REALISTIC®

Service Manual

31-2050

STA-200

STEREOPHONIC AM-FM SOLID STATE RECEIVER with Remote Control

Cat. No. 31-2050

CUSTOM MANUFACTURED FOR RADIO SHACK TC A TANDY CORPORATION COMPANY

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SPECIFICATIONS

FM TUNER SECTION			
Description	**Condition**	**Nominal spec.**	**Limit spec.**
Frequency Range		85 – 108.5 MHz	88 – 108 MHz
IHF Sensitivity (T.H.D. 3%)	98 MHz, 100% Mod. with 400 Hz	2 μV	4 μV
Usable sensitivity (S/N 30 dB)	90 – 106 MHz	2.5 μV	3 μV
Dial Calibration	at 88, 98, 108 MHz	±100 kHz	±300 kHz
Intermediate Frequency	Ceramic filter used	10.7 MHz	10.7 MHz
Signal/Noise Ratio	98 MHz, 1 mV input	60 dB	50 dB
Total Harmonic Distortion	98 MHz, 1 mV input	0.55%	1%
Muting Sensitivity	98 MHz	10 μV	10 μV±6 dB
Full Limiting	-3 dB (98 MHz)	1.5 μV	3.5 μV
AFC Holding Range	98 MHz, 1 mV input	±350 kHz	±250 kHz – ±500 kHz
Image Rejection Ratio	106 MHz	85 dB	70 dB
Antenna Impedance		300/75 ohm	300/75 ohm
IF Rejection Ratio	90 MHz	90 dB	80 dB
Capture Ratio	98 MHz, 1 mV input	1.5 dB	3 dB
Alt. Channel Selectivity	98 MHz, 100 μV input	55 dB	45 dB
	98 MHz, 1 mV input	35 dB	30 dB
De-emphasis	22.5 kHz dev. (0.75μ sec)		
	50 Hz 0 dB	0 dB ±0.2 dB	0 dB ±2 dB
	10 kHz -13.5 dB	-14 dB	-13.5 dB ±2 dB
Spurious Response Ratio	at 98 MHz, Dev. 75 kHz 400 Hz	100 dB	70 dB
Overload	100 mV input	0.55% T.H.D.	1% T.H.D.
Stereo Separation	98 MHz, 1 mV input		
	100 Hz	32 dB	24 dB
	1 kHz	40 dB	30 dB
	10 kHz	30 dB	18 dB
Output voltage	Tape out 0.775 V	0.775 V	0.775 V ±3 dB
Beacon Sensitivity	98 MHz, MOD. 1 kHz	10 μV	10 μV ±6 dB
38 kHz Leakage	98 MHz, 1 mV input	60 dB	50 dB
SCA Rejection Ratio	98 MHz, 1 mV input	60 dB	50 dB
AM TUNER SECTION			
Frequency Range		520 – 1,640 kHz	535 – 1,605 kHz
Intermediate Frequency	Ceramic filter	455 kHz	455 kHz ±3 kHz
Usable Sensitivity (20 dB S/N)	1,000 kHz 30% Mod. with 400 Hz	350 μV per meter	1.0 mV per meter
Terminal Sensitivity (20 dB S/N)	1,000 kHz 30% Mod. with 400 Hz	70 μV	150 μV
Signal to Noise Ratio	1,000 kHz, 10 mV input	50 dB	40 dB
Image Rejection	1,400 kHz	40 dB	35 dB
IF Rejection Ratio	600 kHz	35 dB	30 dB
Output Voltage	Tape out, 5 mV per meter RF input	250 mV	250 mV ±3 dB
Selectivity	±10 kHz	30 dB	20 dB
Band Width	-6 dB	8 kHz	7 kHz
Total Harmonic Distortion	1,000 kHz, 5 mV per meter RF input	1%	2%
AGC	-10 dB Ref. point 100 mV per meter	46 dB	40 dB
REMOTE CONTROL SECTION			
Frequency	40 kHz	40.0 kHz	40.0 kHz ±2 kHz
Key Tone Frequency	Volume increase	622.26 Hz	622.26 Hz ±15 Hz
	Volume decrease	523.26 Hz	523.26 Hz ±15 Hz
	Station select	880.0 Hz	880 Hz ±15 Hz
Operating Distance		28 feet	24 feet
Operating Cycle		70 ms.	100 ms.
Transducer Element	Ceramic type		
Power Source	9 V DC, Flat Battery		Less than 30 mA

AUDIO SECTION

Description	Condition	Nominal spec.	Limit spec.
Output Power (8 ohm load) 1% THD at 1000Hz	RMS. per channel (one channel driven)	40 watts	35 watts
	RMS. per channel (both channels driven)	36 watts	30 watts
Output Power (4 ohm load)	RMS. per channel (both channels driven)	50 watts	—
Total Harmonic Distortion	Rated output (30 watts)		
	100 Hz	0.25%	1%
	1 kHz	0.35%	1%
	10 kHz	0.6%	1%
Power Band Width	Output 15 watts		
	1% Distortion, 8 ohm load		
		9 Hz — 32 kHz	20 Hz — 20 kHz
Sensitivity	Phono Low	2.0 mV	2.0 mV ±2 dB
	Phono High	4.0 mV	4.0 mV ±2 dB
	Aux.	200 mV	200 mV ±2 dB
Input Impedance	Phono	70 KΩ	—
	Aux.	50 KΩ	—
Signal-to-Noise Ratio	Phono (Hi, Low)	65 dB	50 dB
	Aux. (Input shorted)	70 dB	60 dB
	at 30 watts		
Channel Separation	100 Hz	62 dB	50 dB
	1 kHz	57 dB	50 dB
	10 kHz	46 dB	40 dB
	(at output power of 30 watt,8Ω load)		
Filter Response	Low 50 Hz	–8 dB	–8 dB ±2 dB
	High 10 kHz	–5.5 dB	–6 dB ±2 dB
	(0 dB = 0.775 V)		
Tone Controls			
"BASS" Max. to Min.	100 Hz	±10 dB	±10 dB ±2 dB
"MID" Max. to Min.	1.5 kHz	±6 dB	±6 dB ±2 dB
"TREBLE" Max. to Min.	10 kHz	+9 dB	±10 dB ±2 dB
	(at output power of 0.775V,8Ω load)	–11 dB	
Loudness Compensation	–30 dB volume (0 dB = 30 W)		
	100 Hz	+8.5 dB	+10 dB ±2 dB
	10 kHz	0 dB	0 dB ±2 dB
Phono Equalizer	RIAA (0 dB = 0.775 V)	RIAA ±1 dB	RIAA ±2 dB
Frequency Response	at output power of 2watts 8Ω load	20 Hz — 30 kHz	30 Hz — 20 kHz ±1 dB
Residual Noise	Volume at minimum	2.5 mV	5 mV
Hum and Noise	Volume at maximum	6 mV	10 mV
Damping Factor	at 8Ω load	50	20
Output Power to Phones		8.2 mW	8 mW ±2 dB

DISASSEMBLY

a. Remove 4 screws (A) holding cabinet to bottom plate.
b. Remove 4 screws (B) and washers from side of the cabinet.

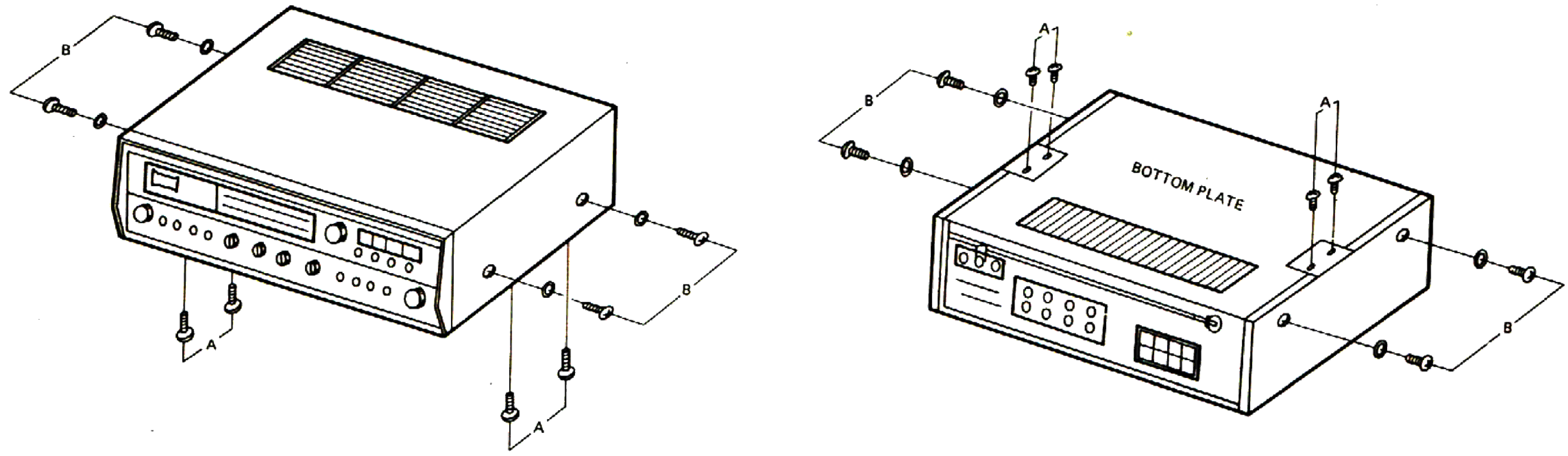


Fig. 1. Disassembly Instructions and Diagrams

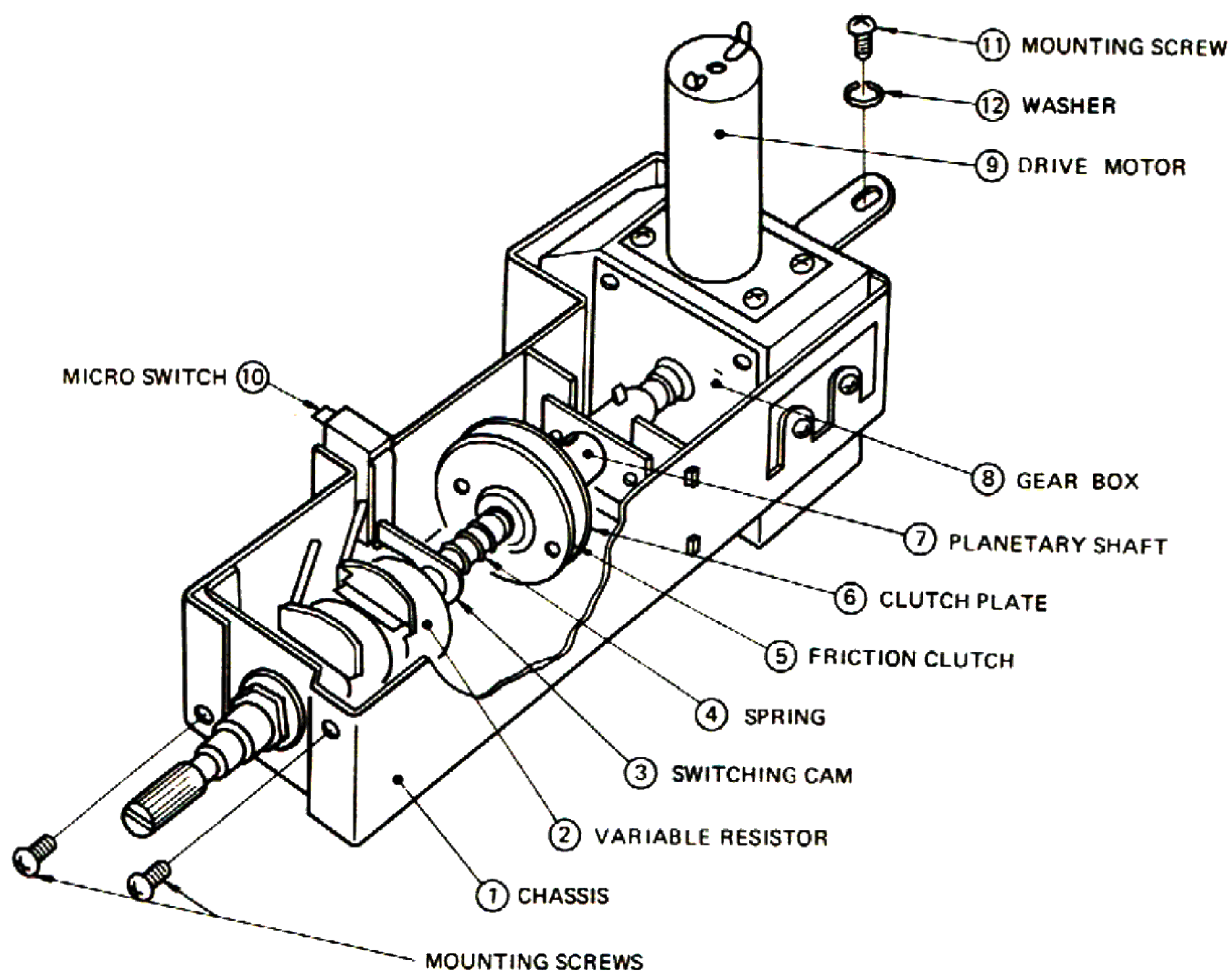


Fig. 2. Motor Drive Pot. Mechanism

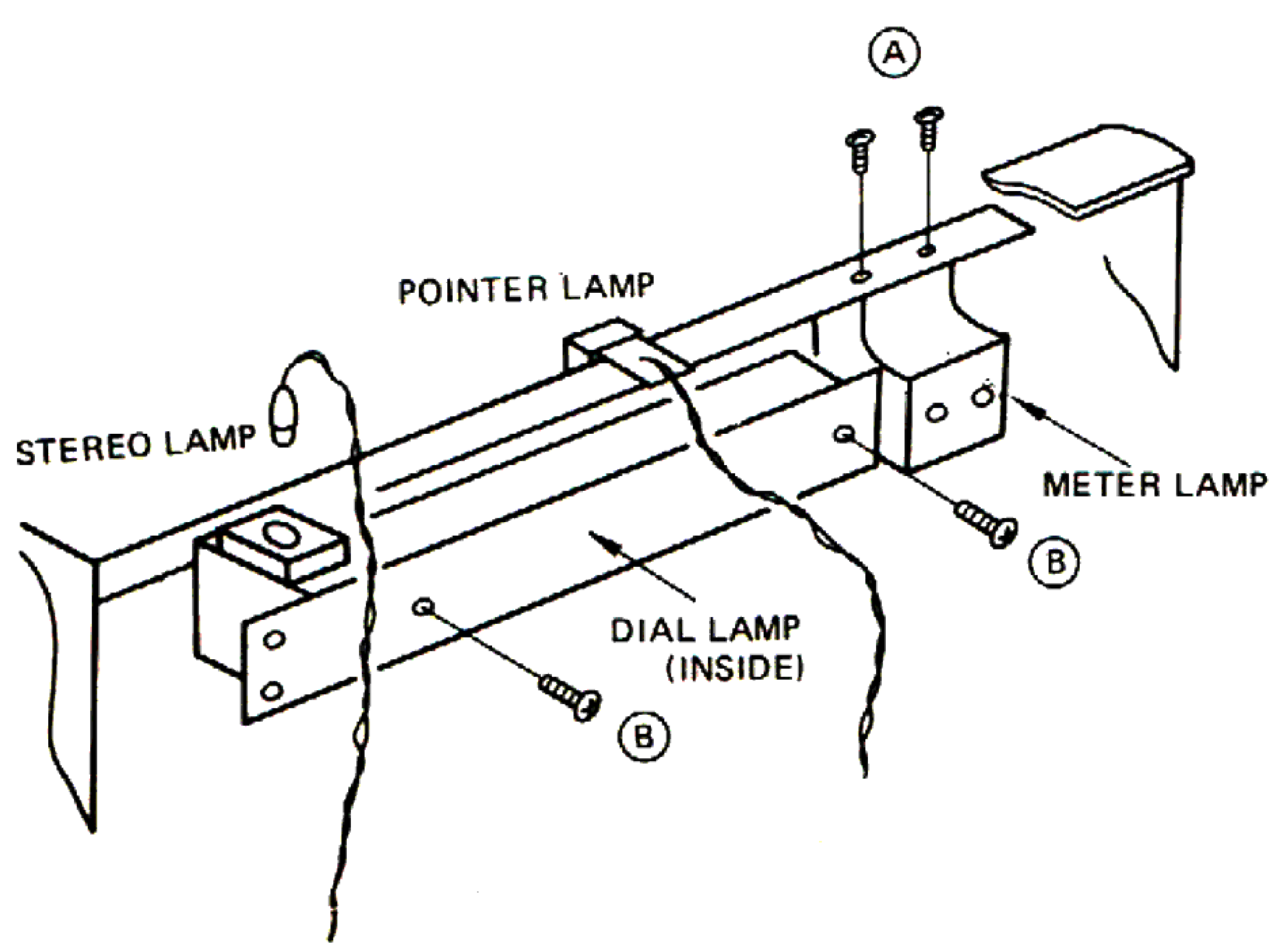


Fig. 3. Lamp Replacement Instructions and Diagram

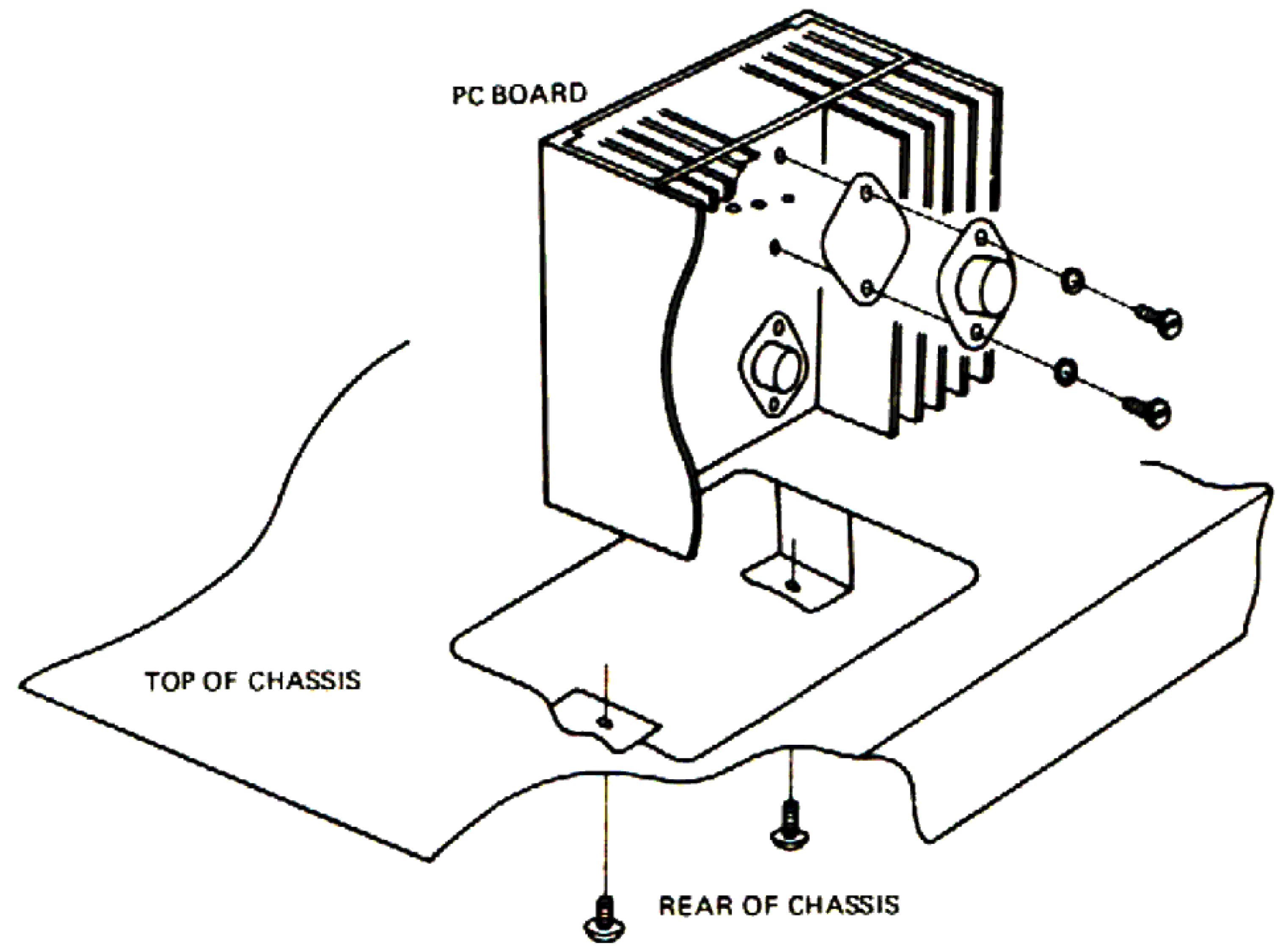


Fig. 4. Removal Instructions and Diagram of Power Transistors and Components

GENERAL ALIGNMENT

Test equipment required:

1. AM/FM Standard signal generator
2. Oscilloscope
3. Slow sweep generator with variable marker (10.7 MHz)
4. RF Sweep generator with variable marker (88–108 MHz)
5. Audio frequency generator
6. AC V.T.V.M.
7. DC V.T.V.M.
8. Distortion meter
9. Frequency counter
10. IEC dummy antenna (AM)
11. 75/300Ω matching dummy antenna (FM)
12. 8 ohm dummy load (30 watts)

NOTE: Allow at least 10 minutes for equipment to warm up and stabilize.

FM IF AMPLIFIER ALIGNMENT

NOTES

a. Set up test equipment as shown in Figure 5.

b. Maintain output of sweep generator at a low level to prevent overloading.

c. Controls on unit under test: Selector at FM and Volume control at minimum.

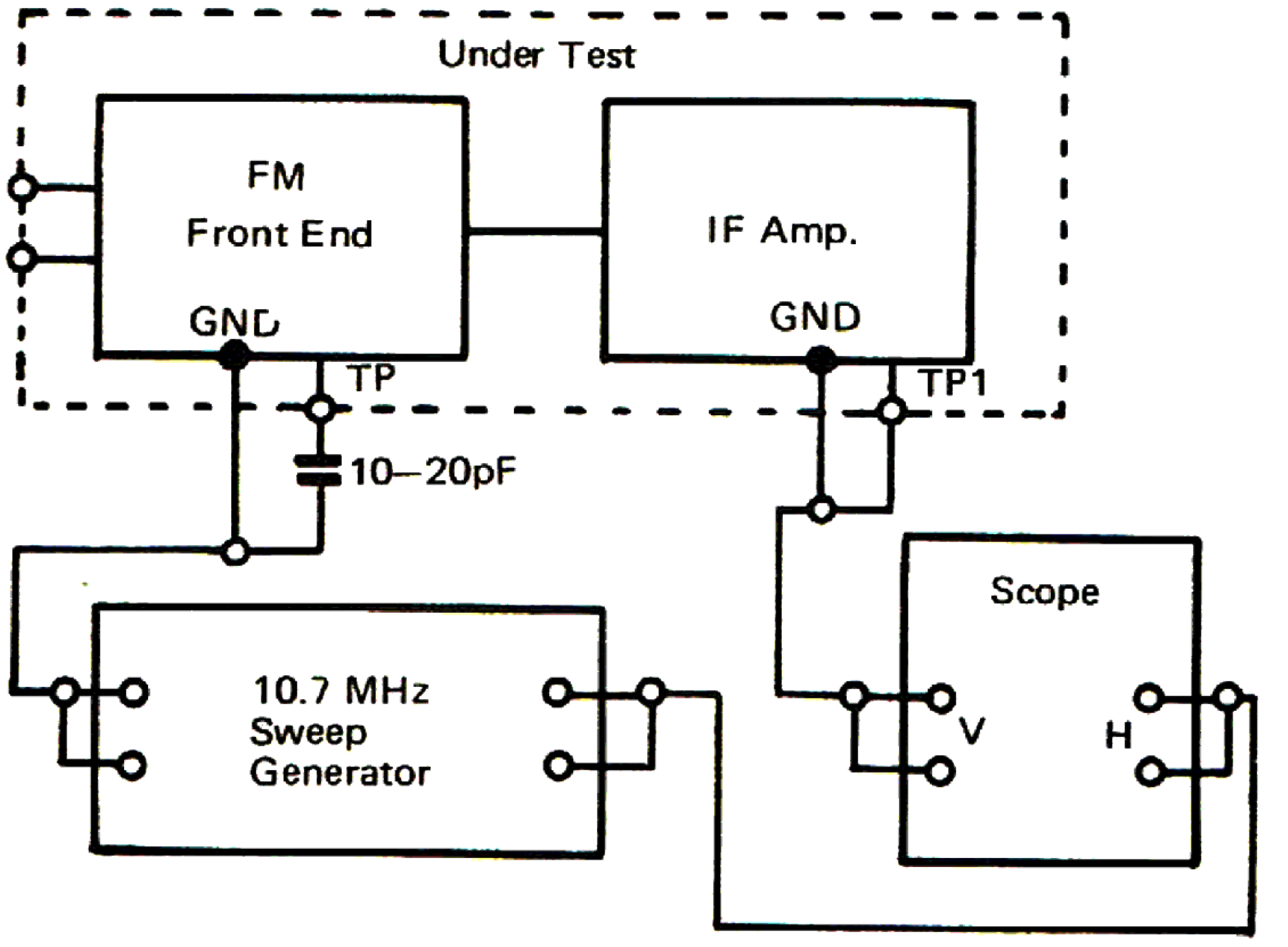


Fig. 5. FM IF Alignment Preliminary Equipment Connection

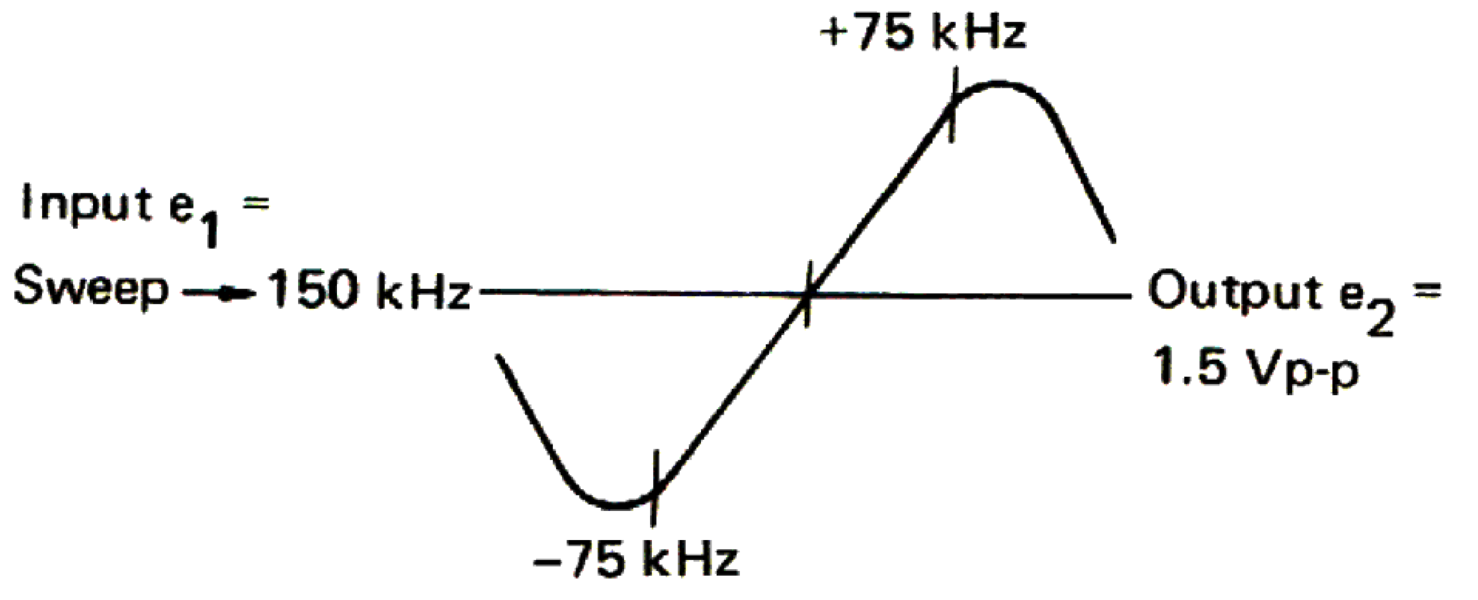


Fig. 6. IF Discriminator Curve

Step	SIGNAL GENERATOR		OUTPUT		UNDER TEST	
	Connection	Frequency	Connection	Indicator	Adjustment point	Adjust for
1	FM Front-End TP	10.7 MHz	TP-1 on #314 PCB	Scope	T 1 on #314 PCB	best linearity of wave form
2	same as above		same as above		IFT FM Front-End #314 PCB	same as above
3	Repeat Steps 1 and 2 until no further improvement is obtainable. Refer discriminator curve as shown in Figure 6.					

FM RF ALIGNMENT

NOTES

a. Set up test equipment as shown in Figure 7.

b. FM Front-End vari-cap voltage B2 should be set to 3.2V by adjusting VR 1 (#314 PCB), with Tuning at low end of dial.

c. Keep the input signal low so that AVC action does not produce misalignment.

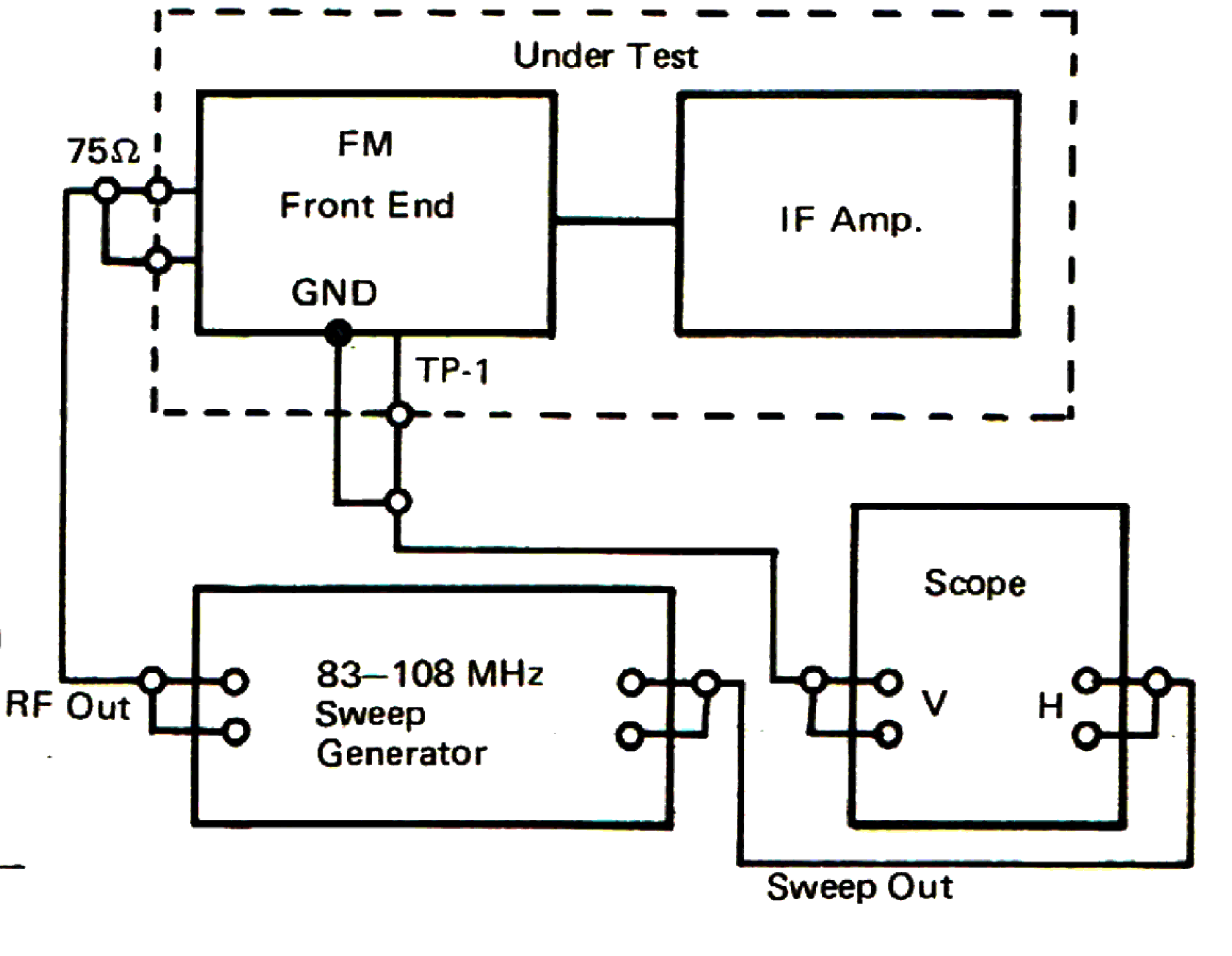


Fig. 7 FM Alignment Diagram

Step	SIGNAL GENERATOR		OUTPUT		UNDER TEST		
	Connection	Frequency	Connection	Indicator	Tuning	Adjustment point	Adjust for
1	FM Antenna terminal	88 MHz at 75 kHz Dev.	TP 1 on #314 PCB	Scope and AC VTVM	88 MHz	Lo in Front-End #314	maximum output
2	same as above	108 MHz at 75 kHz Dev.	same as above	same as above	108 MHz	TC0 in Front-End #314	same as above
3	Repeat Steps 1 and 2 until no further improvement is obtainable.						
4	FM Antenna terminal	88 MHz at 75 kHz Dev.	TP 1 on #314 PCB	Scope and AC VTVM	88 MHz	LA, LR1, LR2 Front-End #314	maximum output
5	same as above	108 MHz at 75 kHz Dev.	same as above	same as above	108 MHz	TCA, TCR, Front-End #314	same as above
6	Repeat Steps 4 and 5 until no further improvement is obtainable.						

AM IF/RF ALIGNMENT

NOTE

a. Set up test equipment as shown in Figure 8.
b. Maintain output of signal generator at a low level to prevent overloading.
c. Control settings: Selector at AM and Volume control at minimum.

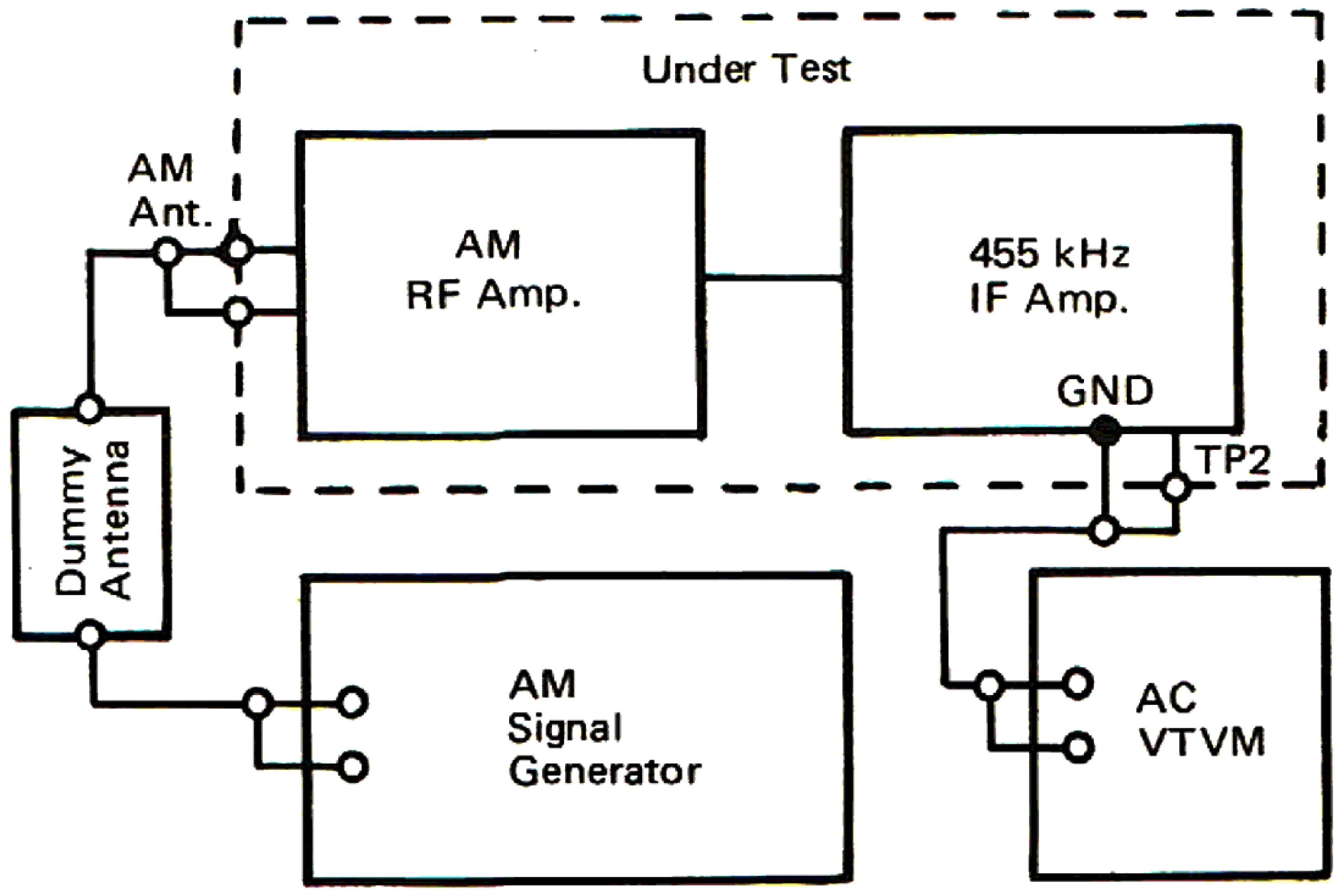


Fig. 8 AM IF/RF Alignment Diagram

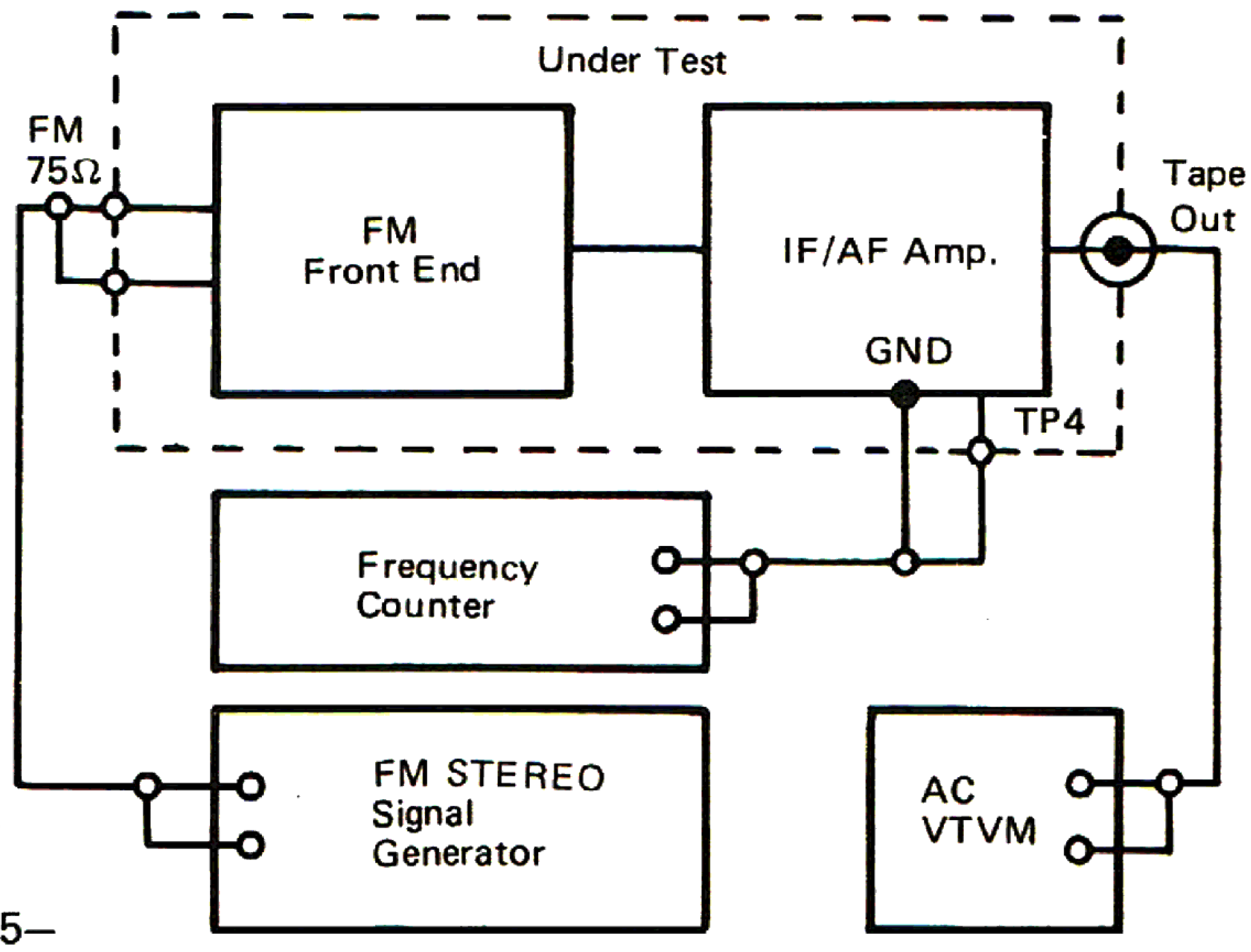
Step	SIGNAL GENERATOR		UNDER TEST		
	Connection	Frequency	Tuning dial setting	Adjustment point	Adjust for
1	AM antenna terminal	455 kHz 30%, 1 kHz modulation	Gang fully closed	T5, 6, CF5 on #314 PCB	maximum output (in order given)
2	same as above	520 kHz	same as above	T 4 on #314 PCB	maximum output
3	same as above	1640 kHz	Gang fully open	TC 2 on #314 PCB	same as above
4	Repeat Steps 2 and 3 until no further improvement is obtainable.				
5	same as above Step 2	600 kHz	600 kHz	MT 1 ferrite ant. coil	maximum output by sliding antenna coil core
6	same as above	1400 kHz	1400 kHz	TC 1 on #314 PCB	maximum output
7	Repeat Steps 5 and 6 until no further improvement is obtainable.				

STEREO LAMP BRIGHTNESS ALIGNMENT

NOTES

a. Set up test equipment as shown in Figure 9.
b. Connect frequency counter to TP-4 on #314 PCB (19 kHz stereo beacon frequency.)

Fig. 9 STEREO LAMP Alignment Diagram



Step	SIGNAL GENERATOR			UNDER TEST			
	Connection	Frequency	Output	Selector switch	Tuning dial setting	Adjustment point	Adjust for
1	FM antenna terminal	98 MHz stereo sig.	10 μV	FM STEREO	98 MHz	VR 7 on #314 PCB	Stereo lamp 'ON' with presence of 19 kHz signal

AFC (Automatic Fidelity Compensation) ADJUSTMENT

NOTE

Set up test equipment as shown in Figure 10.

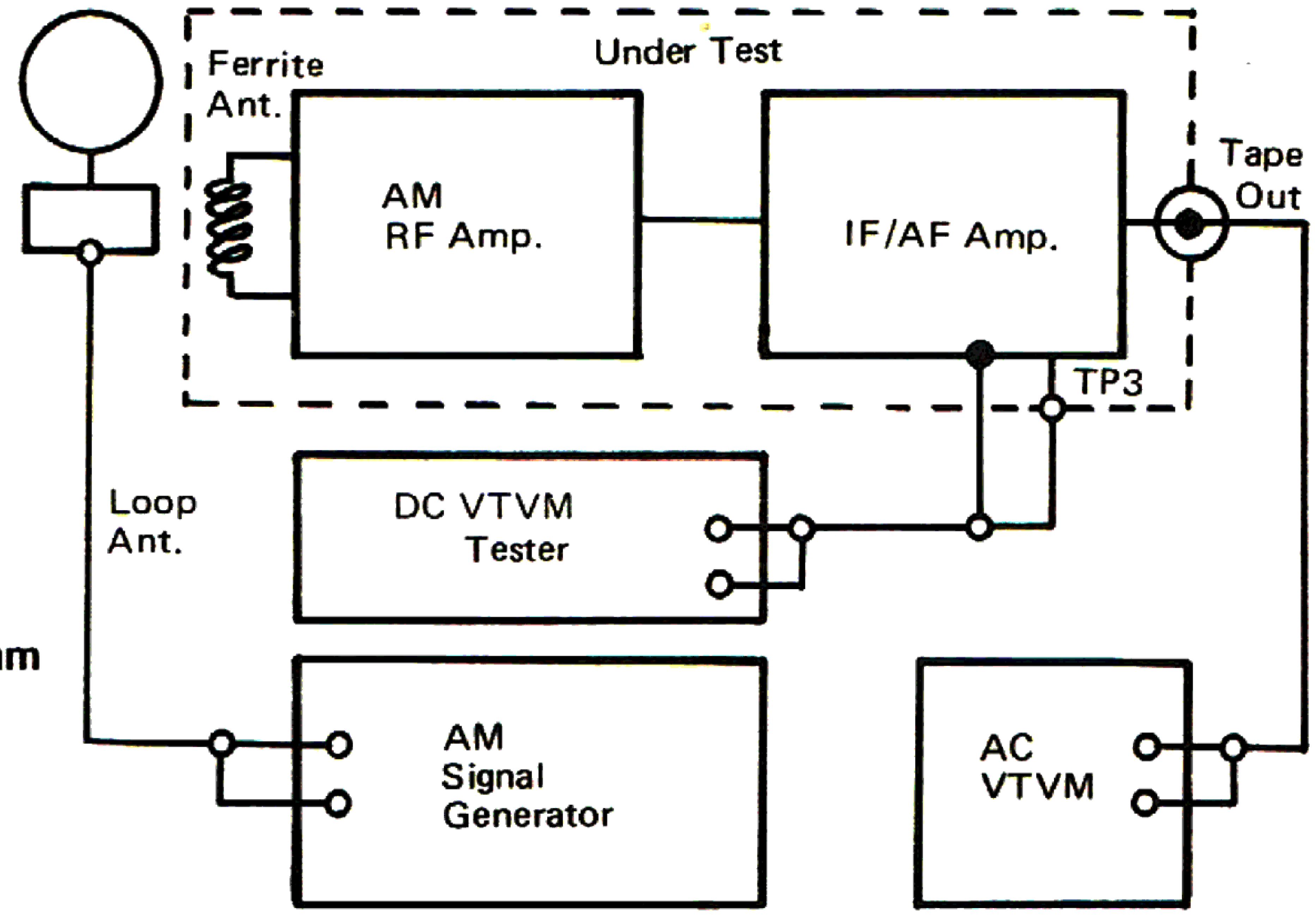


Fig. 10 AFC Alignment Diagram

Step	SIGNAL GENERATOR			UNDER TEST		
	Connection	Frequency	Output	Tuning condition	Adjustment point	Adjust for
1	Radiation couple	1 MHz Mod. 400 Hz 30%	3mV/m	AM, 1 MHz	VR 6 on #314 PCB	0.6V at TP-3 (Q21 switch ON)

POWER AMP. BIAS VOLTAGE ADJUSTMENT

NOTES

a. Set up test equipment as shown in Figure 11.
b. Controls settings: Selector to AUX, Tone CONTROLS, BALANCE control and Speaker-on.

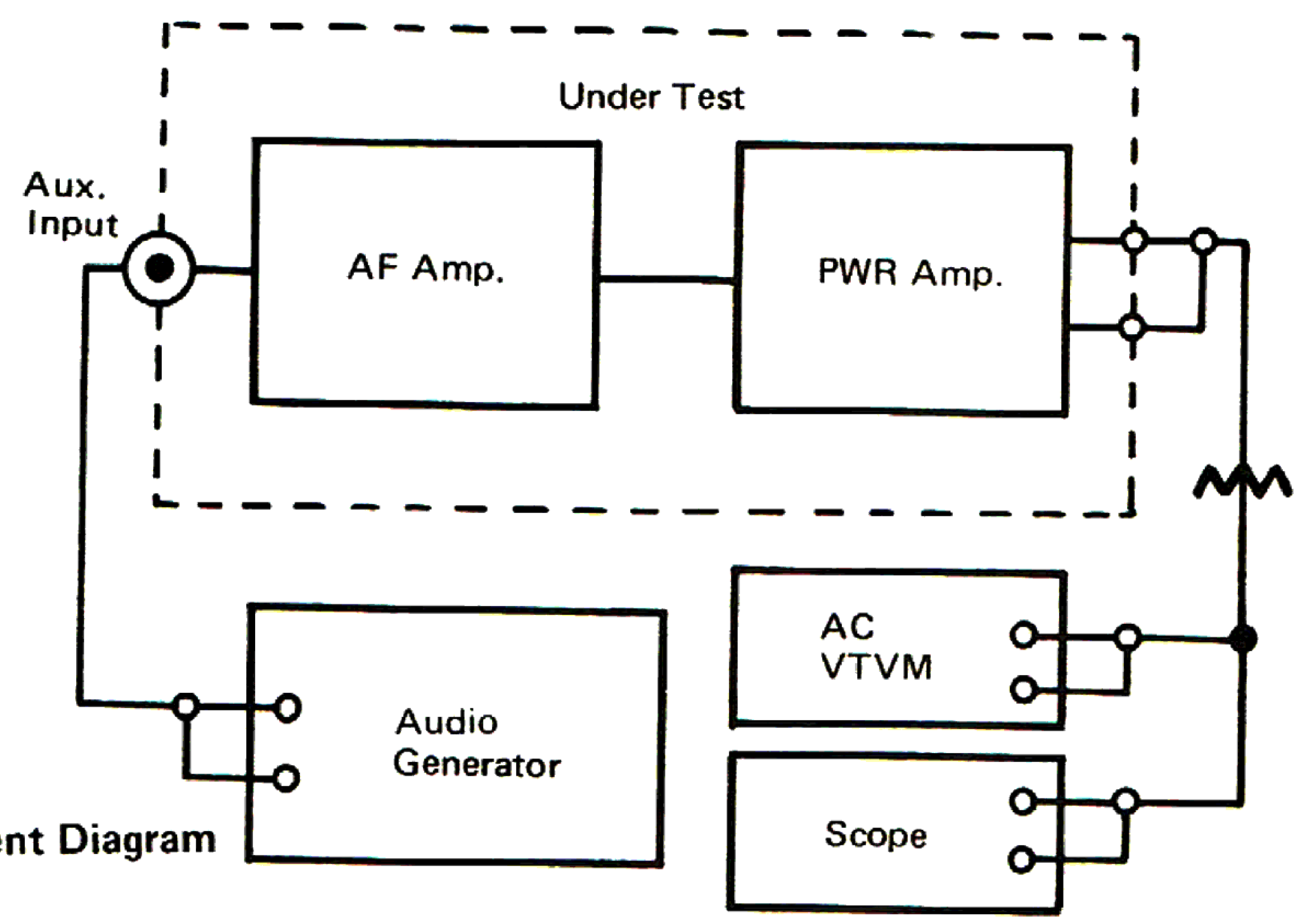


Fig. 11 POWER AMP Adjustment Diagram

Step	SIGNAL GENERATOR		OUTPUT		UNDER TEST	
	Frequency	Output	Connection	Indicator	Adjustment point	Adjust for
1	1 kHz	250 mV	Spkr-A 'L' terminal	Scope	VOLUME on front	Clipping wave form
2	same as above		same as above		VR 1 on 'L' channel #311 PCB	Symmetrical wave form
3	Repeat Steps 1 and 2 until no further improvement is obtainable.					
4	1 kHz	250 mV	Spkr-A 'R' terminal	Scope	VOLUME on front	Clipping wave form
5	same as above		same as above		VR VR1 on 'R' channel #311 PCB	Symmetrical wave form
6	Repeat Steps 4 and 5 until no further improvement is obtainable.					

TUNING METER ADJUSTMENT

NOTE

a. Set up test equipment as shown in Figure 9.

Step	SIGNAL GENERATOR			UNDER TEST			
	Connection	Frequency	Output	Selector switch	Tuning dial setting	Adjustment point	Adjust for
1	FM Antenna terminal	98 MHz 75 kHz Dev.	1 mV	FM	98 MHz	T2, VR 3 on #314 PCB	T2: maximum leading VR3: ¼ scale position
2	same as above	same as above	1 mV	FM MUTE ON	near 98 MHz detuning lower side	VR 2 on #314 PCB	off scale position
3	same as above	same as above	1 mV	same as above	near 98 MHz detuning upper side	VR 2 on #314 PCB	off scale position
4	same as above	same as above	10 μV	same as above	98 MHz	T3, VR 5 on #314 PCB	T3: maximum leading VR5: full scale position

FM PRESETTER UNIT ALIGNMENT

NOTES

a. Set up test equipment as shown in Figure 12.

b. Control settings: Selector at FM and Volume at minimum.

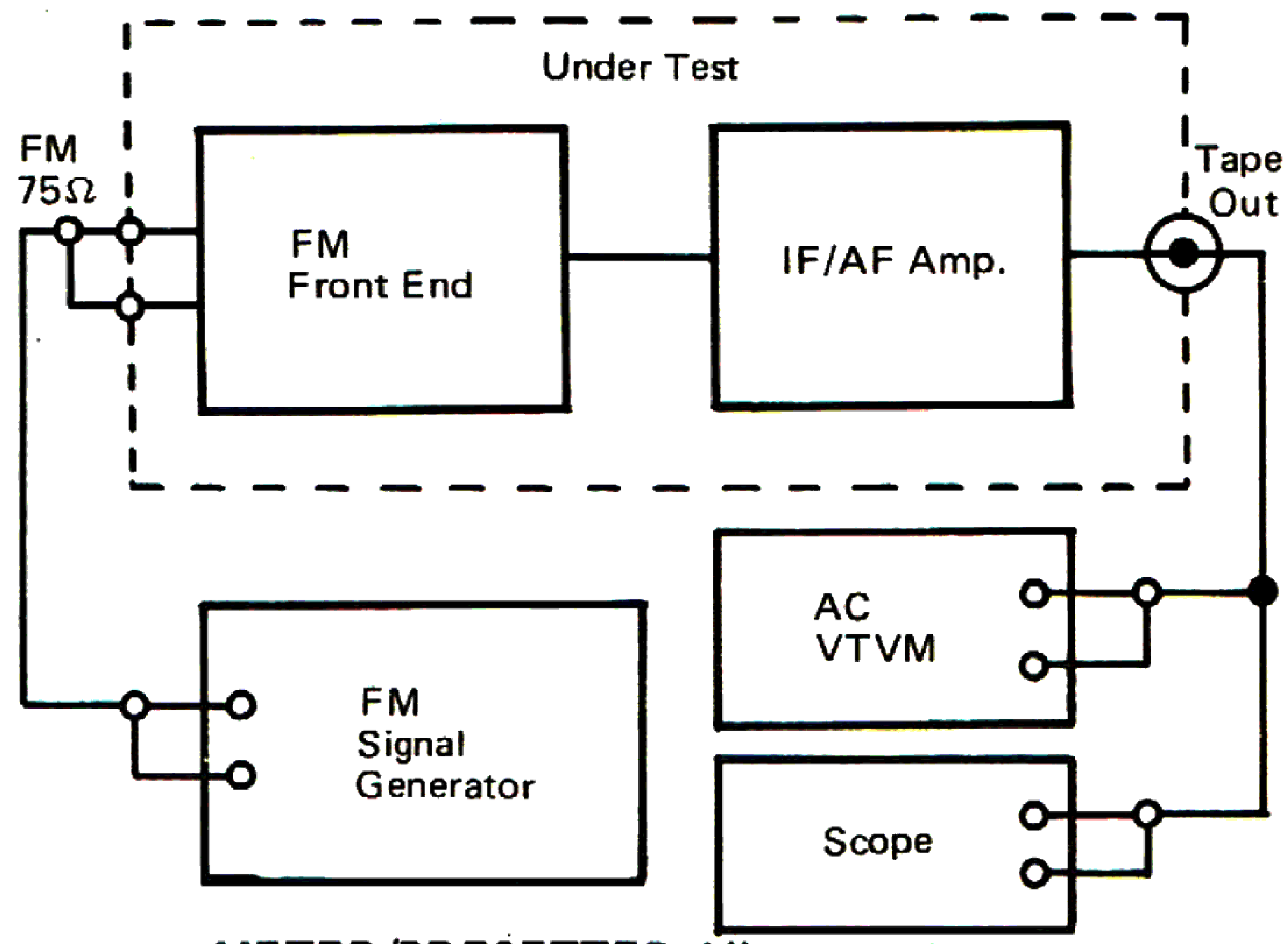


Fig. 12 METER/PRESETTER Alignment Diagram

Step	SIGNAL GENERATOR			OUTPUT		UNDER TEST		
	Connection	Frequency	Output	Connection	Indicator	Preset tuning	Adjustment point	Adjust for
1	FM antenna terminal	88 MHz at 75 kHz Dev.	100 μV	TAPE OUT	VTVM	Channel-1 88 MHz	VR 1 in presetter	maximum output
2	same as above	108 MHz at 75 kHz Dev.	as above	same as above		Channel-1 108 MHz	same as above	same as above
3	Check Steps 1 and 2 for other 5 channels.							

REMOTE CONTROL TRANSMITTER ADJUSTMENT

NOTES

a. Connect frequency counter and scope to TP-1, also jumper wire between TP-2 and GND at the adjustment Step 1 to 3.

b. After adjustment Step 1 to 3, connect frequency counter and scope to TP-3. Jumper wire is holded as previous until adjustment Step 4.

c. Take out jumper wire at Step 5.

Step	OUTPUT		UNDER TEST		
	Frequency	Waveform	Switching	Adjustment point	Adjust for
1	622-630 Hz	Fig.-13 at TP-1	S1(VOL. INC.)	VR1 on #307	frequency in tolerance
2	523-530 Hz	Fig.-13 at TP-1	S2(VOL. DEC.)	VR1 on #307	same as above
3	880-890 Hz	Fig.-13 at TP-1	S3(CH. SEL.)	VR1 on #307	same as above
4	40 kHz ±4 kHz	Fig.-14 at TP-3	S1	T1 on #307	same as above
5	Modulated 40 kHz ±4 kHz	Fig.-15 at TP-3	S1	Check	waveform only

TRANSMITTER WAVEFORM

TP—1 WAVEFORM

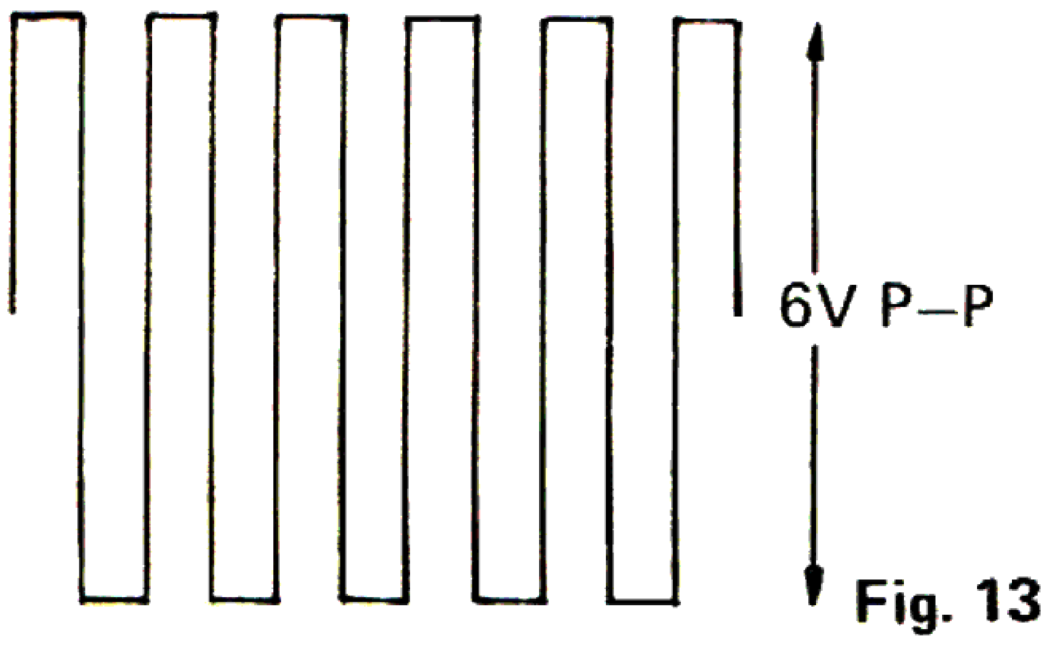


Fig. 13

Up	:	622 – 630 Hz
Down	:	520 – 530 Hz
Selector	:	880 – 890 Hz

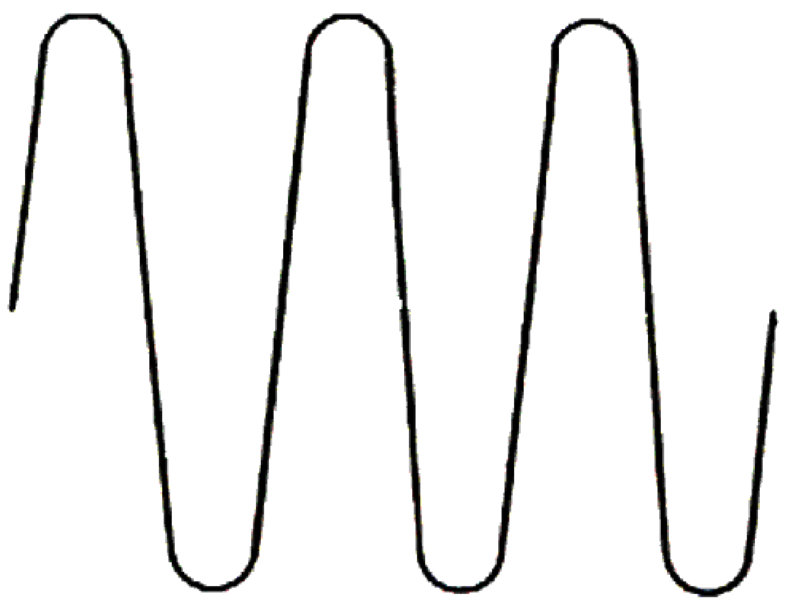


Fig. 14

TP—3

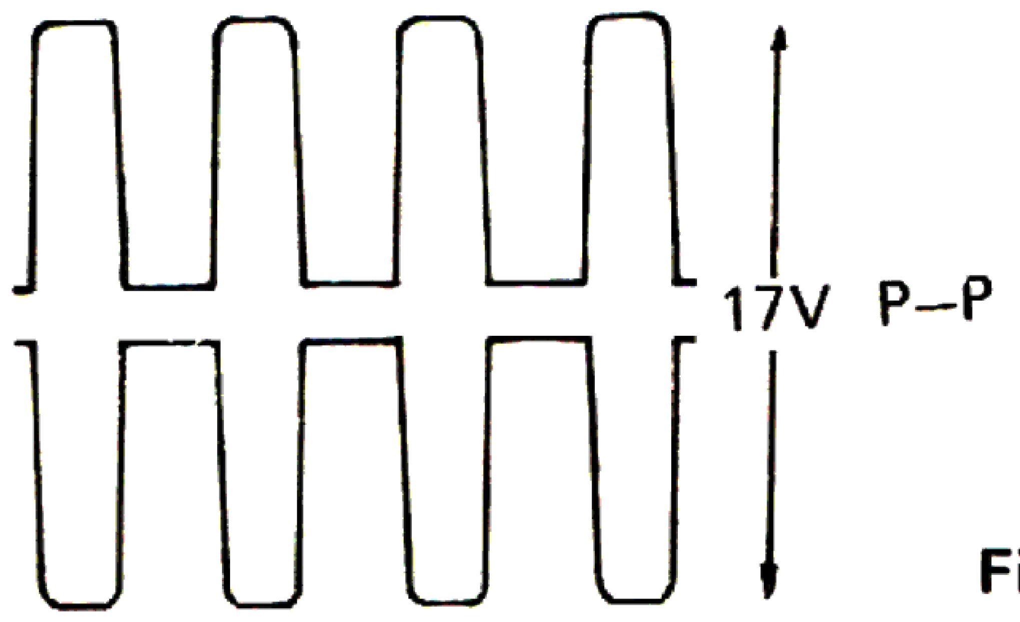


Fig. 15

When TP-1 and TP-2 are grounded, waveform TP-3 should be as indicated in Fig.-15.

REMOTE CONTROL RF AMP ADJUSTMENT

NOTE

a. Keep distance between transmitter and transducer as shown in Figure 16.

Step1. : Operate transmitting switch VOL, INC, VOL. DEC. and SEL. on the transmitter in order on or off.

Step2. : Adjust VR1 on PCB #301 RF AMP as volume control staret and stop smosly when transmitter is operated.

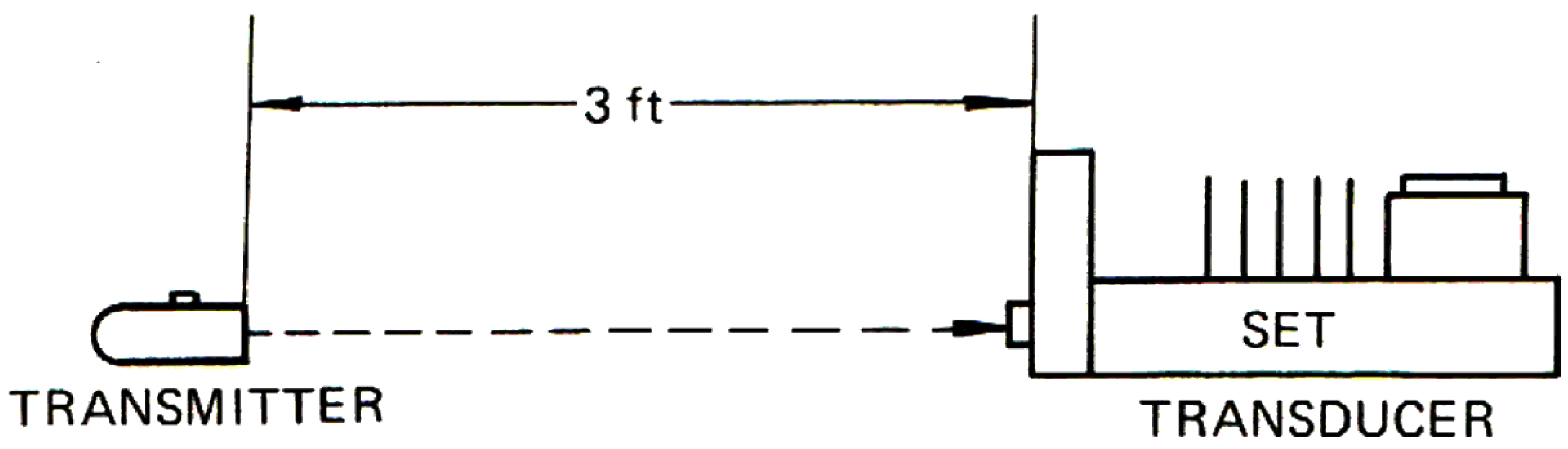
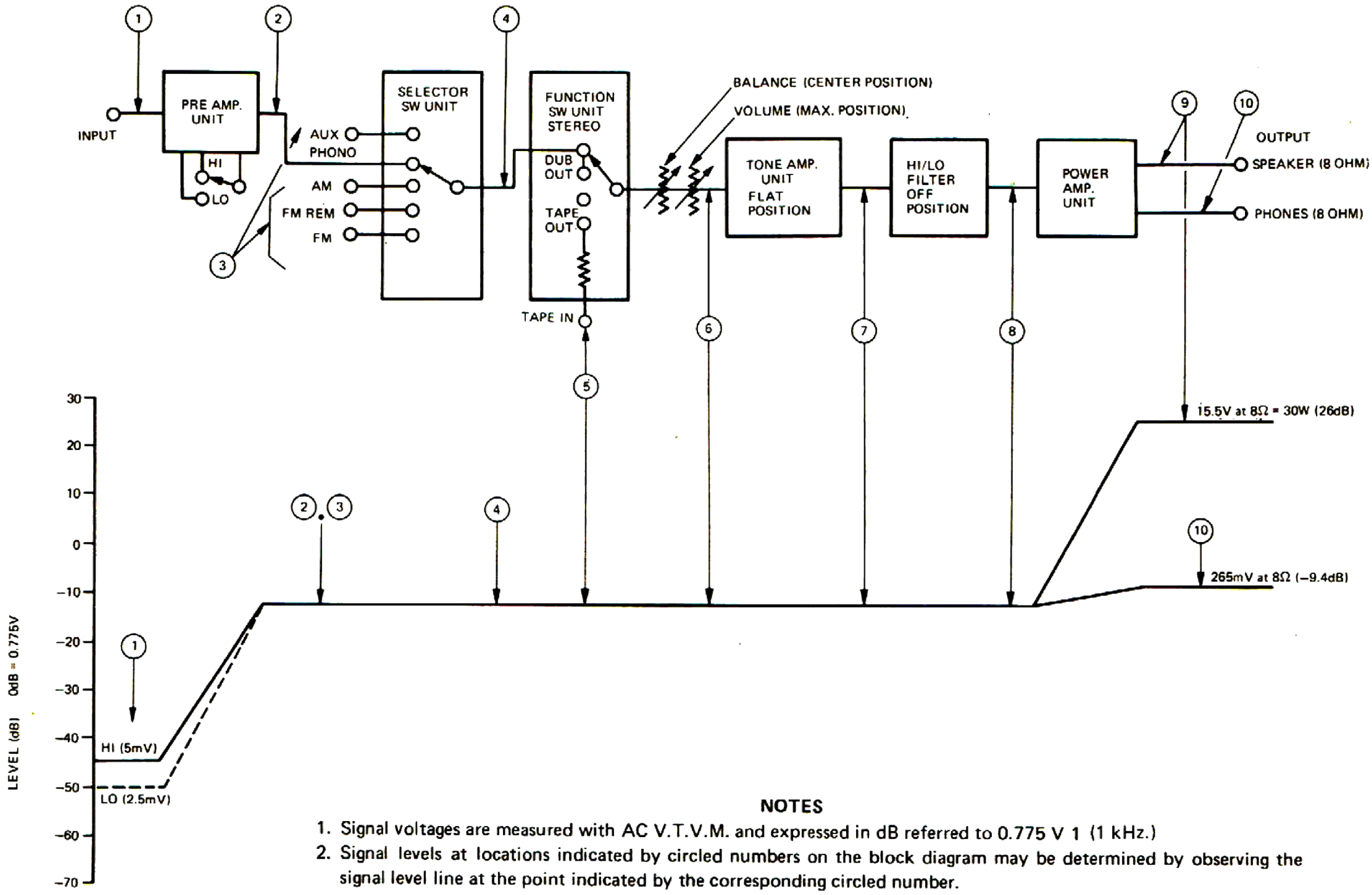


Fig.-16 Transmitter Location

LEVEL DIAGRAM STEREO OPERATION



NOTES

1. Signal voltages are measured with AC V.T.V.M. and expressed in dB referred to 0.775 V 1 (1 kHz.)
2. Signal levels at locations indicated by circled numbers on the block diagram may be determined by observing the signal level line at the point indicated by the corresponding circled number.

Fig.-17 Signal Level Diagram

OPERATION OF THE AUTOMATIC SHUT DOWN OF AUDIO OUTPUT

1. Any time current flows through the final/output transistor, a voltage is developed across R.
2. When this voltage exceeds a preset level, Q6 will be cut off by the action of D4, D6 and Q7.
3. Thus, B^+ to the pre-driver and pre-amp transitors is cut off.
4. As a result, the final transistor is completely disabled (no voltage and no signal).
5. Q5 comes on and Q6 remains off.
6. When this automatic circuit kicks in, turn power OFF, then back ON; this automatically resets the circuit.

Keep in mind that operation of this circuit means there is an overload condition somewhere. Check and correct the problem before going on.

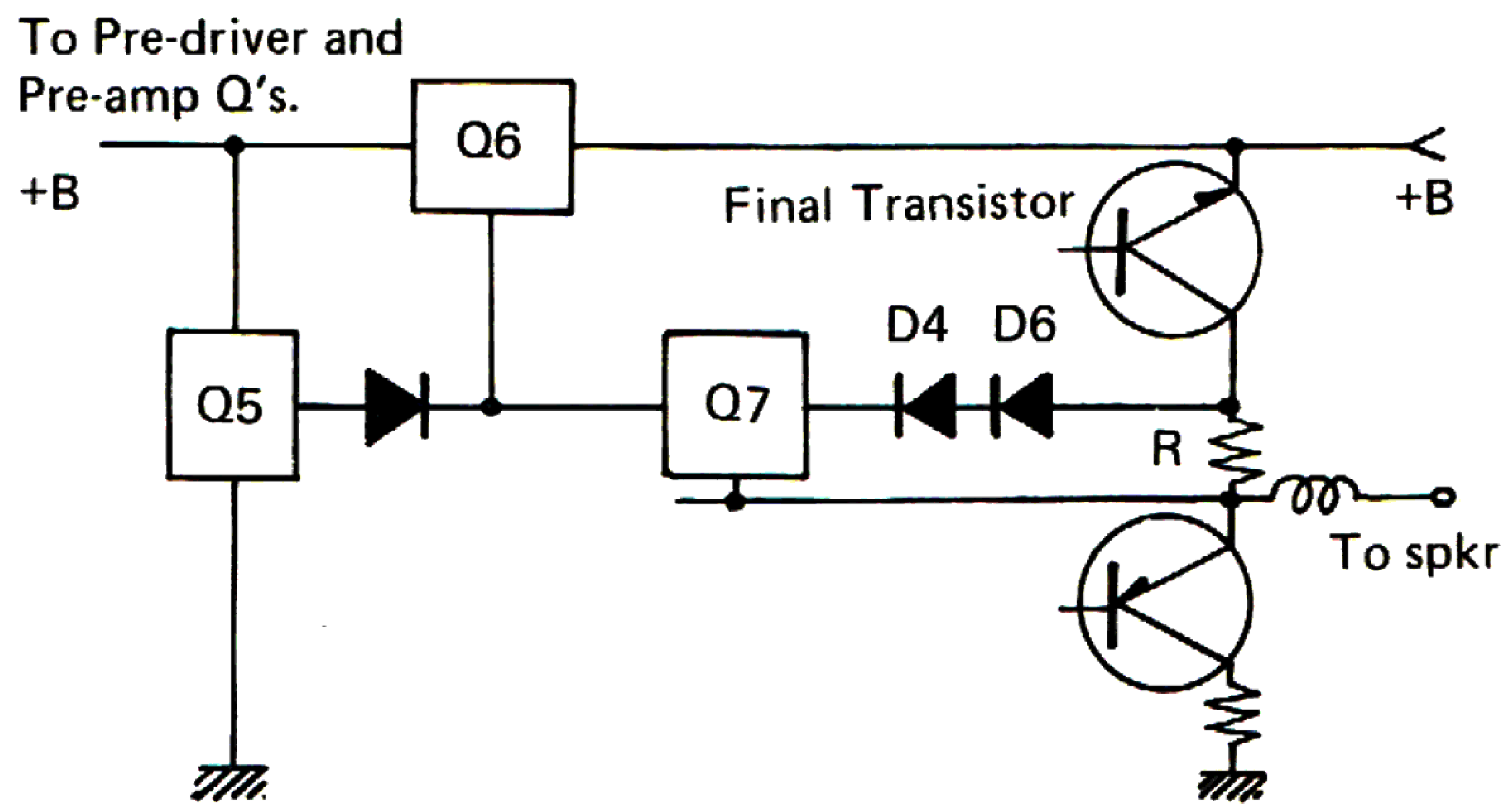


Fig.-18

VOLTAGE CHART

1. Power supply voltage = 120 VAC.
2. All voltage readings are with no input signal.

Remarks: DC voltage measured with V.T.V.M. (±5%)

RF AMPLIFIER P C BOARD NO. 301

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0	0.60	3.49
Q 2	0	0	0
Q 3	0	0.60	3.38
Q 4	0	0.61	3.54
Q 5	0	0	1.63

TONE DETECTOR P C BOARD NO. 302

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0	0	1.61
Q 2	0	0	1.61
Q 3	0.1	0	1.64
Q 4	0	-0.08	0.09

SYMBOL	IC PIN NO. (V)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC–1	0	0	0	-8.42	0	0	8.47	0						
IC–2	0	0	0	-8.42	0	0	8.47	0						
IC–3	0	0	0	-8.42	0	0	8.47	0						
IC–4	0.04	1.6	1.63	3.77	0.67	0.67	0	1.64	1.63	0.06	1.61	1.63	0.04	5.22

MOTOR DRIVE P C BOARD NO. 303

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0	0	8.43
Q 2	0	0	-8.39
Q 3	8.43	8.43	0
Q 4	-8.4	-8.4	0
Q 5	0	0	8.19
Q 6	-8.4	-8.4	0.22

SYMBOL	IC PIN NO. (V)								REMARKS
	1	2	3	4	5	6	7	8	
IC–2	0	0	0	-8.42	0	0	8.45	0	

COUNTER P C BOARD NO. 304

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0	0	3.41

DISPLAY P C BOARD NO. 305

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0	0.75	0.92
Q 2	0	0.05	11.78
Q 3	0	0.05	11.78
Q 4	0	0.62	0.87
Q 5	0	0.60	8.24
Q 6	0	0.62	9.17
Q 7	0	0.76	0.11

TRANSMITTER P C BOARD NO. 307

SYMBOL	EMITTER (V)			BASE (V)			COLLECTOR (V)		
	ON	OFF	SELECT	ON	OFF	SELECT	ON	OFF	SELECT
Q 1	0			-0.49	(-0.44)	-0.57	2.89	(2.92)	2.85
Q 2	0			-0.49	(-0.43)	-0.57	2.96	(2.98)	2.91
Q 3	0			0.24	(0.23)	0.23	1.68	(1.77)	1.65
Q 4	1.65	(1.70)	1.63	1.68	(1.77)	1.64	8.97	(8.97)	8.97

EQUILIZER AMP P C BOARD NO. 308

SYMBOL	IC PIN NO.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC–1	0.64	14.0	20.5	20.5	1.2	0.50	0.03	0	0.699	14.1	20.6	20.6	1.3	0.62	0.043	0

TONE AMPLIFIER P C BOARD NO. 309

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	9.31	8.73	22.2
Q 2	1.42	2.01	14.43
Q 101	8.97	8.47	22.3
Q 102	1.31	1.91	15.28

FUNCTION SWITCH P C BOARD NO. 310

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	12.23	12.75	25.8
Q 101	12.19	12.71	25.8

POWER AMPLIFIER P C BOARD NO. 311

SYMBOL	EMITTER (V)			BASE (V)			COLLECTOR (V)		
	NO Signal	Receiving	Protector ON	NO Signal	Receiving	Protector ON	NO Signal	Receiving	Protector ON
Q 1	0.61	(0.64)	(0)	(1.24)		(0.42)	20.2	(19.7)	(9.0)
Q 2	0	(0)	(0)	(0.58)		(0.50)	25.7	(26.9)	(16.5)
Q 3	25.9	(27.7)	(18.1)	25.5	(27.2)	(17.2)	0	(0.13)	(0.16)
Q 4	27.7	(28.4)	(18.9)	28.2	(29.0)	(18.5)	57.6	(57.5)	(18.7)
Q 5	0	(0)	(0)	(0.62)		(0.56)	(0.09)		(0.08)
Q 6	57.8	(57.3)	(18.3)	58.5	(58.0)	(18.9)	58.6	(58.1)	(58.0)
Q 7	27.1	(27.8)	(18.6)	26.5	(26.9)	(19.2)	58.5	(58.0)	(18.6)
Q 8	27.1	(27.9)	(18.7)	27.5	(28.4)	(18.7)	58.6	(58.1)	(57.9)
Q 9	26.8	(27.9)	(18.8)	26.2	(27.3)	(18.2)	0	(0)	(0)

POWER SUPPLY P C BOARD NO. 313

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	8.38	8.96	13.6
Q 2	-8.37	-8.91	-14.1
Q 3	25.9	26.4	33.1
Q 4	11.7	12.34	17.7

AM–FM TUNER P C BOARD NO. 314

SYMBOL	IC PIN NO. (V)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC–1	1.82	1.84	6.94	0	4.8	1.81	1.82							
IC–2	1.85	1.88	8.11	0	7.28	1.86	1.85							
IC–3	11.76	3.25	7.46	6.56	6.63	11.75	0	0.12	2.46	1.7	2.32	2.47	2.47	3.3

Remarks: DC voltage measured with V.T.V.M. (±5%)

SYMBOL	EMITTER (V)	BASE (V)	COLLECTOR (V)
Q 1	0.25	0.89	3.21
Q 2	2.53	3.21	7.04
Q 3	0	0.02	0
Q 4	0	0.21	0
Q 5	0	0	0
Q 6	0	0	11.66
Q 7	1.13	1.83	7.88
Q 8	0.85	1.53	6.16
Q 9	1.48	2.13	7.17
Q 10	0.3	0.94	7.07
Q 11	0	0.54	0
Q 12	0	0.63	0.015
Q 13	0	-0.25	0
Q 14	0	-0.2	0
Q 15	0.27	0.88	11.02
Q 16	1.37	2.03	10.45
Q 17	0	0	2.03
Q 18	0.34	0.97	4.22
Q 19	3.57	4.23	10.0
Q 20	0	0.6	0.02
Q 21	0	0.024	0
Q 22	1.4	1.92	4.4
Q 23	0	0.14	11.69
Q 24	0	0.54	0.11
Q 25	0	0.05	3.3
Q 26	2.36	2.8	7.28
Q 27	2.36	2.78	7.20

Remarks: DC voltage measured with V.T.V.M. (±5%)

IC TRUTH TABLE

IC-1 N7411

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Manual	H	H	H	H	H	H	GND	L	H	H	H	L	L	VCC
CH-1	H	H	L	H	H	L	GND	L	L	H	H	H	H	VCC
CH-2	L	H	H	L	H	L	GND	H	H	H	H	L	L	VCC
CH-3	H	L	H	H	L	L	GND	L	H	L	L	L	L	VCC
CH-4	H	L	L	H	L	L	GND	L	L	L	L	L	H	VCC
CH-5	L	L	H	L	L	L	GND	L	H	H	L	L	L	VCC

IC-2 N7411

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Manual	H	L	H	H	L	L	GND	L	H	L	L	L	L	VCC
CH-1	H	L	L	H	L	L	GND	L	L	L	L	L	H	VCC
CH-2	L	L	H	L	L	L	GND	L	H	L	L	L	L	VCC
CH-3	H	H	H	H	H	H	GND	L	H	H	H	L	L	VCC
CH-4	H	H	L	H	H	L	GND	L	L	H	H	H	H	VCC
CH-5	L	H	H	L	H	L	GND	H	H	H	H	L	L	VCC

IC-3 N7473

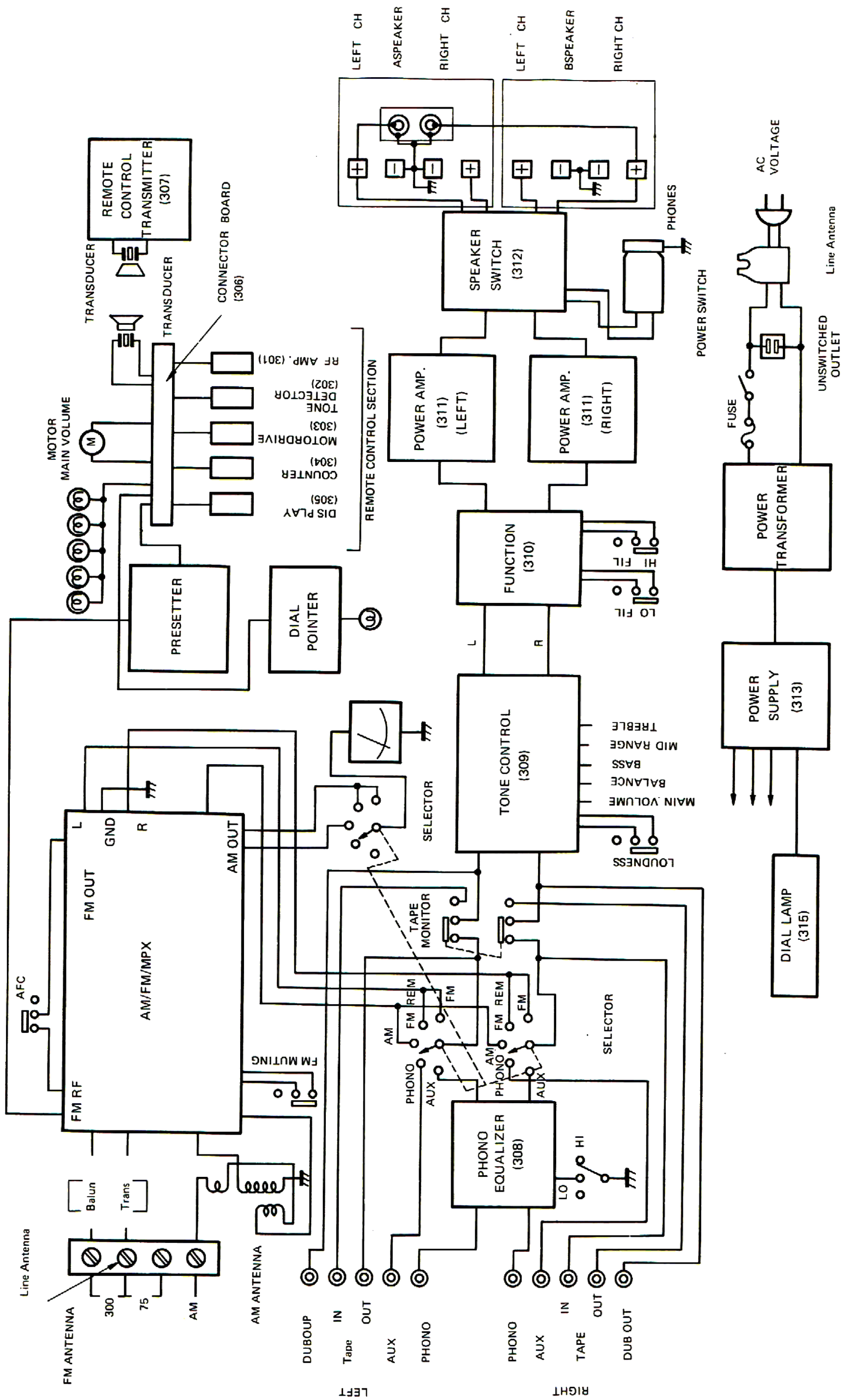
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Manual			H	VCC			H	H	L	H	GND	L	H	H
CH-1			H	VCC			H	H	L	L	GND	H	L	H
CH-2			L	VCC			L	L	H	H	GND	L	H	L
CH-3			H	VCC			L	H	L	H	GND	L	H	H
CH-4			H	VCC			H	H	L	L	GND	L	H	L
CH-5			L	VCC			L	L	H	H	GND	L	H	L

IC-4 N7473

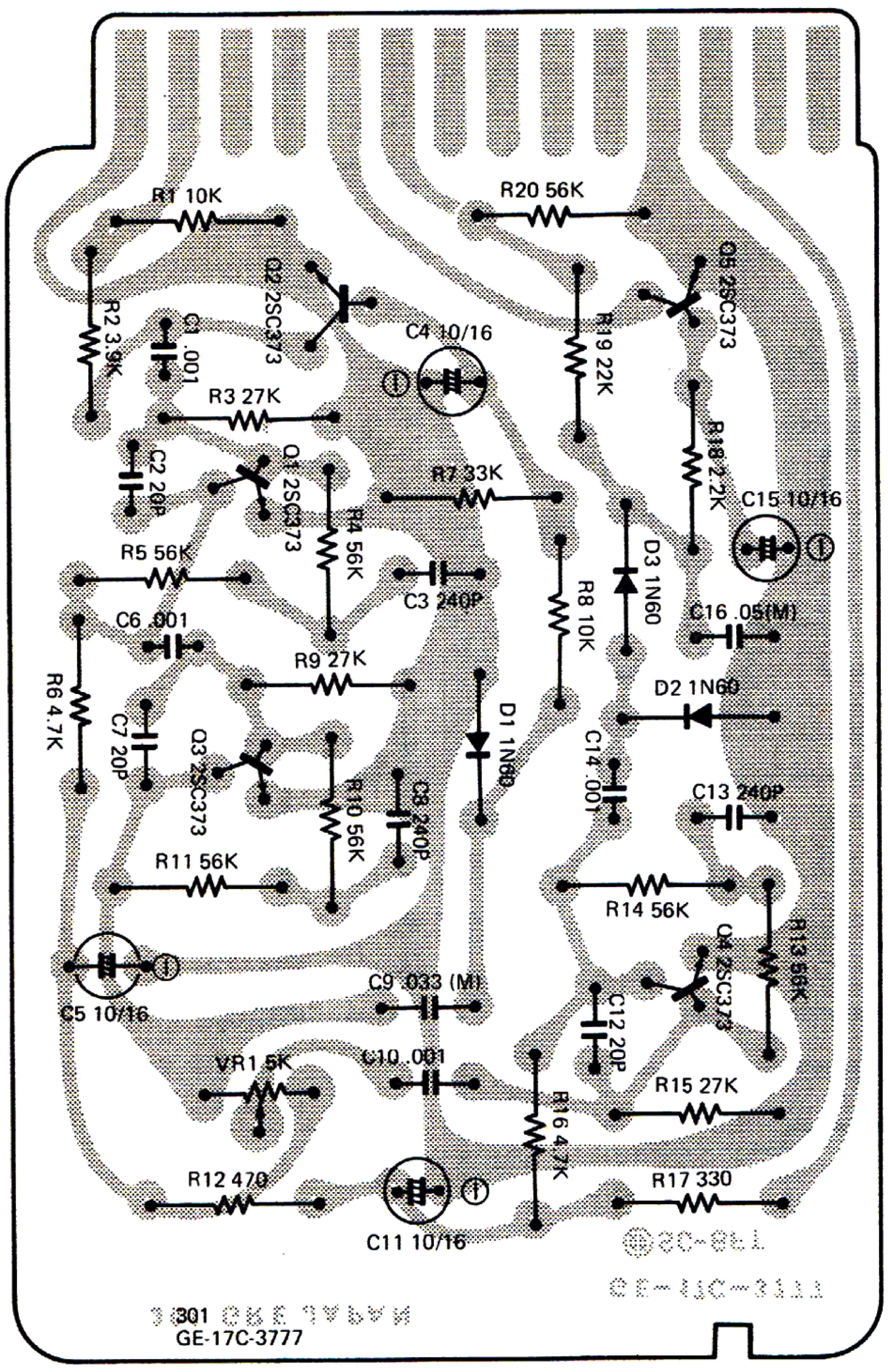
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Manual			H	VCC							GND	L	H	H
CH-1			H	VCC							GND	L	H	H
CH-2				VCC							GND	L	H	L
CH-3			L	VCC							GND	H	L	L
CH-4			L	VCC							GND	H	L	L
CH-5			H	VCC							GND	H	L	H

Permissible Voltage Range for Logic H : More than 2.4V
Permissible Voltage Range for Logic L : Less than 0.4V

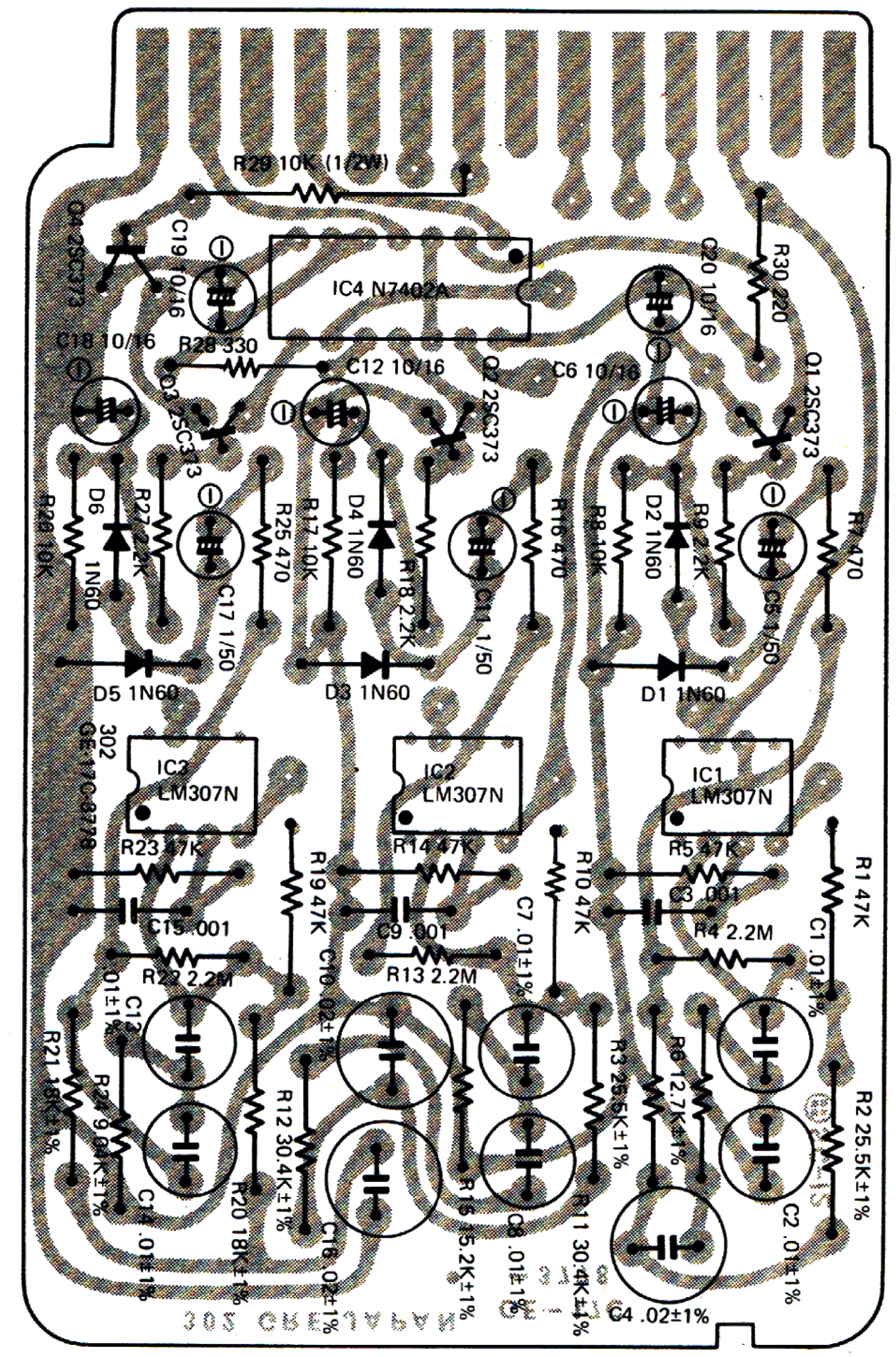
BLOCK DIAGRAM



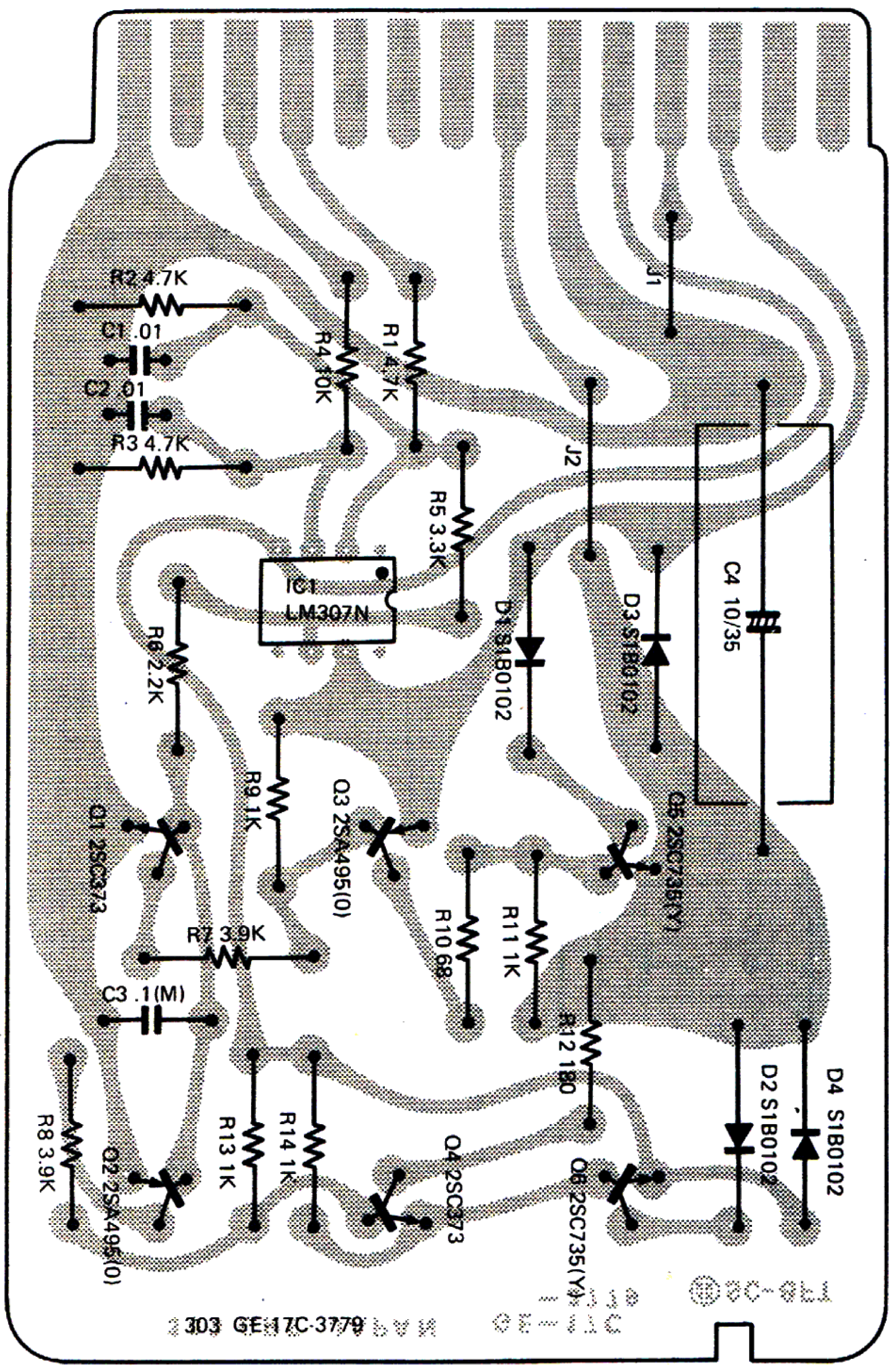
RF AMP (NO. 301)



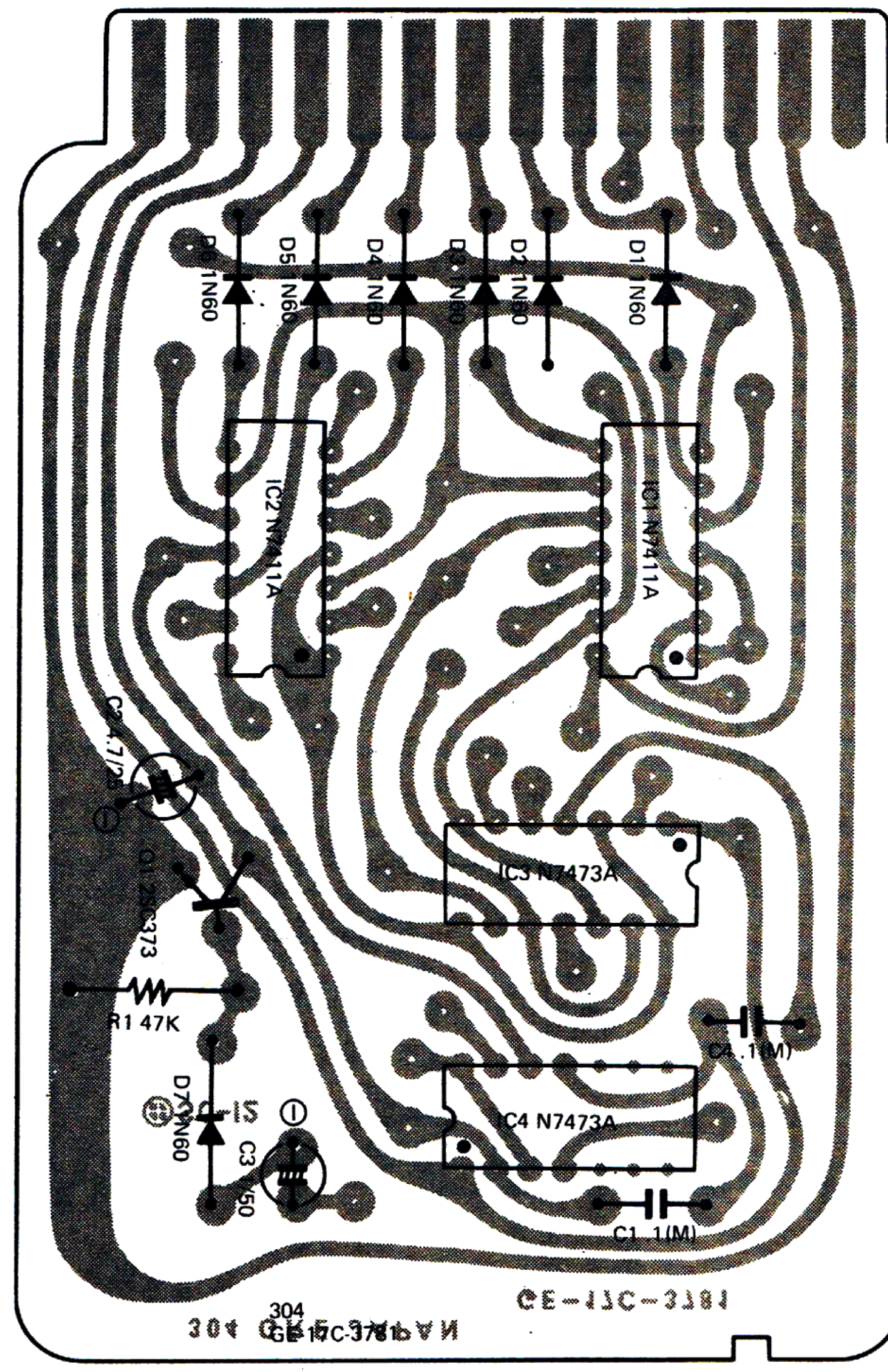
Tone Detector (NO. 302)



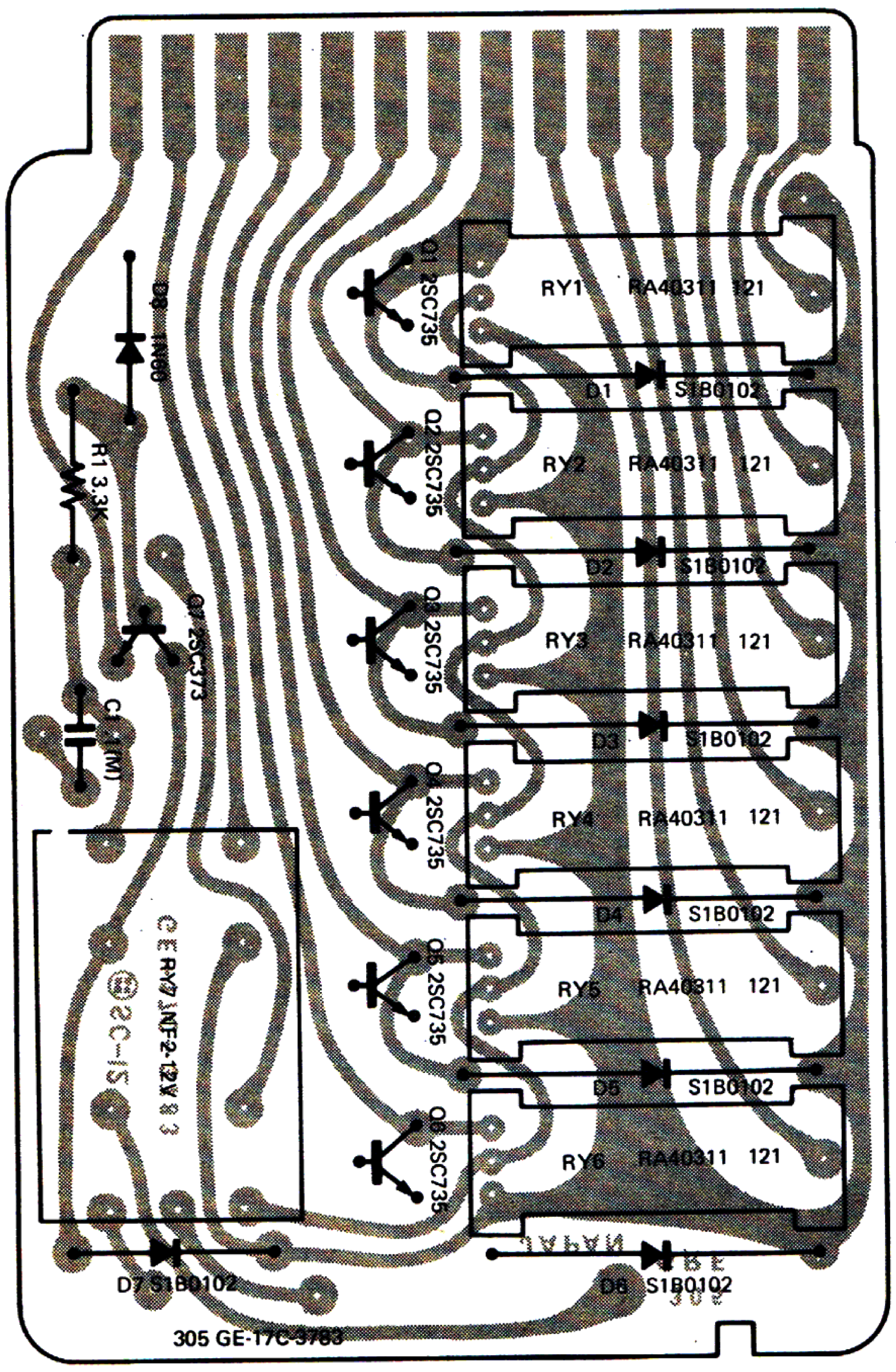
Motor Drive (NO. 303)



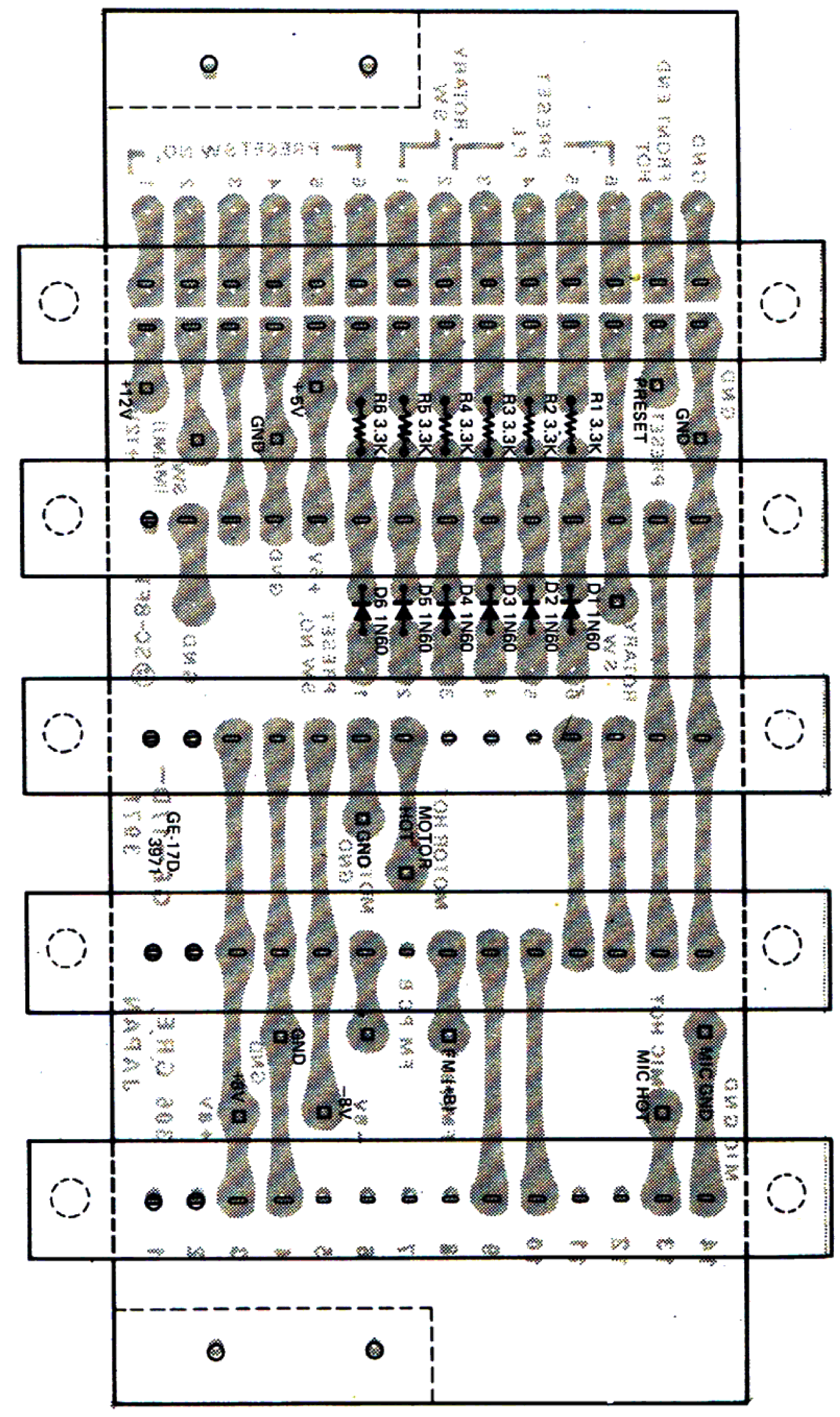
Counter (NO. 304)



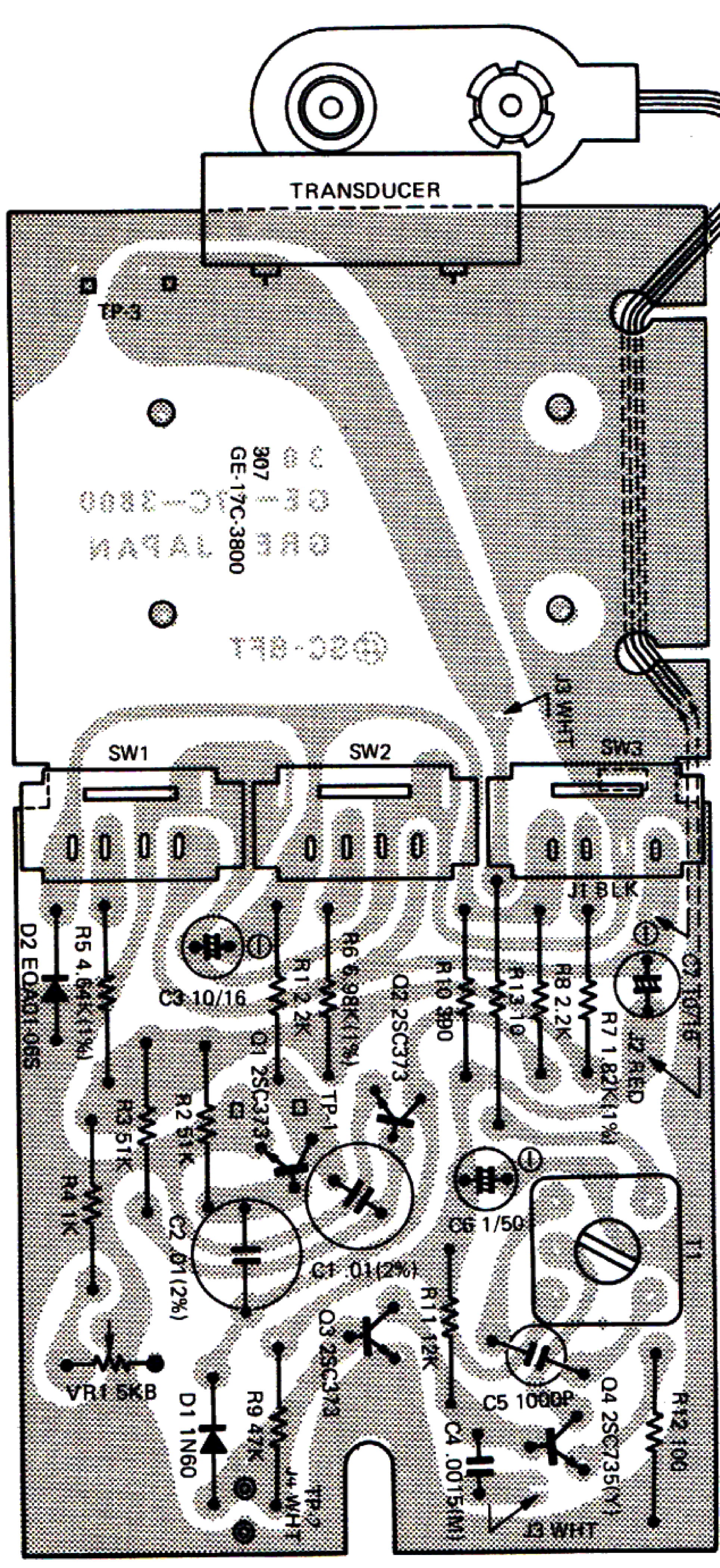
Display (NO. 305)



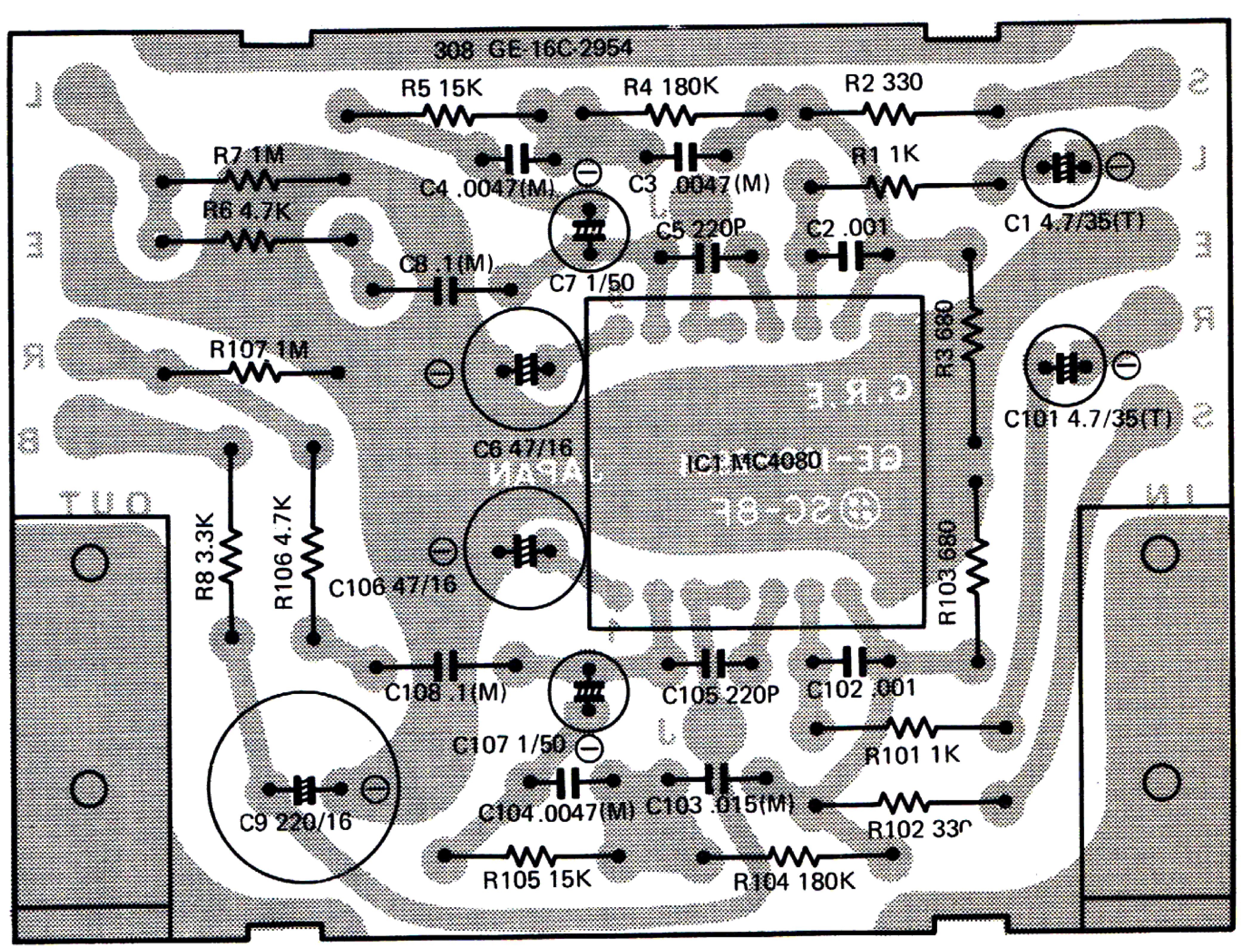
Connector (NO. 306)



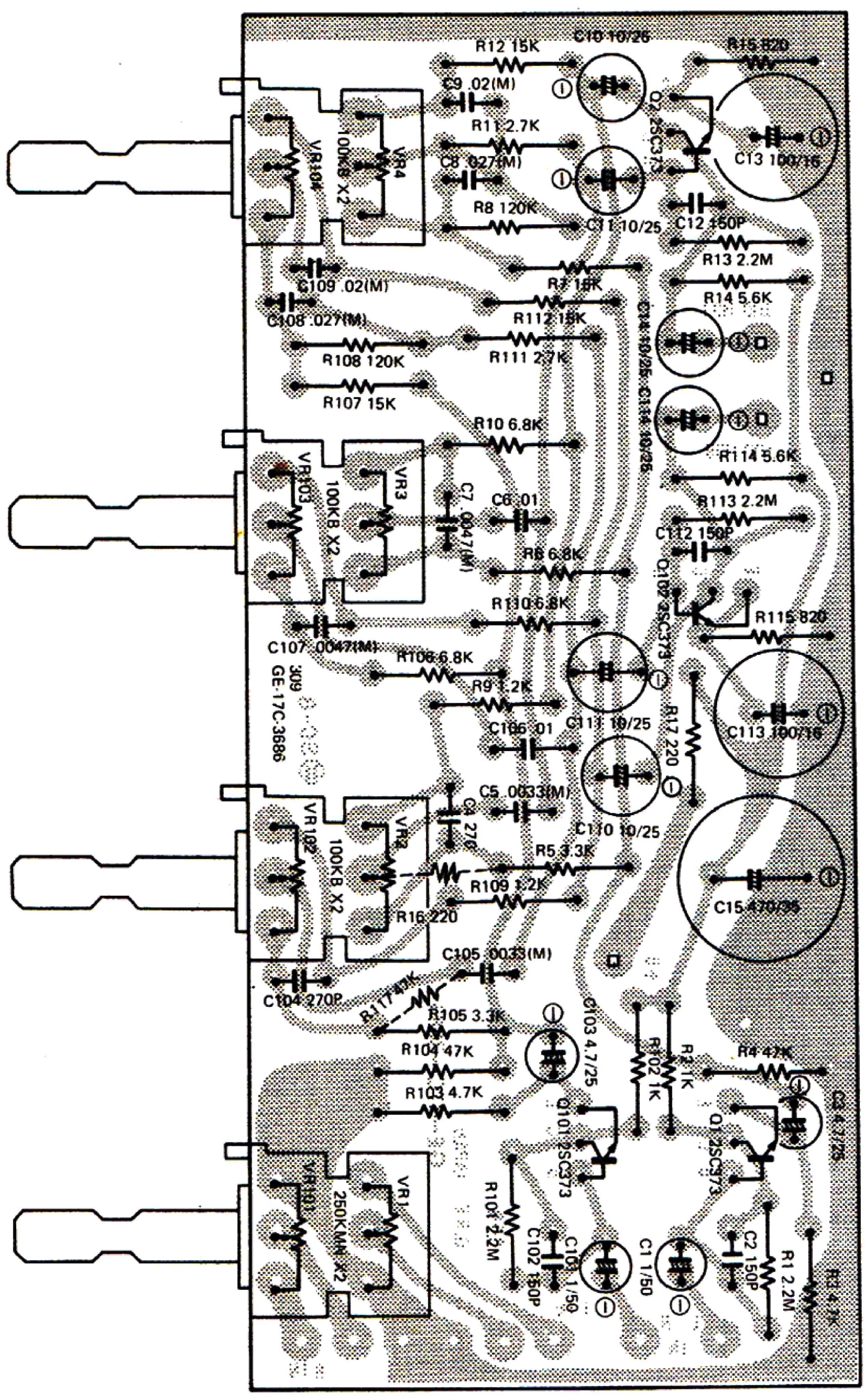
Remote Control Transducer (NO. 307)



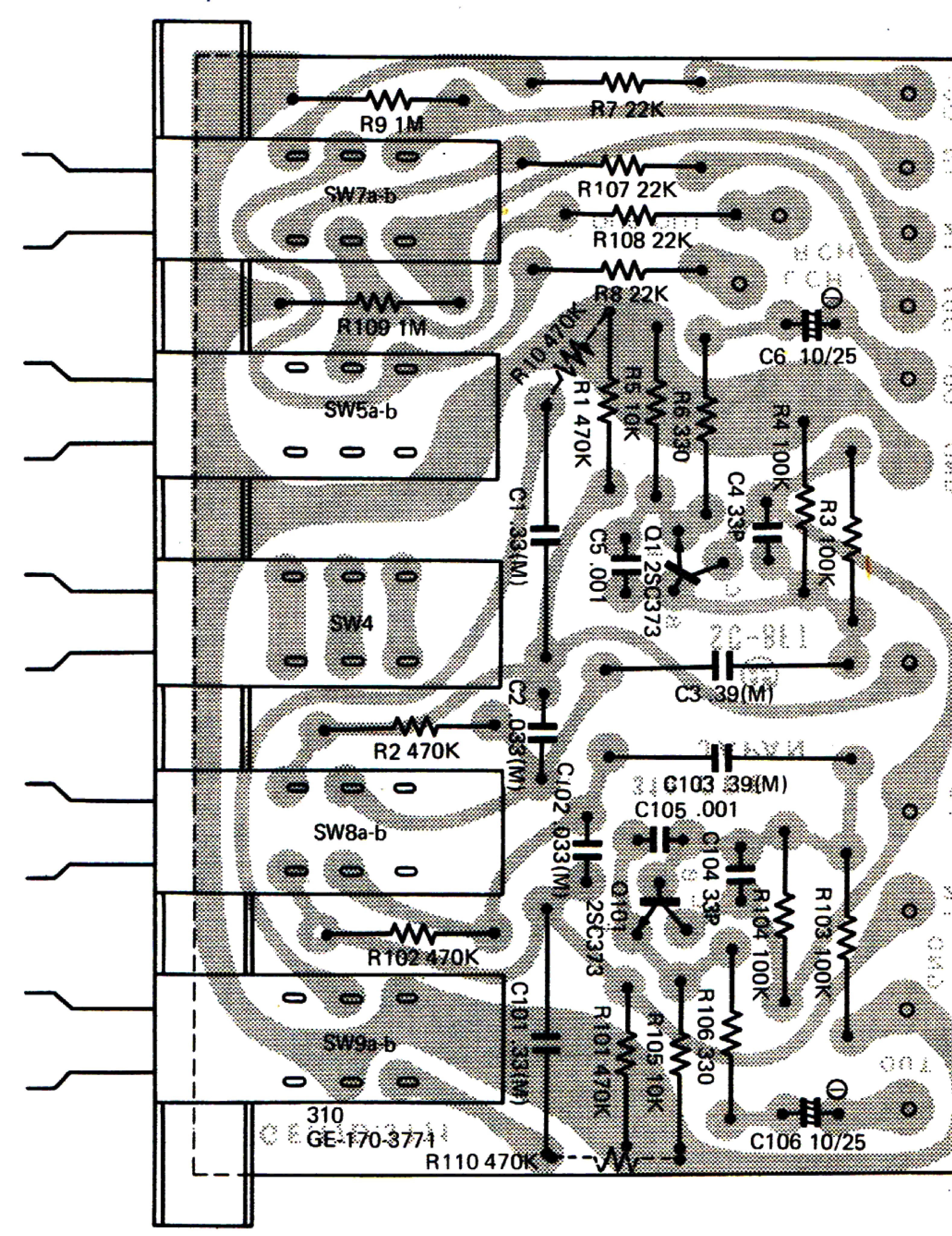
EQ. AMP. (NO. 308)



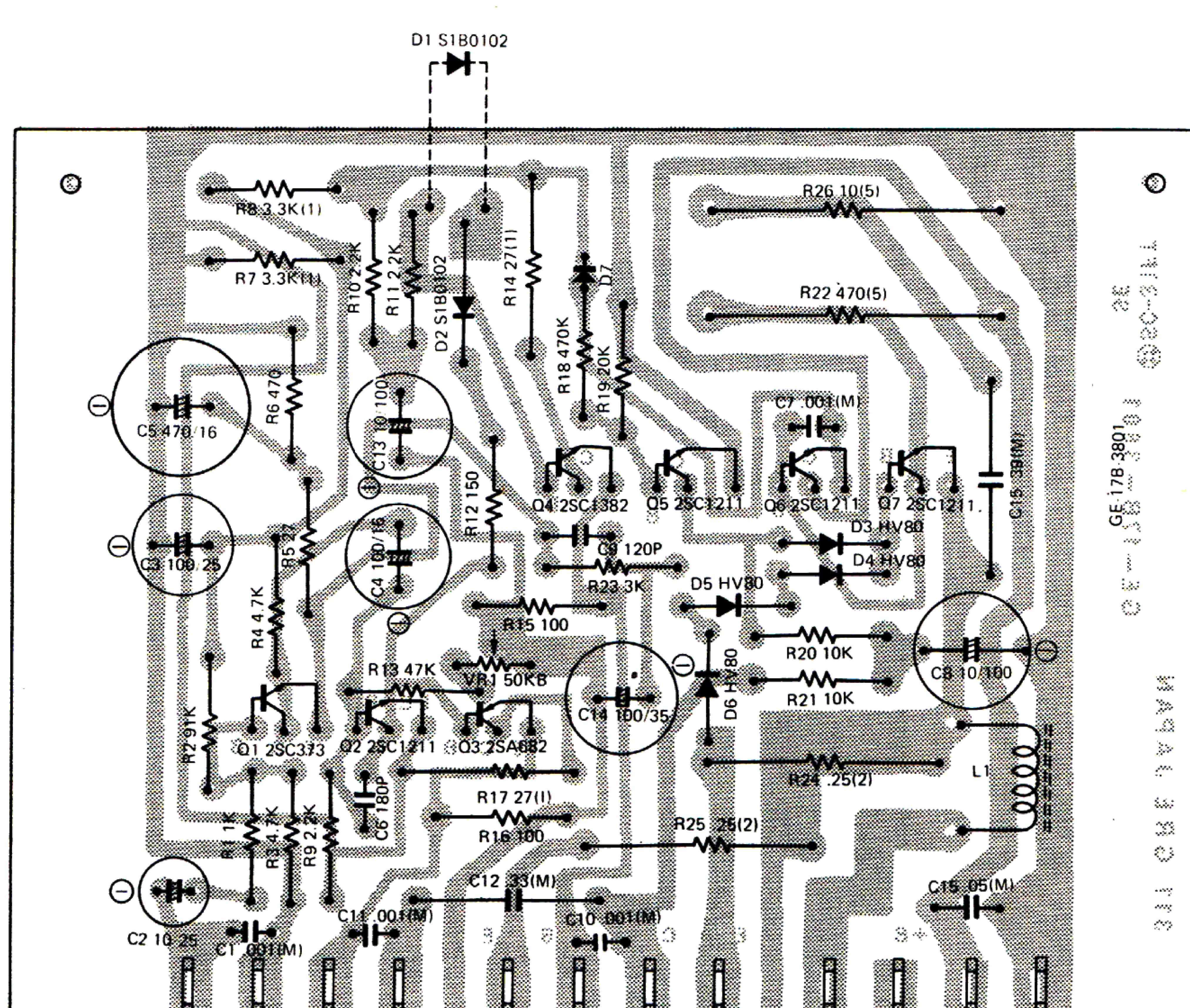
Tone AMP. (NO. 309)



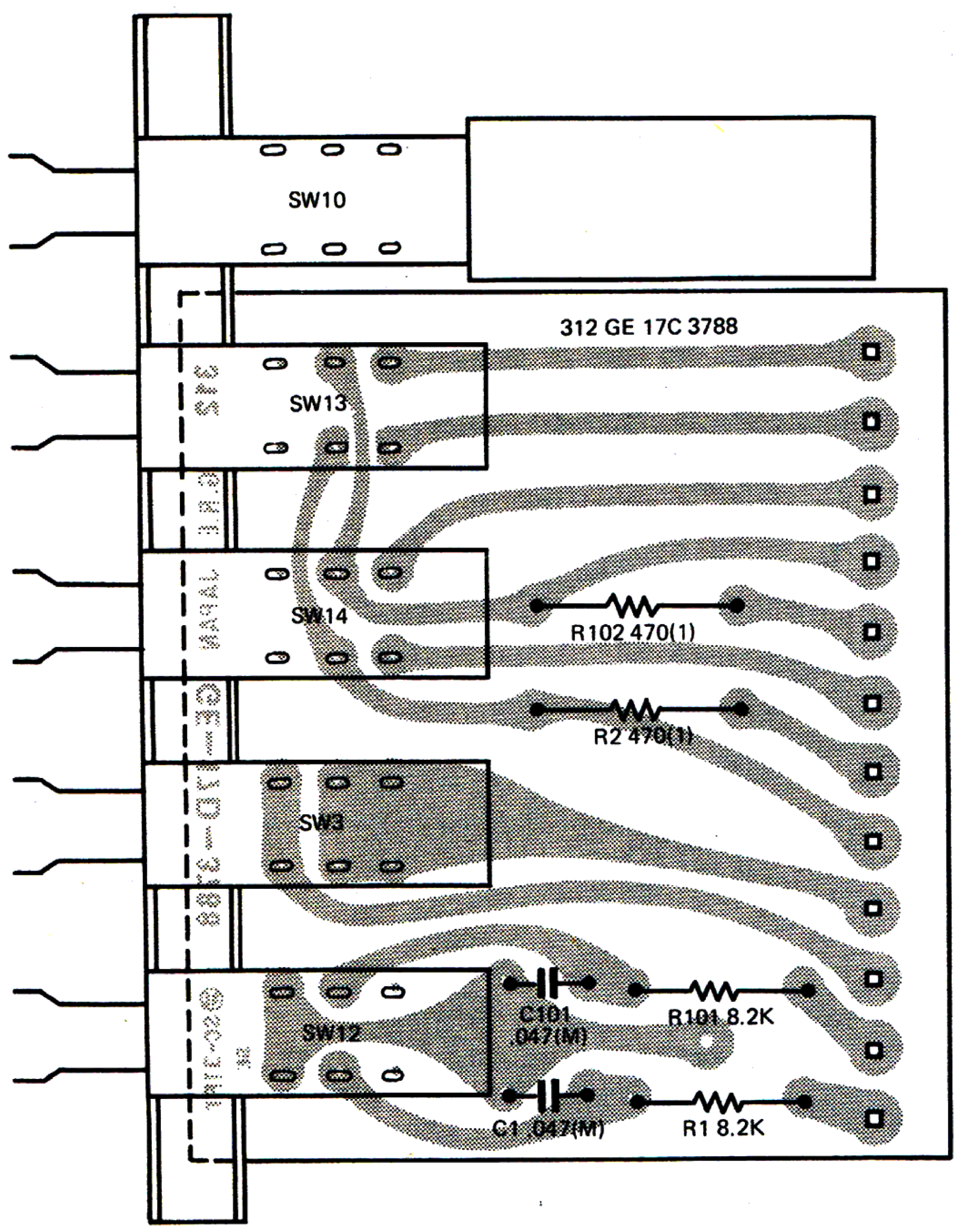
Function SW (NO. 310)



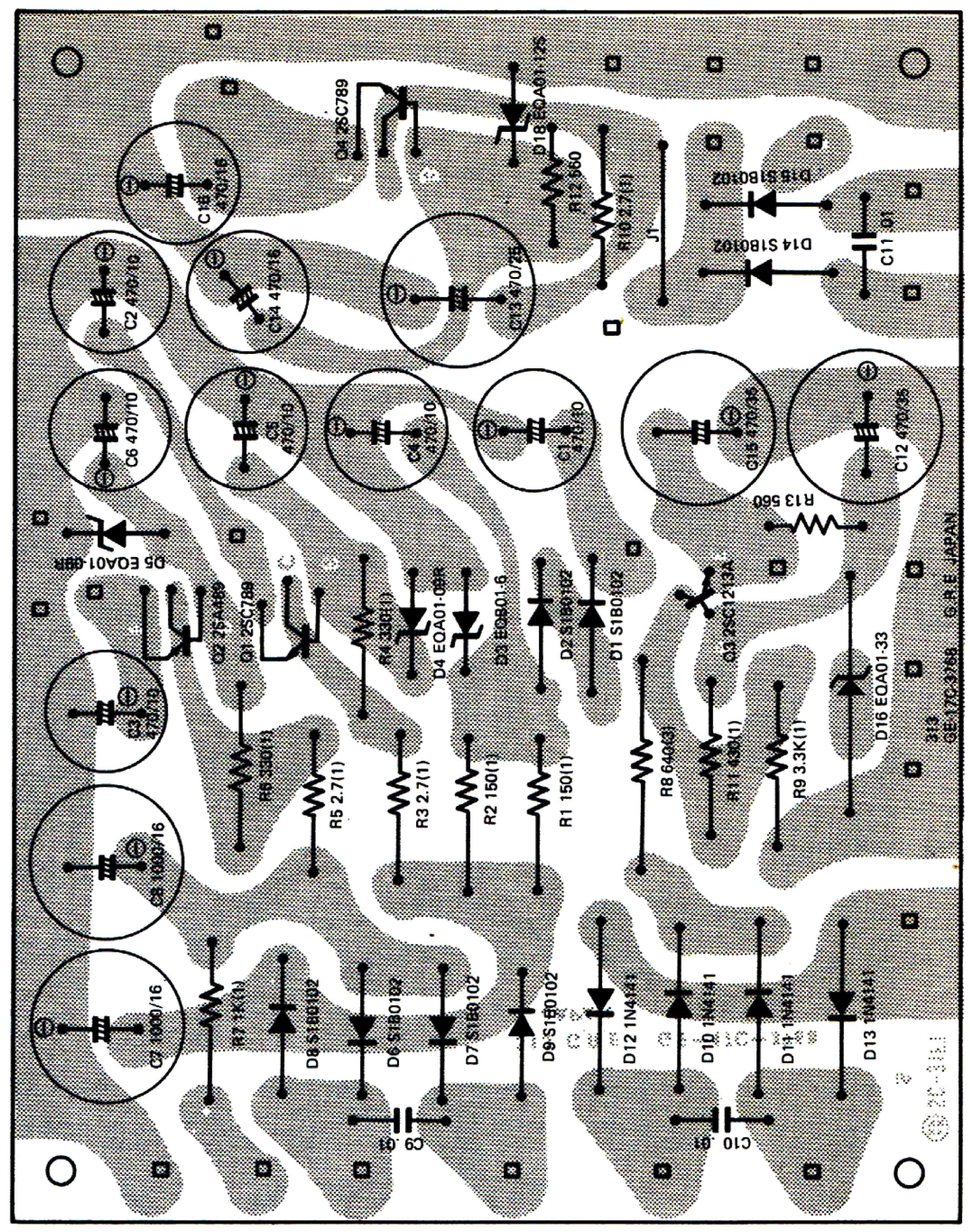
Power AMP. (NO. 311)



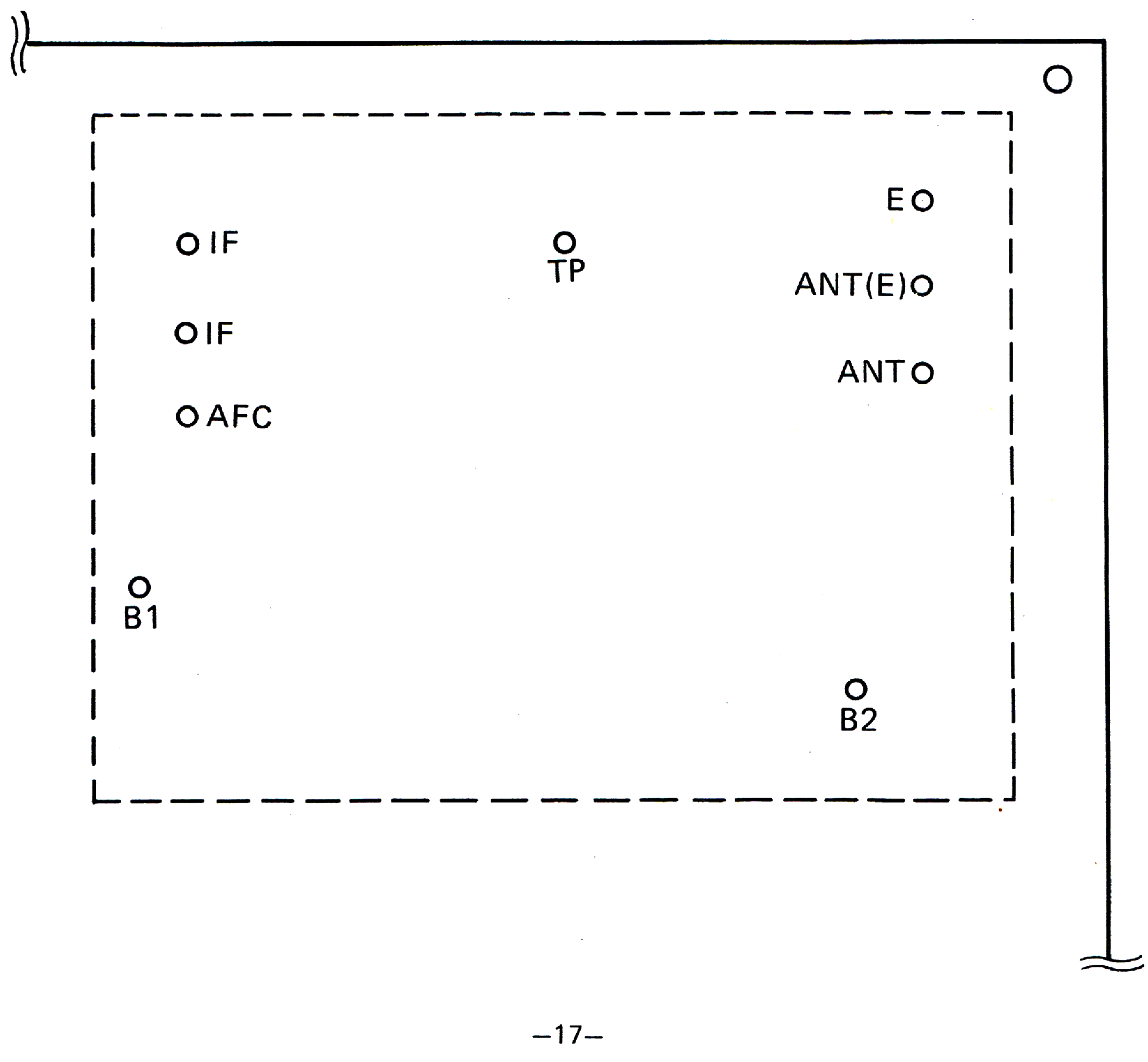
Speaker SW (NO. 312)



Power Supply (NO. 313)



FM FRONT END (CONNECTION/ADJUSTMENT LABELS)



AM/FM TUNER (NO. 314)

TROUBLESHOOTING CHART

Symptom	Possible Cause
1) L.E.D. does not light, and the unit does not function when power is on.	A) Faulty line power cord. B) 3A fuse blown. C) Defective power switch. D) Defective power transformer.
2) Fuse blows when power is switched on.	A) Defective power transformer. B) Primary or secondary circuit of the transformer has a short. C) Short-circuit in the rectifier D10-13 or rectifier circuit. D) Short-circuit in the Power Amplifier circuit component. E) Short-circuit in the Speaker Terminal or defective Power amplifier protector.
3) Dial lamp does not light.	A) Defective Dial lamp or defective rectifier D14, 15. B) Short-circuit in the Q4 circuit. C) Faulty power supply P C Board. (No. 313) D) Defective lamp or R1 (No. 315)
4) Presetter lamp does not light.	A) Defective presetter lamp or defective presetter unit. B) Faulty Connector (No. 306) P C Board or short-circuit in the presetter unit.
5) Dial lamp glows but no sound in either channel or no sound in one channel only.	A) Speaker switch defective. B) Blown 2A fuse in power amplifier circuit protector. (CSA model) C) Faulty speaker coupling capacitor C11, C12 (or other channels). D) Power amplifier defective open. E) Defective in Q4 circuit. F) Defective power transistor Q8, Q9. G) Faulty function switch or faulty function switch circuit component. H) Power Amplifier protector (Q6, Q7, Q8) defective. (No. 311)
6) No sound with Aux., Tape IN or Tuner input.	A) Poor contact at input jack. B) Defective input jack. C) Poor contact at selector switch. D) Defective selector switch.
7) No sound with phono input.	A) Poor contact at input jack. B) Defective input jack. C) Defective IC—1 in Eq. circuit.
8) BASS control not effective.	A) Defective variable resistor VR4. B) Faulty capacitor C8 or C9 or resistor R7, R151,R11 or R12. C) Faulty tone control (P C Board unit) circuit component.
9) TREBLE control not effective.	A) Defective variable resistor VR2, 100 KΩ. B) Faulty capacitor C5 or resistors R5,R9. C) Faulty tone control (P C Board unit No. 309) circuit component.
10) Noisy	A) Defective Tuner, IF unit. B) Defective power transistor Q8,9,108 or 109.

Symptom	Possible Cause
11) Hum	A) Defective shield on low level audio cable. B) No ground wire between ground Terminal on amplifier and other unit. C) Intermittent ground in amplifier. D) Check for loosened hardware or poor solder connections.
12) Improper Stereo Separation.	A) Faulty MPX IC. (MC1310P) B) Faulty discriminator trans. T11. C) Faulty PC trimmer VR5 (No. 314).
13) Remote control does not operate.	A) Transducer Battery weak. B) Defective transducer or defective transducer circuit component. C) One of P C Board unit No. 311, 312, 313, 314, or 315 Defective. D) Adjustment of VR1 (No. 307).
14) Remote channel selector does not operate.	A) Defective transducer: selector push-button switch. B) Weak Battery. C) Defective transducer microphone. D) One of P C Board assembly units No. 311, 312, 313, 314 or 315 defective. E) Adjustment of VR1 (No. 307).
15) Transmitter does not operate.	A) Battery weak. B) Broken transducer. C) Faulty push-button. D) Defective transducer circuit component. E) Defective capacitor C7. F) Defective Zener Diode D2. G) Adjustment of VR1 (No. 307).
16) Presetter does not operate.	A) Defective preset push-button switch. B) VR1 50 KΩB has shifted or became broken. (Presetter unit)

Dial Cord Stringing Diagram

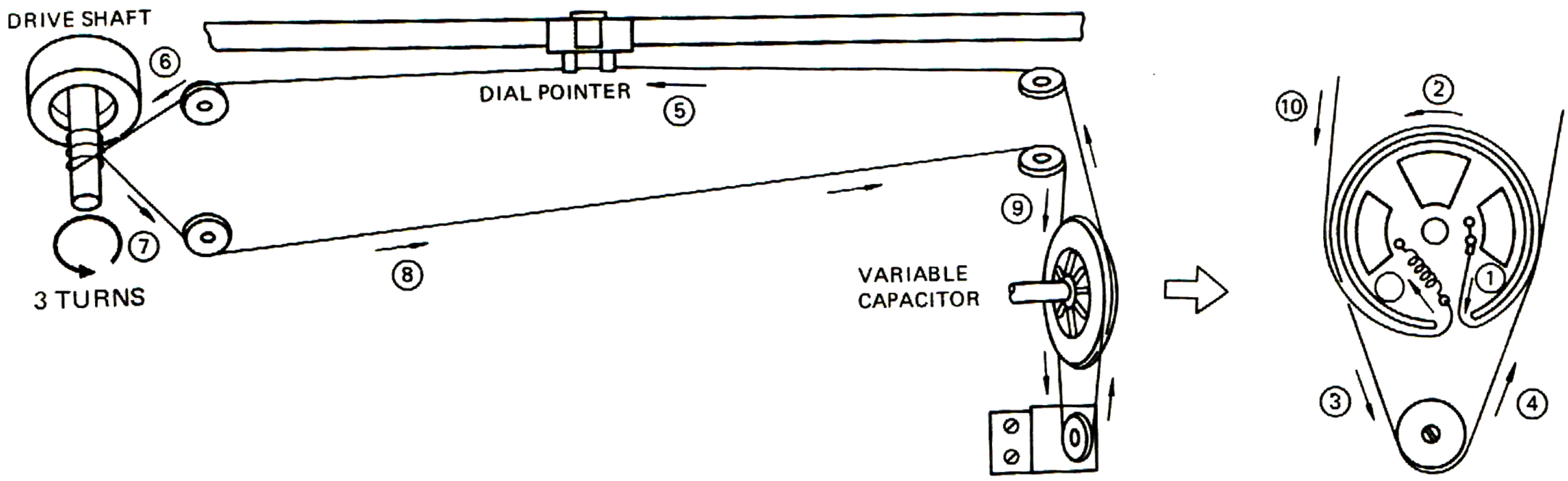
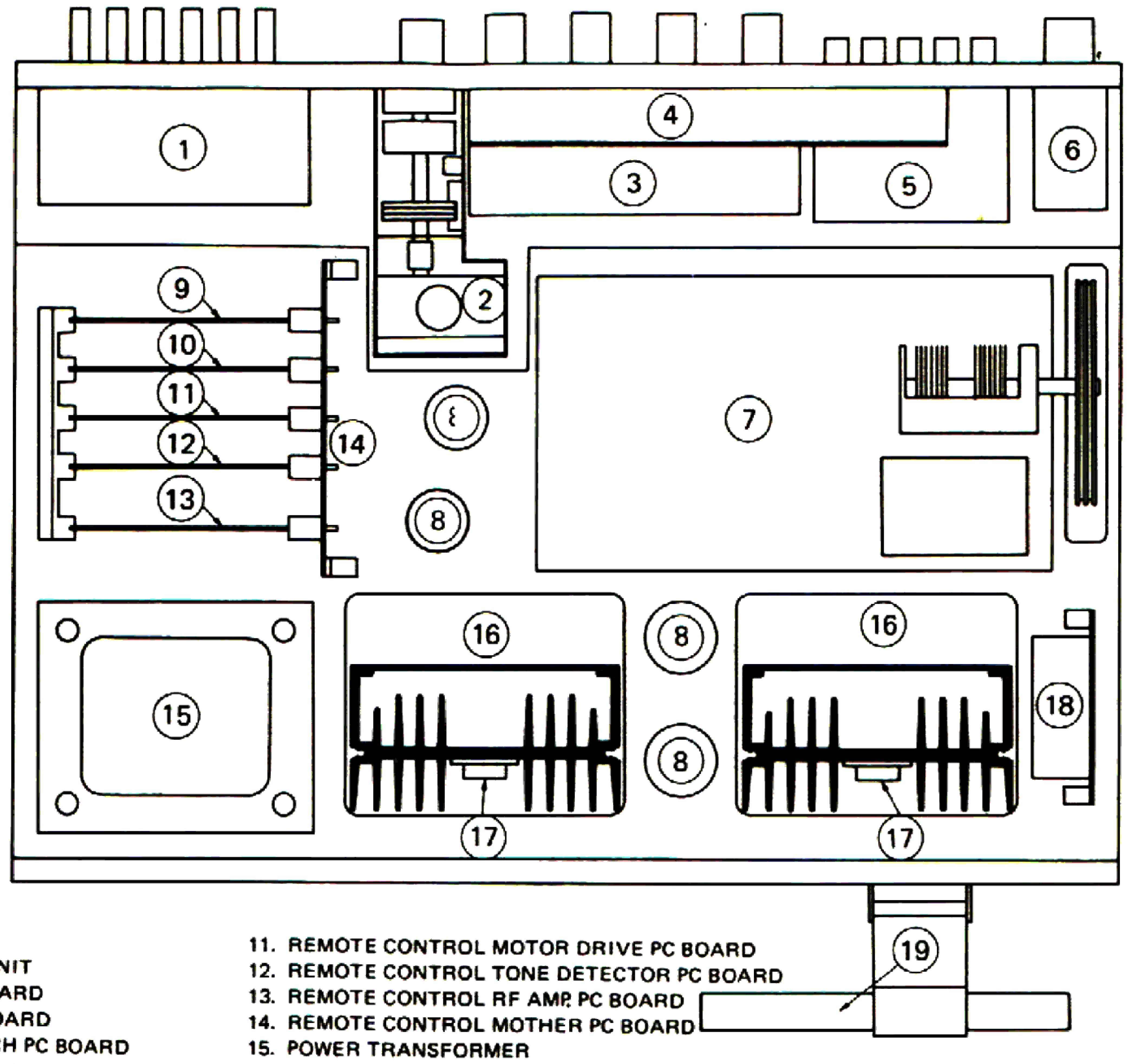


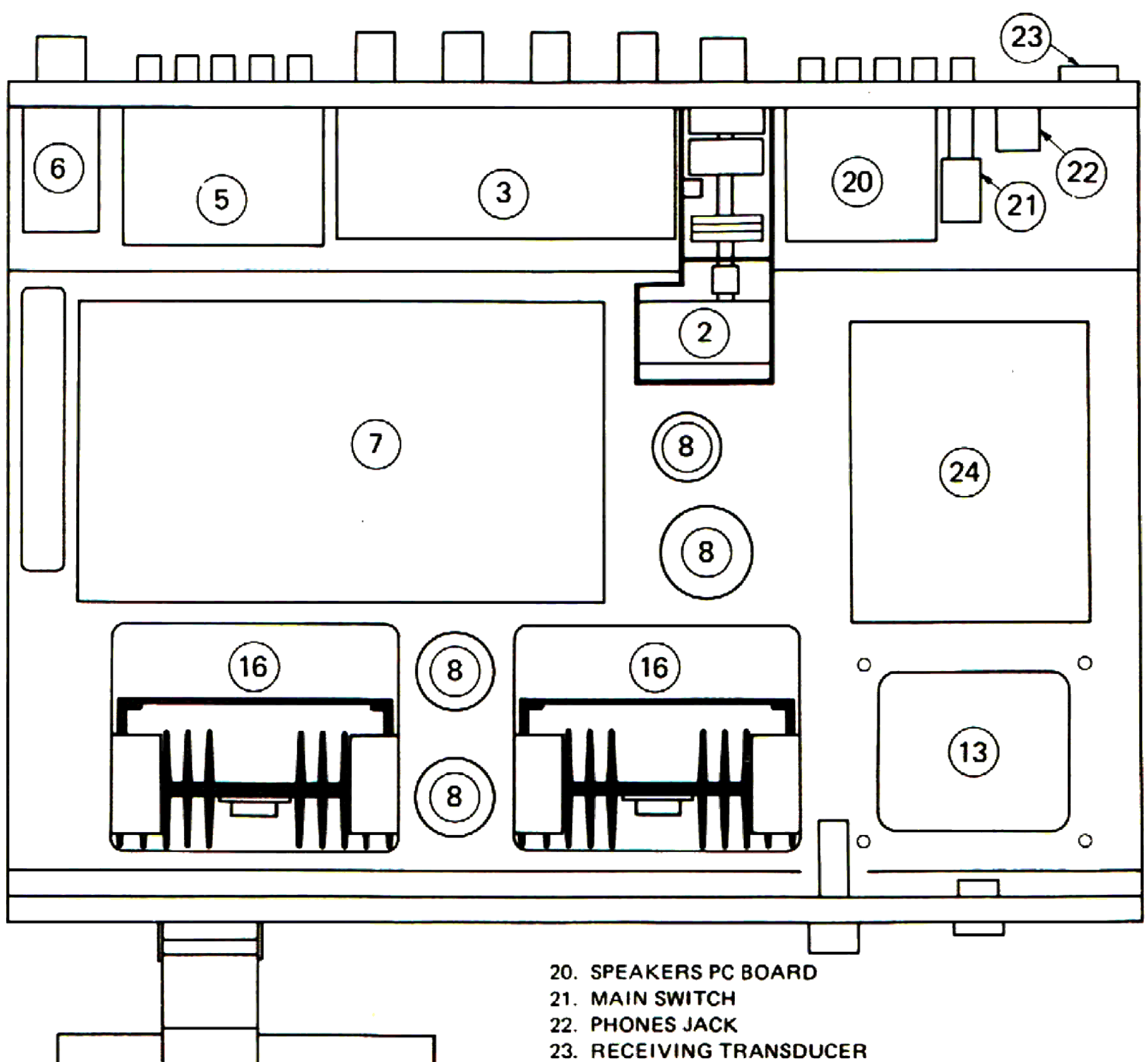
Fig. 19

TOP CHASSIS VIEW



1. PRESET UNIT
2. MOTOR DRIVE UNIT
3. TONE AMP. PC BOARD
4. DIAL LAMP PC BOARD
5. FUNCTION SWITCH PC BOARD
6. SELECTOR SWITCH
7. TUNER PC BOARD
8. ELECTROLYTIC CAPACITOR
9. REMOTE CONTROL DISPLAY PC BOARD
10. REMOTE CONTROL COUNTER PC BOARD
11. REMOTE CONTROL MOTOR DRIVE PC BOARD
12. REMOTE CONTROL TONE DETECTOR PC BOARD
13. REMOTE CONTROL RF AMP. PC BOARD
14. REMOTE CONTROL MOTHER PC BOARD
15. POWER TRANSFORMER
16. POWER AMP. PC BOARD
17. POWER TRANSISTORS
18. PRE-AMP. PC BOARD
19. FERRITE ANTENNA

BOTTOM CHASSIS VIEW



20. SPEAKERS PC BOARD
21. MAIN SWITCH
22. PHONES JACK
23. RECEIVING TRANSDUCER
24. POWER SUPPLY PC BOARD

PARTS LIST

RF AMP. P C BOARD (NO. 301)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		CAPACITORS				
C1, 6, 10, 14		SPC-60	Ceramic	0.001 μF	50WV	±10%
C2, 7, 12		ECC-D1H-200(SL)	Ceramic	20PF	50WV	
C3, 8, 13		ECC-D1H-241J(SL)	Ceramic	240PF	50WV	
C4, 5, 11, 15		ECEA16V10L	Electrolytic	10 μF	16WV	
C9			Mylar	0.033 μF	50WV	±10%
C16			Mylar	0.05 μF	50WV	±10%
		RESISTORS				
R1, 8		ERD-14T-103	Carbon film	10 KΩ	1/4W	±5%
R2		ERD-14T-392	Carbon film	3.9 KΩ	1/4W	±5%
R3, 9, 15		ERD-14T-273	Carbon film	27 KΩ	1/4W	±5%
R4, 5, 10, 11, 13, 14 20		ERD-14T-563	Carbon film	56 KΩ	1/4W	±5%
R6, 16		ERD-14T-472	Carbon film	4.7 KΩ	1/4W	±5%
R7		ERD-14T-333	Carbon film	33 KΩ	1/4W	±5%
R12		ERD-14T-471	Carbon film	470 Ω	1/4W	±5%
R17		ERD-14T-331	Carbon film	330 Ω	1/4W	±5%
R18		ERD-14T-222	Carbon film	2.2 KΩ	1/4W	±5%
R19		ERD-14T-223	Carbon film	22 KΩ	1/4W	±5%
		SEMICONDUCTORS				
Q1-5		2SC373	Transistor	Toshiba silicon		
D1-3		IN60	Diode	germanium		
		POTENTIOMETER				
VR1	P-6175	TR11R	P C Trimmer	5 KΩB		
		MISCELLANEOUS				
	X-2090	GE-17C-3777	P C Board			

TONE DETECTOR P C BOARD (NO. 302)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		CAPACITORS				
C1, 2, 7, 8, 13, 14			Polystyrene	0.01 μF	50WV	±1%
C3, 9, 15		ECK-D1H102MD	Ceramic	0.001 μF	50WV	
C4, 10, 16			Polystyrene	0.02 μF	50WV	±1%
C5, 11, 17		ECE-A50V1L	Electrolytic	1 μF	50WV	
C6, 12, 18, 19, 20		ECE-A16V10L	Electrolytic	10 μF	16WV	
		RESISTORS				
R1, 5, 10, 14, 19, 23		ERD-14T-473	Carbon film	47 KΩ	1/4W	±5%
R2, 3		CFA	Carbon film	25.5 KΩ	1/4W	±1%
R4, 13, 22		ERD-14T-225	Carbon film	2.2 MΩ	1/4W	±10%
R6		CFA	Carbon film	12.7 KΩ	1/4W	±5%
R7, 16, 25		ERD-14T-471	Carbon film	470 Ω	1/4W	±5%
R8, 17, 26		ERD-14T-103	Carbon film	10 KΩ	1/4W	±5%
R9, 18, 27		ERD-14T-222	Carbon film	2.2 KΩ	1/4W	±5%
R11, 12		CFA	Carbon film	30.4 KΩ	1/4W	±1%
R15		CFA	Carbon film	15.2 KΩ	1/4W	±1%
R20, 21		CFA	Carbon film	18 KΩ	1/4W	±1%
R24		CFA	Carbon film	9.04 KΩ	1/4W	±1%
R28		ERD-14T-331	Carbon film	330 Ω	1/4W	±5%
R29		ERD-12T-103	Carbon film	10 KΩ	1/2W	±10%

Ref. No.	RS Part Number	MFR's Part Number	Description
R30		ERD-14T-221	Carbon film 220Ω 1/4W ±5%
		SEMICONDUCTORS	
IC1-3		LM307N	Integrated circuit
IC4		N7402A	Integrated circuit
Q1-4		2SC373	Transistor Toshiba silicon
D1-6		IN60	Diode Toshiba germanum
		MISCELLANEOUS	
		GE-17C-3778	P C Board

MOTOR DRIVE P C BOARD (NO. 303)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITORS	
C1, 2			Ceramic 0.01 μF ±10%
C3			Mylar 0.1 μF ±10%
C4		ECE-B35Y10	Electrolytic 10 μF 35WV BI-polar
		RESISTORS	
R1, 2, 3		ERD-14T-472	Carbon film 4.7 KΩ 1/4W ±5%
R4		ERD-14T-103	Carbon film 10 KΩ 1/4W ±5%
R5		ERD-14T-332	Carbon film 3.3 KΩ 1/4W ±5%
R6		ERD-14T-222	Carbon film 2.2 KΩ 1/4W ±5%
R7, 8		ERD-14T-392	Carbon film 3.9 KΩ 1/4W ±5%
R9, 11, 13, 14		ERD-14T-102	Carbon film 1 KΩ 1/4W ±5%
R10		ERD-14T-680	Carbon film 68 Ω 1/4W ±5%
R12		ERD-14T-181	Carbon film 180 Ω 1/4W ±5%
		SEMICONDUCTORS	
IC1		LM307N	Integrated circuit
Q1, 4		2SC373	Transistor Toshiba silicon
Q2, 3		2SA495(O)	Transistor Toshiba silicon
Q5, 6		2SC735(Y)	Transistor Toshiba silicon
D1-4		SIBO102	Diode Fuji silicon
		MISCELLANEOUS	
		GE-17C-3779	P C Board

COUNTER P C BOARD (NO. 304)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITORS	
C1, 4			Mylar 0.1 μF 50WV ±10%
C2		ECE-A25V4.7L	Electrolytic 4.7 μF 25WV
C3		ECE-A50VIL	Electrolytic 1 μF 50WV
		RESISTOR	
R1		ERD-14T-473	Carbon film 47 KΩ 1/4W ±5%
		SEMICONDUCTORS	
IC1, 2		N7411A	Integrated circuit
IC3, 4		N7473	Integrated circuit
Q1		2SC373	Transistor Toshiba silicon
D1-7		1N60	Diode Toshiba germanium

Ref. No.	RS Part Number	MFR's Part Number	Description
		MISCELLANEOUS	
	X-4626	GE-17C-3781	P C Board

DISPLAY P C BOARD (NO. 305)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITOR	
C1			Mylar 0.1 μF ±10%
		RESISTOR	
R1		ERD-14T-332	Carbon film 3.3 KΩ 1/4W ±5%
		SEMICONDUCTORS	
Q1-6		2SC735(Y)	Transistor Toshiba silicon
Q7		2SC373	Transistor Toshiba silicon
D1-7		SIBO102	Diode Fuji silicon
D8		1N60	Diode Toshiba germanium
		RELAY	
RLY1-6	R-8056	RA40311121	Load Relay
RLY7	R-8055	NF-2-12VAF1323	Load Relay
		MISCELLANEOUS	
	X-4627	GE-17C-3783	P C Board

CONNECTOR P C BOARD UNIT (NO. 306)

Ref. No.	RS Part Number	MFR's Part Number	Description
		RESISTOR	
R1-6		ERD-14VJ-332	Carbon film 3.3 KΩ 1/4W ±5%
		SEMICONDUCTOR	
D1-6		1N60	Diode Toshiba germanium
		MISCELLANEOUS	
	H-3789	110S-14L-116	P C Connector 14P type
	H-3790	210D-28L-206	P C Connector 28P type
		GE-18D-4018	P C Board Mounting Bracket
	H-3798	59BS3015	P C Board Terminal
	X-4631	GE-17D-3971	P C Board

REMOTE CONTROL TRANSMITTER UNIT (NO. 307)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITOR	
C1, 2			Polystyrene 0.01 μF 50WV ±2%
C3, 7		ECE-A16V10L	Electrolytic 10 μF 16WV
C4			Mylar 0.0015 μF 50WV ±10%
C5			Polystyrene 1000PF 50WV ±5%
C6		ECE-A50V1L	Electrolytic 1 μF 50WV
		RESISTORS	
R1, 8		ERD-14T-222	Carbon film 2.2 KΩ 1/4W ±5%
R2, 3		ERD-14T-513	Carbon film 51 KΩ 1/4W ±5%
R4		ERD-14T-102	Carbon film 1 KΩ 1/4W ±5%

Ref. No.	RS Part Number	MFR's Part Number	Description
R5		E-96	Carbon film 4.64 KΩ 1/4W ±1%
R6		E-96	Carbon film 6.98 KΩ 1/4W ±1%
R7		E-96	Carbon film 1.82 KΩ 1/4W ±1%
R9		ERD-14T-473	Carbon film 47 KΩ 1/4W ±5%
R10		ERD-14T-391	Carbon film 390 Ω 1/4W ±5%
R11		ERD-14T-123	Carbon film 12 KΩ 1/4W ±5%
R12		ERD-14T-101	Carbon film 100 Ω 1/4W ±5%
R13		ERD-14T-100	Carbon film 10 Ω 1/4W ±5%
SEMICONDUCTORS			
Q1-3		2SC373	Transistor Toshiba silicon
Q4		2SC735(Y)	Transistor Toshiba silicon
D1		1N60	Diode Toshiba germanium
D2		EQA01-06S	Zener diode
TRANSFORMER			
T1		ELM-10S318B	OSC coil
POTENTIOMETER			
VR1	P-6171	TR12R	P C Trimmer 5KΩB
SWITCH			
S1A-S3B	S-7147	SPN10202	Push button Switch
MISCELLANEOUS			
	S-4467	ERD-DCE-40K2	Transducer
			Battery 9V
	H-3792		Battery clip 006P type
	B-0163	GE-18D-4053	Battery holder
	Z-1603	GE-18B-4045	Top case
	Z-1604	GE-18B-4046	Bottom case
	K-1454	GE-18D-4047	Knob A Push button (volume)
	K-1455	GE-18D-4048	Knob B Push button (selector)
	H-3800	GE-18D-4049	Screen
	H-3799	GE-18D-4050	Dust sheet
	H-3804	GE-18D-4051	Screen stopper board
	H-3803	GE-18D-4052	Screen stopper
	H-3802	GE-18D-4054	Case Bracket
	H-3801	GE-18D-4098	Plastic sponge
	H-3798	59BS3015	P C Board Terminal
	X-4628	GE-17C-3800	P C Board

EQ. AMP. P C BOARD UNIT (NO. 308)

Ref. No.	RS Part Number	MFR's Part Number	Description
CAPACITORS			
C1, 101		CS15E1VR7	Tantalum 4.7 μF 35WV
C2, 102		ECK-D1H102MD	Ceramic 0.001 μF
C3, 103			Mylar 0.015 μF 50WV ±10%
C4, 104			Mylar 0.0047μF 16WV
C5, 105		ECC-D1H221K	Ceramic 220pF 50WV ±10%
C6, 106		ECE-A16V4R7L	Electrolytic 4.7μF 16WV
C7, 107		ECE-A50V1L	Electrolytic 1μF 50WV
C8, 108			Mylar 0.1 μF 50WV ±10%
C9		ECE-A16V220L	Electrolytic 220 μF 16WV

Ref. No.	RS Part Number	MFR's Part Number	Description
		RESISTOR	
R1, 101		ERD-14T-102	Carbon film 1 KΩ 1/4W ±5%
R2, 102		ERD-14T-331	Carbon film 330 Ω 1/4W ±5%
R3, 103		ERD-14T-681	Carbon film 680 Ω 1/4W ±5%
R4, 104		ERD-14T-184	Carbon film 180 KΩ 1/4W ±5%
R5, 105		ERD-14T-153	Carbon film 15 KΩ 1/4W ±5%
R6, 106		ERD-14T-472	Carbon film 4.7 KΩ 1/4W ±5%
R7, 107		ERD-14T-105	Carbon film 1 MΩ 1/4W ±5%
R8		ERD-14T-332	Carbon film 3.3 KΩ 1/4W ±5%
		SEMICONDUCTOR	
IC1		MC4080	Integrated circuit NEC
		MISCELLANEOUS	
	Z-1605	GE-16D-2976	Shield cover
		GE-16D-3039	P C Board Mounting Bracket
	X-4431	GE-16C-2954	P C Board

TONE AMP P C BOARD UNIT (NO. 309)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITORS	
C1, 101		ECE-A50V1L	Electrolytic 1μF 50WV
C2, 12, 102, 112		ECC-D1H150K	Ceramic 150PF
C3, 103		ECE-A25V4R7	Electrolytic 4.7μF 25WV
C4, 104		ECC-D1H270K	Ceramic 270PF
C5, 105		SCP-100	Mylar 0.0033μF 50WV ±10%
C6, 106		SCP-135	Mylar 0.01μF 50WV ±10%
C7, 107			Mylar 0.0047μF 50WV ±10%
C8, 108			Mylar 0.027μF 50WV ±10%
C9, 109			Mylar 0.02μF 50WV ±10%
C10, 11, 14, 110, 111, 114		ECE-A25V10L	Electrolytic 10μF 25WV
C13, 113		ECE-A16V100L	Electrolytic 100μF 16WV
C15		ECE-A35V470Z	Electrolytic 470μF 35WV
		RESISTORS	
R1, 13, 101, 113		ERD-14T-225	Carbon film 2.2 MΩ 1/4W ±10%
R2, 102		ERD-14T-102	Carbon film 1 KΩ 1/4W ±5%
R3, 103		ERD-14T-472	Carbon film 4.7 KΩ 1/4W ±5%
R4, 17, 104, 117		ERD-14T-473	Carbon film 47 KΩ 1/4W ±5%
R5, 105		ERD-14T-332	Carbon film 3.3 KΩ 1/4W ±5%
R6, 10, 106, 110		ERD-14T-682	Carbon film 6.8 KΩ 1/4W ±5%
R7, 12, 107, 112		ERD-14T-153	Carbon film 15 KΩ 1/4W ±5%
R8, 108		ERD-14T-124	Carbon film 120 KΩ 1/4W ±5%
R9, 109		ERD-14T-122	Carbon film 1.2 KΩ 1/4W ±5%
R11, 111		ERD-14T-272	Carbon film 2.7 KΩ 1/4W ±5%
R14, 114		ERD-14T-562	Carbon film 5.6 KΩ 1/4W ±5%
R15, 115		ERD-14T-821	Carbon film 820 Ω 1/4W ±5%
R16		ERD-14T-221	Carbon film 220 Ω 1/4W ±5%
		SEMICONDUCTOR	
Q1, 2, 101, 102		2SC373	Transistor Low Noise Toshiba silicon
		POTENTIOMETERS	
VR1, 101	P-6173	GM10E-250KM	Potentiometer 250 KΩ(MN) x 2
VR2, 3, 4, 102, 103, 104	P-6172	GM10E-100KB	Potentiometer 100 KΩB X 2
		MISCELLANEOUS	
	H-3798	59BS3015	P C Board Terminal

Ref. No.	RS Part Number	MFR's Part Number	Description
	X-4629	GE-17C-3686	P C Board

FUNCTION SW P C BOARD UNIT (NO. 310)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		CAPACITORS				
C1, 101			Mylar	0.33 μF		±10%
C2, 102			Mylar	0.033 μF		±10%
C3, 103			Mylar	0.39 μF		±10%
C4, 104		ECC-D1H330K	Ceramic	33PF		
C5, 105		ECK-D1H102MD	Ceramic	0.001 μF		
C6, 106		ECE-A25V10L	Electrolytic	10 μF	25WV	
		RESISTORS				
R1,2,10,101,102,110		ERD-14T-474	Carbon film	470 KΩ	1/4W	±5%
R3, 4, 103, 104		ERD-14T-104	Carbon film	100 KΩ	1/4W	±5%
R5, 105		ERD-14T-103	Carbon film	10 KΩ	1/4W	±5%
R6, 106		ERD-14T-331	Carbon film	330 KΩ	1/4W	±5%
R7, 8, 107, 108		ERD-14T-223	Carbon film	22 KΩ	1/4W	±5%
R9, 109		ERD-14T-105	Carbon film	1 MΩ	1/4W	±5%
		SEMICONDUCTOR				
Q1, 101		2SC373	Transistor or Equivalent	Low Noise	Toshiba silicon	
		SWITCH				
SW14a-b	S-7148	5FS-10V-79	Push button			
		MISCELLANEOUS				
	X-4632	GE-17D-3771	P C Board			

POWER AMP UNIT (NO. 311)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		CAPACITORS				
C1, 7, 10, 11		SCP-60	Ceramic	0.001 μF	50WV	±10%
C2,		ECE-A25V10L	Electrolytic	10 μF	25WV	
C3, 14		ECE-A35V100L	Electrolytic	100 μF	35WV	
C4		ECE-A16V100L	Electrolytic	100 μF	16WV	
C5		ECE-A16V470Z	Electrolytic	470 μF	16WV	
C6		ECC-D1H181K	Ceramic	180PF (SL)		
C8, 13		ECE-A100V10L	Electrolytic	10 μF	100WV	
C9		ECC-D11-121K	Ceramic	120PF (SL)		
C12			Mylar	0.33 μF	50WV	±10%
C15			Mylar	0.05 μF	50WV	±10%
C16			Mylar	0.39 μF	50WV	±10%
		RESISTORS				
R1		ERD-14T-102	Carbon film	1 KΩ	1/4W	±5%
R2		ERD-14T-913	Carbon film	91 KΩ	1/4W	±5%
R3, 4		ERD-14T-472	Carbon film	4.7 KΩ	1/4W	±5%
R5		ERD-14T-270	Carbon film	27 Ω	1/4W	±5%
R6		ERD-14T-471	Carbon film	470 Ω	1/4W	±5%
R7, 8		RS-1	Metal film	3.3 KΩ	1W	±10%
R9, 10, 11		ERD-14T-222	Carbon film	2.2 KΩ	1/4W	±5%

Ref. No.	RS Part Number	MFR's Part Number	Description
R12		ERD-14T-151	Carbon film 150 Ω 1/4W ±5%
R13		ERD-14T-473	Carbon film 47 KΩ 1/4W ±5%
R14, 17		RS-1	Metal film 27 Ω 1W ±10%
R15, 16		ERD-14T-101	Carbon film 100 Ω 1/4W ±5%
R18		ERD-14T-474	Carbon film 470 KΩ 1/4W ±5%
R19		ERD-14T-203	Carbon film 20 KΩ 1/4W ±5%
R20, 21		ERD-14T-103	Carbon film 10 KΩ 1/4W ±5%
R22		RS-5	Wire wound 470Ω 5W ±10%
R23		ERD-14T-302	Carbon film 3 KΩ 1/4W ±5%
R24, 25		RS-2	Wire wound 0.5 Ω 2W ±10%
R26		RS-5	Wire wound 10 Ω 5W ±10%
		SEMICONDUCTORS	
Q1		2SC373	Transistor Toshiba silicon
Q2, 5, 6, 7		2SC1211	Transistor Mitsubishi silicon
Q3		2SA682(Y)	Transistor Toshiba silicon
Q4		2SC1382(Y)	Transistor Toshiba silicon
Q8		2SC1080(Y)	Transistor Toshiba silicon
Q9		2SA680(Y)	Transistor Toshiba silicon
D1, 2		SIBO102	Diode Silicon
D3, 4, 6,		HV-80	Diode Silicon
D7		EQA01-33	Diode Zener
		COILS	
L1			Choke coil 9 μH
		POTENTIOMETERS	
VR1	P-6189	TR11R	P C Trimmer 50KΩB
		MISCELLANEOUS	
	HH-0098	GE-18D-4014(A)	Heat sink
		GE-18D-4021	Diode holder
	H-3798	GE-18D-4022	P C Board terminal
	H-3791	SZ-104W-02	Transistor socket UL listed
	X-2091	GE-17B-3801	P C Board

SPEAKER SW P C BOARD UNIT (NO. 312)

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITOR	
C1, 101			Mylar 0.047μF ±10%
		RESISTORS	
R1, 101		ERD-14T-822	Carbon film 8.2 KΩ 1/4W ±5%
R2, 102		RN-1	Metal film 470 Ω 1W ±10%
		SWITCH	
SW12~14	S-7149	5FY-8U-615	Push button
		MISCELLANEOUS	
	H-3798	59BS3015	P C Board terminal
	X-4633	GE-17D-3788	P C Board

POWER SUPPLY P C BOARD UNIT (NO. 313)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		CAPACITORS				
C1, 2, 3, 4, 5, 6		ECE-A10V470L	Electrolytic	470 μF	10WV	
C7, 8		ECE-A16V1000L	Electrolytic	1000 μF	16WV	
C9, 10, 11		ECK-D2H103PE	Ceramic	0.01 μF		
C12, 15		ECE-A35V470Z	Electrolytic	470 μF	35WV	
C13		ECE-A25V470L	Electrolytic	470 μF	25WV	
C14, 16		ECE-A16V470Z	Electrolytic	470 μF	16WV	
C17		ECE-A100V4R7	Electrolytic	4.7 μF	100WV	
		RESISTORS				
R1, 2		RN-1	Metal film	150 Ω	1W	±10%
R3, 5, 10		RN-1	Metal film	2.7 Ω	1W	±10%
R4, 6		RN-1	Metal film	330 Ω	1W	±10%
R7		RN-1	Metal film	1 KΩ	1W	±10%
R8		RN-1	Wire wound	640 Ω	3W	±10%
R9		RN-1	Metal film	3.3 KΩ	1W	±10%
R11		RN-1	Metal film	430 Ω	1W	±10%
R12		ERD-14T-561	Carbon film	560 Ω	1/4W	±5%
R14		ERD-14T-581	Carbon film	580 Ω	1/4W	±5%
		SEMICONDUCTORS				
Q1, 4		2SC789	Transistor			
Q2		2SA489(O)	Transistor			
Q3		2SC1213A	Transistor			
D1, 2, 6~9, 14, 15		SIB01A	Diode	Silicon		
D3		EQB01-6	Diode	Zener	6V 1W	±5%
D4, 5		EQA01-09R	Diode	Zener	8.5V	±5%
D10~13		1N4141 or P2000G or P300J	Diode	Silicon	200V 3A	
D16		EQA01-33	Diode	Zener		
D18		EQA01-12S	Diode	Zener		
D21, 22		1N60	Diode	Grmanium		
		MISCELLANEOUS				
	HH-0099	GE-18D-4015	Heat sink			
	H-3798	59BS3015	P C Board terminal			
	X-4630	GE-17C-3768	P C Board			

AM/FM IF TUNER P C BOARD UNIT (NO. 314)

Ref. No.	RS Part Number	MFR's Part Number	Description			
		RESISTORS				
R1, 55, 89, 92		ERD-14T-223	Carbon film	22 KΩ	1/4W	±5%
R2, 35, 53, 95		ERD-14T-332	Carbon film	3.3 KΩ	1/4W	±5%
R3, 47, 48, 80 ,88		ERD-14T-472	Carbon film	4.7 KΩ	1/4W	±5%
R4, 5, 7, 8, 11, 13, 14 13, 14, 17, 41		ERD-14T-331	Carbon film	330 Ω	1/4W	±5%
R6, 62		ERD-14T-121	Carbon film	120 Ω	1/4W	±5%
R10, 15, 52, 68, 77		ERD-14T-221	Carbon film	220 Ω	1/4W	±5%
R9, 12, 18, 21, 33, 37, 42		ERD-14T-101	Carbon film	100 Ω	1/4W	±5%
R16		ERD-14T-470	Carbon film	47 Ω	1/4W	±5%
R19, 20, 49		ERD-14T-152	Carbon film	1.5 KΩ	1/4W	±5%
R22, 23, 39, 57, 58		ERD-14T-222	Carbon film	2.2 KΩ	1/4W	±5%
R24, 25, 94		ERD-14T-104	Carbon film	100 KΩ	1/4W	±5%
R26, 27, 69		ERD-14T-333	Carbon film	33 KΩ	1/4W	±5%

Ref. No.	RS Part Number	MFR's Part Number	Description
R28		ERD-14T-474	Carbon film 470 K 1/4W ±5%
R29, 31, 32, 34, 38, 75, 62, 84		ERD-14T-103	Carbon film 10 KΩ 1/4W ±5%
R30		ERD-14T-823	Carbon film 82 KΩ 1/4W ±5%
R36		ERD-14T-151	Carbon film 150 Ω 1/4W ±5%
R40, 61, 86		ERD-14T-102	Carbon film 1 KΩ 1/4W ±5%
R43		ERD-14T-123	Carbon film 12 KΩ 1/4W ±5%
R44		ERD-14T-334	Carbon film 330 KΩ 1/4W ±5%
R45, 46, 51		ERD-14T-105	Carbon film 1 MΩ 1/4W ±5%
R50		ERD-14T-154	Carbon film 150 KΩ 1/4W ±5%
R54, 64, 109		ERD-14T-473	Carbon film 47 KΩ 1/4W ±5%
R56, 71		ERD-14T-153	Carbon film 15 KΩ 1/4W ±5%
R59		ERD-14T-243	Carbon film 24 KΩ 1/4W ±5%
R60, 63		ERD-14T-202	Carbon film 2 KΩ 1/4W ±5%
R65, 66, 72, 74, 79, 81		ERD-14T-103	Carbon film 470 KΩ 1/4W ±5%
R67		ERD-14T-273	Carbon film 27 KΩ 1/4W ±5%
R70		ERD-14T-823	Carbon film 82 KΩ 1/4W ±5%
R73		ERD-14T-434	Carbon film 430 KΩ 1/4W ±5%
R76, 99, 100		ERD-14T-822	Carbon film 8.2 KΩ 1/4W ±5%
R78		ERD-14T-182	Carbon film 1.8 KΩ 1/4W ±5%
R83, 101, 102		ERD-14T-155	Carbon film 1.5 MΩ 1/4W ±5%
R85, 87		ERD-14T-562	Carbon film 5.6 KΩ 1/4W ±5%
R90, 106, 108		ERD-14T-474	Carbon film 470 KΩ 1/4W ±5%
R96		ERD-14T-163	Carbon film 16 KΩ 1/4W ±5%
R97, 98		ERD-14T-682	Carbon film 6.8 KΩ 1/4W ±5%
R103, 104		ERD-14T-432	Carbon film 4.3 KΩ 1/4W ±5%
		CAPACITORS	
C1, 5, 11, 16, 34		ECK-O1E104ZFZ	Ceramic 0.1 µF
C2, 23, 24, 44, 63, 64, 88		ECE-A50VL	Electrolytic 1 µF 50WV
C3, 67, 79, 81, 86			Mylar 0.1 µF 50WV ±10%
C4, 8, 12, 17, 27, 28, 29, 30, 31, 32, 33		ECK-D1E203ZFZ	Ceramic 0.02 µF
C6		ECC-D1H390DC	Caramic 39PF
C7, 9, 10, 13, 14, 15, 62, 65, 90		ERD-D1H103PE	Ceramic 0.01 µF
C18, 19, 38		ECC-D1H221J	Ceramic 220PF
C20, 25, 37, 41, 56, 59		ECE-A50V10	Electrolytic 10 µF 16WV
C21		ECC-D1H101J	Polystyrene 100PF
C22, 35, 45		ECE-A50V2.2	Electrolytic 2.2 µF 50WV
C26		ECE-A25V4R7L	Electrolytic 4.7 µF 25WV
C36, 39, 76		ECC-D1H471J	Polystyrene 470PF
C40, 46, 57, 68		ECK-D1H102KB	Ceramic 0.001 µF
C42		ECC-D1H470KC	Ceramic 47PF
C43		ECK-D1E473ZFZ	Ceramic 0.047 µF
C47, 50, 51, 53, 54, 55 55, 58, 60, 61		ECK-D1E403ZFZ	Ceramic 0.04 µF
C48			Polystyrene 350PF
C49		ECC-D1H040DC	Ceramic 4PF
C52		ECE-A25V4R7L	Electrolytic 4.7 µF 25WV
C66, 82, 83		ECC-D1H330DC	Ceramic 33PF

Ref. No.	RS Part Number	MFR's Part Number	Description
C69			Mylar 0.015 μF 50WV
C73, 74			Mylar 0.47 μF 50WV
C75		ECK-01E334ZFZ	Mylar 0.33 μF
C77			Mylar 0.047 μF 50WV
C78, 80		ECK-01H222KB	Ceramic 0.0022 μF
C84, 85		CS15EE1VR33M	Tantalum 0.33 μF 6.3WV
C87		ECE-A16V220	Electrolytic 220 μF 16WV
		SEMICONDUCTORS	
Q1, 2, 7, 8, 16, 18, 19		2SC372	Transistor Toshiba silicon
Q3~6, 9, 10~14, 17 20~24, 26, 27		2SC373	Transistor Toshiba silicon
Q15		2SC378	Transistor Toshiba silicon
D1~7,9~11,19~21,22		1N60	Diode Germanium
D8, 12, 13~18		HV80	Diode Silicon
D24, 25		EQA-01-13R	Diode Zener
IC1, 2		TA7001AP	Integrated circuit Toshiba
IC3		MC1310P or equivalent	Integrated circuit
		TRANS, COILS, FILTERS	
T1	CA-2969	V4FCD-1175BW	FM DISCRI
T2	CA-6394	KAC-6184A	FM IFT
T3	CA-2968	PAC-1471X	FM NOISE AMP TRANS
T4	CA-4453	214671R	AM OSC
T5	CA-7275	21465A	AM IFT
T6	CA-7276	40361A	AM IFT
CF1, 3	CA-2972	CFR-35AL-00	Ceramic filter
CF2, 4	CA-3012	CFS-30AC-10	Ceramic filter
CF5	CA-2967	CFU-005D	Ceramic filter
LPF1, 2	CA-2973	M675F	Low pass filter
L1	CA-2971	LF1-100	Microinductor 22 μH
L2	CA-3011	LF1-220	Microinductor 10 μH
		POTENTIOMETERS	
VR1	P-6188	TR92R-50KB	PC Trimmer 50 KΩB
VR2, 3, 5, 7	P-6175	TR91R-5KB	PC Trimmer 5 KΩB
VR6	P-6187	TR92R-1KB	PC Trimmer 1 KΩB
VC1, 2	C4471	C634Y125	Potentiometer with variable Cap. (Tuning)
		FRONT END TUNER	
	C-4470	FD312U13 or UFT-10m	Front End
		MISCELLANEOUS	
	H-3798	59BS3015	P C Board Terminal
	X-4635	GE-17B-3804A	P C Board

DIAL LAMP P C BOARD UNIT (NO. 315)

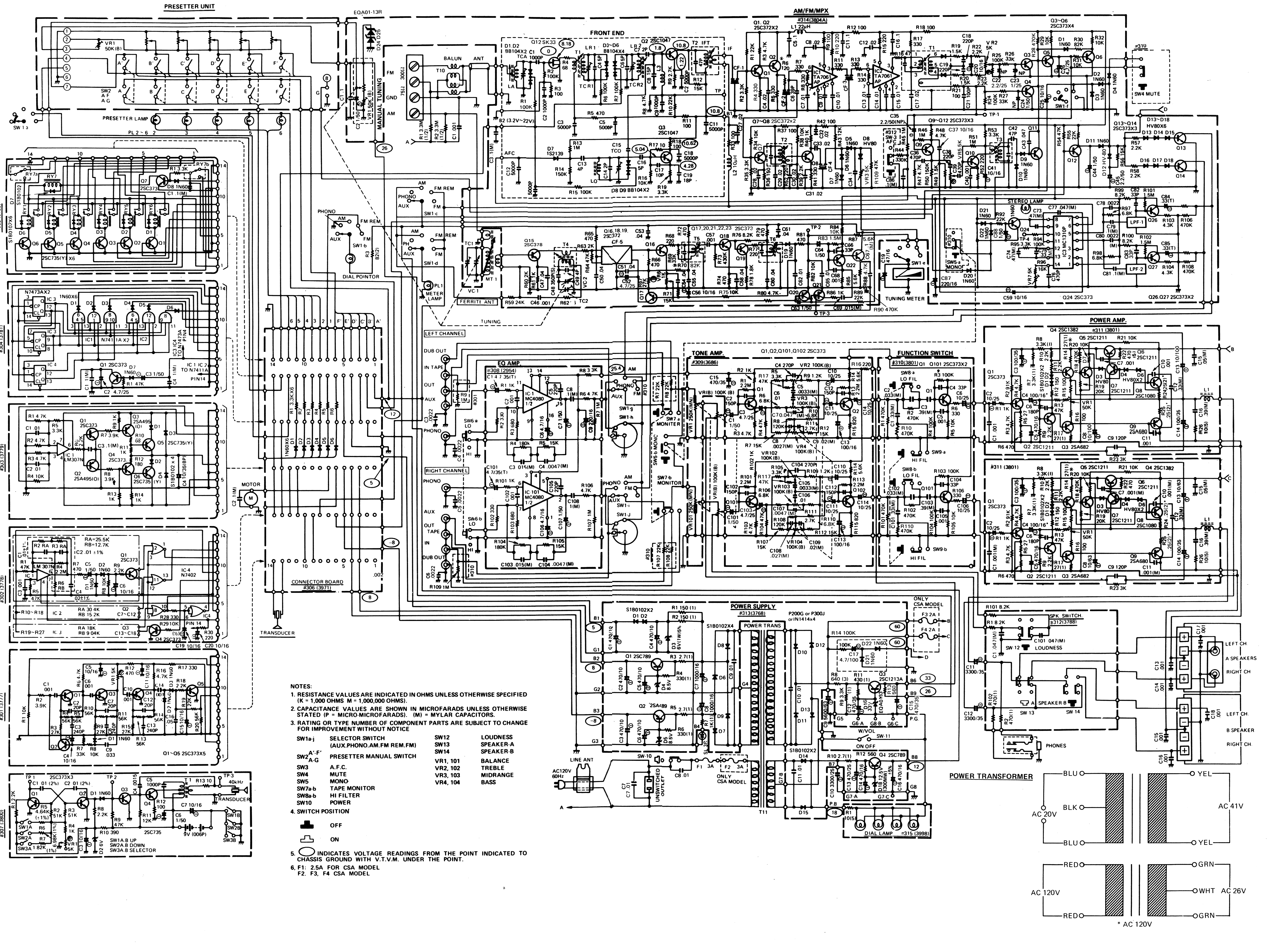
Ref. No.	RS Part Number	MFR's Part Number	Description
R1		RN-5	Wire wound resistor 10 Ω 5W ±10%
	F-1091	8201	Fuse socket UL listed
		GE-18C-4012	Lamp cover
		BU-687	Lamp grommet
		SL3-12030	Pilot lamp 12V30mA L=450m/m
	X-4634	GE-18A-3998	P C Board

MAIN CHASSIS ASSEMBLY

Ref. No.	RS Part Number	MFR's Part Number	Description
		CAPACITORS	
C1, 13~18		ECK-D1H102MP	Ceramic 0.001 μF
C2			Mylar 0.1 μF
C3, 4, 5, 6		ECK-D1H222MP	Ceramic 0.0022 μF
C7, 8		ECK-DAL103PE	Ceramic 0.01 μF UL listed
C9		ECE-E63R5600Z	Electrolytic 5600 μF 63WV
C10		ECE-E25R3300	Electrolytic 3300 μF 25WV
C11, 12		ECE-E35R3300Z	Electrolytic 3300 μF 35WV
C19		ECE-A16V470	Electrolytic 47 μF 16WV
		RESISTOR	
R1, 2		ERD-12T-335	Carbon film 3.3 MΩ 1/2W ±10%
R3			Carbon film 82 Ω 2W ±10%
		TRANS, COILS	
T11	TA-0408	K2932D	Power Transformer UL listed
MT-1	CA-0203	2B-058	Ferrite Antenna Coil
T10	CA-2970	2B-041	Balun coil
		POTENTIOMETER	
VR(B)	P-1388	GJ10E-100KBX2	Potentiometer 100KB X 2
		SWITCHES AND MOTOR	
SW1	S-1124	F475	Rotary Switch
SW6	S-0209	6P9L	Slide Switch
SW11	S-6017	SS-5GL	Micro Switch
M	M-4246	M18N-4R	Micro Motor
		MISCELLANEOUS	
	Z-1606	GE-18A-4025	Cabinet
	Z-1607	GE-18B-4010	Cabinet Grill
	HB-0488	GE-18D-4017	P C Board Holder
	Z-1608	GE-18A-4026	Front Panel Assembly
		GE-18D-4027A	Ornamental panel A
		GE-18D-4027B	Ornamental panel B
		GE-18B-4028	Panel
	G-0145	GE-18C-4029	Dial panel
	K-1456	GE-18D-4036	Knob Tuning
	K-1457	GE-18D-4037	Knob Volume/Selector
	K-1458	GE-18D-4038	Knob Tone/Balance
	K-1459	GE-18D-4058	Knob Silver Push Button
	K-1460	GE-18D-4059	Knob Red Push Button
	HB-0486	GE-18D-4075	Push Switch Holder (A)
	HB-0487	GE-18D-4076	Push Switch Holder (B)
SL-3R		TLR103	Light Emitting Diode
	H-3805	GE-18D-4031	Microphone Escutcheon
	H-3806		Microphone Dust Sheet
	S-4468	FER-RCB40KZ	Transducer (Sensor)
	M-0229	Mode-620	Tuning Meter
	D-5137	GE-18D-4030	Presetter Dial Plate
	D-1094	GE-18D-4033	Dial Pointer
	L-0456	SL3-12030	Dial Lamp L=450m/m
	L-0457	SH7-14120	Pilot Lamp 14V 100mA L=770m/m
	L-0458	SH7-14100	Pilot Lamp 14V 100mA L=450m/m
		F201	Fuse Socket UL listed
	HB-0491	GE-17D-2074	EQ. Shield Plate
	D-5144	GE-18D-4013	Meter Cover

Ref. No.	RS Part Number	MFR's Part Number	Description
		GE-18D-4018	Pulley Mounting Bracket
		GE-18A-4006	Chassis
		GE-18B-4007	Front Chassis (1)
		GE-18B-4008	Front Chassis (2)
		GE-18B-4009	Rear Chassis
	Z-1715	GE-18B-4011	Bottom Plate
	H-3793	GE-18C-4012	Lamp Cover
		GE-18D-4013	Meter Cover
	HB-0492	GE-18D-4023A	Side Plate for Chassis Mount (A)
	HB-0493	GE-18D-4023B	Side Plate for Chassis Mount (B)
		SB-500-6	Snap Bushing
	J-4331	95KU4011	Terminal Strips 2L2P UL listed
	J-4312		Terminal Strips 1L2P (101) UL listed
	J-4313		Terminal Strips 1L3P (102) UL listed
	X-4636	SVA52310	Presetter unit
VR-1			50K Semi-adjustable resistor
	H-3794	GE-18C-4032	Presetter lamp cover
	H-3795	B687	Lamp Grommet
	D-0255	7007	Pulley
	D-0266	7009	Pulley
	D-0254		Dial pulley 90ϕ
	RB-5008		Dial string 1.5 meter
	RA-5906	No.2701	Dial spring 0.45 x 5 x 9
	HB-0494	GE-18D-4016	Pulley Mounting Bracket
	HB-0495	GE-18D-4035	Pulley stud
	D-3102	GE-18D-4034	Tuning shaft
	HB-0498	GE-18D-4020	Line Antenna Coupling
	HB-0499	GE-17D-3493	Line Antenna Insulator w/Fibre
	J-4023		Pin Jack 2P-type
	J-4311	GE-18D-4044	Pin Jack 10P-type
	J-4228	GE-16D-3362	Screw Terminal 4P-type
	J-4200	S-Q2350-03	Push Terminal 4P D-type
	J-6171	SI-6423	AC Outlet
	F-1078	SN-2055	Fuseholder
	J-0358	SG-7850	Phone Jack
	H-1152	SR-3P-4	Line Cord Strain Relief UL listed
	W-1673	SPT-1	AC Cord 10 Feet UL listed
	F-0141	F-0141	Foot
	HB-0496	SB-5006	Snap Bushing
	HB-0497	SB-312-3	Snap Bushing
	H-3796	2021	Ferrite Antenna Holder
	HB-0500	GE-18D-4019	Ferrite Antenna Mounting Bracket
	HF-0049	SOC ST-2	Fuse 3A Cartridge type
	H-3797	GE-15D-2563	Outlet Mounting Bracket
	D-3103	GE-18D-4113	Planetary Shaft
		GE-18C-4024	Motor Mounting Bracket
	HB-0489		Wire Binder
	HB-0490		AL Binder
			Serial No. Sticker
			UL Caution Sticker
			UL Sticker
			Instruction Manual
			Service Manual
			Display Box
	HB-0506		Nuts and Screws 1 kit
	HB-0507		Wires 1 kit

SCHEMATIC DIAGRAM



NOTES:

1. RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SPECIFIED (K = 1,000 OHMS M = 1,000,000 OHMS).
2. CAPACITANCE VALUES ARE SHOWN IN MICROFARADS UNLESS OTHERWISE STATED (P = MICRO-MICROFARADS). (M) = MYLAR CAPACITORS.
3. RATING OR TYPE NUMBER OF COMPONENT PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT WITHOUT NOTICE

SW1a-j	SELECTOR SWITCH (AUX.PHONO.AM.FM REM.FM)	SW12	LOUDNESS
SW2 A'-F' A-G	PRESETTER MANUAL SWITCH	SW13	SPEAKER-A
SW3	A.F.C.	SW14	SPEAKER-B
SW4	MUTE	VR1, 101	BALANCE
SW5	MONO	VR2, 102	TREBLE
SW7a-b	TAPE MONITOR	VR3, 103	MIDRANGE
SW8a-b	HI FILTER	VR4, 104	BASS
SW10	POWER		

4. SWITCH POSITION

OFF

ON

5. INDICATES VOLTAGE READINGS FROM THE POINT INDICATED TO CHASSIS GROUND WITH V.T.V.M. UNDER THE POINT.
6. F1: 2.5A FOR CSA MODEL
F2. F3, F4 CSA MODEL

RADIO SHACK A TANDY CORPORATION COMPANY

U.S.A.: FORT WORTH, TEXAS 76107
CANADA: BARRIE, ONTARIO, CANADA L4M 4W5

TANDY CORPORATION

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