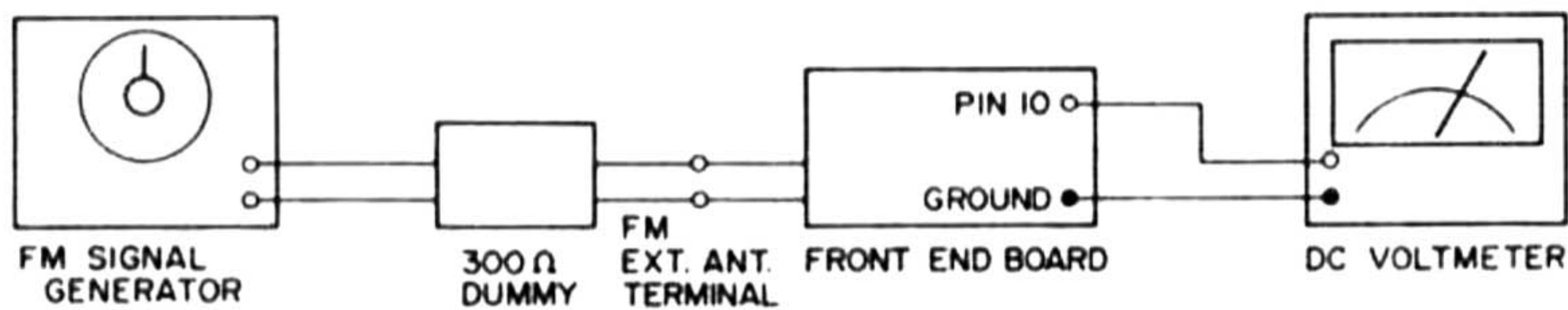


Figure 5

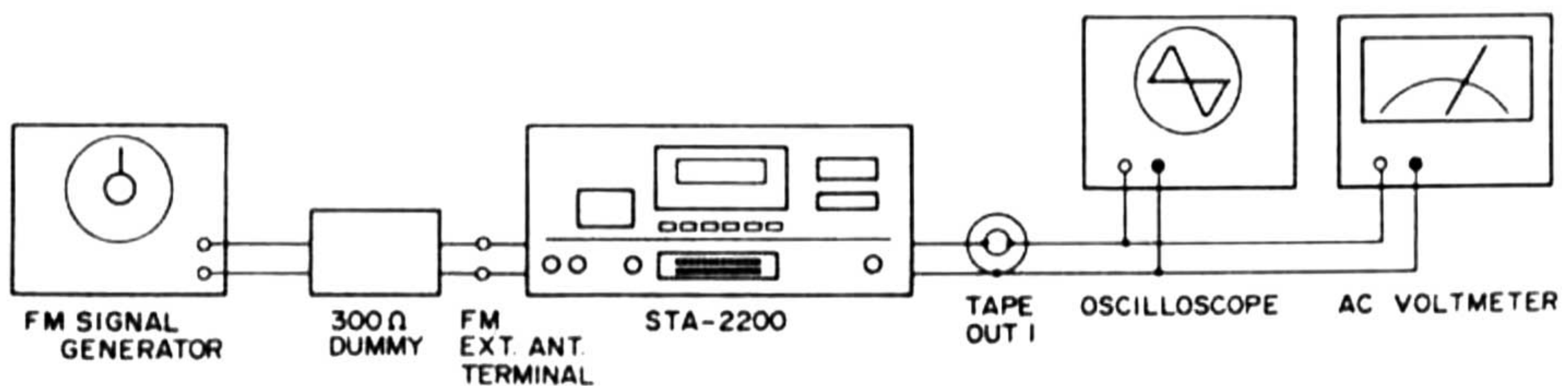


Figure 6

FM IF ADJUSTMENT

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Signal Generator to FM Ant. Terminal thru FM Dummy Ant. (300 Ω)	98.1 MHz (1000Hz, 75 kHz dev.) Input: 1 mV	98.1 MHz	Connect DC Voltmeter to TP2 (+) and TP1 (-) on FM IF board	T101 (primary)	Adjust for DC voltage within 30mV on DC Voltmeter. (Fig. 7, 9)
2	Same as above	Same as above	98.1 MHz	AC Voltmeter Distortion meter and Scope to TAPE OUT 1 jack	T101 (secondary)	Adjust for minimum distortion (about 0.1%). (Fig. 6, 7, 8)
3	Same as above	98.1 MHz (1000 Hz, 75 kHz, dev.) Input: about 2-3 μV	98.1 MHz	Same as above	T1 (1st IFT) on FM Front End PCB	Adjust for maximum reading on AC Voltmeter. (Fig. 6)

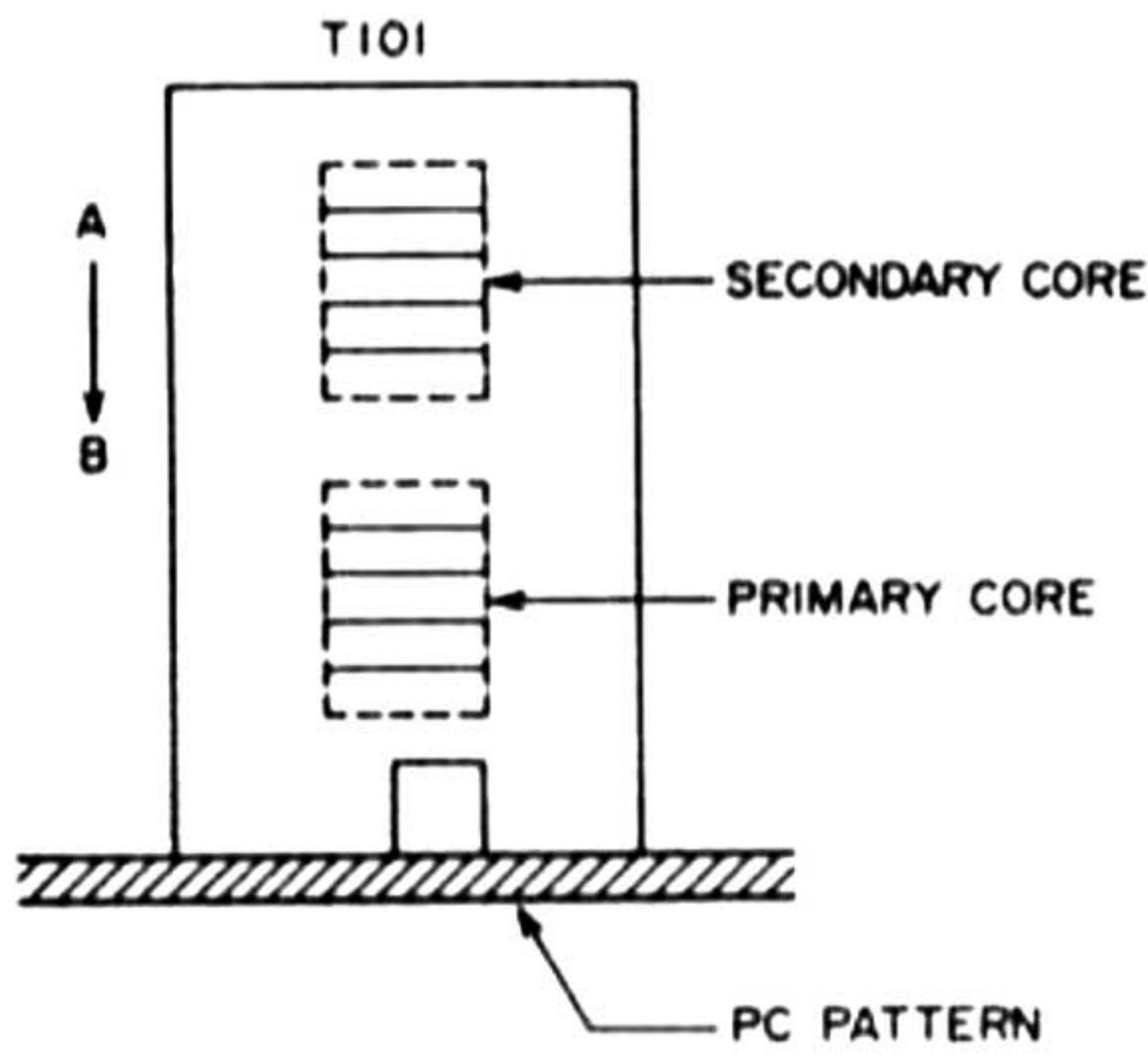


Figure 7

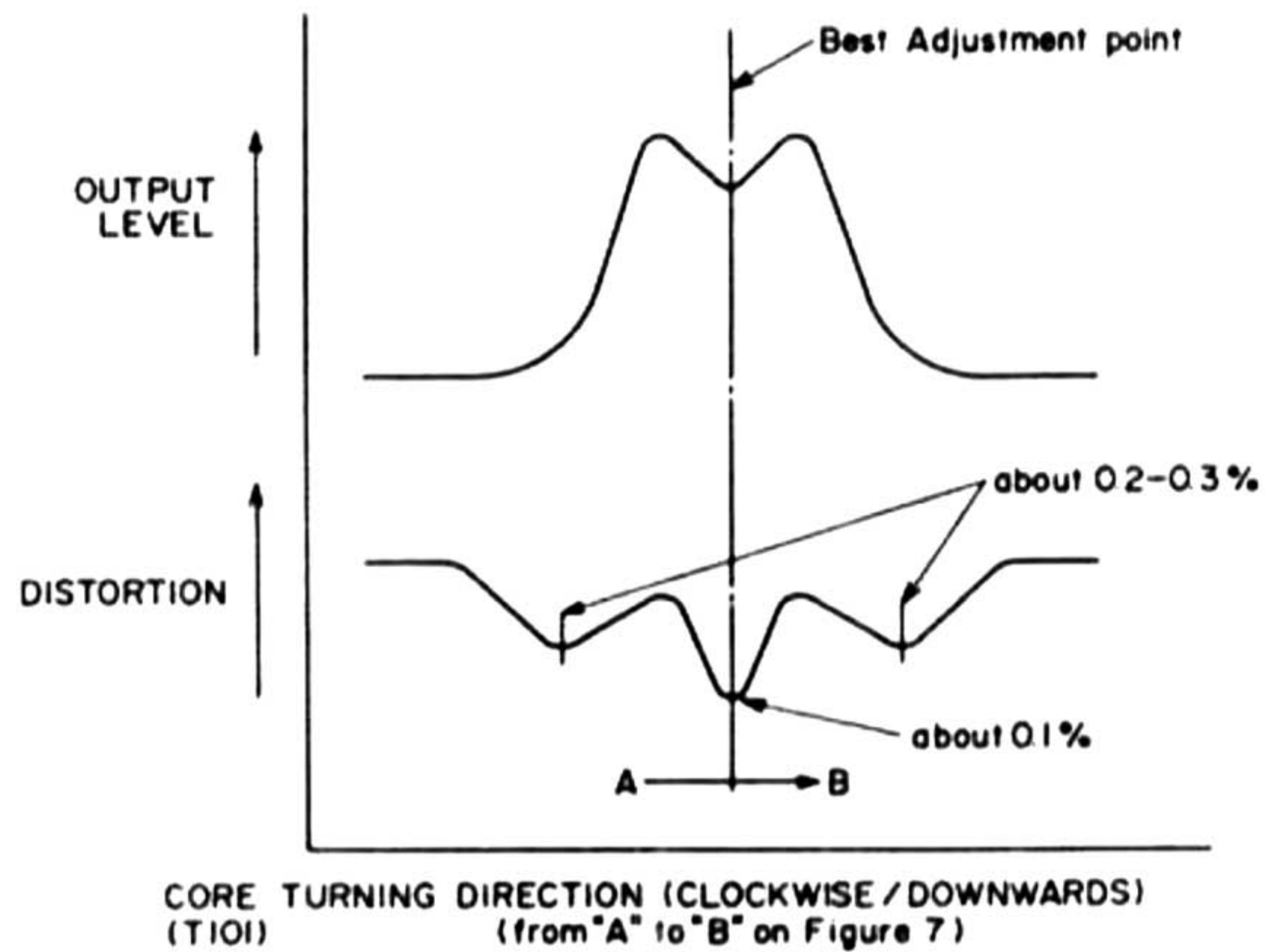


Figure 8

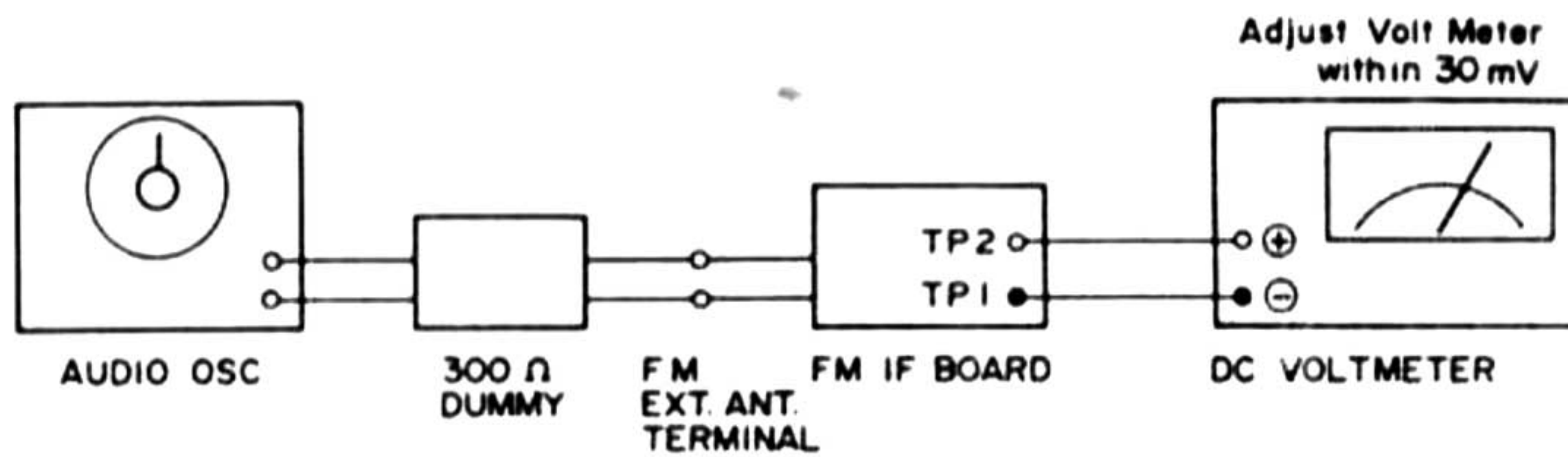


Figure 9

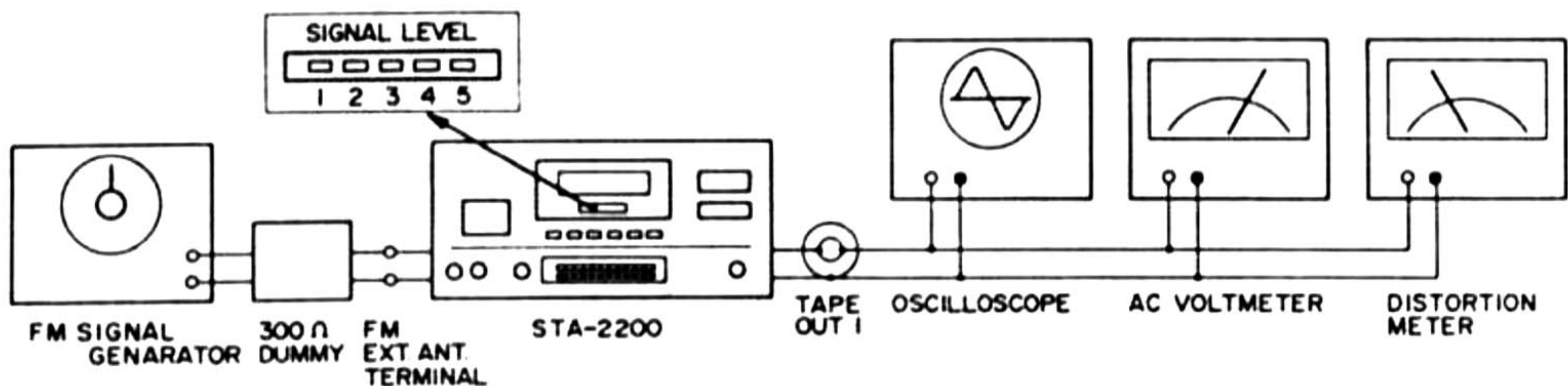


Figure 10

FM AUTO SCAN ADJUSTMENT

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS	
1	Signal Generator to FM Ant. Terminal thru FM Dummy Ant. (300 Ω)	98.1 MHz (1000 Hz, 75 kHz dev.) Input: 6 μ V FM MUTE Switch: LOW	98.1 MHz	Connect DC Voltmeter to Pin 8 on FM IF board	VR101	Adjust for DC voltage to 2-4V on DC Voltmeter. (Fig. 11)	
2	Same as above	98.1 MHz (1000 Hz, 75 kHz dev.) Input: 60 μ V FM MUTE Switch: HIGH	98.1 MHz	Same as above	VR102	Adjust for DC voltage to 2-4V on DC Voltmeter. (Fig. 11)	
3	1	Same as above FM MUTE Switch: LOW	98.1 MHz (1000 Hz, 75 kHz dev.)	98.1 MHz	Auto Scanning and Display	----	Check that Auto Tuning stops when input level is 6 μ V + 1 dB, and Auto Tuning does not stop when input level is 6 μ V - 2 dB.
	2	Same as above FM MUTE Switch: HIGH	98.1 MHz (1000 Hz, 75 kHz dev.)	98.1 MHz	Auto Scanning and Display	----	Check that Auto Tuning stops when input level is 60 μ V + 1 dB and Auto Tuning does not stop when input level is 60 μ V - 2 dB.
4	Same as above	98.1 MHz (no mod.) Input: 1 mV	98.1 MHz	Connect DC Voltmeter to Pin 8 on FM IF board.	-----	Check the frequency difference which will cause the voltage of Pin 8 to rise 2-4V (Low to High at Pin 8), do this to the plus and minus side. Frequency difference on Signal Generator should be within $\pm 50 - \pm 90$ kHz.	

FM SIGNAL METER ADJUSTMENT

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Signal Generator to FM Ant. terminal thru FM Dummy Ant. (300 Ω)	98.1 MHz (1000 Hz, 75 kHz dev.) Input: 6 μ V	98.1 MHz	Signal LED Meter	VR1001 on display PCB	Adjust so the first LED only on Receiver lights (Fig. 10)
2	Same as above	98.1 MHz (1000 Hz, 75 kHz dev.) Input: 1 mV	98.1 MHz	Signal LED Meter	VR201 on AM PCB	Adjust so all LEDs (full scale) on Receiver light. (Fig. 10)

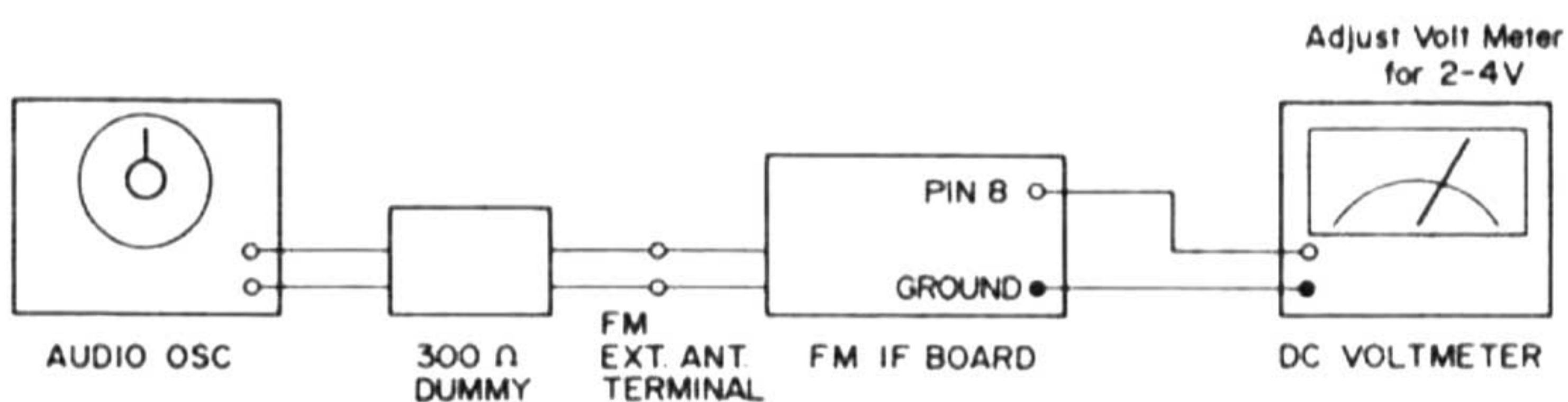


Figure 11

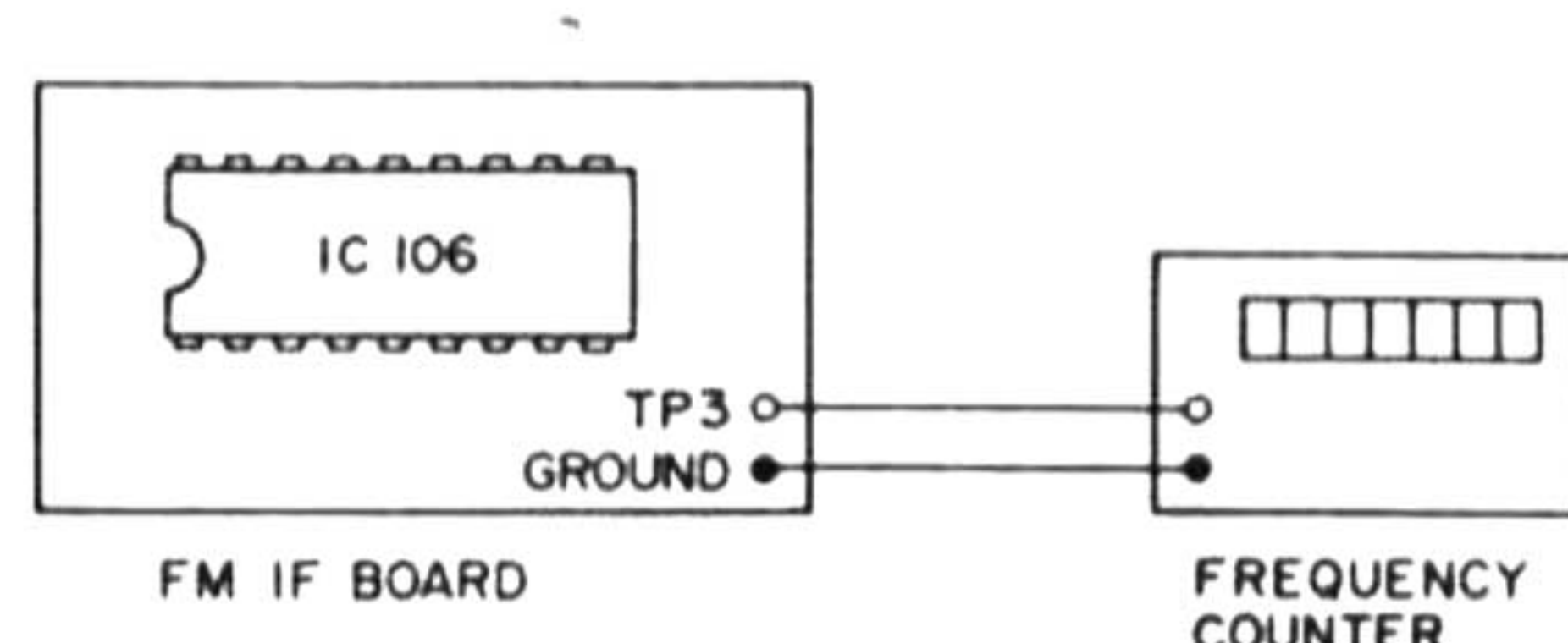


Figure 12

FM MPX ALIGNMENT

EQUIPMENT REQUIRED

1. Stereo Modulator--- Connect Stereo Modulator to EXT. MOD. terminal FM Signal Generator.
Modulation level of 19 kHz Pilot Signal--8%
2. FM Signal Generator Frequency---- 98 MHz (1000 Hz mod.)
Deviation---- 67.5 kHz, 90% modulation of composite signal
3. AC Voltmeter
4. Oscilloscope
5. Distortion Meter
6. Frequency Counter

- NOTE:**
- Set SELECTOR Switch to FM.
 - Set Mode Switch to Stereo.
 - See P.C.B. illustration for alignment/test points.

MULTIPLEX & SEPARATION ADJUSTMENT

STEP	SIGNAL GENERATOR COUPLING	STEREO MODULATION	INDICATOR	ADJUSTMENT	REMARKS
1	Connect FM Ant. terminal thru FM Dummy Ant. (300 Ω)	Mono, 1 kHz no mod. Input: 1 mV	Counter connected to TP3 on FM IF & MPX board	VR106	Adjust for 19 kHz ± 50 Hz on Counter. (Fig. 12)
2	Same as above	Composite MPX signal 1 kHz	AC Voltmeter connected to TAPE OUT 1 jack.	VR104	With 4 μV input signal, STereo display should come on. (Fig. 13)
3	Same as above	Composite MPX signal 1 kHz on left ch. ONLY	AC Voltmeter connected to TAPE OUT 1 jack of right ch.	VR105 (separation)	Adjust for minimum reading on meter. (Fig. 13)
4	Same as above	Composite MPX signal 1 kHz on right ch. ONLY	AC Voltmeter connected to TAPE OUT 1 jack of left ch.	Same as above	Adjust for minimum reading on meter. (Fig. 13)

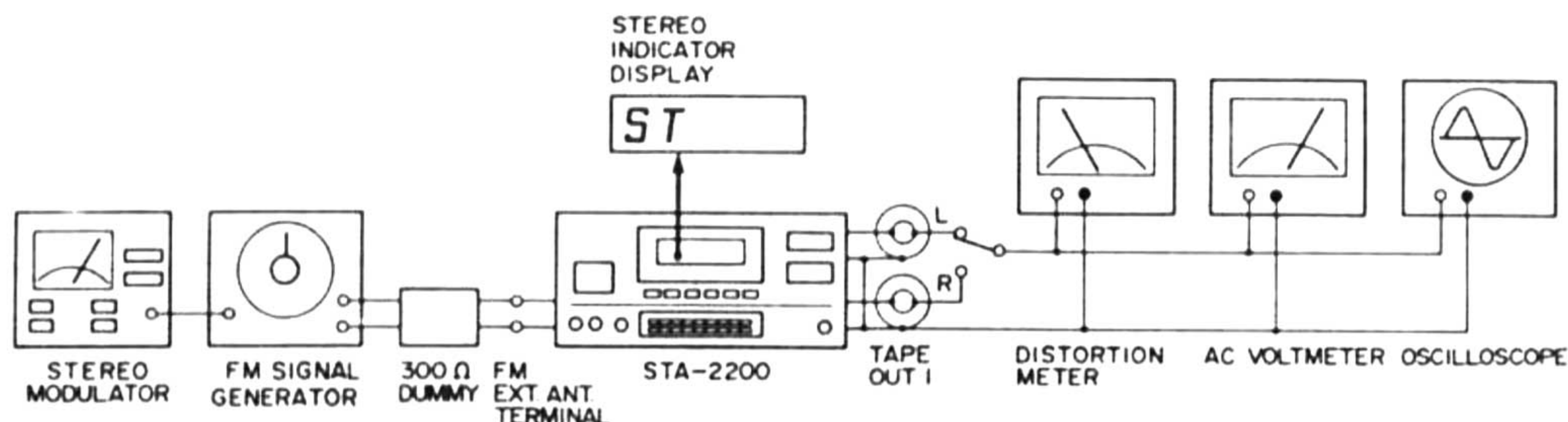


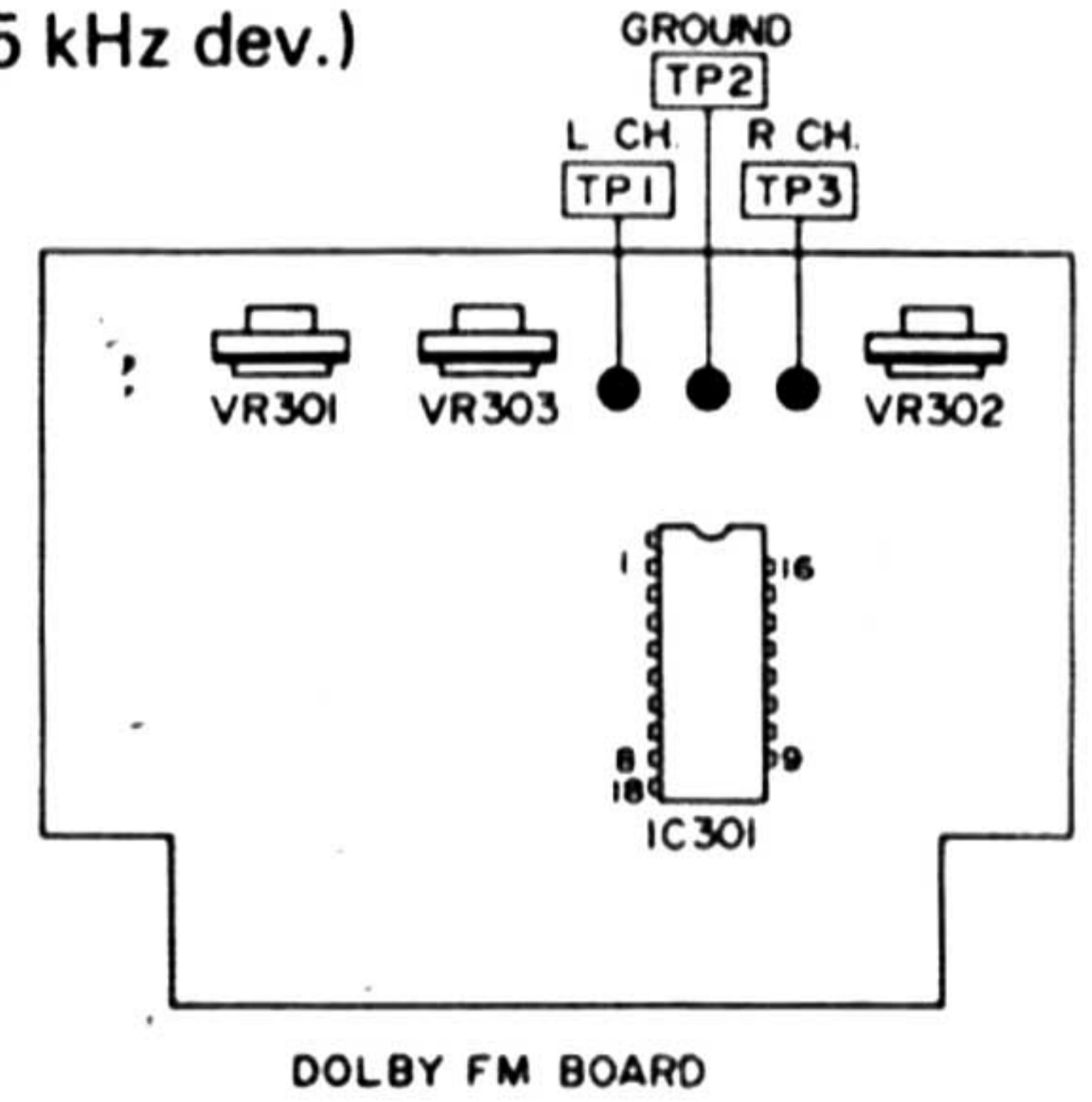
Figure 13

DOLBY FM ADJUSTMENT

EQUIPMENT REQUIRED

1. Stereo Modulator--- Connect Stereo Modulator to EXT. Mod. terminal FM Signal Generator
Modulation level of 19 kHz Pilot Signal---9% (6.75 kHz dev.)
Main level (L + R)--- 50% (37.5 kHz dev.)
2. FM Signal Generator
Frequency-- approx. 98 MHz
Deviation-- 44.25 kHz, 59% modulation of composite signal Modulation frequency-- 400 Hz
3. Audio Oscillator
4. AC Voltmeter
5. Oscilloscope

NOTE: • See P.C.B. illustrations for alignment/test points.
• Set Mode Switch to Stereo.



DOLBY FM TRIMMER & TEST POINT LOCATION

STEP	SIGNAL GENERATOR COUPLING	GENERATOR FREQUENCY	INDICATOR	ADJUSTMENT	REMARKS
1	Connect FM Ant. terminal thru FM dummy ant. (300 Ω)	FM SG: 98 MHz no mod. input: 1 mV Audio Osc: 5 kHz (Fig. 14)	AC Voltmeter connected to TP1(L) or TP3(R) on DOLBY board.	----	With set to FM position, adjust input level of Pin 14 (L) or Pin 16(R) on FM IF board to get output level of 60 mV (-22.4 dBm).
2	Same as above	Same as above (Fig. 14)	Same as above	VR303	After setting the level as per STEP 1, set the Selector to DOLBY FM. Adjust VR303 to get to output level of 24 mV (-30.4 dBm)
3	After STEPs 1 and 2, check the balance of left and right levels: should within ± 0.5 dB.				
4	Connect to FM Ant. terminal thru Dummy Ant. (300 Ω)	98 MHz Composite signal, 400 Hz Input: 1 mV	AC Voltmeter connected to TP1(L) or TP3(R) on DOLBY board. (Fig. 15)	VR301 (Lch) VR302 (Rch)	With the Selector to DOLBY FM, adjust output level to 0.775V (0 dBm).

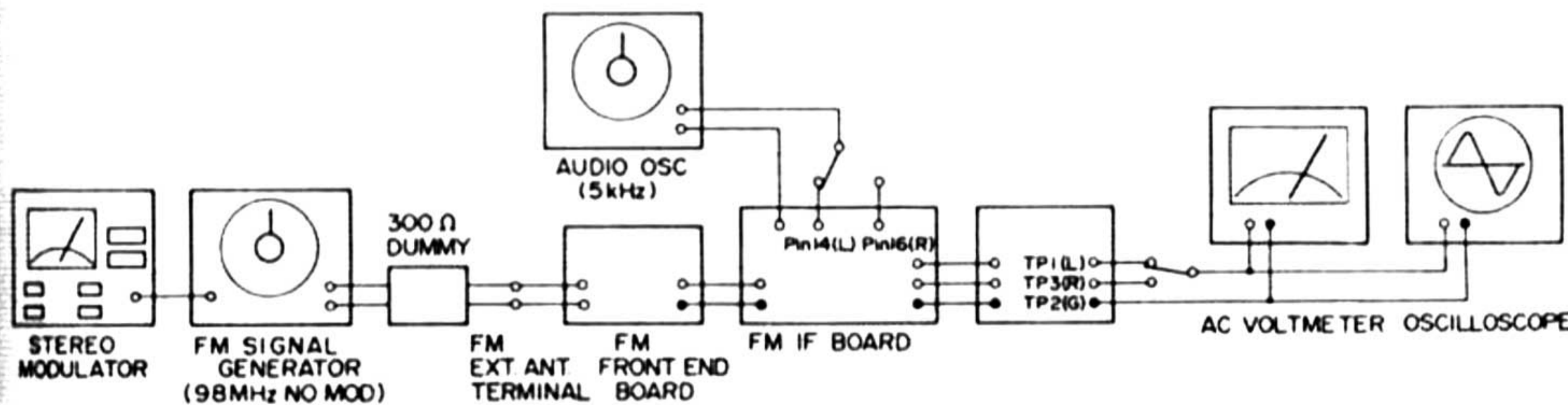


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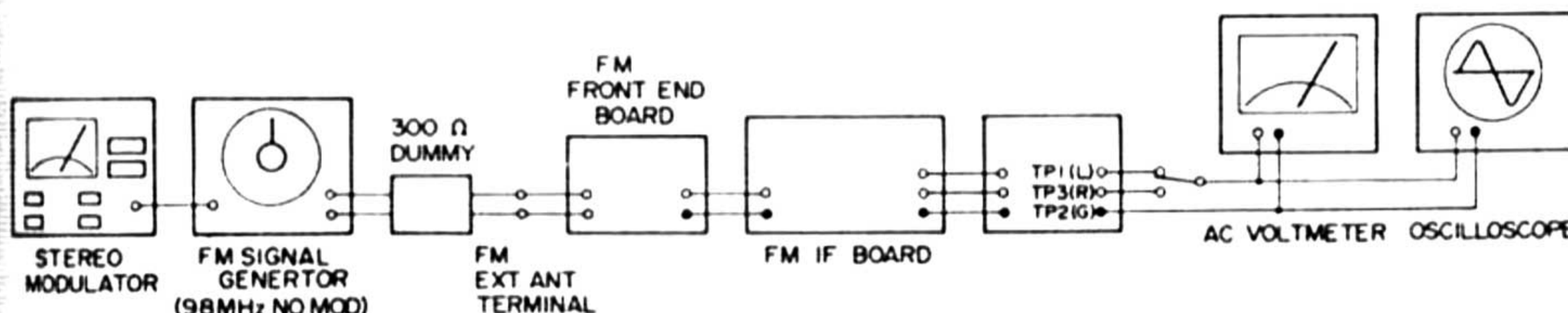


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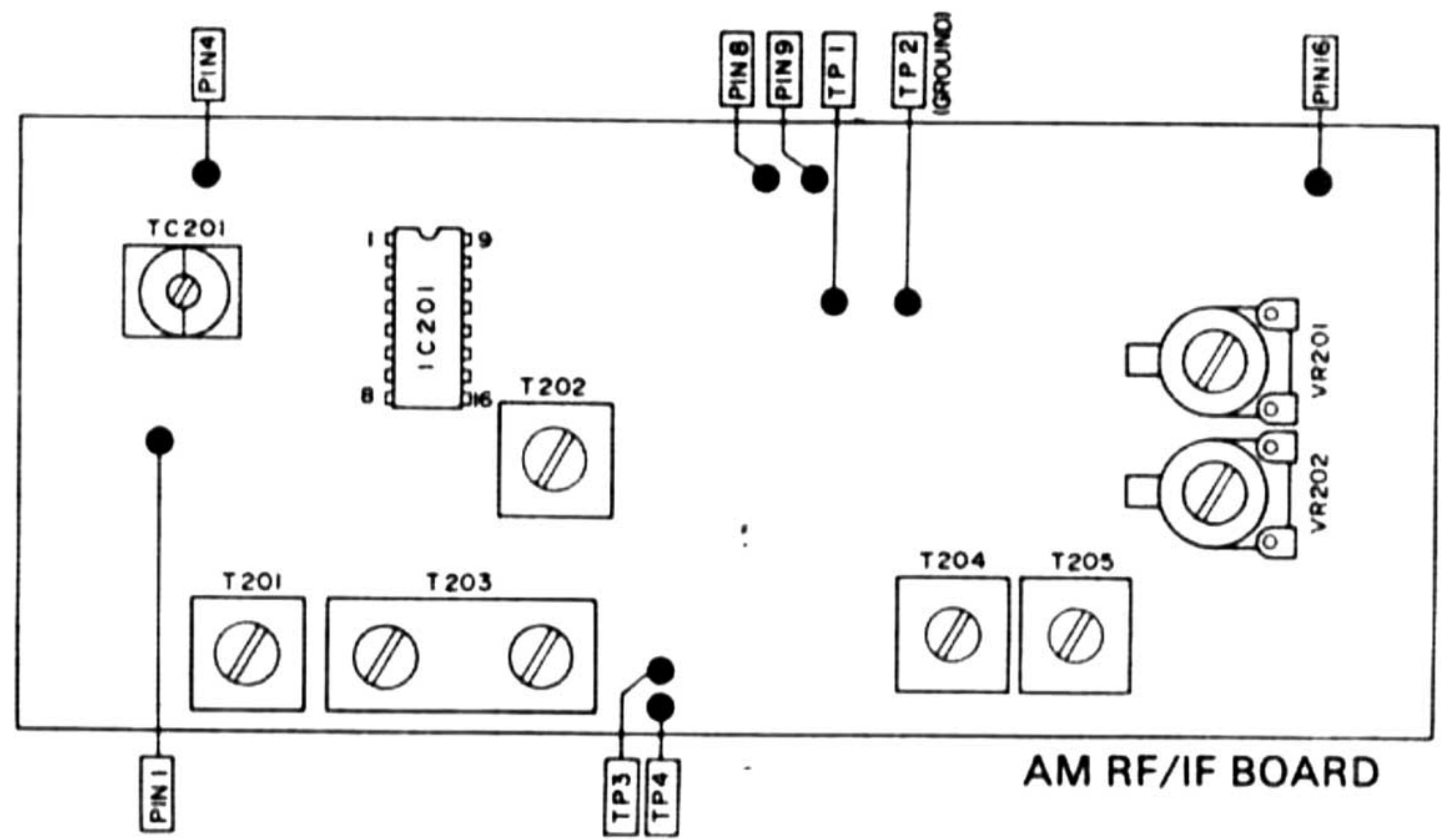
AM IF & RF ALIGNMENT

EQUIPMENT REQUIRED

1. AM Signal Generator
2. IF Scope (with 450 kHz Marker)
3. DC Voltmeter
4. Oscilloscope
5. AC Voltmeter

NOTE:

- Signal Generator output should be no higher than necessary to obtain an output reading.
- Maintain line voltage at 120 volts, 60 Hz AC.
- Set SELECTOR Switch to AM.
- See P.C.B. illustrations for alignment points/adjustments.



AM COIL & TRIMMER LOCATION

AM RF/IF ADJUSTMENT/CHECK

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Connect standard loop antenna to Signal Generator and radiate signal into the AM ferrite Ant. See Fig. 16.	450 kHz	1610 kHz	AC Voltmeter and Scope to TAPE OUT 1 jack.	T203 T202 AM IFT	Adjust for maximum reading on meter. (Fig. 16)
2	Same as above.	1610 kHz (400 Hz, 30% mod.)	1610 kHz	DC Voltmeter to Pin 1 on AM IF/ RF board. (Fig. 17)	T201 (AM OSC Coil)	Adjust for 19 V DC on DC Voltmeter. (Fig. 17)
3	Same as above	600 kHz (400 Hz, 30% mod.)	600 kHz	AC Voltmeter and Scope to TAPE OUT 1 jack (Fig. 16)	L1801 (AM Ant. Coil)	Adjust for maximum reading on AC Voltmeter (Fig. 16)
4	Same as above	1400 kHz (400 Hz, 30% mod.)	1400 kHz	Same as above	TC201 (AM Ant. Trimmer)	Adjust for maximum reading on AC Voltmeter. (Fig. 16)
5	Repeat STEPs 3 and 4 until no further improvement is noticed.					
6	Same as STEP 3	1000 kHz (400 Hz, 30% mod.)	1000 kHz	Same as STEP 3	----	Check for tracking error in 1000 kHz should be within 2 dB.
7	By 1000 kHz, if tracking error does not fall within 2 dB, repeat STEP 2 and adjust for 19 V \pm 1 V DC (Fig. 17). Then repeat STEPs 3 through 6.					
8	Same as STEP 3	1000 kHz (400 Hz, 30% mod.) Input: 100 mV/m	1000 kHz	Signal LED Meter (Fig. 18)	VR202	Adjust so the LED Meter (full scale) on Receiver lights. (Fig. 18)
9	Same as STEP 3	Same as above	1000 kHz	DC Voltmeter connected to Pin 16 on AM RF/IF board (Fig. 19)	VR202	Check the voltage on Pin 16. Adjust for 145 mV on DC Voltmeter (Fig. 19)

AM AUTO SCAN ADJUSTMENT

STEP	GENERATOR COUPLING	GENERATOR FREQUENCY	DISPLAY SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	IF Scope to TP3 on AM RF/IF board. (Fig. 20) Break the path between TP3 and TP4	450 kHz Input: approx. 30 mV	1000 kHz	IF Scope to Pin 9 on AM RF/IF board.	T204 T205	Adjust for maximum amplitude and proper linearity between ± 10 kHz markers. (Fig. 21)
2	Connect TP3 and TP4 on AM RF/IF board by soldering.					
3	Connect standard loop* antenna to Signal Generator and radiate signal into the AM ferrite Ant. (Fig. 22)	1000 kHz (400 Hz, 30% mod.) Input: 100 mV/m	1000 kHz	DC Voltmeter connect to Pin 9 on AM RF/IF board. (Fig. 22)	----	Check that DC voltage at Pin 9: should less than 150 mV. (Fig. 22) If not less than 150 mV, repeat STEP 1.
4	Same as above	1000 kHz ± 2 kHz — 1000 kHz ± 5 kHz (400 Hz, 30% mod.) Input: 100 mV/m	1000 kHz	DC Voltmeter connect to Pin 8 on AM RF/IF board. (Fig. 23)	----	With 995-998 kHz or 1002-1005 kHz range, check that DC voltage at Pin 8 is 2-4 V. (input level: 100 mV/m)
5	Same as above	1000 kHz (400 Hz, 30% mod.) Input: 1 mV/m	1000 kHz	Same as above	VR103	With 1 mV/m input, adjust for 2-4 V DC at Pin 8 on DC Voltmeter. (Fig. 23)
6	Same as above	1000 kHz (400 Hz, 30% mod.)	1000 kHz	Auto Tuning and Display	---	Check that Auto Tuning stops when input level is at 1.1 mV/m, and Auto Tuning does not stop when input level is at 0.9 mV/m.

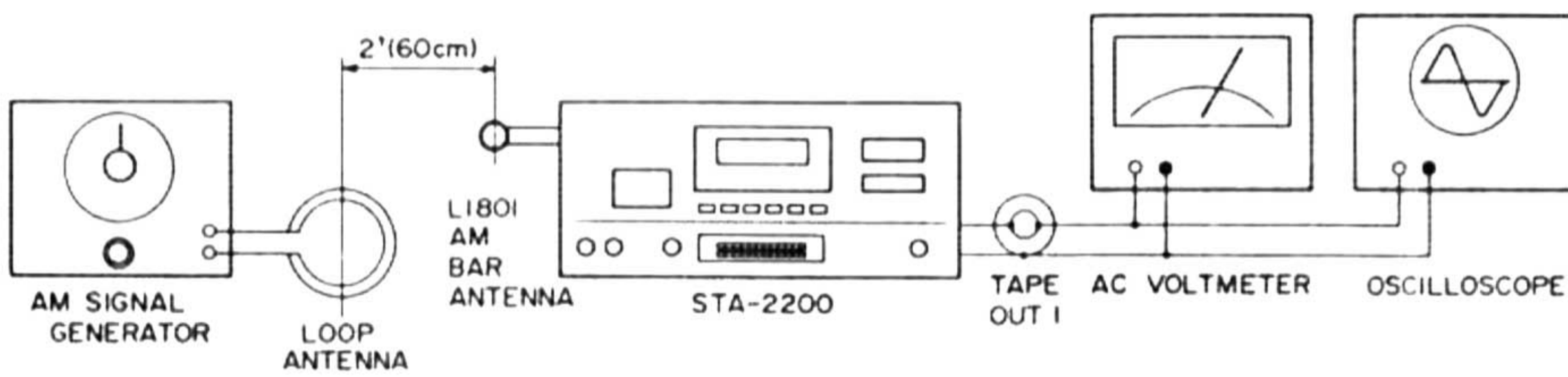


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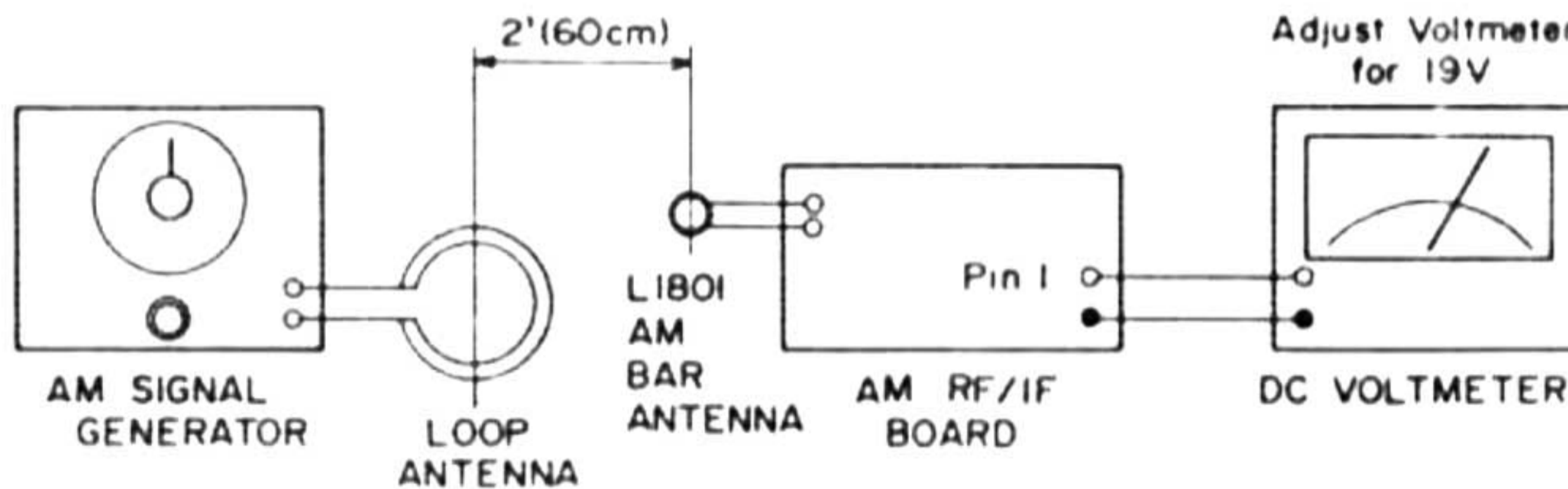


Figure 17

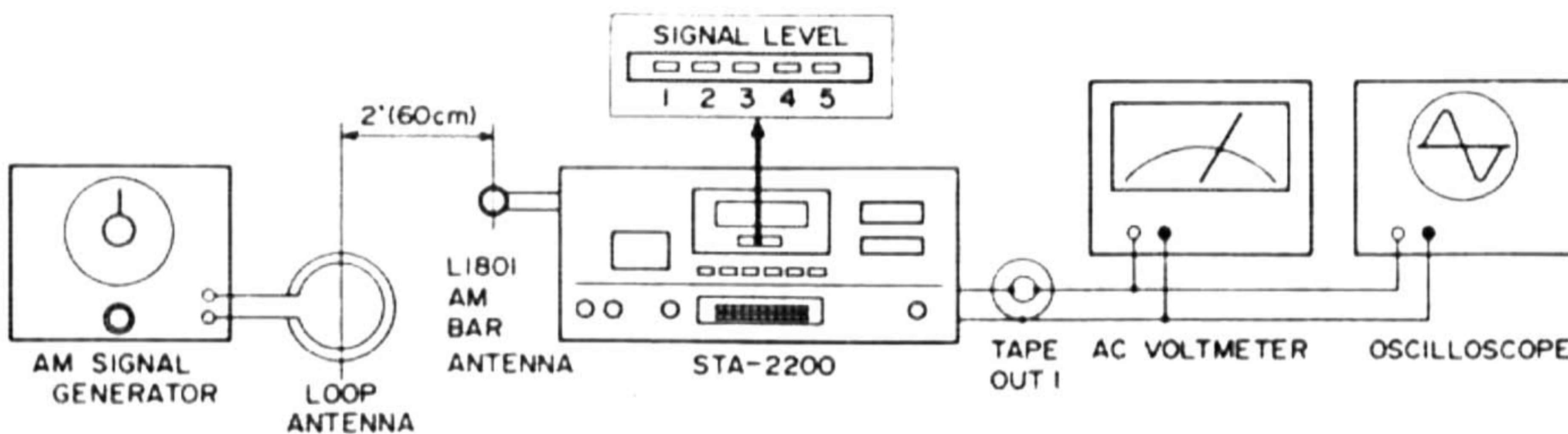


Figure 18

Figure 19

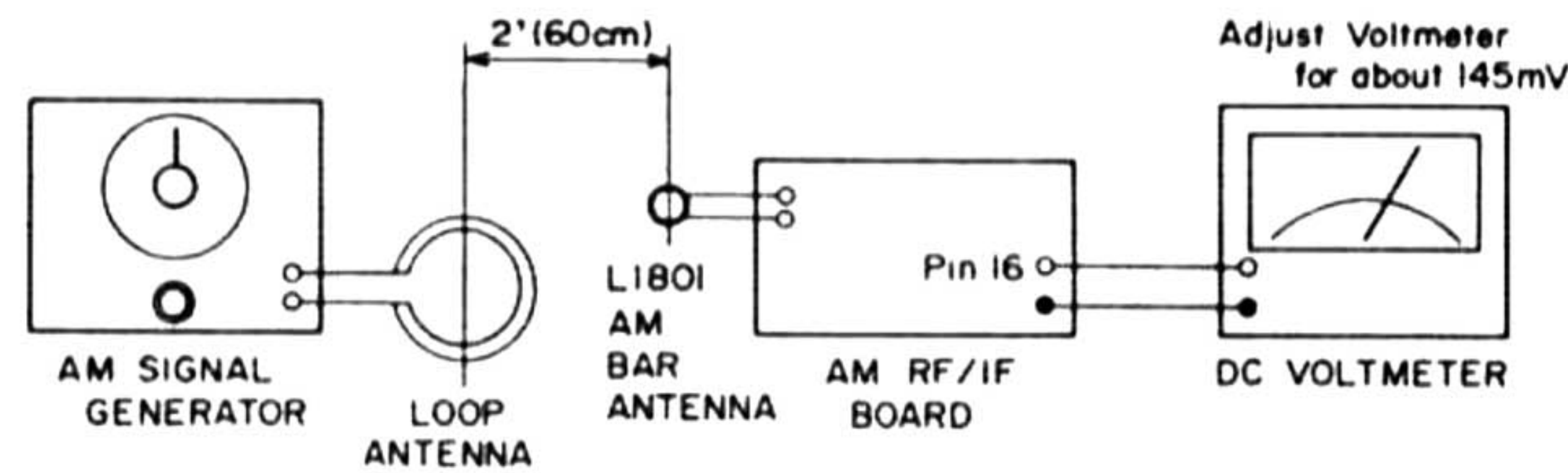


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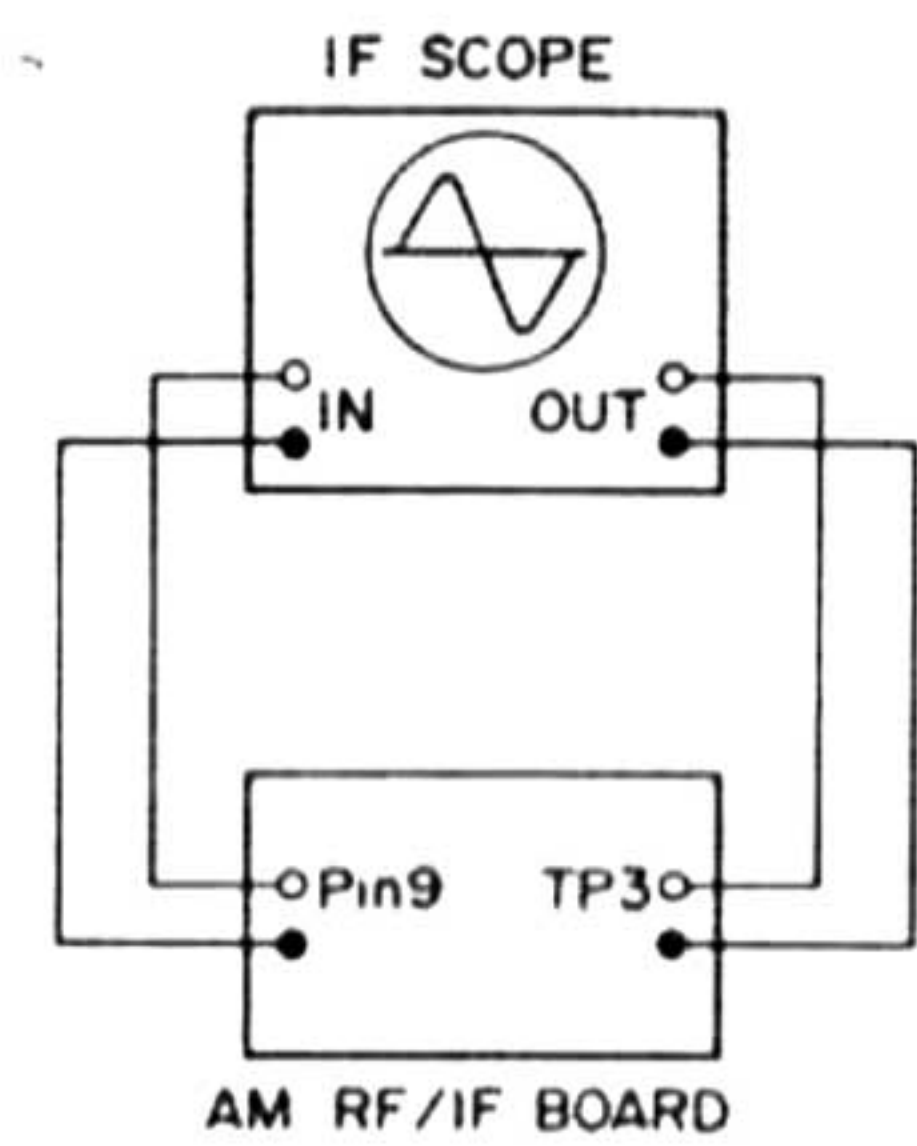
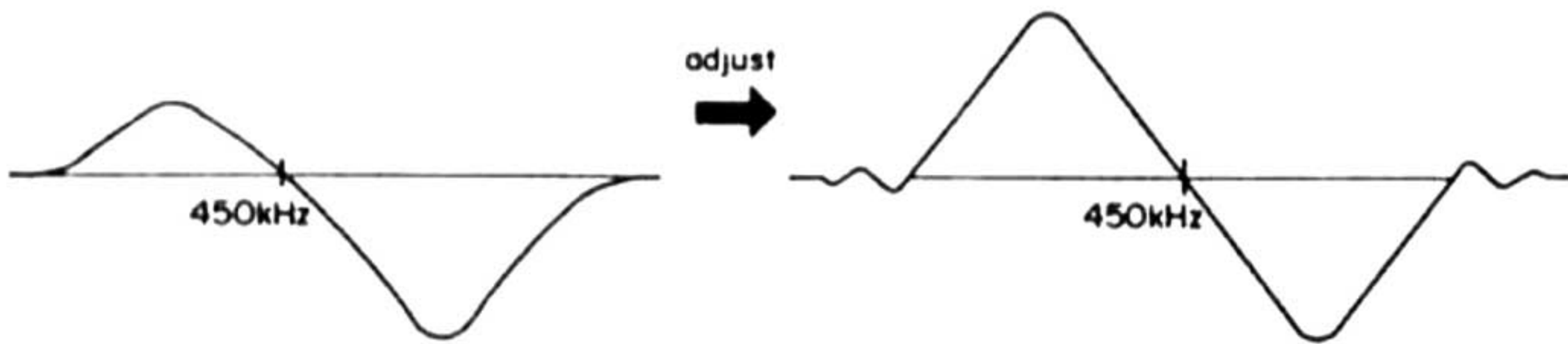


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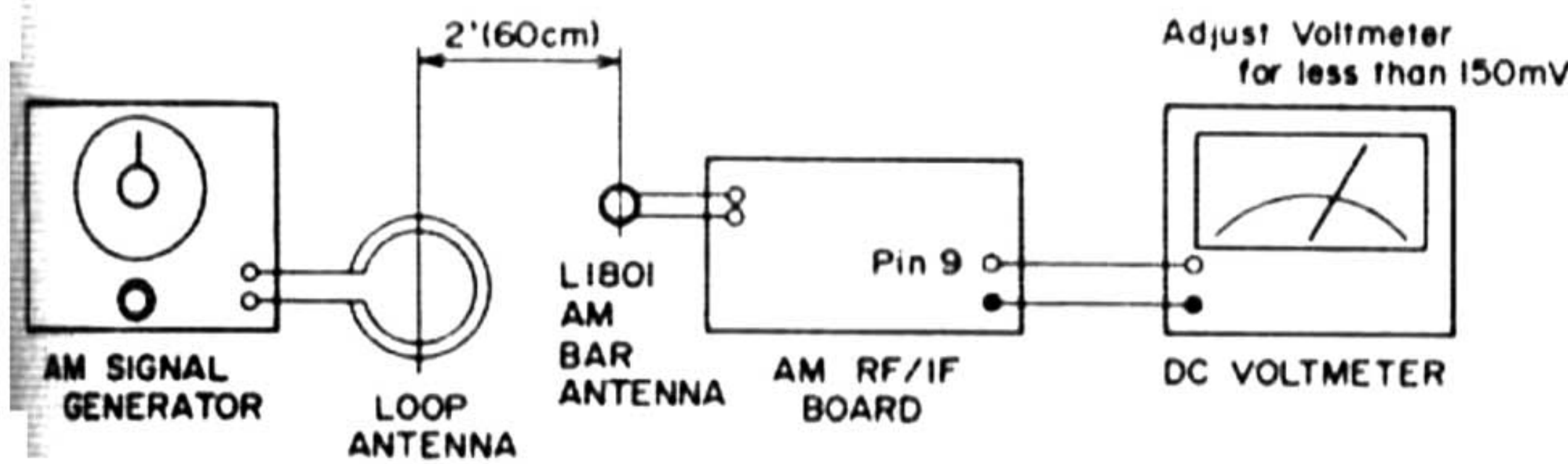


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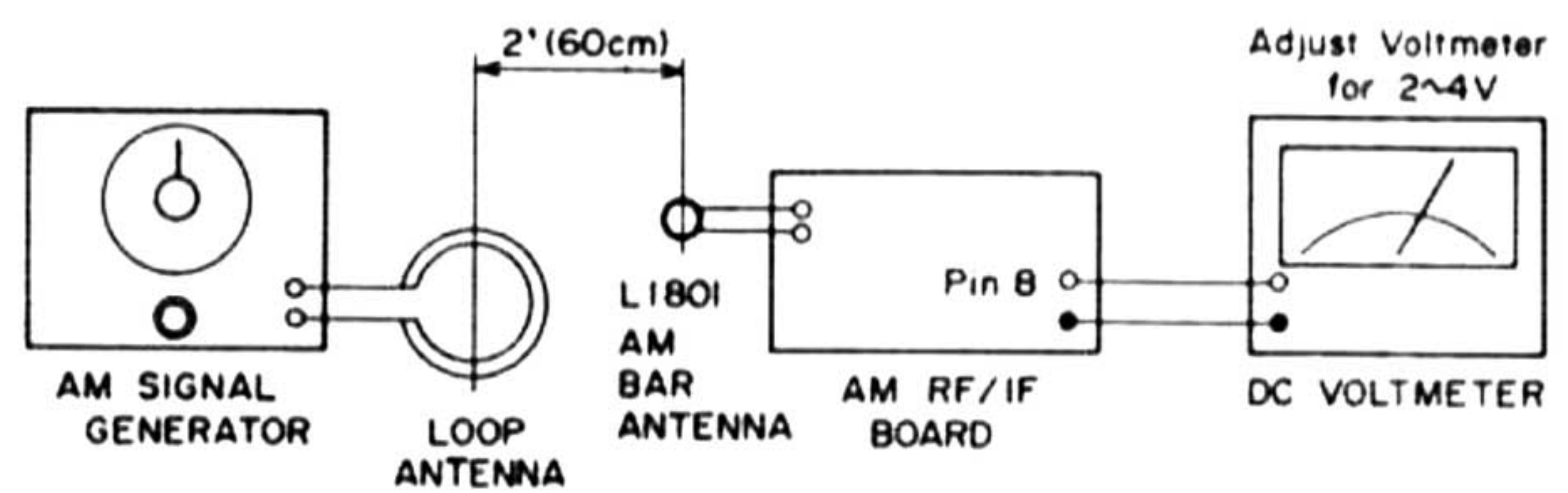


Figure 23

**BATTERY BACK UP CHECK
EQUIPMENT REQUIRED**

1. DC Voltmeter

CHECK

Supply 9 V DC to the Battery Snap and unplug AC cord.

Check that clock keeps accurate time and memorized frequencies are kept after 10 minutes.

TROUBLESHOOTING

SYMPTOM	CAUSE/REMEDY
1) No output	<ol style="list-style-type: none"> 1. Faulty AC power cord *Replace. 2. Defective POWER Switch. *Replace. 3. Broken wire in the Power Transformer (T1802) *Replace. 4. Blown Primary Fuse *Replace. 5. Defective D1801 or Power Supply circuit component *Replace. 6. Defective Relay 1201/1202 *Replace.
2) Display does not light.	<ol style="list-style-type: none"> 1. Broken Display Panel *Replace. 2. Open in the Power Transformer (T1801) tertiary winding *Replace. 3. Defective Regulator IC406 *Replace. 4. Defective Diode D408-411 *Replace.

SYMPTOM	CAUSE/REMEDY
3) Display operates but no Speaker output.	<ol style="list-style-type: none"> 1. Defective Rectifier D1801 *Replace. 2. Defective Capacitors C1809/1810 *Replace. 3. Defect in the Power Transformer (T1802) secondary winding *Replace. 4. Defective Relay RY1201/1202 *Replace. 5. Defective Power Supply circuit component *Replace. 6. Defective Power Transistor TR706AB/707AB *Replace.
4) Blown Fuse	<ol style="list-style-type: none"> 1. Defective rectifier D1801 *Replace. 2. Short circuit in the rectifier circuit *Remove. 3. Short circuit in Power Transistor circuitry TR706AB/707AB *Repair or replace. 4. Defective Protector circuit component *Replace.
5) "A" Speakers do not work.	<ol style="list-style-type: none"> 1. Speaker Switch "A" defective *Replace. 2. Relay RY1201 defective *Replace.
6) "B" Speakers do not work.	<ol style="list-style-type: none"> 1. Speaker Switch "B" defective *Replace. 2. Relay RY1202 defective *Replace.
7) No output on one channel with VOLUME at max. and BALANCE at center, when a test signal is applied to the terminal of non-operating channel of the BALANCE control VR603/604.	<ol style="list-style-type: none"> 1. Defective transistors of Tone and Main Amp circuit *Replace. 2. Defective Tone and Main Amp circuit component *Replace.
8) No output when a test signal is applied to the input terminals except PHONO.	<ol style="list-style-type: none"> 1. Defective MONO-Stereo or TAPE switch *Replace. 2. Defective Selector Switch *Replace.
9) No output when a test signal is applied to the PHONO input terminals.	<ol style="list-style-type: none"> 1. Defective TR501-508 on Pre Amp board *Replace. 2. Defective Pre Amp circuit component *Replace. 2. Defective MONO-Stereo or TAPE Switch *Replace. 4. Defective Selector Switch *Replace.
10) DC not balanced within ± 30 mV at output of L/R channel.	<ol style="list-style-type: none"> 1. Defective TR701A/702A or TR701B/702B *Replace. 2. Defective TR704A/705A or TR704B/705B *Replace.
11) Speakers work normally but Headphones do not work.	<ol style="list-style-type: none"> 1. Defective R901(L)/R902(R) *Replace. 2. Headphone plug does not mate with jack *Replace.

SYMPTOM	CAUSE/REMEDY
12) "AUX" input not operative.	1. Poor contact in "AUX" input jack *Repair or replace. 2. Poor contact in Selector switch *Repair or replace.
13) "PHONO" input not operative.	1. Poor contact in "PHONO" input jack *Repair or replace. 2. Poor contact in Selector switch *Repair or replace.
14) No AM or FM	1. Broken wire in the Power Transformer T1801 *Replace. 2. Defective D409/D410 *Replace. 3. Defective regulator IC405/IC406 *Replace. 4. Defective TR805 *Replace. 5. Defective D802 *Replace. 6. Defective AM/FM Power supply circuit component. *Replace.
15) No AM	1. Poor contact in Selector switch *Replace or repair. 2. Defective AM RF/IF circuit component *Replace. 3. Defective PLL circuit component *Replace. 4. Defective Controller circuit component *Replace.
16) No FM	1. Poor contact in Selector switch *Replace. 2. Defective FM Front End circuit component *Replace. 3. Defective FM IF/MPX circuit component *Replace. 4. Defective PLL circuit component *Replace. 5. Defective Pre-Scaler circuit component *Replace. 6. Defective Controller circuit component *Replace.
17) AUTO TUNE does not operate (UP/DOWN) (AM or FM).	1. Poor contact in AUTO TUNE UP/DOWN key *Repair or replace. 2. Defective TR1301 *Replace. 3. Defective IC402 *Replace. 4. Defective D1005-1008 *Replace. 5. Defective TR103-106 and/or TR109 *Replace. 6. Defective IC105 *Replace. 7. Readjust AUTO STOP Alignment.
18) MANUAL TUNE does not operate (UP/DOWN) (AM or FM)	1. Poor contact in MANUAL TUNE KEY *Repair or replace. 2. Defective IC402 *Replace. 3. Defective TR1301 *Replace. 4. Defective D1005-1008 *Replace.

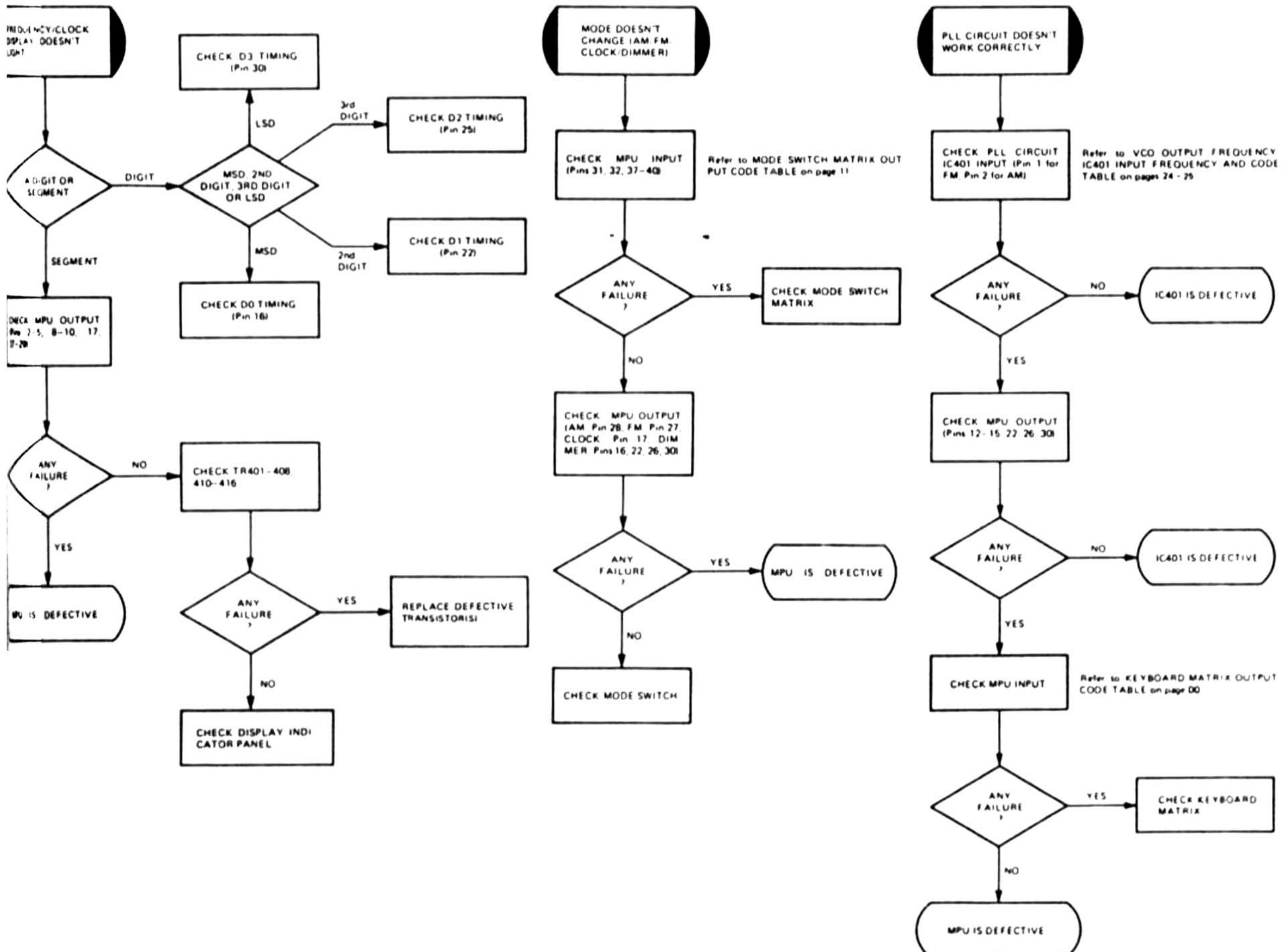
SYMPTOM	CAUSE/REMEDY
19) MEMORY Setting (keys 1-6) does not operate.	<ol style="list-style-type: none"> 1. Memory Setting LED D1501 defective *Replace. 2. Poor contact in Memory Set key *Repair or replace. 3. Poor contact in Memory keys 1-6 *Repair or replace. 4. Defective IC402 *Replace. 5. Defective D1005-1008 *Replace.
20) MEMORY SCAN does not operate.	<ol style="list-style-type: none"> 1. Poor contact in MEMORY SCAN key *Repair or replace. 2. Defective IC402 *Replace. 3. Defective D1005-1008 *Replace.
21) MEMORY HOLD key does not operate.	<ol style="list-style-type: none"> 1. Poor contact in MEMORY HOLD key *Repair or replace. 2. Defective IC402 *Replace. 3. Defective D1005-1008.
22) Signal Meter does not function.	<ol style="list-style-type: none"> 1. Defective LED D1502-1506 *Replace 2. Defective IC1501 *Replace 3. Defective LED Meter circuit component *Repair or replace. 4. Poor contact in METER Switch *Repair or replace. 5. In FM Mode, defective IC104 and/or TR101/TR102 *Replace. 6. In AM Mode, defective IC201 and/or TR202 *Replace.
23) DOLBY FM has no effect.	<ol style="list-style-type: none"> 1. Poor contact in Selector switch *Repair or replace. 2. Defective IC301 *Replace. 3. Defective DOLBY FM circuit component *Replace.
24) CLOCK SETTING does not operate.	<ol style="list-style-type: none"> 1. Poor contact in CLOCK Switch *Repair or replace. 2. Defective TR422 *Replace. 3. Poor contact in Selector switch Ss-5 *Repair or replace. 4. Defective IC402 *Replace. 5. Poor contact in Power Switch PS-2 *Repair or replace. 6. Poor contact in HOUR-MINUTE Switch *Repair or replace.
25) DIMMER does not work.	<ol style="list-style-type: none"> 1. Poor contact in DIMMER Switch *Repair or replace. 2. Defective TR421 *Replace. 3. Defective IC402 *Replace.
26) "TAPE OUT 1" inoperative.	<ol style="list-style-type: none"> 1. Poor contact in TAPE OUT 1 output jack *Repair or replace.
27) "TAPE OUT 2" inoperative.	<ol style="list-style-type: none"> 1. Poor contact in TAPE OUT 2 output jack *Repair or replace.

SYMPTOM	CAUSE/REMEDY
28) "TAPE IN 1" inoperative.	1. Poor contact in TAPE IN 1 input jack *Repair or replace.
29) "TAPE IN 2" inoperative.	1. Poor contact in TAPE IN 2 input jack *Repair or replace.
30) TAPE MONITOR 1 or TAPE MONITOR 2 does not operate.	1. Poor contact in TAPE MONITOR Switch *Repair or replace.
31) TAPE DUBBING 1 → 2 or TAPE DUBBING 2 → 1 does not operate.	1. Poor contact in TAPE DUBBING Switch *Repair or replace.
32) "BASS" has no effect.	1. Faulty VR607/608 *Repair or replace. 2. Defective BASS control circuit component *Replace. 3. In TURNOVER Switch to 300 Hz, defective C631/632 or C635/636 *Replace. 4. In TURNOVER Switch to 150 Hz, defective C633/634 or C637/638 *Replace.
33) "TREBLE" has no effect.	1. Faulty VR605/606 *Repair or replace. 2. Defective TREBLE control circuit component *Replace. 3. In TURNOVER Switch to 3 kHz, defective C621/622 or C625/626 *Replace. 4. In TURNOVER Switch to 6 kHz, defective C623/624 or C627/628 *Replace.
34) OUTPUT POWER Meter does not work.	1. Poor contact in Power Meter switch *Repair or replace. 2. Defective IC1701 or IC1702 *Replace. 3. Defective LED D1703-1722 *Replace. 4. Defective Power Meter circuit component *Replace.
35) "FM MUTE" does not work.	1. Poor contact in FM MUTE Switch *Repair or replace. 2. Readjust FM AUTO SCAN alignment. 3. Defective IC105 *Replace. 4. Defective TR105 or TR109 *Replace.
35) "TONE DEFEAT" has no effect.	1. Poor contact in TONE DEFEAT Switch *Repair or replace.
36) "POWER METER" does not work.	1. Poor contact in POWER METER Switch *Repair or replace.
37) "MONO-Stereo" not effective.	1. Poor contact in MONO Switch *Repair or replace.
38) "HI-MPX FILTER" has no effect.	1. Poor contact in HI-MPX FILTER Switch *Repair or replace. 2. Defective C158 or R180 *Replace.
39) "LOUDNESS" has no effect.	1. Poor contact in LOUDNESS Switch *Repair or replace. 2. Defective C601/602, C603/604 or R601/602 *Replace.

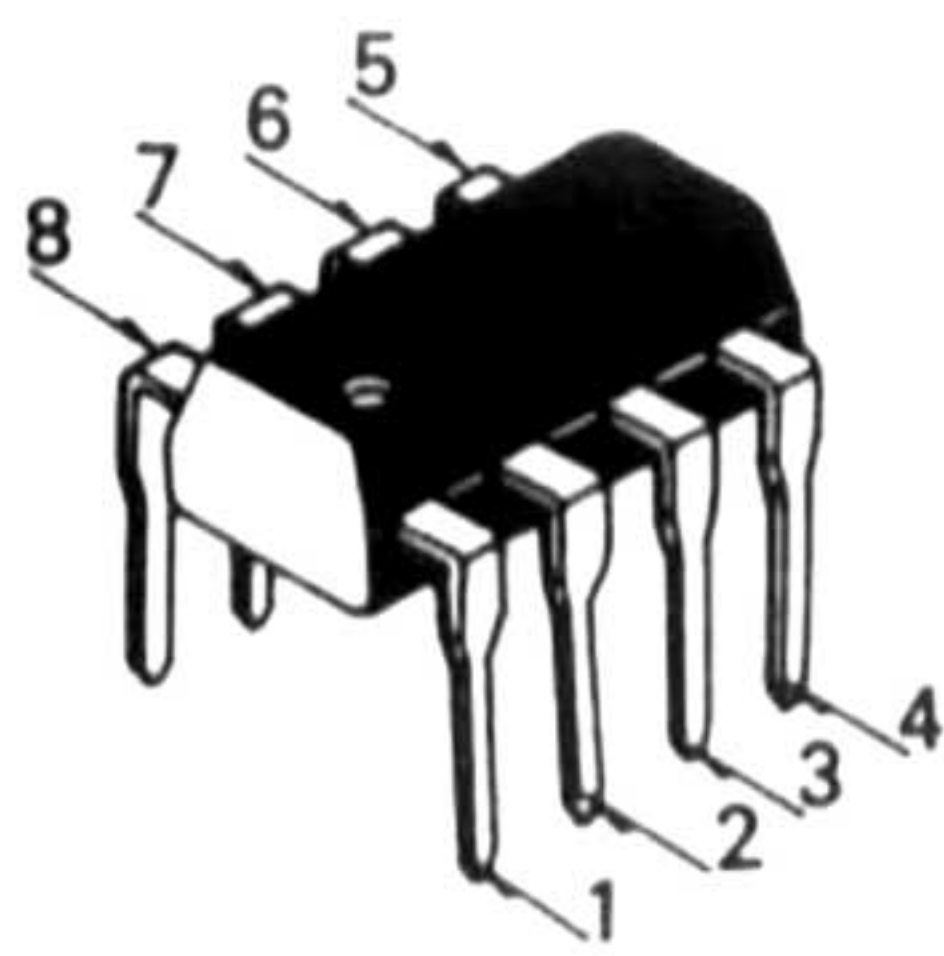
SYMPTOM	CAUSE/REMEDY
40) Protector circuit does not work.	1. Defective SCR901 *Replace. 2. Defective TR901-905 *Replace. 3. Defective Protector circuit component *Replace.
41) STEREO Display or FM Stereo does not work.	1. Readjust VR106. 2. Defective IC106 *Replace. 3. Defective TR107/108 or TR471 *Replace. 4. MONO/Stereo switch defective *Replace. 5. Defective CLOCK Switch *Replace.
42) Clock and Memory do not hold with AC Cord unplugged.	1. Faulty DC Battery (9V) *Replace.

NOTE: If a short circuit takes place in the MPU circuit, unplug the AC Cord immediately. Wait a while and replug the AC Cord. The MPU should be normally operating again. If not, replace the MPU IC402.

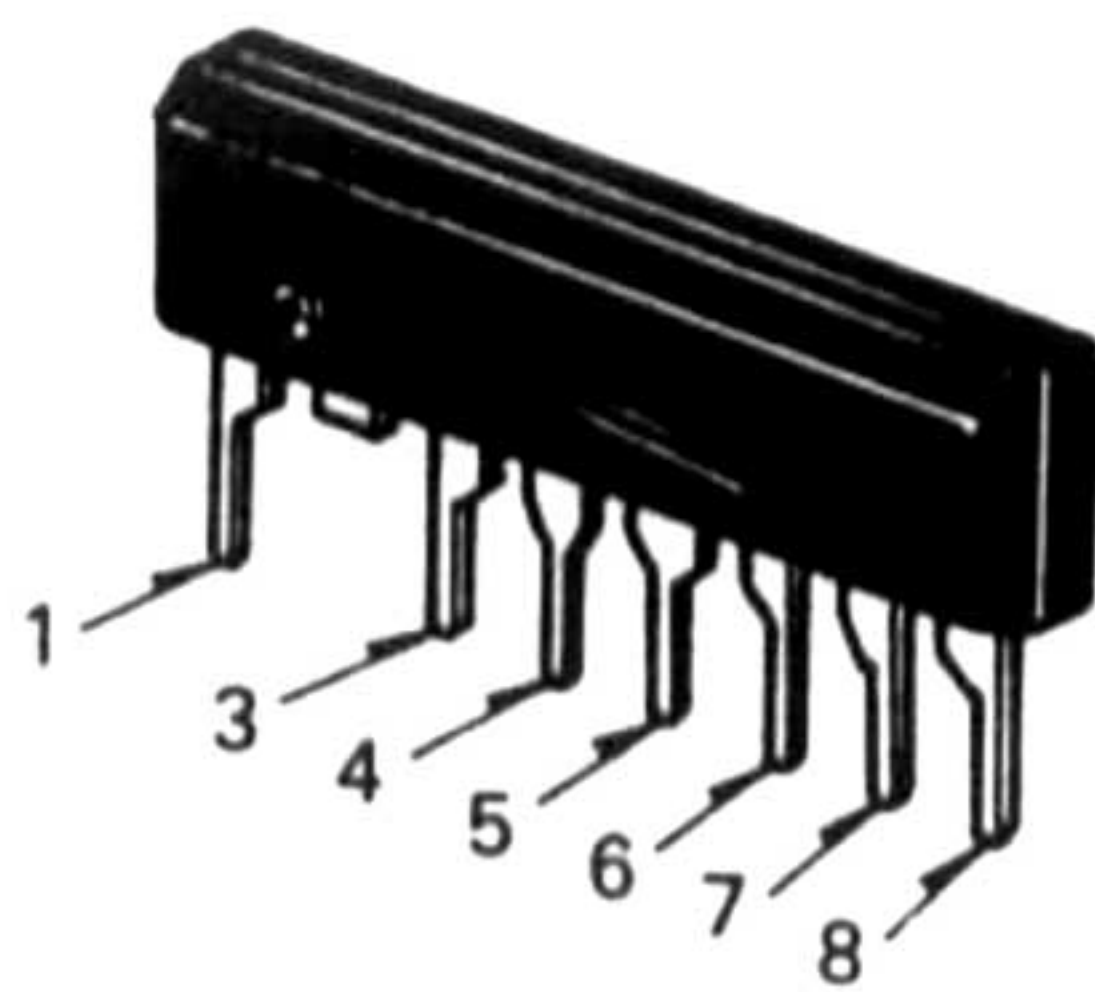
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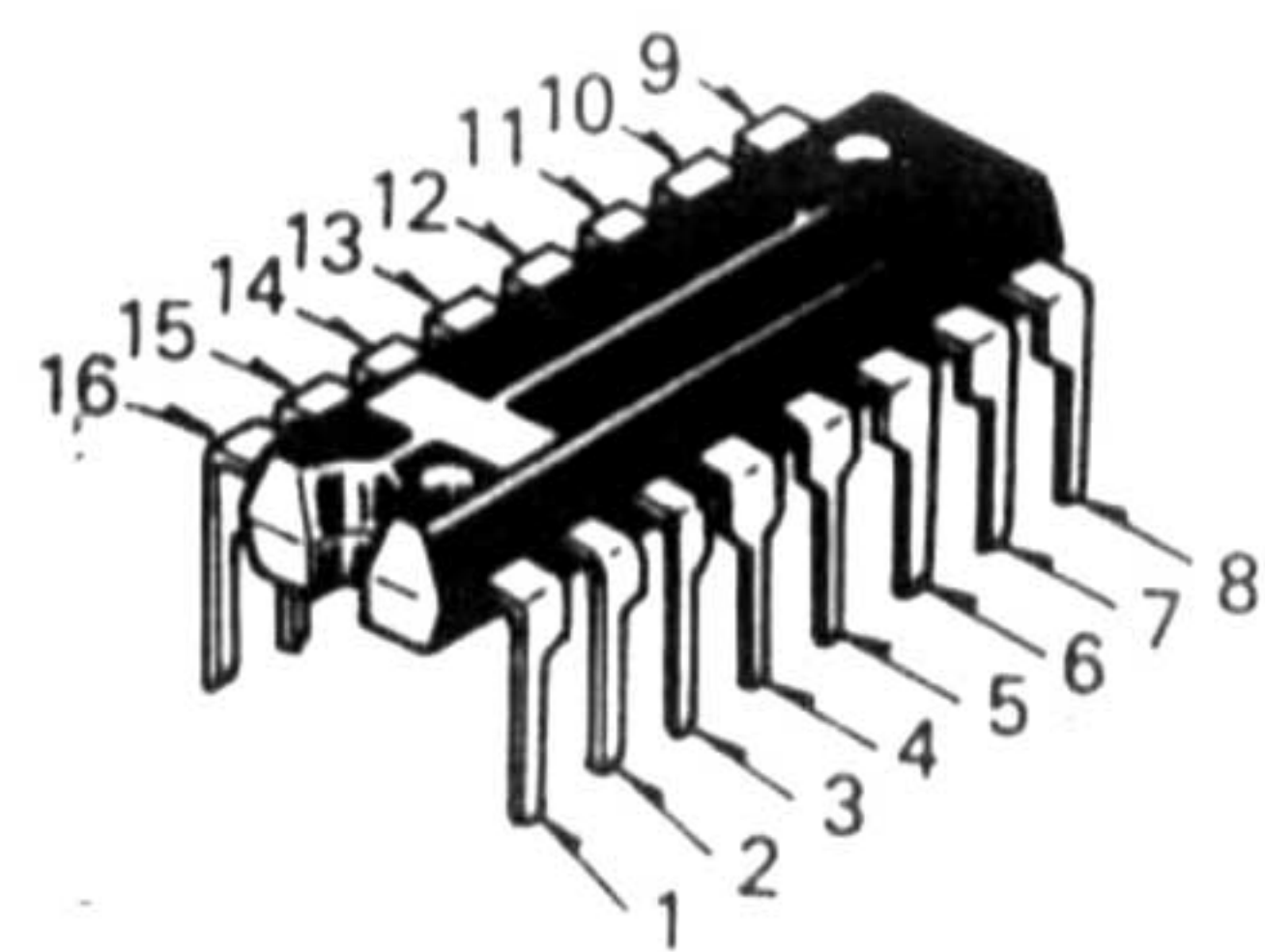
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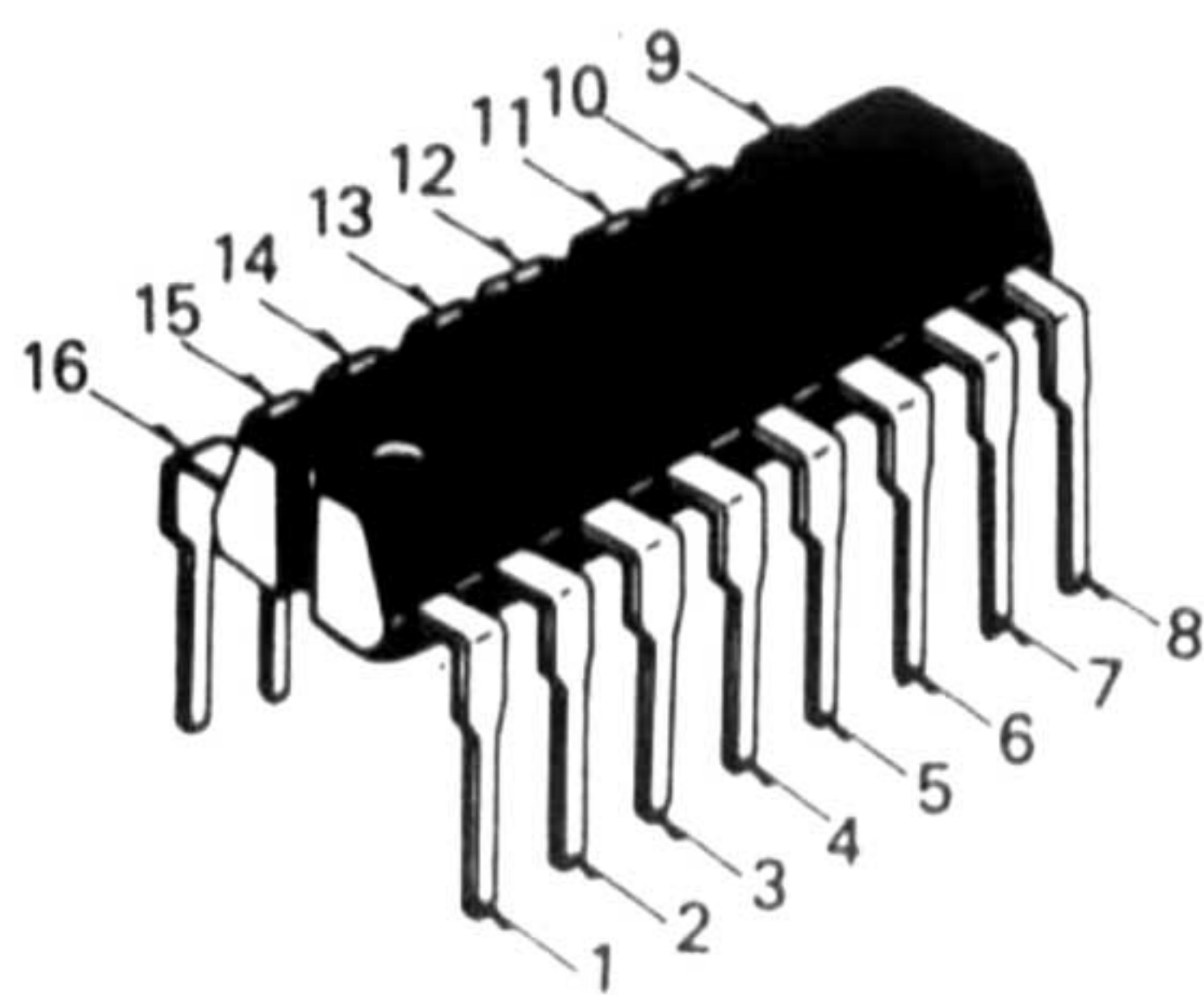
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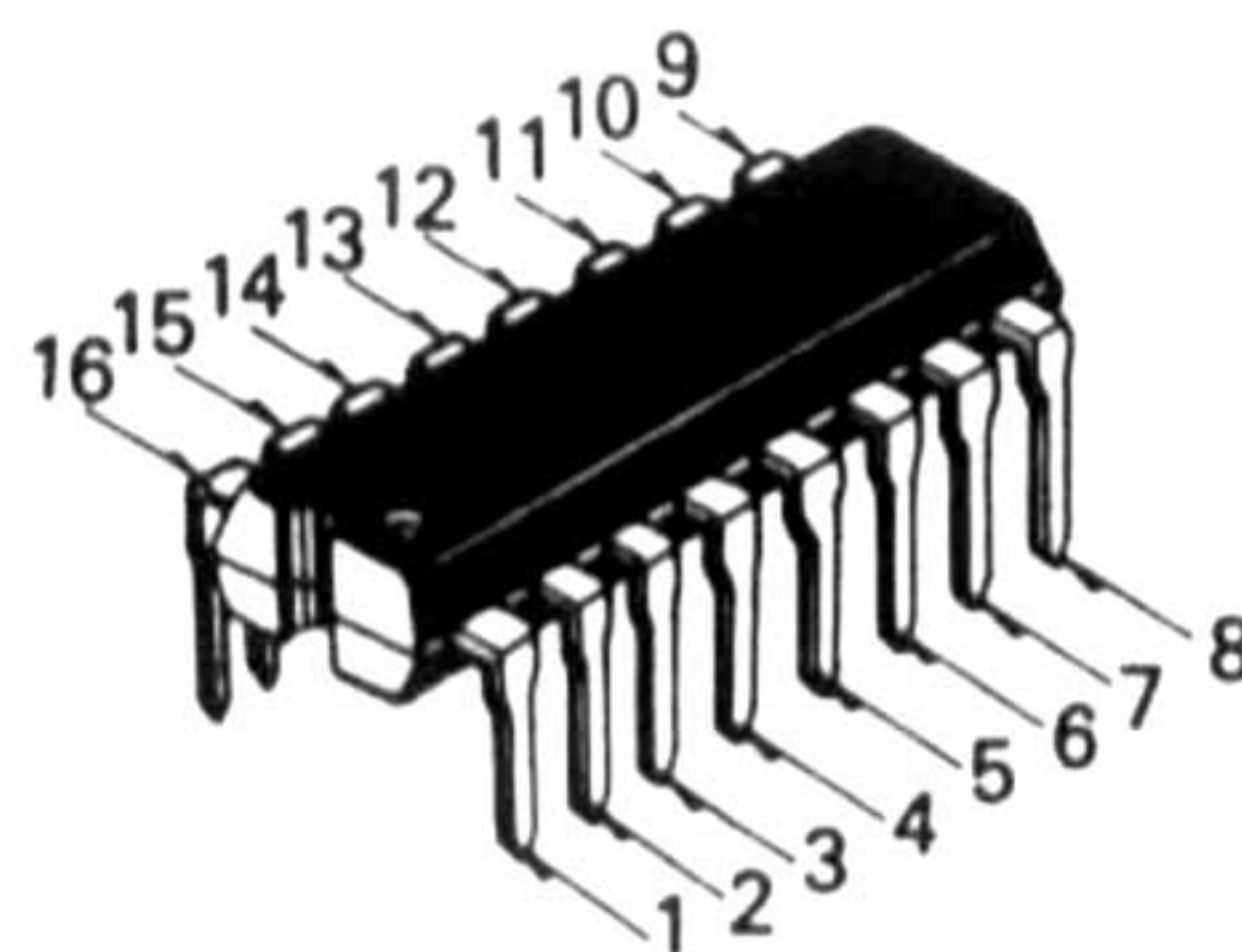
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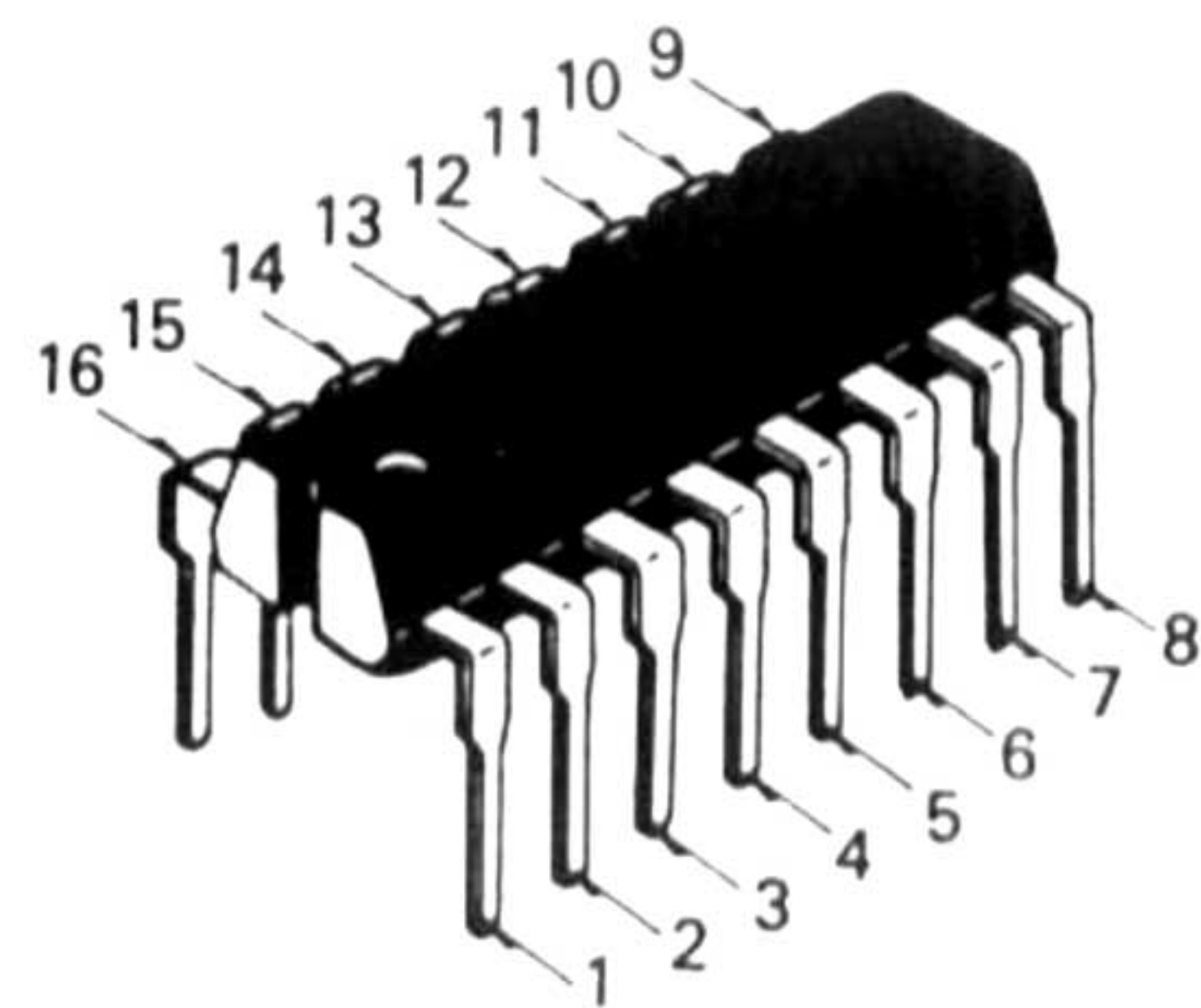
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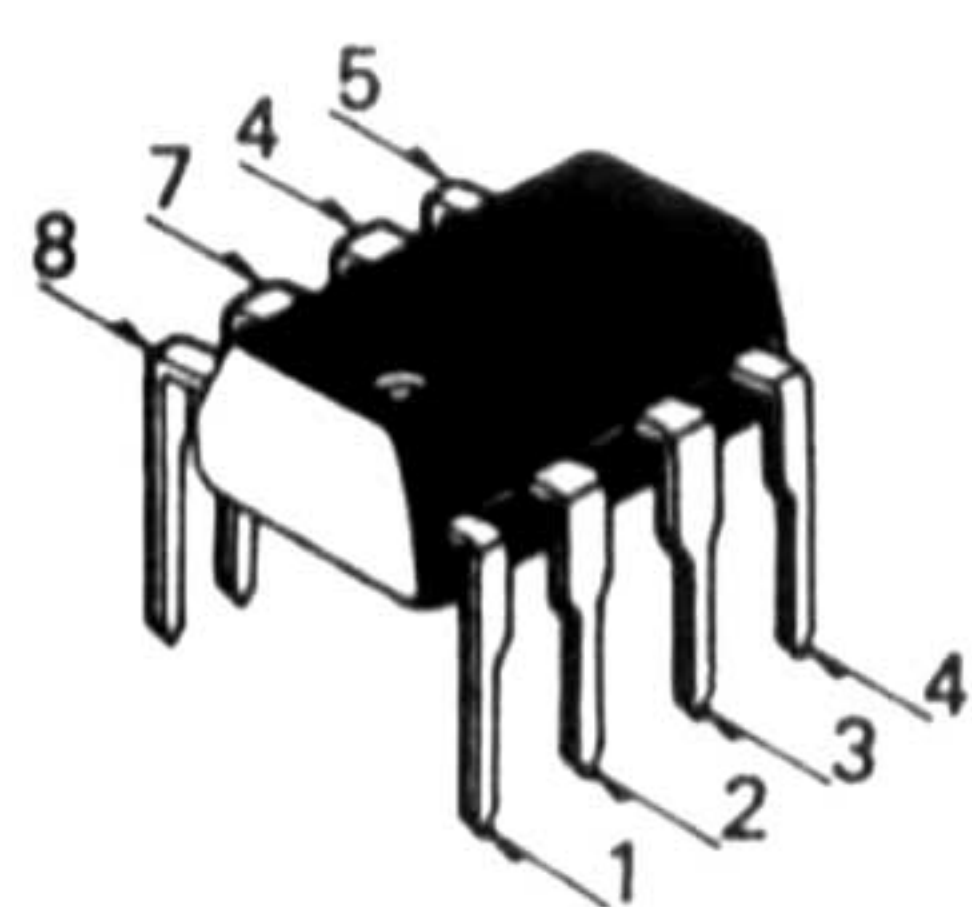
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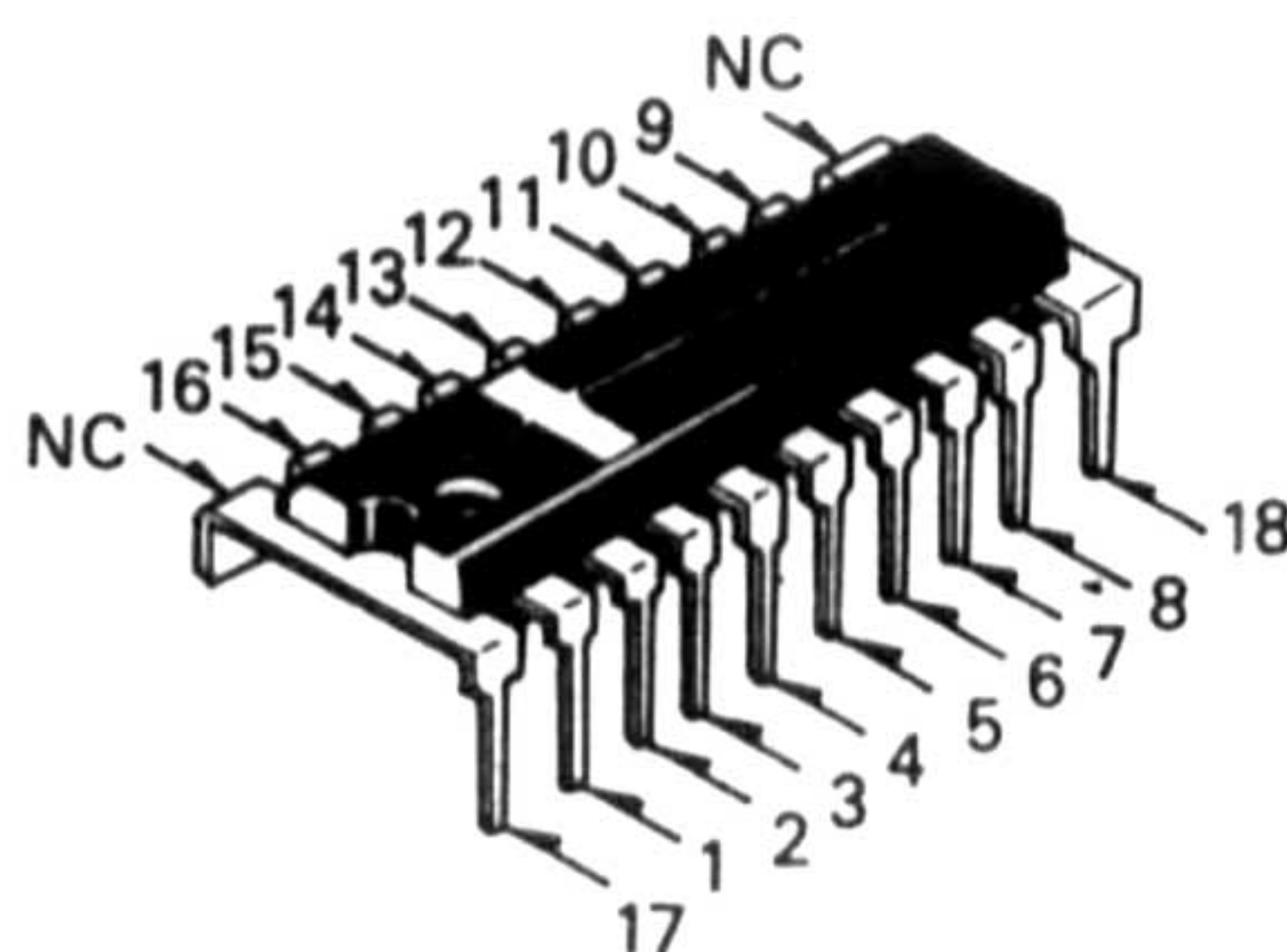
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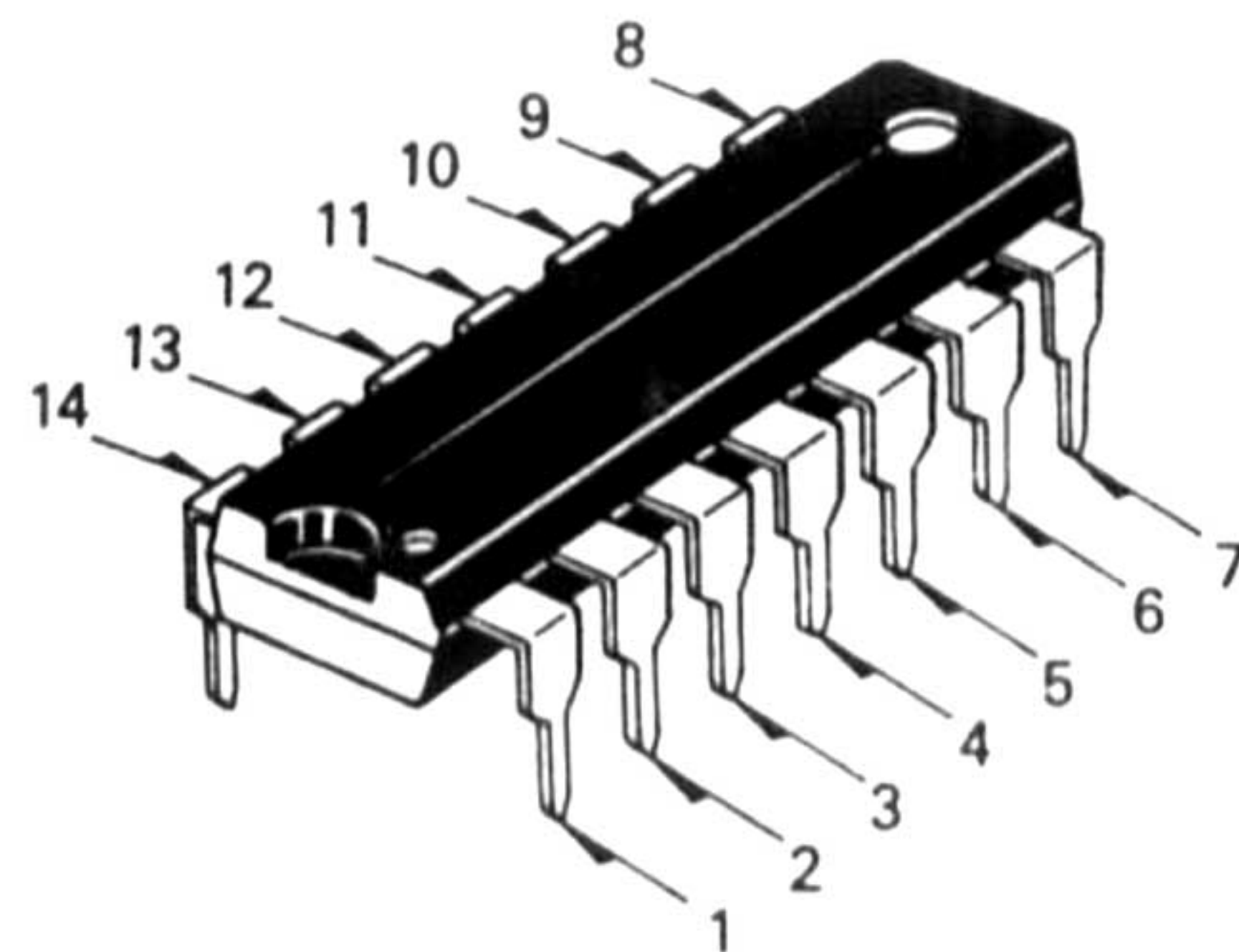
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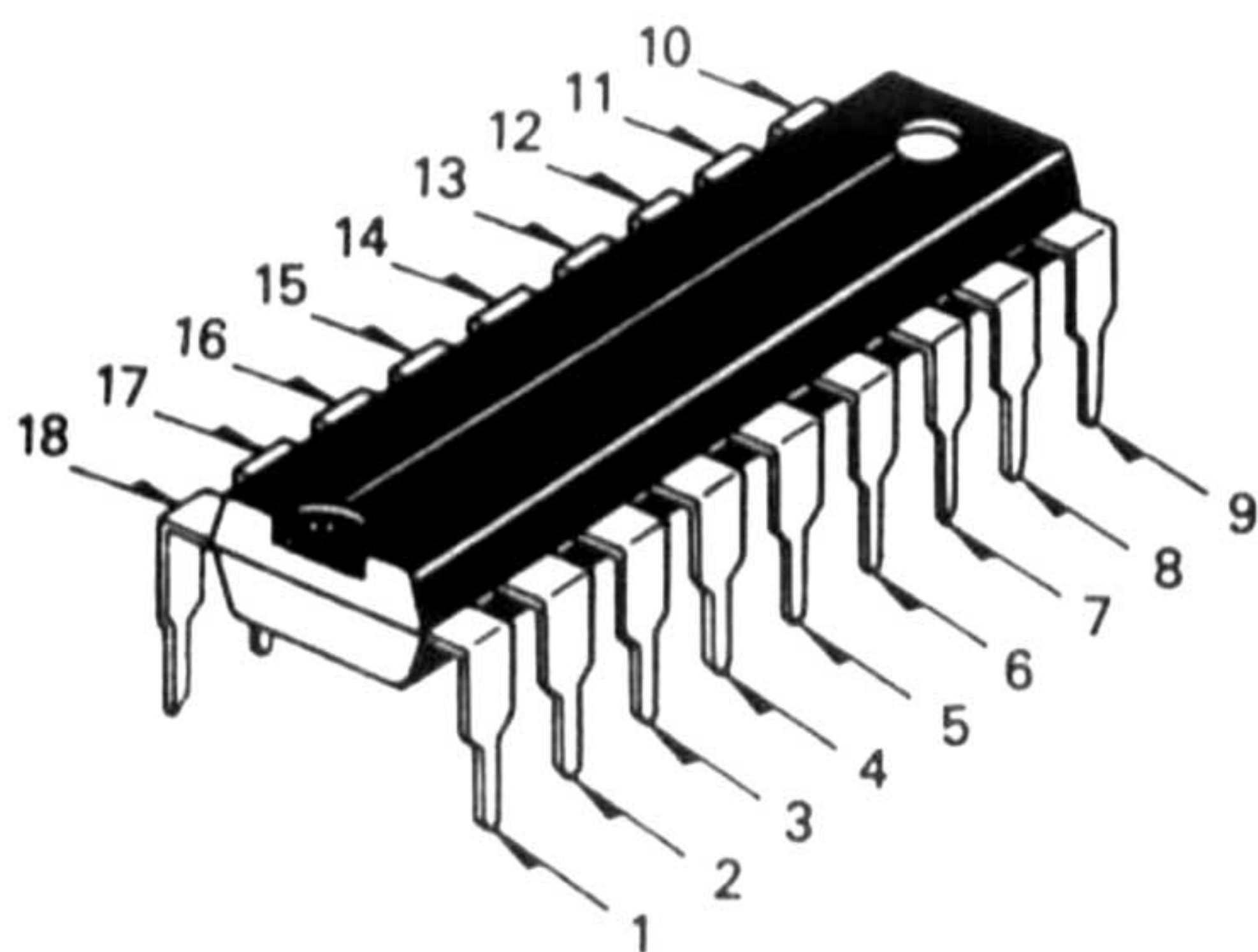
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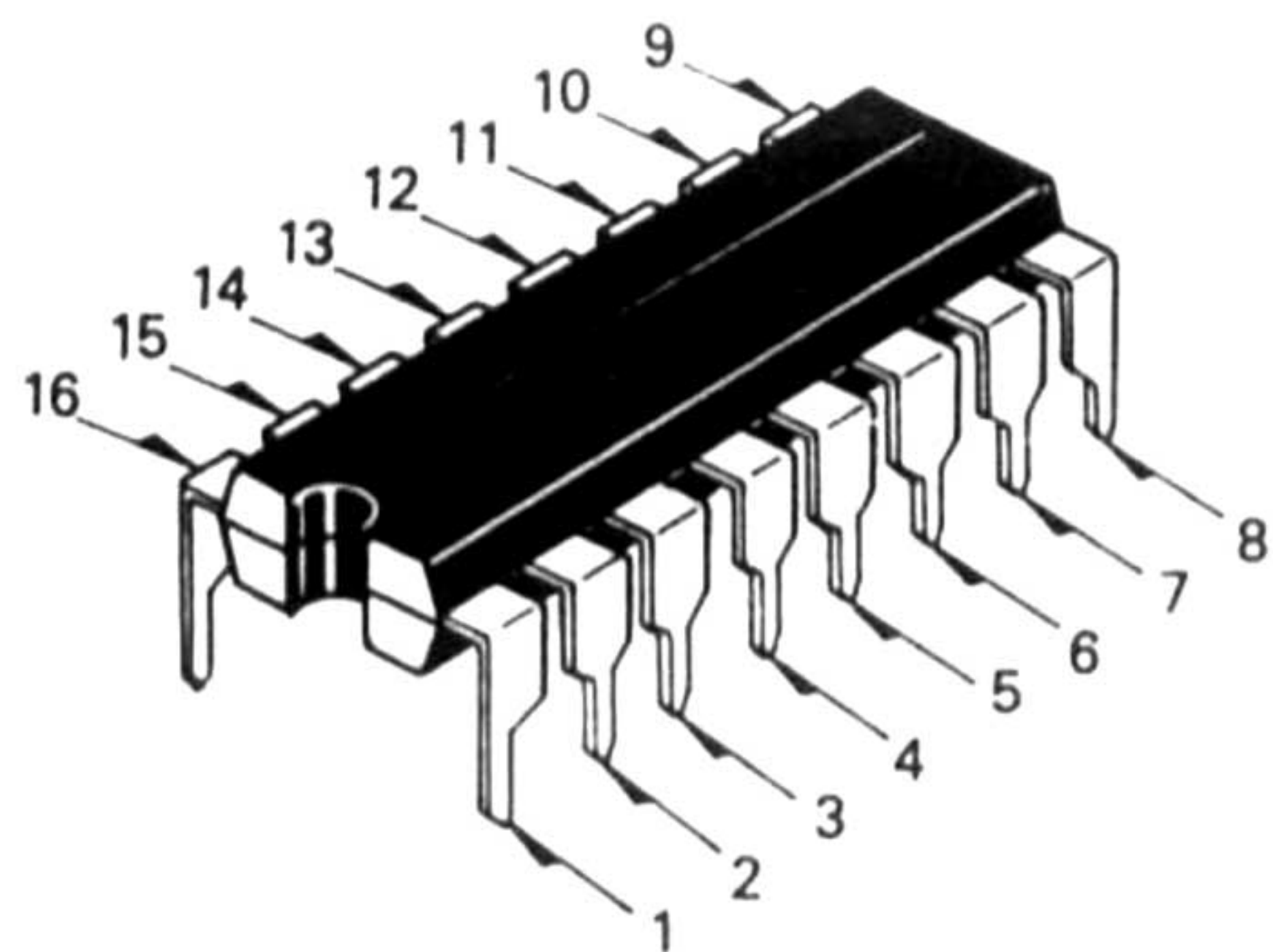
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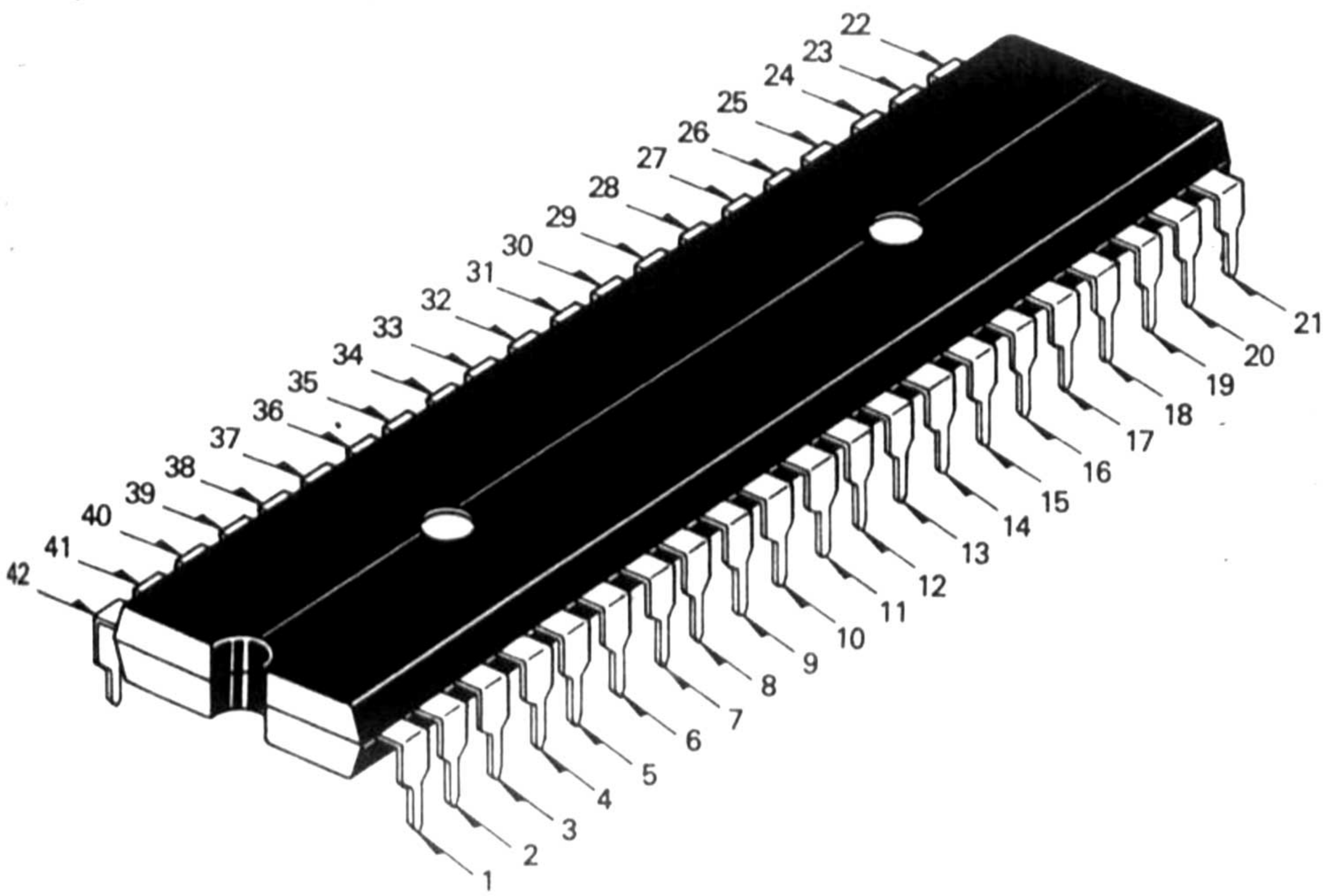
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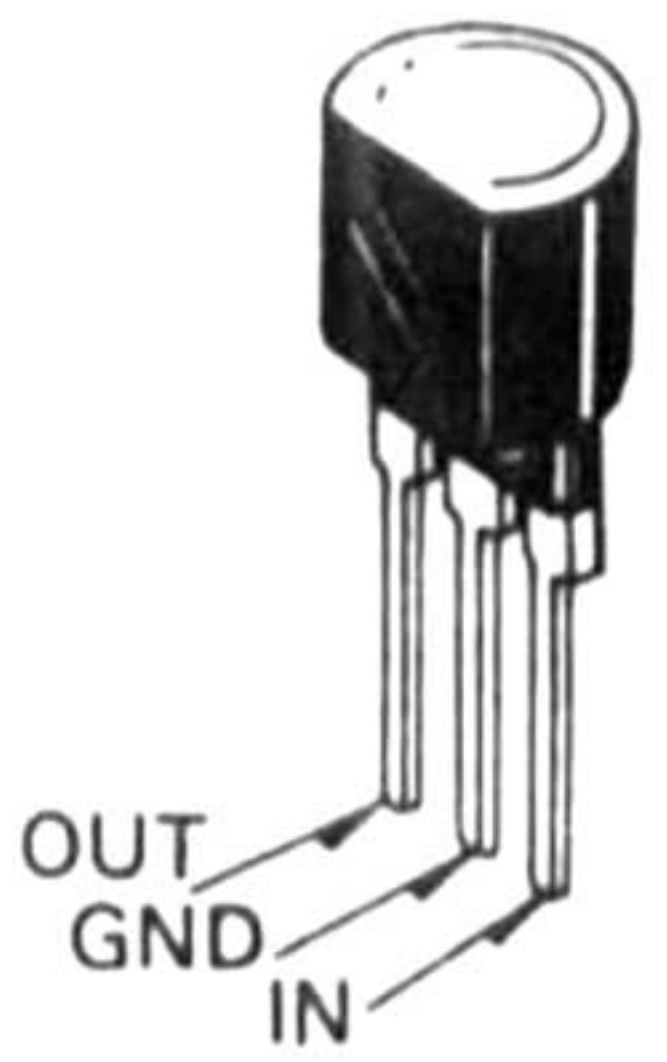
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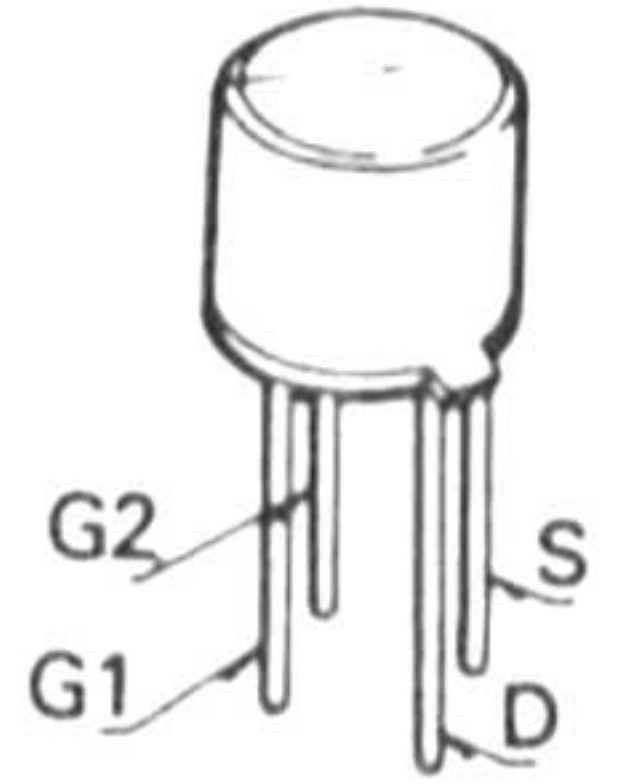
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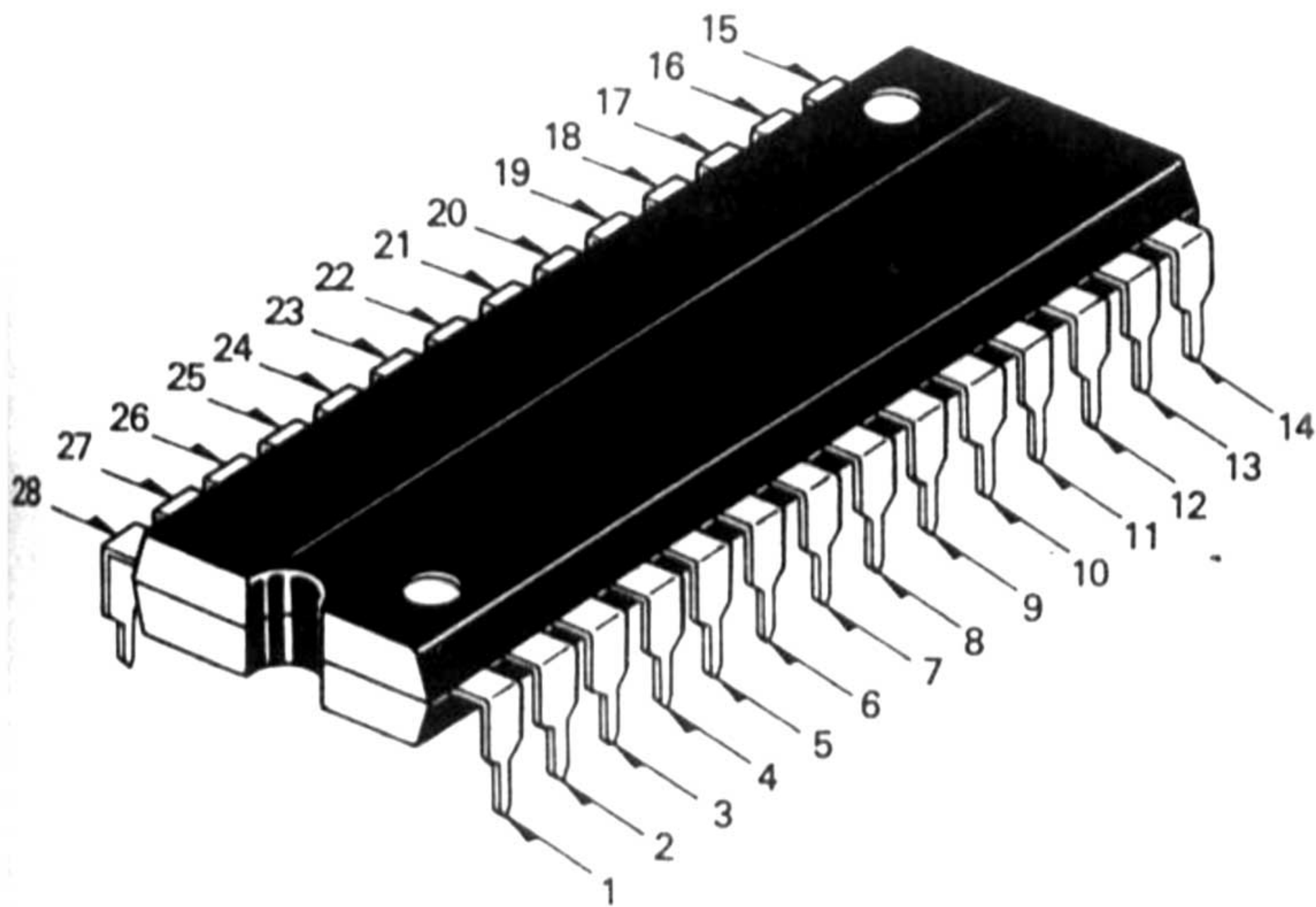
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LM78L-05A
LM78L-08A



3SK45



μPD2815



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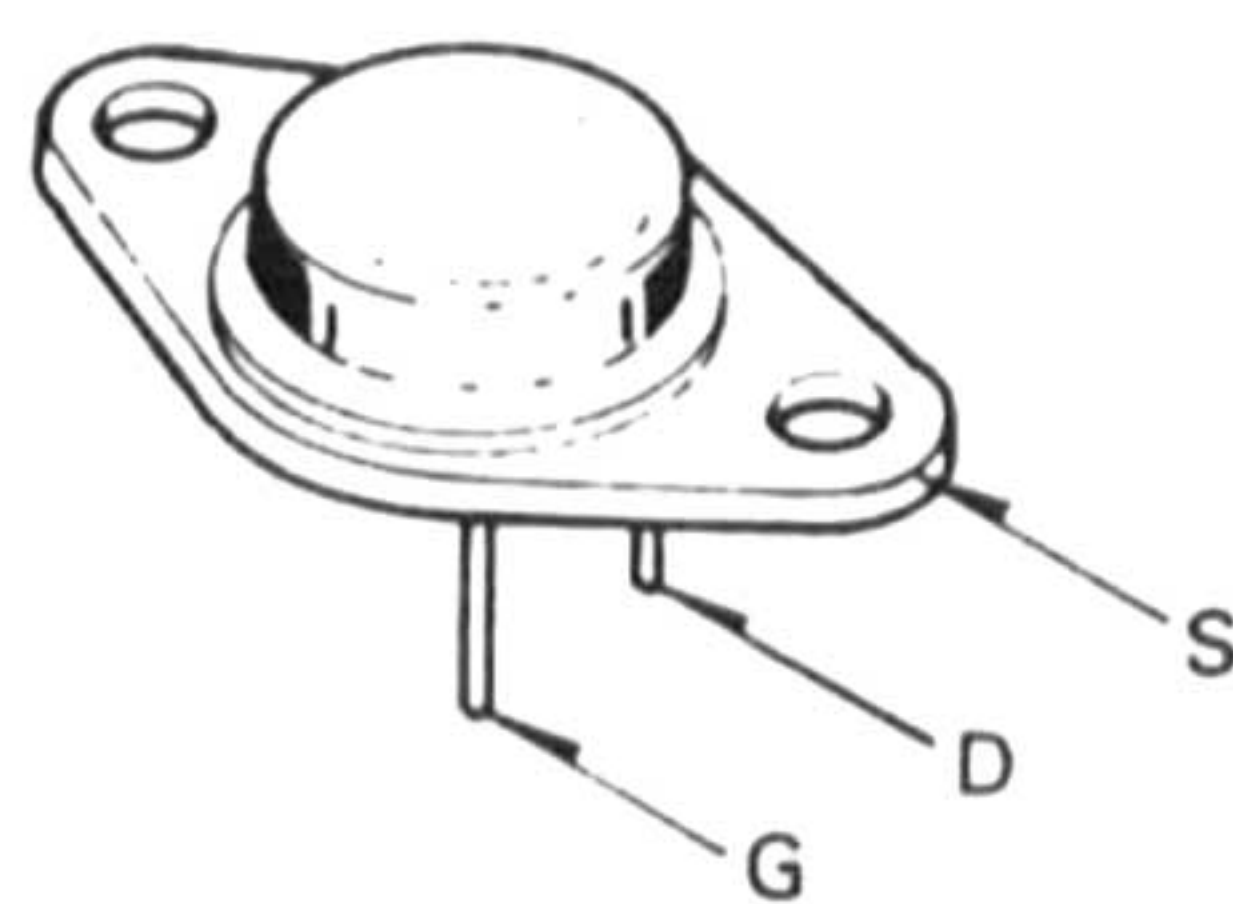
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2SB605



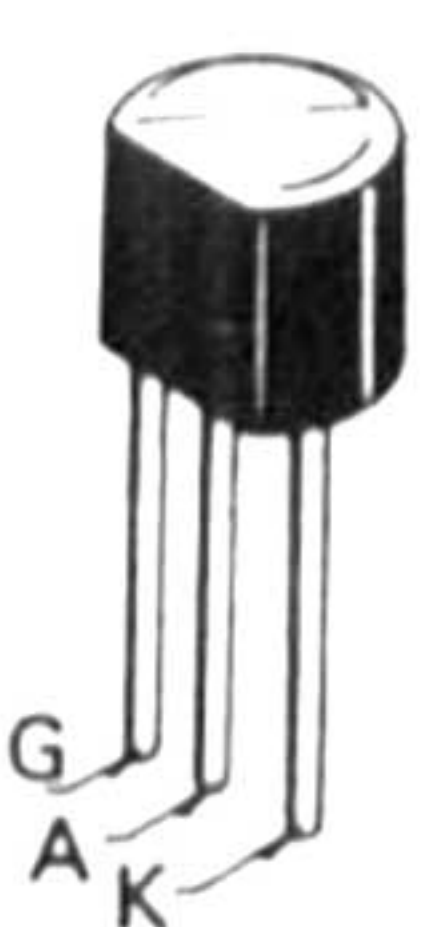
2SA872



2SK104



2SK134
2SJ49



2SF657
D3D-1M

SEMICONDUCTOR VOLTAGE READINGS

Ref. No.		CONDITION: FM MODE		Ref. No.		AM NO SIGNAL	AM 1000 kHz 5 mV/m INPUT
		NO SIGNAL	98.1MHz, 1 mV INPUT				
TR1	G1	3.21 V DC	3.21 V DC	TR204	B	0.69 V	0.69 V
	G2	0.02 V	—		C	2.13 V	2.12 V
	D	10.33 V	10.31 V		E	0	0
TR2	B	1.99 V	1.98 V	TR205	B	2.13 V	2.12 V
	C	11.3 V	11.39 V		C	7.11 V	7.1 V
	E	1.33 V	1.33 V		E	1.44 V	1.43 V
TR3	G	3.24 V	3.23 V	Ref. No. AM SIGNAL METER FULL SCALE LIT			
	D	10.78 V	10.76 V	TR202	B	2.36 V	
	S	3.11 V	3.10 V		C	9.44 V	
			E		1.75 V		
TR4	B	5.82 V	5.81 V	Ref. No. FM SCAN STOP (HOLD) FM AUTO SCANNING			
	C	10.78 V	10.76 V	TR301	B	0.64 V	—
	E	5.21 V	5.21 V		C	35.3 mV	—
			E		0	0	
TR101	B	1.97 V	1.74 V	TR302	B	35.1 mV	—
	C	11.20 V	5.76 V		C	4.91 V	—
	E	1.53 V	1.47 V		E	0	0
TR102	B	0.2 V	0.7 V	TR303	B	20.0 mV	—
	C	1.53 V	88.2 mV		C	19.32 V	—
	E	0	0		E	0	0
Ref. No.		FM AUTO TUNING	FM AUTO STOPPED	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR103	B	5 V	5.60 V	TR401	B	7.50 V	7.50 V
	C	11.4 V	11.39 V		C	-18.81 V	7.25 V
	E	4.45 V	4.99 V		E	7.83 V	7.83 V
TR104	B	0.6 V	0.69 V	TR402	B	7.50 V	7.21 V
	C	6.71 mV	108.8 mV		C	-18.83 V	7.79 V
	E	0	0		E	7.83 V	7.82 V
TR105	B	100.5 mV	0.82 V	TR403	B	7.48 V	7.49 V
	C	7.73 V	158.1 mV		C	-18.83 V	-18.69 V
	E	6.71 mV	108.2 mV		E	7.83 V	7.82 V
Ref. No.		AM MODE NO SIGNAL	FM MODE NO SIGNAL	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR106	B	4.92 V	11.28 V	TR404	B	7.45 V	7.36 V
	C	5.48 V	5.59 V		C	-1.62 V	—
	E	5.48 V	5.48 V		E	7.82 V	7.82 V
Ref. No.		FM 98.1 MHz STEREO 1 mV INPUT	FM 98.1 MHz MONO 1 mV INPUT	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR107	B	23.4 mV	23.3 mV	TR405	B	7.4 V	7.35 V
	C	2.14 V	2.11 V		C	-0.46 V	—
	E	0	0		E	7.83 V	7.83 V
Ref. No.		AM MODE NO SIGNAL	FM MODE NO SIGNAL	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR108	B	0.66 V	7.5 mV	TR406	B	7.4 V	7.36 V
	C	56.6 mV	2.75 V		C	—	—
	E	0	0		E	7.83 V	7.82 V
Ref. No.		FM NO SIGNAL	FM 98.1 MHz 1 mV INPUT	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR109	B	0.58 V	21.9 mV	TR407	B	7.21 V	7.51 V
	C	6.75 mV	108.5 mV		C	7.80 V	-18.70 V
	E	0	0		E	7.83 V	7.82 V
Ref. No.		AM NO SIGNAL	AM 1000 kHz 5 mV/m INPUT	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR201	G	0.07 mV	—	TR408	B	7.35 V	7.21 V
	D	5.4 V	5.31 V		C	0.69 V	7.8 V
	S	0.27 V	0.27 V		E	7.83 V	7.83 V
TR202	B	1.45 V	2.17 V	TR409	B	7.25 V	7.21 V
	C	9.45 V	9.36 V		C	-18.89 V	7.8 V
	E	0.86 V	1.56 V		E	7.83 V	7.82 V
TR203	B	1.62 V	1.6 V	TR410	B	7.4 V	7.50 V
	C	4.58 V	4.54 V		C	—	-18.7 V
	E	1.04 V	1.03 V		E	7.82 V	7.82 V
Ref. No.		AM NO SIGNAL	AM 1000 kHz 5 mV/m INPUT	Ref. No. NO SIGNAL FM 98.1 MHz NO SIGNAL AM 1000 kHz			
TR204	B	1.45 V	2.17 V	TR411	B	7.34 V	7.21 V
	C	9.45 V	9.36 V		C	—	7.8 V
	E	0.86 V	1.56 V		E	7.82 V	7.82 V
TR205	B	1.62 V	1.6 V	TR412	B	7.4 V	7.35 V
	C	4.58 V	4.54 V		C	-0.48 V	—
	E	1.04 V	1.03 V		E	7.82 V	7.82 V

Ref. No.		FM 98.1 MHz NO SIGNAL	AM 1000 kHz NO SIGNAL	Ref. No.		NO INPUT	60 W (1 kHz) OUTPUT 8 Ω, PHONO INPUT
TR413	B C E	7.46 V -16.18 V 7.82 V	7.47 V -16.07 V 7.82 V	TR503 (TR504)	B C E	-58.9 mV 25.9 V -0.57 V	-60.4 mV 25.8 V -0.58 V
TR414	B C E	7.45 V -16.13 V 7.82 V	7.46 V -16 V 7.82 V	TR505 (TR506)	B C E	24.6 V 0.57 V 25.2 V	24.5 V 0.57 V 25.1 V
TR415	B C E	7.45 V -16.13 V 7.82 V	7.45 V -16 V 7.82 V	TR507 (TR508)	B C E	0.57 V 25.9 V 5 mV	0.57 V 25.8 V 5.12 mV
TR416	B C E	7.45 V -16.25 V 7.82 V	7.45 V -16.12 V 7.82 V	Ref. No.		NO INPUT	60W (1kHz) OUTPUT 8 Ω, AUX INPUT
Ref. No.		FM 98.1 MHz MONO 1 mV INPUT	FM 98.1 MHz STEREO 1mV INPUT	TR601	B C E	3.75 V -20.1 V 0.53 V	3.75 V -20.1 V 0.53 V
TR417	B C E	7.77 V -18.83 V 7.82 V	7.20 V 7.80 V 7.82 V	TR603	B C E	-40.8 mV -6.26 V 0.53 V	-40 mV -6.3 V 0.53 V
Ref. No.		AUX FUNCTION	other FUNCTION	TR605	B C E	-20.2 V -0.31 V -20.8 V	-20.2 V -0.39 V -20.9 V
TR418	B C E	7.25 V -18.73 V 7.82 V	7.20 V 7.80 V 7.82 V	Ref. No.		NO INPUT	60W (1kHz) OUTPUT 8 Ω, AUX INPUT
Ref. No.		PHONO FUNCTION	other FUNCTION	TR701A (TR701B)	B C E	0.9 mV -44.7 V 0.58 V	40 mV -44.8 V 0.57 V
TR419	B C E	7.25 V -18.8 V 7.82 V	7.21 V 7.80 V 7.82 V	TR702A (TR702B)	B C E	36.5 mV -45.4 V 0.58 V	39 mV -45.5 V 0.57 V
Ref. No.		MEMORY ON	MEMORY OFF	TR703A (TR703B)	B C E	45.5 V 0.99 V 46.1 V	45.6 V 1.27 V 45.9 V
TR420	B C E	6.37 V 7.82 V 5.84 V	0 7.83 V 0.43 V	TR704A (TR704B)	B C E	-45.4 V 5.25 V -46 V	-45.5 V 5.85 V -45.7 V
Ref. No.		DIMMER ON	DIMMER OFF	TR705A (TR705B)	B C E	-44.7 V -1.18 V -46 V	-44.9 V 1 V -45.7 V
TR421	B C E	1.3 V - 81.5 mV	6.35 V - -	TR706A (TR706B)	G S D	0.96 V 18.9 mV 48.3 V	1.25 V 1.16 V 48.7 V
Ref. No.		CLOCK ON	CLOCK OFF	TR707A (TR707B)	G S D	-0.96 V 18.6 mV -48.3 V	1 V 1.19 V -48.6 V
TR422	B C E	6.33 V - 115.4 mV	1.4 V -0.35 V 121.8 mV	TR801	B C E	30.1 V 34.4 V 29.5 V	30 V 32.7 V 29.4 V
Ref. No.		NO SIGNAL FM MODE	NO SIGNAL AM MODE	TR802	B C E	-30.2 V -34.5 V -27.6 V	-30.1 V -32.7 V -29.5 V
TR423	B C E	1.4 V - 121.9 mV	0.35 V - 9.09 V	TR803	B C E	26.1 V 30.1 V 25.5 V	26.0 V 30.0 V 25.45 V
Ref. No.		NO SIGNAL FM 98.1 MHz	NO SIGNAL AM 1000 kHz	TR804	B C E	-26.2 V -30.2 V -25.6 V	-26.1 V -30.1 V -25.5 V
TR424	B C E	0.59 V 9.12 mV -	2.84 mV 2.55 V -	Ref. No.		NO INPUT	60W (1kHz) OUTPUT 8 Ω, AUX INPUT
Ref. No.		AC POWER SUPPLY	DC BATTERY (9V) SUPPLY	TR805	B C E	11.99 V 17.32 V 11.43 V	11.91 V 16.27 V 11.35 V
TR425	B C E	10.12 V 7.82 V 10.11 V	8.59 V 9.12 V 9.38 V	POWER SUPPLY P.C.B.	Pin 4 Pin 6 Pin 10	26.5 V AC 26.5 V AC 27.5 V	26.0 V AC 26.0 V AC 27.4 V
Ref. No.		NO INPUT	60W (1 kHz) OUTPUT 8 Ω, PHONO INPUT				
TR501 (TR502)	B C E	-44.6 mV 24.6 V -0.57 V	-45.4 mV 24.5 V -0.58 V				

Ref. No.		NO INPUT	60W (1 kHz) OUTPUT 8 Ω, AUX INPUT
POWER SUPPLY P.C.B.	Pin 9	25.4 V	25.2 V
	Pin 8	28.4 V	28.2 V
	Pin 1	-28.5 V	-28.3 V
	Pin 2	-27.6 V	-27.5 V
	Pin 3	-25.4 V	-25.3 V
	Pin 22	15.84 V AC	15.57 V AC
	Pin 18	1.2 mV	
	Pin 17	29.3 V	29.1 V
	Pin 17	16.77 V	13.59 V
	Pin 20	19.17 V	18.13 V
	Pin 16	17.72 V	16.78 V
Pin 14, 15	11.43 V	11.34 V	
TR1101 (TR1102)	B C E	-0.81 V 28.4 V -1.34 V	-0.8 V 28.2 V -1.36 V
Ref. No.		NO SIGNAL AM MODE	NO SIGNAL FM MODE
TR1001	B C E	156.3 mV 11.34 V 0	158.3 mV 23.2 mV 0
Ref. No.		AM/FM/FM DOLBY MODE	PHONO/AUX MODE
TR1301	B C E	6.86 V 7.73 V 6.90 V	- 7.73 V -

Ref. No.		REED RELAY OFF	REED RELAY ON
TR305	B C E	0.62 V 25.4 mV 0	3.25 mV 0.69 V 0
TR304	B C E	25.4 mV 19.05 V 0	0.69 V 58.4 mV 0

Ref. No.		PROTECTOR OFF	PROTECTOR ON Pin 11 & 12 at 3.2 V	PROTECTOR ON Pin 11 & 12 at -3.6 V
TR901	B C E	1.20 V 1.06 V 2.11 mV	523 mV 5.9 V -4.7 mV	-610 mV -459 mV -4.3 mV
TR902	B C E	0 1.06 V 1.49 V	0 5.9 0.47 V	0 -459 mV -502 mV
TR903	B C E	1.06 V 0 1.56 V	5.9 V 0 0.63 V	-459 mV 0 175.6 mV
TR904	B C E	-1.32 V 820 V 0.72 V	633 mV 19.77 V 356 mV	176.4 mV 19.8 V 127 mV
TR905	B C E	0.72 V 0.82 V 0	356 mV 19.77 V 0	127 mV 19.8 V 0
Ref. No.		FM 98.1 MHz 1 mV INPUT	FM NO SIGNAL	AM NO SIGNAL
TR1601	B C E	0.63 V 19.37 mV 0	0.63 V 19.4 mV 0	11.08 mV 0.68 V 0
TR1602	B C E	19.37 mV 4.11 V 0	19.41 mV 3.62 V 0	0.68 V 20.0 mV 0

Ref. No.		NO SIGNAL	FM 98.1 MHz 1 mV INPUT	Ref. No.		NO SIGNAL	FM 98.1 MHz 1 mV INPUT
IC51	1	4.87 V	4.87 V	IC101	1	8.26 V	8.25 V
	2	3.18 V	3.18 V		2	-	-
	3	0	-		3	-	-
	4	0	-		4	1.4 V	1.4 V
	5	19.29 V	19.31 V		5	1.4 V	1.4 V
	6	0	-		6	-	-
	7	0	-		7	7.86 V	7.85 V
	8	0	-		8	8 V	7.99 V
IC52	IN OUT	11.4 V 4.88 V	11.3 V 4.88 V				

Ref. No.		NO SIGNAL	FM 98.1 MHz 1 mV INPUT	Ref No.	FM 98.1 MHz 1 mV INPUT MONO	FM 98.1 MHz 1 mV INPUT STEREO	
IC102	1	8.73 V	8.72 V	IC106	1	7.66 V	7.38 V
	2	—	—		2	2.87 V	2.83 V
	3	—	—		3	5.48 V	5.35 V
	4	1.41 V	1.41 V		4	4.67 V	4.44 V
	5	1.42 V	1.42 V		5	4.72 V	4.47 V
	6	—	—		6	7.82 V	0.65 V
	7	8.28 V	8.27 V		7	—	—
	8	8.47 V	8.45 V		8	0.26 V	0.26 V
IC103	1	9.77 V	9.76 V		9	—	—
	2	—	—		10	2.12 V	2.14 V
	3	—	—		11	2.12 V	2.08 V
	4	1.4 V	1.4 V		12	2.11 V	2.07 V
	5	1.41 V	1.41 V		13	2.12 V	2.11 V
	6	—	—		14	2.11 V	2.11 V
	7	9.28 V	9.28 V		15	2.11 V	2.11 V
	8	9.47 V	9.46 V		16	2.75 V	2.75 V
IC104	1	2.79 V	2.8 V	Ref. No.		AM 1000 kHz 5 mV/M INPUT	NO SIGNAL
	2	2.79 V	2.8 V	IC201	1	4.98 V	185 mV
	3	2.79 V	2.81 V		2	2.25 V	2.25 V
	4	—	—		3	8.15 V	8.06 V
	5	0.10 mV	0.13 mV		4	5.63 V	5.54 V
	6	5.45 V	5.5 V		5	8.15 V	8.07 V
	7	5.08 V	5.2 V		6	3.61 V	3.61 V
	8	5.48 V	5.48 V		7	6.9 mV	1.28 V
	9	5.49 V	5.49 V		8	2.88 V	2.88 V
	10	5.49 V	5.49 V		9	5.92 V	6.19 V
	11	11.39 V	11.38 V		10	0	0
	12	4.65 V	23.9 mV		11	9.45 V	9.36 V
	13	1.02 V	5.51 V		12	1.55 V	2.36 V
	14	—	—		13	0.71 V	0.71 V
	15	—	—		14	1.45 V	2.18 V
	16	5.71 V	0.87 V		15	—	—
IC107	1	5.49 V	5.49 V		Ref. No.		DOLBY FM 98.1 MHz 1 mV INPUT
	2	5.49 V	5.49 V	IC301	1	0.6 V	0.6 V
	3	5.43 V	5.43 V		2	5.19 V	5.19 V
	4	—	—		3	0.3 V	0.3 V
	5	5.43 V	5.43 V		4	5.22 V	5.22 V
	6	5.49 V	5.49 V		5	—	—
	7	5.49 V	5.49 V		6	5.96 V	5.96 V
	8	11.05 V	11.04 V		7	1.68 V	1.68 V
			8		5.44 V	5.44 V	
			9		5.42 V	5.42 V	
			10		1.68 V	1.68 V	
			11		5.95 V	5.95 V	
			12		—	—	
			13		5.2 V	5.2 V	
			14		0.29 V	0.29 V	
			15		5.2 V	5.2 V	

Ref. No.	FM 98.1 MHz 1 mV INPUT MUTE: HIGH	FM 98.1 MHz 1 mV INPUT MUTE: LOW	FM NO SIGNAL	AM 1000 kHz 5 mV/m INPUT	AM NO SIGNAL	
IC105	1	0.58 V	0.57 V	0.5 V	0.52 V	
	2	—	—	—	—	
	3	—	—	—	—	
	4	—	—	—	—	
	5	10.58 V	10.58 V	10 mV	10.62 V	101.9 mV
	6	57.5 mV	24.7 mV	0.55 V	174.4 mV	0.54 V
	7	0	0	0	0	0
	8	0.53 V	0.53 V	0.44 V	75.0 mV	114.2 mV
	9	114.8 mV	119.3 mV	10.62 V	10.64 V	10.65 V
	10	10.61 V	10.61 V	10.62 V	9.61 V	10.66 V
	11	81 mV	825 mV	97 mV	0.46 V	160 mV
	12	0.58 V	0.58 V	0.58 V	0.58 V	0.58 V
	13	0.57 V	0.57 V	0.57 V	0.57 V	0.57 V
	14	11.37 V	11.38 V	11.39 V	11.42 V	11.43 V

Ref. No.		DOLBY FM 98.1 MHz 1 mV INPUT	DOLBY FM NO SIGNAL
IC301	16	5.29 V	5.29 V
	17	10.61 V	10.61 V
	18	0	0
		NO SIGNAL FM 98.1 MHz	NO SIGNAL AM 1000 kHz
IC401	1	2.55 V	2.57 V
	2	9.09 mV	2.55 V
	3	0.71 V	0.71 V
	4	-0.12 mV	-
	5	-0.12 mV	1.41 V
	6	-0.12 mV	-0.13 mV
	7	6.9 V	-
	8	6.89 V	6.89 V
	9	6.89 V	6.89 V
	10	-	-
	11	4.88 V	-
	12	190 mV	-
	13	-	-
	14	4.91 V	-
	15	46.6 mV	-
	16	46.6 mV	46.6 mV
	17	2.55 V	2.56 V
	18	2.47 V	2.48 V
	19	2.62 V	2.62 V
	20	2.51 V	2.51 V
	21	2.45 V	2.45 V
	22	2.45 V	2.44 V
	23	2.33 V	4.91 V
	24	13.17 mV	1.38 V
	25	5.93 mV	21.7 mV
	26	0.2 V	-
	27	-	-
	28	-	-

Ref. No.		NO SIGNAL FM 98.1 MHz	NO SIGNAL AM 1000 kHz	CLOCK AM 0:00
IC402	1	4.62 V	4.63 V	4.60 V
	2	-	4.45 V	4.40 V
	3	-	1.09 V	4.39 V
	4	4.43 V	1.07 V	4.39 V
	5	5.47 V	4.44 V	4.39 V
	6	0.88 V	0.88 V	0.88 V
	7	-	-	-
	8	6.51 V	4.44 V	5.41 V
	9	5.47 V	4.44 V	5.41 V
	10	5.47 V	7.55 V	7.55 V
	11	7.73 V	7.73 V	7.73 V
	12	0.71 V	0.71 V	-0.09 mV
	13	-0.11 mV	-0.12 mV	-0.1 mV
	14	-0.11 mV	1.41 V	-0.10 mV
	15	-0.11 mV	-0.12 mV	-0.10 mV
	16	6.89 V	6.85 V	6.83 V
	17	7.53 V	7.54 V	-
	18	7.72 V	7.73 V	-
	19	7.72 V	-	-
	20	7.73 V	7.73 V	7.33 V
	21	7.73 V	7.73 V	7.73 V
	22	6.89 V	6.89 V	6.83 V
	23	-0.1 mV	-0.1 mV	-0.09 mV
	24	-	-	-
	25	6.25 mV	-114.5 mV	-
	26	6.89 V	6.89 V	6.85 V
	27	1.07 V	7.56 V	7.56 V
	28	7.55 V	1.05 V	-
	29	7.55 V	7.55 V	7.55 V
	30	6.91 V	6.91 V	6.85 V
	31	88.3 mV	88.3 mV	82.7 mV
	32	121.9 mV	0.36 V	115.4 mV
	33	7.73 V	7.73 V	0.32 V
	34	7.73 V	7.73 V	7.73 V
	35	7.73 V	7.73 V	7.73 V
	36	7.73 V	7.73 V	7.73 V
	37	0.21 V	88.3 mV	191.0 mV
	38	120.1 mV	-0.1 mV	113.8 mV
	39	1.44 mV	1.56 mV	-
	40	0.21 V	0.21 V	-
	41	-0.12 mV	-0.13 mV	-0.12 mV
	42	4.18 V	4.21 V	4.19 V

Ref. No.		DISPLAYED
IC404	1	3.74 V
	2	7.78 V
	3	3.89 V
	4	1.77 V
	5	1.76 V
	6	0.88 V
	7	-
	8	-
	9	0.88 V
	10	1.76 V
	11	1.76 V
	12	0.88 V
	13	1.764 V
	14	.882 V
	15	-0.03 mV
	16	7.78 V
IC405	IN	7.78 V
	OUT	4.91 V
IC406	IN	12.27 V
	OUT	7.82 V

Ref. No.		NO SIGNAL FM 98.1 MHz	NO SIGNAL AM 1000 kHz
IC403	1	27.6 V	27.6 V
	2	1.06 V	0.71 V
	3	1.01 V	1.49 V
	4	-	-
	5	1.36 V	1.36 V
	6	12.40 V	1.38 V
	7	27.1 V	9.51 V
	8	28.1 V	28.2 V

Ref. No.		NO SIGNAL		SIGNAL METER FULL SCALE LIT	
		FM	AM	FM	AM
IC1501	1	0.68 V	0.68 V	0.66 V	0.65 V
	2	1.59 mV	1.55 mV	132.3 mV	131.6 mV
	3	5.56 mV	2.28 mV	137.7 mV	137.3 mV
	4	9.21 V	9.25 V	8.09 V	8.26 V
	5	2.87 V	2.87 V	2.86 V	2.86 V
	6	2.87 V	2.87 V	2.86 V	2.86 V
	7	161.6 mV	161.1 V	157.5 mV	156.2 mV
	8	1.23 mV	1.35 mV	2.95 mV	3.51 mV
	9	—	—	—	—
	10	7.73 V	7.76 V	6.19 V	6.28 V
	11	7.73 V	7.76 V	6.19 V	6.27 V
	12	7.75 V	7.79 V	6.25 V	6.37 V
	13	7.74 V	7.78 V	6.25 V	6.23 V
	14	7.74 V	7.78 V	6.19 V	6.25 V
	15	—	4.25 V	2.89 V	2.89 V
	16	0.24 V	175.6 mV	3.62 V	3.61 V

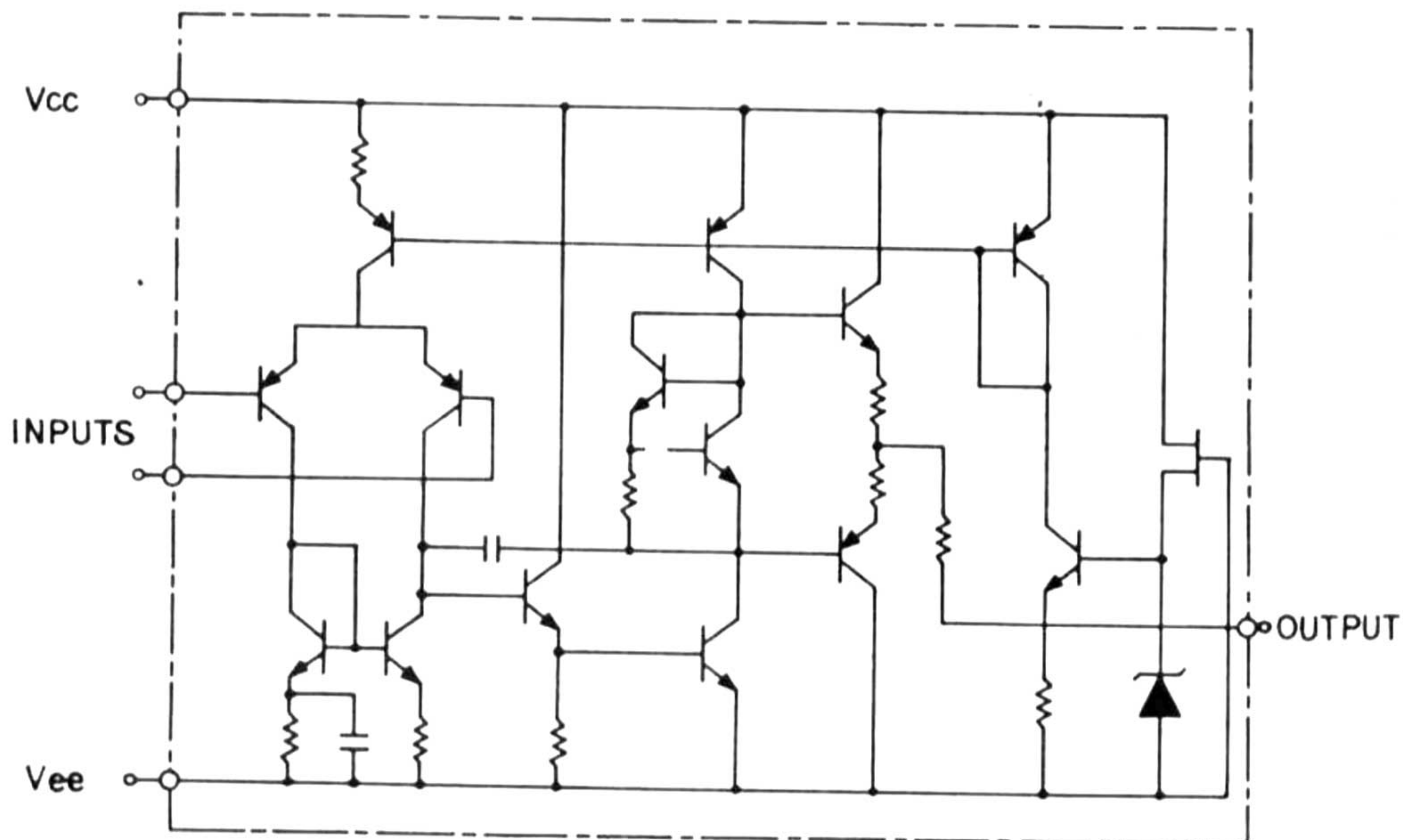
Ref. No.		METER SWITCH: OFF	METER SW: ON 60W (1kHz) OUTPUT 8 Ω
IC1701 (IC1702)	1	0	—
	2	0.07 mV	0.32 V
	3	3.54 mV	4.73 V
	4	150 mV	10.04 V
	5	150 mV	10.04 V
	6	140 mV	11.53 V
	7	140 mV	11.53 V
	8	138 mV	5.89 V
	9	134 mV	7.77 V
	10	140 mV	9.70 V
	11	140 mV	11.57 V
	12	142 mV	5.91 V
	13	0.21 V	7.79 V
	14	0.47 V	9.66 V
	15	0.8 V	11.56 V
	16	0	—
	17	11.3 V	3.79 V

NOTE: Voltages are measured to chassis ground with a Voltmeter (Digital Voltmeter, over 10 k Ω /V).

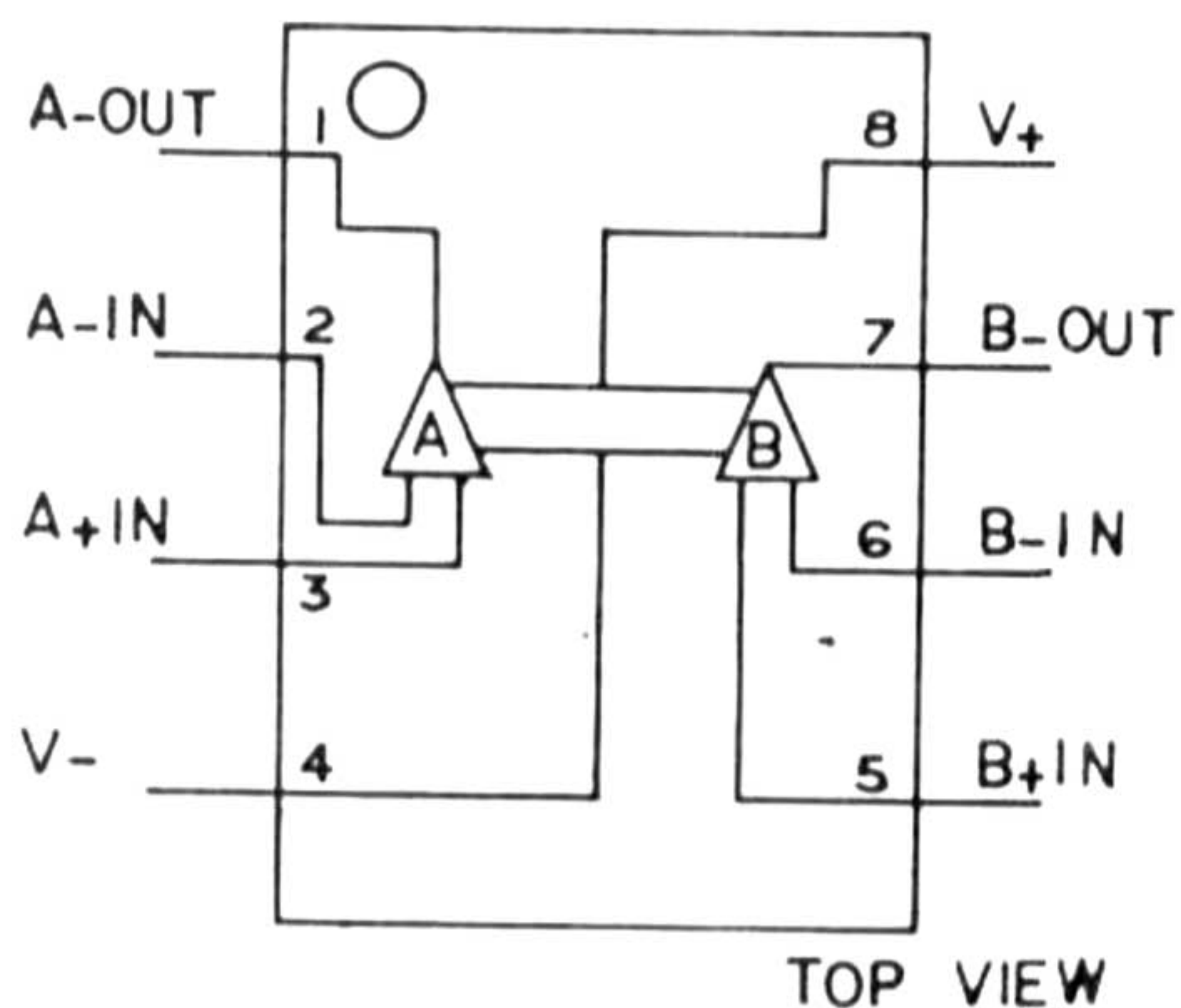
(14) IC INTERNAL DIAGRAM

NJM4558

SCHEMATIC DIAGRAM

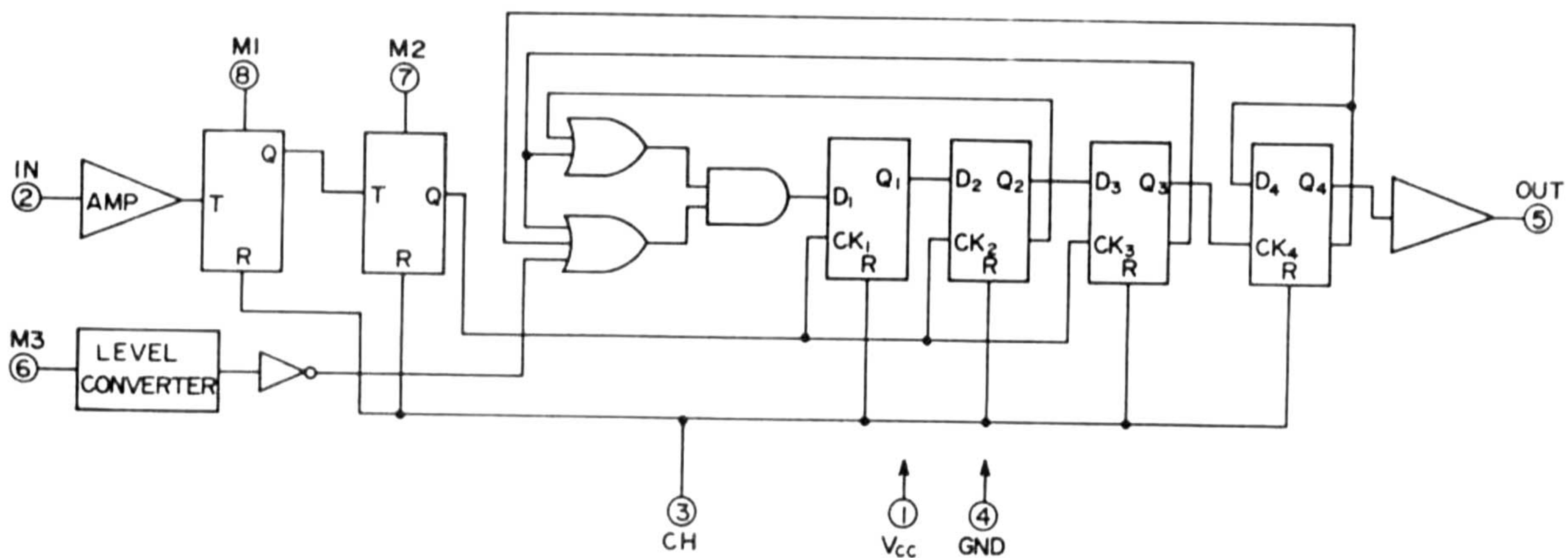


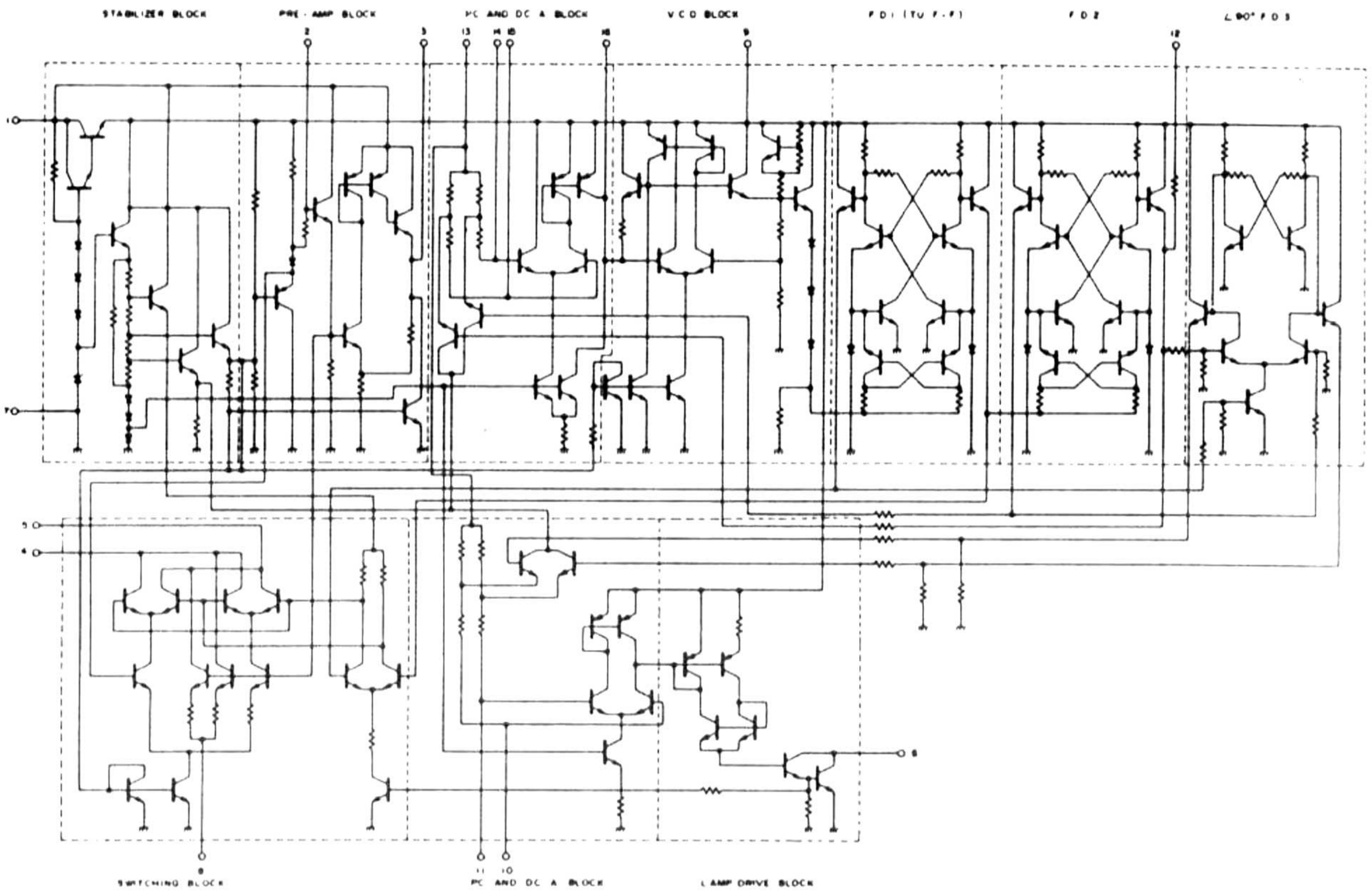
BLOCK DIAGRAM



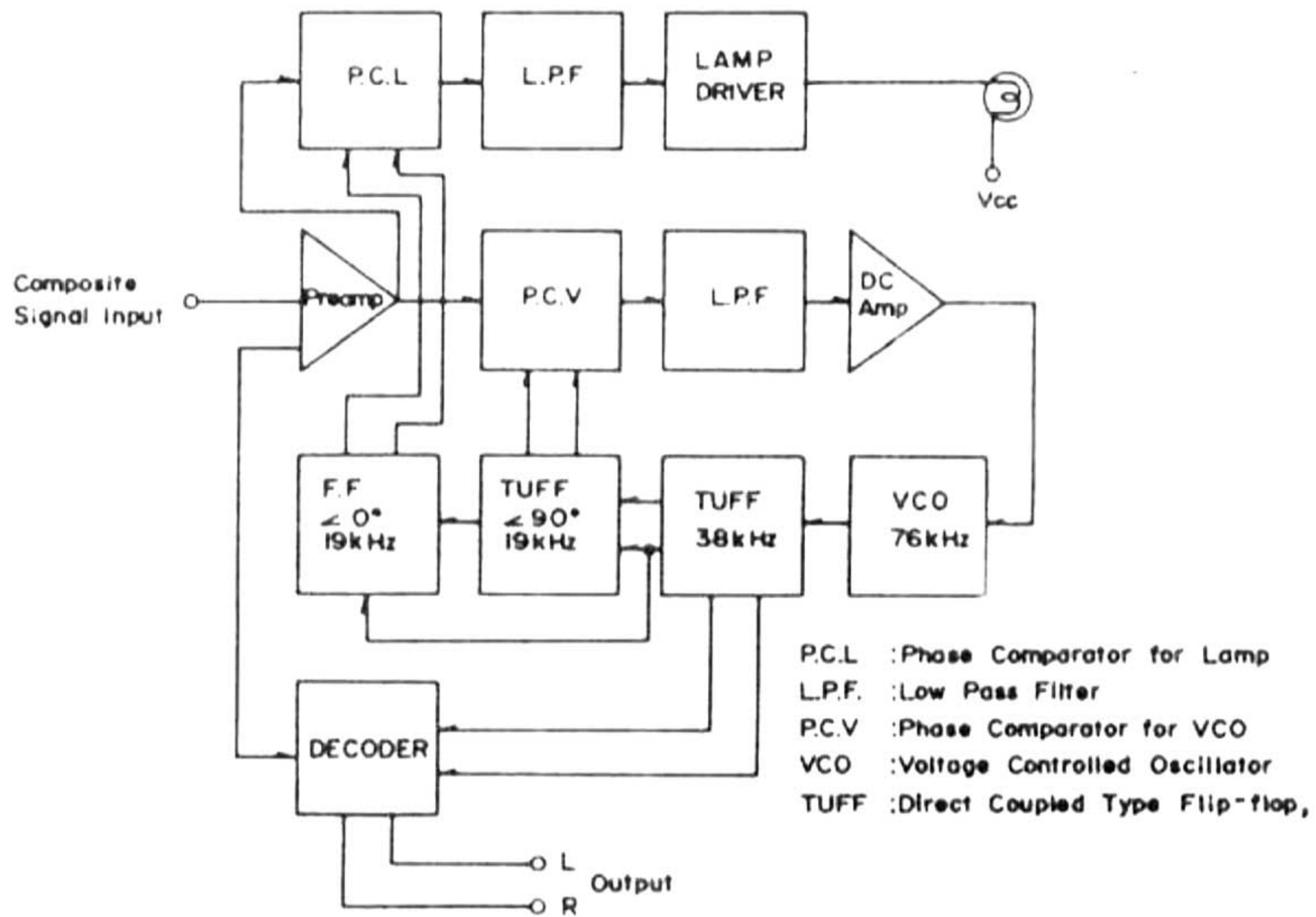
μPB551C

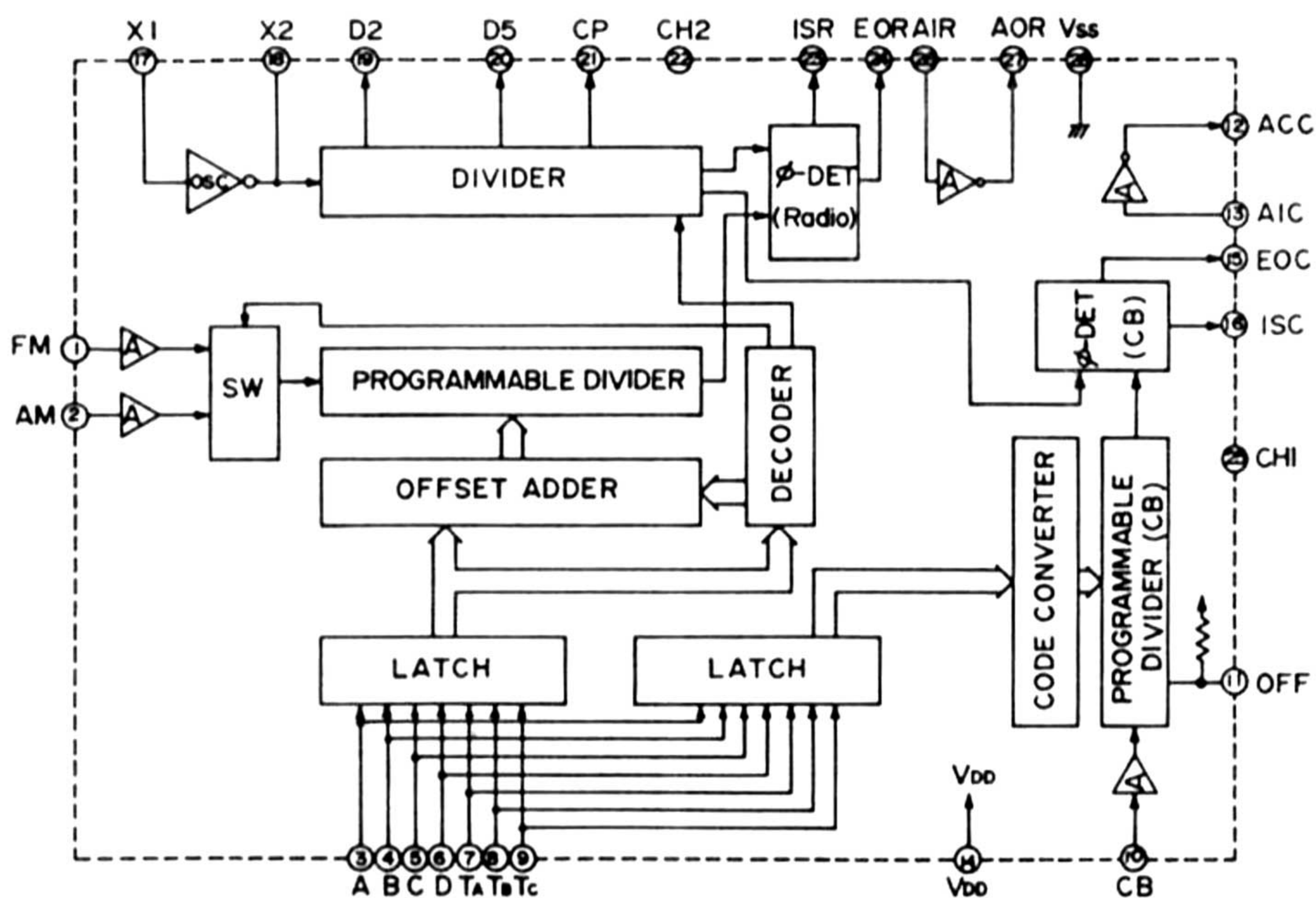
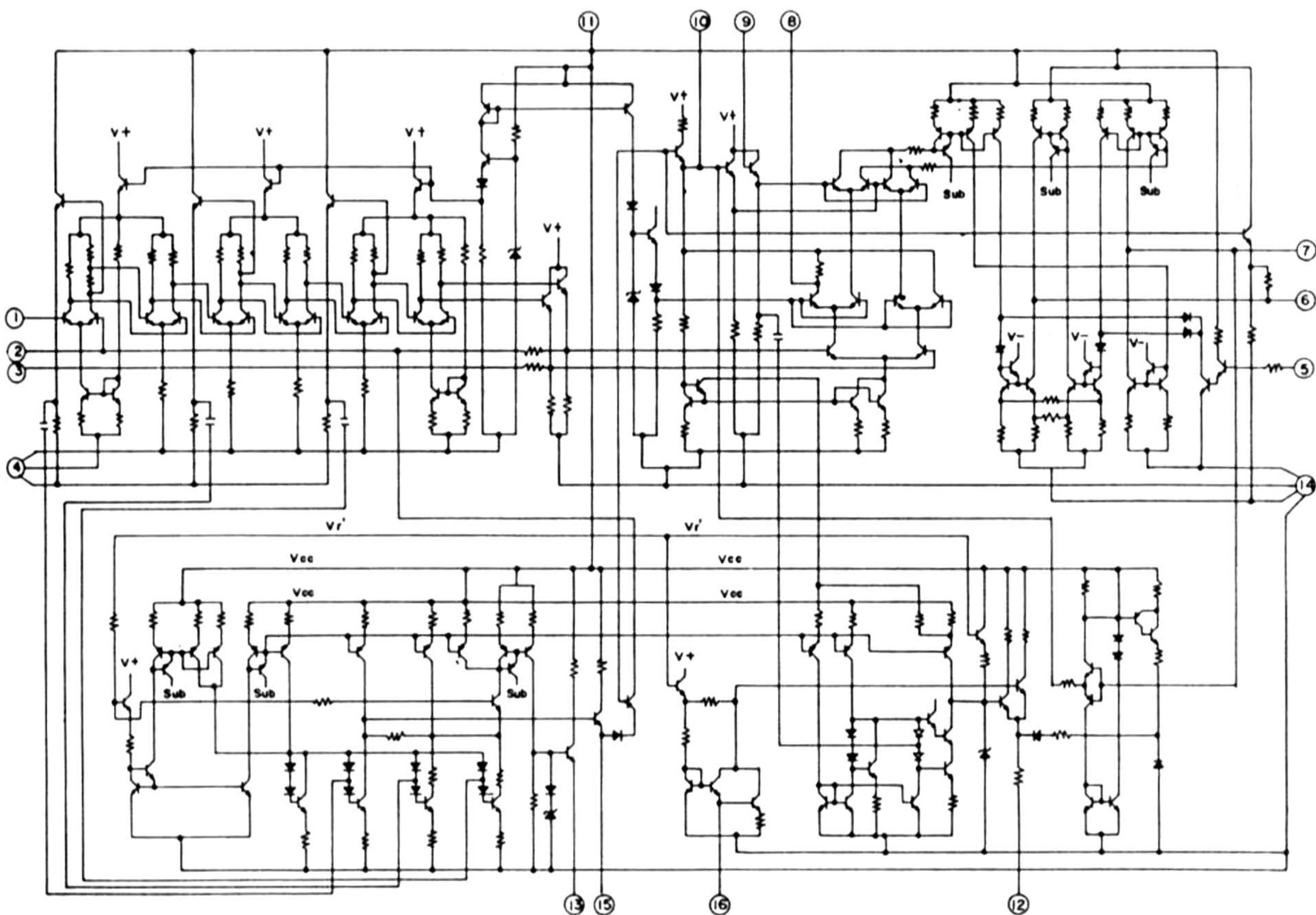
BLOCK DIAGRAM

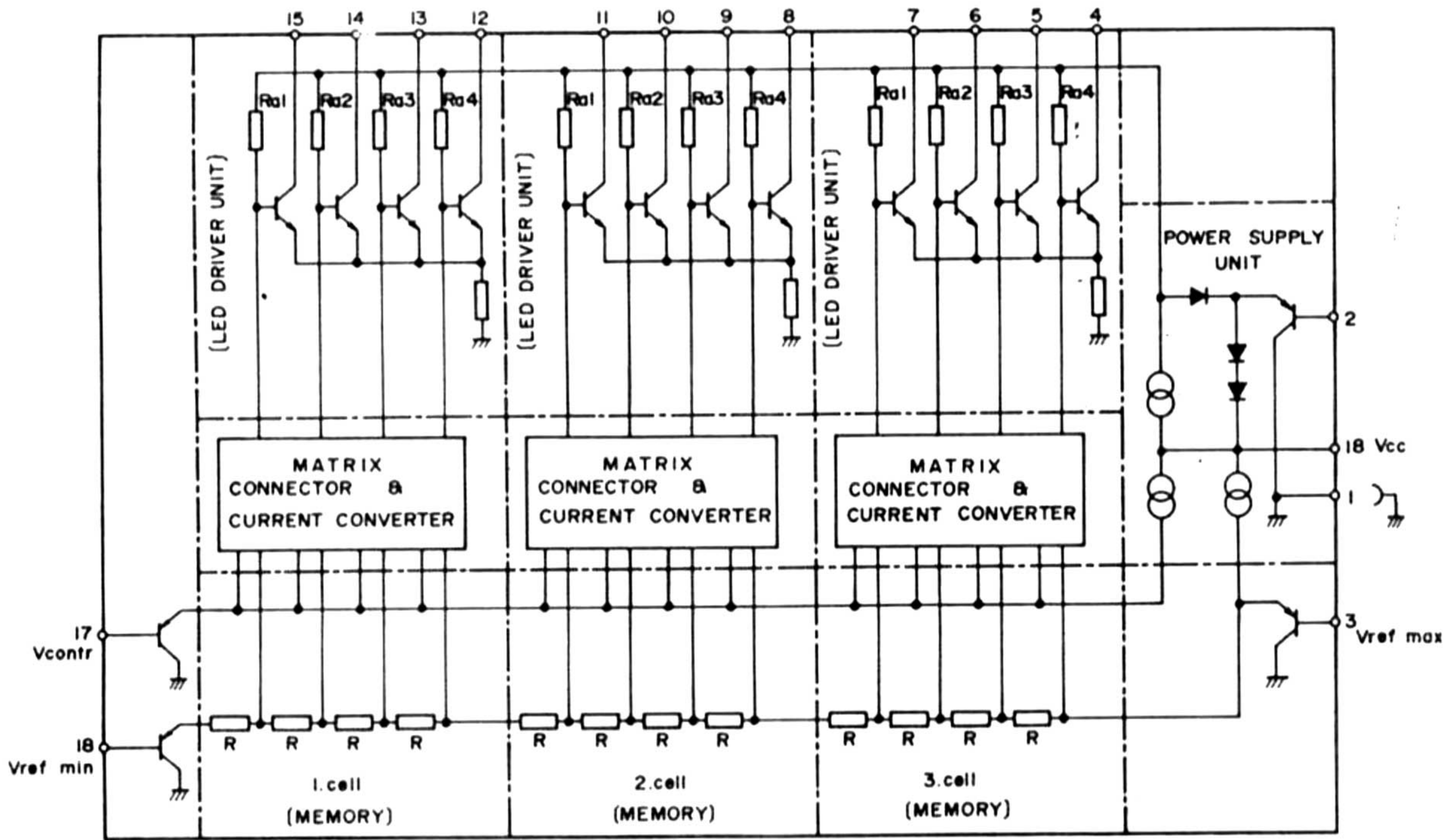




BLOCK DIAGRAM

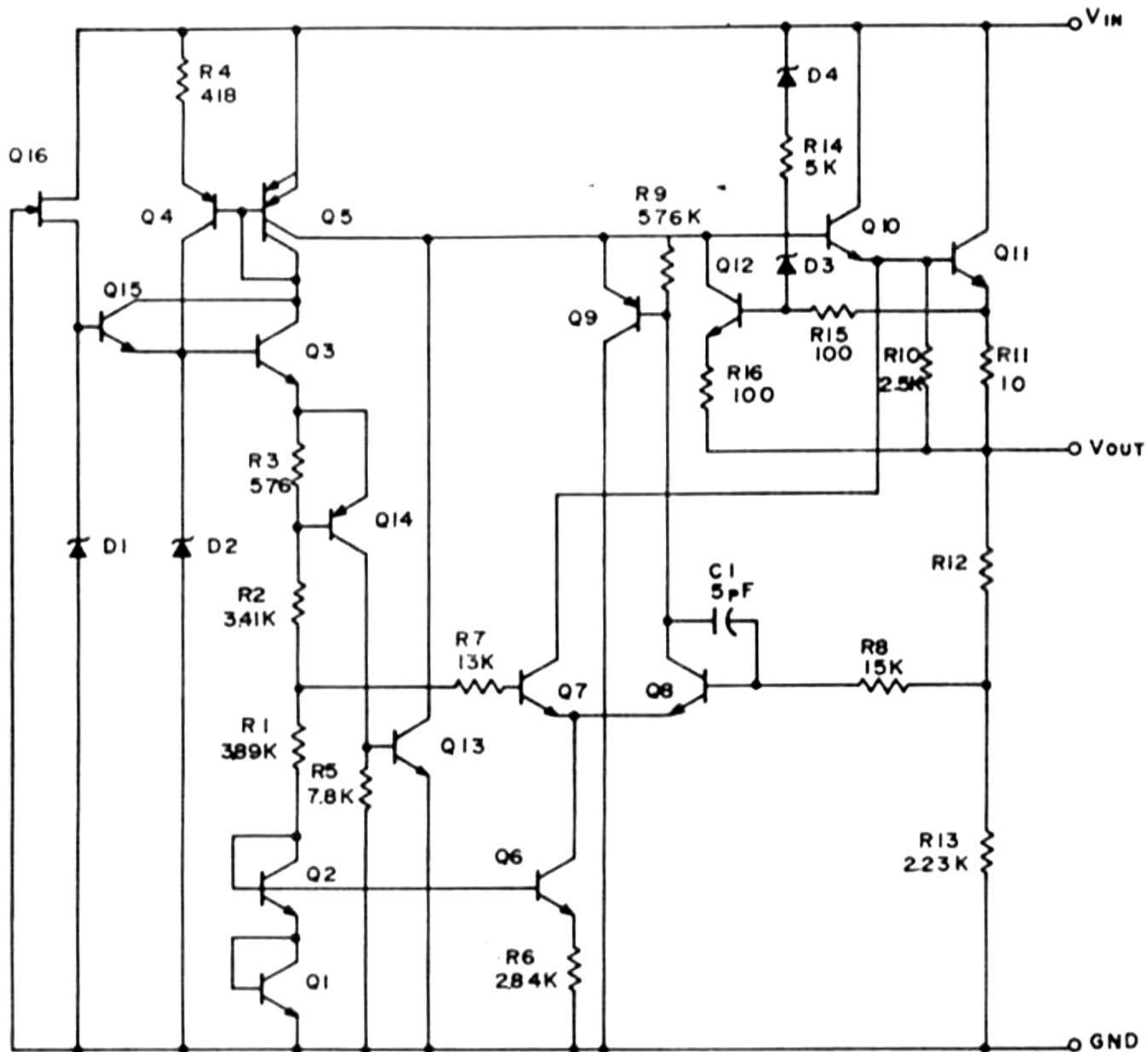






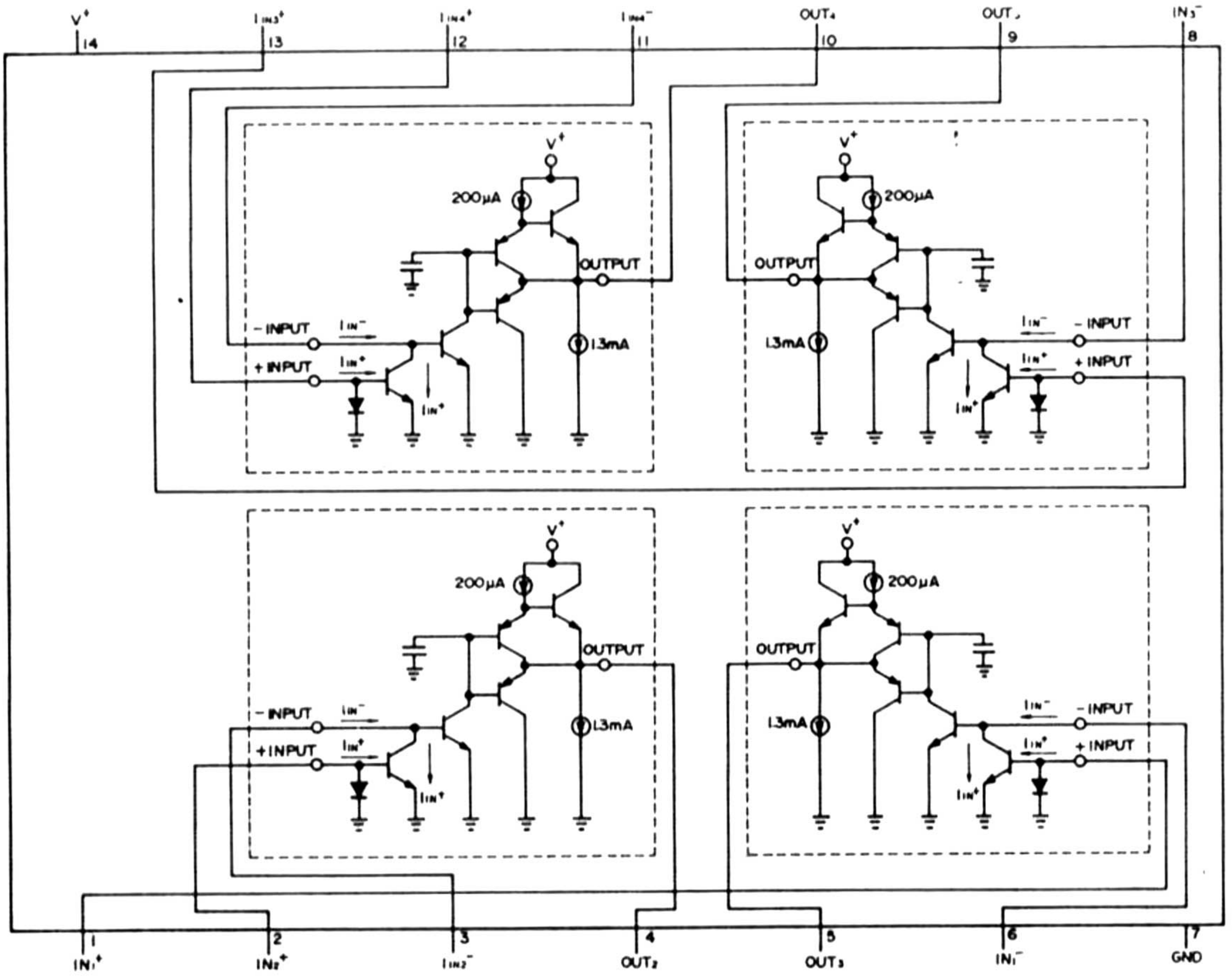
LM-78L05ACZ
LM-78L08ACZ

SCHEMATIC DIAGRAM



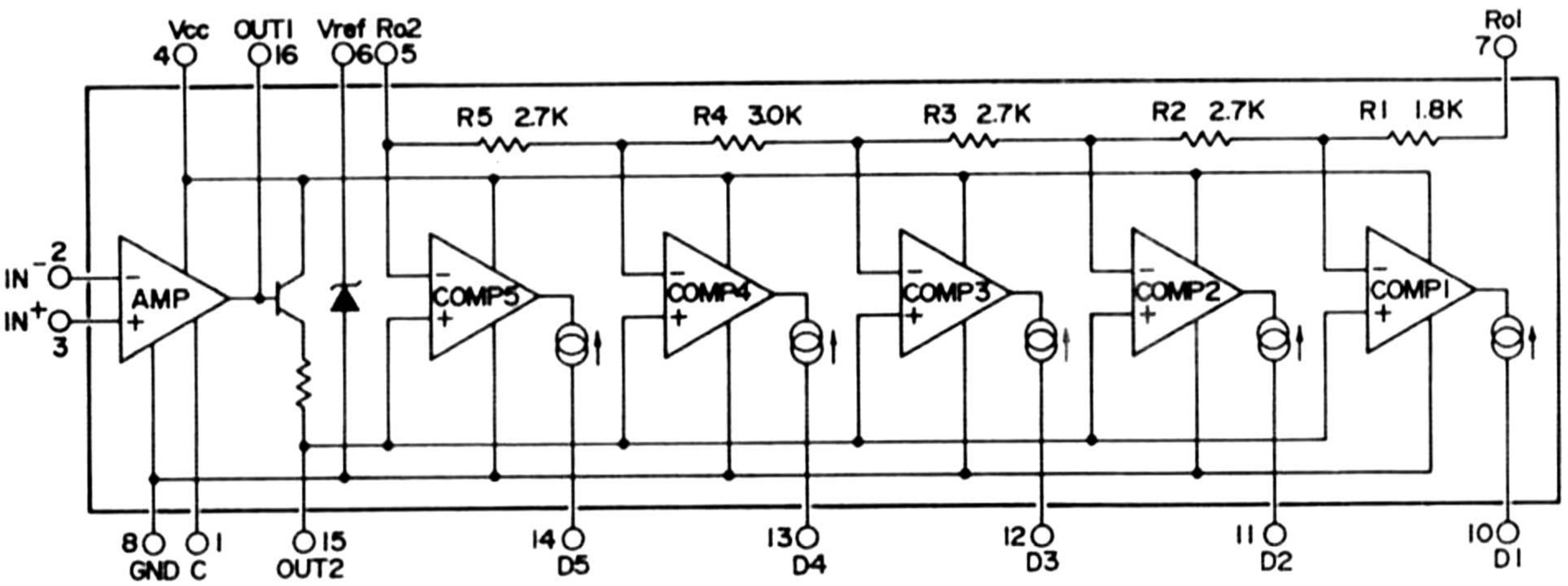
LM3900

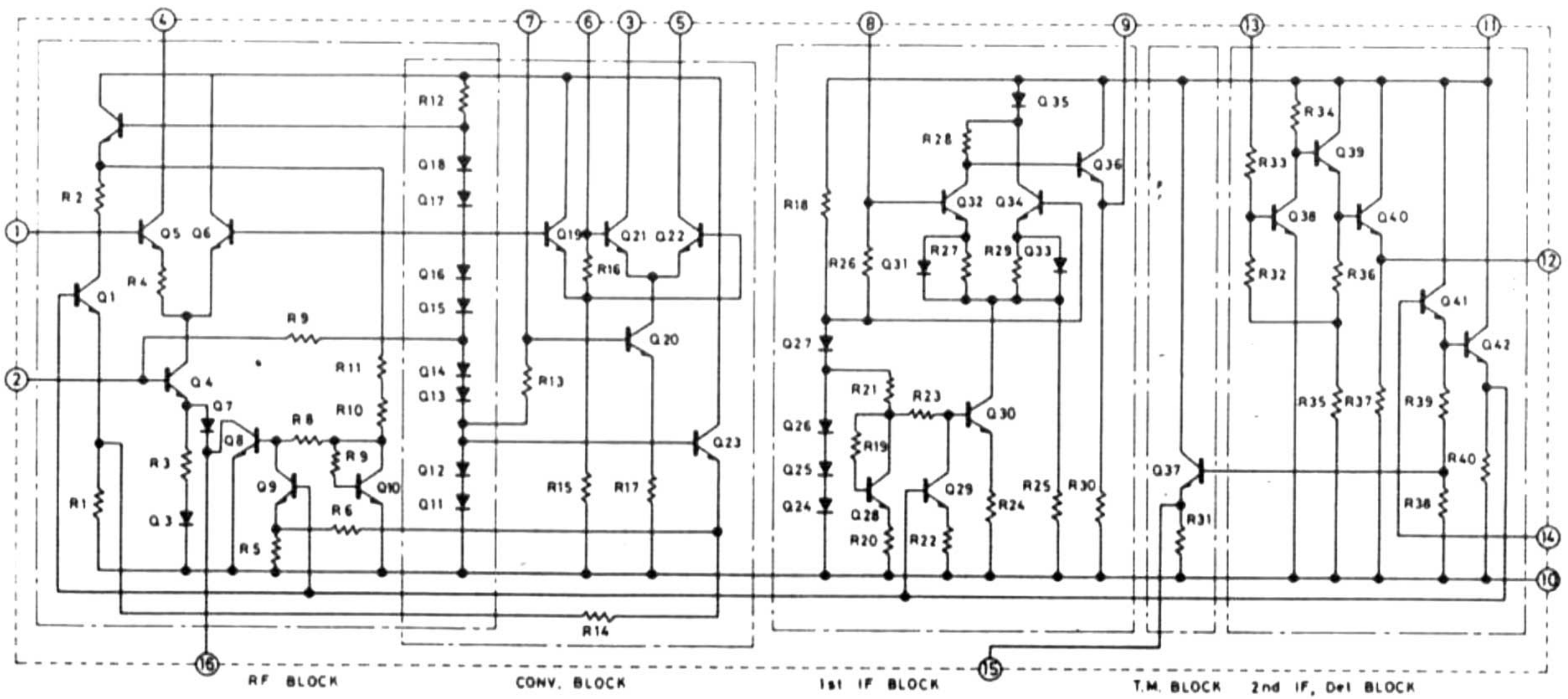
SCHEMATIC DIAGRAM



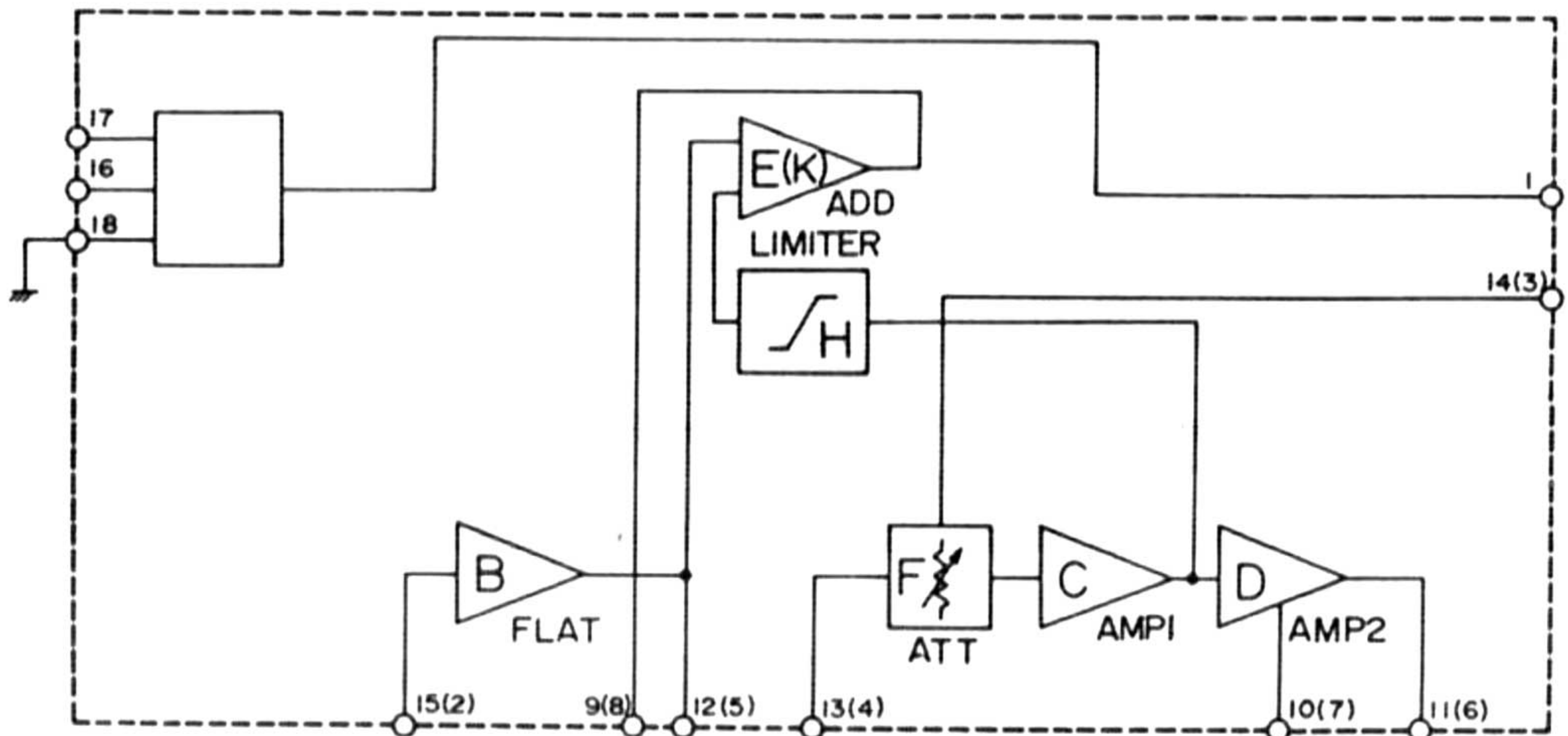
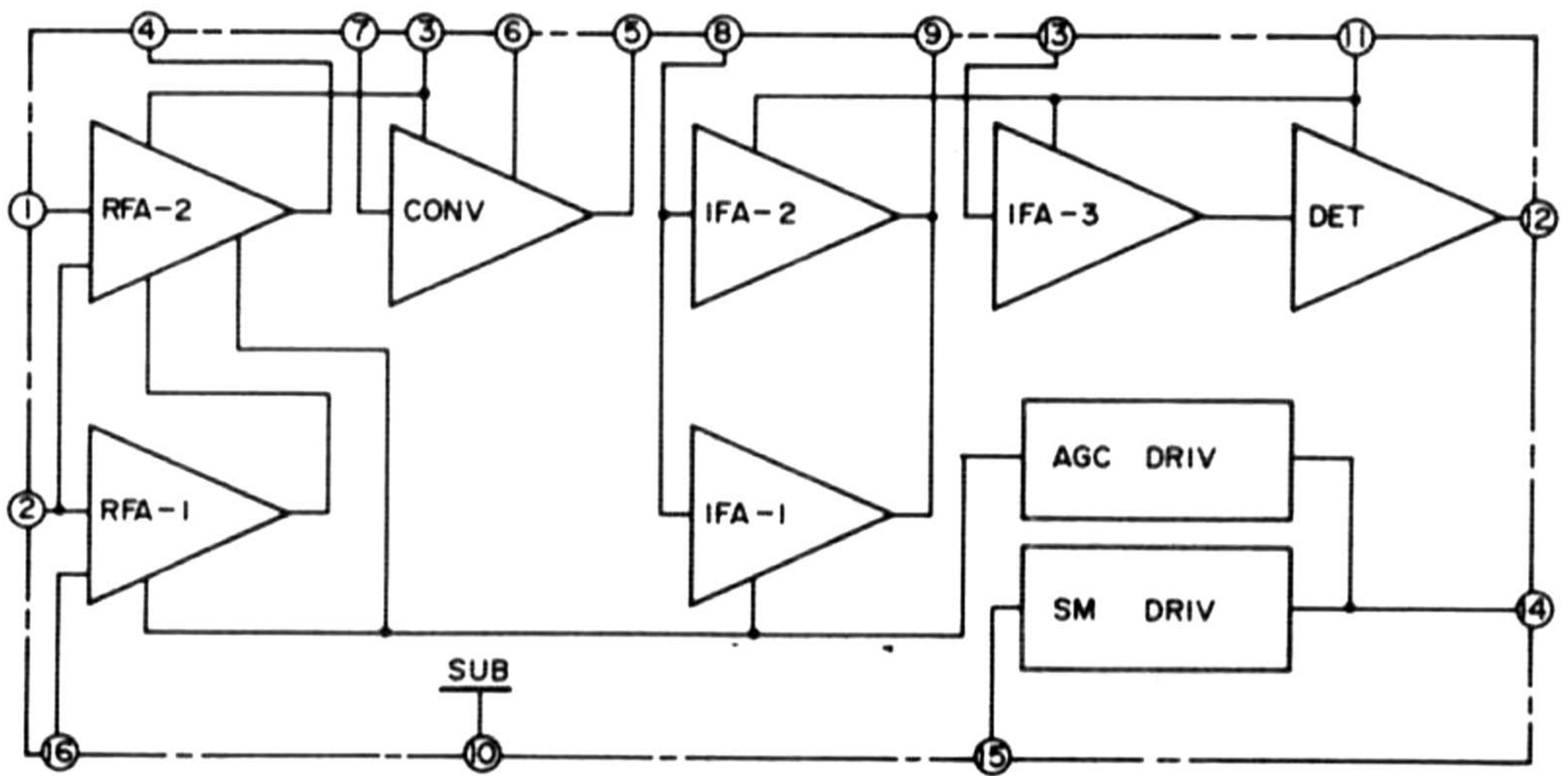
LB1405

SCHEMATIC DIAGRAM

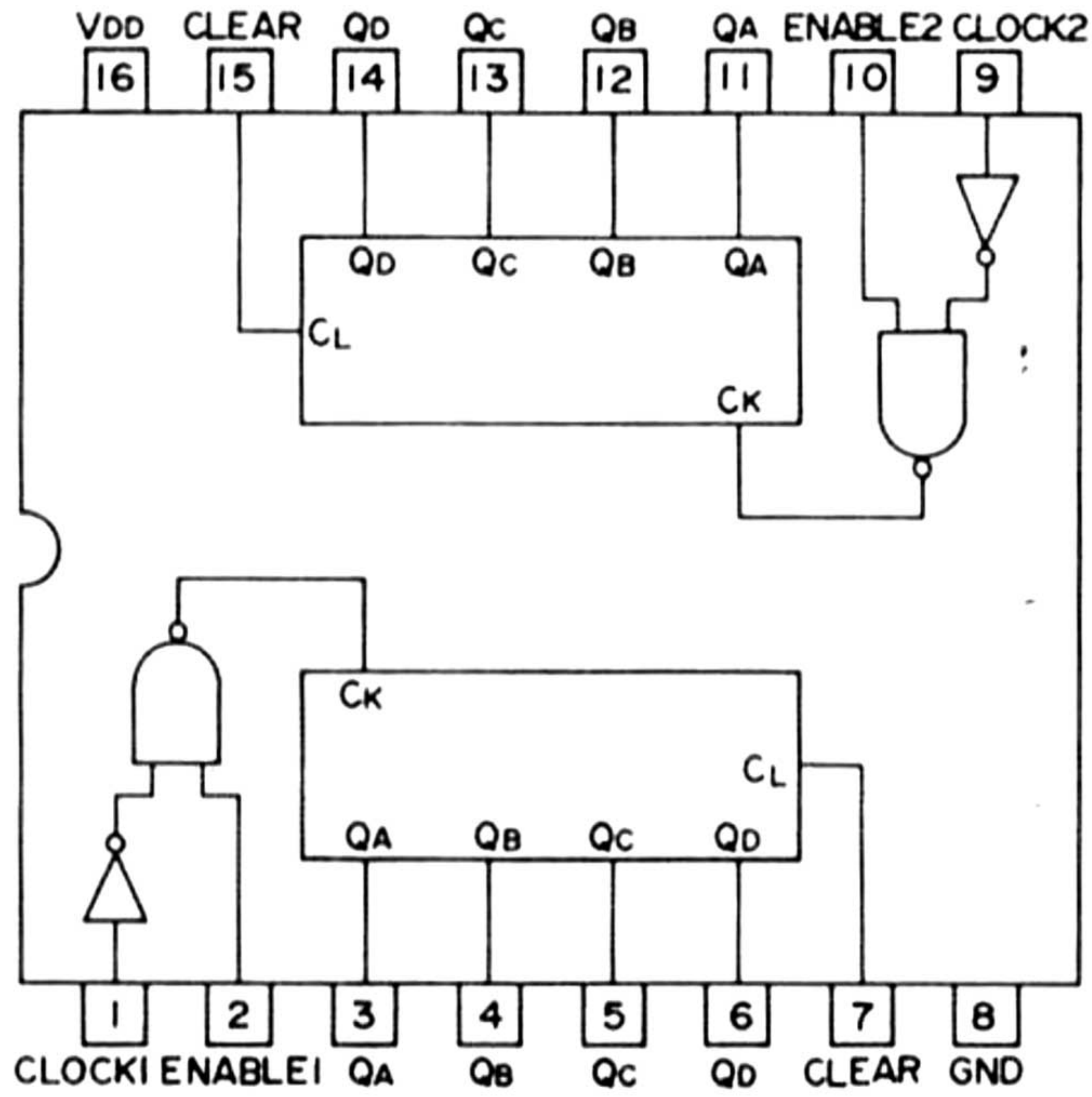




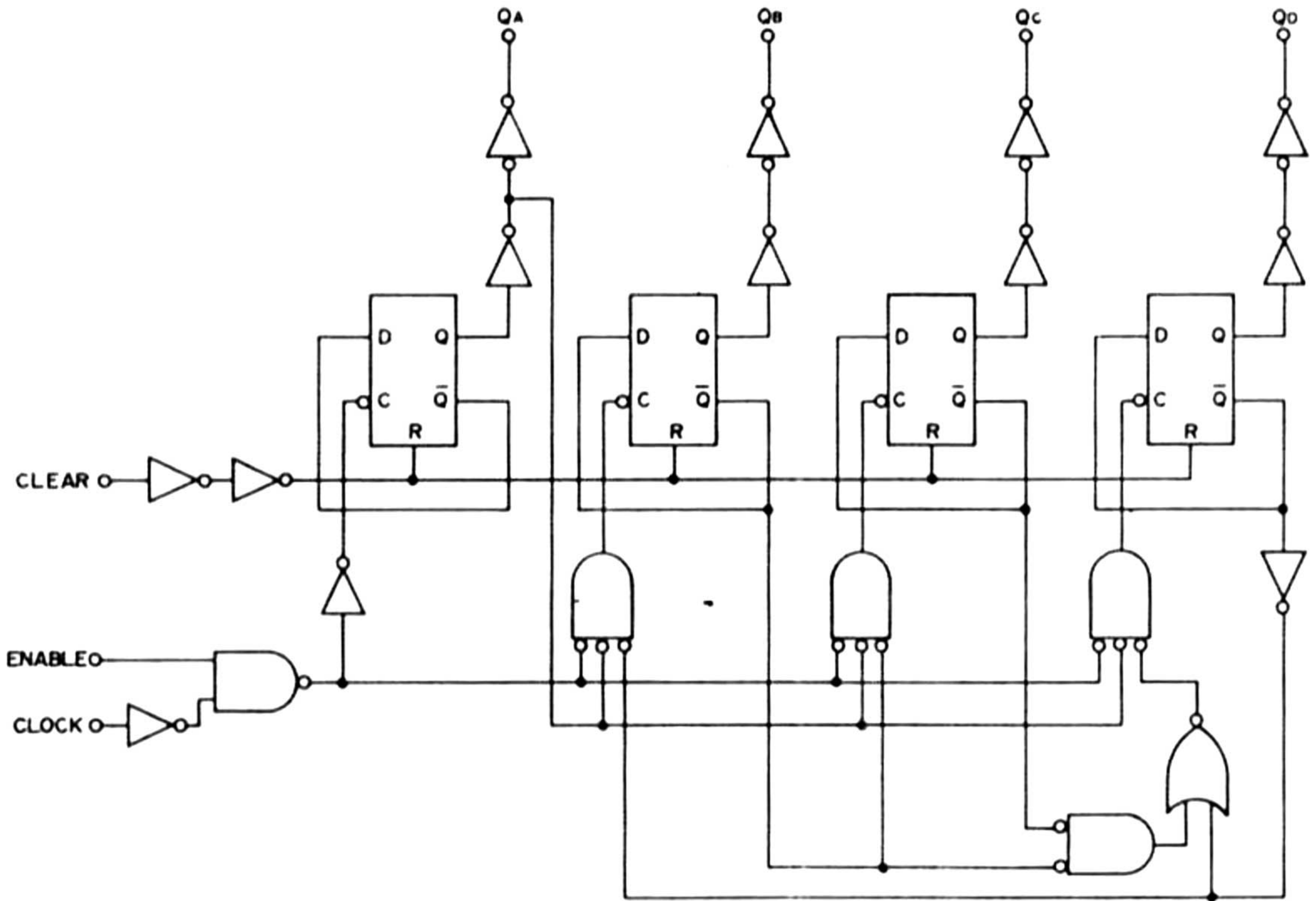
BLOCK DIAGRAM



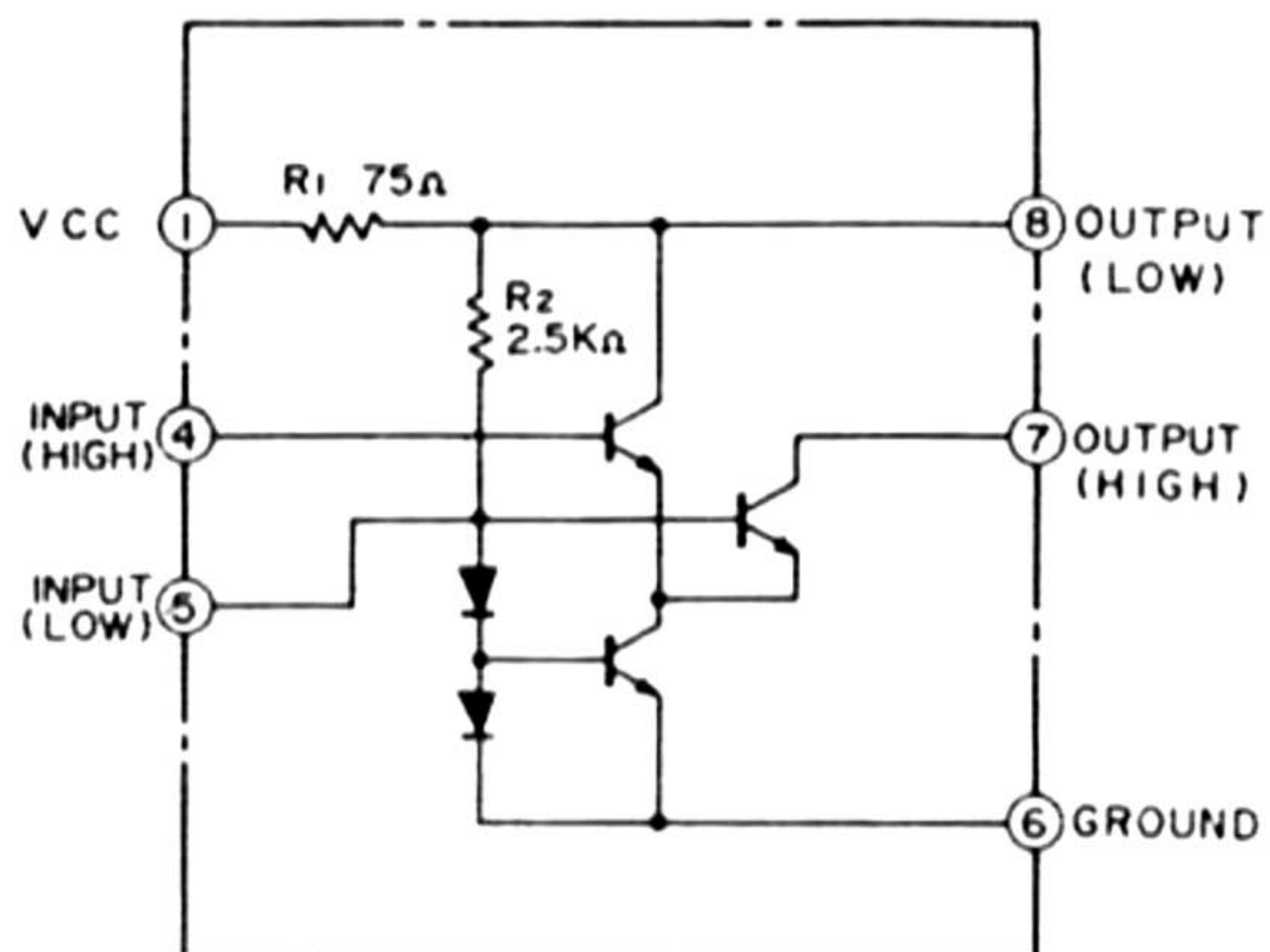
SCHMATIC DIAGRAM

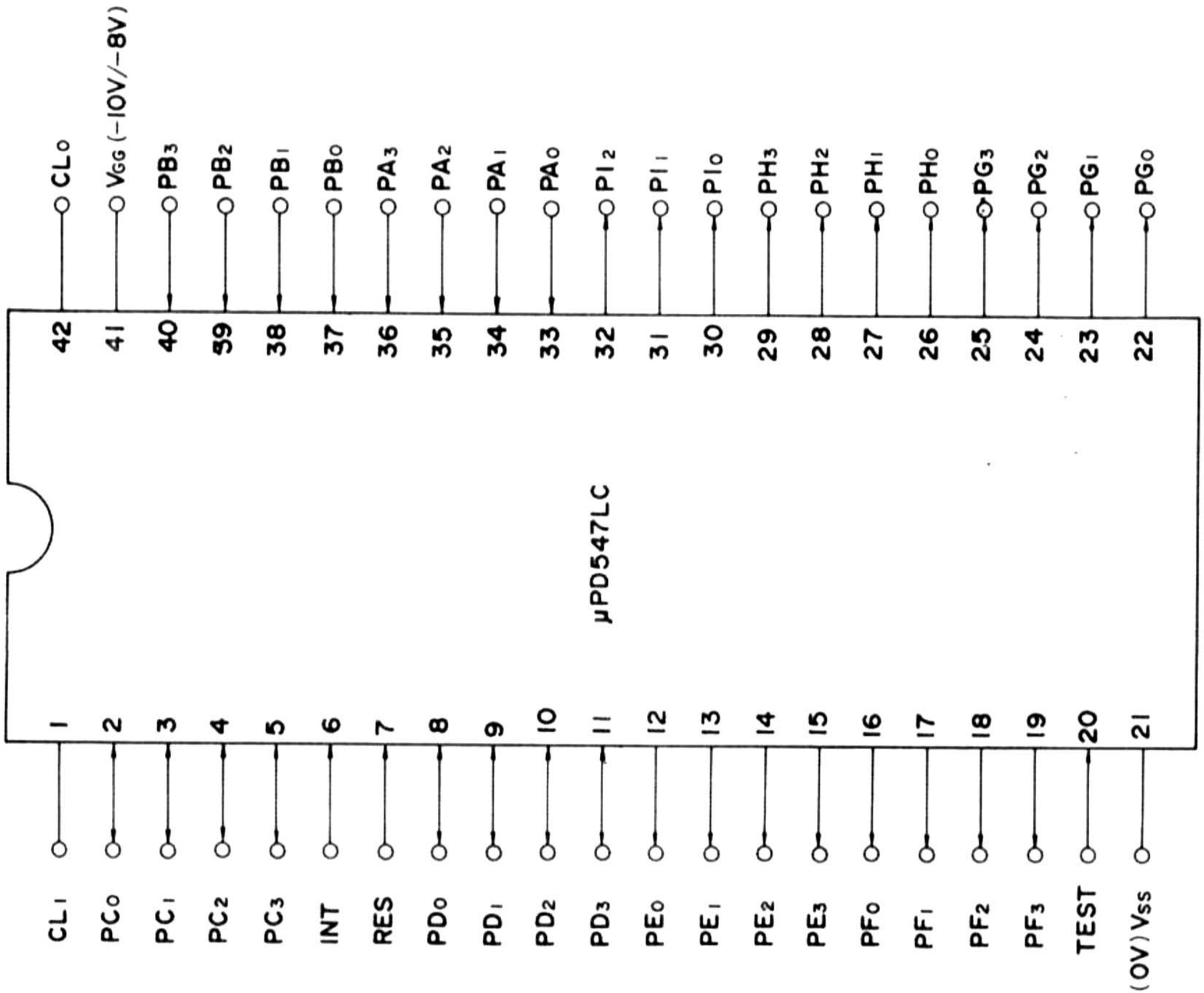


BLOCK DIAGRAM' (1/2 Circuit)

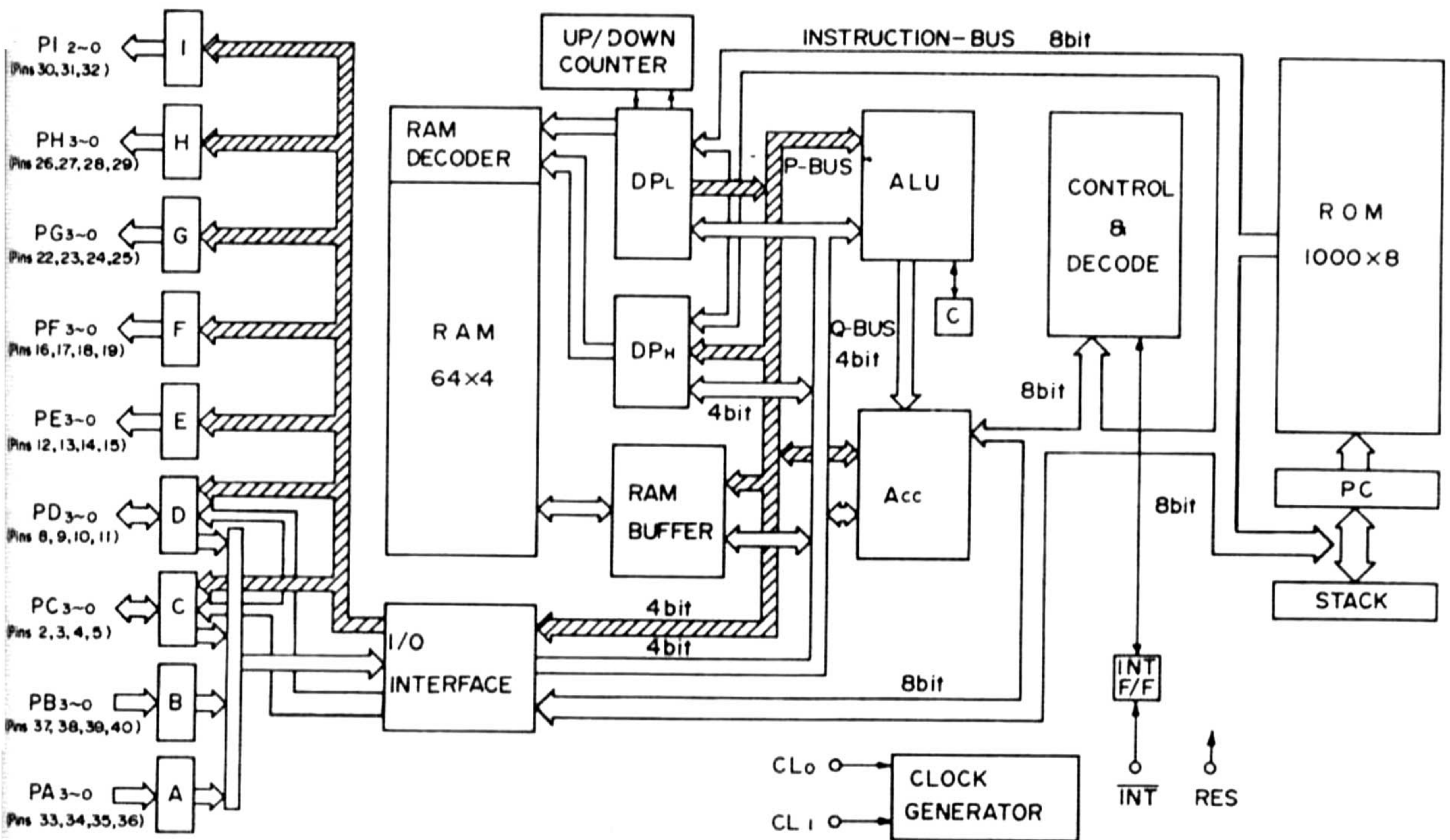


HA1211





BLOCK DIAGRAM

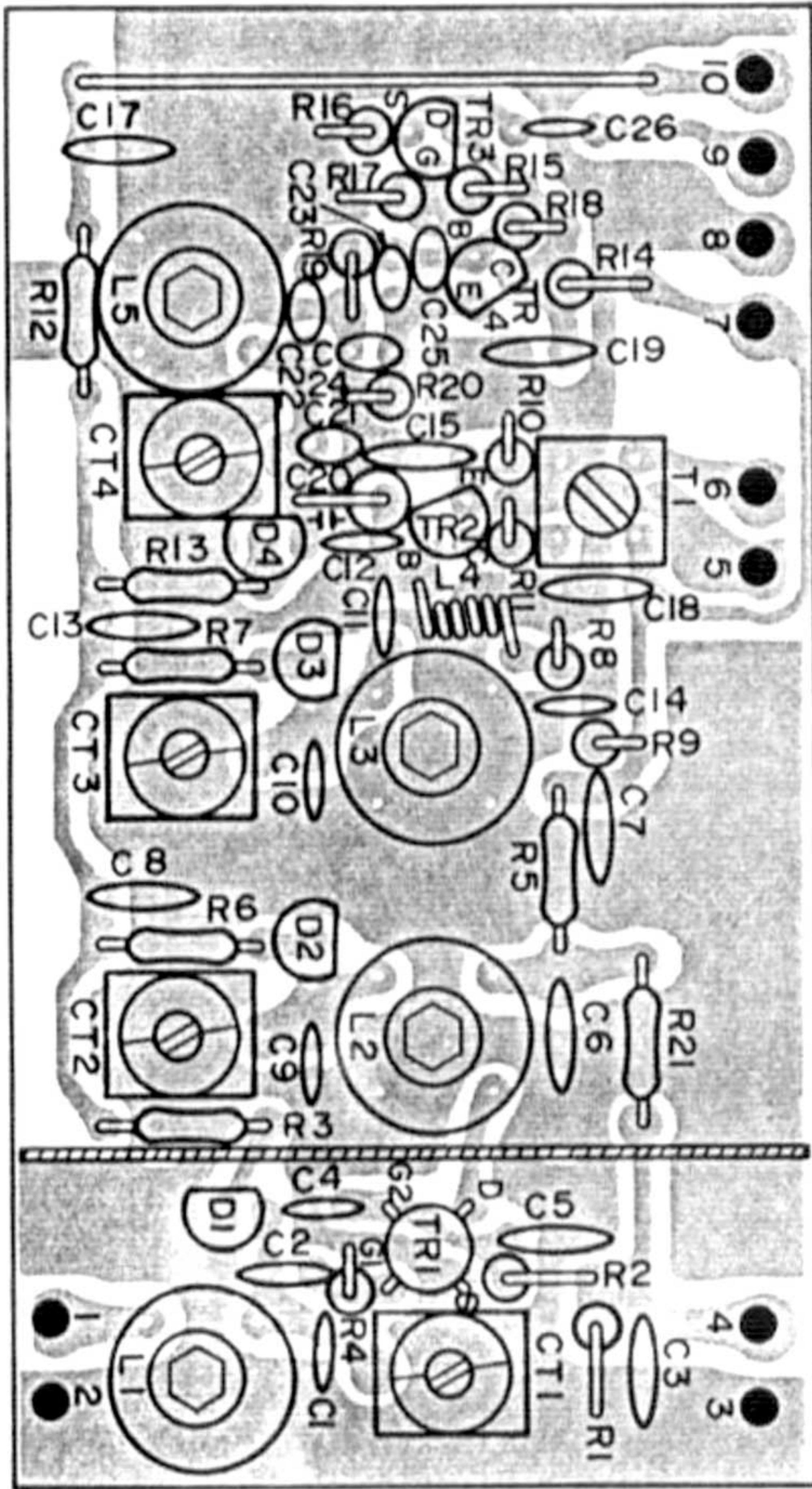


DP: DATA POINT
 ALU: ARITHMETIC AND LOGIC UNIT
 Acc: ACCUMULATOR
 PC: PROGRAM COUNTER
 C: CARRY FLIP/FLOP

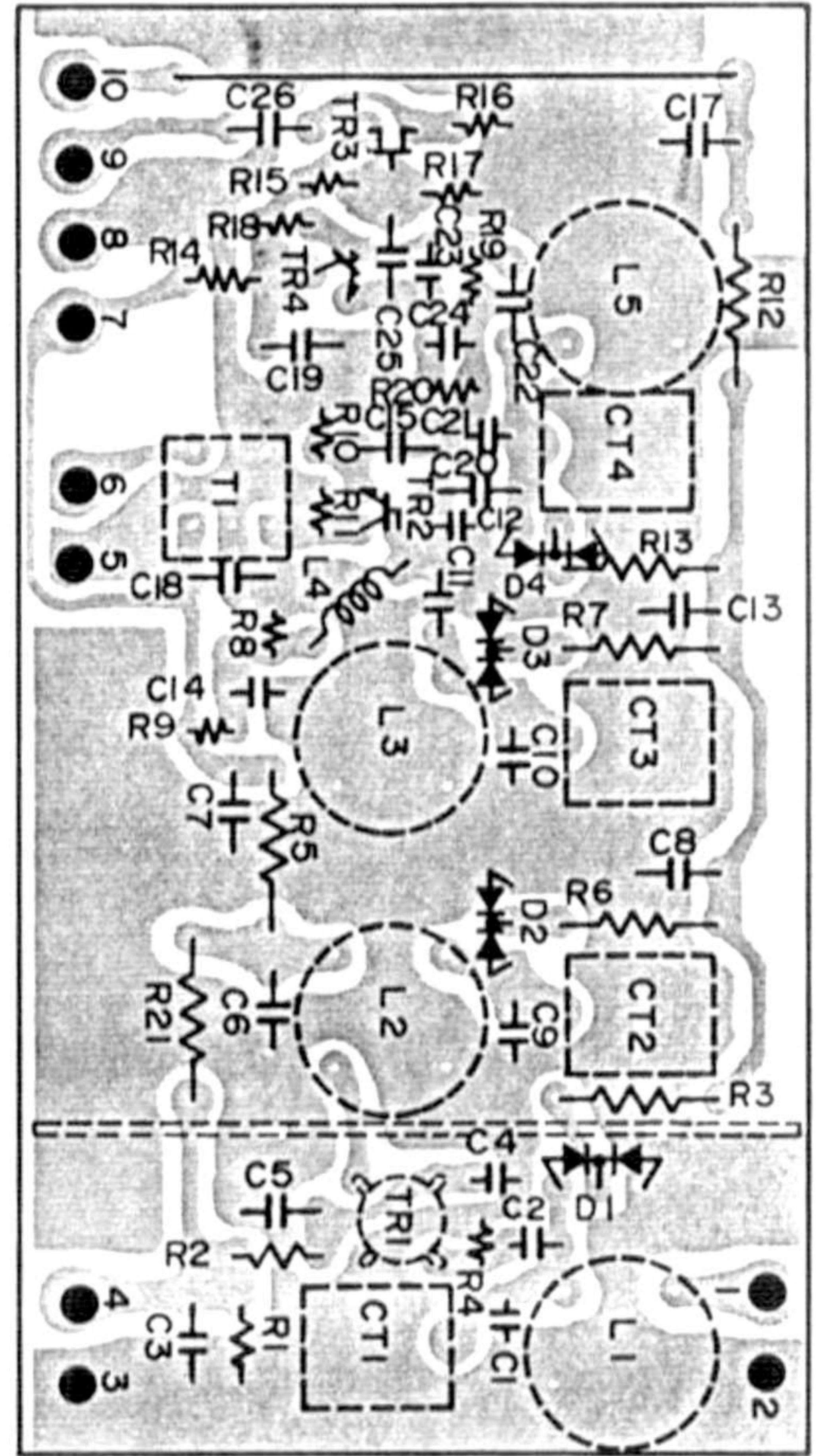
I/O: Input/Output
 ROM: READ-ONLY MEMORY
 RAM: RANDOM ACCESS MEMORY

(15) FM FRONT END P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

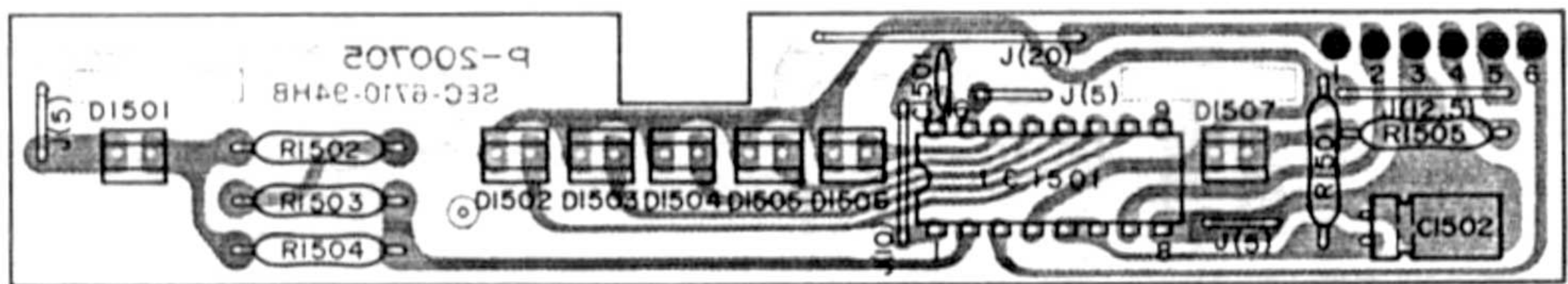


BOTTOM VIEW

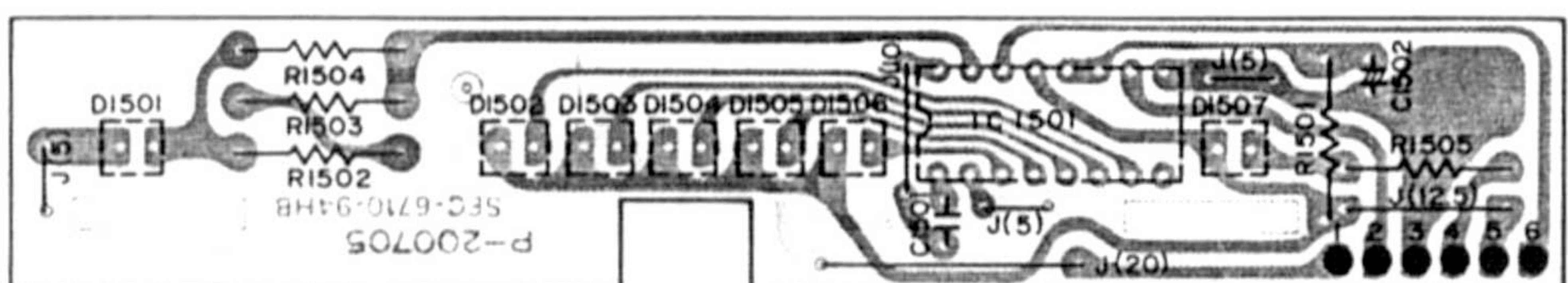


(16) SIGNAL METER P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

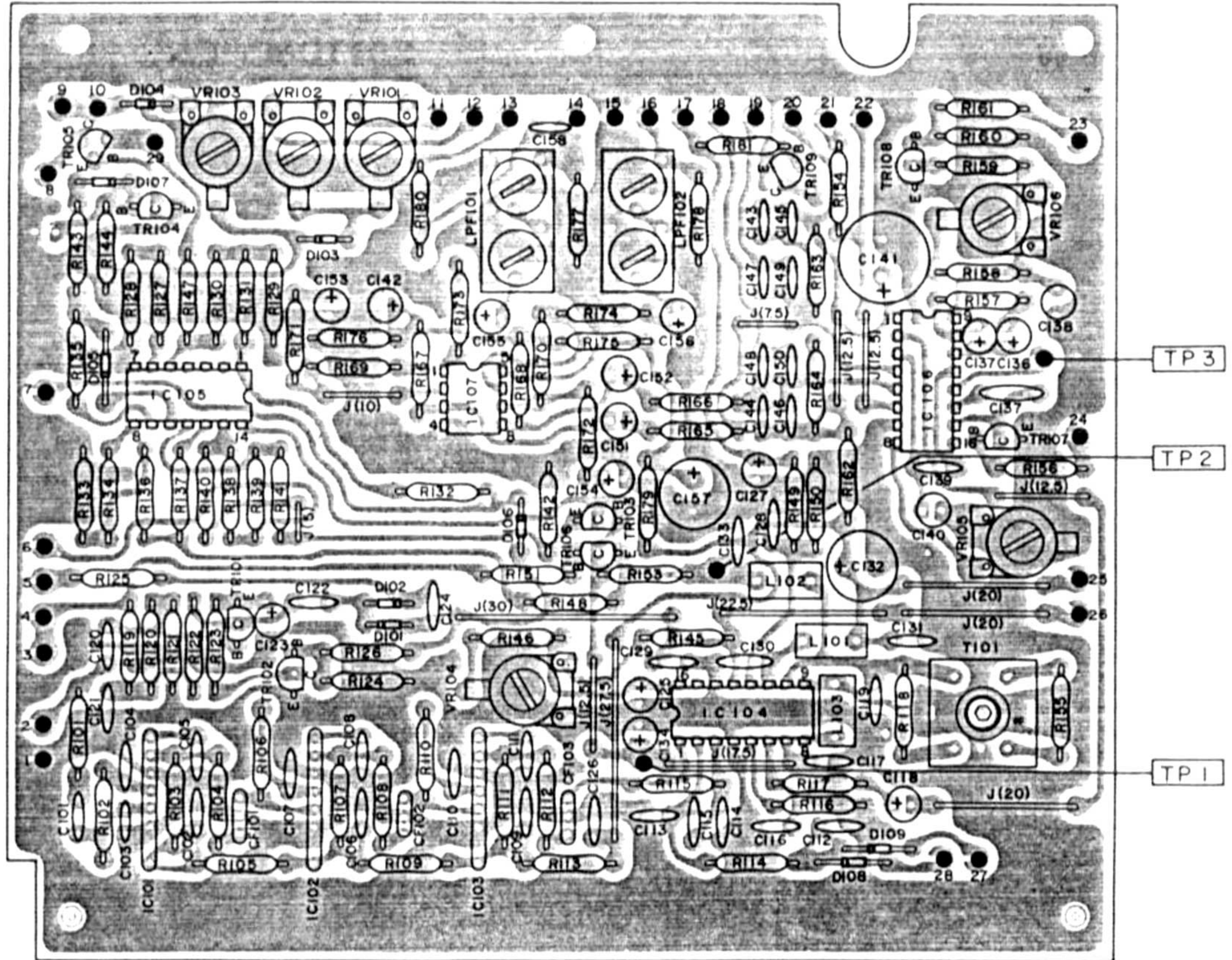


BOTTOM VIEW

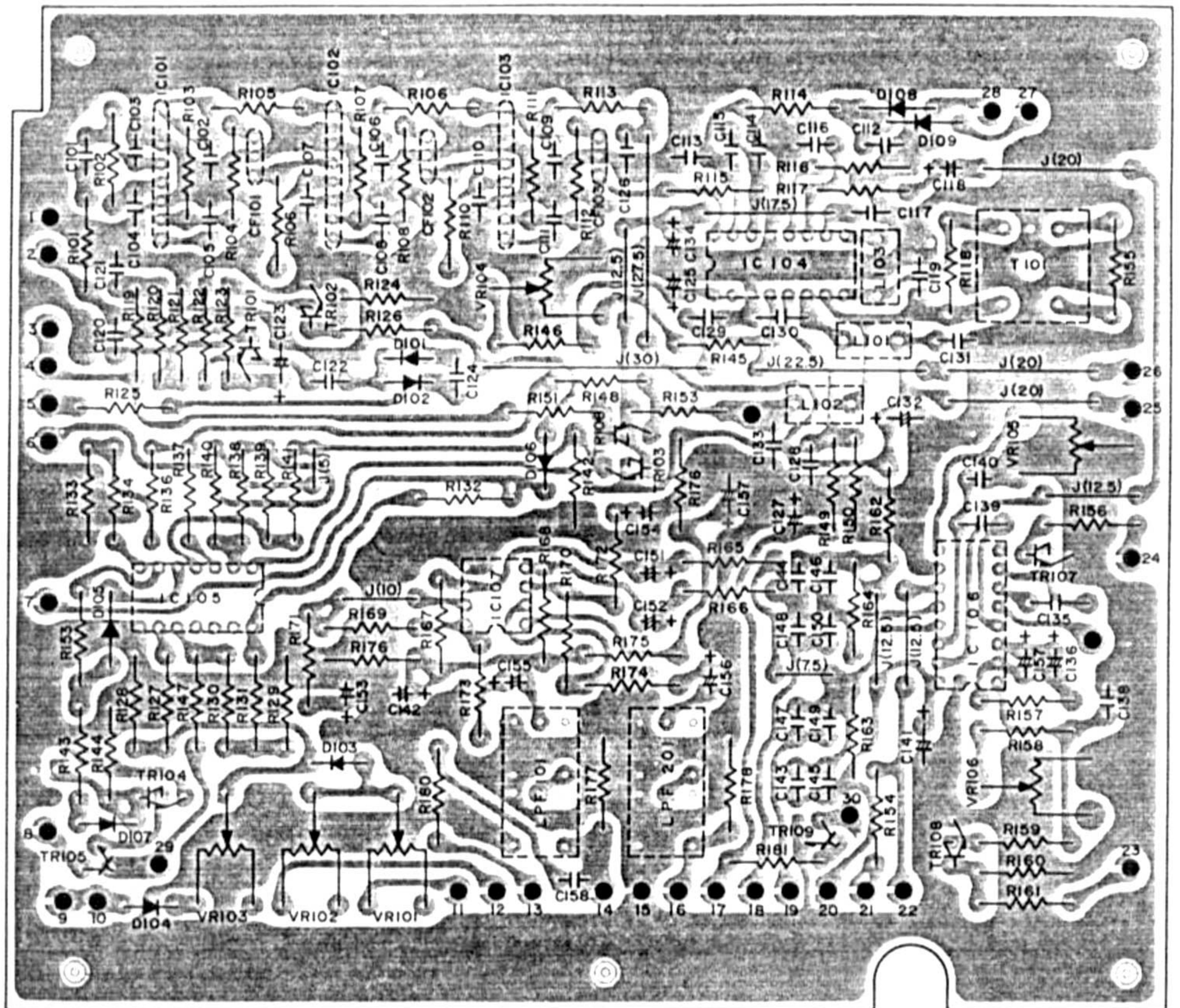


(17) FM IF & MPX P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

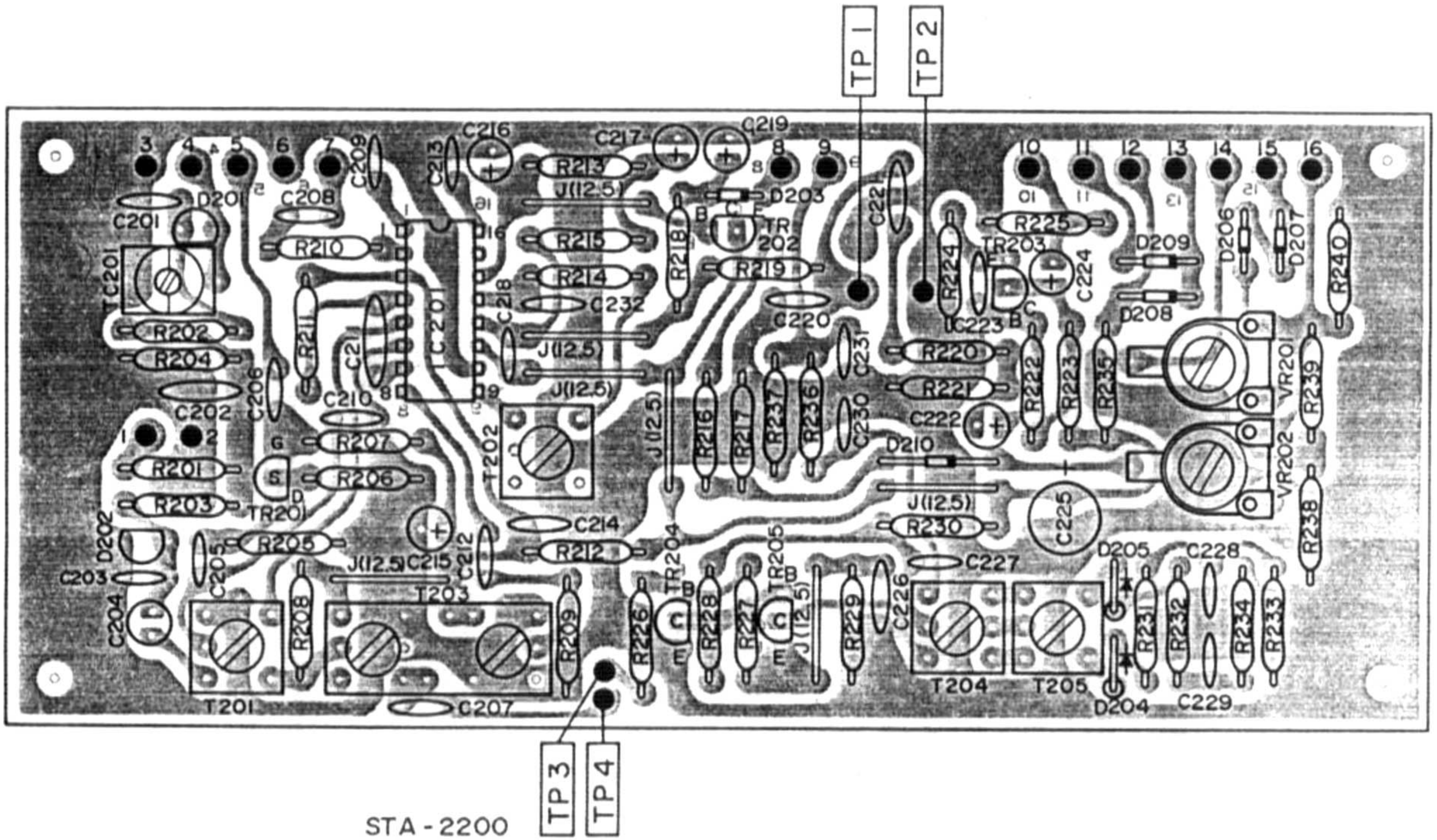


BOTTOM VIEW

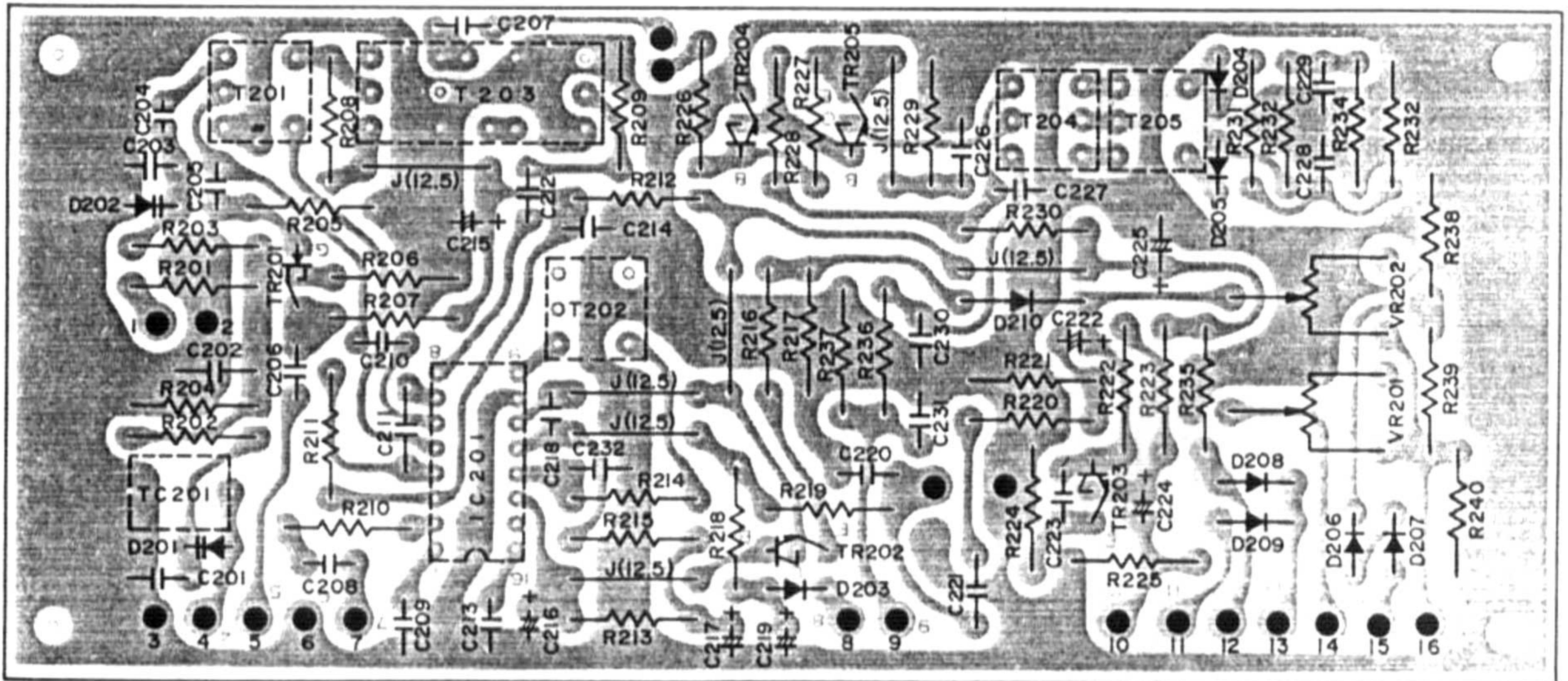


(18) AM RF & IF P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

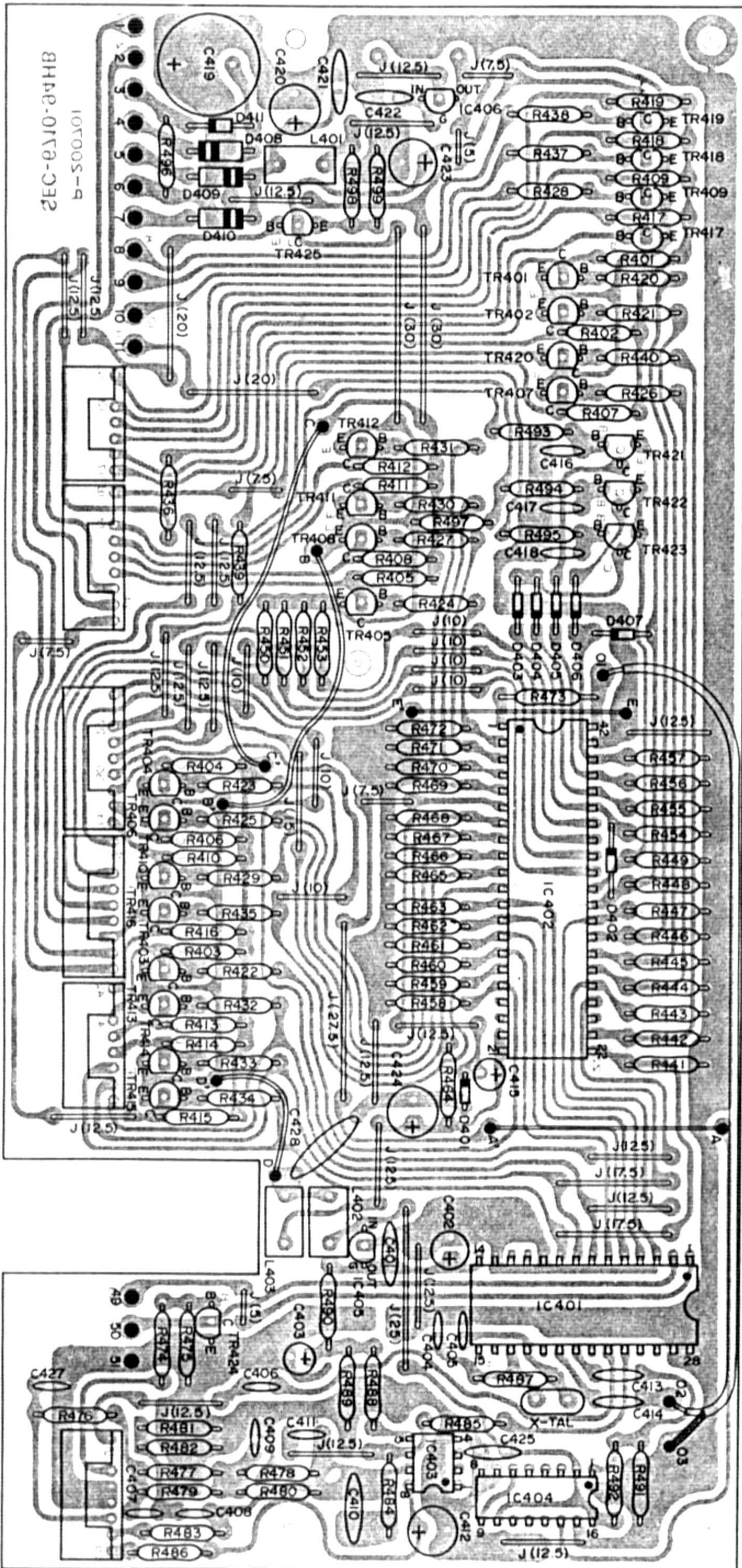


BOTTOM VIEW

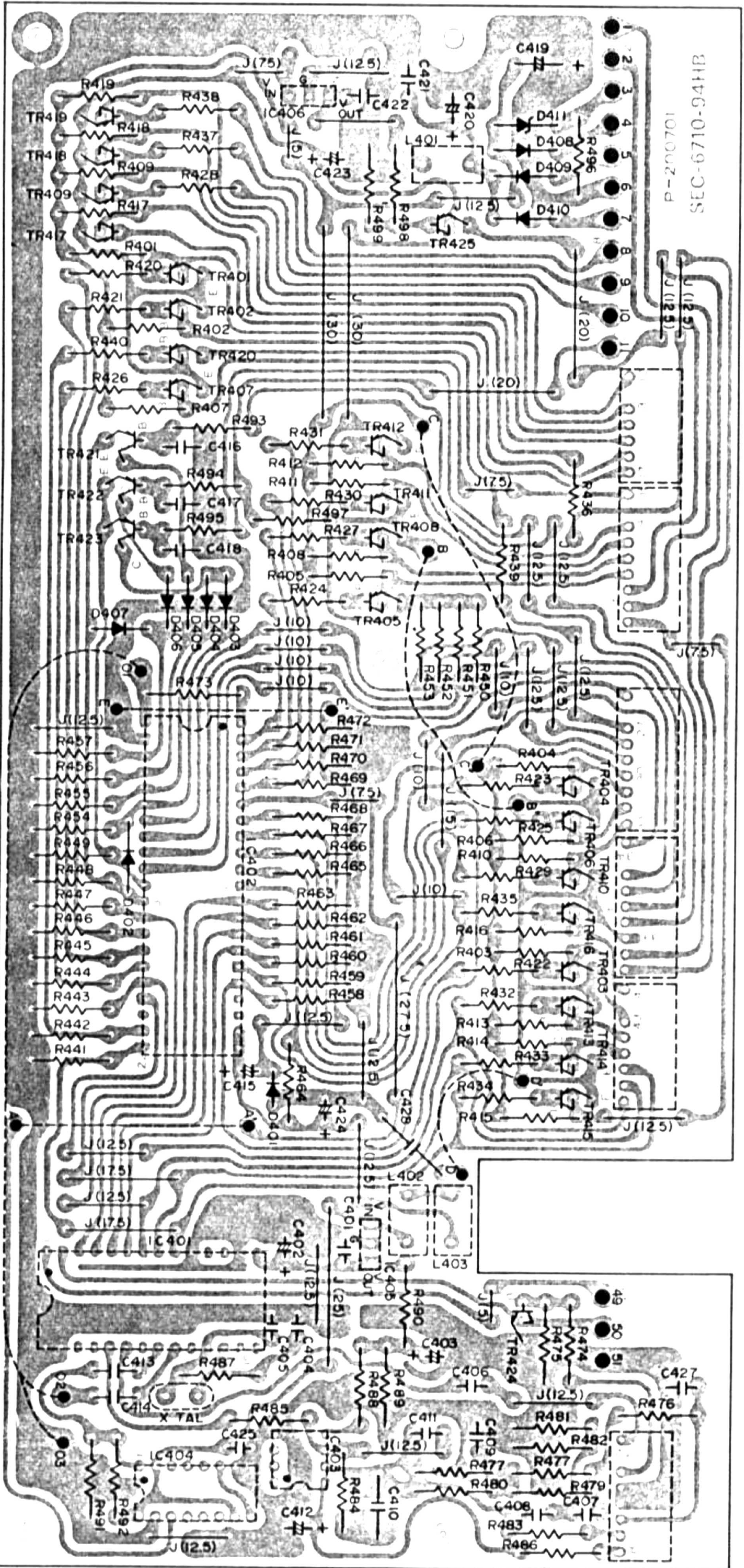


(19) CONTROLLER P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW



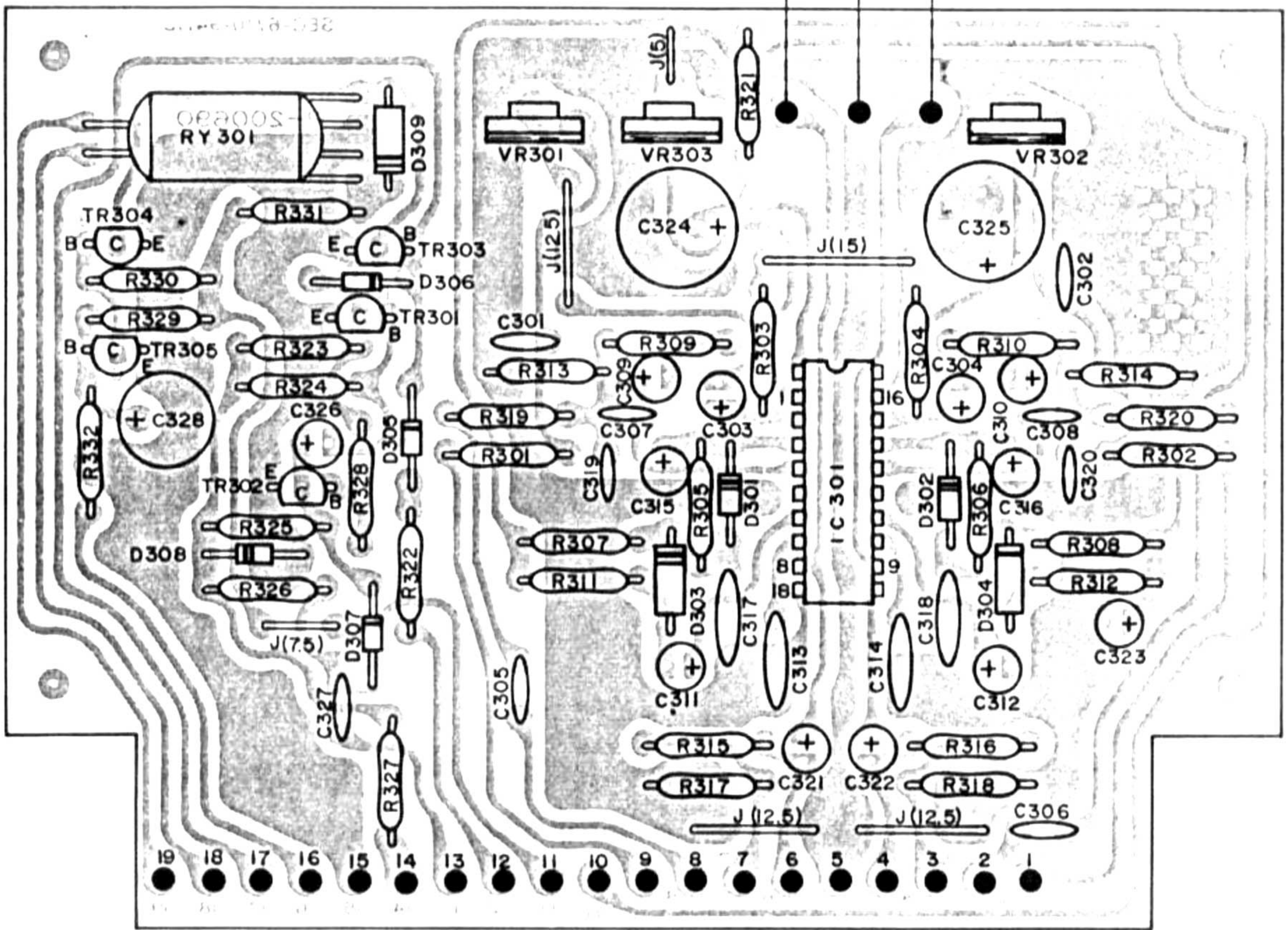
BOTTOM VIEW



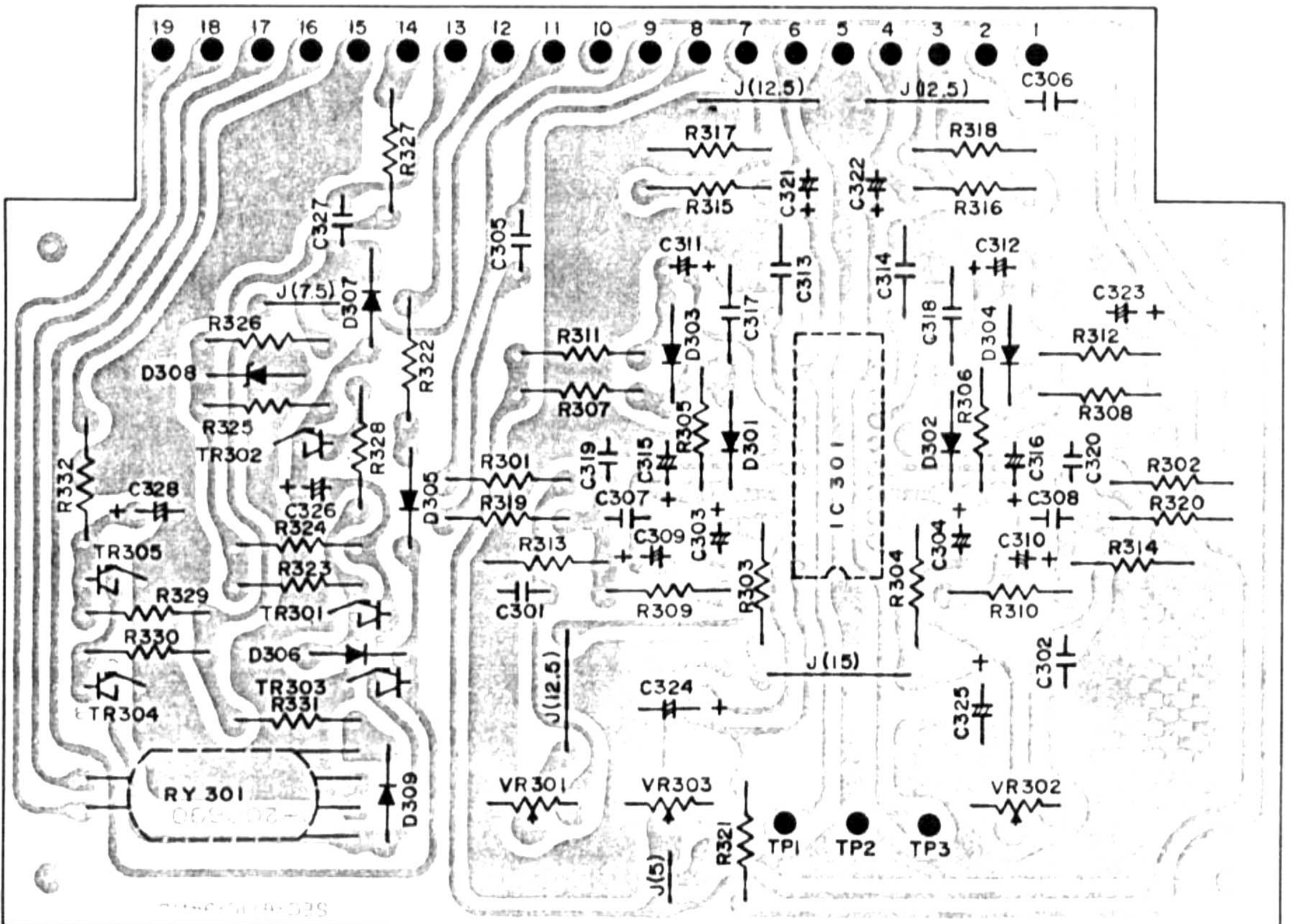
P-200701
104002-P
SEC-6710-94HB

(21) DOLBY FM P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

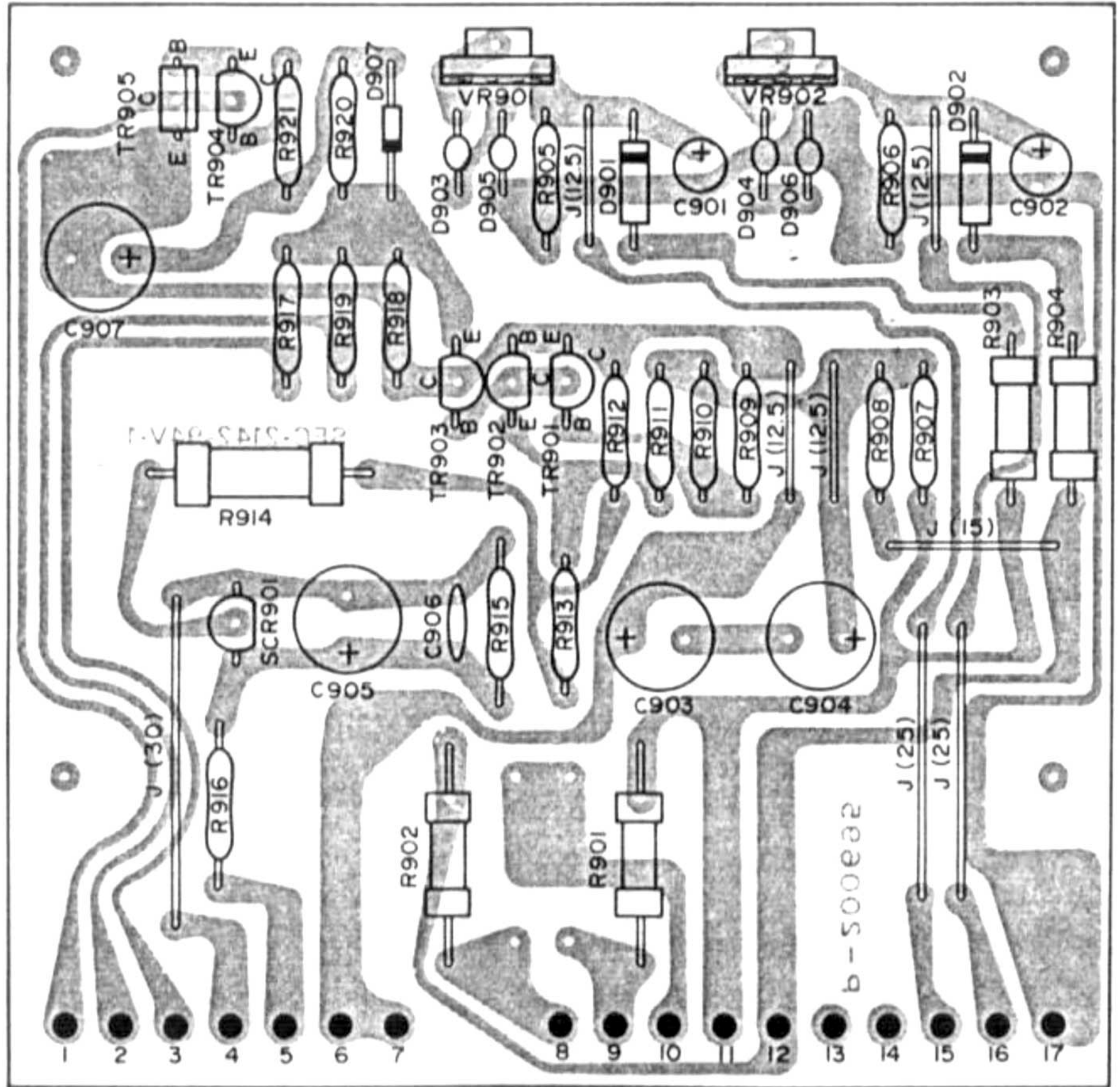


BOTTOM VIEW

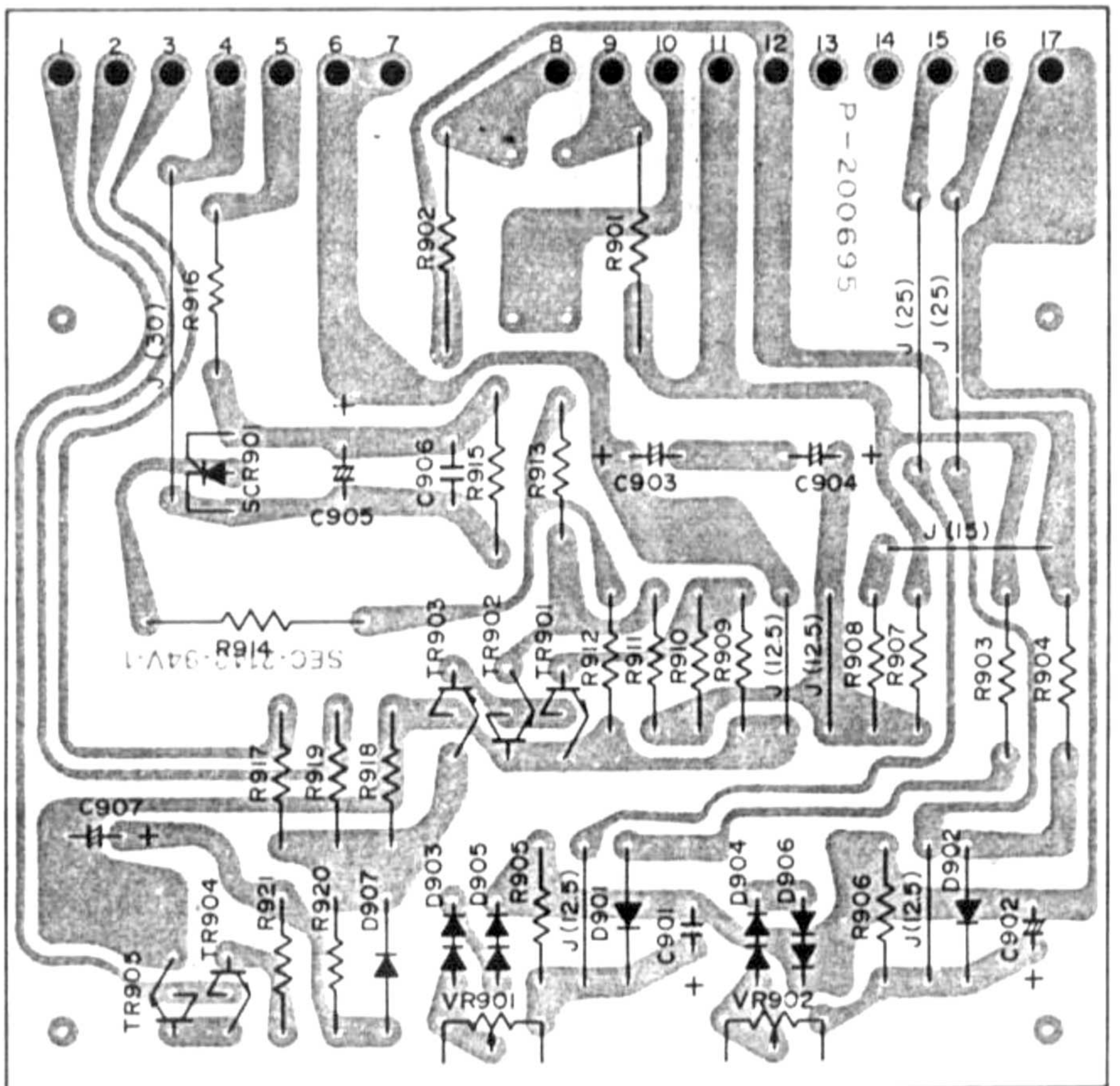


PROTECTOR P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

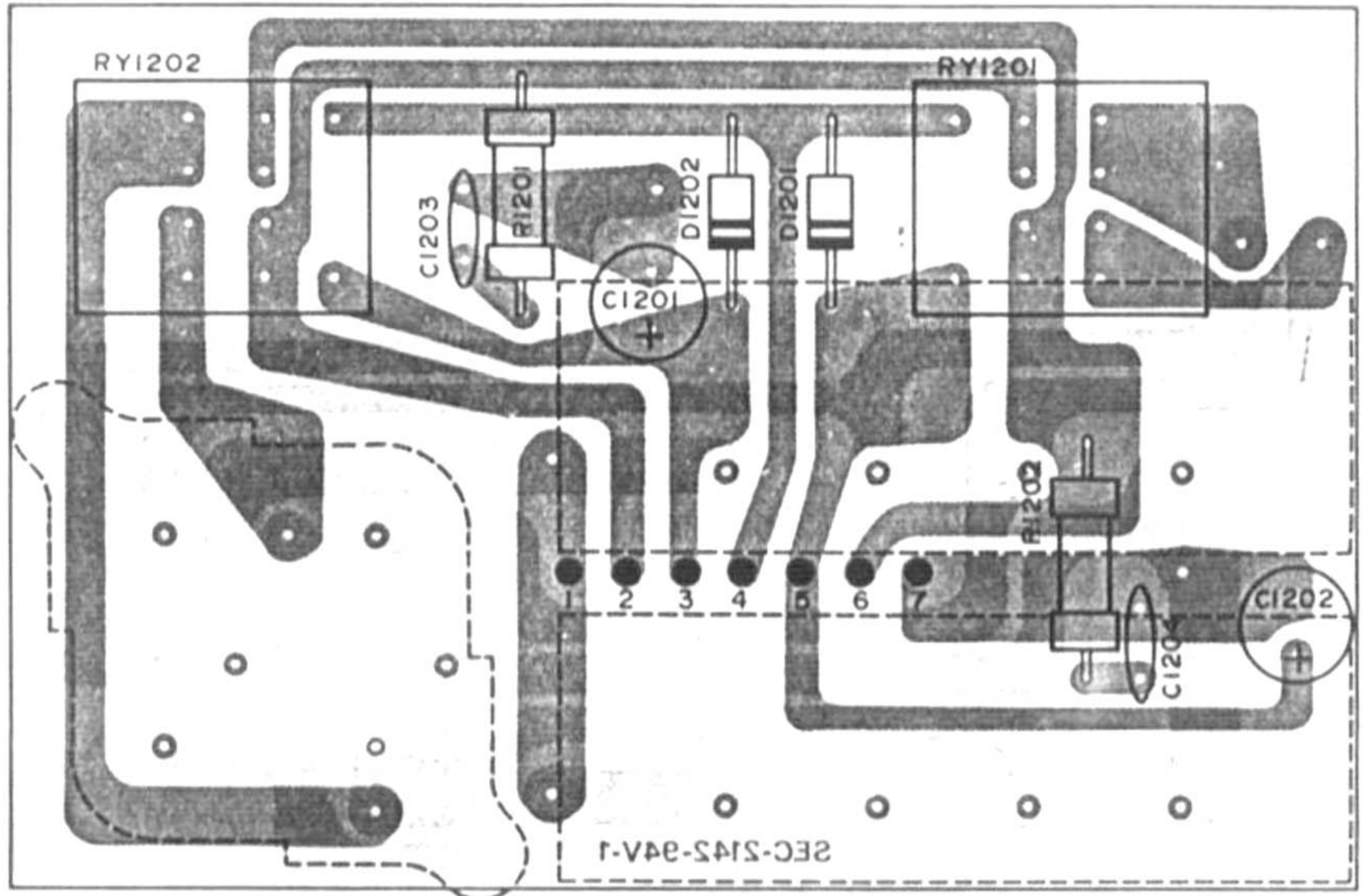


BOTTOM VIEW

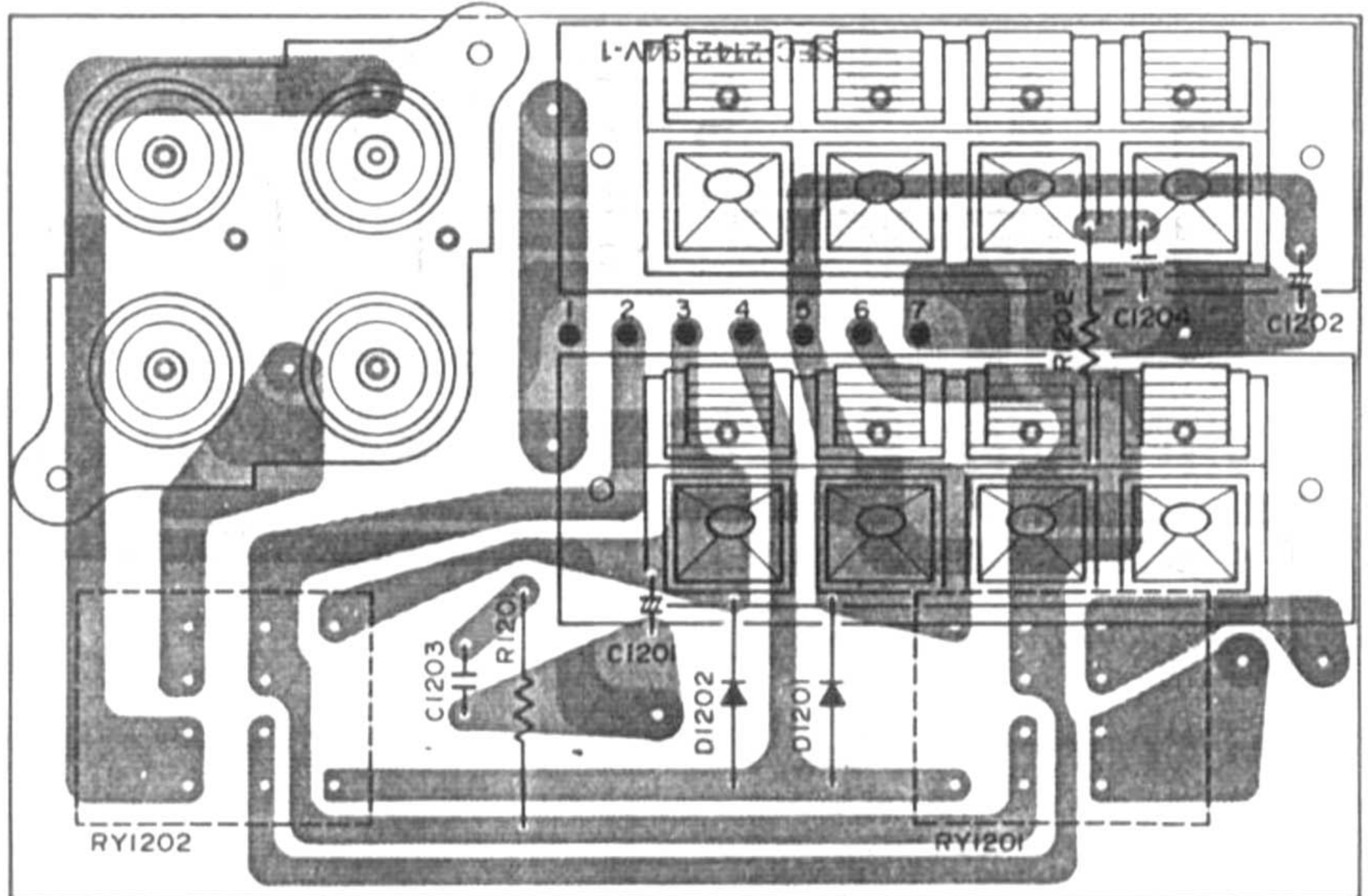


(23) RELAY P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

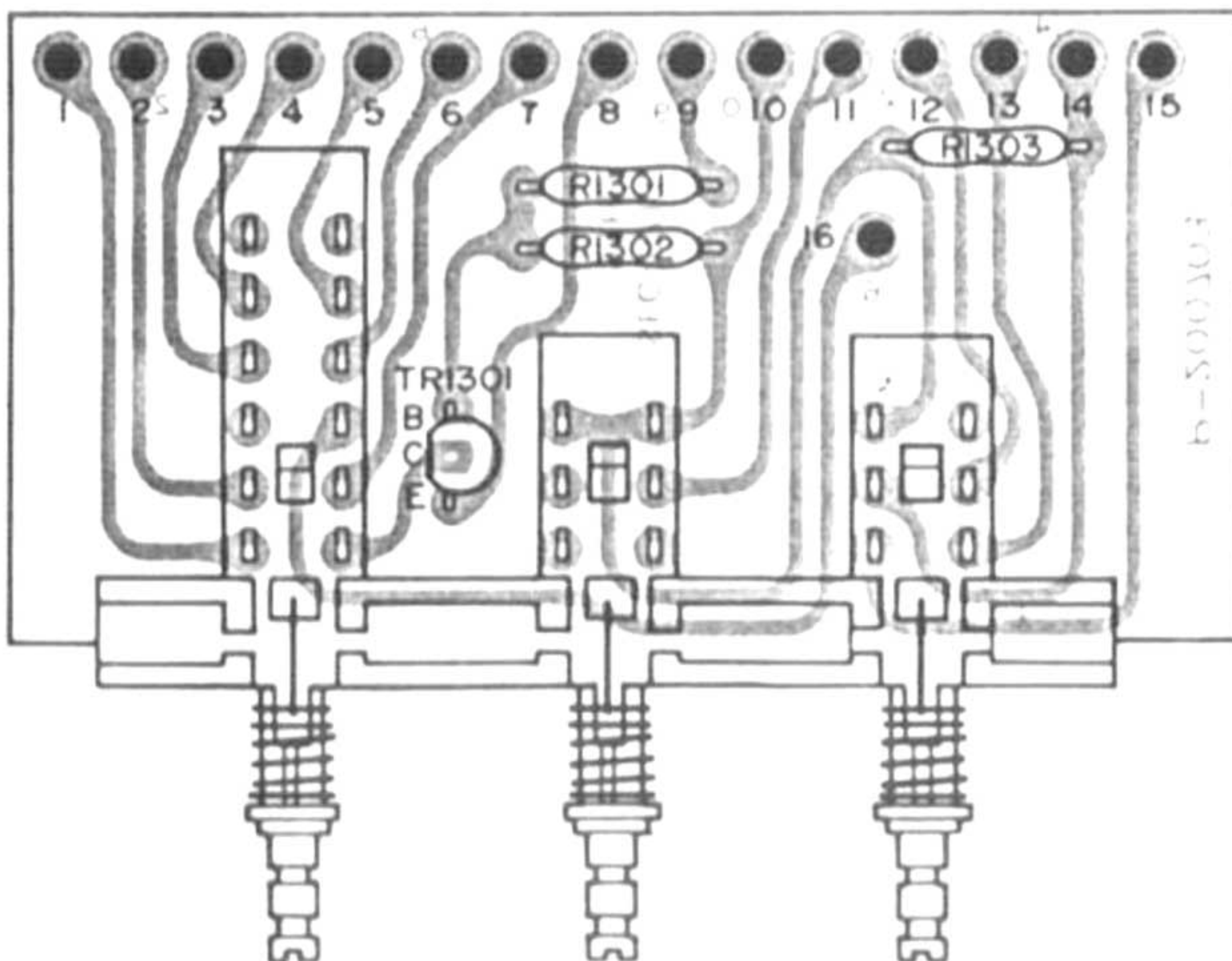


BOTTOM VIEW

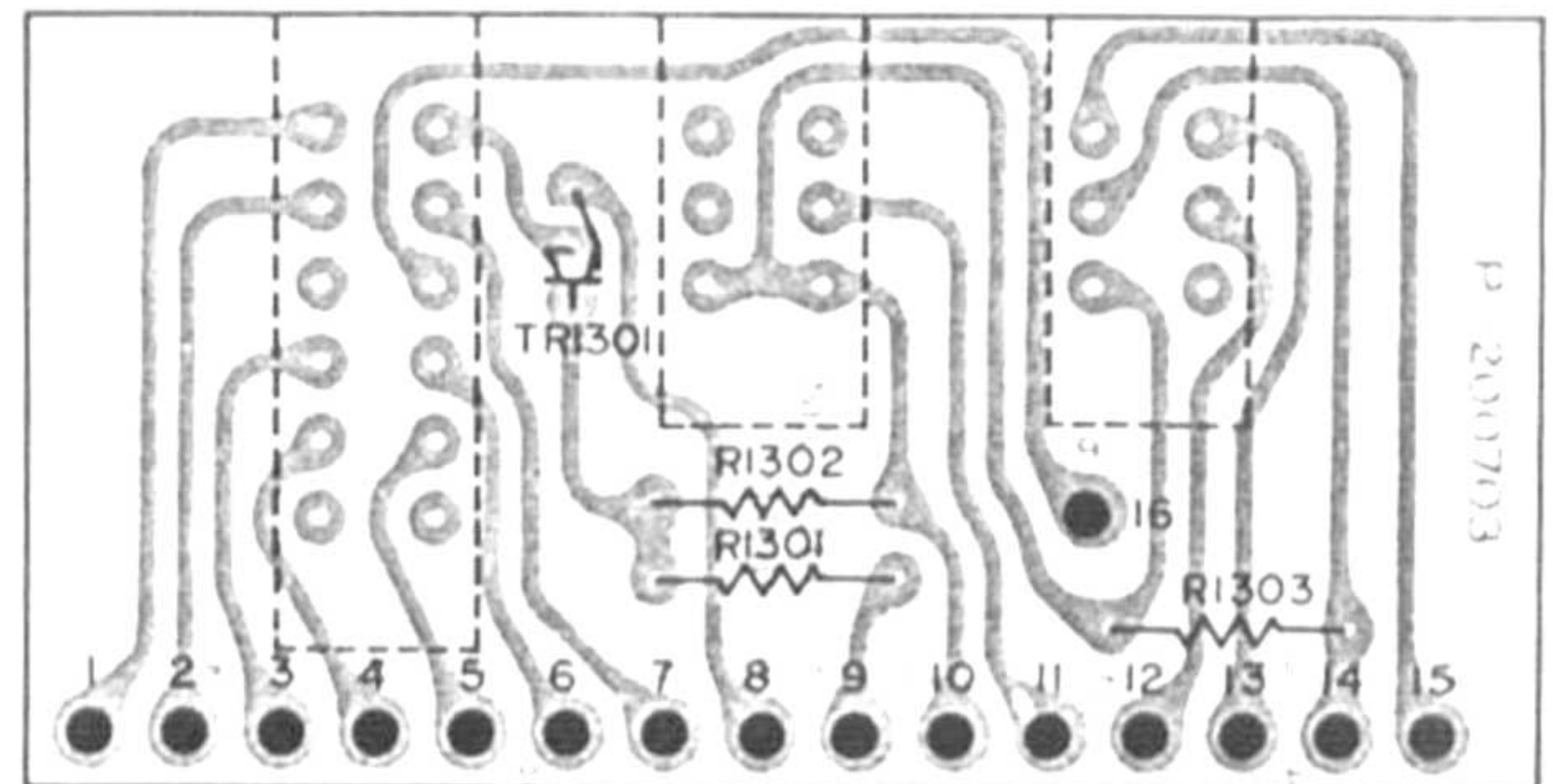


(24) CLOCK SWITCH P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

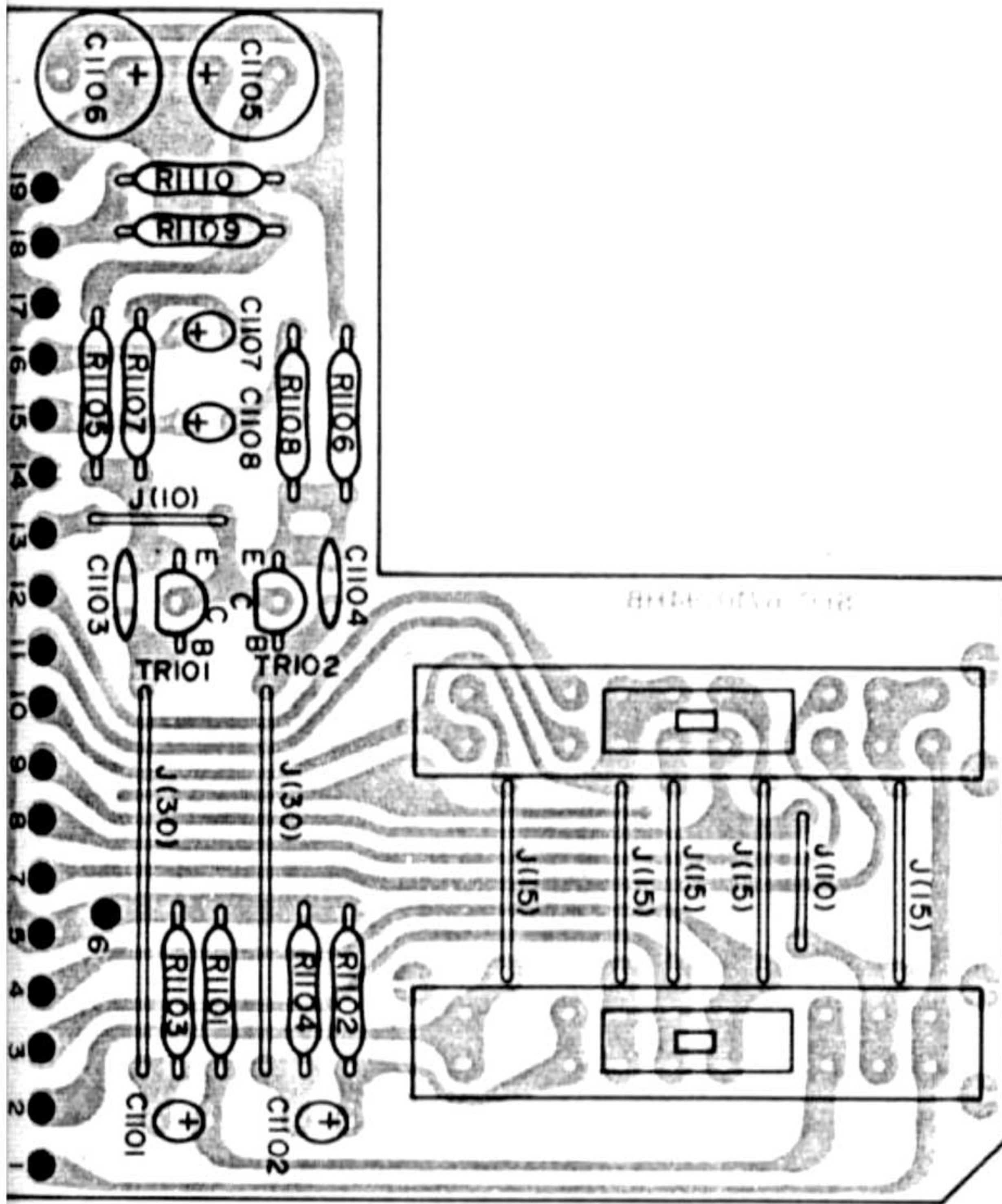


BOTTOM VIEW

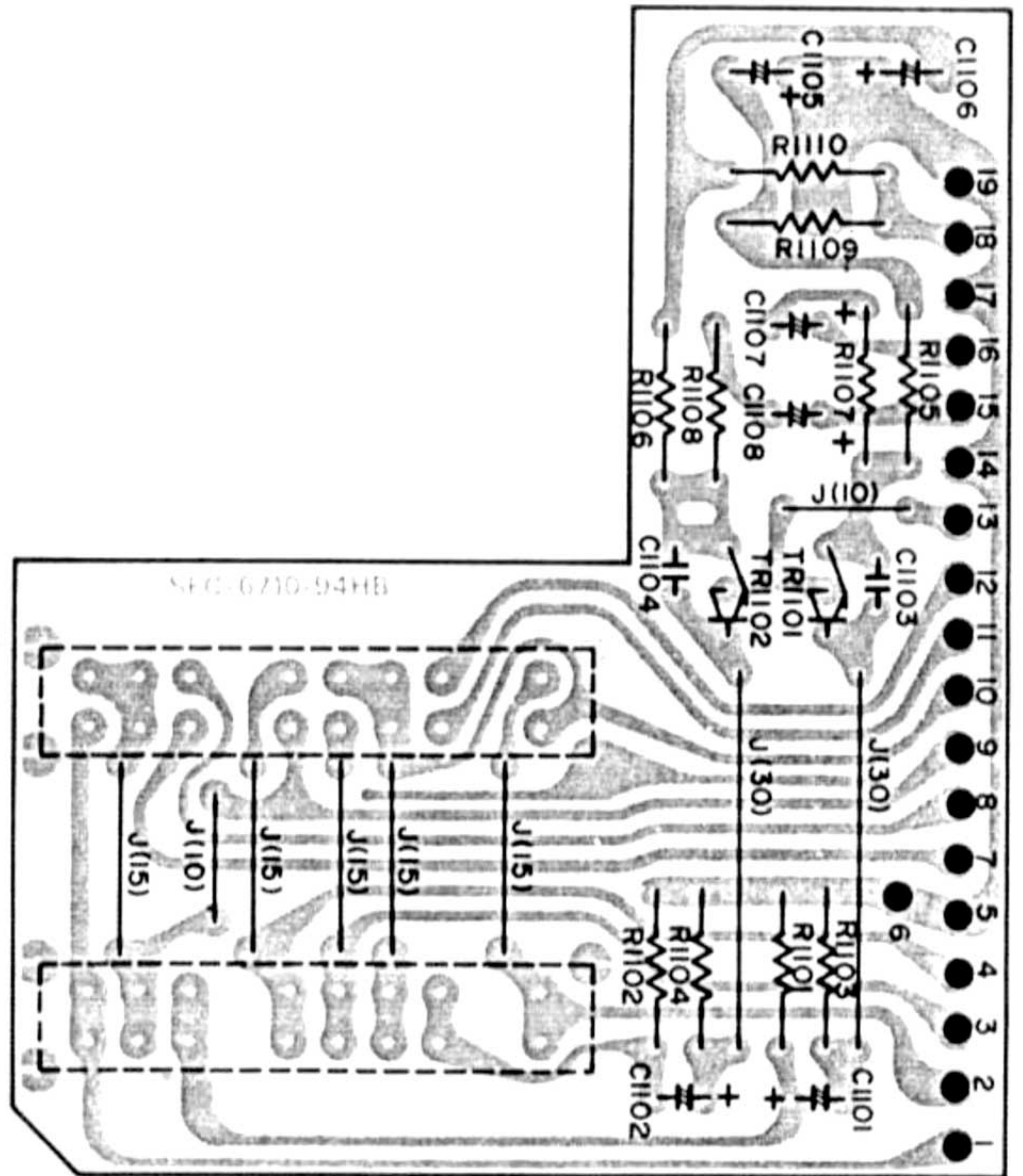


(25) TAPE SWITCH P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

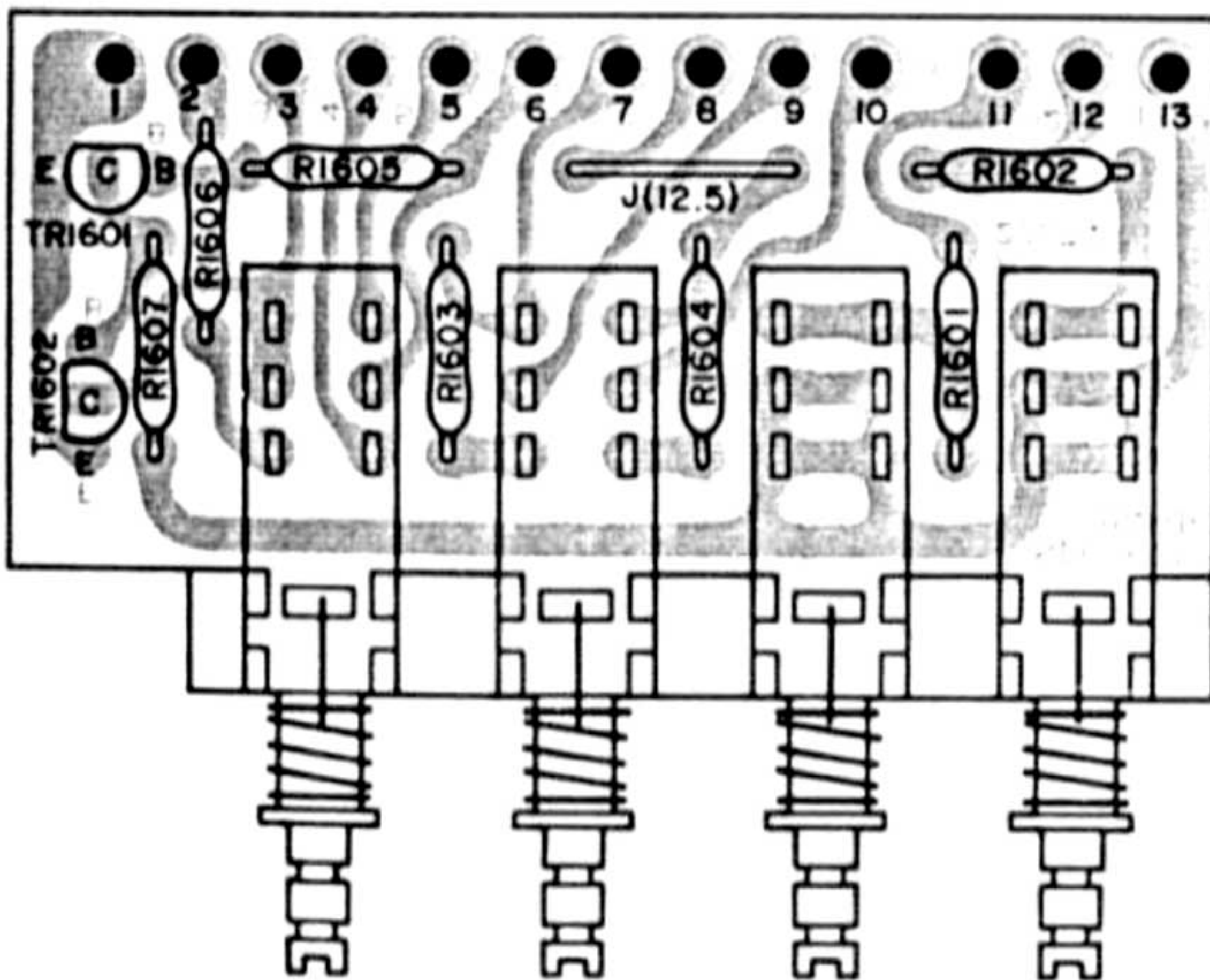


BOTTOM VIEW

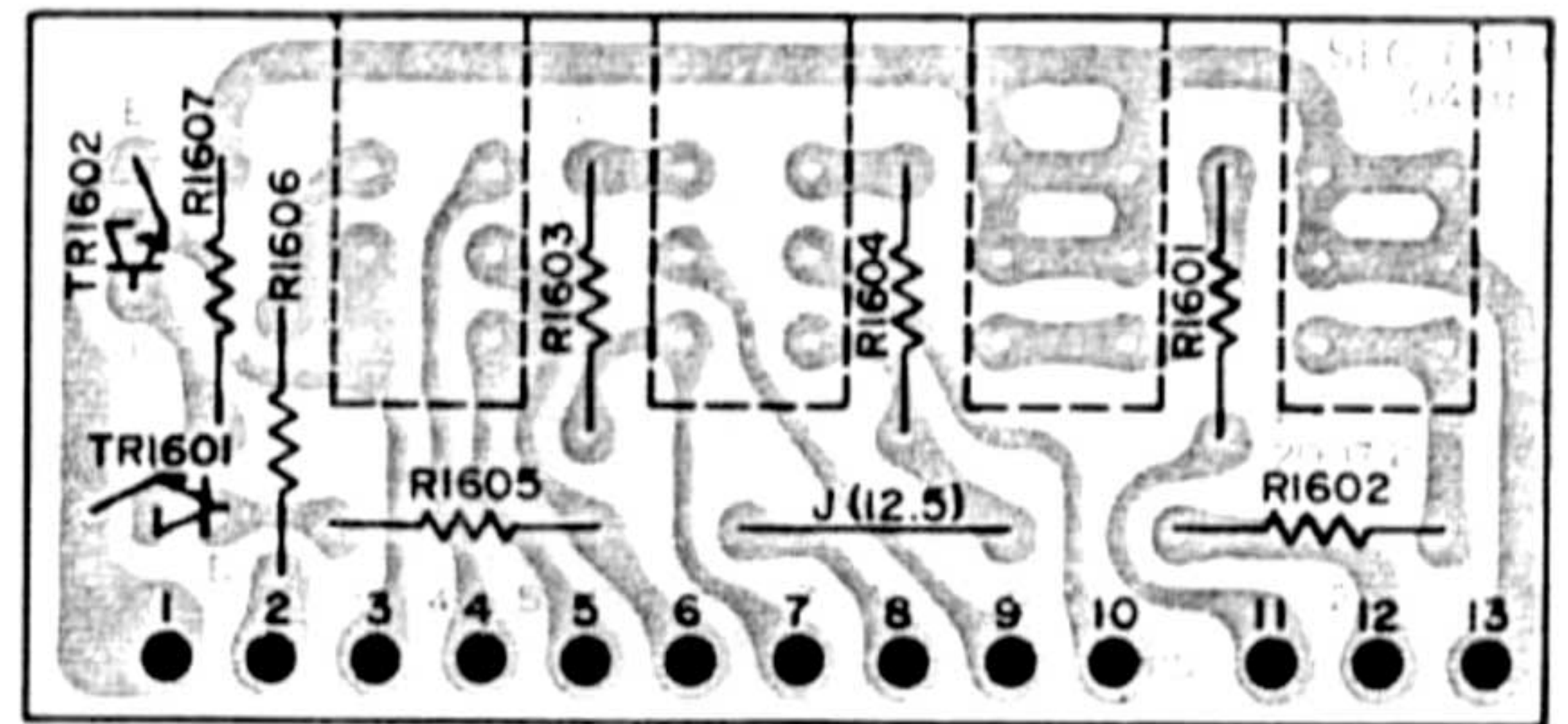


(26) SPEAKER SWITCH P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

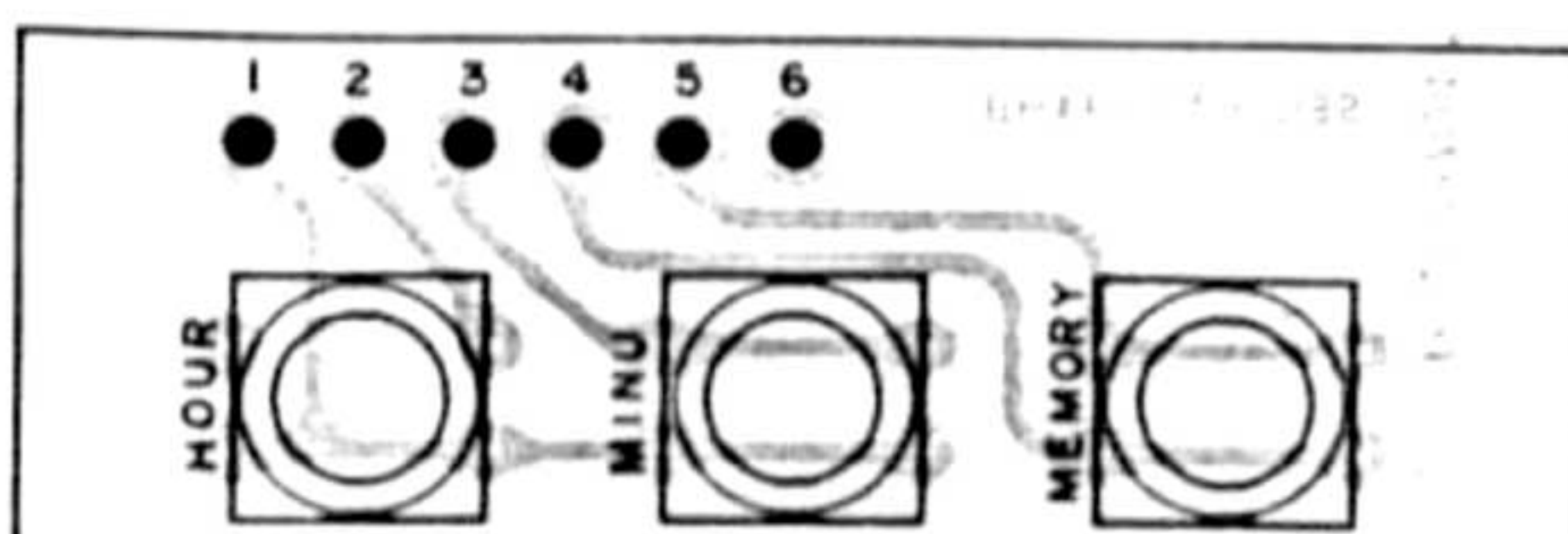


BOTTOM VIEW

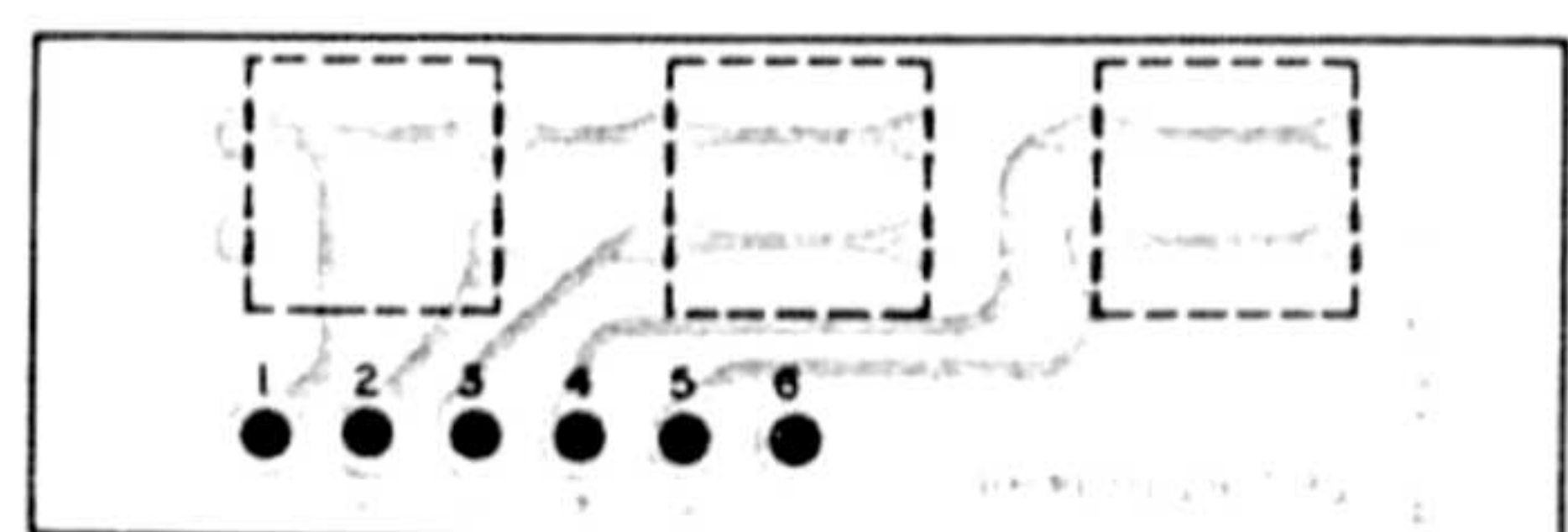


(27) MEMORY & TIME SET P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

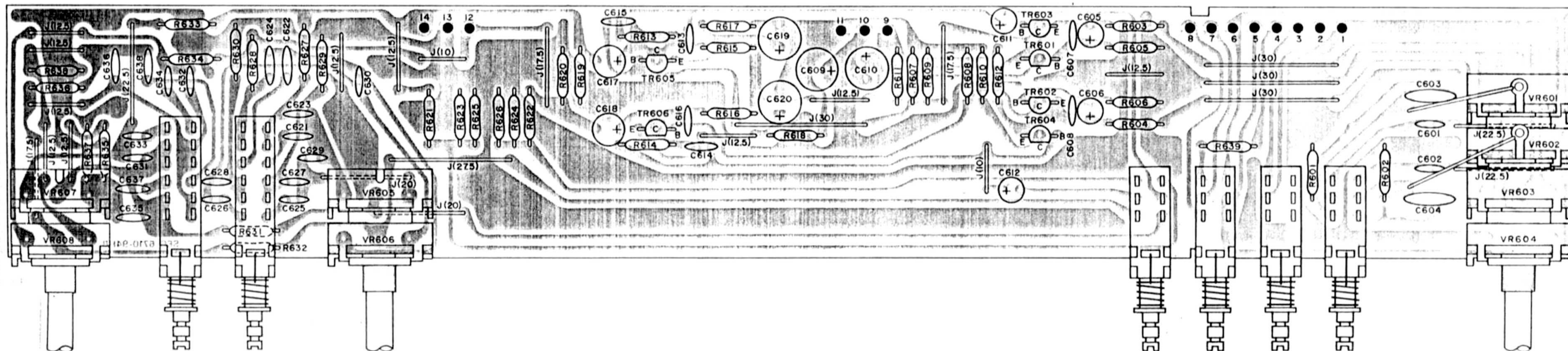


BOTTOM VIEW

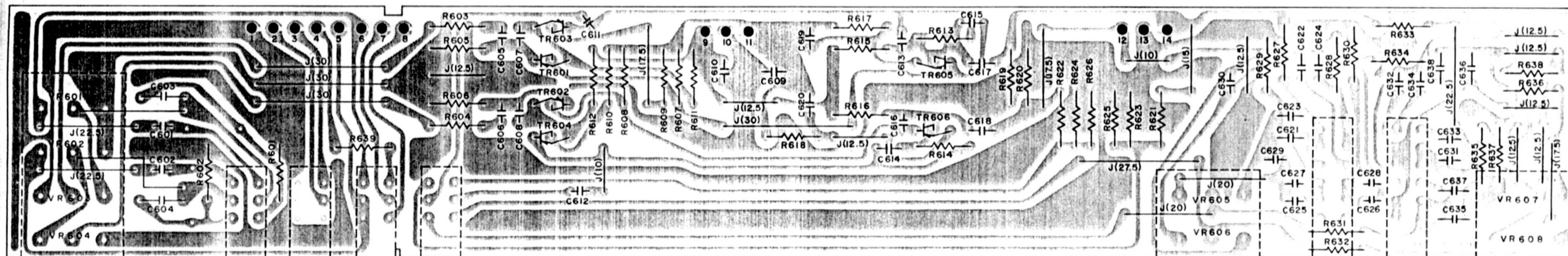


(28) TONE AMP P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

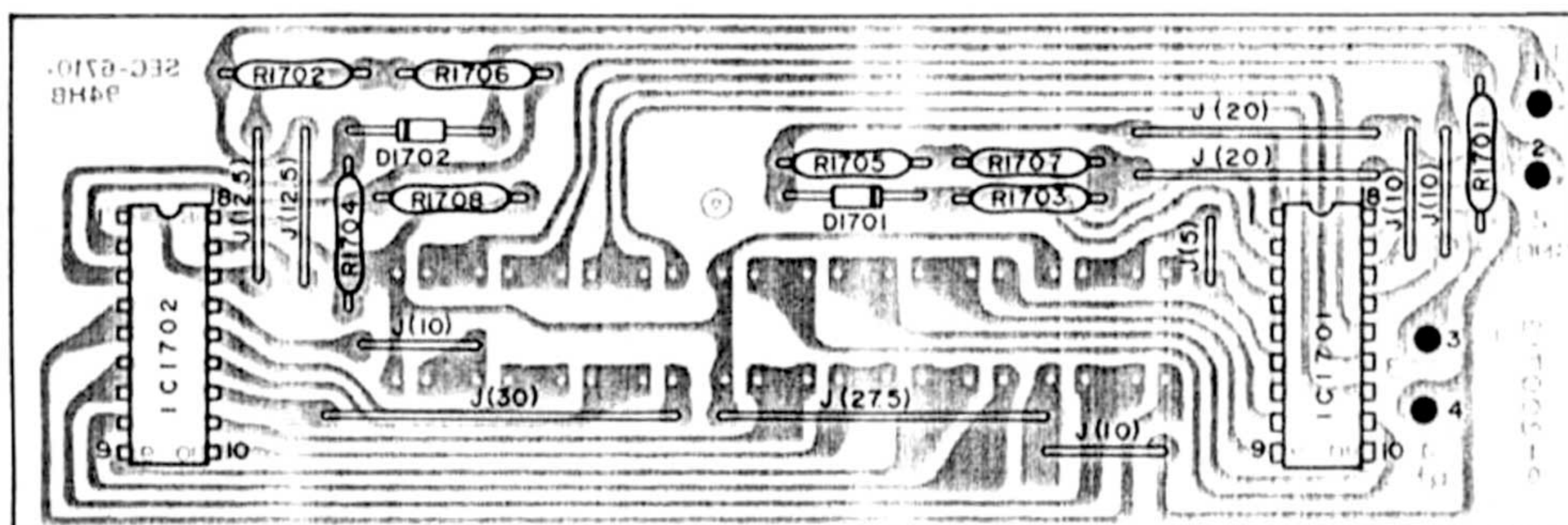


BOTTOM VIEW

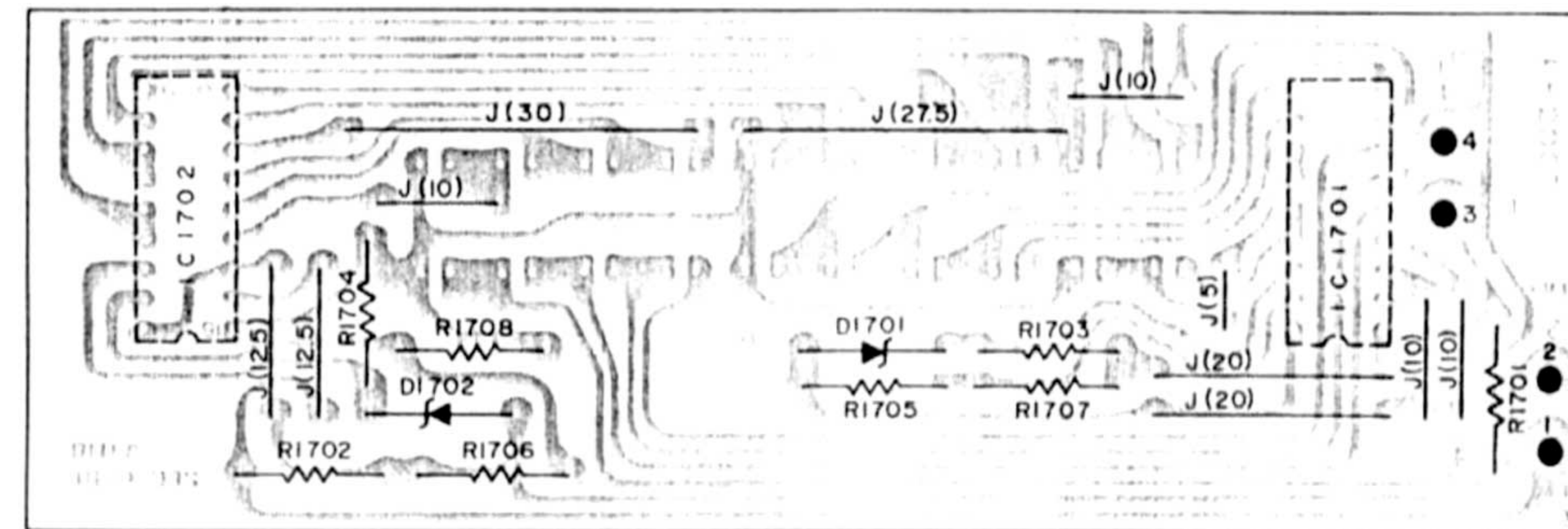


(29) POWER METER P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

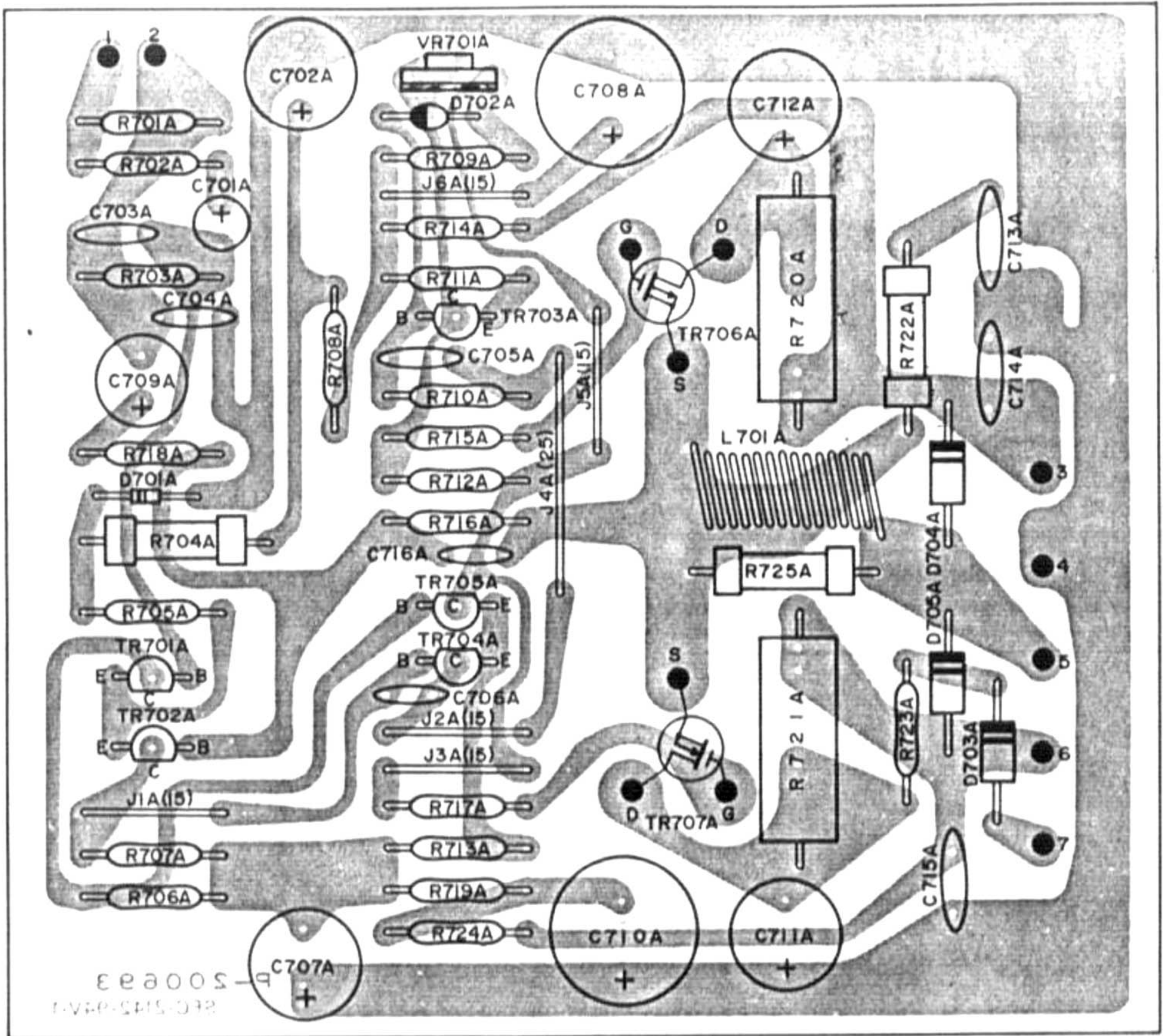


BOTTOM VIEW

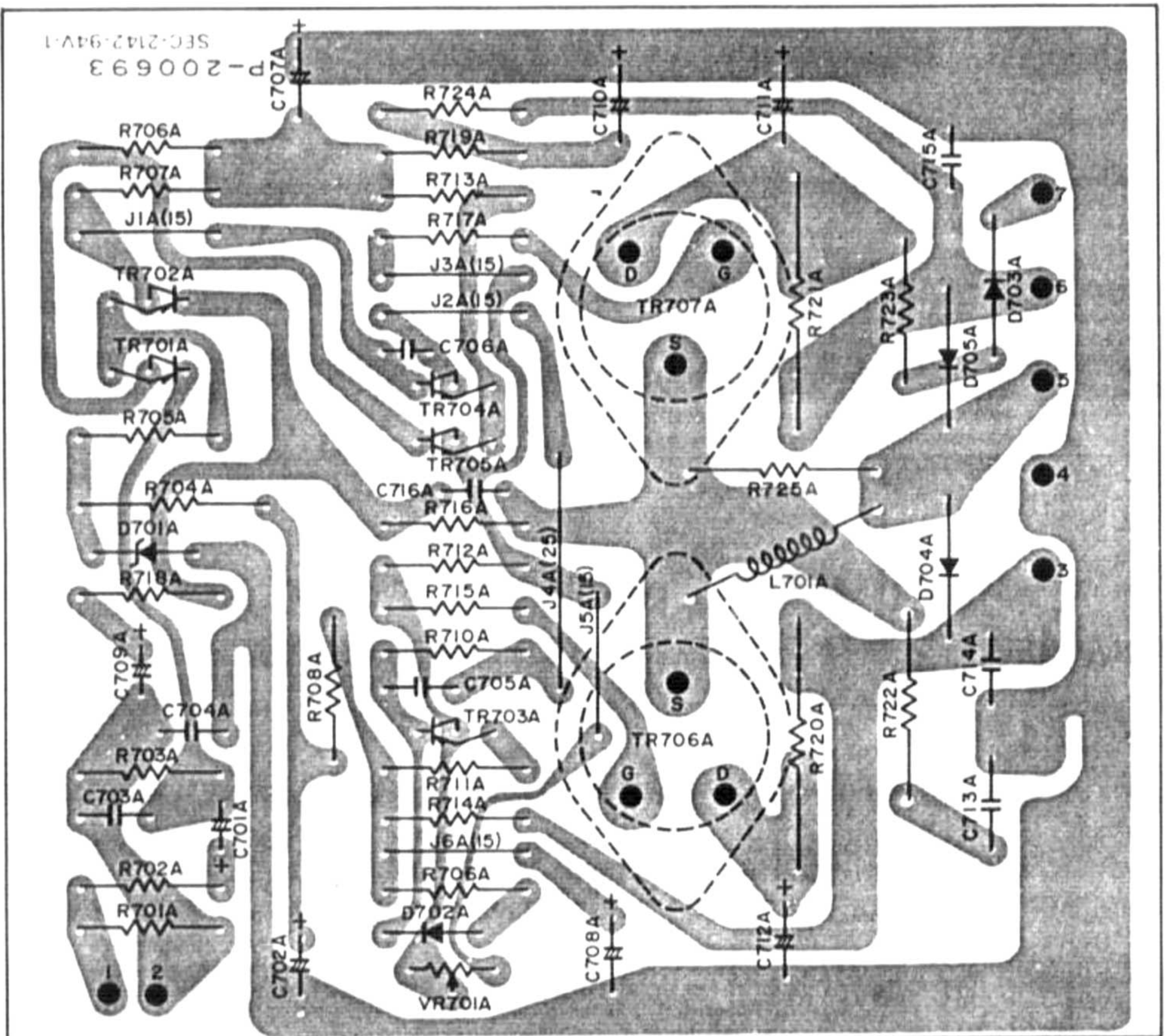


(30) MAIN AMP LEFT P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

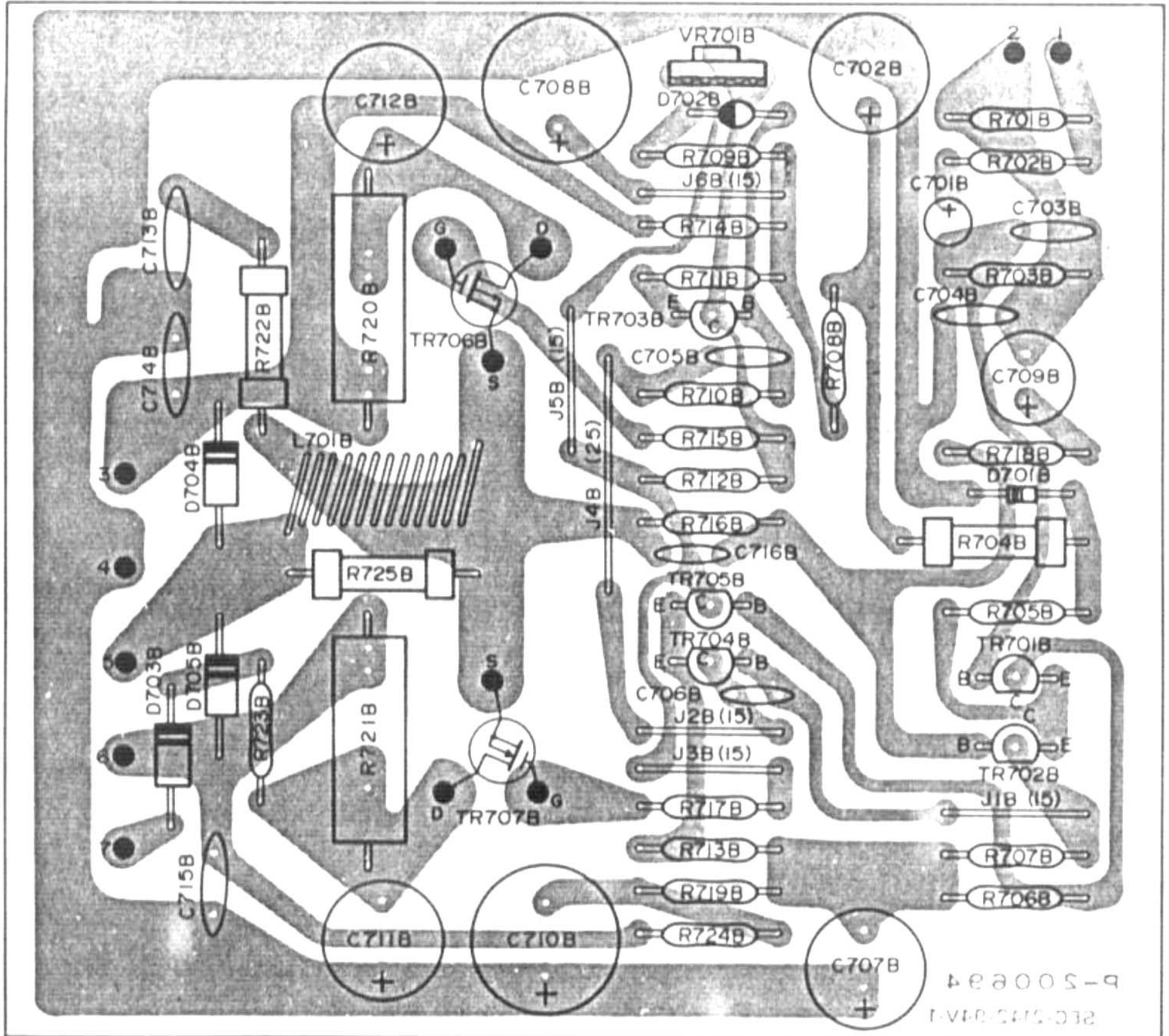


BOTTOM VIEW

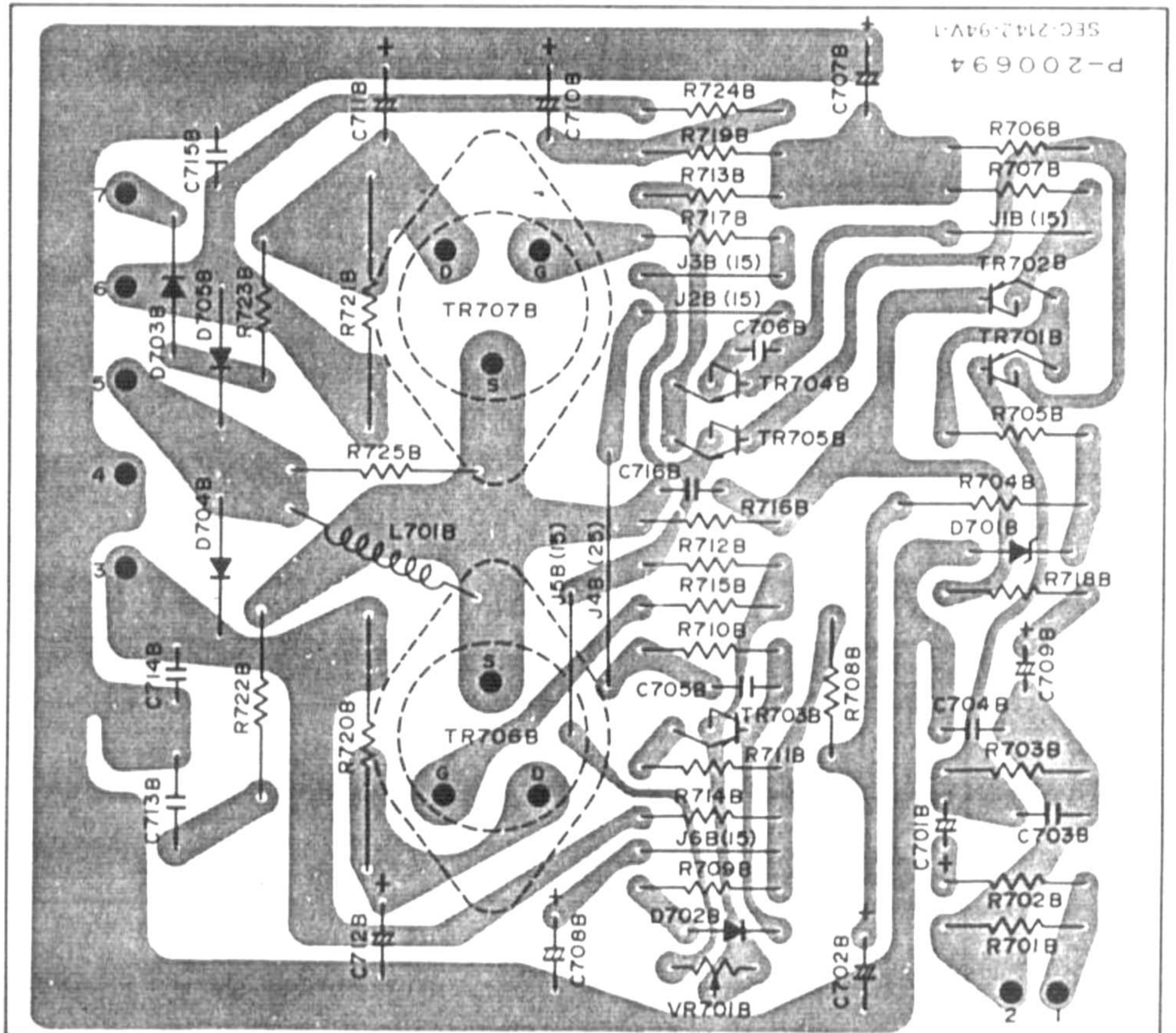


MAIN AMP RIGHT P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

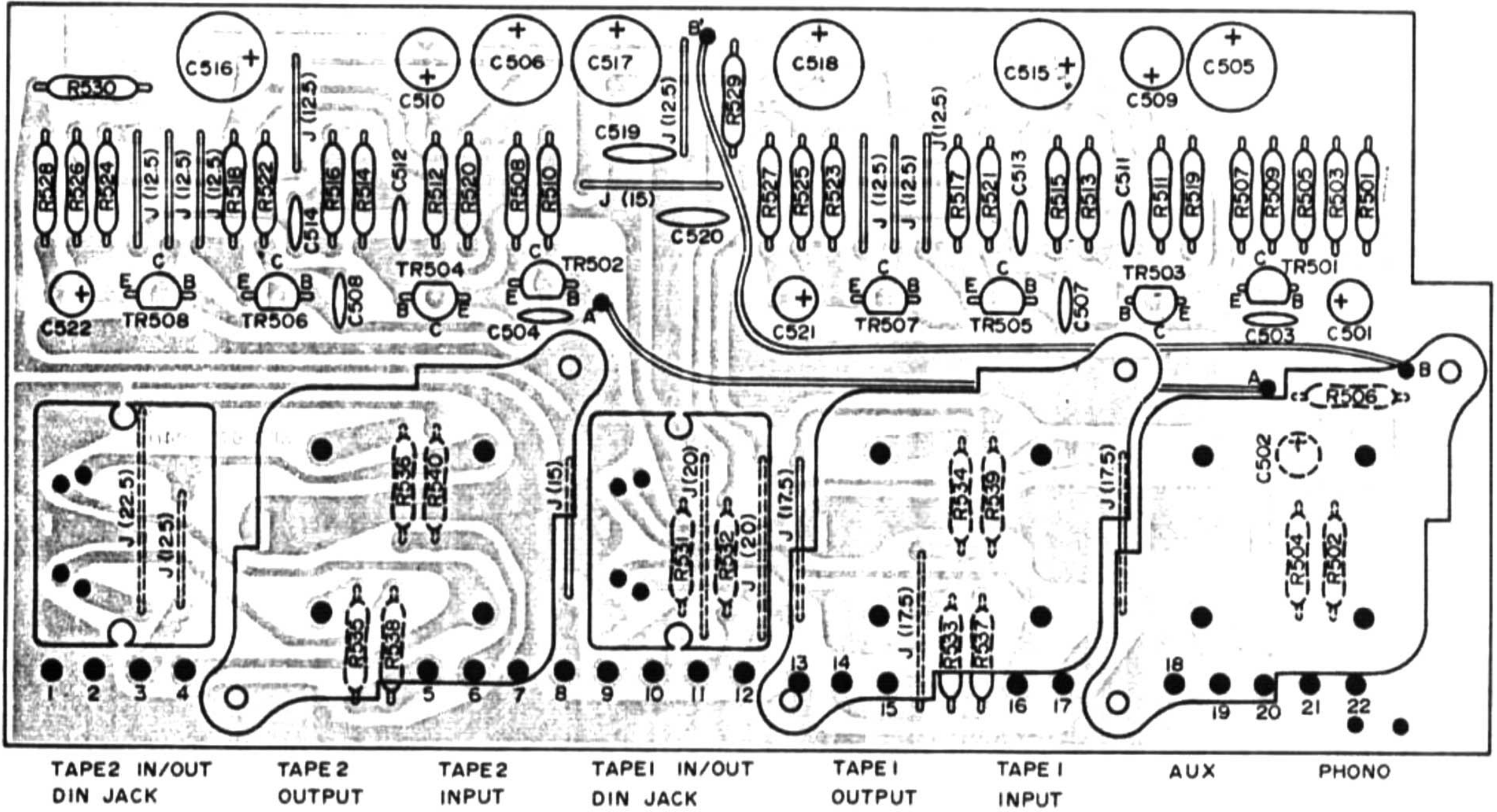


BOTTOM VIEW

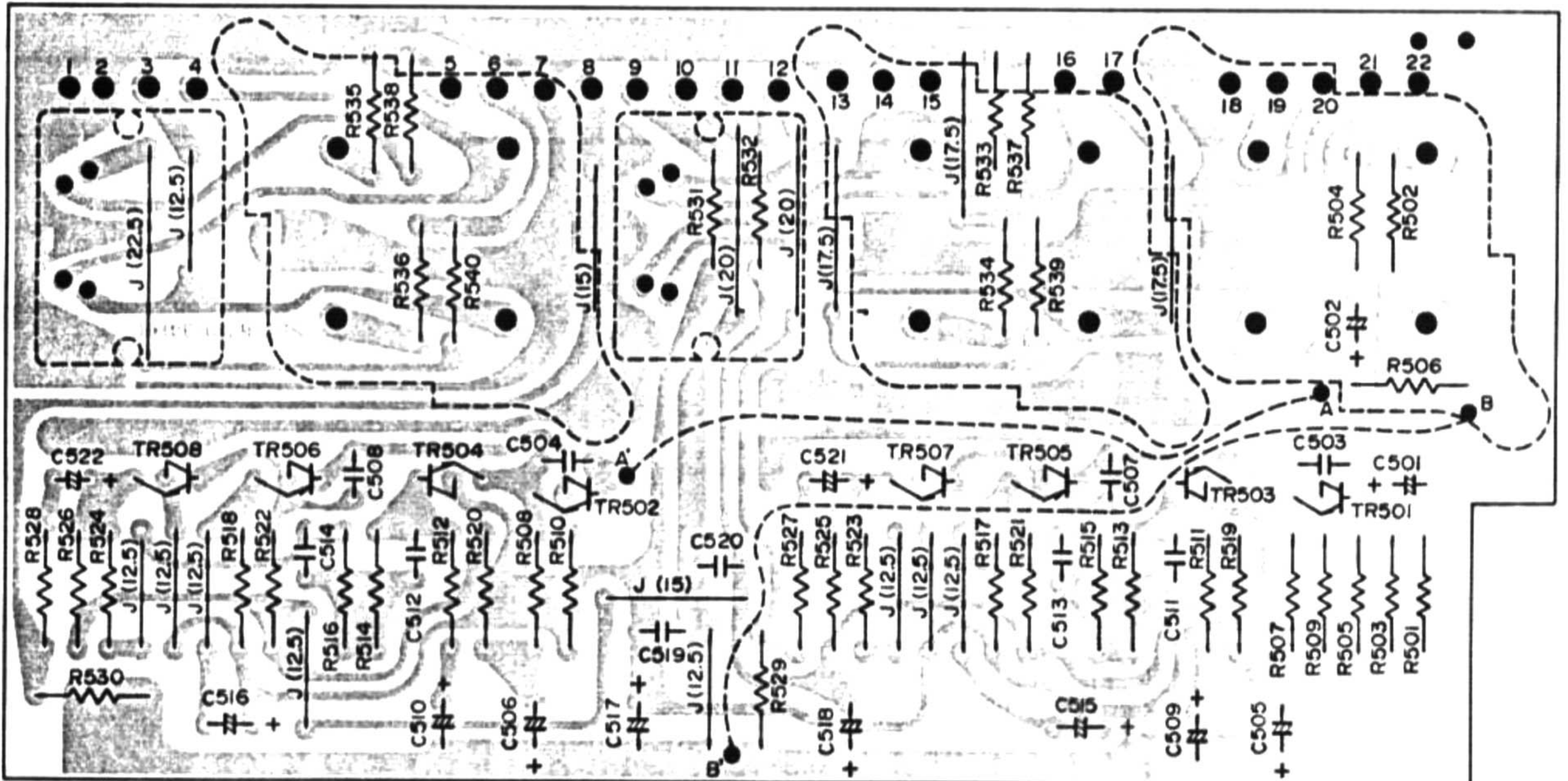


(32) PRE AMP P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

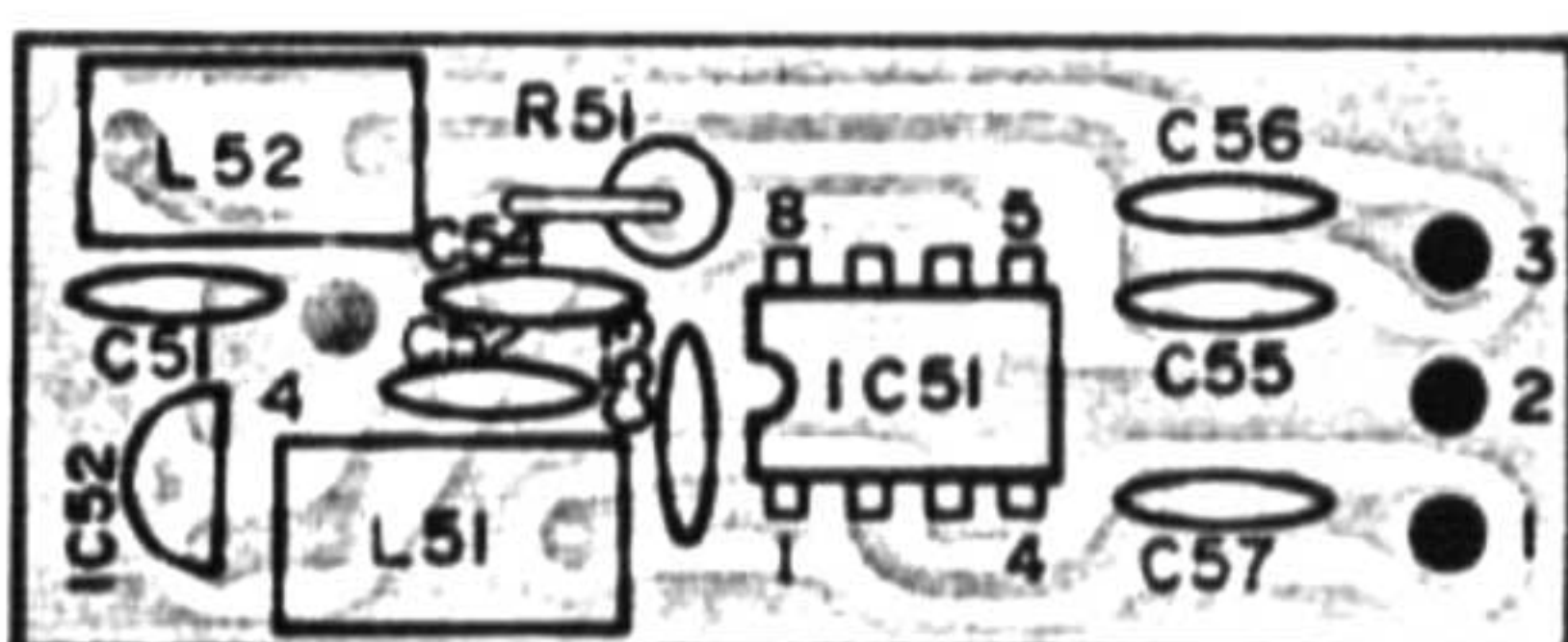


BOTTOM VIEW

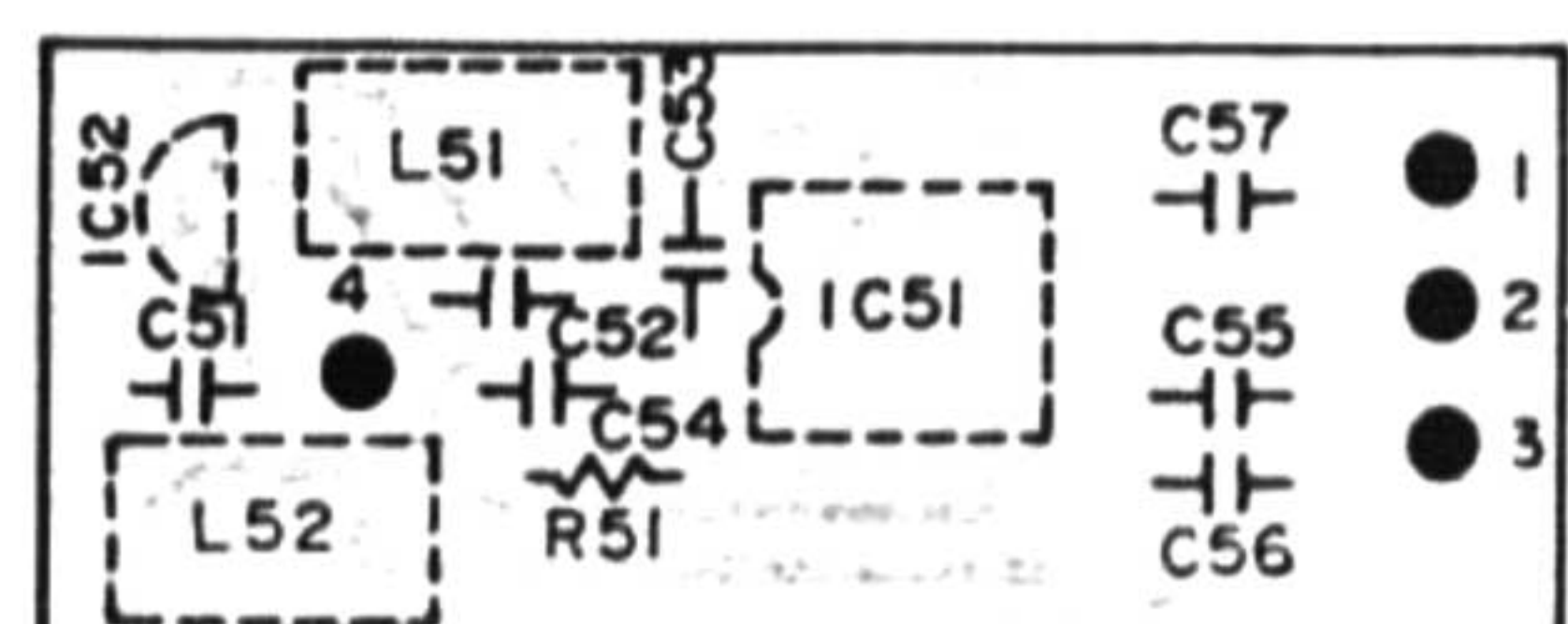


(33) PRE-SCALER P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

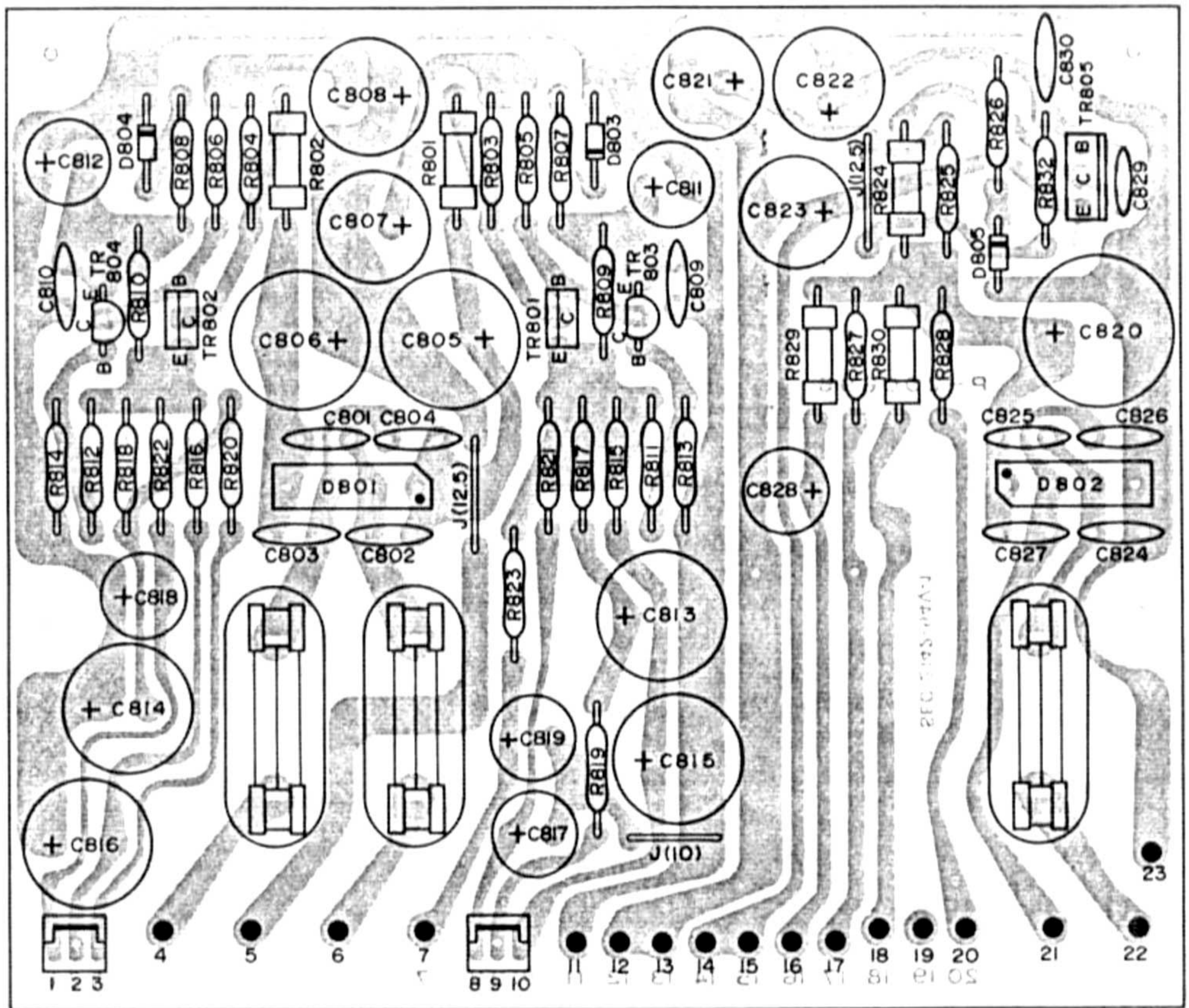


BOTTOM VIEW

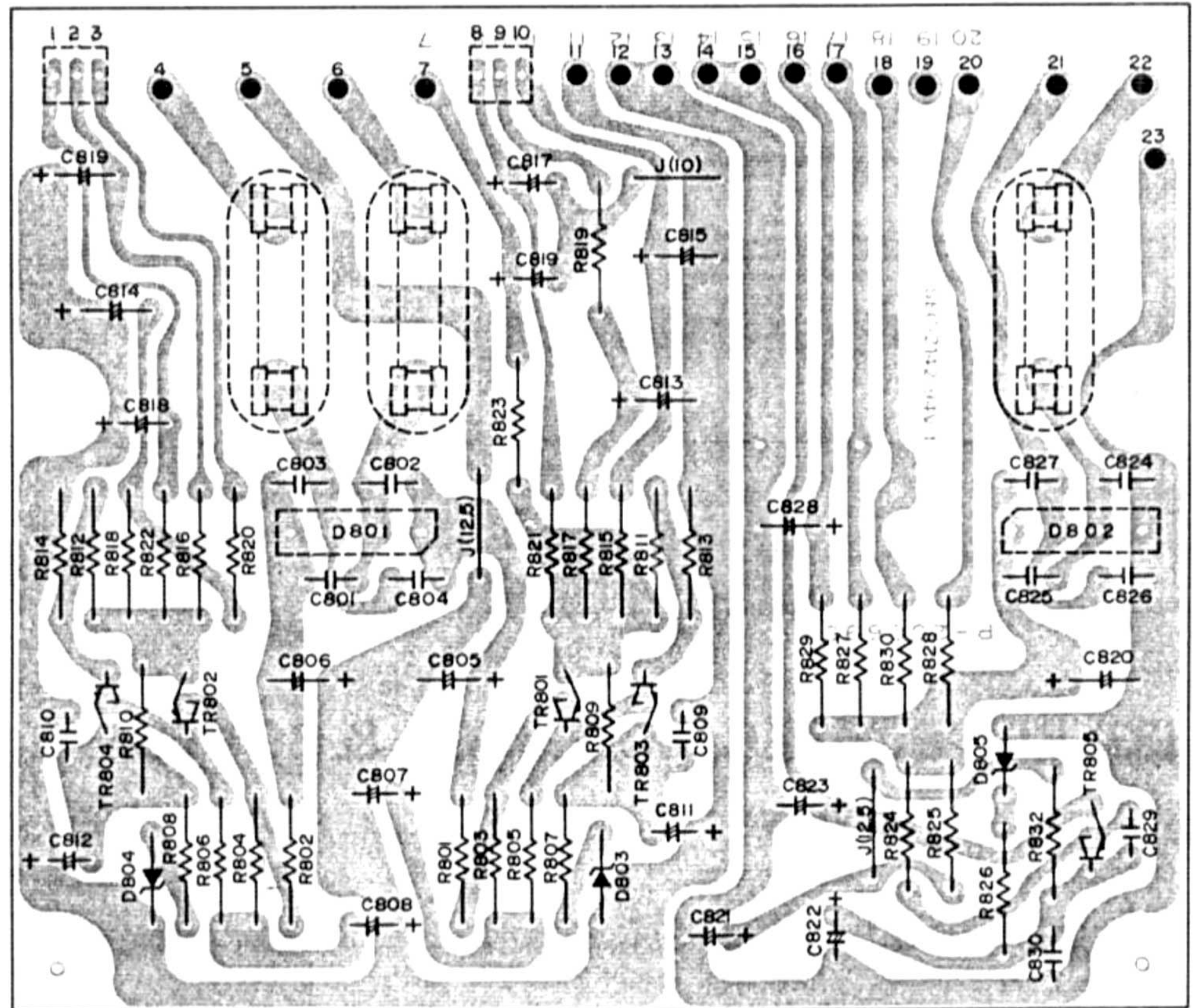


(34) POWER SUPPLY P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW



BOTTOM VIEW



(35) ELECTRICAL PARTS LIST

CAPACITORS						Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.
Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.						
C 1	3p	50	± 0.25pF	Ceramic		C 107	0.022μ	50	+80 -20	Ceramic	
C 2	100p	50	± 5	Ceramic		C 108	0.022μ	50	+80 -20	Ceramic	
C 3	0.022μ	50	+80 -20	Ceramic		C 109	0.022μ	50	+80 -20	Ceramic	
C 4	100p	50	± 5	Ceramic		C 110	0.022μ	50	+80 -20	Ceramic	
C 5	0.022μ	50	+80 -20	Ceramic		C 111	0.022μ	50	+80 -20	Ceramic	
C 6	0.022μ	50	+80 -20	Ceramic		C 112	0.022μ	50	+80 -20	Ceramic	
C 7	0.022μ	50	+80 -20	Ceramic		C 113	0.047μ	50	+80 -20	Ceramic	
C 8	0.022μ	50	+80 -20	Ceramic		C 114	0.047μ	50	+80 -20	Ceramic	
C 9	5p	50	± 0.25pF	Ceramic		C 115	0.047μ	50	+80 -20	Ceramic	
C 10	5p	50	± 0.25pF	Ceramic		C 116	33p	50	± 5	Ceramic	
C 11	2p	50	± 0.25pF	Ceramic		C 117	0.022μ	50	+80 -20	Ceramic	
C 12	15p	50	± 5	Ceramic		C 118	10μ	16	+50 -10	Electrolytic	
C 13	0.022μ	50	+80 -20	Ceramic		C 119	0.047μ	50	+80 -20	Ceramic	
C 14	1000p	50	± 10	Ceramic		C 120	0.01μ	50	+80 -20	Ceramic	
C 15	0.022μ	50	+80 -20	Ceramic		C 121	0.022μ	50	+80 -20	Ceramic	
C 16	(Not used)					C 122	0.01μ	50	+80 -20	Ceramic	
C 17	1000p	50	± 10	Ceramic		C 123	1μ	50	+75 -10	Electrolytic	
C 18	0.022μ	50	+80 -20	Ceramic		C 124	0.022μ	50	+80 -20	Ceramic	
C 19	0.022μ	50	+80 -20	Ceramic		C-125	1μ	50	+75 -10	Electrolytic	
C 20	0.5p	500	± 10	G-Capacitor		C 126	0.022μ	50	+80 -20	Ceramic	
C 21	6p(N470)	50	± 0.25pF	Ceramic	CF-7001	C 127	(Not used)				
C 22	6p(N470)	50	± 0.25pF	Ceramic	CF-7001	C 128	0.047μ	50	+80 -20	Ceramic	
C 23	15p(NPO)	50	± 5	Ceramic	CF-1188	C 129	0.022μ	50	+80 -20	Ceramic	
C 24	15p(NPO)	50	± 5	Ceramic	CF-1188	C 130	0.047μ	50	+80 -20	Ceramic	
C 25	7p(NPO)	50	± 0.25pF	Ceramic	CF-1905	C 131	0.047μ	50	+80 -20	Ceramic	
C 26	1000p	50	± 10	Ceramic		C 132	220μ	16	+50 -10	Electrolytic	
C 51	0.01μ	50	+80 -20	Ceramic		C 133	0.022μ	50	+80 -20	Ceramic	
C 52	0.01μ	50	+80 -20	Ceramic		C 134	0.47μ	50	+75 -10	Electrolytic	
C 53	0.01μ	50	+80 -20	Ceramic		C 135	0.1μ	50	± 5	Mylar	
C 54	47p	50	± 5	Ceramic		C 136	0.47μ	25	± 20	Aluminum	
C 55	100p	50	± 5	Ceramic		C 137	0.22μ	25	± 20	Aluminum	
C 56	1000p	50	± 5	Ceramic		C 138	1500p	50	± 5	Polystyrene	
C 57	1000p	50	± 5	Ceramic		C 139	0.047μ	50	± 5	Mylar	
C 101	0.01μ	50	+80 -20	Ceramic		C 140	680p	50	± 5	Polystyrene	
C 102	0.022μ	50	+80 -20	Ceramic							
C 103	20p	50	± 5	Ceramic							
C 104	0.022μ	50	+80 -20	Ceramic							
C 105	0.022μ	50	+80 -20	Ceramic							
C 106	0.022μ	50	+80 -20	Ceramic							

Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.	Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.
C141	470 μ	16	+50 -10	Electrolytic	CF-1188	C222	0.47 μ	50	+75 -10	Electrolytic	
C142	47 μ	10	+50 -10	Electrolytic		C223	220p	50	\pm 5	Ceramic	
C143	0.0056 μ	50	\pm 5	Mylar		C224	0.47 μ	50	+75 -10	Electrolytic	
C144	0.0056 μ	50	\pm 5	Mylar		C225	100 μ	16	+50 -10	Electrolytic	
C145	0.0018 μ	50	\pm 5	Mylar		C226	0.022 μ	50	+80 -20	Ceramic	
C146	0.0018 μ	50	\pm 5	Mylar		C227	0.022 μ	50	+80 -20	Ceramic	
C147	0.0027 μ	50	\pm 5	Mylar		C228	0.0047 μ	50	\pm 10	Ceramic	
C148	0.0027 μ	50	\pm 5	Mylar		C229	0.0047 μ	50	\pm 10	Ceramic	
C149	0.012 μ	50	\pm 5	Mylar		C230	0.01 μ	50	+80 -20	Ceramic	
C150	0.012 μ	50	\pm 5	Mylar		C231	0.01 μ	50	+80 -20	Ceramic	
C151	0.47 μ	50	+75 -10	Electrolytic		C232	0.001 μ	50	\pm 10	Ceramic	
C152	0.47 μ	50	+75 -10	Electrolytic		C233	0.0039 μ	50	\pm 10	Mylar	
C153	1 μ	50	+75 -10	Electrolytic		C301	100p	50	\pm 5	Ceramic	
C154	1 μ	50	+75 -10	Electrolytic		C302	100p	50	\pm 5	Ceramic	
C155	3.3 μ	50	+75 -10	Electrolytic		C303	3.3 μ	25	+75 -10	Electrolytic	
C156	3.3 μ	50	+75 -10	Electrolytic		C304	3.3 μ	25	+75 -10	Electrolytic	
C157	100 μ	16	+50 -10	Electrolytic		C305	0.015 μ	50	\pm 5	Mylar	
C158	0.0056 μ	50	\pm 5	Mylar		C306	0.015 μ	50	\pm 5	Mylar	
C201	0.047 μ	50	+80 -20	Ceramic		C307	0.0047 μ	50	\pm 5	Mylar	
C202	0.1 μ	50	\pm 10	Mylar		C308	0.0047 μ	50	\pm 5	Mylar	
C203	15p(NPO)	50	\pm 5	Ceramic		C309	0.33 μ	25	\pm 20	Tantalum	
C204	390p	50	\pm 5	Polystyrene		C310	0.33 μ	25	\pm 20	Tantalum	
C205	0.001 μ	50	\pm 10	Ceramic		C311	10 μ	16	+50 -10	Electrolytic	
C206	0.001 μ	50	\pm 10	Ceramic		C312	10 μ	16	+50 -10	Electrolytic	
C207	0.022 μ	50	+80 -20	Ceramic		C313	0.1 μ	50	\pm 5	Mylar	
C208	0.01 μ	50	+80 -20	Ceramic		C314	0.1 μ	50	\pm 5	Mylar	
C209	0.001 μ	50	\pm 10	Ceramic		C315	0.33 μ	25	\pm 20	Tantalum	
C210	0.01 μ	50	+80 -20	Ceramic		C316	0.33 μ	25	\pm 20	Tantalum	
C211	0.01 μ	50	+80 -20	Ceramic		C317	0.1 μ	50	\pm 5	Mylar	
C212	0.01 μ	50	+80 -20	Ceramic		C318	0.1 μ	50	\pm 5	Mylar	
C213	0.047 μ	50	+80 -20	Ceramic		C319	0.015 μ	50	\pm 5	Mylar	
C214	0.022 μ	50	+80 -20	Ceramic		C320	0.015 μ	50	\pm 5	Mylar	
C215	10 μ	16	+50 -10	Electrolytic		C321	10 μ	16	+50 -10	Electrolytic	
C216	4.7 μ	25	+50 -10	Electrolytic		C322	10 μ	16	+50 -10	Electrolytic	
C217	3.3 μ	50	+75 -10	Electrolytic		C323	10 μ	16	+50 -10	Electrolytic	
C218	0.01 μ	50	+80 -20	Ceramic		C324	470 μ	16	+50 -10	Electrolytic	
C219	3.3 μ	50	+75 -10	Electrolytic		C325	470 μ	16	+50 -10	Electrolytic	
C220	0.033 μ	50	\pm 10	Mylar		C326	4.7 μ	25	+50 -10	Electrolytic	
C221	0.15 μ	50	\pm 10	Mylar		C327	0.01 μ	50	\pm 10	Mylar	
						C328	33 μ	25	+50 -10	Electrolytic	

Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.	Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.
C401	0.047 μ	50	+80 -20	Ceramic		C514	0.0068 μ	50	\pm 10	Mylar	
C402	100 μ	10	+50 -10	Electrolytic		C515	100 μ	25	+50 -10	Electrolytic	
C403	47 μ	10	+50 -10	Electrolytic		C516	100 μ	25	+50 -10	Electrolytic	
C404	47p	50	\pm 5	Ceramic		C517	100 μ	35	+50 -10	Electrolytic	
C405	47p	50	\pm 5	Ceramic		C518	100 μ	35	+50 -10	Electrolytic	
C406	0.01 μ	50	\pm 5	Mylar		C519	0.04 μ	50	+80 -20	Ceramic	
C407	0.01 μ	50	\pm 5	Mylar		C520	0.04 μ	50	+80 -20	Ceramic	
C408	0.01 μ	50	\pm 5	Mylar		C521	0.68 μ	25/35	\pm 20	Tantalum	
C409	0.02 μ	50	\pm 5	Mylar		C522	0.68 μ	25/35	\pm 20	Tantalum	
C410	0.33 μ	50	\pm 10	Mylar		C601	330p	50	\pm 5	Polystyrene	
C411	0.001 μ	50	\pm 5	Mylar		C602	330p	50	\pm 5	Polystyrene	
C412	100 μ	35	+50 -10	Electrolytic		C603	0.22 μ	50	\pm 10	Mylar	
C413	0.022 μ	50	\pm 5	Mylar		C604	0.22 μ	50	\pm 10	Mylar	
C414	0.01 μ	50	\pm 5	Mylar		C605	0.68 μ	25	\pm 20	Tantalum	
C415	2.2 μ	50	+75 -10	Electrolytic		C606	0.68 μ	25	\pm 20	Tantalum	
C416	0.01 μ	50	+80 -20	Ceramic		C607	22p	50	\pm 5	Ceramic	
C417	0.01 μ	50	+80 -20	Ceramic		C608	22p	50	\pm 5	Ceramic	
C418	0.01 μ	50	+80 -20	Ceramic		C609	100 μ	35	+50 -10	Electrolytic	
C419	470 μ	25	+50 -10	Electrolytic		C610	100 μ	35	+50 -10	Electrolytic	
C420	220 μ	16	+50 -10	Electrolytic		C611	4.7 μ	25	+50 -10	Electrolytic	
C421	0.047 μ	50	+80 -20	Ceramic		C612	4.7 μ	25	+50 -10	Electrolytic	
C422	0.047 μ	50	+80 -20	Ceramic		C613	47p	50	\pm 5	Ceramic	
C423	100 μ	10	+50 -10	Electrolytic		C614	47p	50	\pm 5	Ceramic	
C424	100 μ	10	+50 -10	Electrolytic		C615	6p	50	\pm 0.25pF	Ceramic	
C425	0.047 μ	50	+80 -20	Ceramic		C616	6p	50	\pm 0.25pF	Ceramic	
C426	(Not used)					C617	4.7 μ	25	+50 -10	Electrolytic	
C427	0.001 μ	50	\pm 10	Ceramic		C618	4.7 μ	25	+50 -10	Electrolytic	
C428	0.047 μ	50	+80 -20	Ceramic		C619	100 μ	35	+50 -10	Electrolytic	
C501	2.2 μ	25/35	\pm 20	Tantalum		C620	100 μ	35	+50 -10	Electrolytic	
C502	2.2 μ	25/35	\pm 20	Tantalum		C621	0.001 μ	50	\pm 5	Mylar	
C503	100p	50	\pm 5	Ceramic		C622	0.001 μ	50	\pm 5	Mylar	
C504	100p	50	\pm 5	Ceramic		C623	0.001 μ	50	\pm 5	Mylar	
C505	47 μ	25	+50 -10	Electrolytic		C624	0.001 μ	50	\pm 5	Mylar	
C506	47 μ	25	+50 -10	Electrolytic		C625	0.0068 μ	50	\pm 5	Mylar	
C507	47p	50	\pm 5	Ceramic		C626	0.0068 μ	50	\pm 5	Mylar	
C508	47p	50	\pm 5	Ceramic		C627	0.0068 μ	50	\pm 5	Mylar	
C509	10 μ	16	+50 -10	Electrolytic		C628	0.0068 μ	50	\pm 5	Mylar	
C510	10 μ	16	+50 -10	Electrolytic		C629	100p	50	\pm 5	Polystyrene	
C511	0.0022 μ	50	\pm 10	Mylar		C630	100p	50	\pm 5	Polystyrene	
C512	0.0022 μ	50	\pm 10	Mylar		C631	0.012 μ	50	\pm 5	Mylar	
C513	0.0068 μ	50	\pm 10	Mylar		C632	0.012 μ	50	\pm 5	Mylar	
						C633	0.012 μ	50	\pm 5	Mylar	
						C634	0.012 μ	50	\pm 5	Mylar	
						C635	0.068 μ	50	\pm 5	Mylar	
						C636	0.068 μ	50	\pm 5	Mylar	
						C637	0.068 μ	50	\pm 5	Mylar	
						C638	0.068 μ	50	\pm 5	Mylar	

Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.	Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.
C701AB	4.7 μ	25	+50 -10	Electrolytic		C819	100 μ	35	+50 -10	Electrolytic	
C702AB	100 μ	63	+50 -10	Electrolytic		C820	1000 μ	25	+50 -10	Electrolytic	
C703AB	150p	50	\pm 5	Ceramic		C821	220 μ	25	+50 -10	Electrolytic	
C704AB	0.1 μ	50	+80 -20	Ceramic		C822	220 μ	25	+50 -10	Electrolytic	
C705AB	0.0068 μ	50	\pm 10	Mylar		C823	470 μ	16	+50 -10	Electrolytic	
C706AB	30p	50	\pm 5	Ceramic		C824	0.04 μ	50	+80 -20	Ceramic	
C707AB	100 μ	63	+50 -10	Electrolytic		C825	0.04 μ	50	+80 -20	Ceramic	
C708AB	220 μ	63	+50 -10	Electrolytic		C826	0.04 μ	50	+80 -20	Ceramic	
C709AB	100 μ	25	+50 -10	Electrolytic		C827	0.04 μ	50	+80 -20	Ceramic	
C710AB	220 μ	63	+50 -10	Electrolytic		C828	100 μ	25	+50 -10	Electrolytic	
C711AB	100 μ	63	+50 -10	Electrolytic		C829	100p	50	\pm 5	Ceramic	
C712AB	100 μ	63	+50 -10	Electrolytic		C830	0.04 μ	50	+80 -20	Ceramic	
C713AB	0.1 μ	100	\pm 10	Mylar		C901	2.2 μ	35	+75 -10	Electrolytic	
C714AB	0.047 μ	100	\pm 20	Ceramic		C902	2.2 μ	35	+75 -10	Electrolytic	
C715AB	0.047 μ	100	\pm 20	Ceramic		C903	220 μ	25	+50 -10	Electrolytic	
C716AB	5p	50	\pm 0.25pF	Ceramic		C904	220 μ	25	+50 -10	Electrolytic	
C801	0.04 μ	50	+80 -20	Ceramic		C905	220 μ	25	+50 -10	Electrolytic	
C802	0.04 μ	50	+80 -20	Ceramic		C906	0.04 μ	50	+80 -20	Ceramic	
C803	0.04 μ	50	+80 -20	Ceramic		C907	220 μ	16	+50 -10	Electrolytic	
C804	0.04 μ	50	+80 -20	Ceramic		C1001	0.022 μ	50	+80 -20	Ceramic	
C805	220 μ	50	+50 -10	Electrolytic		C1101	1 μ	25/35	\pm 20	Tantalum	
C806	220 μ	50	+50 -10	Electrolytic		C1102	1 μ	25/35	\pm 20	Tantalum	
C807	220 μ	35	+50 -10	Electrolytic		C1103	100p	50	\pm 5	Ceramic	
C808	220 μ	35	+50 -10	Electrolytic		C1104	100p	50	\pm 5	Ceramic	
C809	0.04 μ	50	+80 -20	Ceramic		C1105	47 μ	35	+50 -10	Electrolytic	
C810	0.04 μ	50	+80 -20	Ceramic		C1106	47 μ	35	+50 -10	Electrolytic	
C811	100 μ	35	+50 -10	Electrolytic		C1107	3.3 μ	25/35	\pm 20	Tantalum	
C812	100 μ	35	+50 -10	Electrolytic		C1108	3.3 μ	25/35	\pm 20	Tantalum	
C813	220 μ	25	+50 -10	Electrolytic		C1201	1 μ	50	+75 -10	Electrolytic	
C814	220 μ	25	+50 -10	Electrolytic		C1202	1 μ	50	+75 -10	Electrolytic	
C815	220 μ	25	+50 -10	Electrolytic		C1203	0.001 μ	100	\pm 10	Mylar	
C816	220 μ	25	+50 -10	Electrolytic		C1204	0.001 μ	100	\pm 10	Mylar	
C817	100 μ	35	+50 -10	Electrolytic		C1501	47p	50	\pm 5	Ceramic	
C818	100 μ	35	+50 -10	Electrolytic		C1502	1 μ	50	+75 -10	Electrolytic	

Ref. No.	Value (F)	Voltage (V)	Tolerance (%)	Material	R/S Part No.	Ref. No.	Description	R/S Part No.	Mfr's Part No.
C1801	0.01 μ	50	+80 -20	Ceramic		L1001	Micro Inductor (7BA-180J)	C-0709	P-360022
C1802	0.01 μ	50	+80 -20	Ceramic		L1801	AM Bar Antenna Coil (AC-113)	CA-0685	P-110113
C1803	0.01 μ	50	+80 -20	Ceramic		L1802	Balun Coil (75 Ω : 300 Ω)	CA-5027	P-110098
C1804	0.01 μ	50	+80 -20	Ceramic		T 1	FM IFT (7F-048)	CA-8010	P-140048
C1805	0.047 μ	150	+80 -20	Ceramic		T101	FM IFT (3F-49 or 3F-033)	CA-7951	P-140049 or P-140033
C1806	0.047 μ	150	+80 -20	Ceramic		T201	FM OSC Coil (OC-093) red	CA-8012	P-120093
C1807	0.047 μ	150	+80 -20	Ceramic		T202	AM IFT (OA-073 black or OA-048)	CA-7882	P-130073 P-130048
C1808	0.047 μ	150	+80 -20	Ceramic		T203	AM IFT with Cera. Filter (OA-072 450 kHz)	C-1010	P-130072
C1809	10000 μ	56	+50 -10	Electrolytic		T204	AM IFT (OA-074 blue)	CA-8013	P-130074
C1810	10000 μ	56	+50 -10	Electrolytic		T205	AM IFT (OA-075 black)	CA-8014	P-130075
C1811	0.01 μ	125	+80 -20	Ceramic		T1801	Power Transformer (UL)	TA-0757	P-100627
(UL) (LB or UK type)						T1801	Power Transformer (C.S.A.)		P-100628
C1811	0.01 μ	125	+80 -20	Ceramic		T1802	Power Transformer	TA-0758	P-100602
(C.S.A.) (MY type)						CRYSTAL			
CERAMIC FILTERS						Ref. No.	Description	R/S Part No.	Mfr's Part No.
Ref. No.	Description	R/S Part No.	Mfr's Part No.						
CF101	FM Ceramic Filter 10.7MA8-A	C-1012	P-140030						
CF102	FM Ceramic Filter 10.7MA8-A	C-1012	P-140030						
CF103	FM Ceramic Filter 10.7MA8-A	C-1012	P-140030						
COILS & TRANSFORMERS						X-tal	Crystal HC18/U 10.24 MHz	MX-2297	P-390049
Ref. No.	Description	R/S Part No.	Mfr's Part No.	DIODES					
L 1	FM Ant. Coil (AC-112)	CA-8005	P-110112	Ref. No.	Description	R/S Part No.	Manufacturer		
L 2	FM RF Coil (RC-094)	CA-8006	P-340094	D 1	Vari Cap 1SV55	DX-1309	HITACHI		
L 3	FM RF Coil (RC-095)	CA-8007	P-340095	D 2	Vari Cap 1SV55	DX-1309	HITACHI		
L 4	FM Trap Coil (10 $\frac{1}{2}$ T)	CA-8009	P-360042	D 3	Vari Cap 1SV55	DX-1309	HITACHI		
L 5	FM OSC Coil (OC-092)	CA-8008	P-120092	D 4	Vari Cap 1SV55	DX-1309	HITACHI		
L51	Micro Inductor (7BA-180J)	C-0709	P-360022	D101	ITT-73N	DX-1008	ITT		
L52	Micro Inductor (7BA-180J)	C-0709	P-360022	D102	ITT-73N	DX-1008	ITT		
L101	Micro Inductor (2R2K)	CA-7873	P-360021	D103	ITT-73N	DX-1008	ITT		
L102	Micro Inductor (2R2K)	CA-7873	P-360021	D104	ITT-73N	DX-1008	ITT		
L103	Micro Inductor (7BA-180J)	C-0709	P-360022	D105	ITT-73N	DX-1008	ITT		
L401	Micro Inductor (7BA471J)	CB-2347	P-360033	D106	ITT-73N	DX-1008	ITT		
L402	Micro Inductor (7BA471J)	CB-2347	P-360033	D107	ITT-73N	DX-1008	ITT		
L403	Micro Inductor (7BA471J)	CB-2347	P-360033	D108	ITT-73N	DX-1008	ITT		
L701A	Choke Coil (2 μ H)	CB-2298	P-370009	D109	ITT-73N	DX-1008	ITT		
L701B	Choke Coil (2 μ H)	CA-7987	P-370032	D201	BB-509	DX-1310	ITT		
						D202	BB-509	DX-1310	ITT
						D203	ITT-73N	DX-1008	ITT
						D204	1N-60P	DX-0162	HITACHI or SANYO
						D205	1N-60P	DX-0162	HITACHI or SANYO
						D206	ITT-73N	DX-1008	ITT
						D207	ITT-73N	DX-1008	ITT
						D208	ITT-73N	DX-1008	ITT
						D209	ITT-73N	DX-1008	ITT
						D210	ITT-73N	DX-1008	ITT

Ref. No.	Description	R/S Part No.	Manufacturer	Ref. No.	Description	R/S Part No.	Manufacturer
D301	1S2076	DX-0287	HITACHI	D1006	ITT-73N	DX-1008	ITT
D302	1S2076	DX-0287	HITACHI	D1007	ITT-73N	DX-1008	ITT
D303	1N60P	DX-0162	HITACHI	D1008	ITT-73N	DX-1008	ITT
D304	1N60P	DX-0162	HITACHI	D1009	ITT-73N	DX-1008	ITT
D305	ITT-73N	DX-1008	ITT	D1201	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER
D306	ITT-73N	DX-1008	ITT	D1202	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER
D307	ITT-73N	DX-1008	ITT	D1701	RD5.1EB or XZ-051	DX-0987	NEC or JRC
D308	RD5.1EB	DX-0398	NEC	D1702	RD5.1EB or XZ-051	DX-0987	NEC or JRC
D309	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	D1801	S5VB-20	DX-1315	SINDENGEN
D401	ITT-73N	DX-1008	ITT	FUSE			
D402	ITT-73N	DX-1008	ITT	Ref. No.	Description	R/S Part No.	Mfr's Part No.
D403	ITT-73N	DX-1008	ITT		Fuse 1.5A/250V Quick acting	HF-0004	P-250007
D404	ITT-73N	DX-1008	ITT		Fuse 2A/250V Quick acting	HF-0043	P-250009
D405	ITT-73N	DX-1008	ITT		Fuse 6A/125V Quick acting	HF-0116	P-250098
D406	ITT-73N	DX-1008	ITT	DIGITAL DISPLAY PANEL			
D407	ITT-73N	DX-1008	ITT	Ref. No.	Description	R/S Part No.	Mfr's Part No.
D408	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER		Digital Display Panel	M-4523	P-550001
D409	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	INTEGRATED CIRCUITS (IC'S)			
D410	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	Ref. No.	Description	R/S Part No.	Manufacturer
D411	RD3.9EB	DX-1311	NEC	IC 51	μ PB 551C	MX-3962	NEC
D412	ITT-73N (C.S.A. only)	DX-1008	ITT	IC101	HA1211	MX-3617	HITACHI
D701AB	RD13E or WZ130	DX-0537	NEC or JRC	IC102	HA1211	MX-3617	HITACHI
D702AB	VD-1121	DX-0513	NEC	IC103	HA1211	MX-3617	HITACHI
D703AB	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	IC104	LA-1231S	MX-1963	SANYO
D704AB	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	IC105	LM-3900N	MX-3231	NS
D705AB	SR1K-2 or 10E-1	DX-0475	UNIZON or INTER RECTIFIER	IC106	LA-3350S	MX-3768	SANYO
D801	SVB10-200	DX-1115	UNIZON	IC107	NJM-4558DX	MX-3767	JRC
D802	SVB10-200	DX-1115	UNIZON	IC201	HA-1197	MX-3467	HITACHI
D803	RD24E or WZ240	DX-0536	NEC or JRC	IC301	HA-11226	MX-3590	HITACHI
D804	RD24E or WZ240	DX-0536	NEC or JRC	IC401	μ PD2815C	MX-3965	NEC
D805	RD12E or WZ120	F-1013	NEC or JRC	IC402	μ PD547LC	MX-3964	NEC
D901	1K-100-350	DX-0033	UNIZON	IC403	NJM-4558DX	MX-3966	JRC
D902	1K-100-350	DX-0033	UNIZON	IC404	μ PD4518C	MX-3967	NEC
D903	VD-1221	DX-0517	NEC	IC1501	LB-1405	MX-3836	SANYO
D904	VD-1221	DX-0517	NEC	IC1701	UAA180	MX-3968	SIEMENS
D905	VD-1221	DX-0517	NEC	IC1702	UAA180	MX-3968	SIEMENS
D906	VD-1221	DX-0517	NEC				
D907	ITT-73N	DX-1008	ITT				
D1001	ITT-73N	DX-1008	ITT				
D1002	ITT-73N	DX-1008	ITT				
D1003	ITT-73N	DX-1008	ITT				
D1004	ITT-73N	DX-1008	ITT				
D1005	ITT-73N	DX-1008	ITT				

LED'S				RESISTORS					
Ref. No.	Description	R/S Part No.	Manufacturer	Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.
D1501	LED SLP-141B (Red)	L-1067	SANYO	R 1	47K	¼	± 5	Carbon	NEE-0340
D1502	LED SLP-141B (Red)	L-1067	SANYO	R 2	100K	¼	± 5	Carbon	NEE-0371
D1503	LED SLP-141B (Red)	L-1067	SANYO	R 3	100K	¼	± 5	Carbon	NEE-0371
D1504	LED SLP-141B (Red)	L-1067	SANYO	R 4	100K	¼	± 5	Carbon	NEE-0371
D1505	LED SLP-141B (Red)	L-1067	SANYO	R 5	100	¼	± 5	Carbon	NEE-0132
D1506	LED SLP-141B (Red)	L-1067	SANYO	R 6	100K	¼	± 5	Carbon	NEE-0371
D1507	LED SLP-241B (Green)	L-1068	SANYO	R 7	100K	¼	± 5	Carbon	NEE-0371
				R 8	4.7K	¼	± 5	Carbon	NEE-0247
				R 9	22K	¼	± 5	Carbon	NEE-0311
D1703	LED SLP-141B (Red)	L-1067	SANYO	R 10	1K	¼	± 5	Carbon	NEE-0196
D1704	LED SLP-141B (Red)	L-1067	SANYO	R 11	10K	¼	± 5	Carbon	NEE-0281
D1705	LED SLP-141B (Red)	L-1067	SANYO	R 12	1K	¼	± 5	Carbon	NEE-0196
D1706	LED SLP-141B (Red)	L-1067	SANYO	R 13	100K	¼	± 5	Carbon	NEE-0371
D1707	LED SLP-141B (Red)	L-1067	SANYO	R 14	100	¼	± 5	Carbon	NEE-0132
D1708	LED SLP-141B (Red)	L-1067	SANYO	R 15	220K	¼	± 5	Carbon	NEE-0396
D1709	LED SLP-141B (Red)	L-1067	SANYO	R 16	1K	¼	± 5	Carbon	NEE-0196
D1710	LED SLP-141B (Red)	L-1067	SANYO	R 17	100K	¼	± 5	Carbon	NEE-0371
D1711	LED SLP-141B (Red)	L-1067	SANYO	R 18	8.2K	¼	± 5	Carbon	NEE-0271
D1712	LED SLP-141B (Red)	L-1067	SANYO	R 19	10K	¼	± 5	Carbon	NEE-0281
D1713	LED SLP-141B (Red)	L-1067	SANYO	R 20	2.2K	¼	± 5	Carbon	NEE-0216
D1714	LED SLP-141B (Red)	L-1067	SANYO	R 21	100K	¼	± 5	Carbon	NEE-0371
D1715	LED SLP-141B (Red)	L-1067	SANYO	R 51	1K	¼	± 5	Carbon	NEE-0196
D1716	LED SLP-141B (Red)	L-1067	SANYO						
D1717	LED SLP-141B (Red)	L-1067	SANYO	R 101	330	¼	± 5	Carbon	NEE-0159
D1718	LED SLP-141B (Red)	L-1067	SANYO	R 102	330	¼	± 5	Carbon	NEE-0159
D1719	LED SLP-141B (Red)	L-1067	SANYO	R 103	330	¼	± 5	Carbon	NEE-0159
D1720	LED SLP-141B (Red)	L-1067	SANYO	R 104	100	¼	± 5	Carbon	NEE-0132
D1721	LED SLP-141B (Red)	L-1067	SANYO	R 105	100	¼	± 5	Carbon	NEE-0132
D1722	LED SLP-141B (Red)	L-1067	SANYO	R 106	330	¼	± 5	Carbon	NEE-0159
				R 107	330	¼	± 5	Carbon	NEE-0159
				R 108	100	¼	± 5	Carbon	NEE-0132
				R 109	100	¼	± 5	Carbon	NEE-0132
				R 110	330	¼	± 5	Carbon	NEE-0159
				R 111	330	¼	± 5	Carbon	NEE-0159
				R 112	100	¼	± 5	Carbon	NEE-0132
				R 113	100	¼	± 5	Carbon	NEE-0132
				R 114	100K	¼	± 5	Carbon	NEE-0371
				R 115	1K	¼	± 5	Carbon	NEE-0196
				R 116	56K	¼	± 5	Carbon	NEE-0345
				R 117	1K	¼	± 5	Carbon	NEE-0196
				R 118	5.6K	¼	± 5	Carbon	NEE-0257
				R 119	1K	¼	± 5	Carbon	NEE-0196
				R 120	47K	¼	± 5	Carbon	NEE-0340
				R 121	10K	¼	± 5	Carbon	NEE-0281
				R 122	4.7K	¼	± 5	Carbon	NEE-0247
				R 123	1.5K	¼	± 5	Carbon	NEE-0206
				R 124	10K	¼	± 5	Carbon	NEE-0281
				R 125	47K	¼	± 5	Carbon	NEE-0340
				R 126	39K	¼	± 5	Carbon	NEE-0330
				R 127	100K	¼	± 5	Carbon	NEE-0371
				R 128	10K	¼	± 5	Carbon	NEE-0281
				R 129	220K	¼	± 5	Carbon	NEE-0396
				R 130	1M	¼	± 5	Carbon	NEE-0445
				R 131	1M	¼	± 5	Carbon	NEE-0445
				R 132	100K	¼	± 5	Carbon	NEE-0371
				R 133	10K	¼	± 5	Carbon	NEE-0281
				R 134	100K	¼	± 5	Carbon	NEE-0371
				R 135	22K	¼	± 5	Carbon	NEE-0311
				R 136	3.9K	¼	± 5	Carbon	NEE-0237
LOW PASS FILTERS									
Ref. No.	Description	R/S Part No.	Mfr's Part No.						
LPF101	Low Pass Filter LPV-20 or TT-80002	CB-0159	P-510015 or P-510012						
LPF102	Low Pass Filter LPV-20 or TT-80002	CB-0159	P-510015 or P-510012						
RELAYS									
Ref. No.	Description	R/S Part No.	Mfr's Part No.						
RY301	Relay L23 (M) 2X-7	R-8116	P-290022						
RY1201	Relay MS4U 12V	R-8115	P-290032						
RY1202	Relay MS4U 12V	R-8115	P-290032						
REGULATOR									
Ref. No.	Description	R/S Part No.	Manufacturer						
IC 52	LM78L-05ACZ	MX-4290	NS						
IC405	LM78L-05ACZ	MX-4290	NS						
IC406	LM78L-08ACZ	MX-3874	NS						

Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.	Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.
R 137	100K	¼	± 5	Carbon	NEE-0371	R 216	820	¼	± 5	Carbon	NEE-0187
R 138	100K	¼	± 5	Carbon	NEE-0371	R 217	560	¼	± 5	Carbon	NEE-0176
R 139	100K	¼	± 5	Carbon	NEE-0371	R 218	10K	¼	± 5	Carbon	NEE-0281
R 140	100K	¼	± 5	Carbon	NEE-0371	R 219	1K	¼	± 5	Carbon	NEE-0196
R 141	100K	¼	± 5	Carbon	NEE-0371	R 220	10K	¼	± 5	Carbon	NEE-0281
R 142	4.7K	¼	± 5	Carbon	NEE-0247	R 221	6.8K	¼	± 5	Carbon	NEE-0262
R 143	47K	¼	± 5	Carbon	NEE-0340	R 222	1.5M	¼	± 5	Carbon	NEE-0450
R 144	100K	¼	± 5	Carbon	NEE-0371	R 223	4.7K	¼	± 5	Carbon	NEE-0450
R 145	4.7K	¼	± 5	Carbon	NEE-0247	R 224	1K	¼	± 5	Carbon	NEE-0196
R 146	10K	¼	± 5	Carbon	NEE-0281	R 225	47K	¼	± 5	Carbon	NEE-0340
R 147	10K	¼	± 5	Carbon	NEE-0281	R 226	10K	¼	± 5	Carbon	NEE-0281
R 148	470	¼	± 5	Carbon	NEE-0169	R 227	100K	¼	± 5	Carbon	NEE-0371
R 149	2.2K	¼	± 5	Carbon	NEE-0224	R 228	10K	¼	± 5	Carbon	NEE-0281
R 150	47K	¼	± 5	Carbon	NEE-0340	R 229	820	¼	± 5	Carbon	NEE-0187
R 151	100K	¼	± 5	Carbon	NEE-0371	R 230	1K	¼	± 5	Carbon	NEE-0196
R 152	(Not used)					R 231	1K	¼	± 5	Carbon	NEE-0196
R 153	6.8K	¼	± 5	Carbon	NEE-0262	R 232	1K	¼	± 5	Carbon	NEE-0196
R 154	2.2K	¼	± 5	Carbon	NEE-0216	R 233	15K	¼	± 5	Carbon	NEE-0297
R 155	3.3K	¼	± 5	Carbon	NEE-0230	R 234	15K	¼	± 5	Carbon	NEE-0297
R 156	47K	¼	± 5	Carbon	NEE-0340	R 235	100	¼	± 5	Carbon	NEE-0132
R 157	1K	¼	± 5	Carbon	NEE-0196	R 236	1K	¼	± 5	Carbon	NEE-0196
R 158	8.2K	¼	± 5	Carbon	NEE-0271	R 237	220K	¼	± 5	Carbon	NEE-0396
R 159	100	¼	± 5	Carbon	NEE-0132	R 238	220K	¼	± 5	Carbon	NEE-0396
R 160	27K	¼	± 5	Carbon	NEE-0316	R 239	47K	¼	± 5	Carbon	NEE-0340
R 161	47K	¼	± 5	Carbon	NEE-0340	R 240	1K	¼	± 5	Carbon	NEE-0196
R 162	270	¼	± 5	Carbon	NEE-0155						
R 163	3.3K	¼	± 5	Carbon	NEE-0230	R 301	1K	¼	± 5	Carbon	NEE-0196
R 164	3.3K	¼	± 5	Carbon	NEE-0230	R 302	1K	¼	± 5	Carbon	NEE-0196
R 165	1K	¼	± 5	Carbon	NEE-0196	R 303	47K	¼	± 5	Carbon	NEE-0340
R 166	1K	¼	± 5	Carbon	NEE-0196	R 304	47K	¼	± 5	Carbon	NEE-0340
R 167	100K	¼	± 5	Carbon	NEE-0371	R 305	270K	¼	± 5	Carbon	NEE-0402
R 168	100K	¼	± 5	Carbon	NEE-0371	R 306	270K	¼	± 5	Carbon	NEE-0402
R 169	100K	¼	± 5	Carbon	NEE-0371	R 307	270K	¼	± 5	Carbon	NEE-0402
R 170	100K	¼	± 5	Carbon	NEE-0371	R 308	270K	¼	± 5	Carbon	NEE-0402
R 171	27K	¼	± 5	Carbon	NEE-0316	R 309	47K	¼	± 5	Carbon	NEE-0340
R 172	27K	¼	± 5	Carbon	NEE-0316	R 310	47K	¼	± 5	Carbon	NEE-0340
R 173	2.2K	¼	± 5	Carbon	NEE-0216	R 311	12K	¼	± 5	Carbon	NEE-0288
R 174	2.2K	¼	± 5	Carbon	NEE-0216	R 312	12K	¼	± 5	Carbon	NEE-0288
R 175	10K	¼	± 5	Carbon	NEE-0281	R 313	3.9K	¼	± 5	Carbon	NEE-0237
R 176	10K	¼	± 5	Carbon	NEE-0281	R 314	3.9K	¼	± 5	Carbon	NEE-0237
R 177	2.2K	¼	± 5	Carbon	NEE-0216	R 315	2.2K	¼	± 5	Carbon	NEE-0216
R 178	2.2K	¼	± 5	Carbon	NEE-0216	R 316	2.2K	¼	± 5	Carbon	NEE-0216
R 179	100	¼	± 5	Carbon	NEE-0132	R 317	2.2K	¼	± 5	Carbon	NEE-0216
R 180	1K	¼	± 5	Carbon	NEE-0196	R 318	2.2K	¼	± 5	Carbon	NEE-0216
R 181	47K	¼	± 5	Carbon	NEE-0340	R 319	180	¼	± 5	Carbon	NEE-0144
						R 320	180	¼	± 5	Carbon	NEE-0144
						R 321	47	¼	± 5	Carbon	NEE-0099
R 201	10K	¼	± 5	Carbon	NEE-0281	R 322	22K	¼	± 5	Carbon	NEE-0311
R 202	15K	¼	± 5	Carbon	NEE-0297	R 323	4.7K	¼	± 5	Carbon	NEE-0247
R 203	15K	¼	± 5	Carbon	NEE-0297	R 324	47K	¼	± 5	Carbon	NEE-0340
R 204	10K	¼	± 5	Carbon	NEE-0281	R 325	4.7K	¼	± 5	Carbon	NEE-0247
R 205	100K	¼	± 5	Carbon	NEE-0371	R 326	10K	¼	± 5	Carbon	NEE-0281
R 206	100	¼	± 5	Carbon	NEE-0132	R 327	820	¼	± 5	Carbon	NEE-0187
R 207	1K	¼	± 5	Carbon	NEE-0196	R 328	47K	¼	± 5	Carbon	NEE-0340
R 208	82K	¼	± 5	Carbon	NEE-0360	R 329	390K	¼	± 5	Carbon	NEE-0414
R 209	5.6K	¼	± 5	Carbon	NEE-0257	R 330	39K	¼	± 5	Carbon	NEE-0330
R 210	(Not used)					R 331	220	¼	± 5	Carbon	NEE-0149
R 211	1.5K	¼	± 5	Carbon	NEE-0206	R 332	100	¼	± 5	Carbon	NEE-0132
R 212	150	¼	± 5	Carbon	NEE-0142						
R 213	10K	¼	± 5	Carbon	NEE-0281	R 401	100K	¼	± 5	Carbon	NEE-0371
R 214	150	¼	± 5	Carbon	NEE-0142	R 402	100K	¼	± 5	Carbon	NEE-0371
R 215	10K	¼	± 5	Carbon	NEE-0281	R 403	100K	¼	± 5	Carbon	NEE-0371

Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.	Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.
R404	100K	¼	± 5	Carbon	NEE-0371	R466	12K	¼	± 5	Carbon	NEE-0288
R405	100K	¼	± 5	Carbon	NEE-0371	R467	12K	¼	± 5	Carbon	NEE-0288
R406	100K	¼	± 5	Carbon	NEE-0371	R468	150K	¼	± 5	Carbon	NEE-0384
R407	100K	¼	± 5	Carbon	NEE-0371	R469	12K	¼	± 5	Carbon	NEE-0288
R408	100K	¼	± 5	Carbon	NEE-0371	R470	12K	¼	± 5	Carbon	NEE-0288
R409	100K	¼	± 5	Carbon	NEE-0371	R471	12K	¼	± 5	Carbon	NEE-0288
R410	100K	¼	± 5	Carbon	NEE-0371	R472	12K	¼	± 5	Carbon	NEE-0288
R411	100K	¼	± 5	Carbon	NEE-0371	R473	470K	¼	± 5	Carbon	NEE-0423
R412	100K	¼	± 5	Carbon	NEE-0371	R474	100K	¼	± 5	Carbon	NEE-0371
R413	100K	¼	± 5	Carbon	NEE-0371	R475	33K	¼	± 5	Carbon	NEE-0324
R414	100K	¼	± 5	Carbon	NEE-0371	R476	1K	¼	± 5	Carbon	NEE-0196
R415	100K	¼	± 5	Carbon	NEE-0371	R477	4.7K	¼	± 5	Carbon	NEE-0247
R416	100K	¼	± 5	Carbon	NEE-0371	R478	4.7K	¼	± 5	Carbon	NEE-0247
R417	100K	¼	± 5	Carbon	NEE-0371	R479	10K	¼	± 5	Carbon	NEE-0281
R418	100K	¼	± 5	Carbon	NEE-0371	R480	10K	¼	± 5	Carbon	NEE-0281
R419	100K	¼	± 5	Carbon	NEE-0371	R481	5.6K	¼	± 5	Carbon	NEE-0257
R420	68K	¼	± 5	Carbon	NEE-0354	R482	2.2K	¼	± 5	Carbon	NEE-0216
R421	68K	¼	± 5	Carbon	NEE-0354	R483	1K	¼	± 5	Carbon	NEE-0196
R422	68K	¼	± 5	Carbon	NEE-0354	R484	10K	¼	± 5	Carbon	NEE-0281
R423	68K	¼	± 5	Carbon	NEE-0354	R485	5.6K	¼	± 5	Carbon	NEE-0257
R424	68K	¼	± 5	Carbon	NEE-0354	R486	470	¼	± 5	Carbon	NEE-0169
R425	68K	¼	± 5	Carbon	NEE-0354	R487	330K	¼	± 5	Carbon	NEE-0410
R426	68K	¼	± 5	Carbon	NEE-0354	R488	100K	¼	± 5	Carbon	NEE-0371
R427	68K	¼	± 5	Carbon	NEE-0354	R489	6.8K	¼	± 5	Carbon	NEE-0262
R428	68K	¼	± 5	Carbon	NEE-0354	R490	15K	¼	± 5	Carbon	NEE-0297
R429	68K	¼	± 5	Carbon	NEE-0354	R491	680K	¼	± 5	Carbon	NEE-0433
R430	68K	¼	± 5	Carbon	NEE-0354	R492	680K	¼	± 5	Carbon	NEE-0433
R431	68K	¼	± 5	Carbon	NEE-0354	R493	120K	¼	± 5	Carbon	NEE-0375
R432	68K	¼	± 5	Carbon	NEE-0354	R494	120K	¼	± 5	Carbon	NEE-0375
R433	68K	¼	± 5	Carbon	NEE-0354	R495	120K	¼	± 5	Carbon	NEE-0375
R434	68K	¼	± 5	Carbon	NEE-0354	R496	8.2K	¼	± 5	Carbon	NEE-0271
R435	68K	¼	± 5	Carbon	NEE-0354	R497	82K	¼	± 5	Carbon	NEE-0360
R436	68K	¼	± 5	Carbon	NEE-0354	R498	2.2K	¼	± 5	Carbon	NEE-0216
R437	68K	¼	± 5	Carbon	NEE-0354	R499	10K	¼	± 5	Carbon	NEE-0281
R438	68K	¼	± 5	Carbon	NEE-0354						
R439	470	¼	± 5	Carbon	NEE-0169	R501	56K	¼	± 5	Carbon	NEE-0345
R440	22K	¼	± 5	Carbon	NEE-0311	R502	56K	¼	± 5	Carbon	NEE-0345
R441	12K	¼	± 5	Carbon	NEE-0288	R503	4.7K	¼	± 5	Carbon	NEE-0247
R442	12K	¼	± 5	Carbon	NEE-0288	R504	4.7K	¼	± 5	Carbon	NEE-0247
R443	12K	¼	± 5	Carbon	NEE-0288	R505	390K	¼	± 5	Carbon	NEE-0414
R444	12K	¼	± 5	Carbon	NEE-0288	R506	390K	¼	± 5	Carbon	NEE-0414
R445	12K	¼	± 5	Carbon	NEE-0288	R507	180K	¼	± 5	Carbon	NEE-0387
R446	12K	¼	± 5	Carbon	NEE-0288	R508	180K	¼	± 5	Carbon	NEE-0387
R447	12K	¼	± 5	Carbon	NEE-0288	R509	22K	¼	± 5	Carbon	NEE-0311
R448	12K	¼	± 5	Carbon	NEE-0288	R510	22K	¼	± 5	Carbon	NEE-0311
R449	12K	¼	± 5	Carbon	NEE-0288	R511	680	¼	± 5	Carbon	NEE-0183
R450	120K	¼	± 5	Carbon	NEE-0375	R512	680	¼	± 5	Carbon	NEE-0183
R451	120K	¼	± 5	Carbon	NEE-0375	R513	33K	¼	± 5	Carbon	NEE-0324
R452	120K	¼	± 5	Carbon	NEE-0375	R514	33K	¼	± 5	Carbon	NEE-0324
R453	120K	¼	± 5	Carbon	NEE-0375	R515	680K	¼	± 5	Carbon	NEE-0433
R454	12K	¼	± 5	Carbon	NEE-0288	R516	680K	¼	± 5	Carbon	NEE-0433
R455	12K	¼	± 5	Carbon	NEE-0288	R517	270	¼	± 5	Carbon	NEE-0155
R456	12K	¼	± 5	Carbon	NEE-0288	R518	270	¼	± 5	Carbon	NEE-0155
R457	12K	¼	± 5	Carbon	NEE-0288	R519	15K	¼	± 5	Carbon	NEE-0297
R458	12K	¼	± 5	Carbon	NEE-0288	R520	15K	¼	± 5	Carbon	NEE-0297
R459	12K	¼	± 5	Carbon	NEE-0288	R521	10K	¼	± 5	Carbon	NEE-0281
R460	12K	¼	± 5	Carbon	NEE-0288	R522	10K	¼	± 5	Carbon	NEE-0281
R461	12K	¼	± 5	Carbon	NEE-0288	R523	560	¼	± 5	Carbon	NEE-0176
R462	12K	¼	± 5	Carbon	NEE-0288	R524	560	¼	± 5	Carbon	NEE-0176
R463	12K	¼	± 5	Carbon	NEE-0288	R525	4.7K	¼	± 5	Carbon	NEE-0247
R464	1K	¼	± 5	Carbon	NEE-0196	R526	4.7K	¼	± 5	Carbon	NEE-0247
R465	12K	¼	± 5	Carbon	NEE-0288	R527	100	¼	± 5	Carbon	NEE-0132

Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.	Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.
R 528	100	¼	± 5	Carbon	NEE-0132	R 701AB	100K	½	± 5	Carbon	NEF-0371
R 529	47K	¼	± 5	Carbon	NEE-0340	R 702AB	2.2K	½	± 5	Carbon	NEF-0216
R 530	47K	¼	± 5	Carbon	NEE-0340	R 703AB	22K	½	± 5	Carbon	NEF-0311
R 531	100	¼	± 5	Carbon	NEE-0132	R 704AB	3.9K	2	± 5	Metal Oxide	NEH-0237
R 532	100	¼	± 5	Carbon	NEE-0132						
R 533	4.7K	¼	± 5	Carbon	NEE-0247	R 705AB	10K	½	± 5	Carbon	NEF-0281
R 534	4.7K	¼	± 5	Carbon	NEE-0247	R 706AB	2.2K	½	± 5	Carbon	NEF-0216
R 535	4.7K	¼	± 5	Carbon	NEE-0247	R 707AB	2.2K	½	± 5	Carbon	NEF-0216
R 536	4.7K	¼	± 5	Carbon	NEE-0247	R 708AB	68 (UL)	½	± 5	Carbon	NEF-0183
R 537	220K	¼	± 5	Carbon	NEE-0396		68 (C.S.A.)	1	± 5	Metal Oxide	
R 538	220K	¼	± 5	Carbon	NEE-0396						
R 539	220K	¼	± 5	Carbon	NEE-0396	R 709AB	100	½	± 5	Carbon	NEF-0132
R 540	220K	¼	± 5	Carbon	NEE-0396	R 710AB	12K	½	± 5	Carbon	NEF-0288
						R 711AB	100	½	± 5	Carbon	NEF-0132
R 601	3.9K	¼	± 5	Carbon	NEE-0237	R 712AB	10K	½	± 5	Carbon	NEF-0281
R 602	(Not used)					R 713AB	120	½	± 5	Carbon	NEF-0136
R 603	2.2K	¼	± 5	Carbon	NEE-0216	R 714AB	150 (UL)	½	± 5	Carbon	NEF-0142
R 604	2.2K	¼	± 5	Carbon	NEE-0216	R 714AB	150 (C.S.A.)	1	± 5	Metal Oxide	
R 605	56K	¼	± 5	Carbon	NEE-0345	R 715AB	1K	½	± 5	Carbon	NEF-0196
R 606	56K	¼	± 5	Carbon	NEE-0345	R 716AB	22K	½	± 5	Carbon	NEF-0311
R 607	100K	¼	± 5	Carbon	NEE-0371	R 717AB	1K	½	± 5	Carbon	NEF-0196
R 608	100K	¼	± 5	Carbon	NEE-0371	R 718AB	1K	½	± 5	Carbon	NEF-0196
R 609	100K	¼	± 5	Carbon	NEE-0371	R 719AB	68 (UL)	½	± 5	Carbon	NEF-0183
R 610	100K	¼	± 5	Carbon	NEE-0371	R 719AB	68 (C.S.A.)	1	± 5	Metal Oxide	
R 611	100K	¼	± 5	Carbon	NEE-0371						
R 612	100K	¼	± 5	Carbon	NEE-0371	R 720AB	0.5	5	± 5	Cement	NEL-
R 613	1M	¼	± 5	Carbon	NEE-0445	R 721AB	0.5	5	± 5	Cement	NEL-
R 614	1M	¼	± 5	Carbon	NEE-0445	R 722AB	4.7	2	± 5	Metal Oxide	NEH-0047
R 615	10K	¼	± 5	Carbon	NEE-0281	R 723AB	470	½	± 5	Carbon	NEF-0169
R 616	10K	¼	± 5	Carbon	NEE-0281	R 724AB	150 (UL)	½	± 5	Carbon	NEF-0142
R 617	1.8K	¼	± 5	Carbon	NEE-0210	R 724AB	150 (C.S.A.)	1	± 5	Metal Oxide	
R 618	1.8K	¼	± 5	Carbon	NEE-0210						
R 619	220K	¼	± 5	Carbon	NEE-0396	R 725AB	2.2	2	± 5	Metal Oxide	NEH-0216
R 620	220K	¼	± 5	Carbon	NEE-0396						
R 621	56K	¼	± 5	Carbon	NEE-0345						
R 622	56K	¼	± 5	Carbon	NEE-0345	R 801	22	1	± 5	Metal Oxide	NEG-0311
R 623	15K	¼	± 5	Carbon	NEE-0297	R 802	22	1	± 5	Metal Oxide	NEG-0311
R 624	15K	¼	± 5	Carbon	NEE-0297						
R 625	15K	¼	± 5	Carbon	NEE-0297	R 803	1.2K	½	± 5	Carbon	NEF-0199
R 626	15K	¼	± 5	Carbon	NEE-0297	R 804	1.2K	½	± 5	Carbon	NEF-0199
R 627	4.7K	¼	± 5	Carbon	NEE-0247	R 805	1.2K	½	± 5	Carbon	NEF-0199
R 628	4.7K	¼	± 5	Carbon	NEE-0247	R 806	1.2K	½	± 5	Carbon	NEF-0199
R 629	680	¼	± 5	Carbon	NEE-0183	R 807	100	½	± 5	Carbon	NEF-0132
R 630	680	¼	± 5	Carbon	NEE-0183	R 808	100	½	± 5	Carbon	NEF-0132
R 631	2.2K	¼	± 5	Carbon	NEE-0216	R 809	1K	½	± 5	Carbon	NEF-0196
R 632	2.2K	¼	± 5	Carbon	NEE-0216	R 810	1K	½	± 5	Carbon	NEF-0196
R 633	33K	¼	± 5	Carbon	NEE-0324	R 811	15K	½	± 5	Carbon	NEF-0297
R 634	33K	¼	± 5	Carbon	NEE-0324	R 812	15K	½	± 5	Carbon	NEF-0297
R 635	56K	¼	± 5	Carbon	NEE-0345	R 813	120K	½	± 5	Carbon	NEF-0375
R 636	56K	¼	± 5	Carbon	NEE-0345	R 814	120K	½	± 5	Carbon	NEF-0375
R 637	3.9K	¼	± 5	Carbon	NEE-0237	R 815	120	½	± 5	Carbon	NEF-0136
R 638	3.9K	¼	± 5	Carbon	NEE-0237	R 816	120	½	± 5	Carbon	NEF-0136
R 639	10K	¼	± 5	Carbon	NEE-0281	R 817	470	½	± 5	Carbon	NEF-0169
						R 818	470	½	± 5	Carbon	NEF-0169
						R 819	270	½	± 5	Carbon	NEF-0155
						R 820	270	½	± 5	Carbon	NEF-0155
						R 821	100 (UL)	½	± 5	Carbon	NEF-0132
						R 821	100 (C.S.A.)	1	± 5	Metal Oxide	
						R 822	100 (UL)	½	± 5	Carbon	NEF-0132

Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.	Ref. No.	Value (ohm)	Wattage (W)	Tolerance (%)	Material	Mfr's Part No.
R822	100(C.S.A.)	1	± 5	Metal Oxide		R1501	560	¼	± 5	Carbon	NEE-0171
R823	180	½	± 5	Carbon	NEF-0144	R1502	18K	¼	± 5	Carbon	NEE-0303
R824	22	1	± 5	Metal Oxide	NEG-0078	R1503	100K	¼	± 5	Carbon	NEE-0371
R825	820	½	± 5	Carbon	NEF-0187	R1504	4.7K	¼	± 5	Carbon	NEE-0247
R826	100	½	± 5	Carbon	NEF-0132	R1505	330	¼	± 5	Carbon	NEE-0159
R827	150	½	± 5	Carbon	NEF-0142	R1601	56	½	± 5	Carbon	NEF-0107
R828	470	½	± 5	Carbon	NEF-0169	R1602	56	½	± 5	Carbon	NEF-0107
R829	12	1	± 5	Metal Oxide	NEG-0067	R1603	1.2M	¼	± 5	Carbon	NEE-0447
R830	180	1	± 5	Metal Oxide	NEG-0144	R1604	1.2M	¼	± 5	Carbon	NEE-0447
R831	(Not used)					R1605	100K	¼	± 5	Carbon	NEE-0371
R832	820	½	± 5	Carbon	NEF-0187	R1606	10K	¼	± 5	Carbon	NEE-0281
R901	560	1	± 5	Metal Oxide	NEG-0176	R1607	47K	¼	± 5	Carbon	NEE-0340
R902	560	1	± 5	Metal Oxide	NEG-0176	R1701	220K	¼	± 5	Carbon	NEE-0396
R903	1K	1	± 5	Metal Oxide	NEG-0196	R1702	220K	¼	± 5	Carbon	NEE-0396
R904	1K	1	± 5	Metal Oxide	NEG-0196	R1703	2.7K	¼	± 5	Carbon	NEE-0224
R905	150K	¼	± 5	Carbon	NEE-0314	R1704	2.7K	¼	± 5	Carbon	NEE-0224
R906	150K	¼	± 5	Carbon	NEE-0314	R1705	22K	¼	± 5	Carbon	NEE-0311
R907	18K	¼	± 5	Carbon	NEE-0303	R1706	22K	¼	± 5	Carbon	NEE-0311
R908	18K	¼	± 5	Carbon	NEE-0303	R1707	1M	¼	± 5	Carbon	NEE-0445
R909	6.8K	¼	± 5	Carbon	NEE-0262	R1708	1M	¼	± 5	Carbon	NEE-0445
R910	3.3K	¼	± 5	Carbon	NEE-0230	R1801	2.2M	½	± 5	Carbon	NEF-0454
R911	6.8K	¼	± 5	Carbon	NEE-0262	SCR					
R912	330	¼	± 5	Carbon	NEE-0159	Ref. No.	Description	R/S Part No.	Manufacturer		
R913	10K	¼	± 5	Carbon	NEE-0281	SCR901	2SF657 or D3D-1M	MX-4114	NEC		
R914	2.7K	2	± 5	Metal Oxide	NEH-0224	SWITCHES					
R915	820	½	± 5	Carbon	NEF-0187	Ref. No.	Description	R/S Part No.	Mfr's Part No.		
R916	1.2K	½	± 5	Carbon	NEF-0199	-	Push Switch (TONE DEFEAT/ MONO/LOUDNESS/ HI MPX FILTER)	S-7437	P-180396		
R917	10K	¼	± 5	Carbon	NEE-0281		Push Switch (TURNOVER Switch)	S-7438	P-180397		
R918	1K	¼	± 5	Carbon	NEE-0196		TAPE MONITOR Switch	S-2550	P-180395		
R919	1	¼	± 5	Carbon	NEE-0010		TAPE DUBBING Switch	S-2550	P-180395		
R920	10K	¼	± 5	Carbon	NEE-0281		Key Board Switch (HOUR MINUTE SET, MEMORY SET, MANUAL AUTO TUNE, SCAN, HOLD, MEMORY 1-6)	S-0980	P-180399		
R921	27K	¼	± 5	Carbon	NEE-0316		Push Switch (CLOCK/DIMMER/ MEMORY OUT)	S-7439	P-180352		
R1001	100K	¼	± 5	Carbon	NEE-0371	Ss1-Ss11	Rotary Selector Switch	S-1343	P-180400		
R1101	220K	¼	± 5	Carbon	NEE-0396	PS1-PS3	Power Switch (TV-5)	S-0856	P-180239		
R1102	220K	¼	± 5	Carbon	NEE-0396						
R1103	100K	¼	± 5	Carbon	NEE-0371						
R1104	100K	¼	± 5	Carbon	NEE-0371						
R1105	4.7K	¼	± 5	Carbon	NEE-0247						
R1106	4.7K	¼	± 5	Carbon	NEE-0247						
R1107	1K	¼	± 5	Carbon	NEE-0196						
R1108	1K	¼	± 5	Carbon	NEE-0196						
R1109	100	¼	± 5	Carbon	NEE-0132						
R1110	100	¼	± 5	Carbon	NEE-0132						
R1201	4.7	2	± 5	Metal Oxide	NEH-0047						
R1202	4.7	2	± 5	Metal Oxide	NEH-0047						
R1301	1M	¼	± 5	Carbon	NEE-0445						
R1302	2.2M	¼	± 5	Carbon	NEE-0454						
R1303	100K	¼	± 5	Carbon	NEE-0371						

TRANSISTORS				Ref. No.	Description	Manufacturer	
Ref. No.	Description		Manufacturer				
TR 1	3SK45	(B)	HITACHI	TR 601	2SA750	(E, U)	NEC
TR 2	2SC1674	(L, K)	NEC	TR 602	2SA750	(E, U)	NEC
TR 3	2SK104	(H)	NEC	TR 603	2SA750	(E, U)	NEC
TR 4	2SC1674	(L, K)	NEC	TR 604	2SA750	(E, U)	NEC
TR 101	2SC1675	(L, K)	NEC	TR 605	2SC1222	(E, U)	NEC
TR 102	2SC945A	(P)	NEC	TR 606	2SC1222	(E, U)	NEC
TR 103	2SC945A	(P)	NEC	TR 701AB	2SA872A	(E)	HITACHI
TR 104	2SC945A	(P)	NEC	TR 702AB	2SA872A	(E)	HITACHI
TR 105	2SC945A	(P)	NEC	TR 703AB	2SB646A	(C)	HITACHI
TR 106	2SA733A	(P)	NEC	TR 704AB	2SD666A	(C)	HITACHI
TR 107	2SC945A	(P)	NEC	TR 705AB	2SD666A	(C)	HITACHI
TR 108	2SC945A	(P)	NEC	TR 706AB	2SK134		HITACHI
TR 109	2SC945A	(P)	NEC	TR 707AB	2SJ49		HITACHI
TR 201	2SK104	(H)	NEC	TR 801	2SD571	(L, K)	NEC
TR 202	2SC945A	(P)	NEC	TR 802	2SB605	(L, K)	NEC
TR 203	2SC900	(E)	NEC	TR 803	2SC1222	(E, U)	NEC
TR 204	2SC1675	(L, K)	NEC	TR 804	2SA750	(E, U)	NEC
TR 205	2SC1675	(L, K)	NEC	TR 805	2SD330	(D, E)	SANYO
TR 301	2SC945A	(P)	NEC	TR 901	2SC945A	(P)	NEC
TR 302	2SC945A	(P)	NEC	TR 902	2SC945A	(P)	NEC
TR 303	2SC945A	(P)	NEC	TR 903	2SA733A	(P)	NEC
TR 304	2SC945A	(P)	NEC	TR 904	2SC945A	(P)	NEC
TR 305	2SC945A	(P)	NEC	TR 905	2SA733A	(P)	NEC
TR 401	2SA733A	(P)	NEC	TR 1001	2SC945A	(P)	NEC
TR 402	2SA733A	(P)	NEC	TR 1101	2SC1222	(E, U)	NEC
TR 403	2SA733A	(P)	NEC	TR 1102	2SC1222	(E, U)	NEC
TR 404	2SA733A	(P)	NEC	TR 1301	2SC945A	(P)	NEC
TR 405	2SA733A	(P)	NEC	TR 1601	2SC945A	(P)	NEC
TR 406	2SA733A	(P)	NEC	TR 1602	2SC945A	(P)	NEC
TR 407	2SA733A	(P)	NEC				
TR 408	2SA733A	(P)	NEC				
TR 409	2SA733A	(P)	NEC				
TR 410	2SA733A	(P)	NEC				
TR 411	2SA733A	(P)	NEC				
TR 412	2SA733A	(P)	NEC				
TR 413	2SA733A	(P)	NEC				
TR 414	2SA733A	(P)	NEC				
TR 415	2SA733A	(P)	NEC				
TR 416	2SA733A	(P)	NEC				
TR 417	2SA733A	(P)	NEC				
TR 418	2SA733A	(P)	NEC				
TR 419	2SA733A	(P)	NEC				
TR 420	2SC945A	(P)	NEC				
TR 421	2SA733A	(P)	NEC				
TR 422	2SA733A	(P)	NEC				
TR 423	2SA733A	(P)	NEC				
TR 424	2SC945A	(P)	NEC				
TR 425	2SA733A	(P)	NEC				
TR 501	2SC1222(1)	(E, U)	NEC				
TR 502	2SC1222(1)	(E, U)	NEC				
TR 503	2SC1222(1)	(E, U)	NEC				
TR 504	2SC1222(1)	(E, U)	NEC				
TR 505	2SA750(1)	(E, U)	NEC				
TR 506	2SA750(1)	(E, U)	NEC				
TR 507	2SC1222(1)	(E, U)	NEC				
TR 508	2SC1222(1)	(E, U)	NEC				

THERMAL PROTECTOR			
Ref. No.	Description	R/S Part No.	Mfr's Part No.
	Thermal Protector 100°C UI-2 type	HH-0329	P-290025

VARIABLE CAPACITORS			
Ref. No.	Description	R/S Part No.	Mfr's Part No.
CT 1	Trimmer TRC-1T8x10	C-1009	P-160019
CT 2	Trimmer TRC-1T8x10	C-1009	P-160019
CT 3	Trimmer TRC-1T8x10	C-1009	P-160019
CT 4	Trimmer TRC-1T8x10	C-1009	P-160019
TC 201	Trimmer TRC-1T8x10	C-1009	P-160019

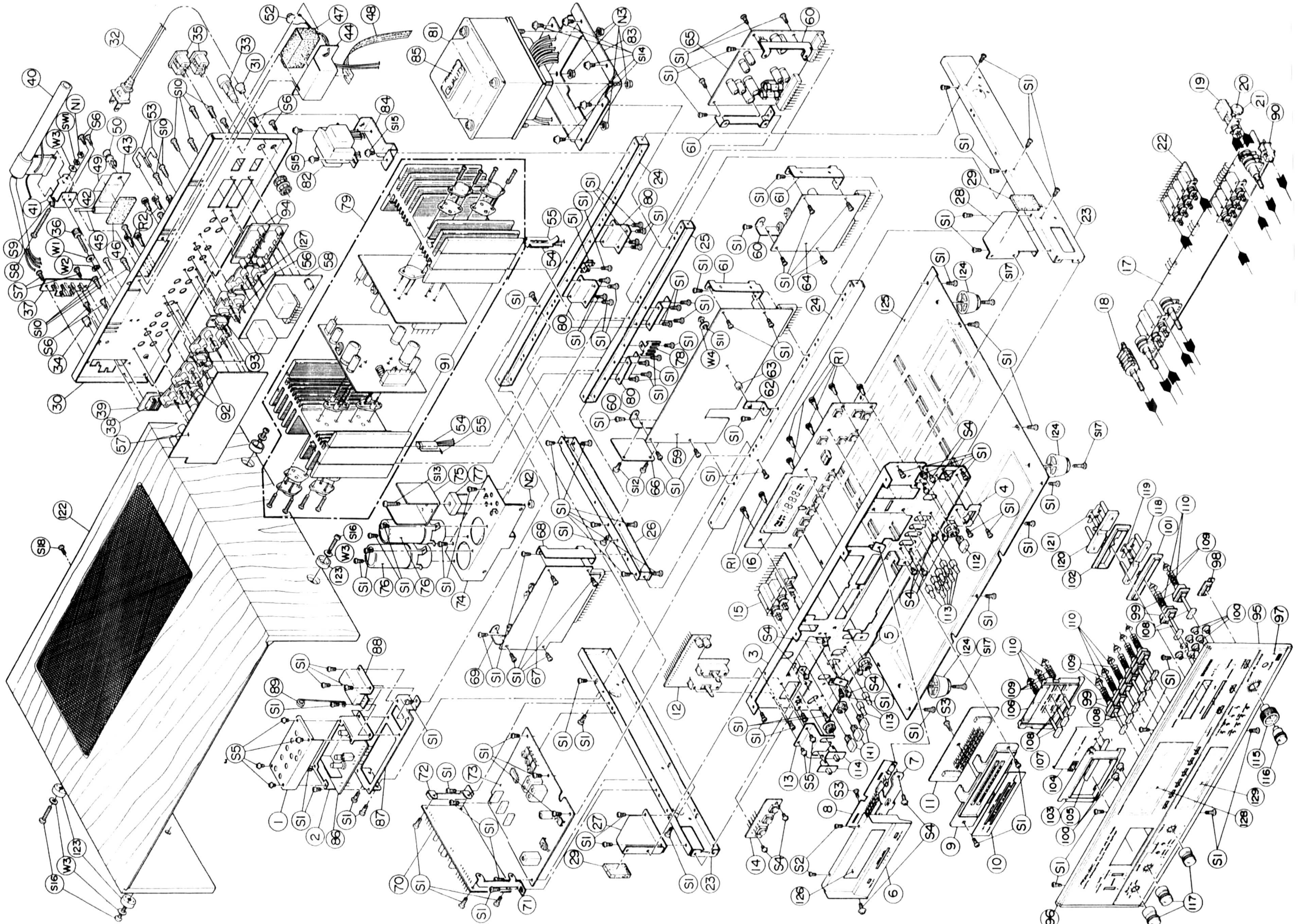
VARIABLE RESISTORS				Ref. No.	Description	R/S Part No.	Mfr's Part No.
Ref. No.	Description	R/S Part No.	Mfr's Part No.				
VR101	Trimmer 100KΩB	P-6578	P-170374	VR601	VOLUME CONTROL	P-6582	P-170484
VR102	Trimmer 100KΩB	P-6578	P-170374	/VR602	100KΩBx2 (plus 100KΩ1Zx2)		
VR103	Trimmer 100KΩB	P-6578	P-170374	VR603	BALANCE Control	P-6582	P-170484
VR104	Trimmer 47KΩB	P-6551	P-170373	/VR604	100KΩ1Zx2 (plus 100KΩBx2)		
VR105	Trimmer 1KΩB	P-6579	P-170367	VR605	TREBLE Control	P-6583	P-170485
VR106	Trimmer 4.7KΩB		P-170370	/VR606	100KΩCx2		
VR201	Trimmer 2.2KΩB	P-6566	P-170368	VR607	BASS Control	P-6583	P-170485
VR202	Trimmer 100KΩB	P-6578	P-170374	/VR608	100KΩCx2		
VR301	Trimmer 22KΩB	P-6409	P-170204	VR701AB	Trimmer 1KΩB	P-6352	P-170198
VR302	Trimmer 22KΩB	P-6409	P-170204	VR901	Trimmer 22KΩB	P-6409	P-170240
VR303	Trimmer 10KΩB	P-6351	P-170202	VR902	Trimmer 22KΩB	P-6409	P-170240
				VR1001	Trimmer 2.2KΩB	P-6581	P-170435

(36) EXPLODED VIEW PARTS LIST

Ref. No.	Description	R/S Part No.	Mfr's Part No.	Ref. No.	Description	R/S Part No.	Mfr's Part No.
1	Front End Cover	HB-9065	P-411906	32	Power Cord	W-2408	P-310093
2	Front End Frame	HB-9064	P-411905	33	Fuse Holder (UL)	F-1017	P-260011
3	Front Chassis		P-400243				or P-260020
4	Headphone Bracket	HB-9068	P-411885	33	Fuse Holder (C.S.A.)		P-260013
5	Frame Bracket	HB-9065	P-411886	34	Strain Relief	HB-0705	P-480010
6	Signal Meter Panel	M-0428	P-710176	35	AC Outlet	J-6434	P-190098
7	Signal Meter Frame	RT-2488	P-610662				or P-190157
8	LED Assembly P.C.B.	X-8297	U-28005	36	GND Screw	HD-1305	P-420284
9	Power Meter Frame	RT-2489	P-610663	37	Antenna Terminal	J-4527	P-320190
10	Power Meter Panel	HB-9070	P-710175	38	Balun Coil	CA-5027	P-110098
11	Power Meter Assembly P.C.B.	X-8295	U-25146	39	Balun Coil P.C.B.	X-4972	P-200244
12	Tape Monitor Assembly P.C.B.	X-8291	U-23139	40	AM Bar Antenna Coil	CA-0685	P-110113
13	Guide Bracket	HB-9071	P-411949	41	AM Antenna Holder (A)	HB-6370	P-410138
14	Time Set Switch Assembly P.C.B.	X-8285	U-28003	42	AM Antenna Holder (B)	HB-6371	P-410139
15	Clock Switch Assembly P.C.B.	X-8286	U-28004	43	Battery Compartment Cover	DB-0302	
16	Display Assembly P.C.B.	X-8284	U-28002	44	Battery Compartment	B-0453	P-411924
17	Tone Control Assembly P.C.B.	X-8288	U-14117	45	Shaft for Battery Compartment	RT-2493	P-420325
18	Rotary Selector Switch	S-1343	P-180400	46	Shield Box		P-480263
19	Power Switch	S-0856	P-180239	47	Cushion for Battery Compartment		P-820595
20	Line Pass Capacitor (UK or LB type) (UL)	C-1013		48	Battery Ribbon		P-660189
20	Line Pass Capacitor (MY type) (C.S.A.)			49	Battery Label		P-730285
21	Capacitor Cover (UL)	HB-6379	P-610466	50	Latch for Battery Compartment	HB-9077	P-610678
21	Capacitor Cover (C.S.A.)		P-610670	51	Lug Terminal (1L1P)	B-7051	P-320191
22	Speaker Switch Assembly P.C.B.	X-8294	P-23140	52	Battery Snap		P-310114
23	Side Channel Bracket	RT-2490	P-411887	53	Joint Pin	HB-7828	P-190120
24	PCB Stay (A) (long)	RT-2491	P-411888	54	Thermal Protector	HH-0329	P-290025
25	PCB Stay (B) (short)	RT-2492	P-411889	55	Protector Spring	RB-6570	P-411701
26	PCB Stay for FM IF/MPX Board	HB-9074	P-411890	56	4P RCA Jack	J-1063	P-320286
27	Chassis Bracket (L)	HB-9075	P-411891	57	Pre Amp Assembly P.C.B.	X-8287	U-14116
28	Chassis Bracket (R)	HB-9076	P-411892	58	Relay Assembly P.C.B.	X-8293	U-23137
29	Cushion on Chassis Bracket	RA-6142	P-680223	59	Controller Assembly P.C.B.	X-8283	U-28001
30	Back Panel (UL)	Z-5088	P-411871	60	PCB Bracket (A)	HB-9078	P-411893
30	Back Panel (C.S.A.)		P-411872	61	PCB Bracket (B)	HB-9079	P-411894
31	Strain Relief	HB-0705	P-480010	62	PCB Bracket (G)	HB-9080	P-411899
				63	Spacer	HB-9081	P-420324
				64	Protector Assembly P.C.B.	X-8292	U-23138

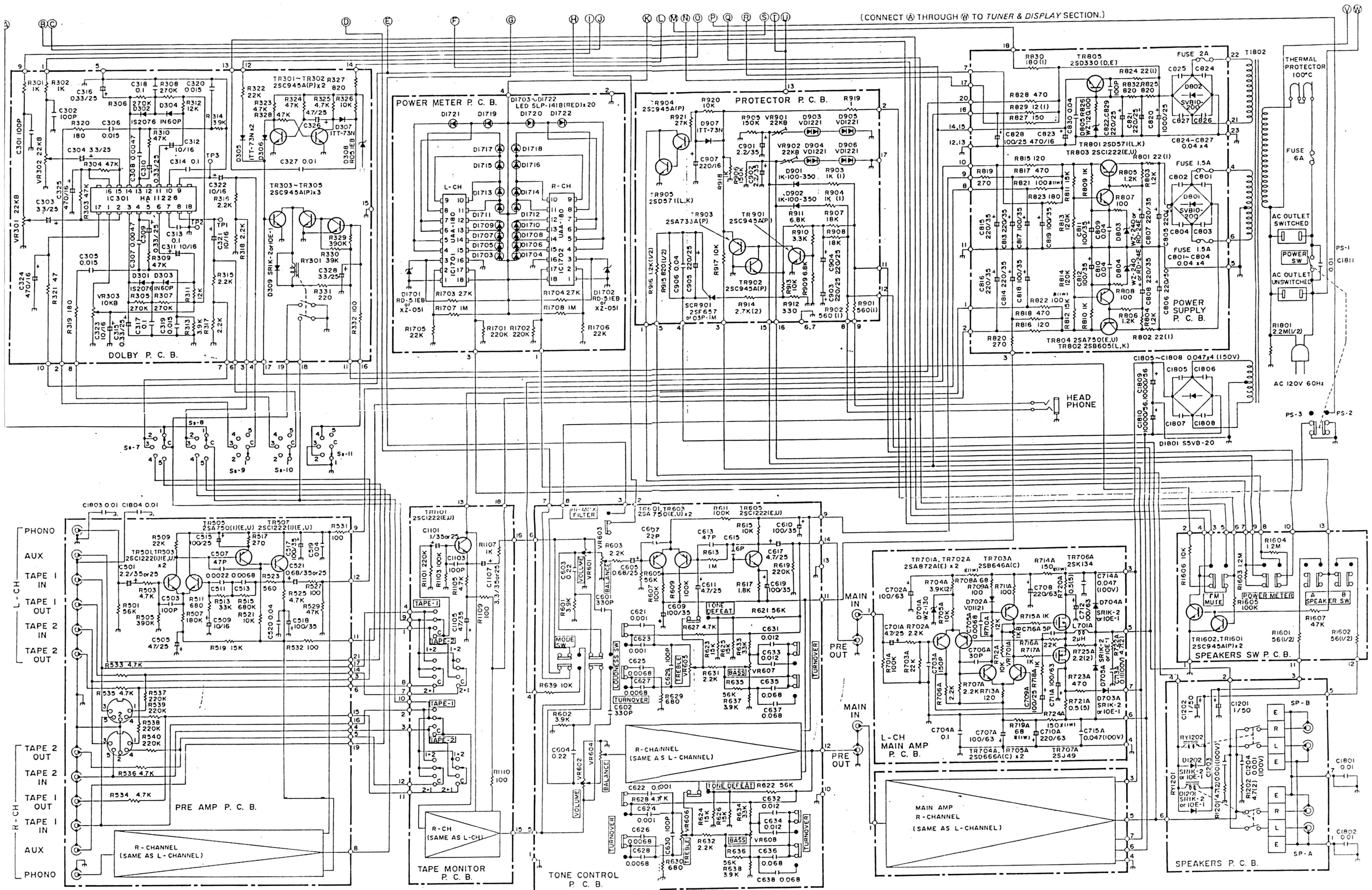
Ref. No.	Description	R/S Part No.	Mfr's Part No.	Ref. No.	Description	R/S Part No.	Mfr's Part No.
65	Power Supply Assembly P.C.B.	X-8290	U-17071	120	Tuning Button (B)	K-3645	P-650376
66	Shield Plate (D)	HB-9086	P-411938	121	Plate Spring (B) for Tuning Button	RB-6573	P-440162
67	Dolby FM Assembly P.C.B.	X-8296	U-25145	122	Cabinet Assembly	Z-5092	P-600160
68	PCB Bracket (C)	HB-9087	P-411895		Consists of Cabinet Grill		P-600147
69	PCB Bracket (D)	HB-9085	P-411896		Grill Holder		P-710177
70	AM RF/IF Assembly P.C.B.	X-8281	P-22039		Grill Cushion		P-411883
71	PCB Bracket (E)	HB-9089	P-411897		Grill Cushion Bracket		P-680216
72	PCB Bracket (F)	HB-9090	P-411898		Wood Screw 2.7 x 8 PW		P-411813
73	FM IF/MPX Assembly P.C.B.	X-8282	U-12047		Wood Screw 2.4 x 6.3 PW		
74	Rectifier Holder	RT-2494	P-411900	123	Screw Cover	HB-5105	P-610397
75	Heat Sink Plate	HH-0341	P-411901	124	Foot	F-0240	P-610485
76	Electrolytic Capacitor <i>CC109WJFP</i> (10000µF/56V)	DX-1315	P-220048	125	Bottom Plate	Z-5091	P-411884
77	Rectifier (S5VB-20)			126	Digital Window	G-0391	P-640227
78	Ground Lug Terminal	<i>DX-1315</i>	P-320284	127	4P RCA Speaker Jack	J-1062	P-320264
79	Main Amp Assembly P.C.B.	X-8289	U-16092	128	Tuning Window	G-0392	P-640225
80	Heat Sink Holder	HB-9091	P-411902	129	Power Meter Window	G-0393	P-640226
81	Power Transformer (T1802)	TA-0758	P-100602	HARDWARE			
82	Power Transformer (T1801) (UL)	TA-0757	P-100627	Ref. No.	Description		
82	Power Transformer (T1801) (C.S.A.)		P-100628	S 1	Bind Tapping Screw	3 x 8BT-2	
83	Power Transformer Holder (A)	RT-2495	P-411903	S 2	Frange Lock Screw	2 x 4P-FL	
84	Power Transformer Holder (B)	RT-2496	P-411904	S 3	Tapping Screw for Plastic	2.6 x 6PT-PLAX	
85	Label for Transformer		P-810487	S 4	Frange Lock Screw	3 x 6P-FL	
86	FM Front End Assembly P.C.B.	X-8279	U-11030	S 5	Frange Lock Screw	2.6 x 4P-FL	
87	FM Front End Holder	HB-9092	P-411908	S 6	Tooth Tapping Screw (Black)	3 x 8BT-2	
88	Pre Scaler Assembly P.C.B.	X-8280	U-11031	S 7	Bind Tapping Screw (Black)	3 x 8BT-2	
89	Wire Stay	HB-9093	P-450073	S 8	Screw (Black)	4 x 37P	
90	Headphone Jack	J-0985	P-190129	S 9	Screw (Black)	4 x 35P	
91	Heat Sink	HH-0340	P-411882	S10	Bind Tapping Screw for Plastic (Black)	3 x 8BT-PLAX	
92	4P RCA Input Terminal	J-1036	P-320256	S11	Frange Lock Screw	2.6 x 10P-FL	
93	5P DIN Jack	J-1061	P-190181	S12	Bind Tapping Screw	2 x 6BT-2	
94	4P Speaker Push Terminal	J-4607	P-320263	S13	Bind Tapping Tite Screw	3 x 16BT-3-DEL	
95	Front Panel	Z-5090	P-700407	S14	Poly-wave Tapping Screw	4 x 10PT-2-PW	
96	End Cap (L)	HB-9094	P-610653	S15	Poly-wave Tapping Screw	3 x 8PT-2-PW	
97	End Cap (R)	HB-9095	P-610654	S16	Bind Tapping Tite Screw (Black)	4 x 16BT-3-C	
98	Guide (A) for Power Knob	HB-9096	P-610657	S17	Bind Tapping Screw	4 x 18BT-2	
99	Guide (B) for Memory Button	HB-9097	P-610658	S18	Bind Tapping Screw (Black)	3 x 6BT-2	
100	Guide (C) for Turnover Knob	HB-9098	P-610659	R 1	Nylon Rivet (Black)	3 x 4.5	
101	Tuning Button Guide (A)	HB-9099	P-610660	R 2	Nylon Rivet (Black)	3 x 5.5	
102	Tuning Button Guide (B)	HB-9100	P-610661	W 1	Washer	3W	
103	Time & Memory Frame	HB-9109	P-610655	W 2	Inner Tooth Washer	3W	
104	Memory Box Door	DA-0280	P-710174	W 3	Washer (Black)	4W	
105	Door Knob	K-3641	P-650377	W 4	Washer	2.6W	
106	Memory Base	RT-2497	P-610656	N 1	Nut (Black)	4N	
107	Spacer for Frame		P-660196	N 2	Nut	3N	
108	Memory Push Button	K-3642	P-650373	N 3	Frange Nut	4N-F	
109	Spring for Memory Button	RB-6571	P-440163	SW1	Spring Washer (Black)	4SW	
110	Push Shaft for Memory Button						
111	Knob for Clock/Dimmer/Meter	K-3643	P-650372				
112	Knob for Power Switch	K-3646	P-650371				
113	Knob for Mode Switch	K-3647	P-650374				
114	Knob for Tape Slide Switch	K-3648	P-650370				
115	Outer Knob for Balance Control	K-3649	P-650367				
116	Inner Knob for Volume Control	K-3650	P-650368				
117	Knob for Selector/Bass/Treble	K-3651	P-650369				
118	Tuning Button (A)	K-3644	P-650375				
119	Plate Spring (A) for Tuning Button	RB-6572	P-440161				

(38) EXPLODED VIEW



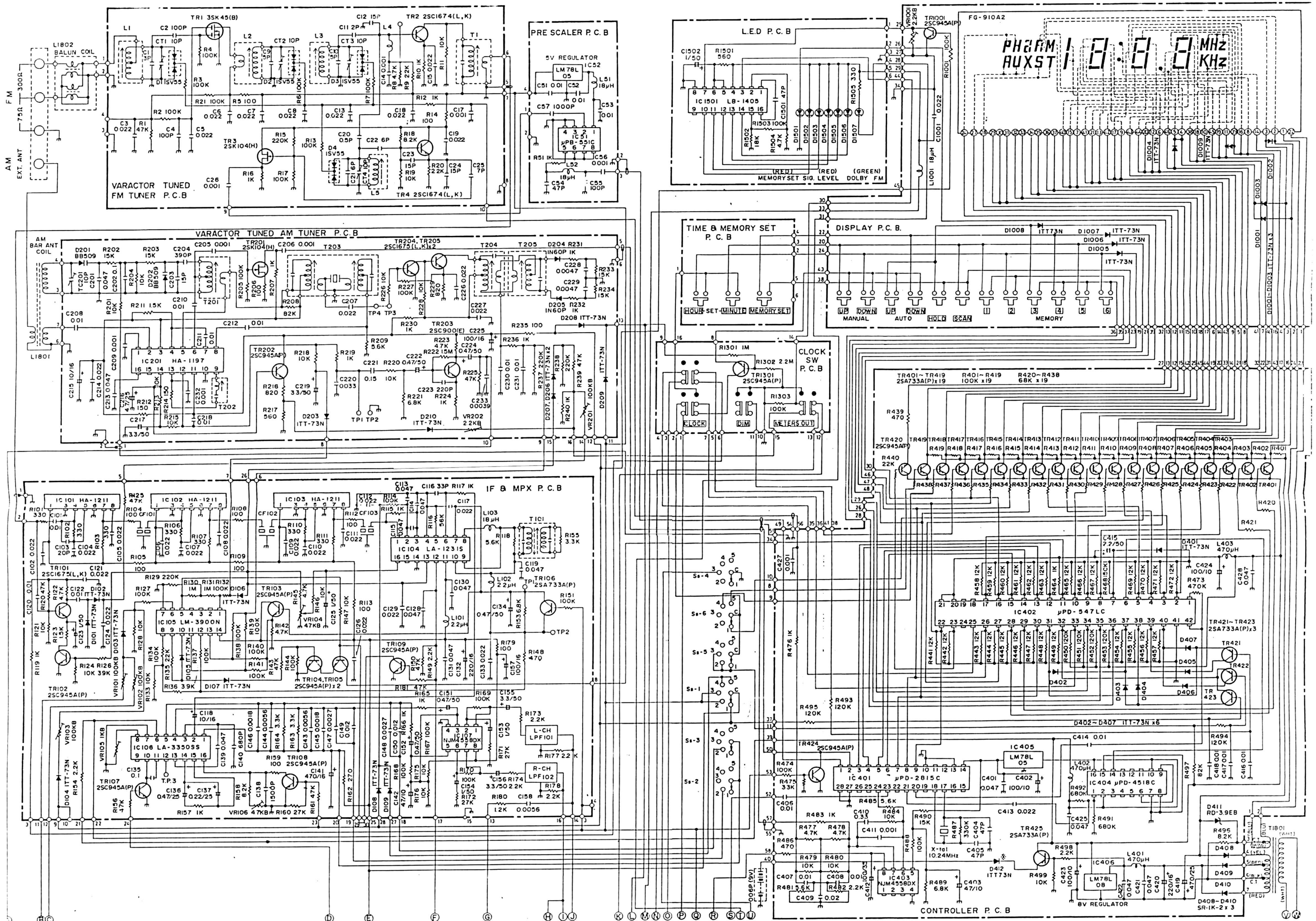
(37) MISCELLANEOUS PARTS LIST

Description	R/S Part No.	Mfr's Part No.	Description	R/S Part No.	Mfr's Part No.
Spacer for Keyboard Switch (Black)	HB-9072	P-690304	9P Plug (Male)		P-190210
Spacer for Keyboard Switch (Red)	HB-9073	P-690303	Solderless Pin Terminal		P-320287
Collar for Antenna Holder	HB-6372	P-420032	Pin Terminal		P-320245
Ground Bar for Electrolytic Capacitors	HB-7822	P-411433			
Fuse Caution Label (UL)		P-810308	[DISPLAY Assembly P.C.B.]		
Fuse Caution Label (C.S.A.)		P-810516	Jumper Wire (L = 7.5mm)		P-320126
Solderless Terminal	H-3305	P-320006	Jumper Wire (L = 10 mm)		P-320127
			Jumper Wire (L = 12.5mm)		P-320128
[FM FRONT END Assembly P.C.B.]			Jumper Wire (L = 15 mm)		P-320128
Shield Plate	HB-9066	P-411907	Jumper Wire (L = 17.5mm)		P-320130
Pin Terminal		P-320245	Jumper Wire (L = 20 mm)		P-320213
Pin Terminal (2P Mold L type)		P-320288	Jumper Wire (L = 22.5mm)		P-320198
			Jumper Wire (L = 25 mm)		P-320199
[PRE SCALER Assembly P.C.B.]			Jumper Wire (L = 27.5mm)		P-320222
Pre Scaler Frame		P-411910	6P Plug (Male)		P-190173
Pin Terminal		P-320245	7P Socket (Female)		P-190237
			8P Socket (Female)		P-190238
[AM RF/IF Assembly P.C.B.]			9P Socket (Female)		P-190237
Pin Terminal		P-320245	Solderless Pin Terminal (Female)		P-320287
Jumper Wire (L = 12.5mm)		P-320128			
			[TIME SET SWITCH Assembly P.C.B.]		
[FM IF/MPX Assembly P.C.B.]			Pin Terminal		P-320046
Pin Terminal		P-320046			
Jumper Wire (L = 5 mm)		P-320125	[CLOCK SWITCH Assembly P.C.B.]		
Jumper Wire (L = 7.5mm)		P-320126	Pin Terminal		P-320245
Jumper Wire (L = 10 mm)		P-320127			
Jumper Wire (L = 12.5mm)		P-320128	[LED Assembly P.C.B.]		
Jumper Wire (L = 17.5mm)		P-320130	6P Socket (Female)		P-190224
Jumper Wire (L = 20 mm)		P-320213	Solderless Pin Terminal (Female)		P-320287
Jumper Wire (L = 22.5mm)		P-320198			
Jumper Wire (L = 27.5mm)		P-320222	[PRE AMP Assembly P.C.B.]		
Jumper Wire (L = 30 mm)		P-320200	Jumper Wire (L = 12.5mm)		P-320128
			Jumper Wire (L = 15 mm)		P-320129
[CONTROLLER Assembly P.C.B.]			Jumper Wire (L = 17.5mm)		P-320130
Jumper Wire (L = 5 mm)		P-320125	Jumper Wire (L = 20 mm)		P-320213
Jumper Wire (L = 7.5mm)		P-320126	Jumper Wire (L = 22.5mm)		P-320198
Jumper Wire (L = 10 mm)		P-320127	2P Pin Terminal (L type)		P-320288
Jumper Wire (L = 12.5mm)		P-320128	3P Pin Terminal (L type)		P-320289
Jumper Wire (L = 15 mm)		P-320129	4P Pin Terminal (L type)		P-320290
Jumper Wire (L = 17.5mm)		P-320130	5P Pin Terminal (L type)		P-320291
Jumper Wire (L = 20 mm)		P-320213	8P Pin Terminal (L type)		P-320294
Jumper Wire (L = 25 mm)		P-320199			
Jumper Wire (L = 27.5mm)		P-320222	[TONE CONTROL Assembly P.C.B.]		
Jumper Wire (L = 30 mm)		P-320200	8P Pin Terminal (U type)		P-320239
3P Pin Terminal (Male)		P-320258	3P Pin Terminal (U type)		P-320165
3P Connector (Female)		P-190196	Jumper Wire (L = 10 mm)		P-320127
4P Pin Terminal (Male)		P-320266	Jumper Wire (L = 12.5mm)		P-320128
4P Connector (Female)		P-190197	Jumper Wire (L = 15 mm)		P-320129
7P Pin Terminal (Male)		P-320260	Jumper Wire (L = 17.5mm)		P-320130
7P Connector (Female)		P-190199	Jumper Wire (L = 20 mm)		P-320213
7P Plug (Male)		P-190208	Jumper Wire (L = 22.5mm)		P-320198
8P Socket (Female)		P-190238	Jumper Wire (L = 27.5mm)		P-320222
8P Plug (Male)		P-190209	Jumper Wire (L = 30 mm)		P-320200
9P Socket (Female)		P-190237			



NOTE: (1) ALL RESISTANCE VALUES ARE INDICATED IN "OHM" (K = 10³ OHM, M = 10⁶ OHM).
 (2) ALL CAPACITANCE VALUES ARE INDICATED IN "μF" (P = 10⁻⁸ μF).
 (3) S₁-1 ~ S₁-11 SELECTOR SWITCH 1-AM, 2-FM, 3-FM DOLBY, 4-PHONO, 5-AUX, C-COMMON.
 (4) PS-1 ~ PS-3 POWER SWITCH.
 (5) *1) WATTAGE VALUES ON MAIN AMP AND POWER SUPPLY STAGE ARE USED FOR C.S.A. MODELS ONLY.

(6) ALL RESISTANCE WATTAGES ARE SHOWN IN %W UNLESS OTHERWISE EXCEPT MAIN AMP AND POWER SUPPLY STAGE.
 (7) RESISTANCE WATTAGES ON MAIN AMP AND POWER SUPPLY STAGE ARE SHOWN IN %W UNLESS OTHERWISE SPECIFIED.
 (8) * MARKS OF EACH SWITCH TERMINALS ARE SHOWN AT "ON" POSITION.
 (9) * MARKS ON TUNER & DISPLAY SECTION ARE USED FOR C.S.A. MODELS ONLY.



(CONNECT (A) THROUGH (S) TO AUDIO SECTION.)

Description	R/S Part No.	Mfr's Part No.	Description	R/S Part No.	Mfr's Part No.
[MAIN AMP Assembly P.C.B.]			[PROTECTOR Assembly P.C.B.]		
Jumper Wire (L = 15 mm)		P-320129	Jumper Wire (L = 12.5mm)		P-320128
Jumper Wire (L = 25 mm)		P-320199	Jumper Wire (L = 15 mm)		P-320129
2P Pin Terminal (Male)		P-320271	Jumper Wire (L = 25 mm)		P-320199
2P Connector (Female)		P-190216	Jumper Wire (L = 30 mm)		P-320200
5P Pin Terminal (Male)		P-320280	5P Pin Terminal (Male)		P-320259
5P Connector (Female)		P-190204	5P Connector (Female)		P-190198
			7P Pin Terminal (Male)		P-320260
[POWER SUPPLY Assembly P.C.B.]			7P Pin Connector (Female)		P-190199
Fuse Holder		P-260017			
Jumper Wire (L = 10 mm)		P-320127	[POWER METER Assembly P.C.B.]		
Jumper Wire (L = 12.5mm)		P-320128	Jumper Wire (L = 5 mm)		P-320125
3P Plug (Male)		P-190170	Jumper Wire (L = 10 mm)		P-320127
3P Socket (Female)		P-190221	Jumper Wire (L = 12.5mm)		P-320128
Solderless Pin Terminal (Female)		P-320287	Jumper Wire (L = 20 mm)		P-320213
4P Pin Terminal (Male)		P-320279	Jumper Wire (L = 27.5mm)		P-320222
4P Connector (Female)		P-190194	Jumper Wire (L = 30 mm)		P-320200
5P Pin Terminal (Male)		P-320285	Pin Terminal		P-320245
5P Connector (Female)		P-190217			
7P Pin Terminal (Male)		P-320275	[RELAY Assembly P.C.B.]		
7P Connector (Female)		P-190190	7P Pin Terminal (Male)		P-320275
			7P Connector (Female)		P-190190
[TAPE MONITOR Assembly P.C.B.]					
Pin Terminal		P-320245	[SPEAKER SWITCH Assembly P.C.B.]		
Jumper Wire (L = 10 mm)		P-320127	Jumper Wire (L = 12.5mm)		P-320128
Jumper Wire (L = 15 mm)		P-320129	Pin Terminal		P-320245
Jumper Wire (L = 30 mm)		P-320200			
			[DOLBY FM Assembly P.C.B.]		
			Jumper Wire (L = 5 mm)		P-320125
			Jumper Wire (L = 7.5mm)		P-320126
			Jumper Wire (L = 12.5mm)		P-320128
			Jumper Wire (L = 15 mm)		P-320129
			Pin Terminal		P-320245
			5P Pin Terminal (Male)		P-190259
			5P Connector (Female)		P-190198
			7P Pin Terminal (Male)		P-320260
			7P Connector (Female)		P-190199

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