

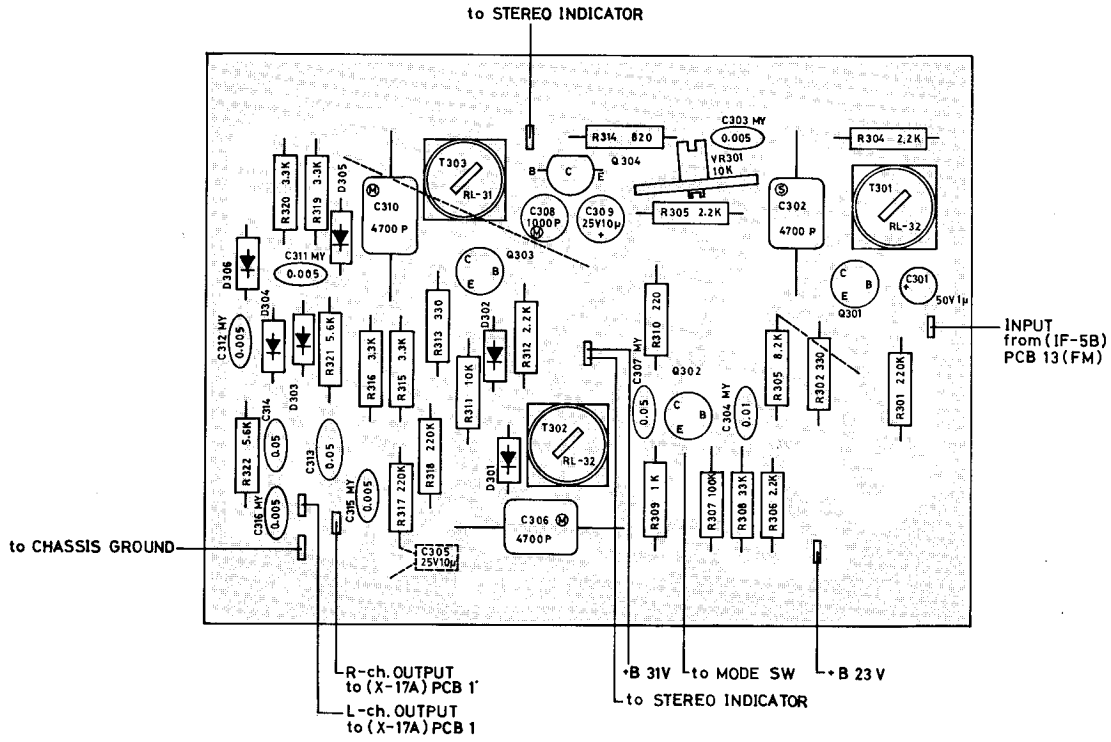
**The Harman-Kardon
Model 50+**

AM/FM/Multichannel Receiver

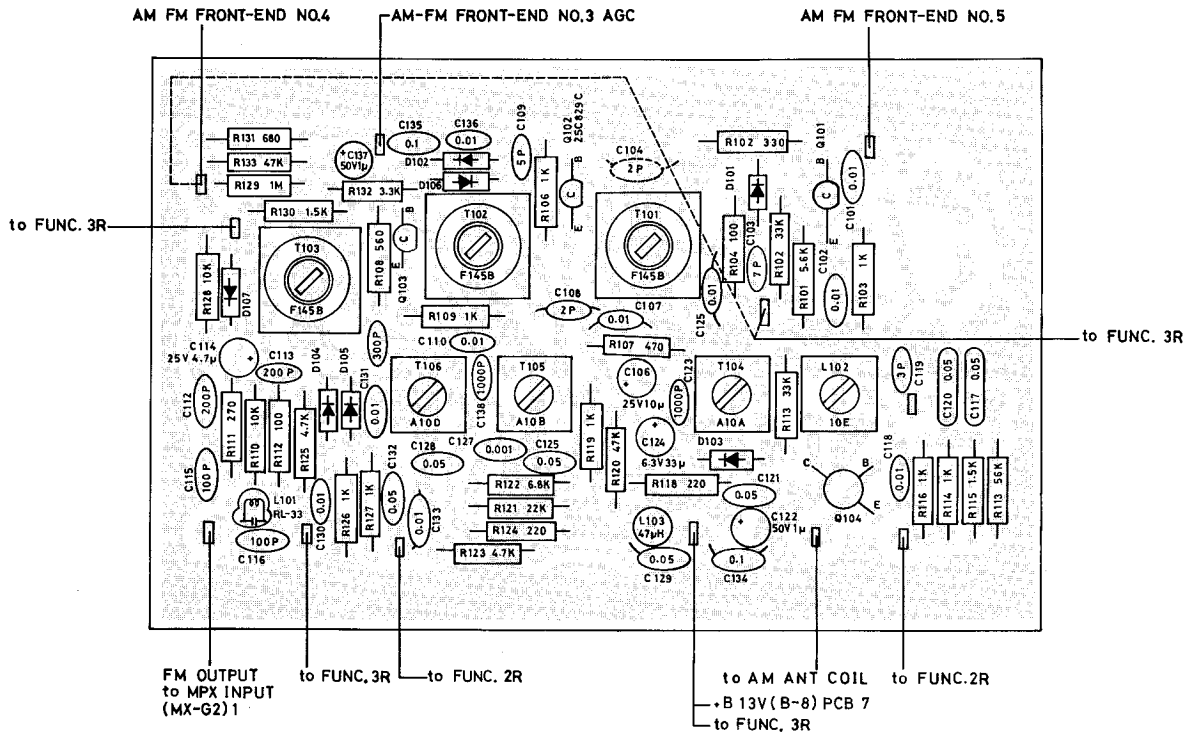
Technical Manual

harman/kardon

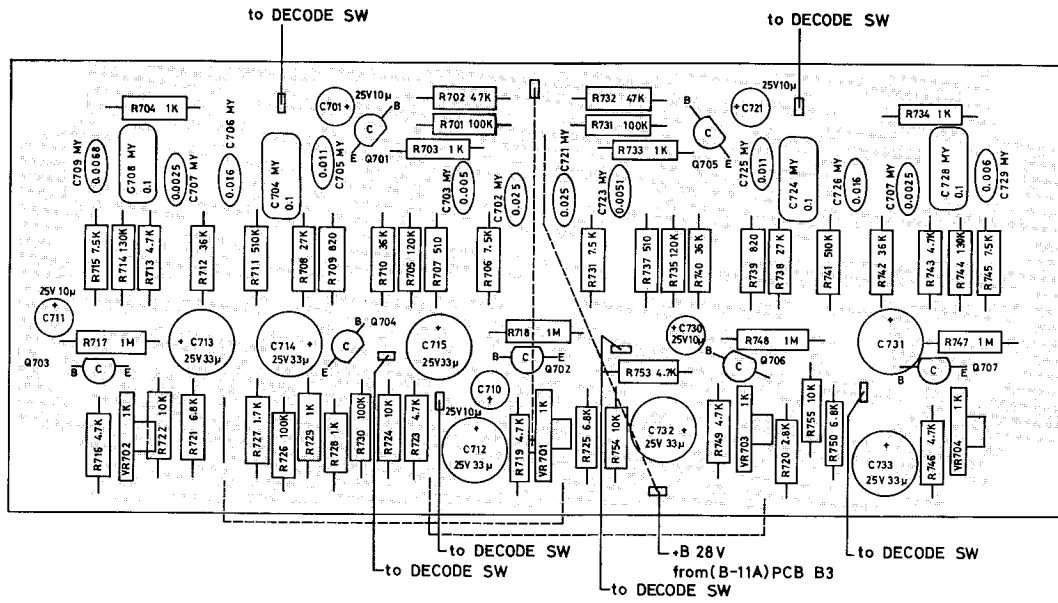
MULTIPLEX BOARD



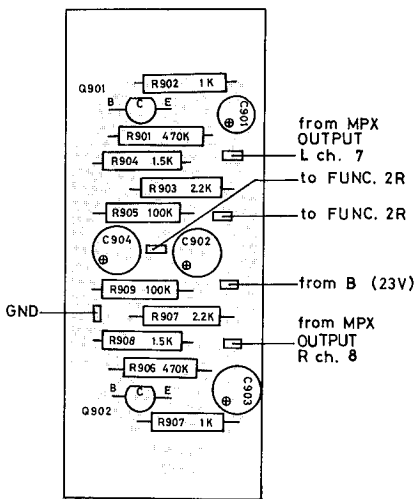
AM BOARD



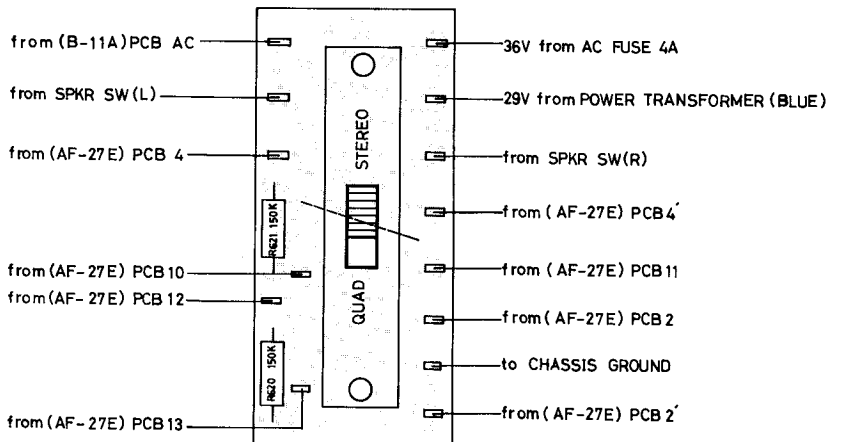
DECODER BOARD



MULTIPLEX OUTPUT BOARD



B + SUPPLY VOLTAGE SWITCH BOARD



ALIGNMENT PROCEDURE

FM ALIGNMENT PROCEDURE

INSTRUMENTS: FM Sweep Generator, FM Signal Generator, VTVM & Oscilloscope

Set Selector Switch to FM

Set Volume Control to Minimum

STEPS	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNING DIAL SETTING	VTVM AND OSCILLOSCOPE CONNECTION	ADJUSTMENT & FUNCTION	ADJUST FOR
1	Connect Sweep Gen. to Pin Number 14 on IF Circuit Board. See Fig. 2	10.7MHz	Quiet Point on Band	Pin Number 13 on IF Circuit Board. See Fig. 2	T101 FM 2nd IFT T102 FM 3rd IFT T103 FM DET. IFT Top & Bottom	Maximum Amplitude and Well Balanced S. Curve on Scope See Fig. 3
2	Connect FM Signal Gen. to FM Antenna Terminal	98MHz (400Hz 75KHz Deviation)	Tuning for Maximum Output	L, or R Channel Tape OUT Terminal	T2 FM 1st IFT on FM Front-End Top & Bottom Also Touch Up T102 FM 3rd IFT DET IFT	Maximum Amplitude & Undistorted Sine Wave on Scope
3		90MHz (400Hz 75KHz Deviation)	90MHz		L ₂ (FM OSC Coil) L ₁ (FM RF Coil)	Maximum Amplitude on Scope
4		106MHz (400Hz 75KHz Deviation)	106MHz		CT ₂ (FM OSC Trimmer) CT ₁ (FM RF Trimmer)	
5	Repeat Steps 3 and 4 until no further improvement is noticed					

PRE-DRIVER/DRIVER ADJUSTMENT

INSTRUMENTS: Audio Generator, AC VTVM, Oscilloscope and DC Voltmeter.

POSITION OF SWITCHES, AND CONTROLS:

- Tone Controls and Balance controls to mid position
- Volume Control to minimum position
- Selector Switch to AUX position
- Decoder Switch to OFF position
- Speaker Switch to ON position
- Mode Switch to Stereo position
- Stereo Quad Switch (on back panel) to QUAD. position

NOTE: Connect Audio Generator to AUX Input Terminals (Freq. 1KHz)

1. Connect an 8 ohm 25 watt resistor across front left speaker terminal, in parallel with the load resistor, connect the VTVM and the vertical input leads of the Oscilloscope.
2. Connect AC Power Supply Cord and rotate Volume Control clockwise to full volume. Increase Generator output until sine wave on Scope just starts clipping.
Adjust DC Balance VR604A (on Audio Circuit Board) for equal clipping on the positive and negative half cycle of the signal.
3. Set Volume Control to minimum position.
4. Connect DC Voltmeter (30mV Full Scale) to TP-2 and Chassis. (On Audio Circuit Board) See Fig. 5.
5. Rotate Idling Adjust Control VR602A clockwise until the DC Volt Meter reads 7.5mV.
6. Do the same Steps 1 through 5 for the Left Channel Back Section, and Right Channel Front Section and Right Channel Back Section.

FM STEREO ALIGNMENT PROCEDURE

INSTRUMENTS: FM Stereo Generator, AC VTVM and Oscilloscope

NOTE: The IF Amplifier alignment must be completed before attempting this FM-Stereo Alignment. Poor IF alignment will result in poor FM Stereo adjustment.

Set MPX Separation VR301 (on top of FM Stereo Board) to mid-position before starting this procedure.

Set Selector switch to FM

Connect FM Signal Generator to FM antenna terminals.

STEPS	FM STEREO GENERATOR		OUTPUT INDICATOR CONNECTED TO	ADJUST	ADJUST FOR
	SIGNAL	MODULATION			
1	19KHz Pilot Signal only	1 - 2%	VTVM & Oscilloscope to Test Point TP-2	L301, T301 and 302	Maximum Reading on VTVM
2	Composite 1KHz Signal to Left Channel only	Pilot 10% Signal 90%	VTVM & Oscilloscope to Left Channel Tape OUT	T301	Maximum and Undistorted Sine Wave on Scope
3	Composite 1KHz Signal to Right Channel only			VR301	Minimum Reading
4	Same as in Step 2				
5	Repeat Steps 3 and 4 until no further improvement is noticed.				

AM ALIGNMENT PROCEDURE

INSTRUMENTS: AM Signal Generator, AC VTVM

NOTE: Set Selector switch to "AM" position

Input signal must be kept as low as possible to avoid A.V.C. action.

STEPS	SIGNAL GENERATOR		TUNING DIAL SETTING	VTVM AND OSCILLOSCOPE CONNECTION	ADJUSTMENT	
	COUPLING	FREQUENCY				
1	To Q101 Base (Pin 1) through a 0.01uFD Capacitor See (Fig. 1)	455KHz (400Hz 30% Mod.)	None Interfering setting at Low End of Scale	L. or R. Channel Tape OUT Terminal	T104 (AM 1st IFT) T105 (AM 2nd IFT) T106 (AM Det IFT)	Maximum Reading on VTVM
2	Connect a loop of wire to Generator Output Terminal to keep the Test loop about 6 in. away from AM ANT. Bar	600Hz (400Hz 30% Mod.)	600KHz		L102 (AM OSC coil) L101 (AM ANT. coil)	
3		1400KHz (400Hz 30% Mod.)	1400KHz		CT2 (AM OSC Trimmer) & CT1 (AM ANT Trimmer on AM/ FM Front End) See FM Front - End	
4	Repeat Steps 2 and 3 until no further improvement is noticed.					

DECODE ALIGNMENT PROCEDURE

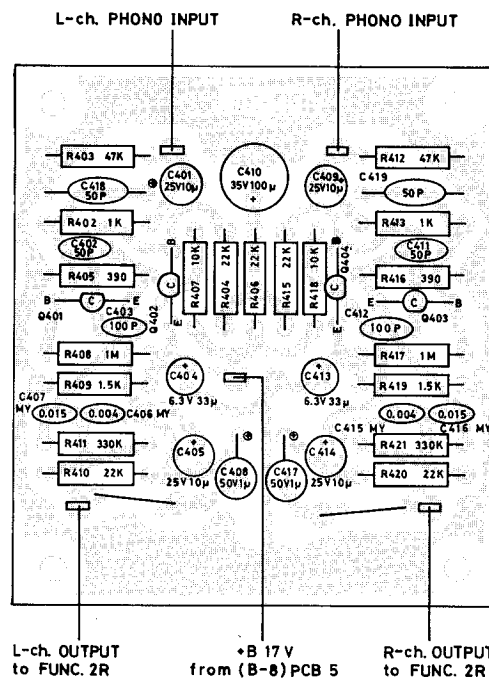
INSTRUMENT: Audio Generator, AC VTVM and Oscilloscope

POSITION OF SWITCHES & CONTROLS:

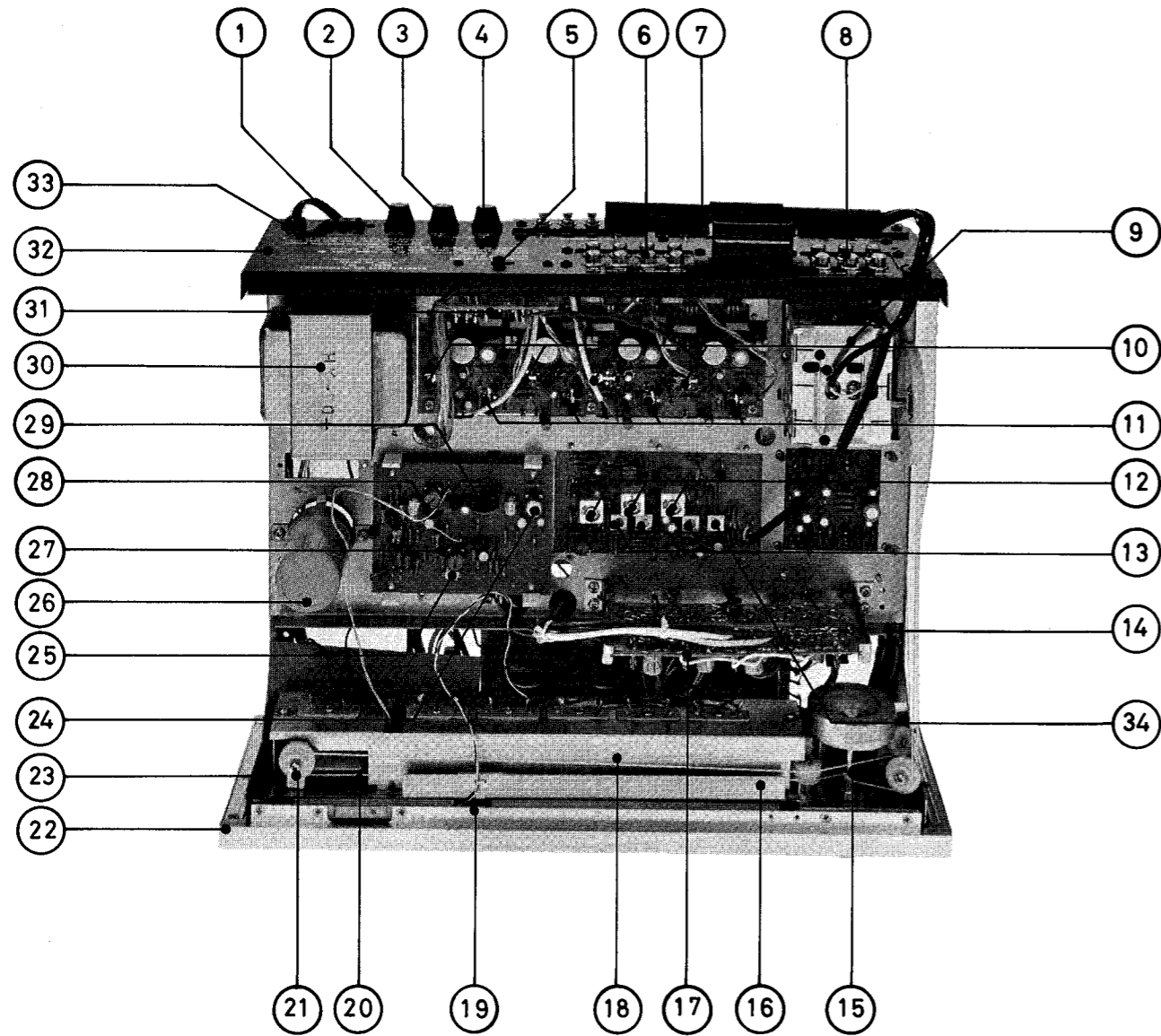
Tone Control, Balance Control to mid position
 Selector Switch to AUX position
 Mode Switch to STEREO position
 Speaker Switch to ON position
 Decode Switch to OFF position
 Stereo Quad Switch to QUAD position
 Volume Control to MAXIMUM position

STEPS	8 OHM DUMMY LOAD CONNECTED TO	VTVM & OSCILLOSCOPE CONNECTED TO	(1 KHz)		ADJUST	ADJUST FOR
			AUDIO GENE. CONNECTED TO	DECODE SWITCH		
1	Left Speaker Terminals (Front)	Left Speaker Terminals (Front)	Aux (Front)	OFF	Audio Gene. Output Level	8V on VTVM
2				ON		
3	Left Speaker Terminals (Back)	Left Speaker Terminals (Back)	Aux (Front)	OFF	VR ⁷⁰²	3dB Down from 8V
4	Right Speaker Terminals (Front)	Right Speaker Terminals (Front)		ON	VR ⁷⁰³	8V on VTVM
5	Right Speaker Terminals (Back)	Right Speaker Terminals (Back)	OFF	VR ⁷⁰⁴	3dB Down from 8V	
6			ON			

PREAMP BOARD

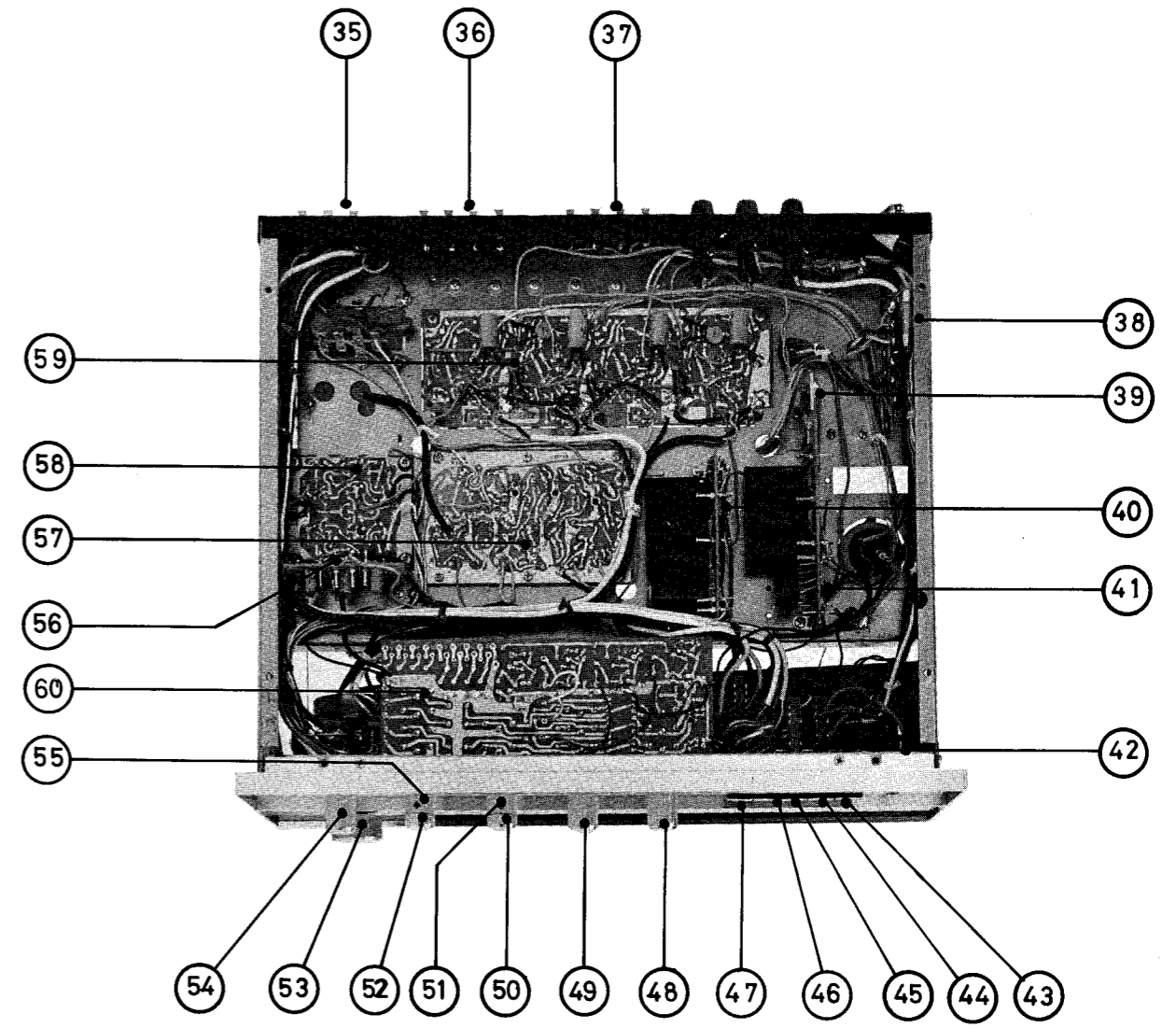


TOP VIEW



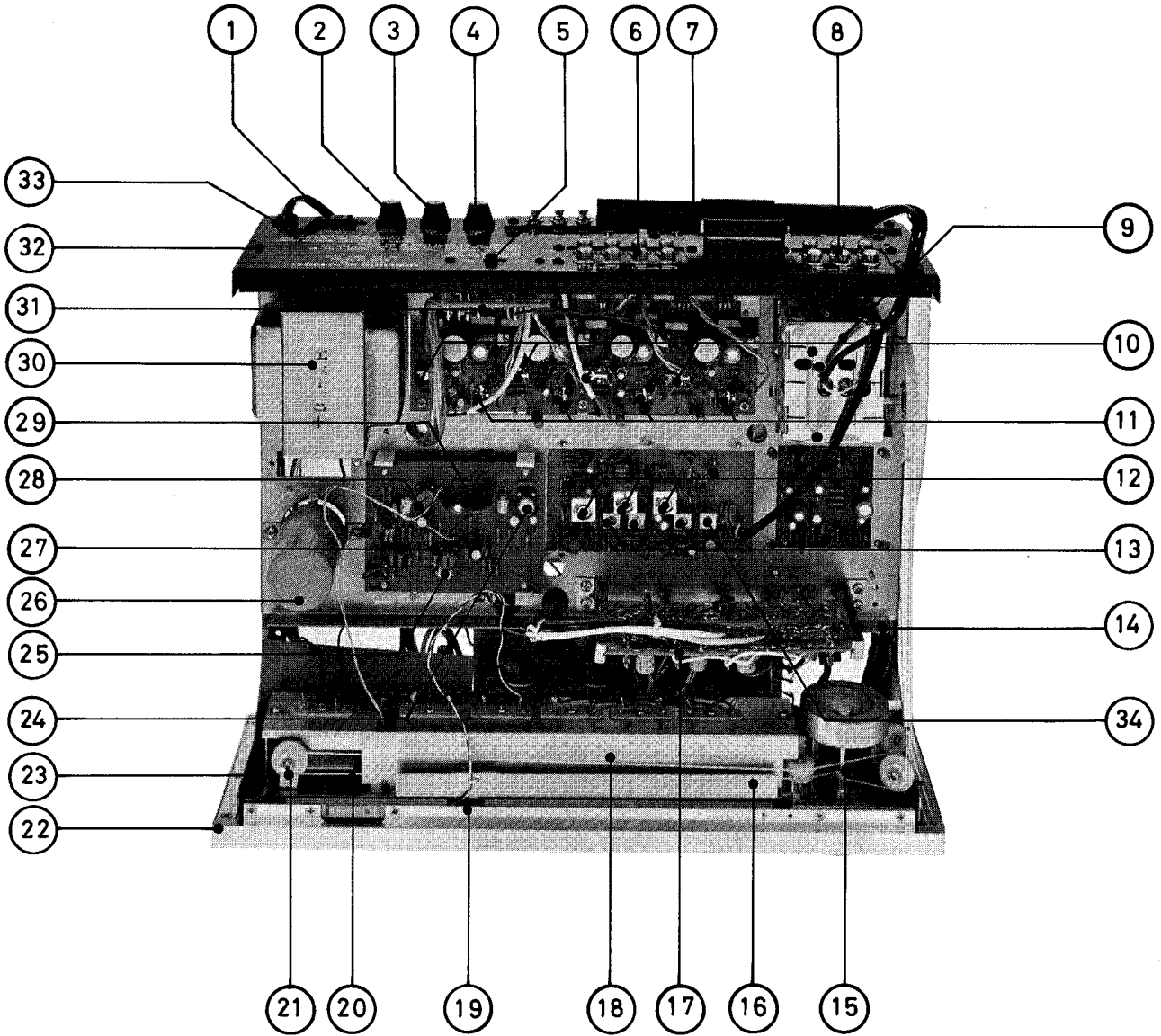
- | | | |
|----------------------|------------------------|-----------------------------|
| ① AC OUTLET | ⑬ AM IFT | ⑲ T302 MPX TRANS. 19KHz |
| ② AC FUSE | ⑭ CHASSIS | ⑳ C001 |
| ③ DC FUSE (LEFT) | ⑮ TUNING SHAFT | ㉑ MPX CIRCUIT BOARD (MX-G2) |
| ④ DC FUSE (RIGHT) | ⑯ SLIDE PLATE | ㉒ T303 MPX TRANS. 38KHz |
| ⑤ QUAD-STEREO SWITCH | ⑰ DECODE CIRCUIT BOARD | ㉓ VR301 SEPARATION ADJ. |
| ⑥ OUTPUT TERMINAL | ⑱ LAMP HOUSING | ㉔ POWER TRANSFORMER |
| ⑦ AM ANTENNA COIL | ⑲ DIAL POINTER | ㉕ (X-19B) BOARD |
| ⑧ INPUT TERMINAL | ⑳ TUNING METER | ㉖ BACK CHASSIS |
| ⑨ AM FM FRONT-END | ㉑ PULLEY | ㉗ AC SUPPLY CORD |
| ⑩ SYMMETRY ADJ. | ㉒ FRONT PANEL | ㉘ L102 AM OSC COIL |
| ⑪ BIAS ADJ. | ㉓ FRONT CHASSIS | |
| ⑫ FM IFT | ㉔ T301 MPX COIL 19KHz | |

BOTTOM VIEW



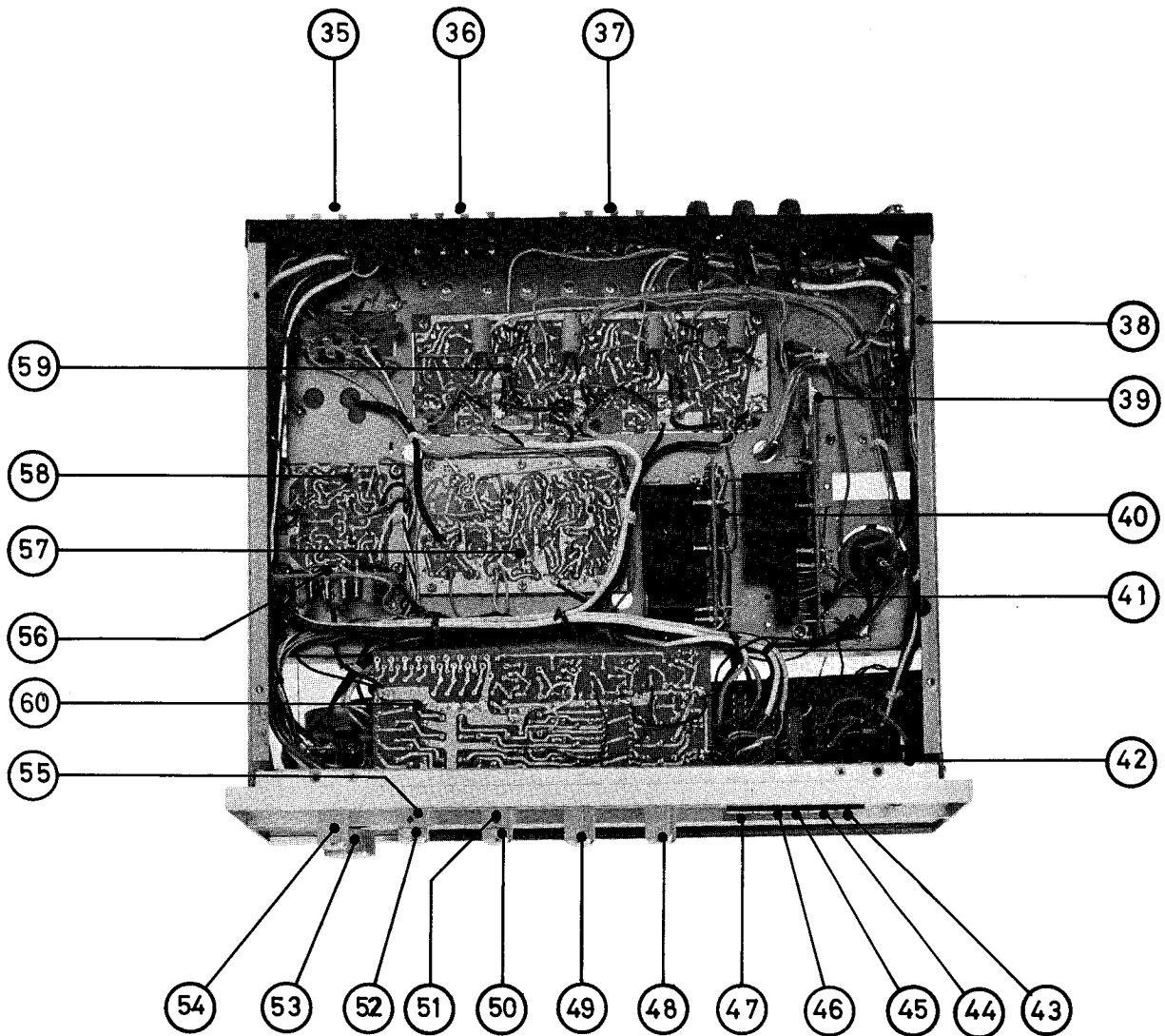
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|---------------------|----------------------------|------------------------------|
| ③⑤ ANTENNA TERMINAL | ④④ SPEAKER SW | ⑤③ TUNING |
| ③⑥ OUTPUT TERMINAL | ④⑤ MODE SW | ⑤④ FUNCTION SW |
| ③⑦ OUTPUT TERMINAL | ④⑥ TAPE MONITOR SW | ⑤⑤ VOLUME CONTROL (BACK) |
| ③⑧ AC FUSE 4A | ④⑦ SQ MATRIX SW | ⑤⑥ X-17A PCB |
| ③⑨ Q801 2SC1107 | ④⑧ BASS CONTROL | ⑤⑦ IF-5B PCB |
| ④① B-8A PCB | ④⑨ TREBLE CONTROL | ⑤⑧ PRE AMP PCB (PR-3D) |
| ④② B-11A PCB | ⑤① BALANCE CONTROL (FRONT) | ⑤⑨ DRIVER PCB (AF-27E) |
| ④③ HEADPHONES JACK | ⑤② BALANCE CONTROL (BACK) | ⑥① TONE CONTROL PCB (TC-24B) |
| ④④ POWER SW | ⑤③ VOLUME CONTROL (FRONT) | |

TOP VIEW

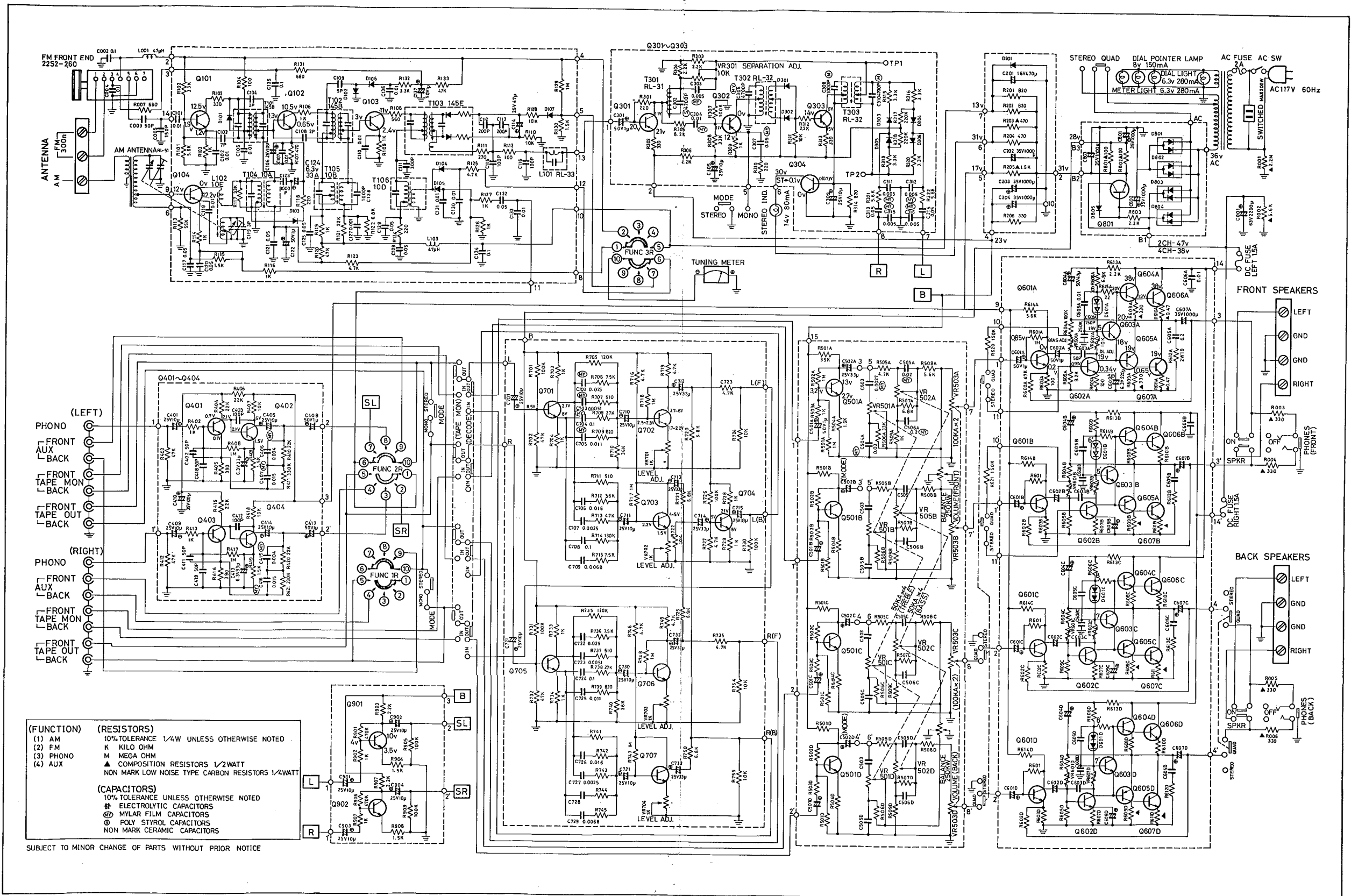


- | | | |
|----------------------|------------------------|-----------------------------|
| ① AC OUTLET | ⑬ AM IFT | ⑳ T302 MPX TRANS. 19KHz |
| ② AC FUSE | ⑭ CHASSIS | ㉑ C001 |
| ③ DC FUSE (LEFT) | ⑮ TUNING SHAFT | ㉒ MPX CIRCUIT BOARD (MX-G2) |
| ④ DC FUSE (RIGHT) | ⑯ SLIDE PLATE | ㉓ T303 MPX TRANS. 38KHz |
| ⑤ QUAD-STEREO SWITCH | ⑰ DECODE CIRCUIT BOARD | ㉔ VR301 SEPARATION ADJ. |
| ⑥ OUTPUT TERMINAL | ⑱ LAMP HOUSING | ㉕ POWER TRANSFORMER |
| ⑦ AM ANTENNA COIL | ⑲ DIAL POINTER | ㉖ (X-19B) BOARD |
| ⑧ INPUT TERMINAL | ㉑ TUNING METER | ㉗ BACK CHASSIS |
| ⑨ AM FM FRONT-END | ㉒ PULLEY | ㉘ AC SUPPLY CORD |
| ⑩ SYMMETRY ADJ. | ㉓ FRONT PANEL | ㉙ L102 AM OSC COIL |
| ⑪ BIAS ADJ. | ㉔ FRONT CHASSIS | |
| ⑫ FM IFT | ㉕ T301 MPX COIL 19KHz | |

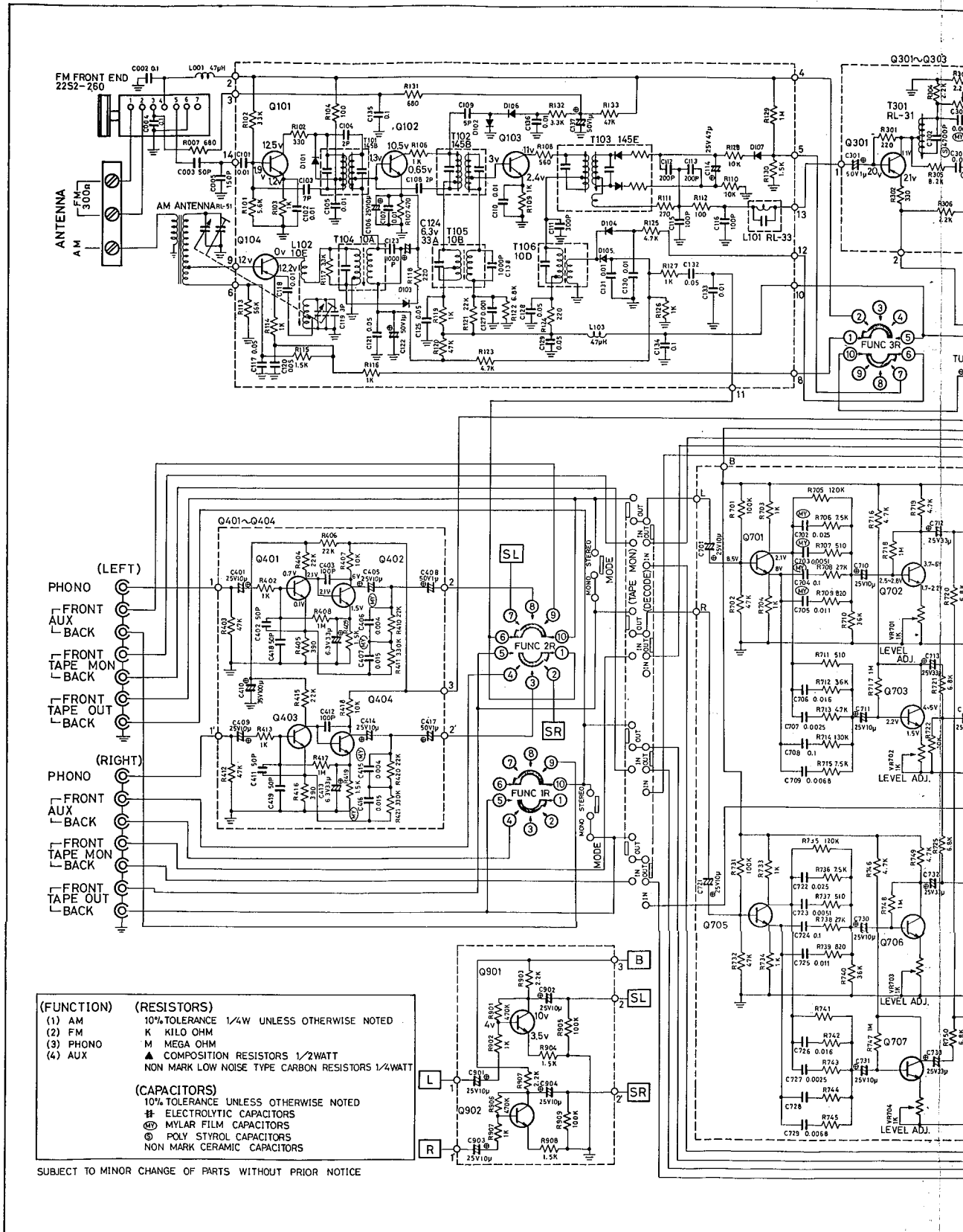
BOTTOM VIEW

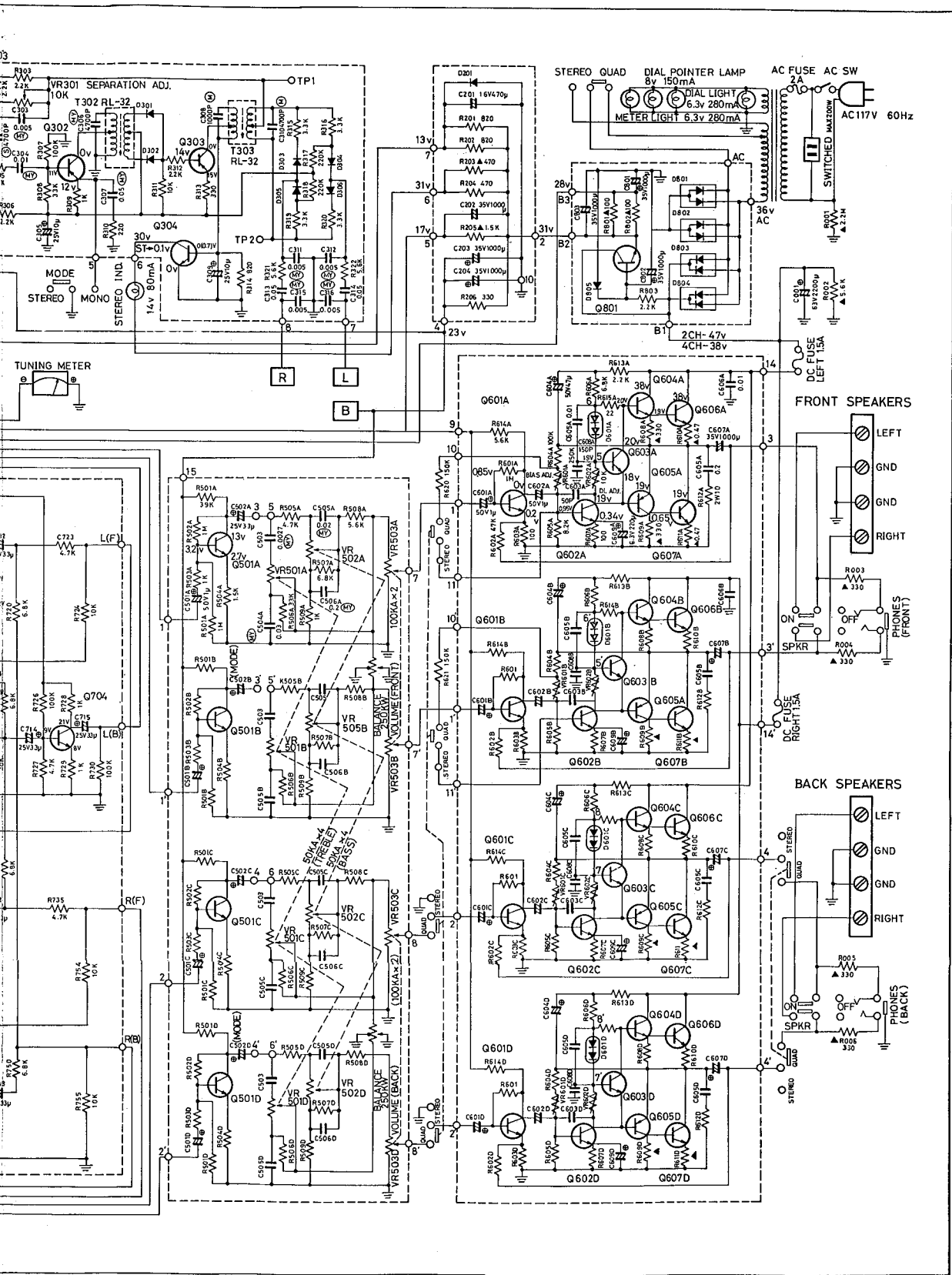


- | | | |
|---------------------|----------------------------|------------------------------|
| 35 ANTENNA TERMINAL | 44 SPEAKER SW | 53 TUNING |
| 36 OUTPUT TERMINAL | 45 MODE SW | 54 FUNCTION SW |
| 37 OUTPUT TERMINAL | 46 TAPE MONITOR SW | 55 VOLUME CONTROL (BACK) |
| 38 AC FUSE 4A | 47 SQ MATRIX SW | 56 X-17A PCB |
| 39 Q801 2SC1107 | 48 BASS CONTROL | 57 IF-5B PCB |
| 40 B-8A PCB | 49 TREBLE CONTROL | 58 PRE AMP PCB (PR-3D) |
| 41 B-11A PCB | 50 BALANCE CONTROL (FRONT) | 59 DRIVER PCB (AF-27E) |
| 42 HEADPHONES JACK | 51 BALANCE CONTROL (BACK) | 60 TONE CONTROL PCB (TC-24B) |
| 43 POWER SW | 52 VOLUME CONTROL (FRONT) | |

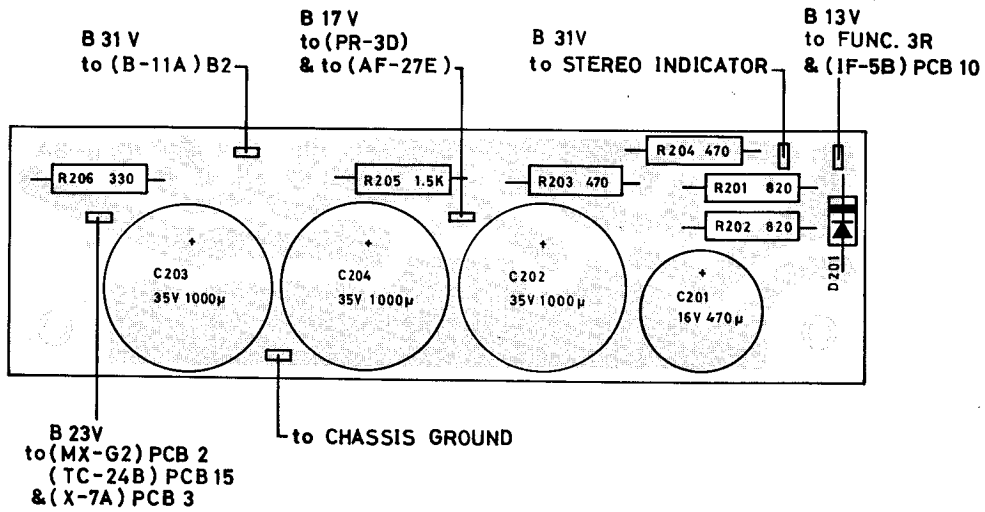


SCHEMATIC DIAGRAM — MODEL 50+

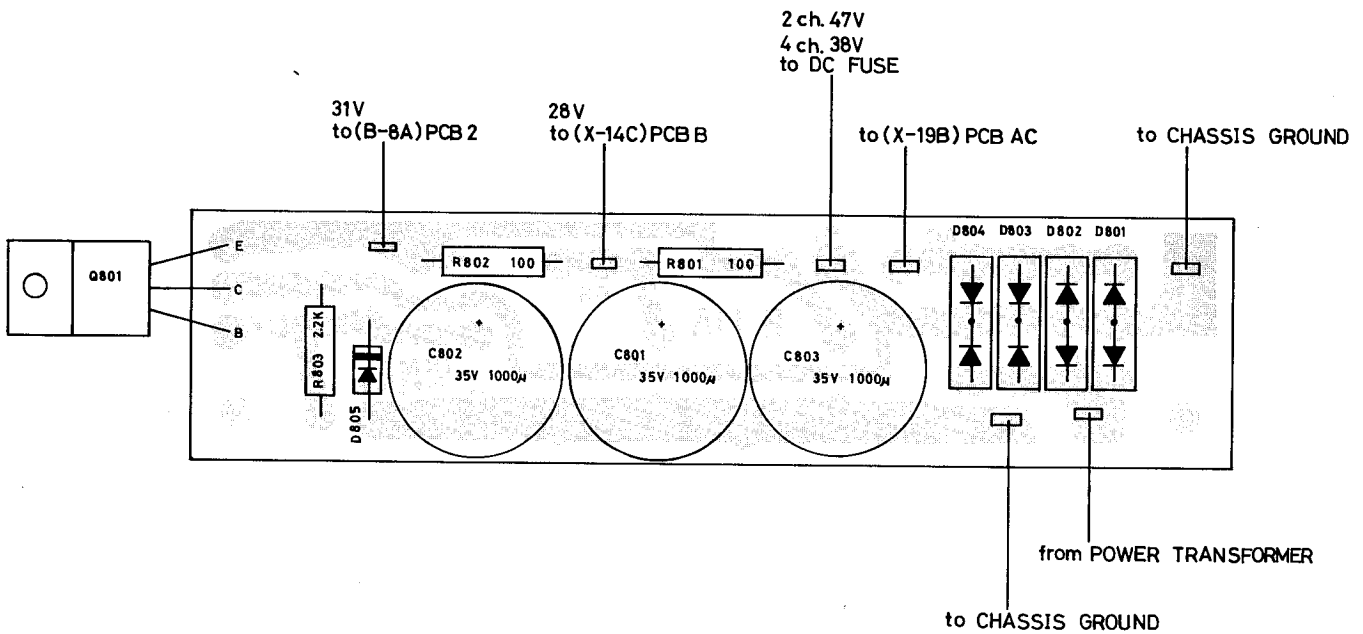




POWER SUPPLY CAPACITOR BOARD



POWER RECTIFIER BOARD



AM/FM FRONT END

Fig. 3-1 TOP VIEW

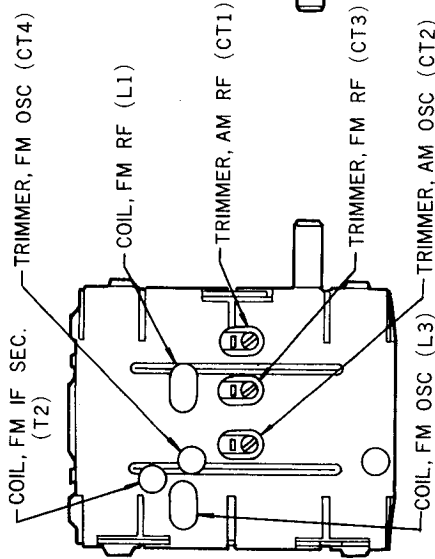
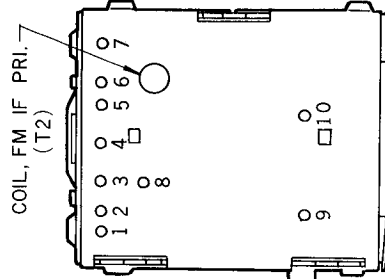


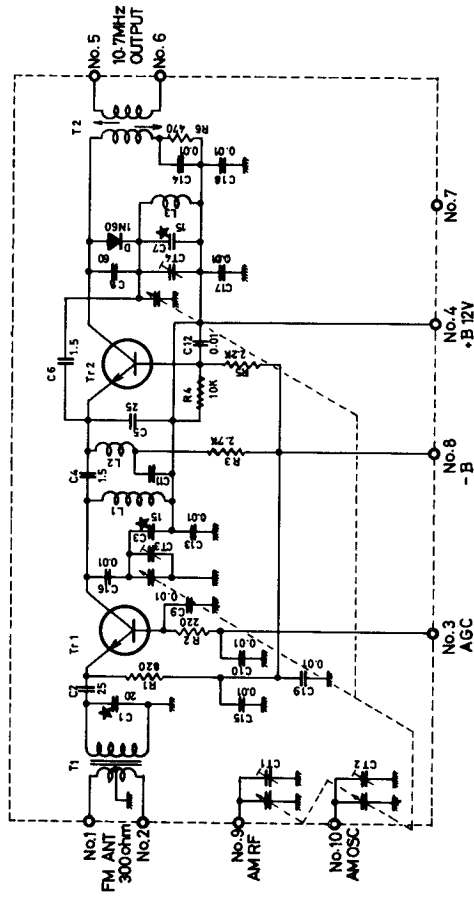
Fig. 3-2 BOTTOM VIEW



DESCRIPTION OF TERMINAL PINS

- No.1: No.2: ANTENNA, 300ohm BALANCED.
- No.3: A.G.C
- No.4: +B. 12V
- No.5: IF, HOT
- No.6: IF, COLD
- No.7: N.C.
- No.8: -B, GND
- No.9: AM RF
- No.10: AM OSC

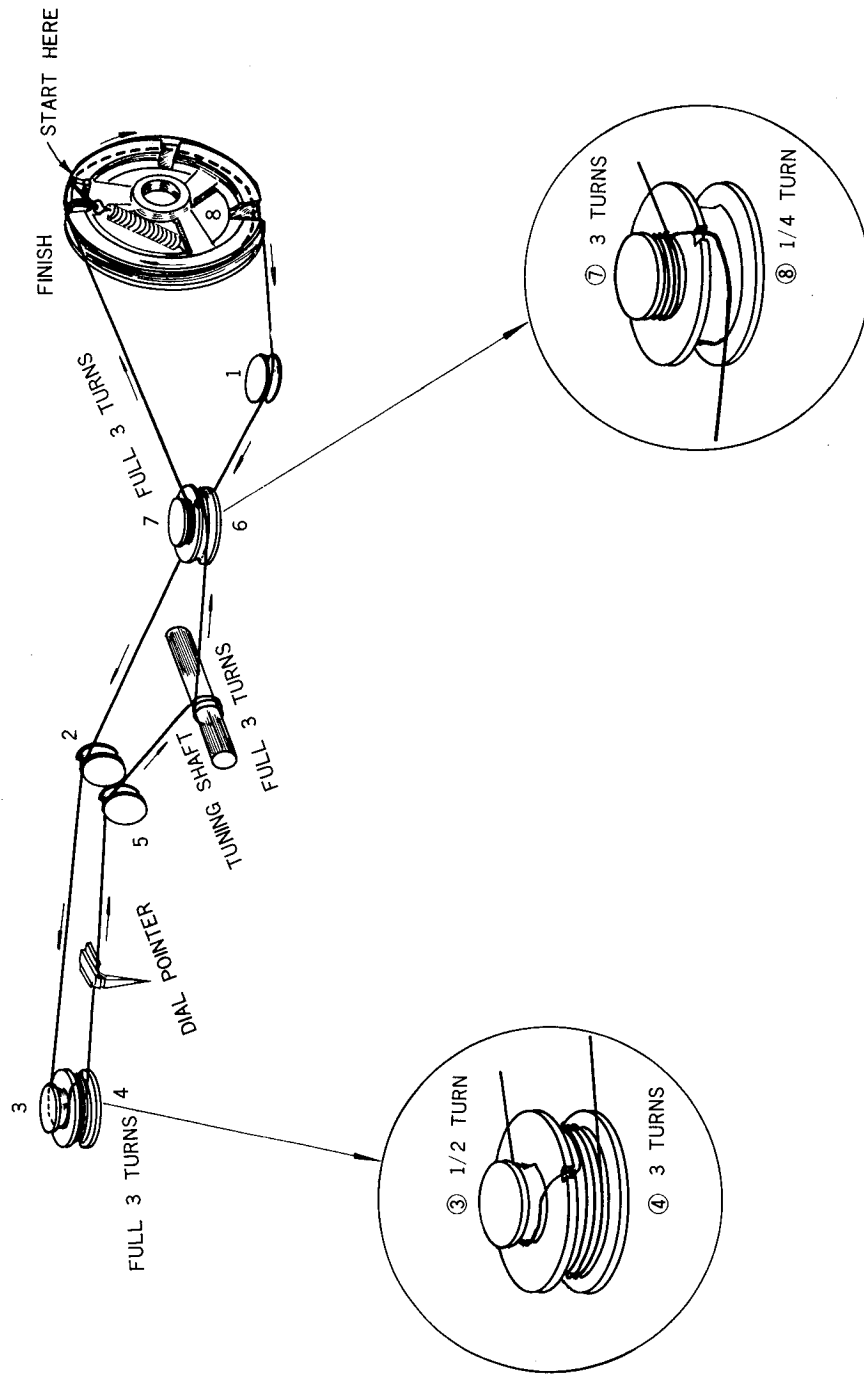
AM/FM FRONT-END "2252-260"
CIRCUIT DIAGRAM



NOTES:

1. ALL CAPACITY VALUES IN μF EXCEPT DECIMAL VALUES IN nF .
2. ALL RESISTANCE VALUES IN OHMS.
3. A.G.C VOLTAGE IS 1.4V UPPER FOR -B WHEN INPUT ZERO LEVEL.
4. ★ MARKS INDICATE ADJUSTABLE IN PRODUCTION.

STRINGING DIAGRAM



harman/kardon

55 AMES COURT, PLAINVIEW, N. Y. 11803

ADDENDUM TO MODEL 50+ TECHNICAL MANUAL

PLEASE ADD THIS ADDITIONAL INFORMATION TO YOUR MODEL 50+ TECHNICAL MANUAL.

FIG. 1

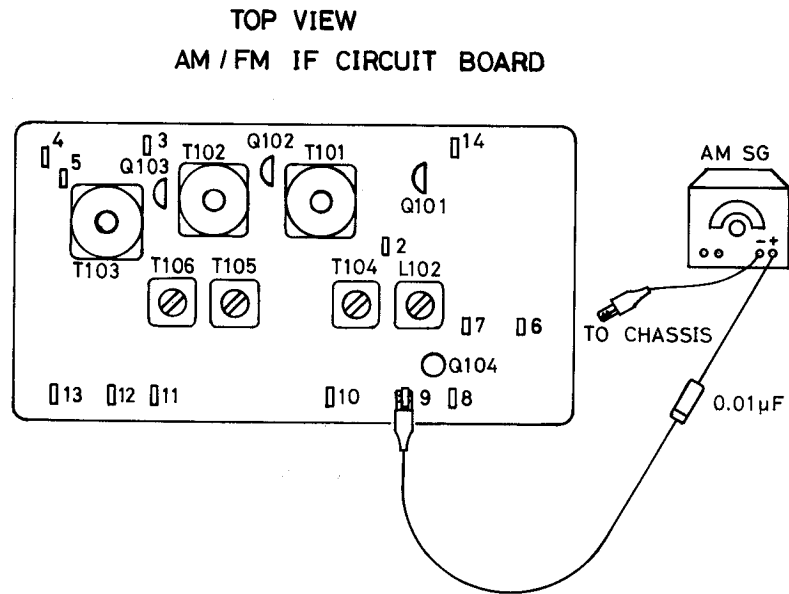


FIG. 2

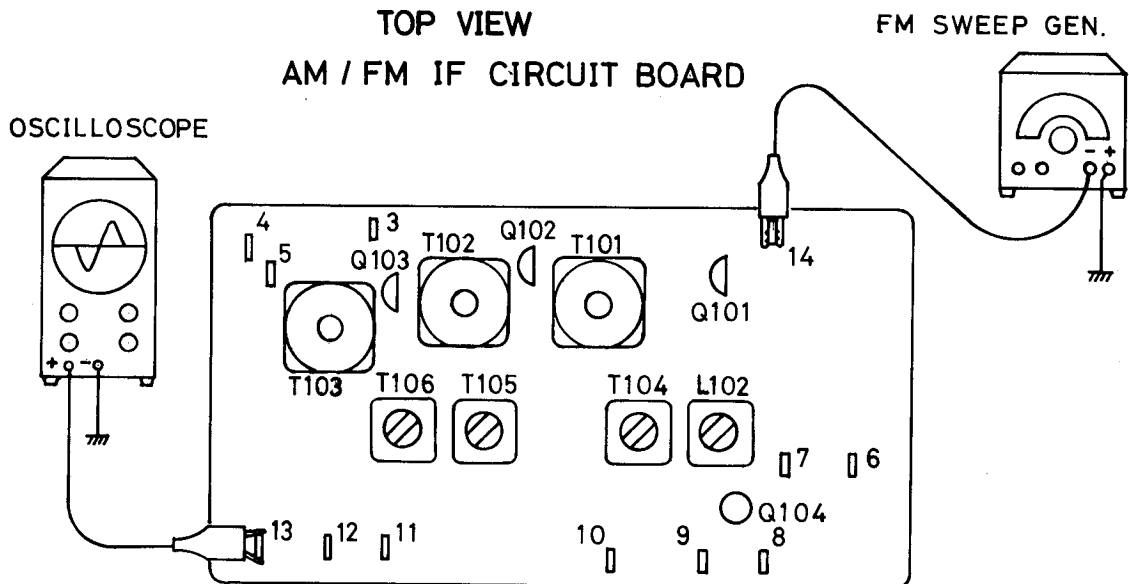


FIG. 3

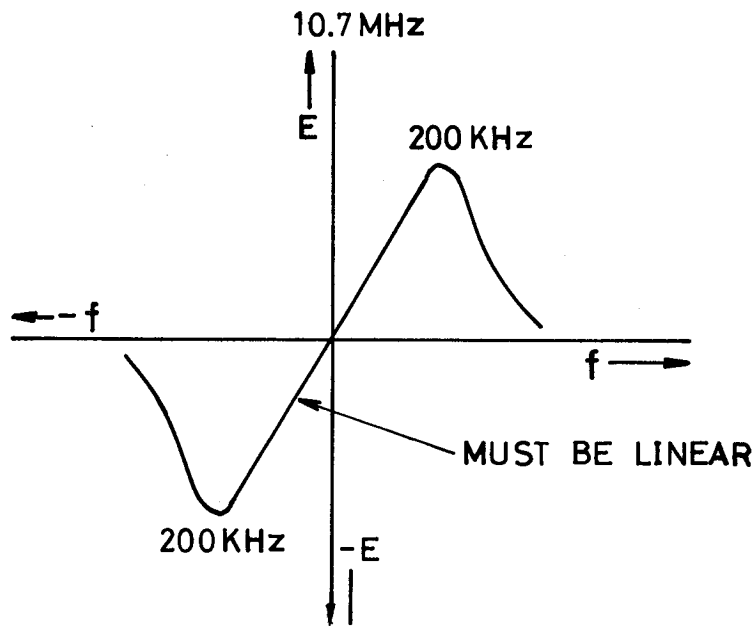


FIG. 4

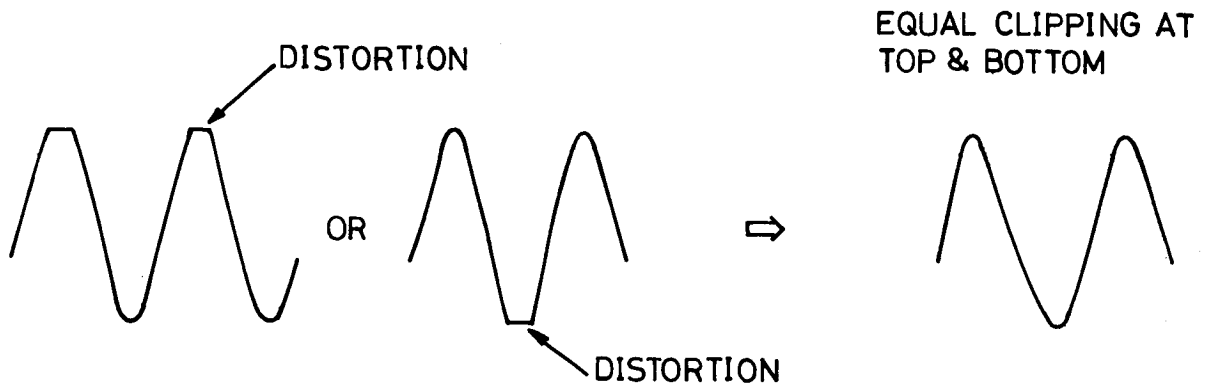


FIG. 5

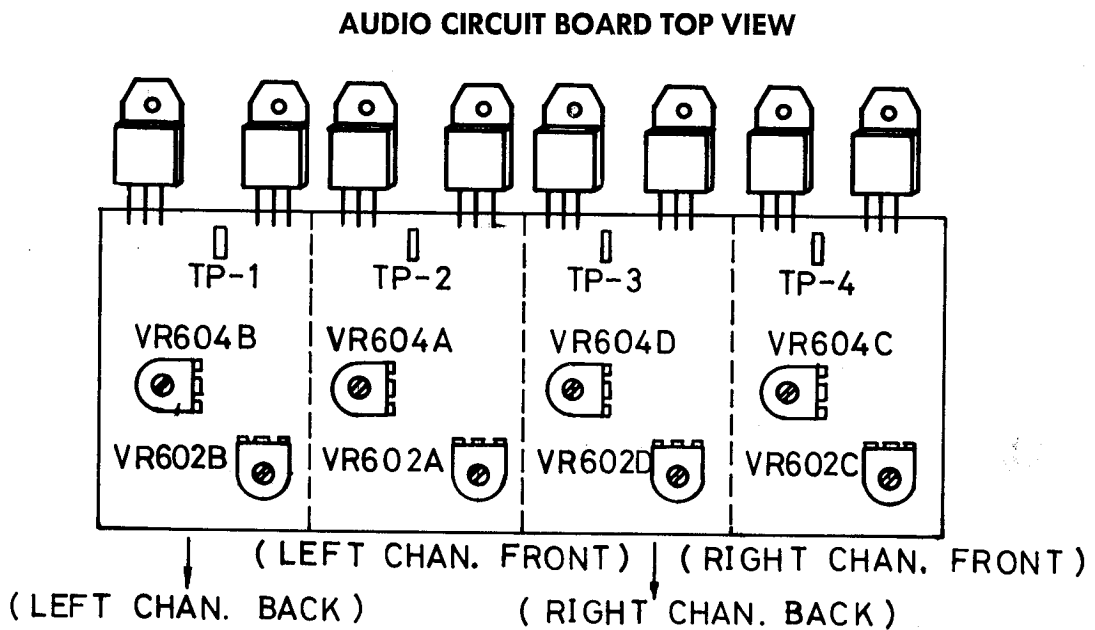
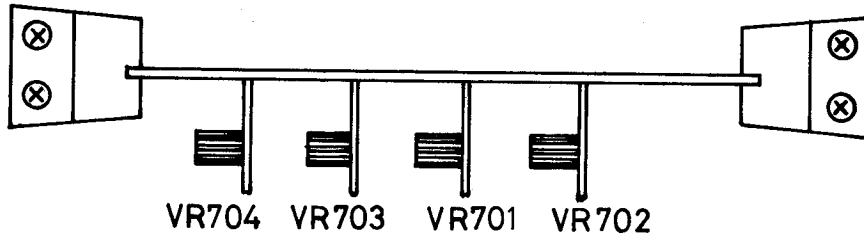
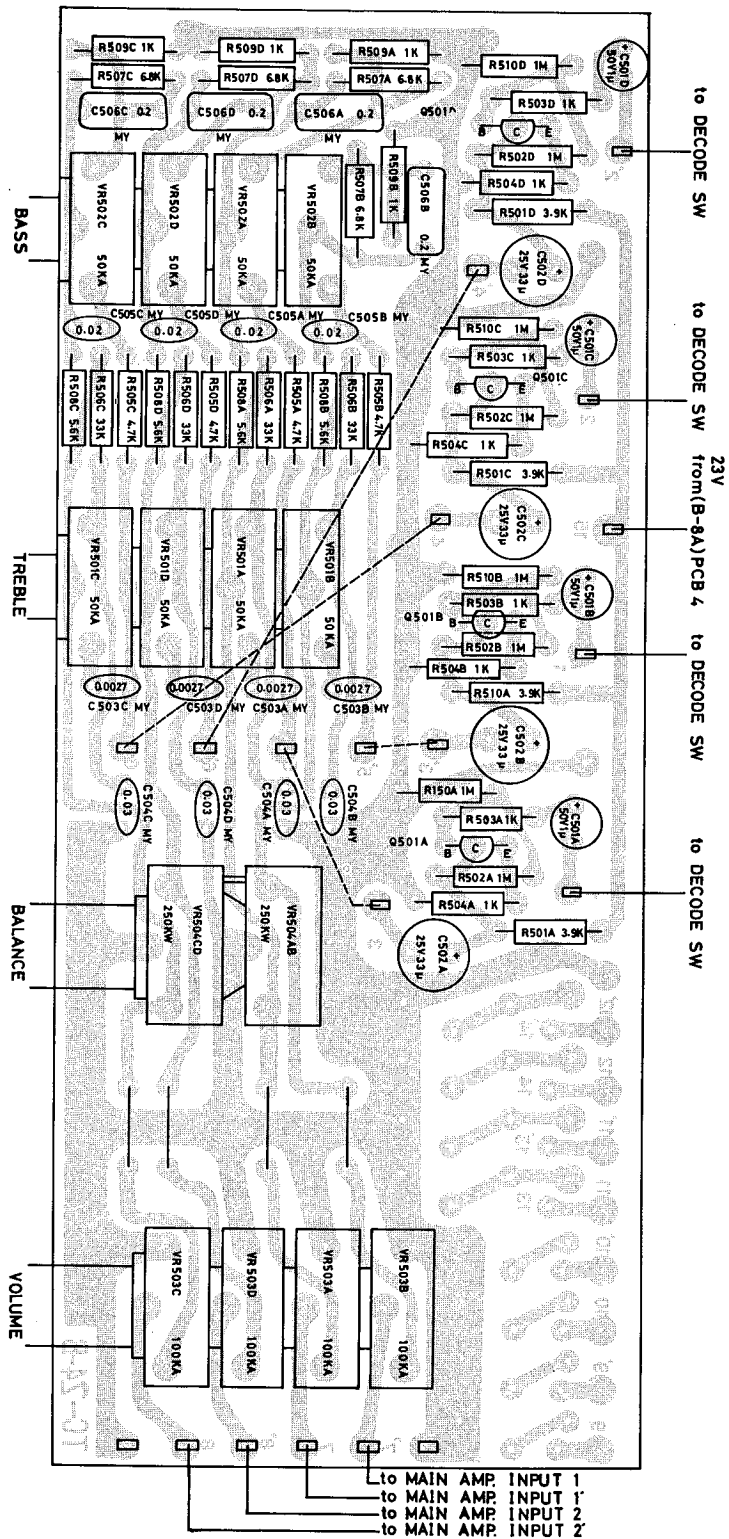


FIG. 6

CHASSIS TOP VIEW

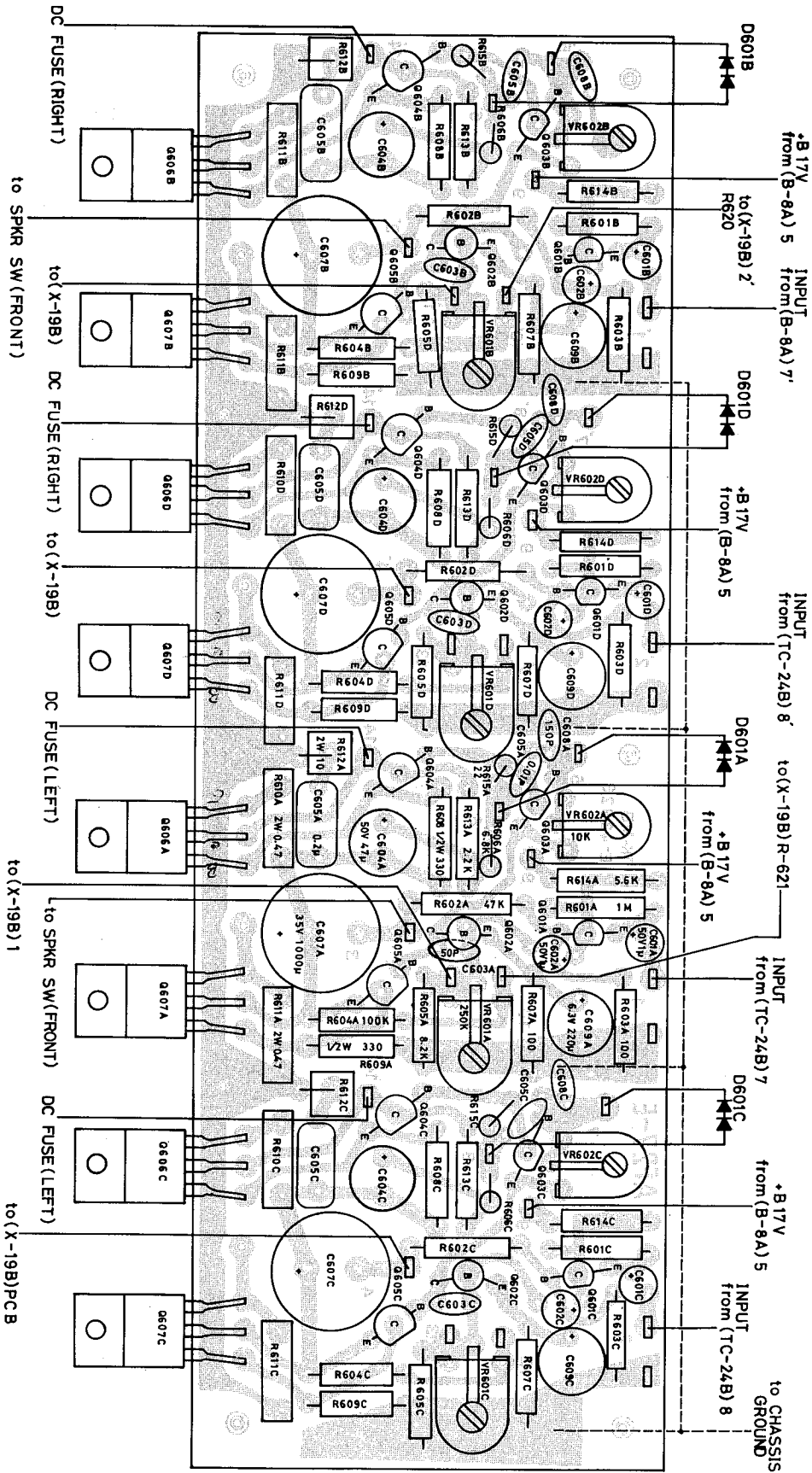


TONE CONTROL BOARD



TONE CONTROL BOARD

PREDRIVER BOARD



PREDRIVER BOARD

REPLACEMENT PARTS LIST

H-K PART NO.	REF. NO.	DESCRIPTION	H-K PART NO.	REF. NO.	DESCRIPTION
TRANSISTORS					
43028298	Q606A/B/C/D/ Q607A/B/C/D/801	Transistor 2SC1107	41027992	D101/2/3/4/5/6/ D301/2/3/4/5/6	Diode, IS188
43025972	Q101/2/3/304 Q401/2/3/4 Q501A/B/C/D Q601A/B/C/D Q602A/B/C/D Q603A/B/C/D Q701/2/3/4/5/6/7 Q901/2	Transistor 2N3417	41028139	D107	Diode, S.05
43028299	Q604A/B/C/D	Transistor 2SC1384	41027991	D803/4	Diode, IS1850
43028300	Q605A/B/C/D	Transistor 2SA684	41028109	D801/2	Diode, IS1850R
43024833	Q104	Transistor 2SA52	42028308	D805	Zener Diode, BZ-310
43024834	Q301/2/3	Transistor 2SA49	42028321	D201	Zener Diode, BZ-120
CONTROLS					
23528301	VR602A/B/C/D	VR, 10K Bias Adj.	42028322	D601/A/B/C/D	Double Diode, KB269
23528302	VR601A/B/C/D	VR, 250K Symmetry Adj.	MISCELLANEOUS		
22028162	VR501A/B/C/D VR501A/B/C/D	VR, Tone 50K	60128306		Front Panel Assy.
22028163	VR503A/B/C/D	VR, Volume 100K	60128307		Top Cover
22028303	VR504AB/CD	VR, Balance 250K	60128294		Bottom Plate
23528128	VR301	VR, 10K Separation Adj.	12528288		Tuning Meter
23528127	VR701/2/3/4	VR, Level Adj., 1K	00228286		Dial Pointer Assy.
TRANSFORMERS & COILS					
10128285		Power Transformer	00228287		Tuning Shaft w/Flywheel
12027236		Micro-Inductor, 47uh	63227925		Knob, Dual Back
12028292	RL51	Antenna Coil	63228295		Knob, Tuning
11027238	T102	IFT	63228296		Knob, Left Tone
11027239	T103	IFT	63228297		Knob, Right Tone
11024829	T104	Coil	63227924		Knob, Dual Front
11024830	T105	Coil	24028289		Switch Selector
11024830	T106	Coil	25028290		Pushbutton Switch
12027934	L102	Osc. Coil	24528291		Switch Power
12028304	L101	Coil	00327255		AM/FM Front End
12028138	T301	Micro-Inductor, 47uh	31527234		Capacitor, 2200pF 63V
12027935	T302/3	Coil	46527892		Stereo Indicator, 14V 80MA
12027936		Coil	46527928		Dial Lamp, 6.3V, 280MA
DIODES					
NOTE: To speed handling of your order be sure to include both the model and serial numbers which appear at the back of the chassis, in addition to the quantity, part number and part description of the items ordered. Orders from independent dealers, independent servicemen, and retail customers will be shipped on a cash in advance basis. Harman-Kardon reserves the right to substitute equivalent parts for those originally installed in this chassis. All parts should be ordered from Harman-Kardon, 55 Ames Court, Plainview, L.I., N.Y. 11803, Att: Parts Department.					