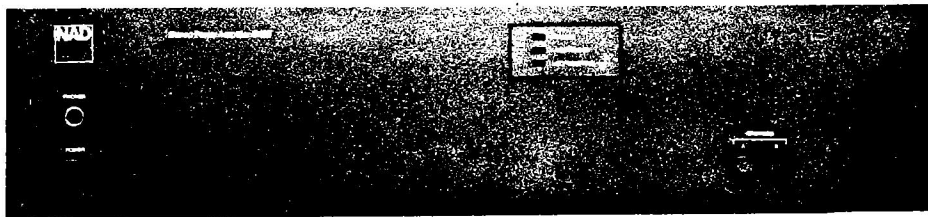
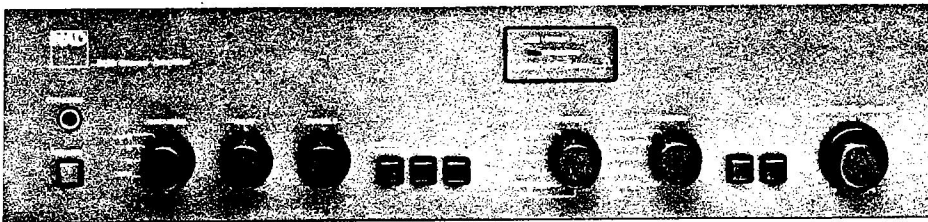


# **NAD SERVICE MANUAL**

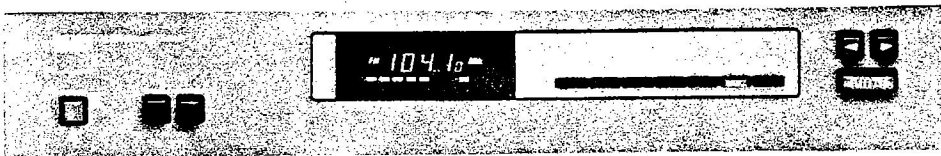


**MODELS**

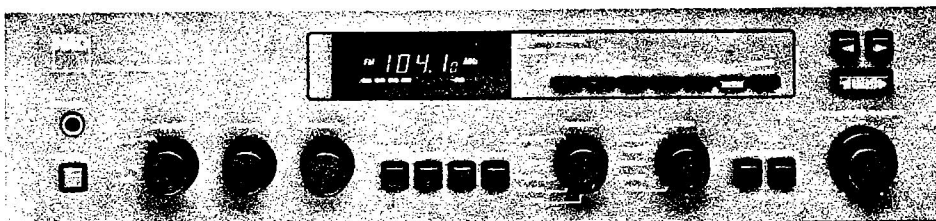
**2150**



**3150**



**4150**



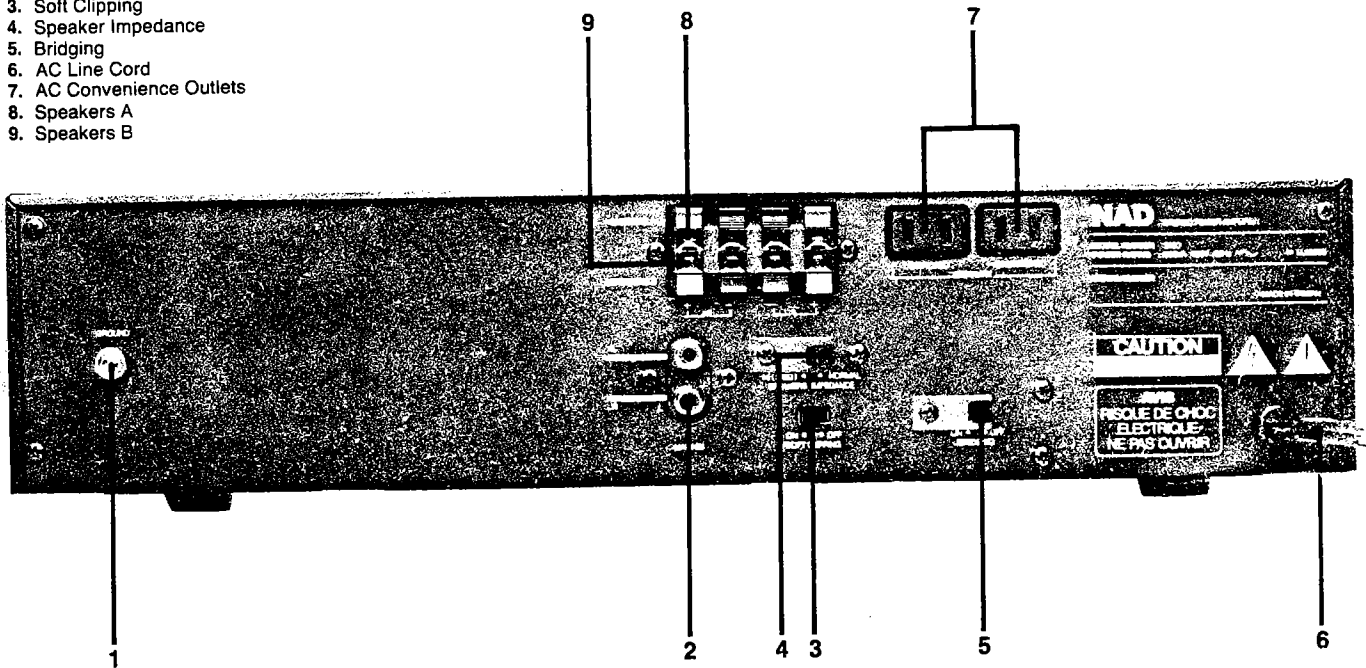
**7150**

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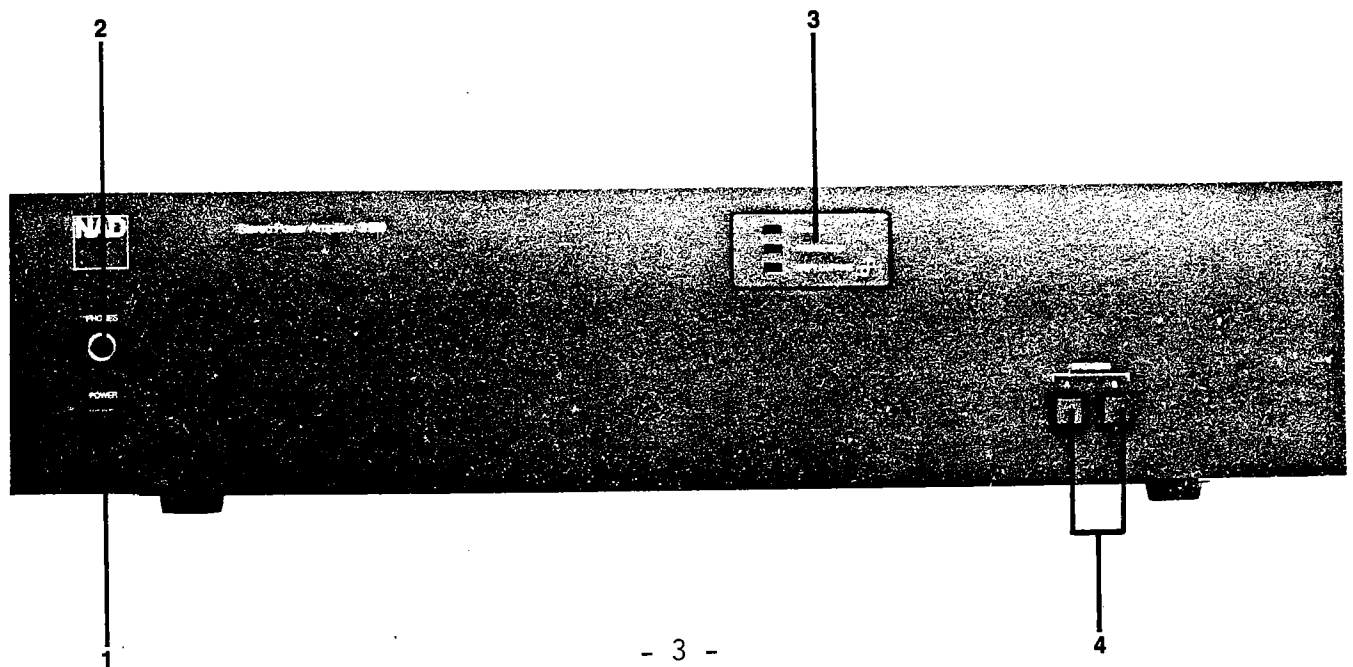
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# 2150 FRONT/REAR VIEW

1. Ground
2. Main in
3. Soft Clipping
4. Speaker Impedance
5. Bridging
6. AC Line Cord
7. AC Convenience Outlets
8. Speakers A
9. Speakers B

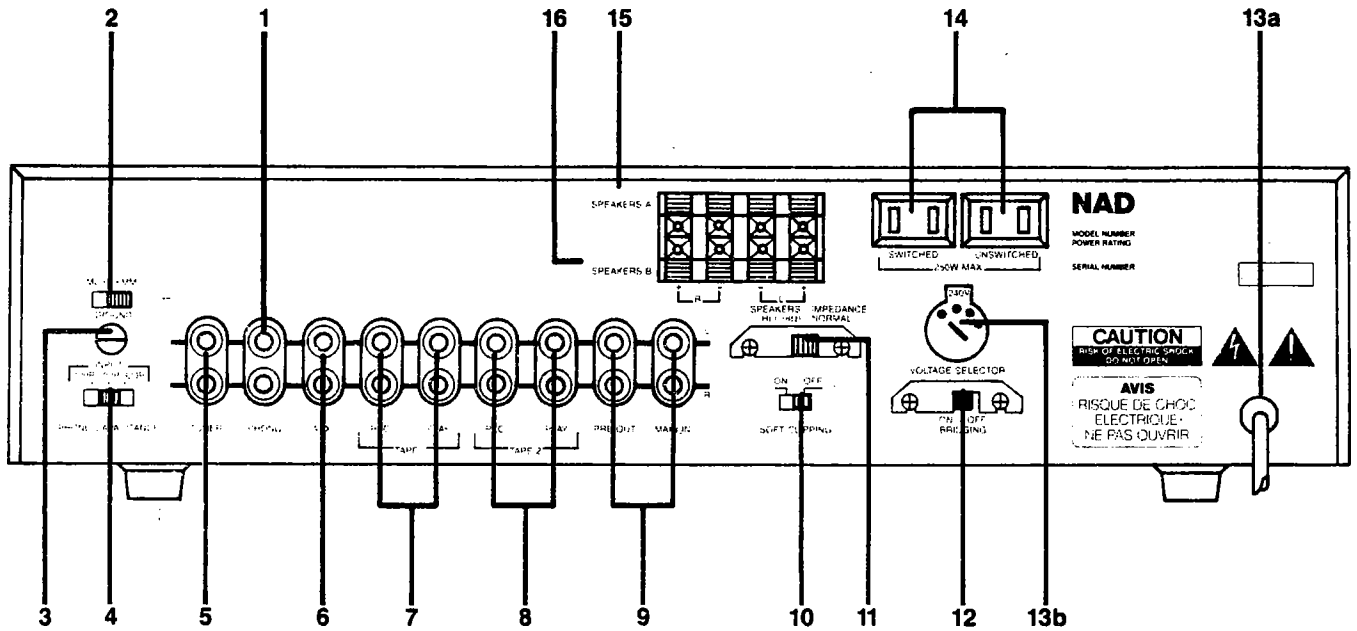


1. Power
2. Phones
3. Status Indicators
4. Speaker Selector

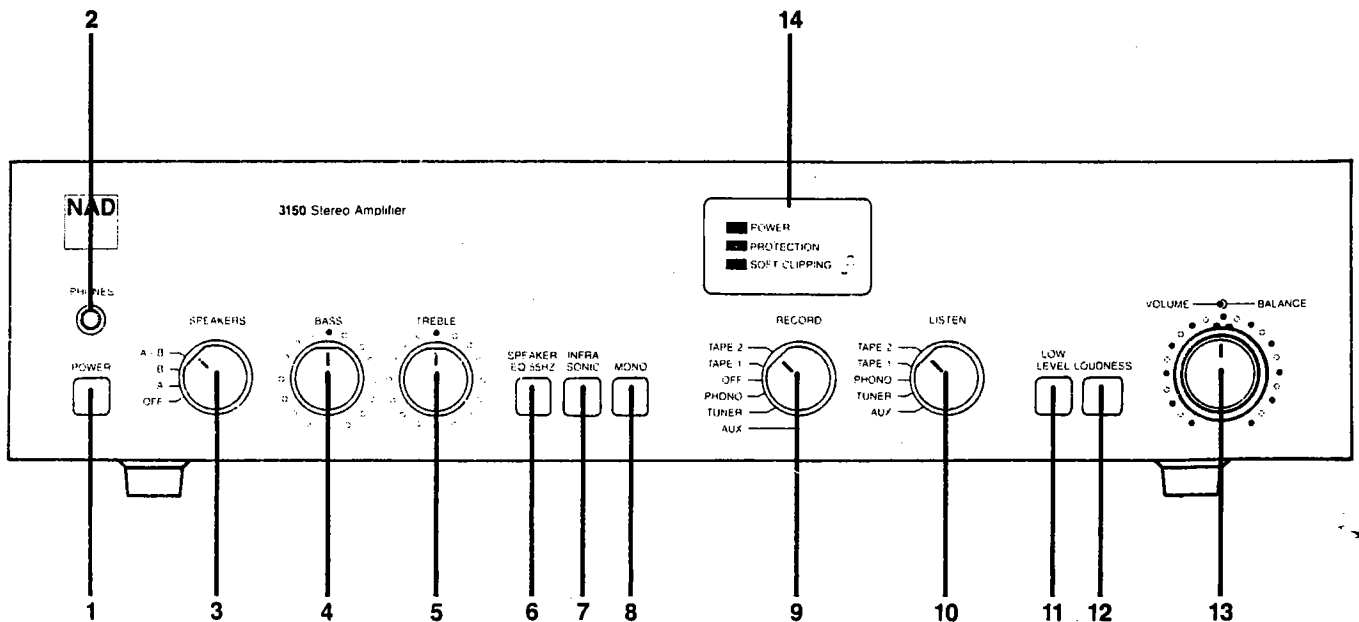


# 3150 FRONT/REAR VIEW

- |                         |                            |
|-------------------------|----------------------------|
| 1. Phono Input          | 10. Soft Clipping          |
| 2. MM MC Selector       | 11. Speaker Impedance      |
| 3. Ground               | 12. Bridging               |
| 4. Capacitance Selector | 13a. AC Line Cord          |
| 5. Tuner Input          | 13b. Voltage Selector      |
| 6. Aux Input            | (Not in U.K. model)        |
| 7. Tape 1 Rec/Play      | 14. AC Convenience Outlets |
| 8. Tape 2 Rec/Play      | 15. Speakers A             |
| 9. Preamp Out, Main in  | 16. Speakers B             |

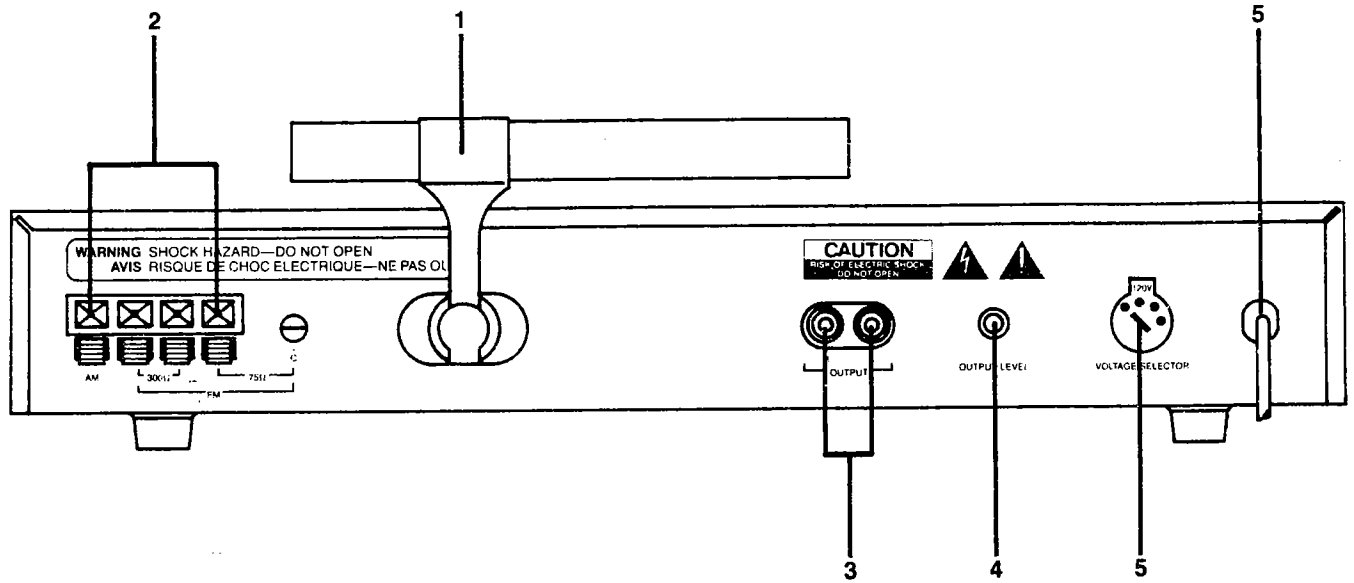


- |                      |                           |
|----------------------|---------------------------|
| 1. Power             | 8. Mono                   |
| 2. Phones            | 9. Recording Selector     |
| 3. Speaker Selector  | 10. Listen Selector       |
| 4. Bass              | 11. Low Level             |
| 5. Treble            | 12. Loudness Compensation |
| 6. Speaker EQ        | 13. Volume/Balance        |
| 7. Infrasonic Filter | 14. Status Indicators     |

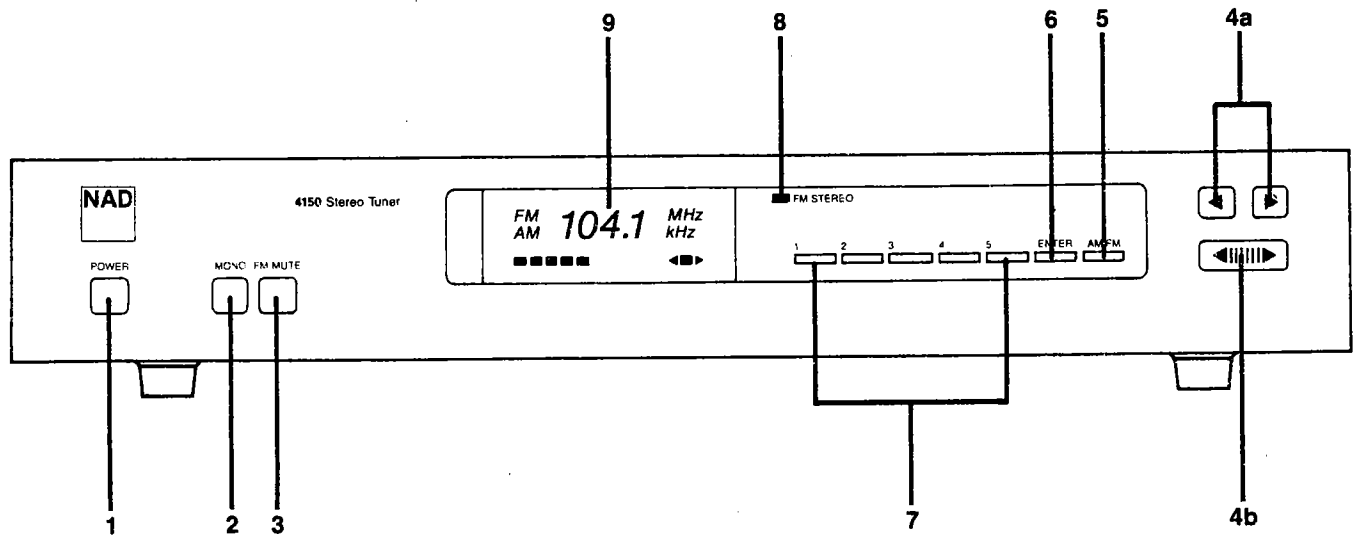


# 4150 FRONT/REAR VIEW

1. AM Bar Antenna
2. Antenna Terminals
3. Audio Output
4. Output Level
5. AC Line Cord and Voltage Selector

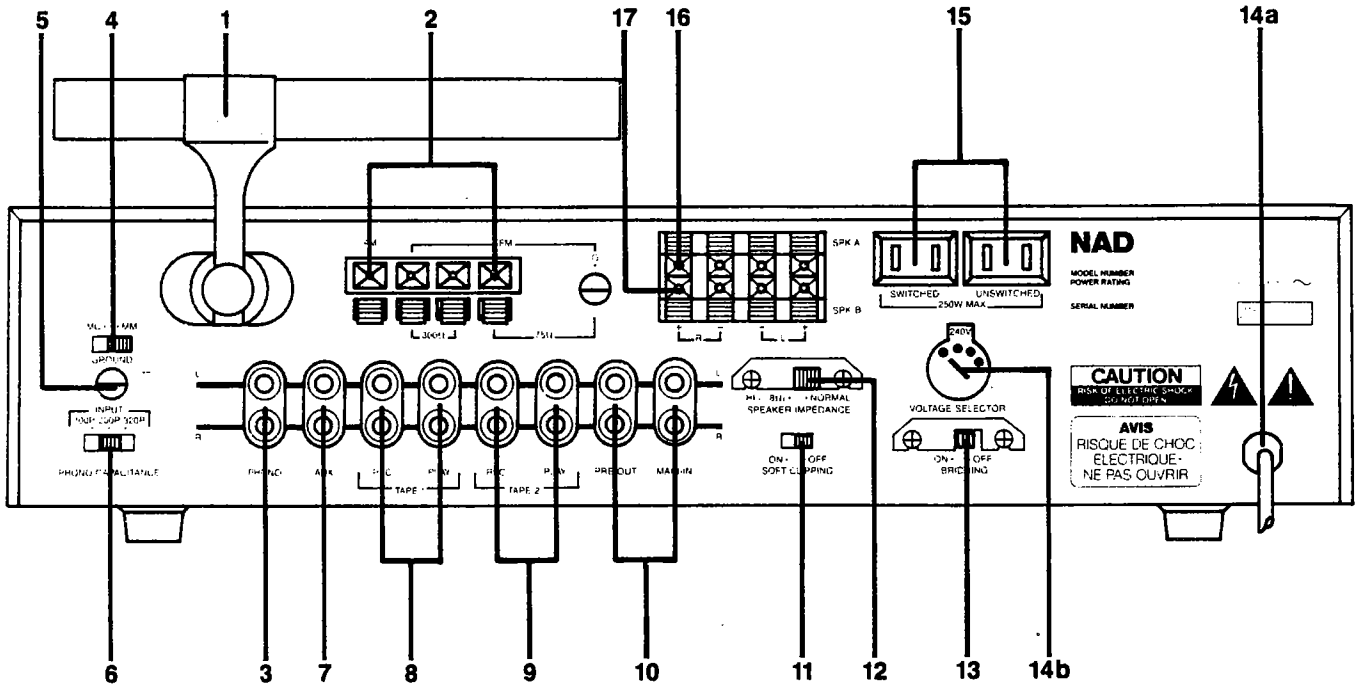


1. Power
2. Mono
3. FM Mute
4. (a.) Up/Down Scan
4. (b.) Search
5. FM/AM
6. Enter
7. Pre-Sets
8. FM Stereo Indicator
9. Tuning Display

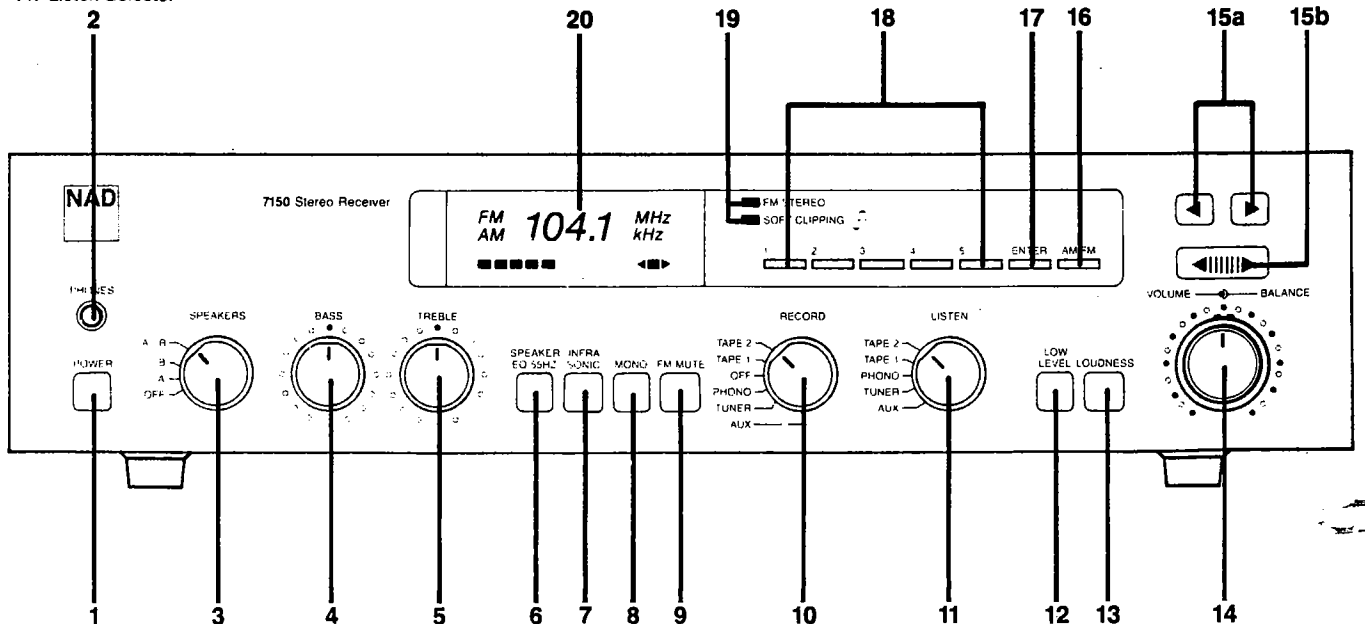


# 7150 FRONT/REAR VIEW

- |                         |                         |                             |
|-------------------------|-------------------------|-----------------------------|
| 1. AM Bar Antenna       | 8. Tape 1 Rec/Play      | 14b. Voltage Selector       |
| 2. Antenna Terminals    | 9. Tape 2 Rec/Play      | (Not in U.S./Canada models) |
| 3. Phono Input          | 10. Preamp Out, Main In | 15. AC Convenience Outlets  |
| 4. MM/MC Phono Selector | 11. Soft Clipping       | (Not in U.K. model)         |
| 5. Ground               | 12. Speaker Impedance   | 16. Speakers A              |
| 6. Capacitance Selector | 13. Bridging            | 17. Speakers B              |
| 7. Aux Input            | 14a. AC Line Cord       |                             |



- |                        |                           |
|------------------------|---------------------------|
| 1. Power               | 12. Low Level             |
| 2. Phones              | 13. Loudness Compensation |
| 3. Speaker Selector    | 14. Volume/Balance        |
| 4. Bass                | 15a. Up/Down              |
| 5. Treble              | 15b. Search               |
| 6. Speaker Eq.         | 16. FM/AM                 |
| 7. Infrasonic Filter   | 17. Enter                 |
| 8. Mono                | 18. Pre-sets              |
| 9. FM Mute             | 19. Status Indicators     |
| 10. Recording Selector | 20. Tuning Display        |
| 11. Listen Selector    |                           |



## 2150 SPECIFICATIONS

All specifications are measured in accordance with IHF standard A-202

	Normal	Hi ( $\geq 8\Omega$ )
Speakers Impedance Switch Set:		
Continuous Average Power Output at 8 ohm 20-20K Hz both Channels Driven	50 W	60 W
Rated Distortion 20-20K Hz	<0.03%	<0.03%
Clipping Headroom at 8 ohm	+0.5 dB	+0.5 dB
Clipping Power at 8 ohm	57 W	68 W
	80 W	-
	90 W	-
Dynamic Headroom at 8 ohm	+1.8 dB	+1.6 dB
Dynamic Power at 8 ohm	90 W	100 W
	150 W	-
	180 W	-
Transient Overload Recovery Time	<1 usec	
Slew Factor	>50	
Slew Rate	20 V/usec	
Damping Factor at 50 Hz (Ref. 8 ohm)	>100	
THD 20-20K Hz from 250 mW to 60 W	<0.03%	
SMPTTE IMD (60K Hz +7K Hz, 4:1) from 250 mW to 50 W	<0.03%	
IHF IMD (19K Hz + 20K Hz) at 50 W	<0.03%	
TIM (15K Hz Sinewave +3.18K Hz Square Wave) at 50 W	<0.03%	
Frequency Response, 20-20K Hz	+/-0.5 dB	
Frequency Response Range -3 dB	10-35K Hz	
Physical Specifications		
Dimensions WxHxD (inch)		16.5x3.8x12.2
		420x96x310
		8.8Kg/19.4 Lbs.
Net Weight		

## 7150 AUDIO/3150 SPECIFICATIONS

\* Measurements identified by an asterisk are taken in accordance with the new IHF A-202 amplifier measurement standard.

	Normal	Hi ( $\geq 8\Omega$ )
Speaker Impedance Switch Set:		
Power Amplifier Section		
* Continuous average power output at 8 ohms 20-20K Hz both Channels Driven	50 W	60 W
Rated distortion 20-20K Hz	<0.03%	<0.03%
* Clipping Headroom at 8 ohm	+0.5 dB	+0.5 dB
Clipping Power at 8 ohm	57 W	68 W
	80 W	-
	90 W	-
Dynamic Headroom at 8 ohm	+1.8 dB	+1.6 dB
Dynamic Power at 8 ohm	90 W	100 W
	150 W	-
	180 W	-

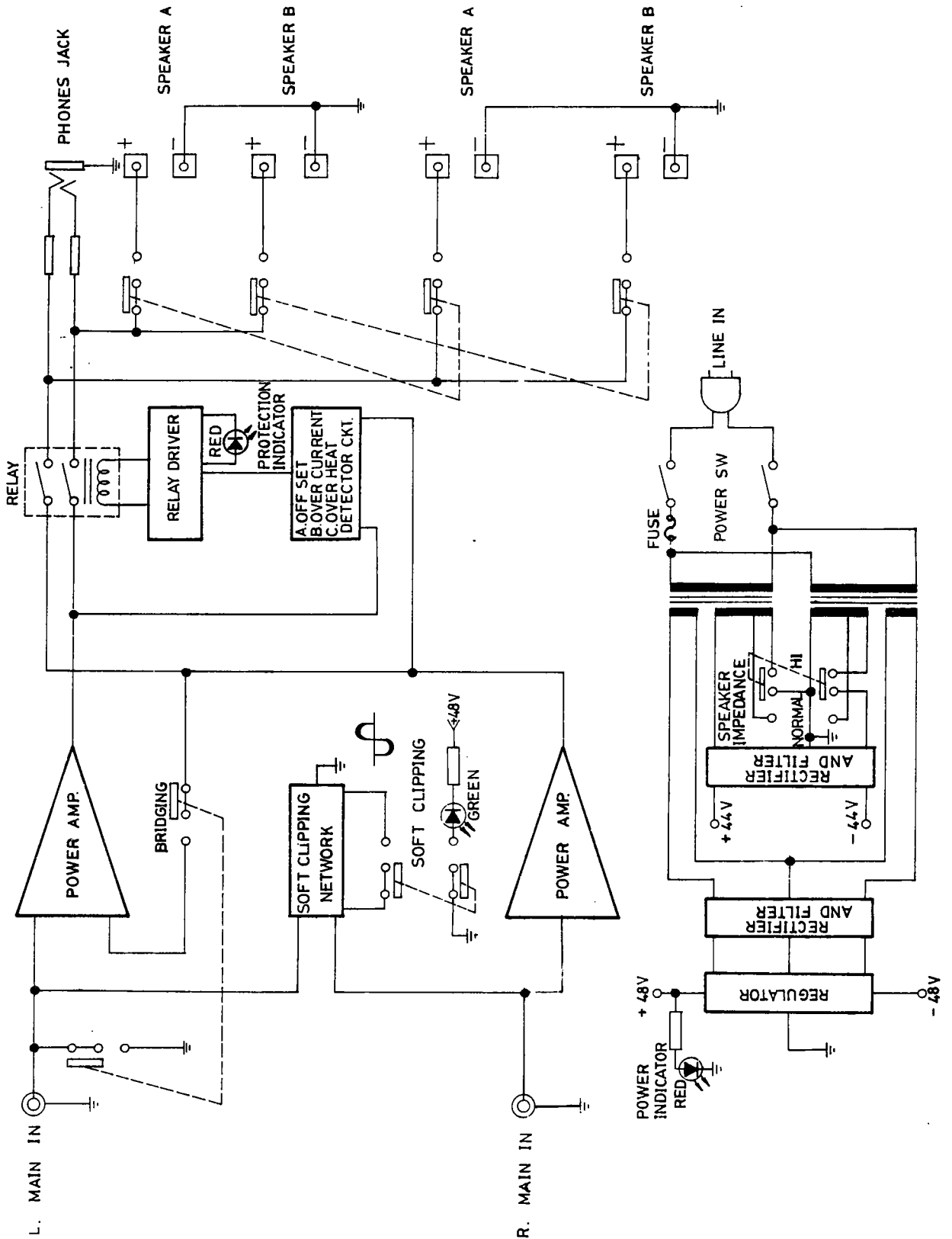
* Transient Overload Recovery Time	≤ 1 usec	
* Slew Factor	> 50	
Slew Rate	20 V/usec	
Damping factor at 50 Hz (Ref. 8 ohm)	> 100	
THD 20-20K Hz From 250 mW to 60 W	≤ 0.03%	
SMPTTE IMD (60K Hz + 7K Hz, 4:1)		
from 250 mW to 60 W	≤ 0.03%	
IHF IMD (19K Hz + 20K Hz) at 60 W	≤ 0.03%	
TIM (15K Hz Sine Wave +3.18K Hz Square Wave)		
at 60 W	≤ 0.03%	
Frequency Response, 20-20K Hz	+/-0.5 dB	
Frequency Response Range -3 dB	10-35K Hz	
<b>Preamplifier Section</b>		
	<u>MM</u>	<u>MC</u>
PHONO Input Resistance	47K ohm	47K ohm
PHONO Input Capacitance (Selectable)	100P/200P/320P	100P/200P/320P
Input Sensitivity (1K Hz) * For 1 Watt out	0.4 mV	0.035 mV
50 Watt out	2.5 mV	0.25 mV
Input Overload at 1K Hz	240 mV	24 mV
20 Hz	24 mV	2.4 mV
20K Hz	2.4 V	180 mV
THD (20-20K Hz) and IMD at +30 dB input level	< 0.015%	0.04%
RIAA Response Accuracy	+/-0.2 dB	+/-0.5 dB
Signal to Noise Ratio A-Weighted		
(a) with phono cartridge connected		
Ref 10 mV	> 82 dB	
*Ref 5 mV	> 76 dB	
*Ref 0.5 mV		68 dB
(b) with short-circuit input		
Ref 10 mV	> 90 dB	
Ref 0.5 mV		70 dB
<b>High Level Input</b>		
* Input Impedance Resistance/Capacitance	150K ohm/220pF	
Input sensitivity * for 1 watt out	20 mV	
for 50 watt out	145 mV	
Signal to Noise Ratio A-Weighted		
(a) with mute off Ref 1 watt out	> 80 dB	
Ref 50 watt out	> 95 dB	
(b) with mute on Ref 1 watt out	> 93 dB	
* Maximum Input Signal	15 V	
Frequency Response, 20-20K Hz	+/-0.5 dB	
<b>Controls</b>		
Bass Control, Range at 100K Hz	+/-8 dB	
Treble Control, Range at 10K Hz	+/-7 dB	
Infrasonic Filter Turn Over Frequency	20K Hz	
Slope (dB/Octave)	12	
Speaker Eq Turn Over Frequency	55	
Slope (dB/Octave)	12	
Mute	-20 dB	
<b>Physical Specifications</b>		
Dimensions WxHxD (inch)	16.5x3.8x12	
(cm)	42x9.6x310	
Net Weight	9.0Kg/19.8 Lbs	



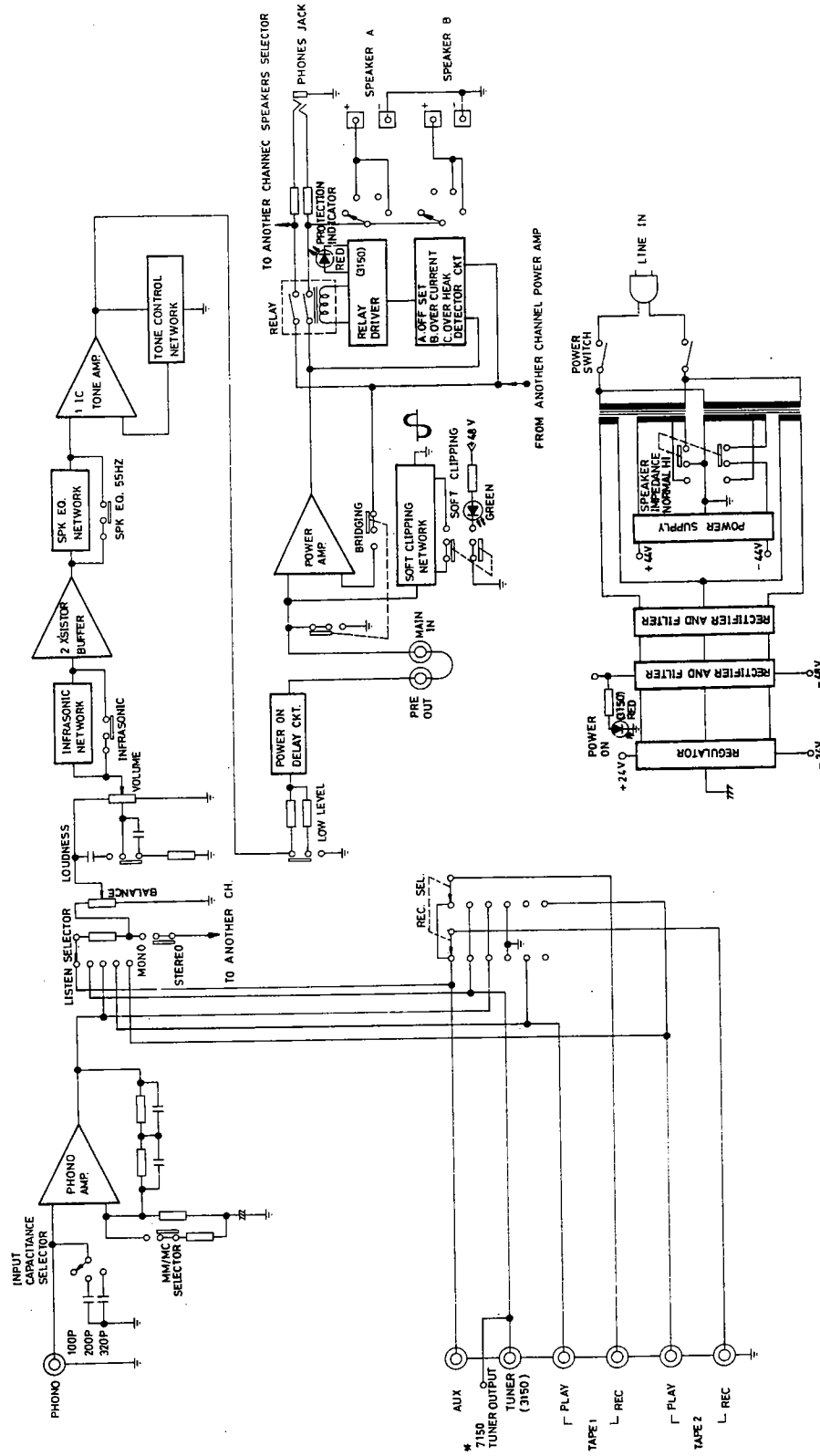
## 7150 TUNER /4150 SPECIFICATIONS

	Normal	Limited
FM Tuner Section		
Input Sensitivity IHF, 30 dB Quieting	1.4 uV	1.8 uV
IHF, 50 dB S/N Mono/Stereo	3.5 uV/30 uV	4.5 uV/40 uV
Signal to Noise Ratio (A Weighted, at 65 dBf)		
Mono/Stereo	83 dB/75 dB	78 dB/70 dB
Frequency Response, 30-15K Hz	+ -0.5 dB	+ -0.5 dB
De-emphasis Accuracy, 75 usec	+ -0.5 dB	+ -1 dB
Channel Separation 1K Hz	45 dB	40 dB
30-15K Hz	35 dB	30 dB
Selectivity, Alternate Channel (400K Hz)	70 dB	65 dB
Capture Ratio at 45 dBf and 65 dBf	1.0 dB	2.0 dB
AM Suppression at 45 dBf and 65 dBf	58 dB	53 dB
Image Rejection	100 dB	95 dB
IF Rejection	95 dB	90 dB
SCA Rejection	70 dB	65 dB
Pilot Signal Suppression	60 dB	55 dB
T.H.D. at 100% Modulation 1K Hz Mono/Stereo	0.08%/0.1%	0.15%/0.2%
100K Hz Mono/Stereo	0.10%/0.2%	0.2%/0.3%
6K Hz Mono/Stereo	0.10%/0.2%	0.2%/0.3%
T.H.D. Stereo 1K Hz 50%/150%	0.1%/0.2%	0.2%/0.3%
AM Tuner Section		
Usable Sensitivity	300 uV/m	450 uV/m
Selectivity	30 dB	25 dB
Image Rejection	50 dB	45 dB
IF Rejection	50 dB	45 dB

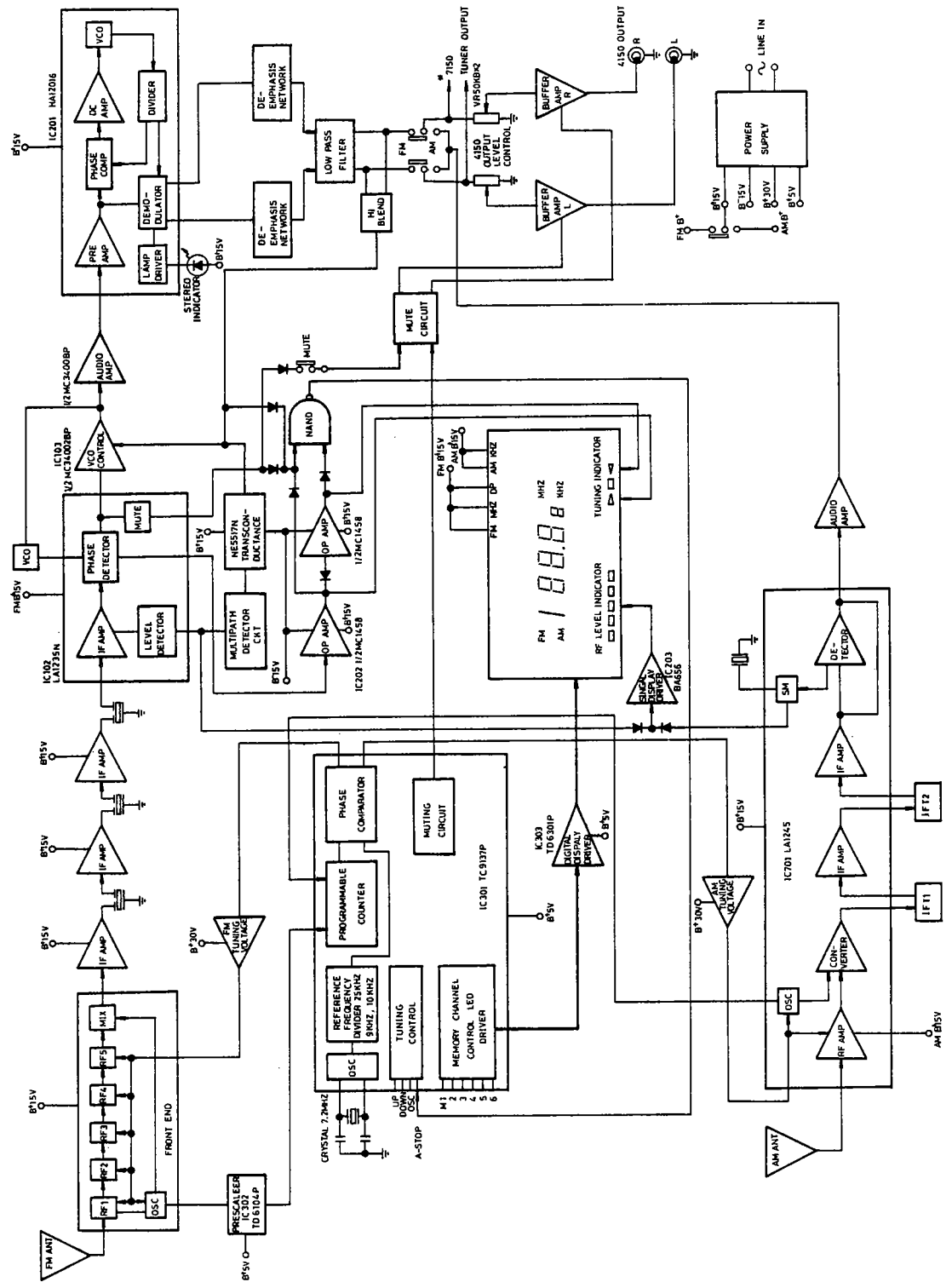
# 2150 BLOCK DIAGRAM



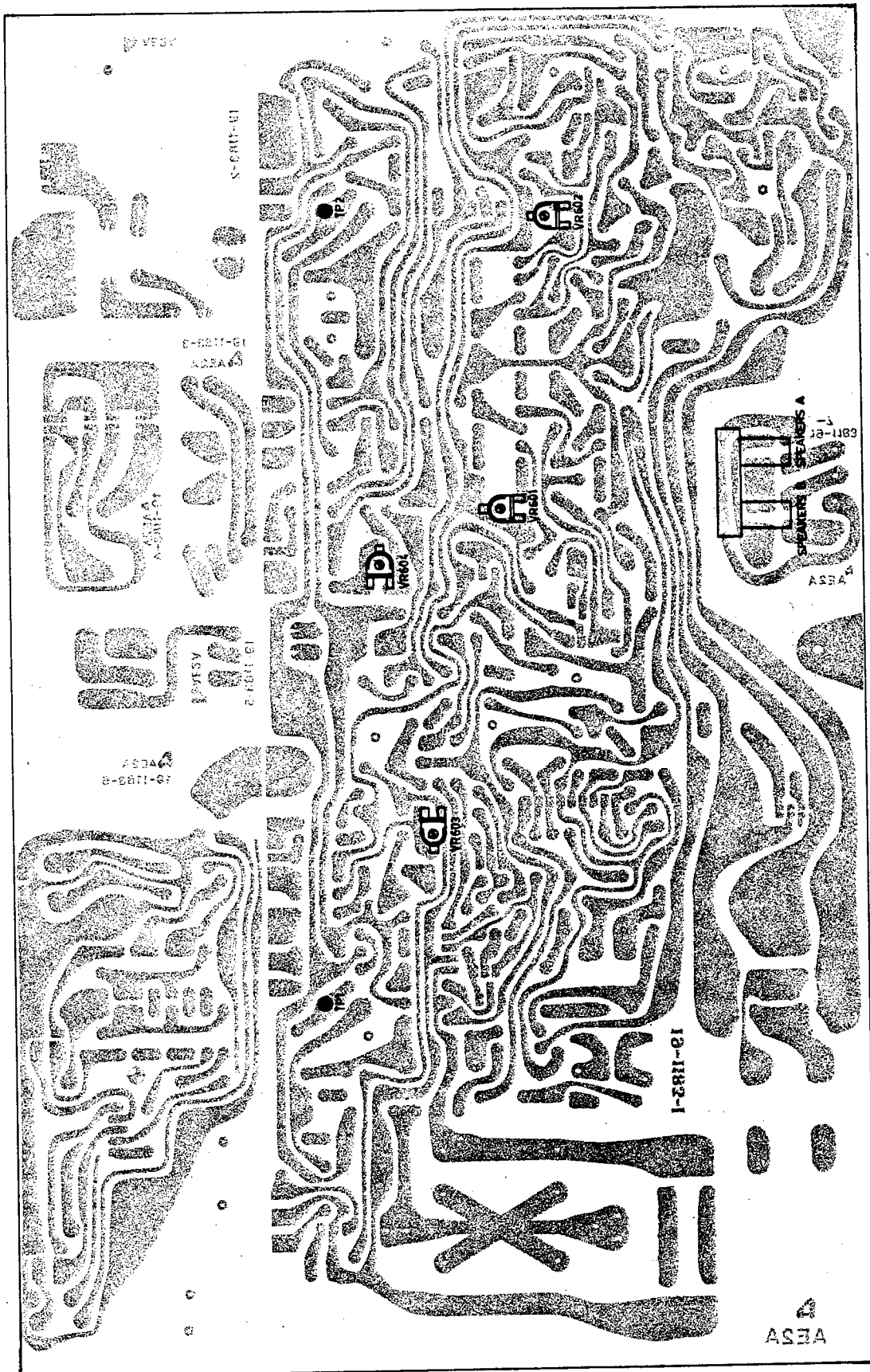
# 7150 AUDIO / 3150 BLOCK DIAGRAM



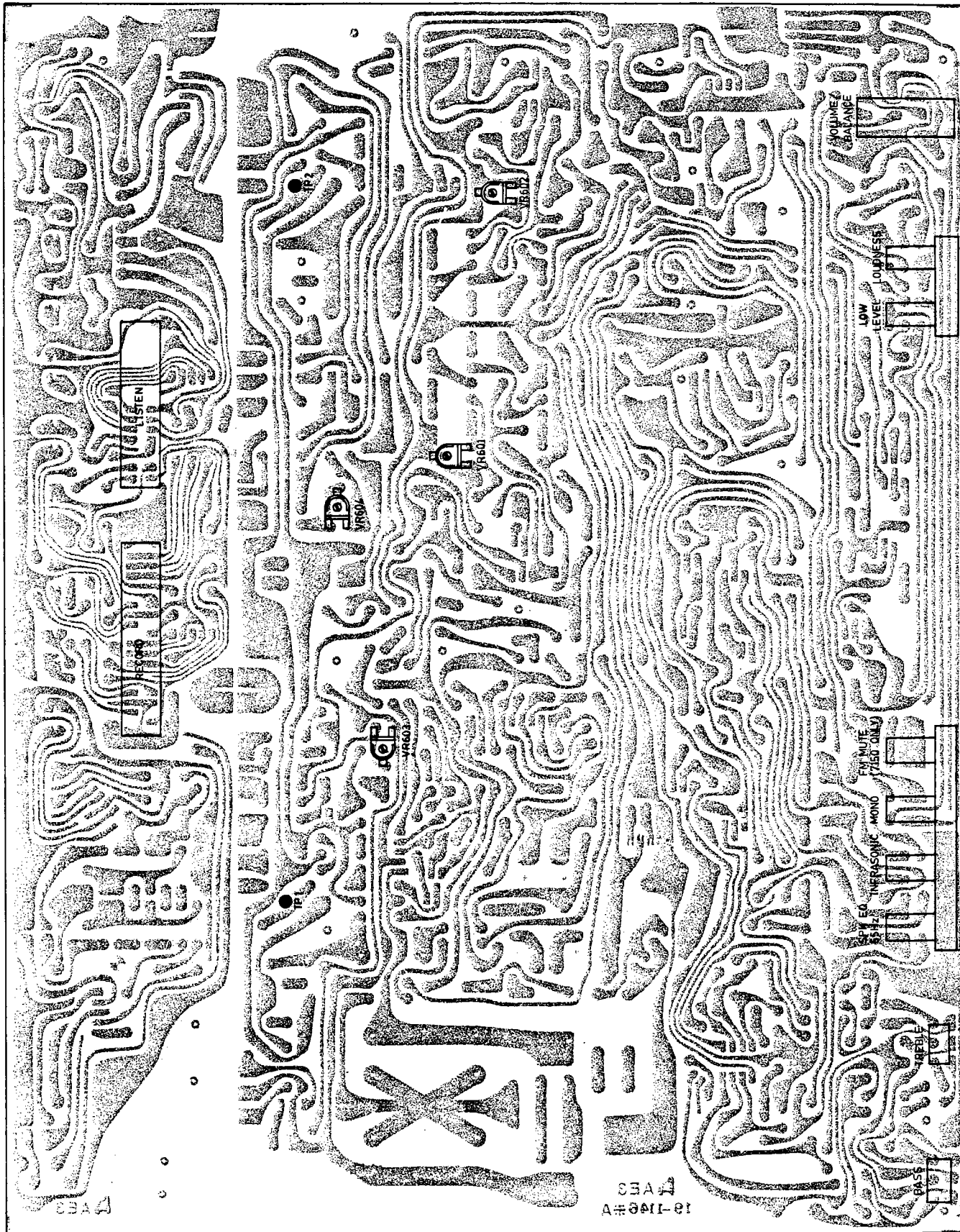
# 7150 TUNER/4150 BLOCK DIAGRAM



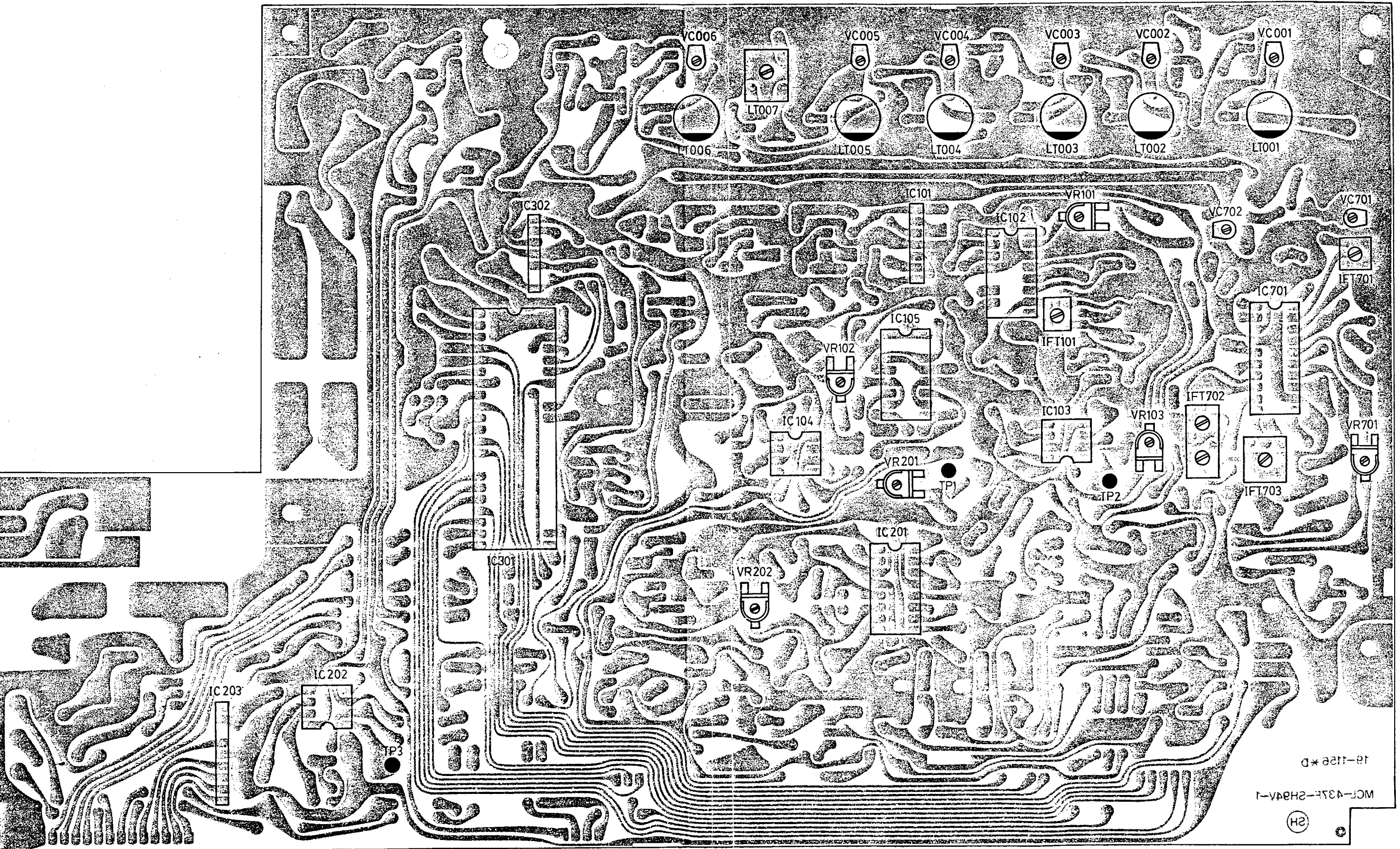
# 2150 ADJUSTMENT POINT



# 7150 AUDIO/3150 ADJUSTMENT POINT



# TUNER/4150 ALIGNMENT POINT



18-1128 \*D  
MCF-432E-284V-1

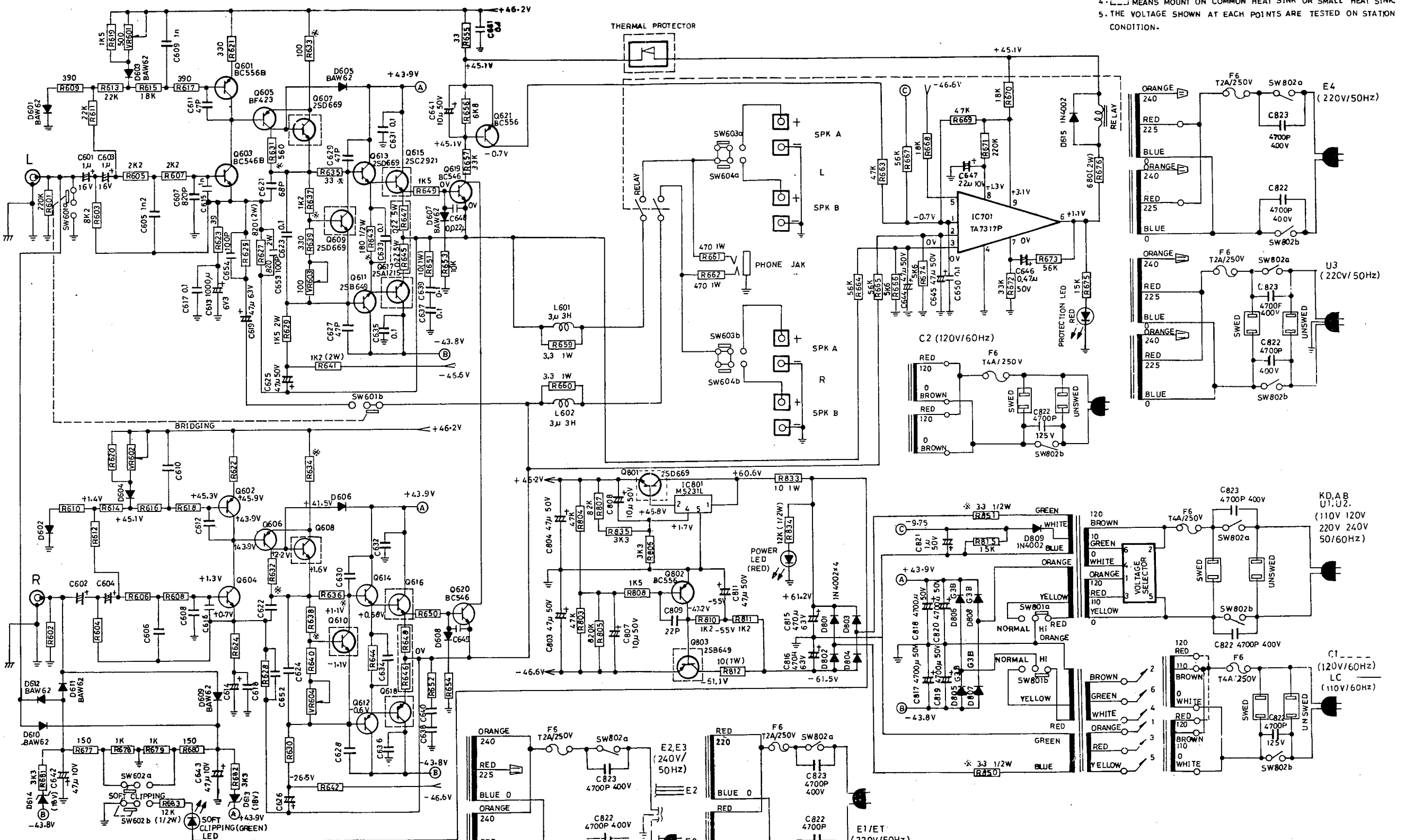
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# 2150 CIRCUIT DIAGRAM

- NOTES
1. ALL RESISTORS ARE 1/4W ±5% CARBON UNLESS OTHERWISE SPECIFIED.
  2. CAPACITANCE ARE IN µF UNLESS OTHERWISE SPECIFIED.
  3. \* MEANS RESISTOR STAND UP ON THE PCB.
  4. □ MEANS MOUNT ON COMMON HEAT SINK OR SMALL HEAT SINK.
  5. THE VOLTAGE SHOWN AT EACH POINTS ARE TESTED ON STATION CONDITION.



- 1 BC546 2 BF423 25B649  
 BC556 25B669  
 BC559  
 M5231L  
 25A1215  
 25C2921  
 TA7317P
- 1 CBE  
 2 ECB  
 ECB  
 5  
 B C E  
 1 9

# 0/3150/4150/7150 ALIGNMENT PROCEDURE

## ALIGNMENT

ALIGNMENT  
 he power for 5 minutes pre- heating.  
 ) channel alignment: Connect probe of DC millivolt-meter to L (R) channel speaker  
 s, then adjust VR-601 (VR-602) till the reading are closed to 0mV.

T ALIGNMENT  
 603 to fully clockwise position and VR-604 to fully counter-clockwise position.  
 he power for 5 minutes pre-heating.  
 he load in speaker terminals.  
 one probe of DC millivolt-meter to L (R) channel speaker terminal "+", the other to  
 TP2) on main PCB foiling side, adjust VR-603 (VR-604) till the reading is between  
 1 (TP2) on main PCB foiling side, adjust VR-603 (VR-604) till the reading is  
 4.4mv and 11mv.

## AUDIO) ALIGNMENT

ALIGNMENT  
 he power for 5 minutes pre-heating.  
 me control to mininum position and speaker selector switch to "A+B" position.  
 ) channel alignment: Connect probe of DC millivolt-meter to L (R) channel speaker  
 s, then adjust VR-601(VR-602)till the reading are coised to 0mV.

T ALIGNMENT  
 603 to fully colckwise position and VR-604 to fully counter-clockwise position.  
 he power for 5 minutes pre-heating.  
 me control to minimum position and speaker selector switch to "A+B" position..  
 he load on speaker terminals.  
 one probe of DC millivolt-meter to L (R) channel speaker terminal "+", the other  
 t TP1 (TP2) on main PCB. Foiling side, adjust VR-603 (VR-604) till the reading is  
 4.4mV and 11mV.

## (TUNER) ALIGNMENT

ALIGNMENT a. Selector Switch in FM position  
 b. AC Line Voltage at Rated Voltage  
 c. Monitor OUTPUT at record OUTPUT  
 d. FM SG is external modulated by stereo SG and connected to FM 300 OHM  
 antenna terminal on the rear panel through FM dummy antenna.

Step	FM SG	Stereo Sg	Dial Setting	Indicator	Adjustment	Adjust For
1	98 MHz 0% Modulation	—	98 MHz	Connect frequ- eny Counter To Pin TP1	VR201	76 kHz±50 Hz
2	98 MHz	10% 19 kHz 90% L+R	98 MHz	—	VR201	Stereo LED Light
3	98 MHz	10% 19 kHz pilot L only	98 MHz	Connect V.T.V.M or Oscilloscope to R REC out	VR202	Minimum OUTPUT
		10% 19 kHz pilot R only	98 MHz	Connect V.T.V.M or Oscilloscope to L REC out	VR202	
Repeat Step 1 and Step 2						
IF there is an excessive difference between leak-free effect of both channels, slightly adjust VR202 So that the levels of signal leakage of both channels are equal.						
4	98 MHz SG OUTPUT Level 30uV	10% 19 kHz pilot.0% L+R, L-R.	98 MHz	V.T.V.M or Oscilloscope	VR102	Just minimum OUTPUT

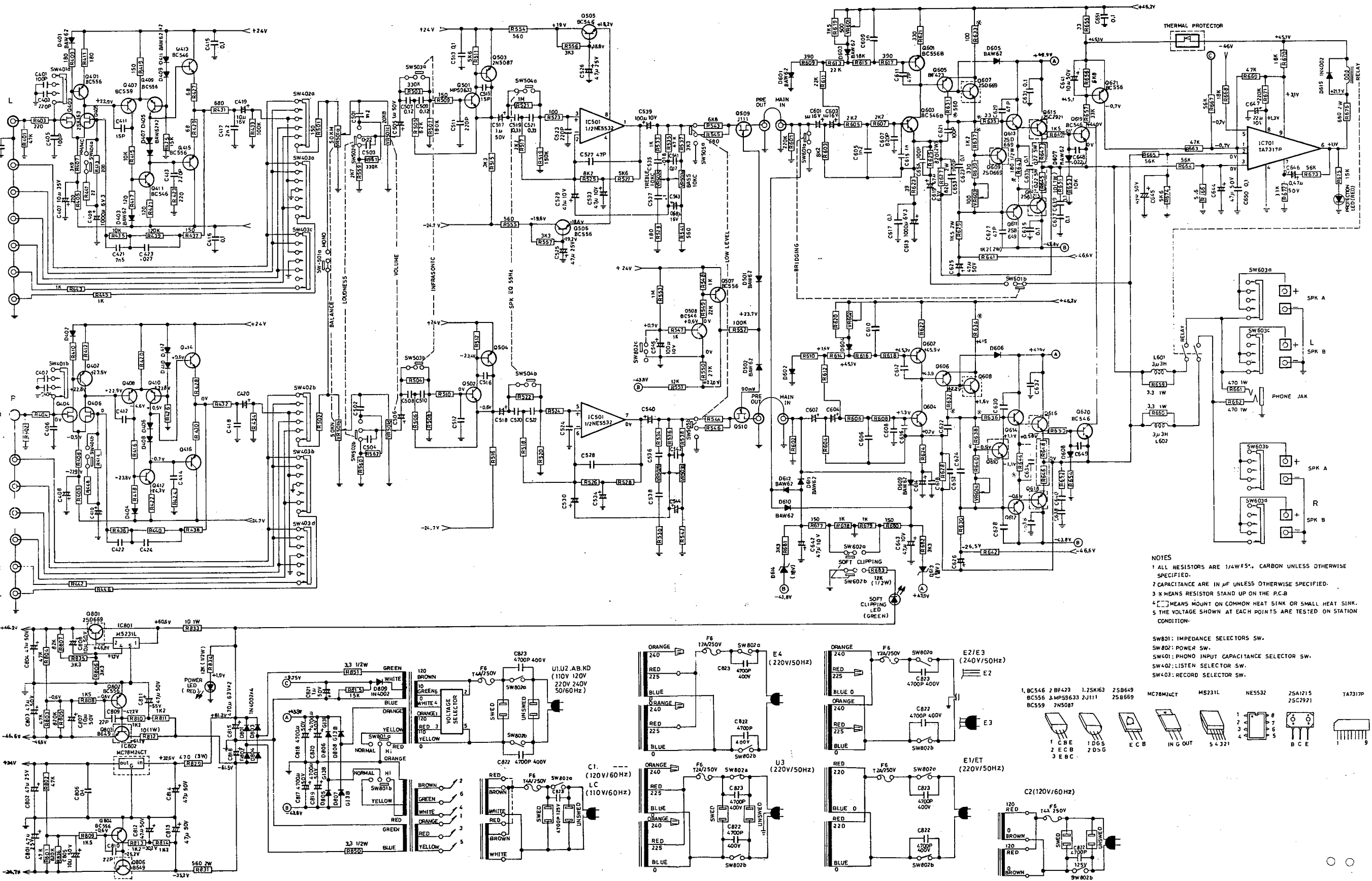
2. FM ALIGNMENT a. Selector Switch in FM position  
 b. AC Line Voltage at Rated Voltage  
 c. Monitor OUTPUT at record OUTPUT

SECTION	FM SG			Dial Setting	Indicator	Adjustment	Adjust for				
	Connection		Carrier					Mod.			
FM IF	—			point of non-interference	Digital Voltage Meter	IFT 101	to pin TP3 Voltage 0V				
FM RF	Connect to FM 300 OHM antenna on the rear panel through FM Dummy Antenna.	90 MHz	100% Mod 400 Hz	90 MHz	Digital Voltage Meter	LT 606	Tuning Voltage 4.3v ±0.1v				
				106MHz				106MHz			
				Repeat Step 1 and Step 2							
FM Sens				90 MHz	V.T.V.M Oscilloscope	LT001 to LT005 VC001 to VT005 LT007	Maximum OUTPUT				
				106MHz				106 MHz			
				98 MHz				98 MHz			
				Repeat Step 1.2 and Step 3							
FM Mute				Muting Push Switch "ON" Adjust attenuator of FM SG for Antenna Input 14dB							
				98 MHz	100%Mod 400 Hz	98 MHz	V.T.V.M Oscilloscope	VR 101	OUTPUT just disappear		
				Increase FM SG OUTPUT 4dB more to get fully audio OUTPUT IF fully audio OUTPUT cannot get, repeat Step 1.2.3							
				Repeat Step 1.2 and Step 3							

## 3. AM ALIGNMENT

SECTION	AM SG			Dial Setting	Indicator	Adjustment	Adjust for		
	Connection		Carrier					Mod.	
AM IF	Hot side of SG OUTPUT through 200pF to AM ANT. trimmer			450kHz	30% Mod	point of non-interference	V.T.V.M. or Oscilloscope	IFT 703 IFT 702	Maximun OUTPUT
AM Range	Hot side of SG OUTPUT through a loop ANT radiate to AM ANT BAR vertically, and keep 60cm distance.	600kHz	30% Mod 400Hz	600kHz	Digital Voltage Meter	IFT 701	Tuning Voltage 4.5V±0.1		
				1400kHz				1400kHz	
				Repeat Step 1 and Step 2					
AM Sens	Hot side of SG OUTPUT through a loop ANT radiate to AM ANT BAR vertically and keep 60cm distance.	600kHz	30% Mod 400Hz	600kHz	V.T.V.M or Oscilloscope	ANT BAR	Maximum OUTPUT		
				1400kHz				1400kHz	
				Repeat Step 1 and Step 2					

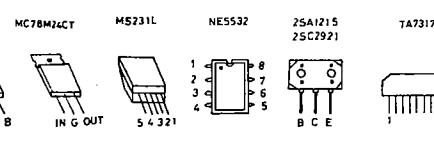
# CIRCUIT DIAGRAM



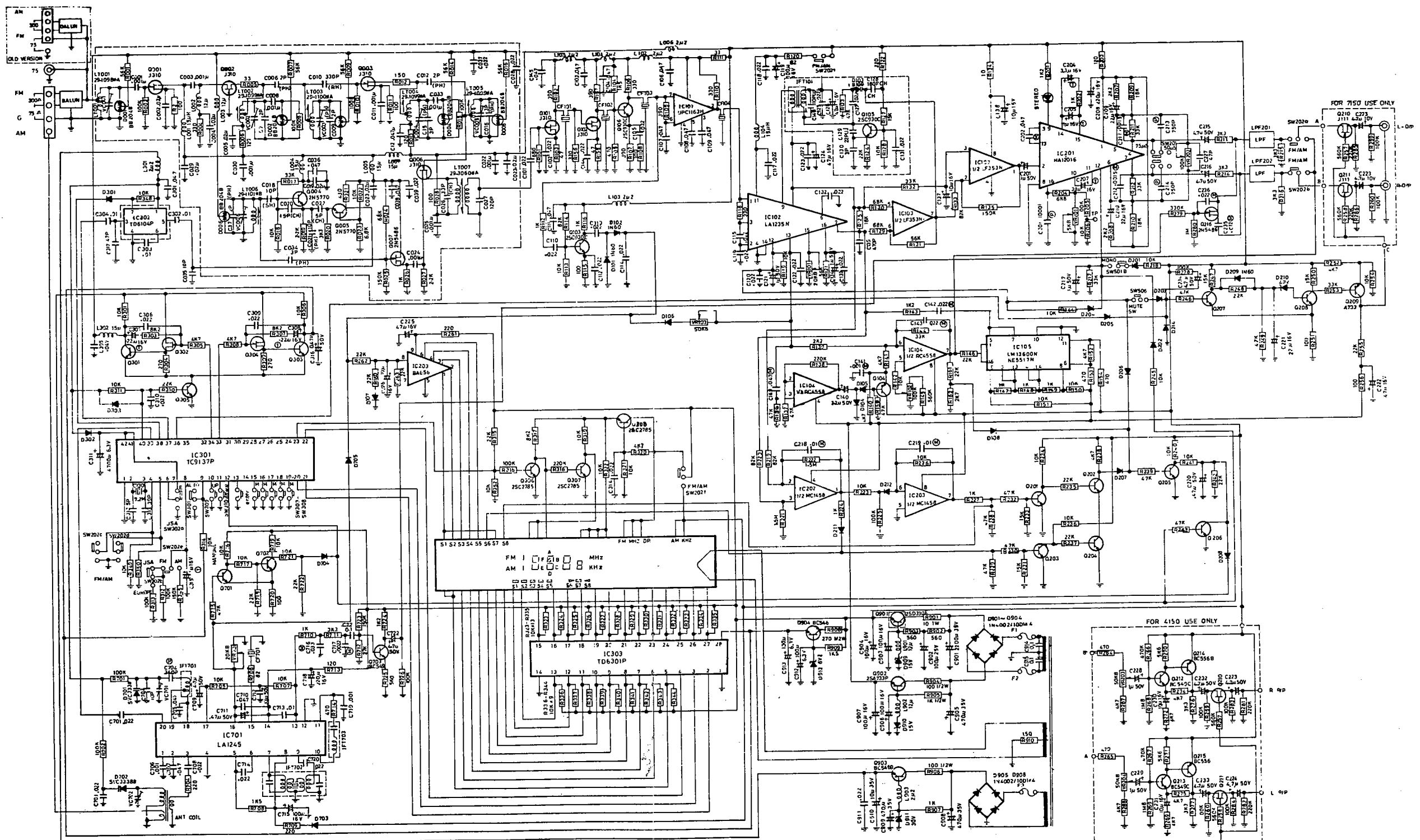
**NOTES**

- 1 ALL RESISTORS ARE 1/4W±5% CARBON UNLESS OTHERWISE SPECIFIED.
- 2 CAPACITANCE ARE IN µF UNLESS OTHERWISE SPECIFIED.
- 3 X MEANS RESISTOR STAND UP ON THE P.C.B
- 4 [ ] MEANS MOUNT ON COMMON HEAT SINK OR SMALL HEAT SINK.
- 5 THE VOLTAGE SHOWN AT EACH POINTS ARE TESTED ON STATION CONDITION.

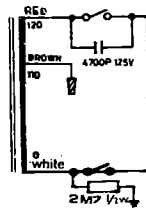
SW801: IMPEDANCE SELECTORS SW.  
 SW802: POWER SW.  
 SW401: PHONO INPUT CAPACITANCE SELECTOR SW.  
 SW402: LISTEN SELECTOR SW.  
 SW403: RECORD SELECTOR SW.



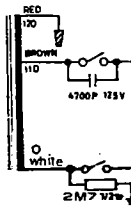
# 7150 TUNER / 4150 CIRCUIT DIAGRAM



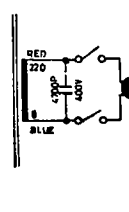
FOR: C1 (120V/60Hz)



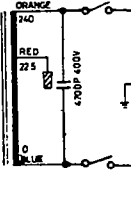
FOR: L C (110V/60Hz)



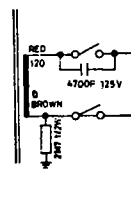
FOR: E1, E2 (220V/50Hz)



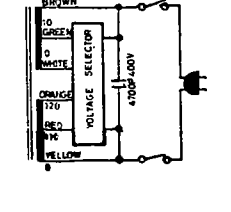
FOR: E2, E3 (240V/50Hz)



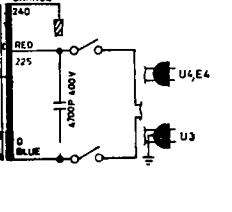
FOR: C2 (120V/60Hz)



FOR: U1, U2, AB, KD, (110, 120, 220 240V / 50, 60Hz)

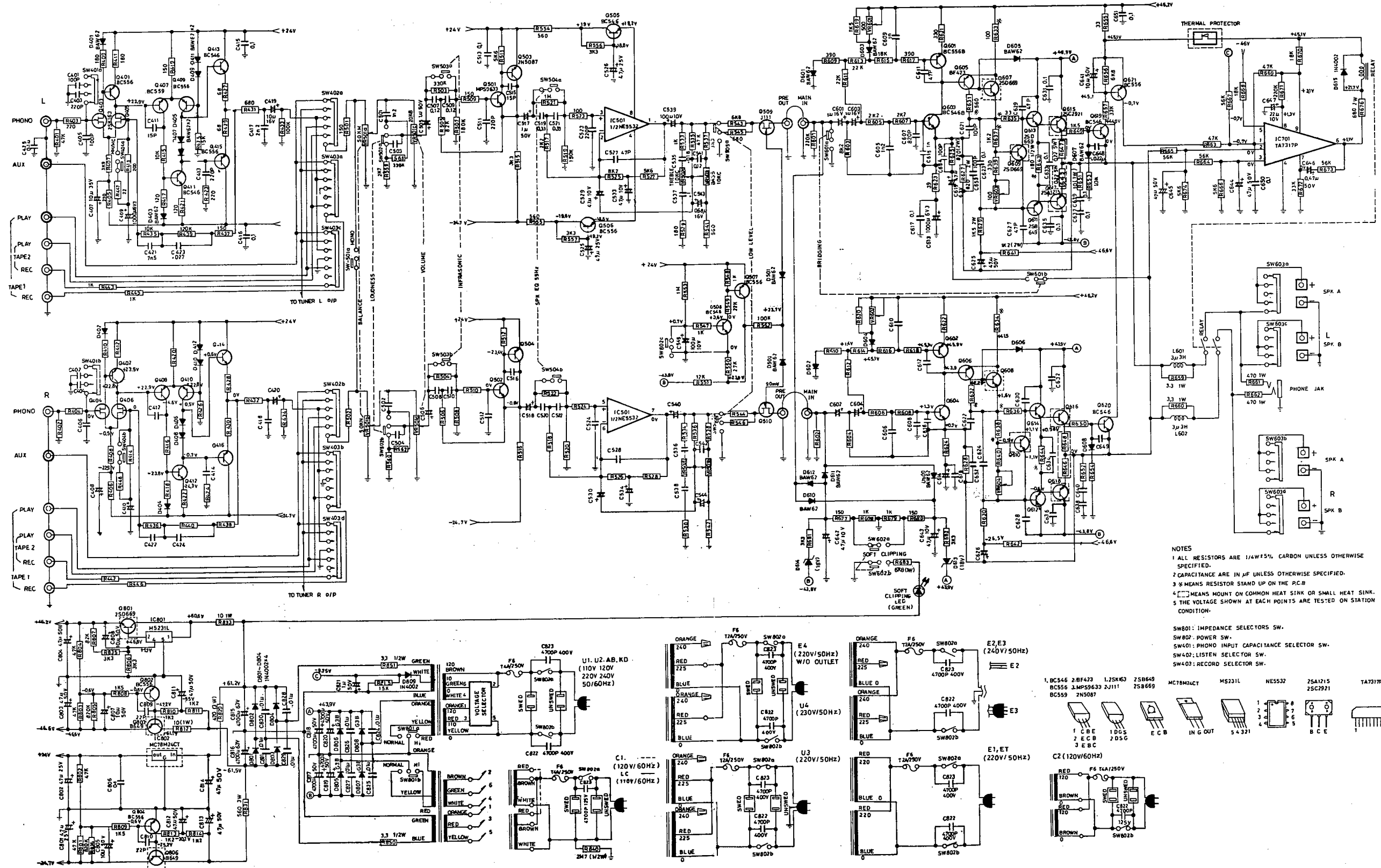


FOR: U4 (230V/50Hz) E4, U3 (220V/50Hz)



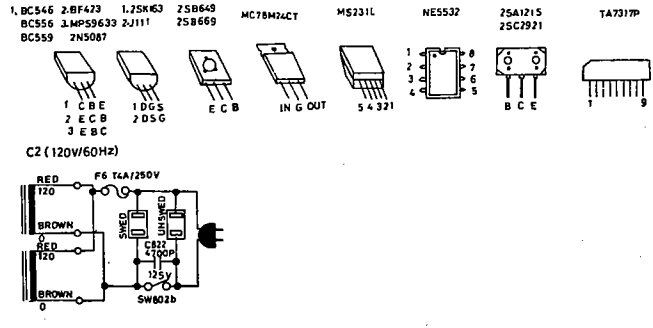
NOTE: ALL THE RESISTORS ARE 1/4 W CARBON FILM RESISTOR UNLESS OTHERWISE SPECIFIED.  
 2 ALL THE NPN TRANSISTORS ARE 2SC1815GR UNLESS OTHERWISE SPECIFIED  
 3 ALL THE DIODES ARE 1N4148 UNLESS OTHERWISE SPECIFIED  
 P1/P2/P3 RATING:  
 1 1500MA 250V FOR E1, E2, E3, E4, U2, KD  
 2 500MA 250V FOR C1, C2, L C, AB, U1

# 7150 AUDIO CIRCUIT DIAGRAM



NOTES  
 1 ALL RESISTORS ARE 1/4W±5% CARBON UNLESS OTHERWISE SPECIFIED.  
 2 CAPACITANCE ARE IN μF UNLESS OTHERWISE SPECIFIED.  
 3 \* MEANS RESISTOR STAND UP ON THE P.C.B  
 4 [ ] MEANS MOUNT ON COMMON HEAT SINK OR SMALL HEAT SINK.  
 5 THE VOLTAGE SHOWN AT EACH POINTS ARE TESTED ON STATION CONDITION.

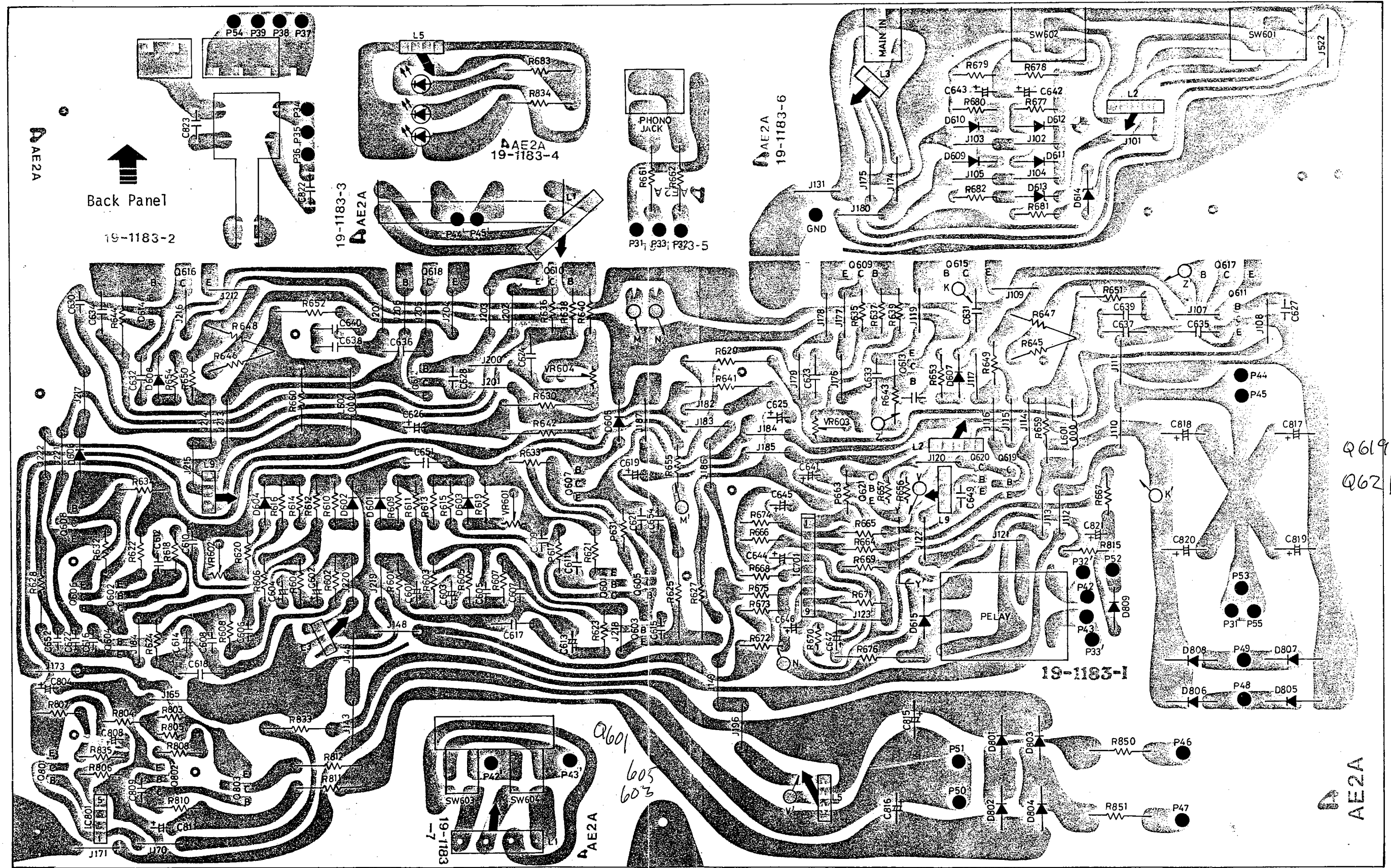
SW801: IMPEDANCE SELECTORS SW.  
 SW802: POWER SW.  
 SW601: PHONO INPUT CAPACITANCE SELECTOR SW.  
 SW402: LISTEN SELECTOR SW.  
 SW403: RECORD SELECTOR SW.



2150 PCB PARTS LOCATION (BOTTOM VIEW)

813

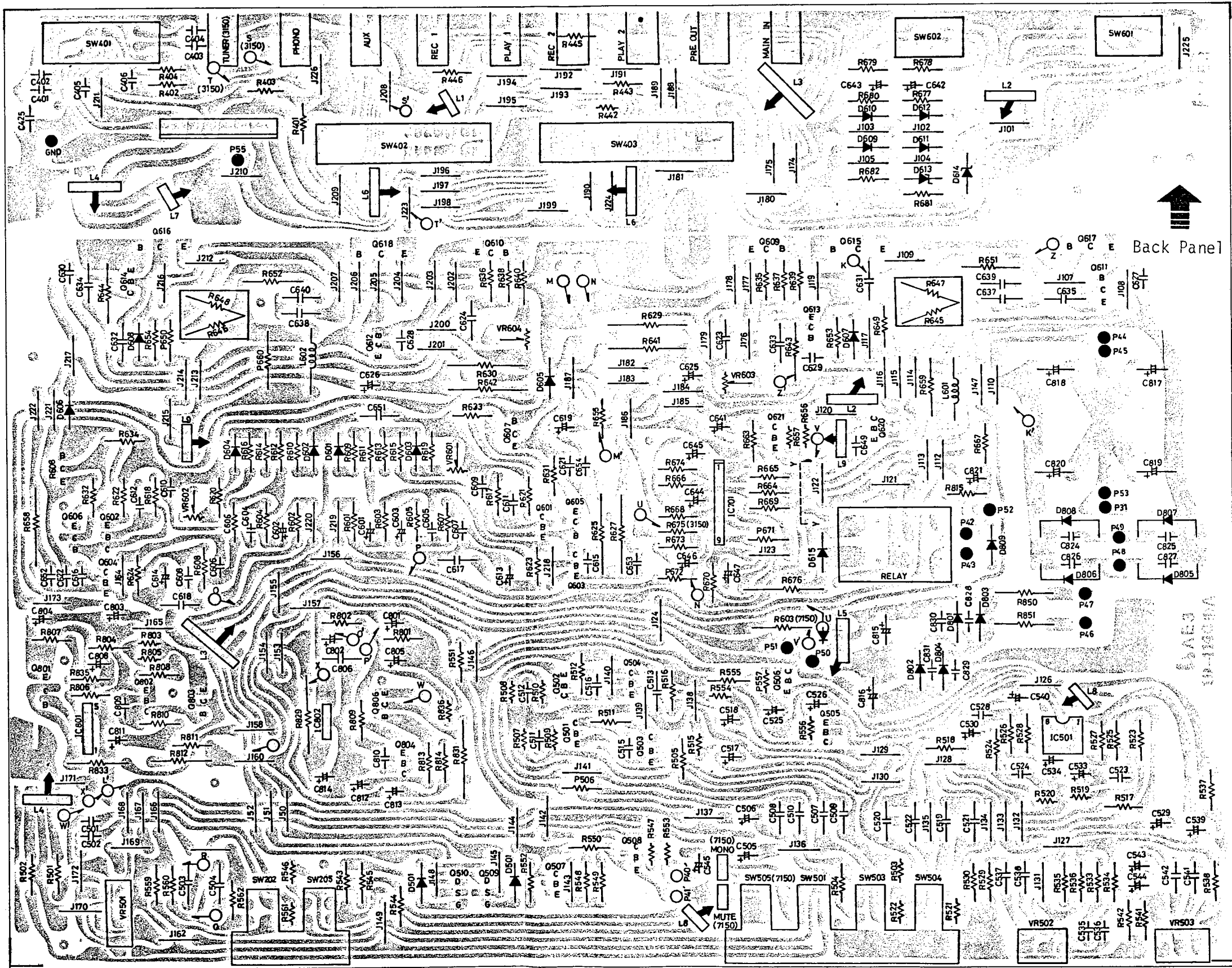
817  
811



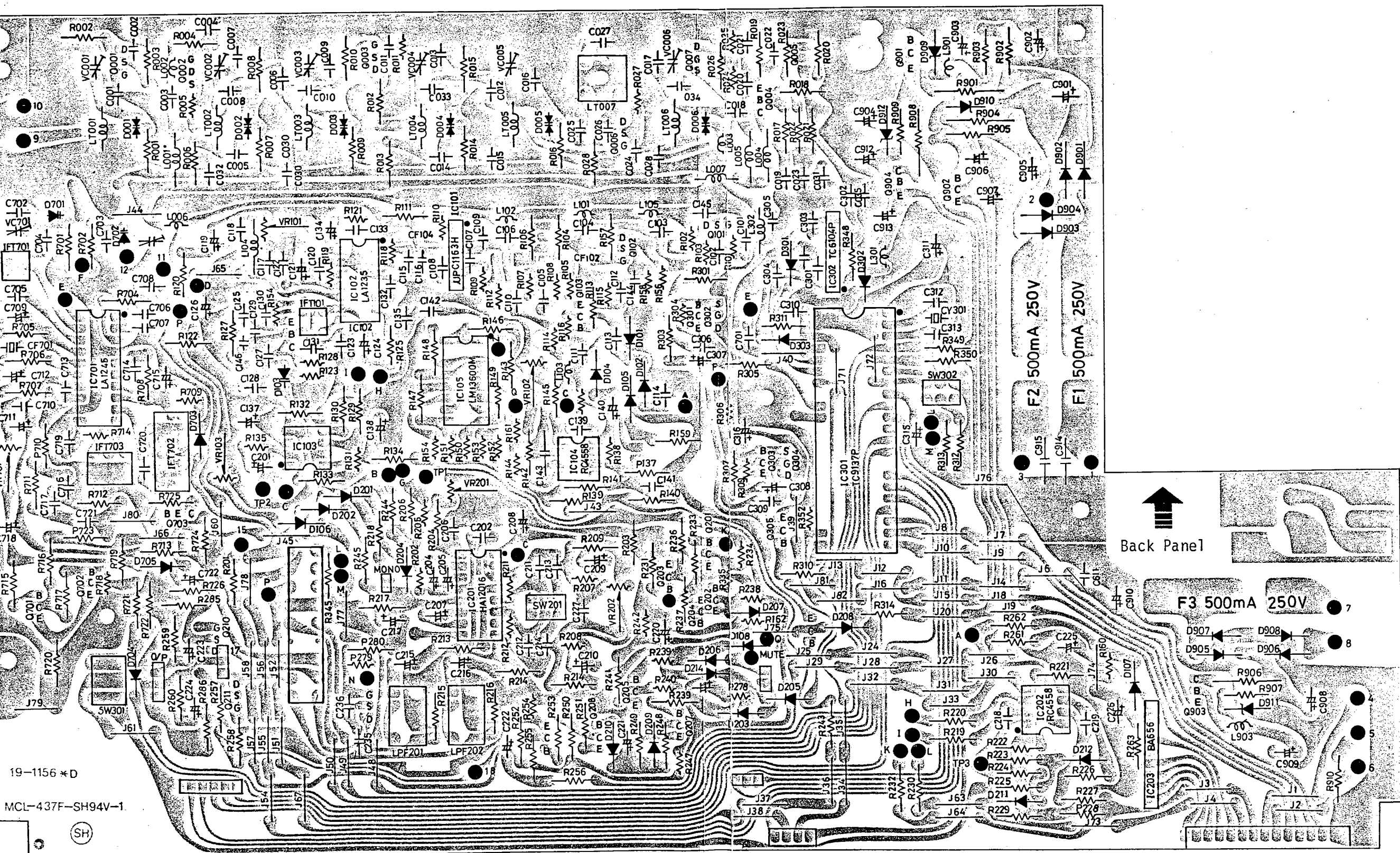
Q619+620  
Q621

Q601  
605  
603

# 7150 AUDIO/3150 PCB PARTS LOCATION (BOTTOM VIEW)



# TUNER/4150 PCB PARTS LOCATION (BOTTOM VIEW)



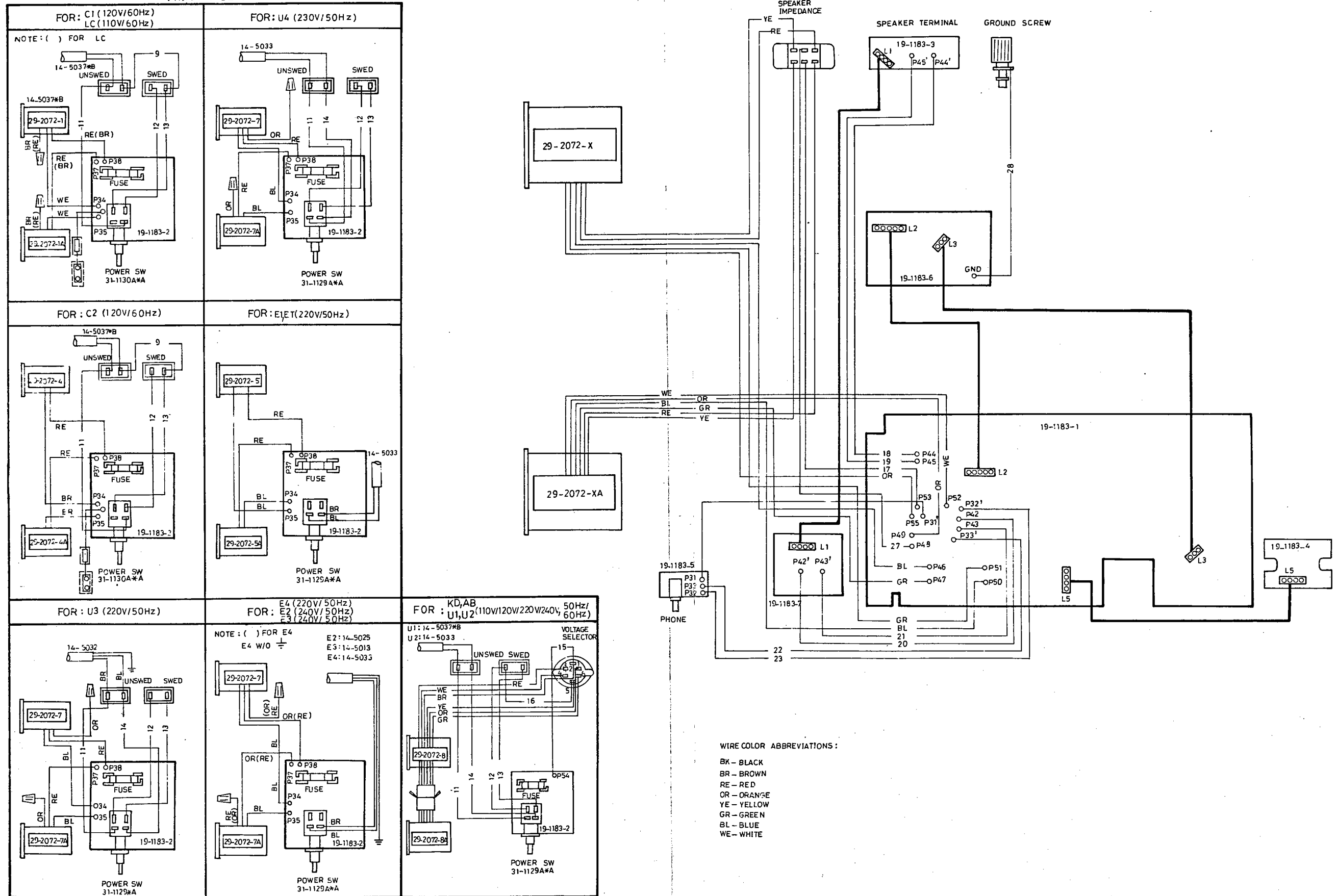
19-1156 \*D  
MCL-437F-SH94V-1





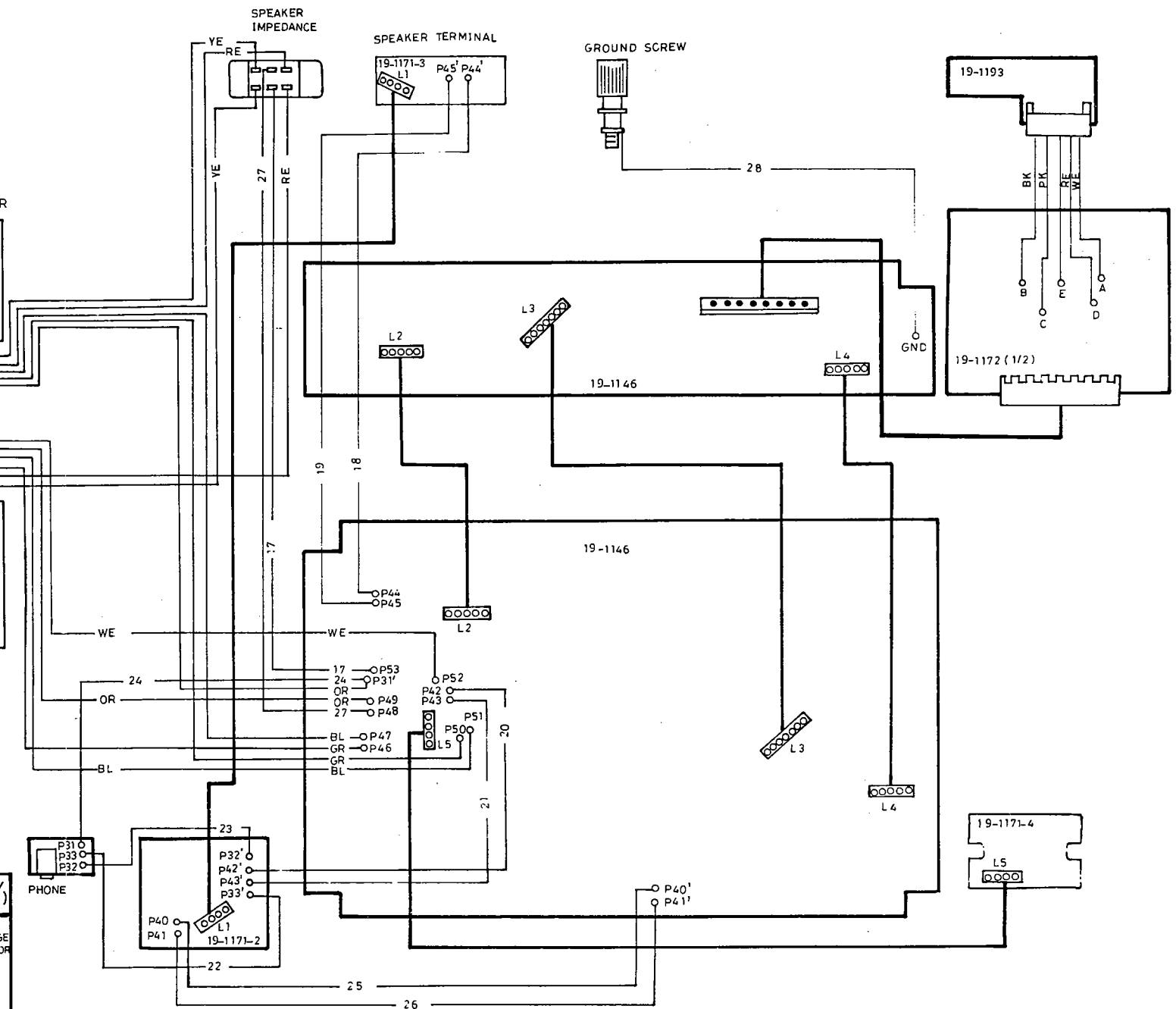
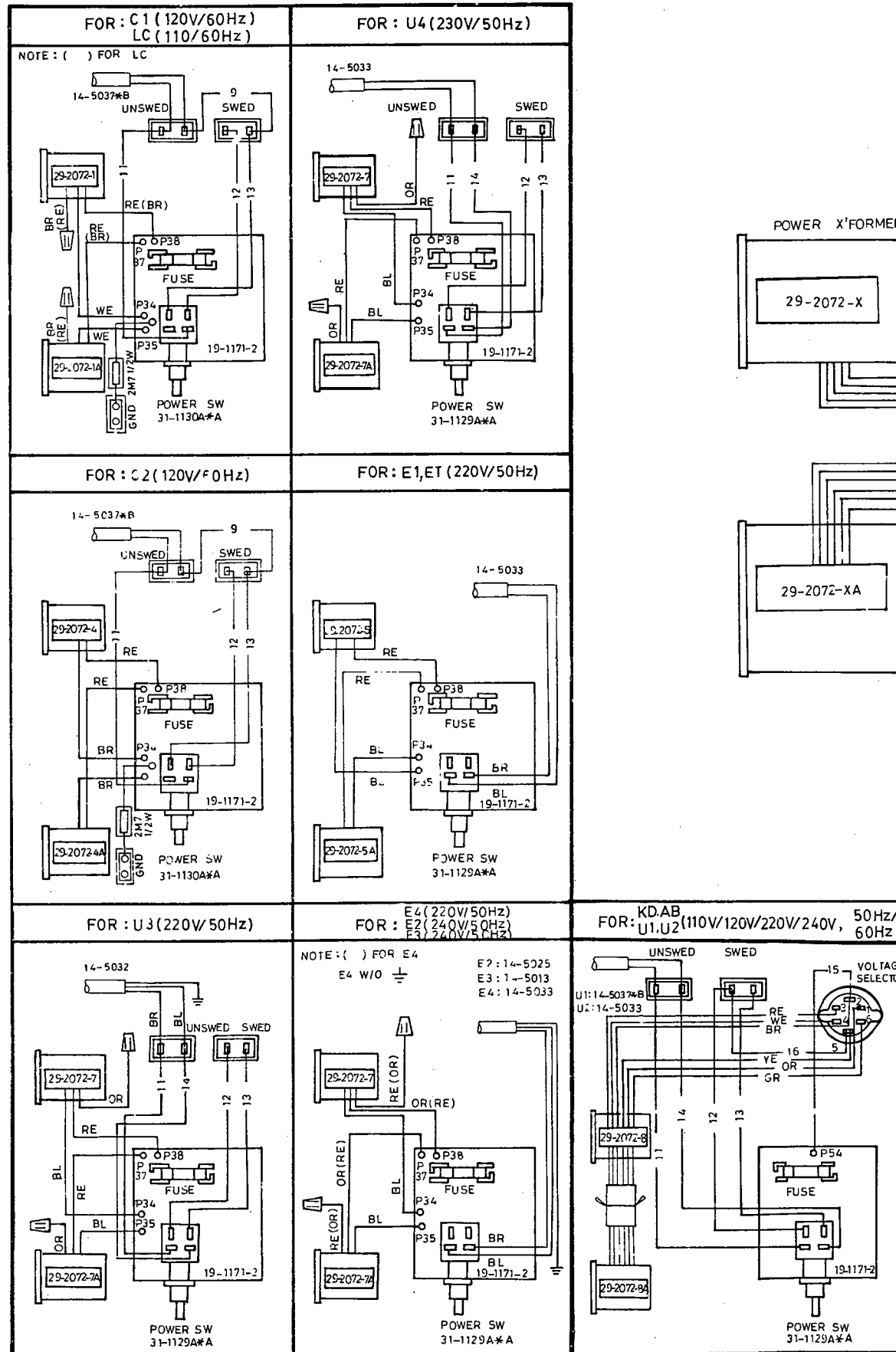
# 2150 WIRING DIAGRAM

## PRIMARY SECTION



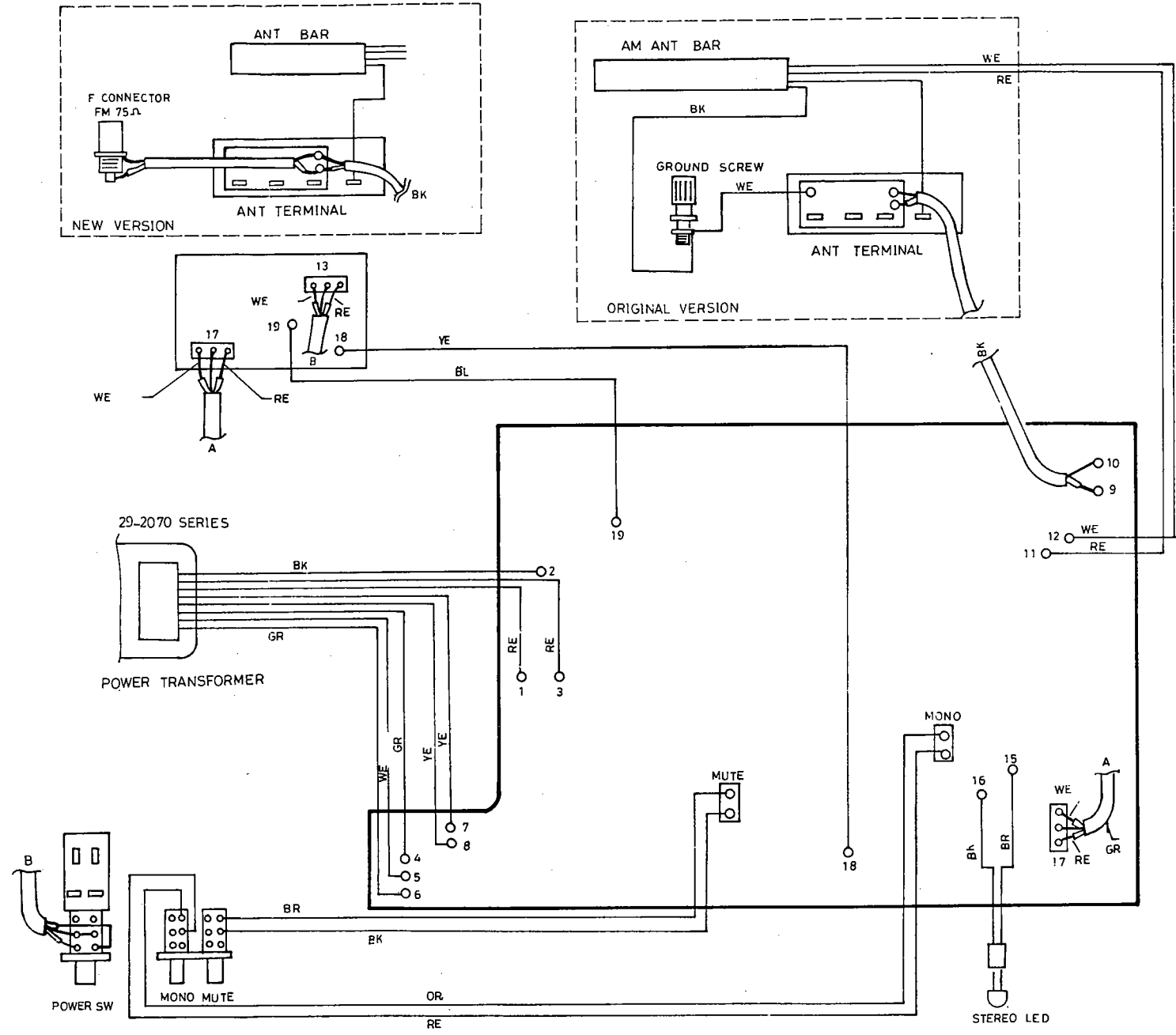
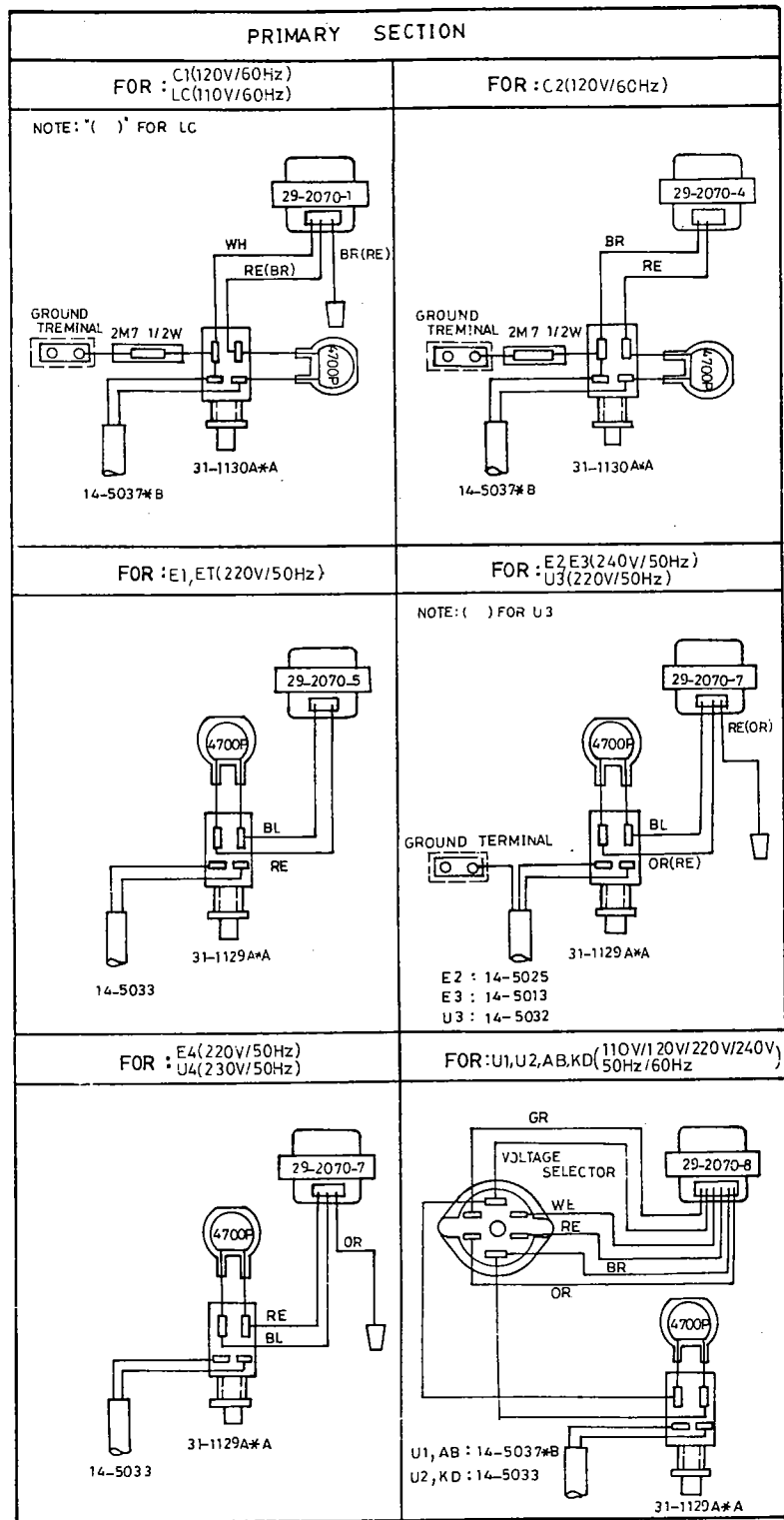
# 3150 WIRING DIAGRAM

## PRIMARY SECTION



- WIRE COLOR ABBREVIATIONS:
- BK - BLACK
  - BR - BROWN
  - RE - RED
  - OR - ORANGE
  - YE - YELLOW
  - GR - GREEN
  - BL - BLUE
  - WE - WHITE
  - PK - PINK

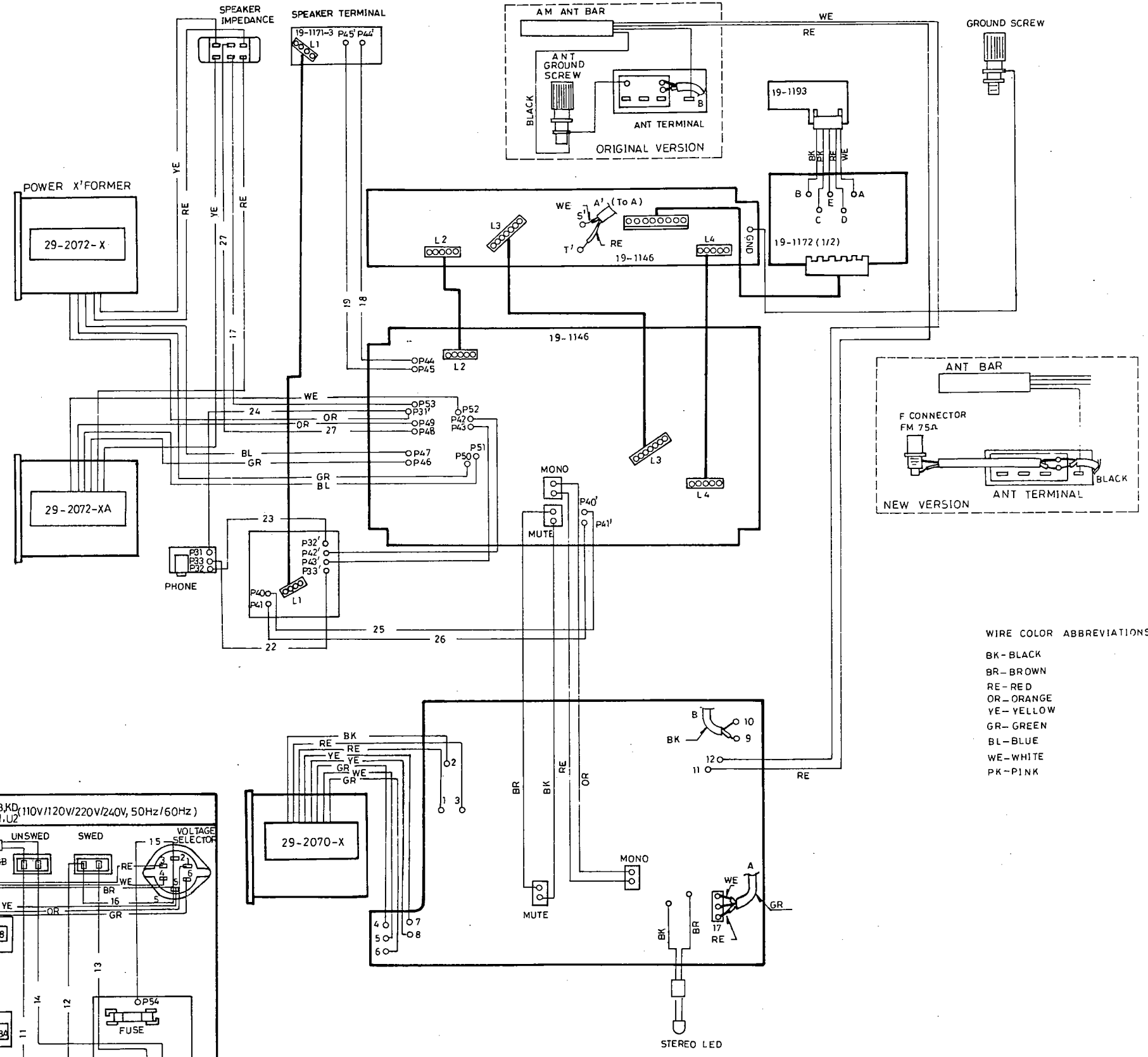
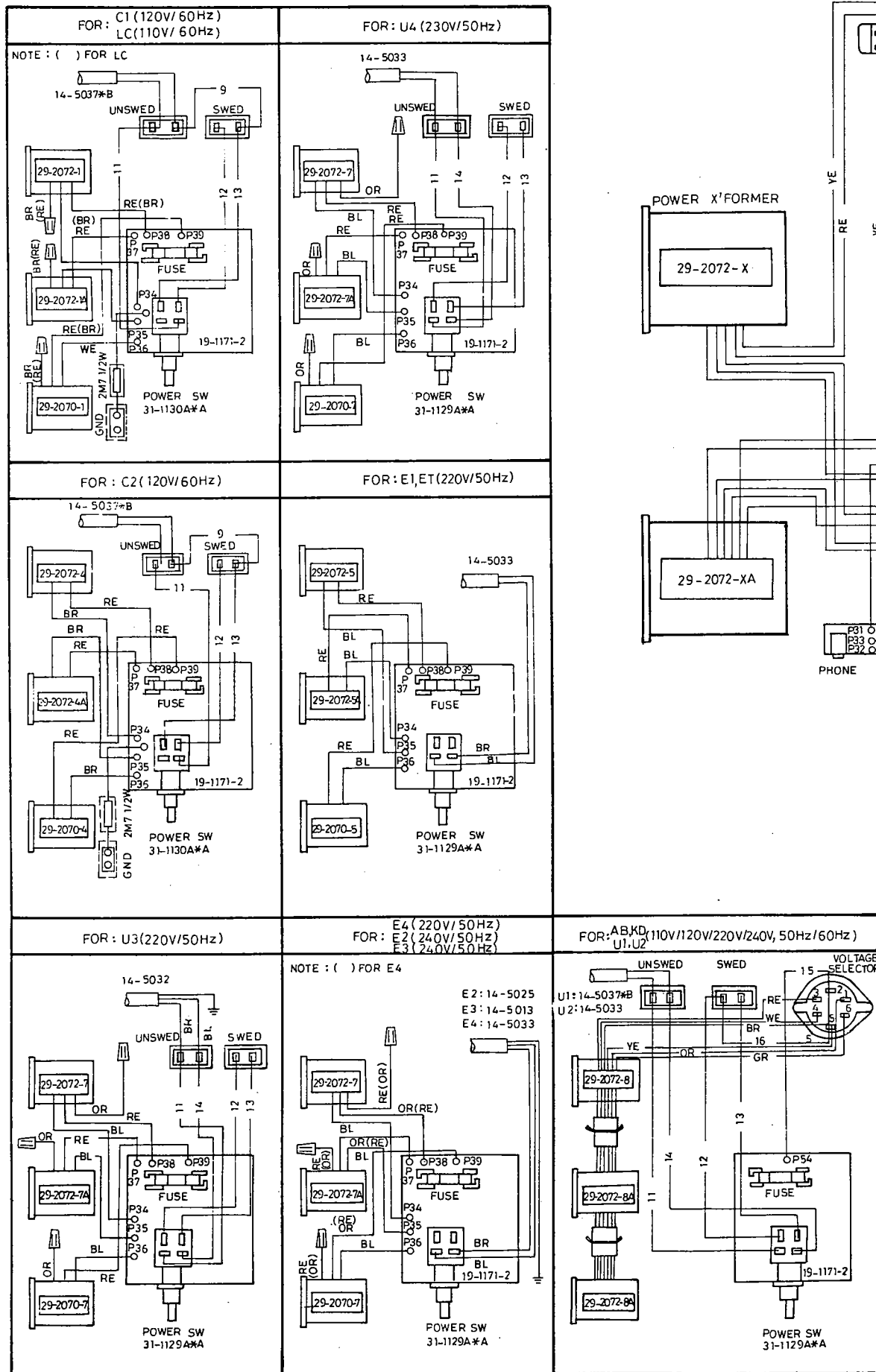
# 4150 WIRING DIAGRAM



- WIRE COLOR ABBREVIATIONS:
- BK-BLACK
  - BR-BROWN
  - RE-RED
  - OR-ORANGE
  - YE-YELLOW
  - GR-GREEN
  - BL-BLUE
  - WE-WHITE
  - PK-PINK

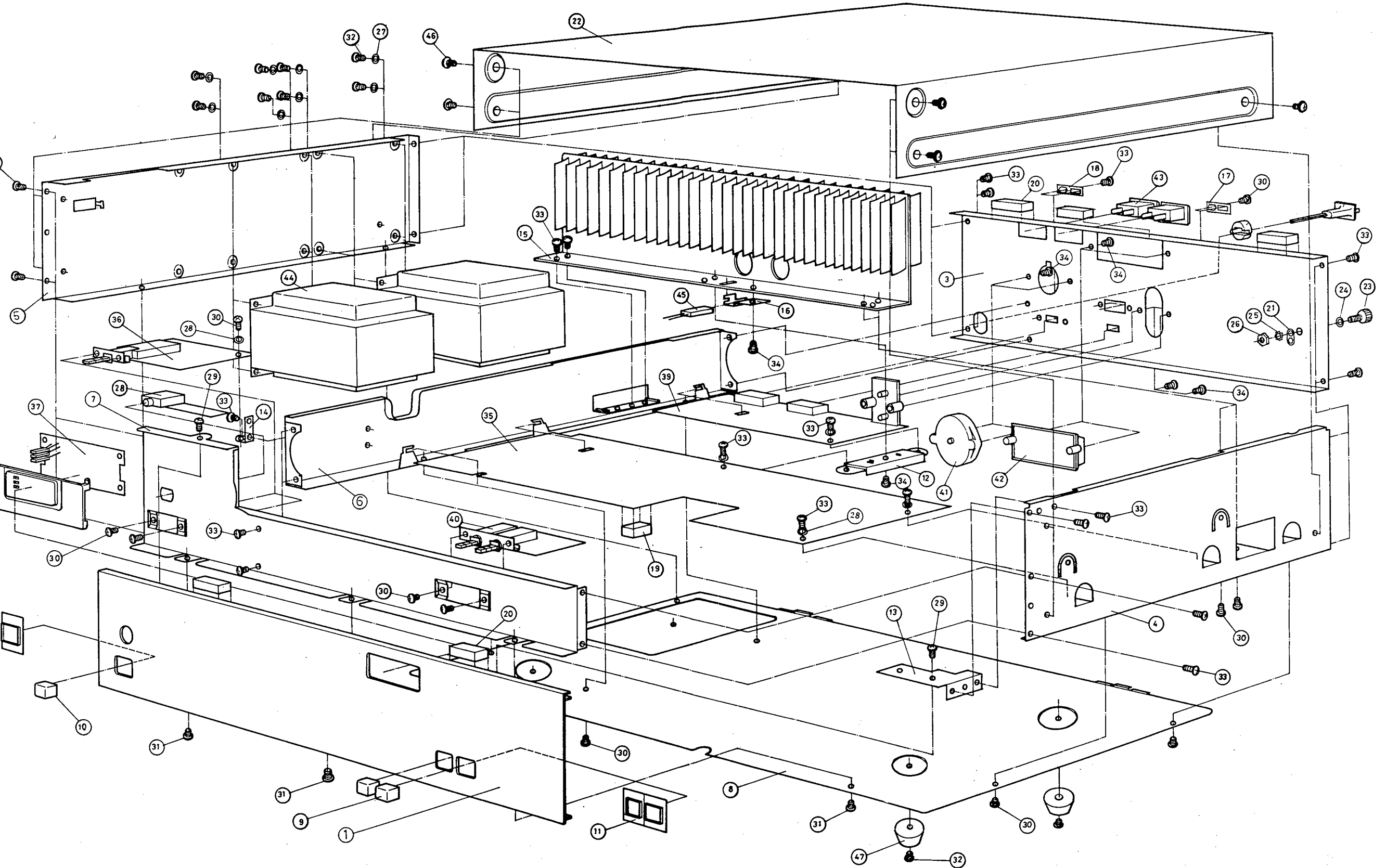
# 7150 WIRING DIAGRAM

## PRIMARY SECTION

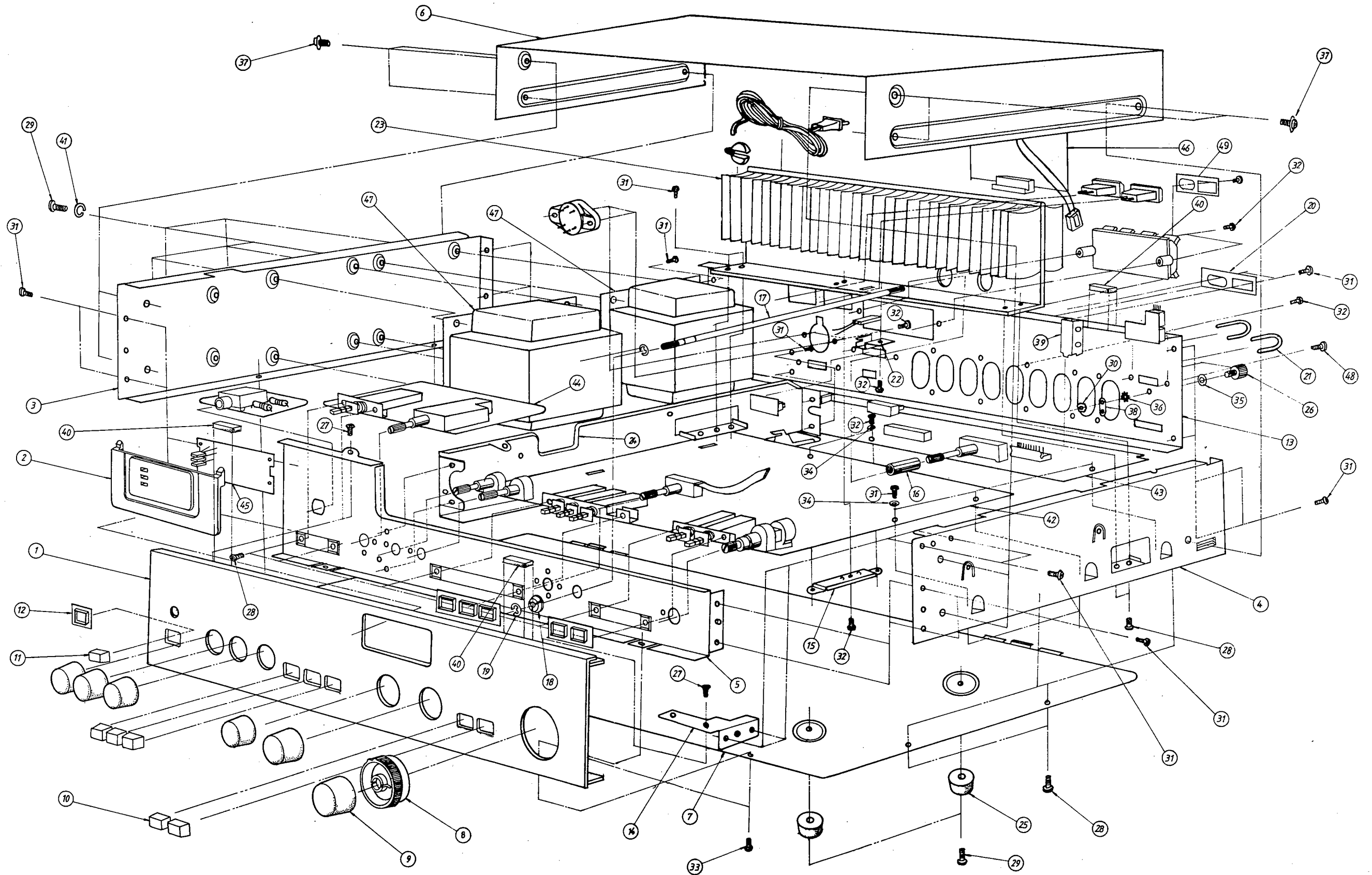


- WIRE COLOR ABBREVIATIONS
- BK - BLACK
  - BR - BROWN
  - RE - RED
  - OR - ORANGE
  - YE - YELLOW
  - GR - GREEN
  - BL - BLUE
  - WE - WHITE
  - PK - PINK

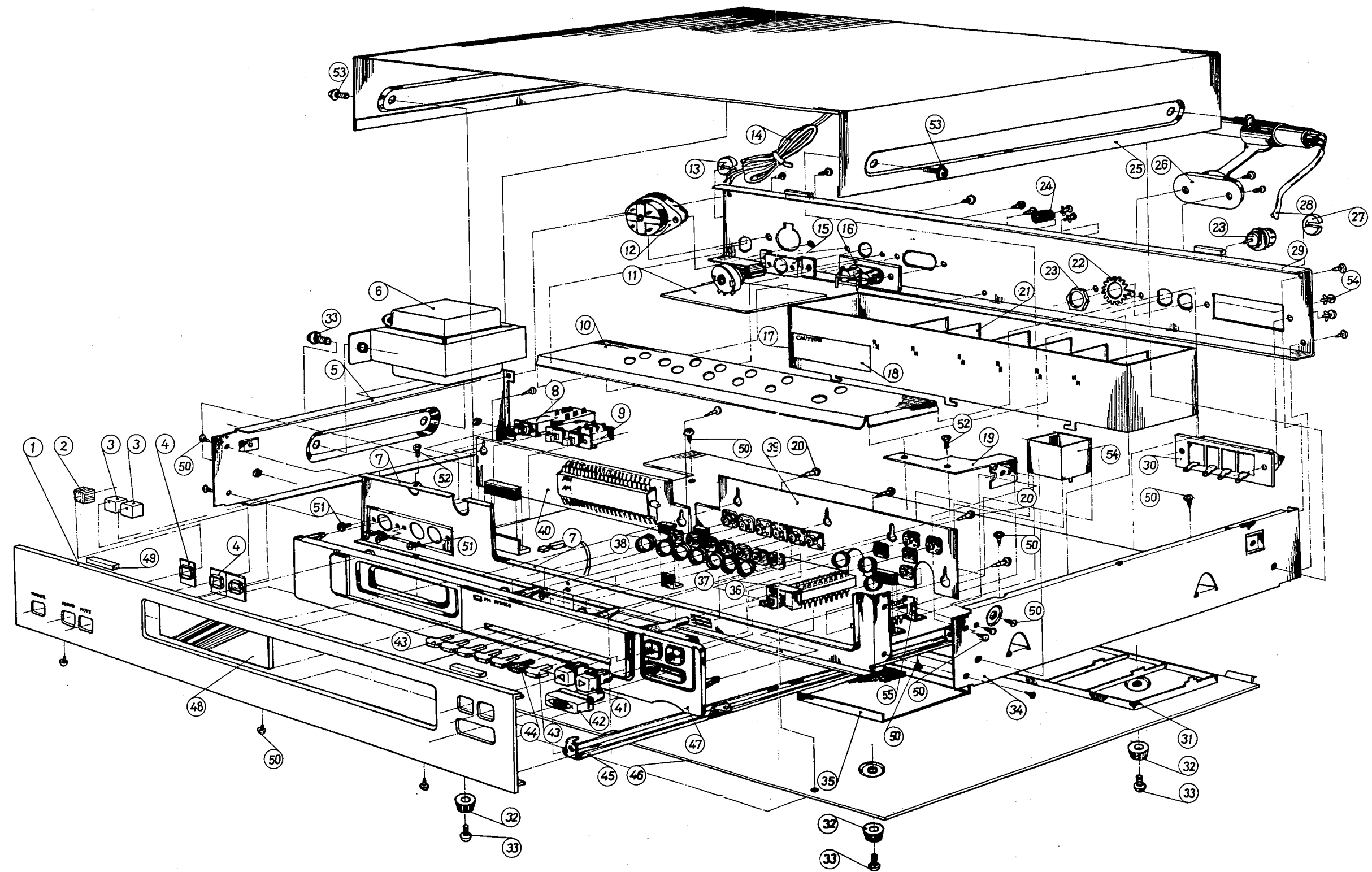
# ASSEMBLY DIAGRAM



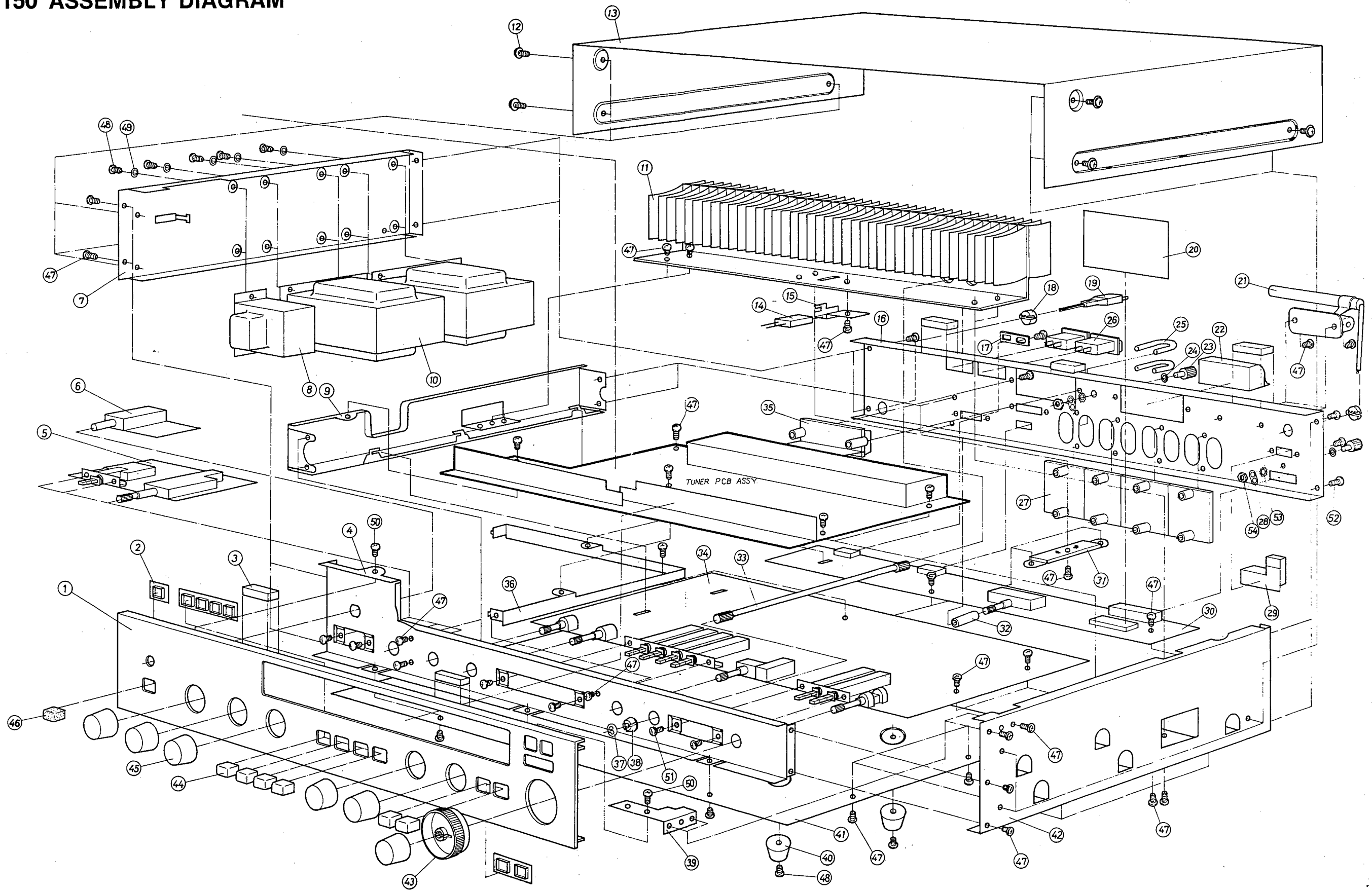
# 3150 ASSEMBLY DIAGRAM



# ASSEMBLY DIAGRAM

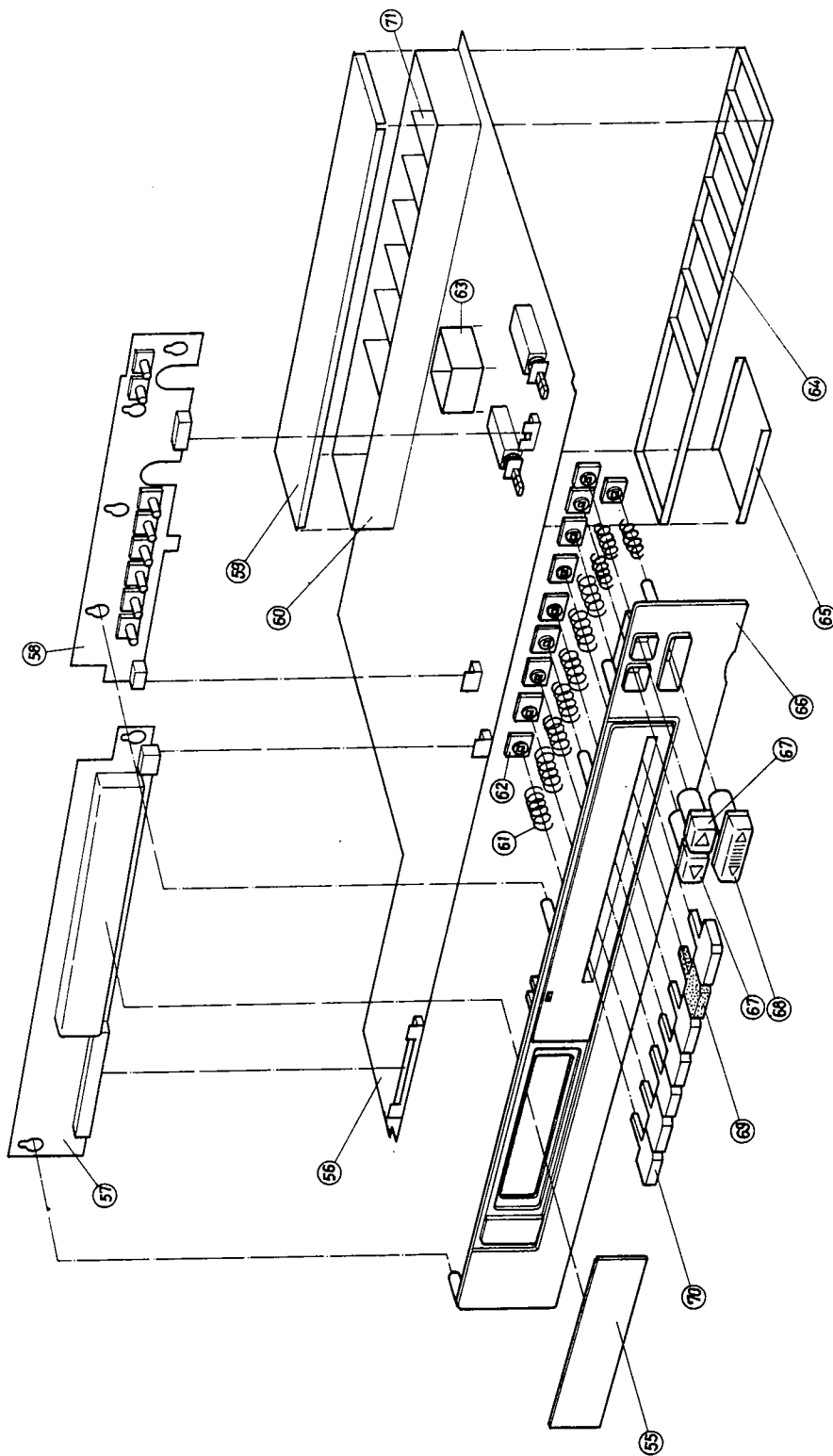


# 7150 ASSEMBLY DIAGRAM





# 7150 SUB-ASSEMBLY DIAGRAM (TUNER PCB)



**2150 MECHANICAL PARTS LIST**

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
1	PANEL FRONT	11-8232	1
2	PANEL AUX	11-8233	1
3	PANEL BACK	11-8236	1
4	CHASSIS AUX. R.	11-6112-1	1
5	CHASSIS AUX. L.	11-6119	1
6	CHASSIS CENTER	11-6113	1
7	CHASSIS FRONT	11-6130	1
8	CHASSIS BOTTOM	11-6111	1
9	KNOB PUSH	12-3090	2
10	KNOB PUSH GREEN	12-3090-2	1
11	BUSHING	28-1067	3
12	BKT. FOR PCB	11-2208	1
13	BKT. FOR PNL. FRONT	11-2293	1
14	BRACKET	11-2100	1
15	HEAT SINK	11-5064	1
16	HOLDER RELAY	11-3064	1
17	STOPPER SW. (A)	11-9106	1
18	STOPPER SW. (B)	11-9107	1
19	RETAINER	28-2050	1
20	RETAINER	28-2025	5
21	LUG	11-3026	1
22	CABINET	50-1033	1
23	GROUND SCREW	15-2037	1
24	GROUND WASHER	A3.5A09SN01	1
25	GEAR WASHER	A3.5I07SZ01	1
26	NUT	N3.5B0612.8SZ	1
27	SPRING WASHER	A04G07SL01	8
28	FIBER WASHER	A03A08F0.5	5
29	MACHINE SCREW F. 3x6	S1E03+I06SL-2	2
30	MACHINE SCREW 3x6	S1B03+I06SL-2	15
31	MACHINE SCREW 3x10	S1B03+I10SL-2	13
32	MACHINE SCREW 4x10	S1B04+I10SL-2	12
33	TAPPING SCREW 3x6	S2B03+I06SL-2	22
34	TAPPING SCREW 3x8	S2B03+I08SL-2	8
35	PCB MAIN	19-1183-1	1
36	PCB POWER	19-1183-2	1
37	PCB LED	19-1183-4	1
38	PCB PHONE	19-1183-5	1
39	PCB SUB	19-1183-6	1
40	PCB SPK. SW.	19-1183-7	1
41	VOLT. SELECTOR	31-1121	1
42	SPK. TERMINAL	12-2109	1
43	AC OUTLET	12-2121	2
44	TRANSFORMER	29-2072	1
45	THERMAL RELAY	16-2002	6
46	SPECIAL SCREW	15-2062	1
47	RUBBER FOOT	28-1029	4

**3150 MECHANICAL PARTS LIST**

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
1	PANEL FRONT	11-8235	1
2	PANEL AUX.	11-8233	1
3	CHASSIS AUX. L.	11-6119	1
4	CHASSIS AUX. R.	11-6112-1	1
5	CHASSIS FRONT	11-6110	1
6	CABINET	50-1033	1
7	CHASSIS BOTTOM	11-6111	1
8	KNOB BALANCE	12-3071	1
9	KNOB CONTROL	12-3058	6
10	KNOB PUSH	12-3090	5
11	KNOB PUSH GREEN	12-3090-2	1
12	BUSHING	28-1067	6
13	PANEL BACK	11-8234	1
14	BKT. FOR PNL. FRONT	11-2293	1
15	BKT. FOR PCB	11-2208	1
16	TUBE FOR SHAFT	13-7003	1
17	SHAFT	11-7047	1
18	TUBE	12-4027	1
19	E-RING	15-5014	2
20	STOPPER SW.	11-9106	1
21	JUMPER	11-4011	2
22	HOLDER RELAY	11-3064	1
23	HEAT SINK	11-5064	1
24	CHASSIS CENTER	11-6113	1
25	RUBBER FOOT	28-1029	4
26	GROUND SCREW	15-2037	1
27	MACHINE SCREW F. 3x6	S1E03+I06SL-2	2
28	MACHINE SCREW 3x6	S1B03+I06SL-2	16
29	MACHINE SCREW 4x10	S1B04+I10SL-2	12
30	NUT	N3.5B0612.8SZ	1
31	TAPPING SCREW 3x6	S2B03+I06SL-2	22
32	TAPPING SCREW 3x8	S2B03+I08SL-2	16
33	MACHINE SCREW 3x10	S1B03+I10SL-2	13
34	FIBER WASHER	A03A08F0.5	5
35	GROUND WASHER	A3.5A09SN01	1
36	GEAR WASHER	A3.5I07SZ01	1
37	SPECIAL SCREW	15-2062	6
38	LUG	11-3026	1
39	SHEET PLATE	11-9104	1
40	RETAINER	28-2025	5
41	SPRING WASHER	A04G07SL01	8
42	PCB MAIN	19-1146	1
43	PCB SUB	19-1146	1
44	PCB POWER	19-1171	1
45	PCB LED	19-1171	1
46	PCB PHONO	19-1172	1
47	TRANSFORMER	29-2072	2
48	MACHINE SCREW 2.6x4	S1B2.6+I04SL-2	2
49	STOPPER SW.	11-9107	1

**4150 MECHANICAL PARTS LIST**

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
1	FRONT PANEL	11-8230	1
2	POWER KNOB GREEN	11-3090-2	1
3	PUSH KNOB BLACK	12-3090	2
4	BUSHING FOR PUSH KNOB	28-1067	3
5	LEFT CHASSIS	11-6182	1
6	TRANSFORMER	29-2070	1
7	FRONT CHASSIS	11-6125	1
8	POWER SWITCH	31-1129A	1
9	PUSH SWITCH 2P	31-1236	1
10	METAL COVER	11-1011	1
11	BUFFER PCB ASS'Y	90-1192	1
12	VOLTAGE SELECTOR SWITCH	31-1121	1
13	BUSHING 4N4	14-5003	1
14	POWER CORD	14-5037	1
15	BRACKET FOR O/P	11-2295	1
16	RCA JACK 2P	12-2110	1
17	SHIELD CASE	11-9101	1
18	CAUTION LABEL	21-2295	1
19	BRACKET FOR FRONT PANEL	11-2287	1
20	RIVET 2.5x14L	15-2061	6
21	INNER SHIELD PLATE	11-9100	6
22	LUG	11-3033	1
23	CONNECTOR & NUT	12-1032	1
24	KNOB FOR O/P	12-3147	1
25	CABINET	50-1035	1
26	AM ANT	29-5010	1
27	BUSHING 5N4	14-5005	1
28	TUBING 6.5x PVC	WB-0A65	1
29	BACK PANEL	11-8237	1
30	ANT TERMINAL	12-2012	1
31	BOTTOM SHIELD	11-9102	1
32	RUBBER FOOT	28-1029	4
33	MACHINE SCREW M4x8	S1B04+I08SL-2	6
34	RIGHT CHASSIS	11-6126	1
35	SHIELD FOR OSC	11-9105	1
36	BAND SWITCH	31-1237	1
37	BUSHING FOR KNOB	28-1065	10
38	SPRING FOR KNOB	12-5036	10
39	SWITCH PCB ASS'Y	90-1155	1
40	DISPLAY PCB ASS'Y	90-1155	1
41	UP/DOWN KNOB	12-3124	2
42	SEARCH KNOB	12-3126	1
43	PUSH KNOB BLACK	12-3127	6
44	PUSH KNOB BROWN	12-3127-1	1
45	CENTER CHASSIS	11-6129	1
46	BOTTOM CHASSIS	11-6127	1
47	AUXILIARY PANEL	11-8204-2	1
48	ACRY WINDOW	11-8203	1
49	RETAINER	28-2090	4
50	TAPPING SCREW T3x9	S2B03+I08SL-2	29
51	MACHINE SCREW M3x6	S1B03+I06SL-2	6

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
52	FLAT SCREW M3x6	S1E03+I06SZ-2	2
53	SPECIAL SCREW M4x8	15-2051	4
54	SHIELD PLATE FOR IF	11-9098	1
55	BRACKET FOR SEARCH SW.	11-2290	1

7150 MECHANICAL PARTS LIST

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
1	FRONT PANEL	11-8205	1
2	BUSHING	28-1067	7
3	RETAINER	28-2090	4
4	FRONT CHASSIS	11-6110	1
5	POWER SW. PCB ASS'Y	90-1171	2/3
6	HEADPHONE JACK PCB ASS'Y	90-1171	1/3
7	LEFT CHASSIS	11-6119	1
8	TUNER'S POWER TRANSFORMER	29-6070	1
9	CENTER CHASSIS	11-6113	1
10	POWER TRANSFORMER	29-2072	2
11	HEAT SINK	11-5064	1
12	SPECIAL SCREW	15-2062	6
13	CABINET	50-1033	1
14	THERMAL PROTECTOR RELAY	16-2002	1
15	HOLDER FOR THERMAL RELAY	11-3064	1
16	BACK PANEL	11-8206	1
17	STOPPER FOR SW.	11-9107	1
18	BUSHING 4N-4	14-5003	1
19	POWER CORD	14-5037	1
20	PHONO PCB ASS'Y	90-1172	1
21	AM. ANT	29-5010	1
22	ANT. TERMINAL	12-2012	1
23	GROUND SCREW	15-2037	1
24	WASHER #3.5x9x1T	A3.5A09SN01	6
25	JUMPER	11-4011	2
26	RECEPTACLE UL/CSA IR19-1	12-2121	2
27	RCA JACK (4P)	12-2092	4
28	LUG	11-3026	2
29	MC/MM PCB ASS'Y	90-1193	1
30	MAIN PCB ASS'Y	90-1146	1/3
31	HOLD FOR PCB	11-2208	1
32	TUBE	12-7003	1
33	SHAFT	11-4047	1
34	MAON PCB ASS'Y	90-1146	2/3
35	SPEAKERS TERMINAL (8P)	12-2109	1
36	BRACKET FOR PCB	11-2234	1
37	E-RING 5#	15-5014	1
38	TUBE FOR SHAFT	13-4027	1
39	BRACKET FOR FRONT PANEL	11-2293	1
40	RUBBER FOOT	28-1029	4
41	BOTTOM CHASSIS	11-6111	1
42	RIGHT CHASSIS	11-6112	1
43	BALANCE KNOB	12-3071-1	1
44	PUSH KNOB BLACK	12-3090	6
45	CONTROL KNOB	12-3038	6
46	PUSH KNOB GREEN	12-3090-2	1
47	TAPPING SCREW T3x6	S2B03+I06SL-2	28
48	MACHINE SCREW M4x8	S1B04+I08SL-2	14
49	S./WASHER #4x8x1	A04G07SL01	10
50	FLAT SCREW M3x6	S1E03+I06S2-2	2
51	MACHINE SCREW M3x6	S1B03+I06SL-2	28

REF. NO.	DESCRIPTION	RS PART NO.	Q'ty
52	TAPPING SCREW T3xb	S2B03+I08SL-2	10
53	GEAR WASHER	A3.5I07SZ01	2
54	NUT #3.5x7	N3.5B0612.BSZ	2
55	ACRT SCALE	11-8203	1
56	TUNER PCB ASS'Y	90-1156	1
57	DISPLAT PCB ASS'Y	90-1155	1
58	TOUCH SW. PCB ASS'Y	90-1157	1
59	METAL COVER	11-1101	1
60	SHIELD CASE	11-9011	1
61	SPRING FOR KNOB	19-5036	10
62	BUSHING FOR KNOB	28-1065	3
63	SHIELD PLATE FOR IF.	11-9098	1
64	BOTTOM SHIELD	11-9102	1
65	SHIELD FOR OSC	11-9105	1
66	AUXILIARY PANEL	11-8204	1
67	UP/DOVE KNOB	12-3124	2
68	SEARCH KNOB	12-3126	1
69	PUSH KNOB BROWN	12-3127-1	1
70	PUSH KNOB BLACK	12-3127	1
71	INNER SHIELD PLATE	11-9100	6





**7150 AUDIO/ 3150 ELECTRICAL PARTS LIST**

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>INTEGRATED CIRCUITS</b>			
IC501	30-3179	Dual OP RC5532/NE5532	
IC701	30-3187	Protector TA7317P	
IC801	30-3178	Regulator M5231L	
IC802	30-3213	Regulator MC79M24CT/AN7824	
<b>SWITCHES</b>			
SW401	31-1228	Slide SS823FL313	
SW402	31-1204	Rotary RZL45FL504	
SW403	31-1253	Switching Part ESA-26132	
	31-1261	Operating Part ESA-33446B	
SW404	31-1260	Slide SS8022NA01-FL	
SW501	31-1247	Push SUF32AE023-FL	
SW503 SW504	31-1247	Push SUF32AE023-FL	
SW502 SW505	31-1235	Push SUF22AA012-FL	
SW601 SW602	31-1226	Slide SSP22FL080	
SW603	31-1024F	Rotary SRZV044N37-FL	

**7150 TUNER/4150 ELECTRICAL PARTS LIST**

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>RESISTORS (All are carbon film 1/4W +/-5% unless noted otherwise)</b>			
R001	16-kCA563J	56K OHM	
R002	16-kCA104J	100K OHM	
R003	16-kCA101J	100 OHM	
R004	16-kCA331J	330 OHM	
R005	16-kCR330J	33 OHM	
R006	16-kCA121J	120 OHM	
R007	16-kCA563J	56K OHM	
R008	16-kCA104J	100K OHM	
R009	16-kCA563J	56K OHM	
R010	16-kCA104J	100K OHM	
R011	16-kCL101J	100 OHM	
R012	16-kCA151J	150 OHM	
R013	16-kCA121J	120 OHM	
R014	16-kCA563J	56K OHM	
R015	16-kCA104J	100K OHM	
R016	16-kCA563J	56K OHM	
R017	16-kCA333J	33K OHM	
R018	16-kCA103J	10K OHM	
R019	16-kCA222J	2K2 OHM	
R020	16-kCA332J	3K3 OHM	
R021	16-kCA431J	430 OHM	
R022	16-kCA103J	10K OHM	
R023	16-kCA682J	6K8 OHM	
R024	16-kCR682J	68K OHM	
R025	16-kCL154J	150K OHM	
R026	16-kCA102J	1K OHM	
R027	16-kCR222J	2K2 OHM	
R028	16-kCA101J	100 OHM	
R101	16-kCR681J	680 OHM	
R102	16-kCR391J	390 OHM	
R103	16-kCR470J	47 OHM	
R104	16-kCA152J	1K5 OHM	
R105	16-kCR471J	470 OHM	
R106	16-kCA331J	330 OHM	
R107	16-kCR391J	390 OHM	
R108	16-kCR101J	100 OHM	
R109	16-kCR391J	390 OHM	
R110	16-kCR331J	330 OHM	
R111	16-kCA330J	33 OHM	
R112	16-kCR102J	1K OHM	
R113	16-kCA103J	10K OHM	
R114	16-kCR823J	82K OHM	
R115	16-kCR101J	100 OHM	
R116	16-kCR102J	1K OHM	
R118	16-kCR331J	330 OHM	
R119	16-kCR103J	10K OHM	
R120	16-kCA820J	82 OHM	
R121	16-kCL563J	56K OHM	
R122	16-kCA221J	220 OHM	

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>RESISTORS (All are carbon film 1/4W +/-5% unless noted otherwise)</b>			
R123	16-kCR473J	47K OHM	
R124	16-kCR223J	22K OHM	
R125	16-kCA183J	18K OHM	
R127	16-kCA153J	15K OHM	
R128	16-kCR103J	10K OHM	
R129 R130	16-kCA683J	69K OHM	
R131	16-kCR563J	56K OHM	
R132	16-kCA333J	33K OHM	
R133	16-kCA823J	82K OHM	
R134	16-kCA100J	10 OHM	
R135	16-kCR154J	150K OHM	
R136	16-kCR473J	47K OHM	
R137	16-kCA473J	47K OHM	
R138	16-kCR224J	220K OHM	
R139	16-kCA222J	2K2 OHM	
R140 R141	16-kCA472J	4K7 OHM	
R142	16-kCA103J	10K OHM	
R143	16-kCA122J	1K2 OHM	
R144	16-kCR333J	33K OHM	
R145	16-kCA564J	560K OHM	
R146	16-kCA223J	22K OHM	
R147-R149	16-kCA102J	1K OHM	
R150 R151	16-kCR103J	10K OHM	
R152	16-kCR472J	4K7 OHM	
R153 R154	16-kCR471J	470 OHM	
R156	16-kCR331J	330 OHM	
R157	16-kCA391J	390 OHM	
R158	16-kCR470J	47 OHM	
R159	16-kCA473J	47K OHM	
R160 R161	16-kCR223J	22K OHM	
R162	16-kCR272J	2K7 OHM	
R201	16-kCA122J	1K2 OHM	
R202	16-kCR102J	1K OHM	
R203	16-kCA121J	120 OHM	
R204	16-kCA682J	6K8 OHM	
R205	16-kCR104J	100K OHM	
R206	16-kCA103J	10K OHM	
R207 R208	16-kCR222J	2K2 OHM	
R209 R210	16-kCA183J	18K OHM	
R211 R212	16-kCR333J	33K OHM	
R213-R216	16-kCA332J	3K3 OHM	
R217	16-kCA333J	33K OHM	
R218	16-kCA103J	10K OHM	
R219 R220	16-kCR823J	82K OHM	
R221 R222	16-kCA155J	1M5 OHM	
R223	16-kCA103J	10K OHM	
R224	16-kCA102J	1K OHM	
R225	16-kCA104J	100K OHM	

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>RESISTORS (All are carbon film 1/4W +/-5% unless noted otherwise)</b>			
R226	16-kCA103J	10K OHM	
R227	16-kCA102J	1K OHM	
R228-R230	16-kCA473J	47K OHM	
R231	16-kCA135J	15K OHM	
R232	16-kCA473J	47K OHM	
R233	16-kCA153J	15K OHM	
R234	16-kCR103J	10K OHM	
R235	16-kCR223J	22K OHM	
R236	16-kCA103J	10K OHM	
R237	16-kCA223J	22K OHM	
R238	16-kCR472J	4K7 OHM	
R239	16-kCR473J	47K OHM	
R240 R241	16-kCA103J	10K OHM	
R242	16-kCR223J	22K OHM	
R243	16-kCA473J	47K OHM	
R244 R245	16-kCA103J	10K OHM	
R246	16-kCA473J	47K OHM	
R247	16-kCR153J	15K OHM	
R248	16-kCA223J	22K OHM	
R249	16-kCA473J	47K OHM	
R250	16-kCA153J	15K OHM	
R251	16-kCA101J	100 OHM	
R252	16-kCA472J	4K7 OHM	
R253	16-kCA333J	33K OHM	
R254	16-kCR103J	10K OHM	
R255	16-kCA223J	22K OHM	
R256	16-kCA101J	100 OHM	
R257 R258	16-kCA564J	560K OHM	
R259 R260	16-kCA104J	100K OHM	
R261	16-kCA221J	220 OHM	
R262 R263	16-kCA223J	22K OHM	
*R264 R265	16-kCA471J	470 OHM	
*R266 R267	16-kCR474J	470K OHM	
*R268 R269	16-kCA185J	1M8 OHM	
*R270 R271	16-kCR562J	56K OHM	
*R272-R275	16-kCA472J	4K7 OHM	
*R276 R277	16-kCA332J	3K3 OHM	
R278	16-kCR104J	100K OHM	
R279	16-kCR334J	330K OHM	
R280	16-kCA105J	1M OHM	
*R281 R282	16-kCA224J	220K OHM	
*R283 R284	16-kCA104J	100K OHM	
*R285 R286	16-kCA224J	220K OHM	
*R287 R288	16-kCA472J	4K7 OHM	
R301	16-kCA103J	10K OHM	
R303	16-kCR822J	8K2 OHM	
R304	16-kCR271J	270 OHM	
R305	16-kCA472J	4K7 OHM	
R306	16-kCA103J	10K OHM	

Note: 1.Asterisk \* denotes for 4150 only 2.Delta Δdenotes for 7150 only



**7150 TUNER/4150 ELECTRICAL PARTS LIST**

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>DIODES</b>			
D106	30-1010	IN60	
D107 D108	30-1152TA	IN4148	
D201-D208	30-1152TA	IN4148	
D209	30-1010	IN60	
D201	30-1077-1	ZENER HZ5A-3	
D211 D212	30-1152TA	IN4148	
D214	30-1152TA	IN4148	
D301-D303	30-1152TA	IN4148	
D701 D702	30-1146	Variable capacitor. SVC333B	
D703-D705	30-1152TA	IN4148	
D901-D908	30-1002	Rectifier 100V1A IN4002/10D1	
D909 D910	30-1044-1	ZENER HZ15-2	
D911	30-1147-1	ZENER HZ30-2	
D912	30-1136-1	ZENER HZ7A-2	
<b>INTEGRATED CIRCUITS</b>			
IC101	30-3155	FM IF UPC1163H	
IC102	30-3206	FM IF LA1235N	
IC103	30-3118	DUAL OP MC34002P	
IC104	30-3069	DUAL OP RC4558/UPC4558N	
IC105	30-3205	DUAL OP NE5517N/LM13600N	
IC201	30-3079	MPX HA12016	
IC202	30-3069	DUAL OP RC4558/UPC4558N	
IC203	30-3051	METER DRIVER BA656	
IC301	30-3148	PULL-CONTROLLER TC9137P	
IC302	30-3149	PRECALLER TD6104P	
IC303	30-3050	DISPLAY DRIVER TD6301P	
<b>TRANSISTORS</b>			
Q001-Q003	30-2201*A	FET J310	
Q004 Q005	30-2197*B	2N5770	
Q006	30-2201*A	FET J310	
Q007	30-2267*A	FET 2N5486	
Q101 Q102	30-2201*A	FET J310	
Q103	30-2019	25C930	
Q104	30-2156	25C1815GR	
Q105 Q106	30-2019	25C930	
Q201-Q208	30-2156	25C1815GR	
Q209	30-2171	25A733A	
Q210 Q211	30-2265	FET J111	
*Q212 Q213	30-2084-3	BC549C	
*Q214 Q215	30-2096	BC556B	
Q216	30-2267*A	FET 2N5486	
Q301	30-2156	25C1815GR	
Q302	30-2161	FET K40	
Q303	30-2156	25C1155GR	
Q304	30-2161	FET K40	
Q305	30-2156	25C1815GR	

Note: Asterisk \* denotes for 4150 only

REF. NO.	PART NO.	DESCRIPTION	NOTE
<b>TRANSISTORS</b>			
Q306-Q308	30-2255	25C2785	
Q701 Q702	30-2156	25C1815GR	
Q703	30-2084-3	BC549C	
Q901	30-2078	25D330E	
Q902	30-2171	25A733A	
Q903 Q904	30-2090-2	BC546B	

**7150 AUDIO/2150/3150 CRITICAL COMPONENT PARTS LIST**

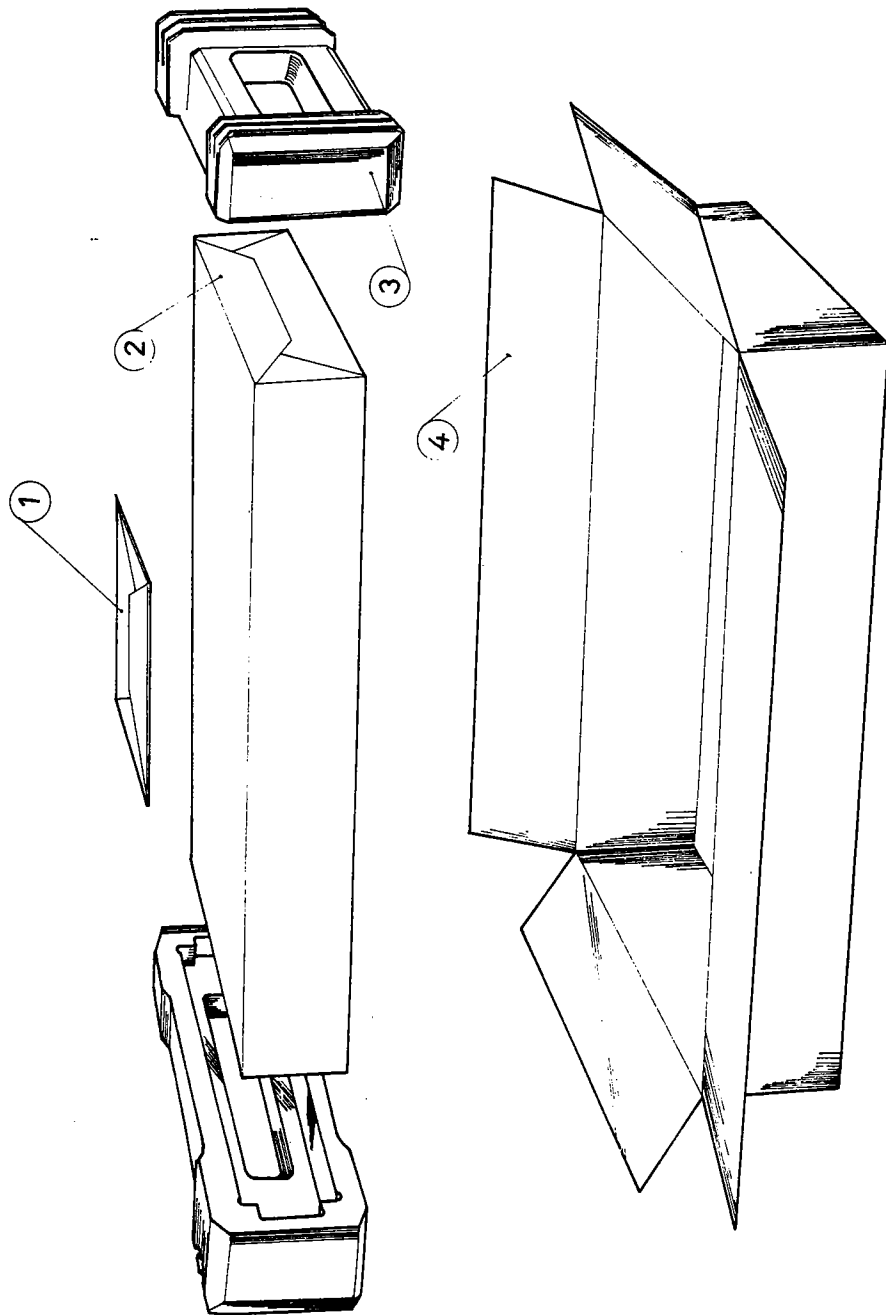
REF. NO.	PART NO.	DESCRIPTION	NOTE
Switched	12-2121	AC Outlet AB/C1/C2/LC/U1-U4	Version
Unswitched	14-5013	Power Cord E3	Version
	14-5025	Power Cord E2	Version
	14-5032	Power Cord U3	Version
	14-5033	Power Cord E1/ET/E4/U2/U4	Version
	14-5037*B	Power Cord C1/C2/LC/U1/AB	Version
CB22 CB23	17-2011	Capacitor AB/E1-E4/ET/U1-U4	Version
	17-2014	Capacitor C1/C2/LC	Version
	29-2072-1	Transformer C1/LC	Version
	29-2072-1A	Transformer C1/LC	Version
	29-2072-4	Transformer C2	Version
	29-2072-4A	Transformer C2	Version
	29-2072-5	Transformer E1/ET	Version
	29-2072-5A	Transformer E1/ET	Version
	29-2072-7	Transformer E2/E3/E4/U3/U4	Version
	29-2072-7A	Transformer E2/E3/E4/U3/U4	Version
	29-2072-8	Transformer AB/U1/U2	Version
	29-2072-8A	Transformer AB/U1/U2	Version
SW802a SW802b	31-1129A*A	Switch AB/E1-E4/ET/U1-U4	Version
SW802a	31-1130A*A	Switch C1/C2/LC	Version
F6	32-14001W	Fuse 4A 250V Nomal AB/C1/C2/LC/U1	Version
F6	32-12001S	Fuse 2A 250V Time-lag E1-E4/ET/U2-U4	Version

**4150/7150 TUNER CRITICAL COMPONENT PARTS LIST**

REF. NO.	PART NO.	DESCRIPTION	NOTE
	14-5013	Power Cord E3	Version
	14-5025	Power Cord E2	Version
	14-5032	Power Cord U3	Version
	14-5033	Power Cord E1/ET/E4/U2/U4	Version
	14-5037*B	Power Cord C1/C2/LC/U1/AB	Version
	17-2011	Capacitor AB/E1-E4/ET/U1-U4	Version
	17-2014	Capacitor C1/C2/LC	Version
	29-2070-1	Transformer C1/LC	Version
	29-2070-4	Transformer C2	Version
	29-2070-5	Transformer E1/ET	Version
	29-2070-7	Transformer E2/E3/E4/U3/U4	Version
	29-2070-8	Transformer AB/U1/U2	Version
	31-1129A*A	Switch AB/E1-E4/ET/U1-U4	Version
	31-1130A*A	Switch C1/C2/LC	Version
F1 F2 F3	32-15000U	Fuse 500mA 250V Normal AB/C1/C2/LC/U1	Version
F1 F2 F3	32-15000S	Fuse 500mA 250V Time-lag E1-E4/ET/U2-U4	Version

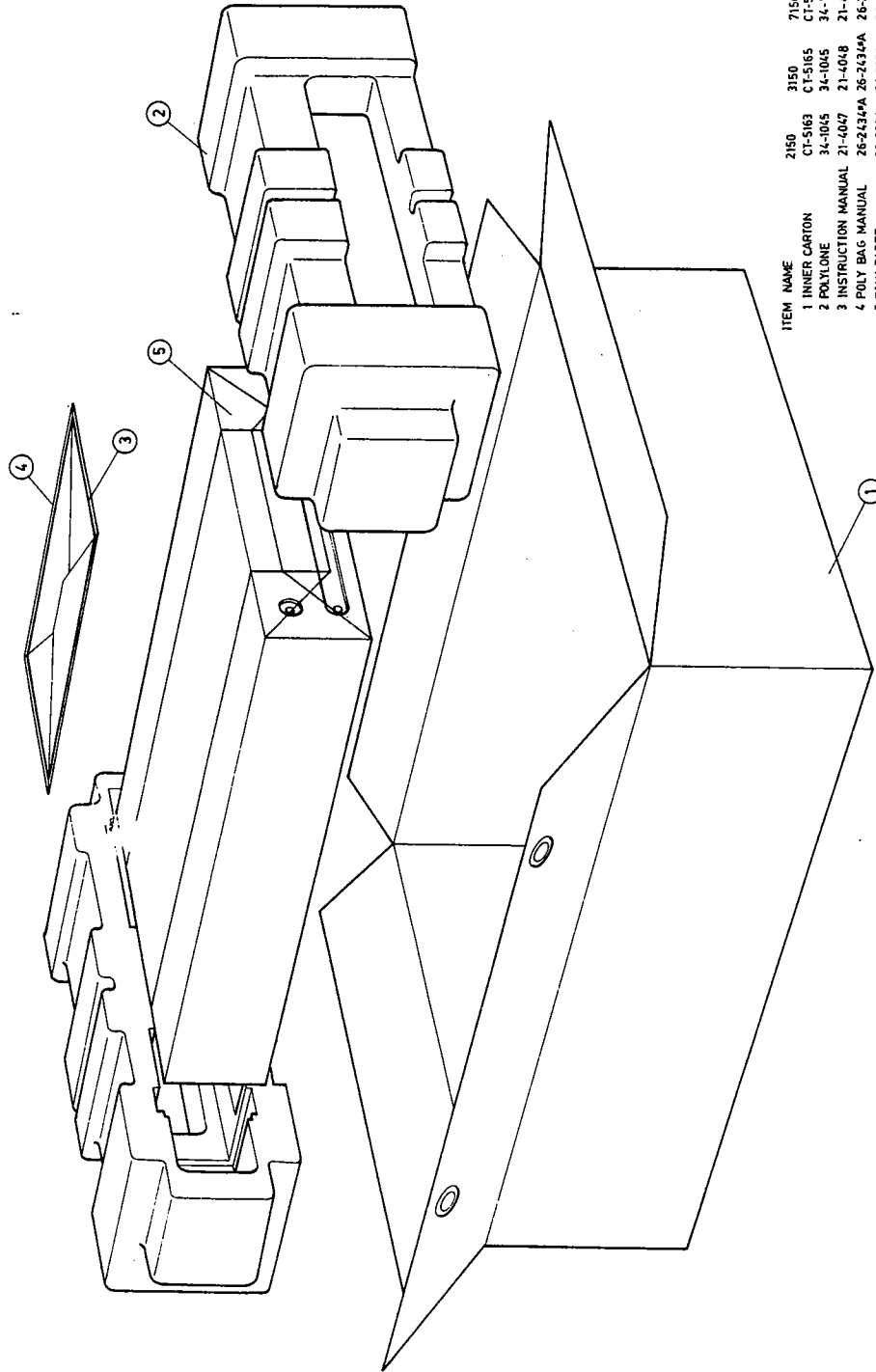


# 2150/3150/7150 PACKING DIAGRAM

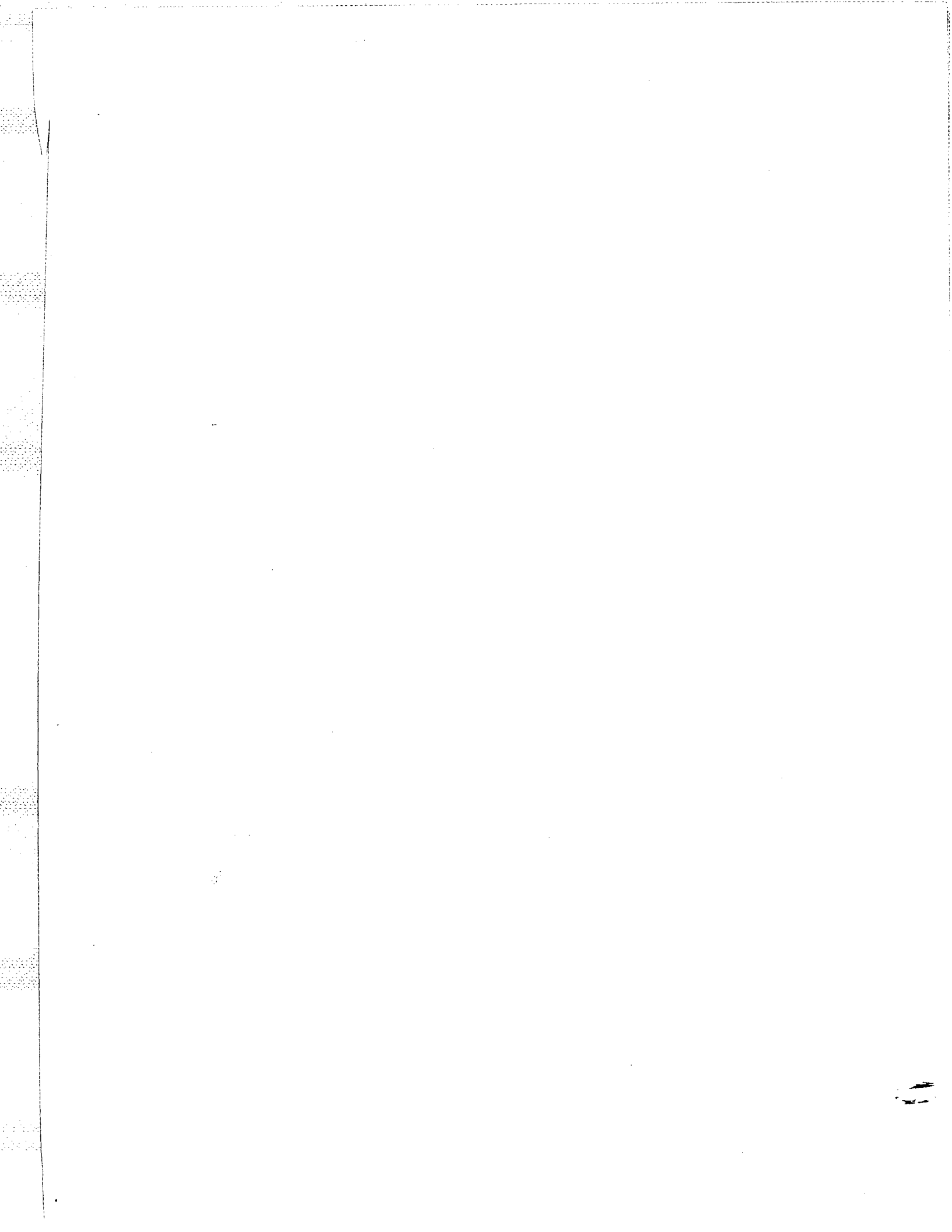


ITEM NUMBER	MANE	Q'ty
1.	26-2434 MANUAL'S POLY BAG	1
2.	26-0005 POLY PAPER	1
3.	34-1044 POLYTHENE	2
4.	CT-5161 INNER CARTON	1

# 4150 PACKING DIAGRAM



ITEM NAME	2150	3150	7150	Qty
1 INNER CARTON	CT-5163	CT-5165	CT-5167	1
2 POLYOXONE	34-1045	34-1045	34-1045	2
3 INSTRUCTION MANUAL	Z1-4047	Z1-4048	Z1-4049	1
4 POLY BAG MANUAL	26-2434* <sup>A</sup>	26-2434* <sup>A</sup>	26-2434* <sup>A</sup>	1
5 POLY PAPER	26-0024	26-0024	26-0024	1



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