

The Harman Kardon Model hk380i

Manual No.56A

ULTRA WIDEBAND LINEAR PHASE STEREO RECEIVER

Technical Manual



harman/kardon
240 CROSSWAYS PARK WEST, WOODBURY, N.Y. 11797
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hk380i

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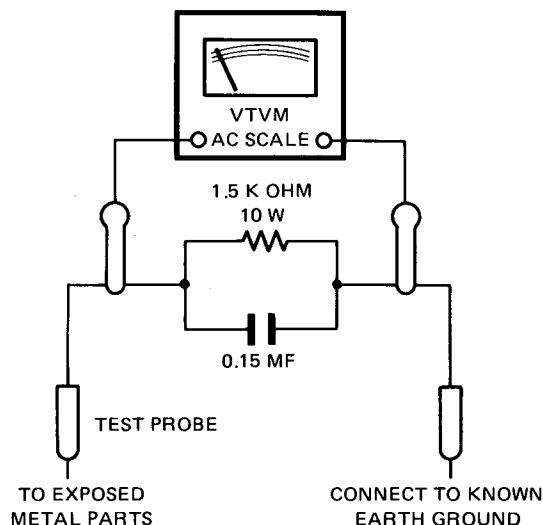
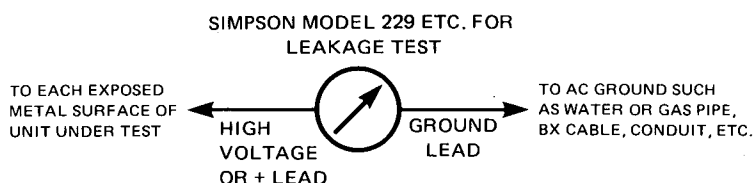
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LEAKAGE TEST

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Replace all protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
Plug the AC line cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 ohm, 10-watt resistor paralleled by a 0.15mf capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)
A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.



SPECIFICATIONS

● FM SECTION

	Nominal	Limit
Tuning Range	87.3 ~ 108.4MHz	
50dB Quieting Sensitivity		
Mono	17.6dBf	< 20dBf
Stereo	36.1dBf	< 40dBf
Usable Sensitivity	12.4dBf	< 15dBf
Image Ratio	59.9dB	> 50dB
IF Rejection	87dB	> 80dB
Spurious Response Rejection	85dB	> 60dB
Capture Ratio	1.8dB	> 2.5dB
Alternate Channel Selectivity	62.8dB	> 50dB
AM Rejection	50.6dB	> 45dB
Signal to Noise Ratio		
Mono	81.5dB	> 78dB
Stereo	74.7dB	> 72dB
Total Harmonic Distortion		
Mono	0.07%	< 0.3%
Stereo	0.09%	< 0.35%
Stereo Separation at 1kHz	51dB	> 45dB

● AM SECTION

Tuning Range	515 ~ 1,680kHz
Usable Sensitivity	245μV/m < 350μV/m
Selectivity	36.5dB > 32dB
Signal to Noise Ratio	52.5dB > 50dB
Image Rejection	52.5dB > 40dB
IF Rejection	34dB > 25dB

● AUDIO SECTION

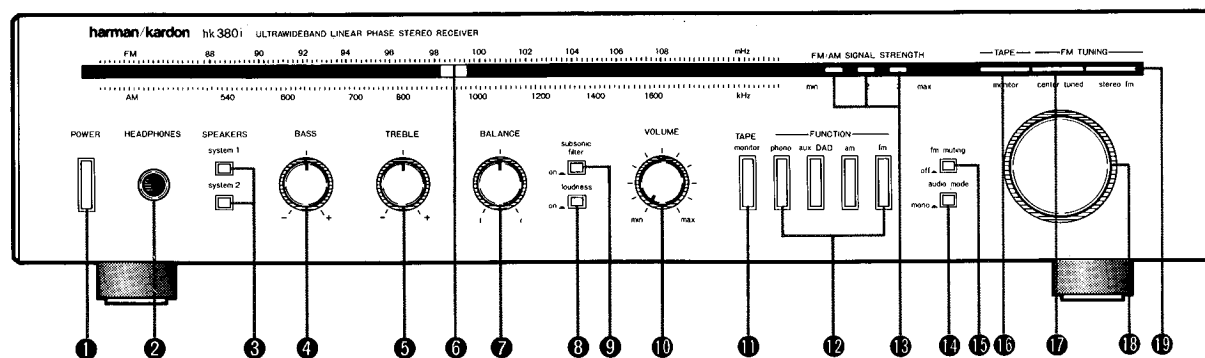
Usable Sensitivity	
AUX/DAD	135mV ± 25mV
Phono	2.2mV ± 0.2mV
Signal to Noise Ratio	
AUX/DAD	84.1dB > 75dB
Phono	81.4dB > 75dB

	Nominal	Limit
Channel Separation at 10kHz		
AUX/DAD	51.3dB	> 45dB
Phono	52dB	> 45dB
IM Distortion Ratio	0.07%	< 0.25%
RMS Output Power		
8Ω, 1kHz, THD 0.1%	34.4W	> 30W
4Ω, 1kHz, THD 0.15%	46.1W	> 40W
Damping Factor at 1kHz	71.6	> 60
Tone Control Characteristics		
Bass at 50Hz		
Boost	10dB ± 1.5dB	
Cut	-10dB ± 1.5dB	
Treble at 10kHz		
Boost	10dB ± 1.5dB	
Cut	-10dB ± 1.5dB	
Loudness Control		
at 10kHz	3dB ± 1dB	
at 50Hz	10dB ± 2dB	
DC Output Voltage		
L channel	0mV ± 60mV	
R channel	0mV ± 60mV	
RIAA Equalization at Tape Out (20Hz/20kHz)		
+1.5dB	0.8dB	+1.5dB
-0.5dB	-0.3dB	-0.5dB
● DIMENSIONS (W x H x D)	17-3/8" x 3-15/16" x 14-3/8"	(442 x 100 x 365 mm)
● WEIGHT	14.3 lbs (6.5kg)	
● POWER SUPPLY	AC120V, 60Hz	
● POWER CONSUMPTION	200W (220VA)	

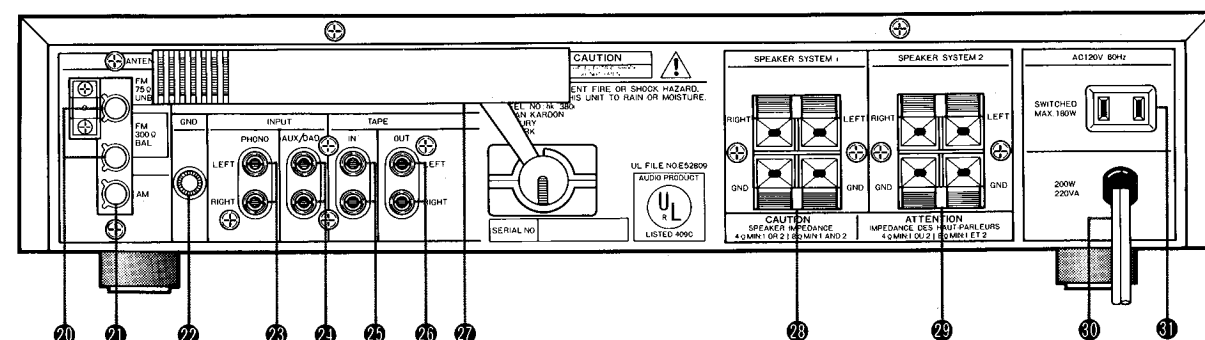
Specifications and components subject to change without notice.
Overall performance will be maintained or improved.

COMPONENTS AND THEIR FUNCTIONS

■ FRONT PANEL



■ REAR PANEL



① POWER SWITCH (POWER)

When this switch is pressed after the power line cord has been plugged into an AC outlet, the FM/AM dial and the DIAL POINTER are illuminated. Press the switch again to turn the power off.

② STEREO HEADPHONES JACK (HEADPHONES)

The output signal is always supplied to this jack. Sounds can be obtained only through the headphones when both SPEAKER SELECTOR SWITCHES (system 1 and 2) are pressed out to the OFF position (■ OFF/■ ON).

③ SPEAKER SELECTOR SWITCHES (SPEAKERS system 1/2)

Two speaker systems can be connected to this unit. Press down the selector switch corresponding to the speaker system which is connected to the terminals on the rear panel of the unit, if only one system is connected. If two systems are connected, press down the selector switch 1 or 2 corresponding to the system you want to listen to. To use both speaker systems, press down both switches. Press down the switches once again if the use of the speaker systems is not desired.

④ BASS CONTROL KNOB (BASS)

This knob controls the low-pitched tone. Turn it clockwise to emphasize or counterclockwise to attenuate the low-pitched tone.

⑤ TREBLE CONTROL KNOB (TREBLE)

This knob controls the high-pitched tone. Turn it clockwise to emphasize, or counterclockwise to attenuate the high-pitched tone.

⑥ DIAL POINTER

This dial pointer illuminates when POWER switch is turned ON.

⑦ BALANCE CONTROL KNOB (BALANCE)

This knob is used to balance the left and the right channels. Usually, it is set at the center. Turn it to the left or right to balance the sound if it comes unbalanced from the speakers or the headphones.

⑧ LOUDNESS SWITCH (loudness)

This switch functions to create natural reproduction when listening at a low volume by emphasizing the low and the high frequency ranges.

⑨ SUBSONIC FILTER SWITCH (subsonic filter)

For filtering very low frequencies. When pressed, the subsonic filter is validated to prevent distortion resulting from turntable rumble and speaker damage caused by super-low tones.

⑩ VOLUME CONTROL KNOB (VOLUME)

This knob controls the sound level. Turning clockwise increases the sound volume, and turning counterclockwise decreases it. Set this knob at a minimum level before turning the power on, and the sound source is changed to prevent the speakers from being damaged by a sudden booming noise.

⑪ TAPE MONITOR SWITCH (TAPE monitor)

This switch is used for reproducing sounds with a tape or monitoring the sound during recording. The TAPE MONITOR INDICATOR lights up red when the switch is pressed down, indicating for reproduction by tape or monitoring the sound during recording.

⑫ FUNCTION SELECTORS (FUNCTION)

PHONO switch (phono): Press this switch to listen to a disc played on the turntable.

AUX/DAD switch (aux/DAD): Press this switch to listen to the program source connected to the AUX/DAD INPUT terminals.

AM switch (am): Press this switch to listen to an AM broadcasting program.

FM switch (fm): Press this switch to listen to an FM broadcasting program.

⑬ SIGNAL INDICATORS (FM/AM SIGNAL STRENGTH)

The receiving signal levels are indicated by 3 LEDs. The better the selected station is tuned in, the more LEDs light up. Adjust with the TUNING knob.

⑭ AUDIO MODE SELECTOR (audio mode)

This selector is used for the composition of sounds. Usually it is set at the stereo position (■ stereo/■ mono), but when it is set at "mono", sounds from the two channels are combined into a monaural reproduction. If the FM stereo broadcasting station you are listening to is weak and there is a lot of noise, set this switch at "mono". The sound becomes monaural, but the noise is reduced for more comfortable listening.

⑮ MUTING SWITCH (fm muting)

This switch functions to eliminate irritating interstation noises when the FM reception is being scanned for a station. To tune in to a weak station, press this switch down to invalidate the muting function.

⑯ TAPE MONITOR INDICATOR (monitor)

This indicator illuminates when the TAPE MONITOR switch is pressed to monitor the tape sound.

⑰ CENTER TUNED INDICATOR (center tuned)

A green light is turned on when an FM station is correctly tuned in. It may not light up when a weak station is tuned in.

⑱ TUNING KNOB

This knob is used to search for a broadcasting station. Turn the knob, looking at the SIGNAL INDICATOR to tune in to the desired station.

⑲ FM STEREO INDICATOR (stereo fm)

This indicator is illuminated when the FM stereo broadcasting station is tuned in.

⑳ FM ANTENNA TERMINALS (FM 300Ω BAL) (FM 75Ω UNBAL)

These terminals are connected with feeders from the FM antenna (a 300Ω parallel feeder cable, a 75Ω coaxial cable or the accessory feeder antenna).

㉑ AM ANTENNA TERMINAL (AM)

In a fringe reception area or inside a concrete building where the AM broadcasting signals are too weak for good reception, erect an AM outdoor antenna and connect this terminal to it.

㉒ GROUND TERMINAL (GND)

Connect this terminal to the ground wire of the turntable.

㉓ PHONO INPUT TERMINALS (PHONO INPUT)

Connect these terminals with the output cords of the turntable (Use MM-type cartridges).

㉔ AUX/DAD INPUT TERMINALS (AUX/DAD INPUT)

Use these terminals when another program source (such as a television tuner or compact disc player) is desired.

㉕ TAPE INPUT TERMINALS (TAPE IN)

Connect these terminals with the output terminals of the tape deck.

㉖ TAPE OUTPUT TERMINALS (TAPE OUT)

Connect these terminals with the input terminals of tape deck.

㉗ AM FERRITE LOOPSTIC ANTENNA

This antenna is used for AM reception. This high-sensitivity ferrite loopstic antenna requires no AM outdoor antenna except in a fringe reception area where signals are weak. Adjust the antenna back and forth and set it at the optimum reception.

㉘ SPEAKER SYSTEM 1 CONNECTOR TERMINALS (SPEAKER SYSTEM 1)

Connect these terminals to the speaker cords. Make certain that the left and the right channels are connected properly, and that the speaker polarities are not reversed.

㉙ SPEAKER SYSTEM 2 CONNECTOR TERMINALS (SPEAKER SYSTEM 2)

These terminals are for the 2nd speaker system. Connect them in the same manner as speaker system 1.

㉚ POWER LINE CORD

Connect this cord to the AC wall outlet.

㉛ AC CONVENIENCE OUTLET (SWITCHED)

This outlet can be used for the turntable, tape deck or other components. The component plugged in this outlet is turned ON and OFF when this unit is turned ON and OFF. The maximum allowable power is 180W.

SPECIFICATIONS

● FM SECTION

Tuning Range	Nominal	Limit
50dB Quieting Sensitivity	87.3 ~ 108.4MHz	
Mono	17.6dBf	< 20dBf
Stereo	36.1dBf	< 40dBf
Usable Sensitivity	12.4dBf	< 15dBf
Image Ratio	59.9dB	> 50dB
IF Rejection	87dB	> 80dB
Spurious Response Rejection	85dB	> 60dB
Capture Ratio	1.8dB	< 2.5dB
Alternate Channel Selectivity	62.8dB	> 50dB
AM Rejection	50.6dB	> 45dB
Signal to Noise Ratio		
Mono	81.5dB	> 78dB
Stereo	74.7dB	> 72dB
Total Harmonic Distortion		
Mono	0.07%	< 0.3%
Stereo	0.09%	< 0.35%
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AUX/DAD	51.3dB > 45dB
Phono	52dB > 45dB
IM Distortion Ratio	0.07% < 0.25%

RMS Output Power

8 Ω , 1kHz, THD 0.1%	34.4W > 30W
4 Ω , 1kHz, THD 0.15%	46.1W > 40W

Damping Factor at 1kHz

	71.6 > 60
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Tone Control Characteristics

Bass at 50Hz	
Boost	10dB \pm 1.5dB
Cut	-10dB \pm 1.5dB
Treble at 10kHz	
Boost	10dB \pm 1.5dB
Cut	-10dB \pm 1.5dB

Loudness Control

at 10kHz	3dB \pm 1dB
at 50Hz	10dB \pm 2dB

DC Output Voltage

L channel	0mV \pm 60mV
R channel	0mV \pm 60mV

RIAA Equalization at Tape Out (20Hz/20kHz)

	0.8dB +1.5dB	-0.3dB +1dB
	-0dB	-0.5dB

● DIMENSIONS

(W x H x D) 17-3/8" x 3-15/16" x 14-3/8"

(442 x 100 x 365 mm)

● WEIGHT

14.3 lbs (6.5kg)

● POWER SUPPLY

AC120V, 60Hz

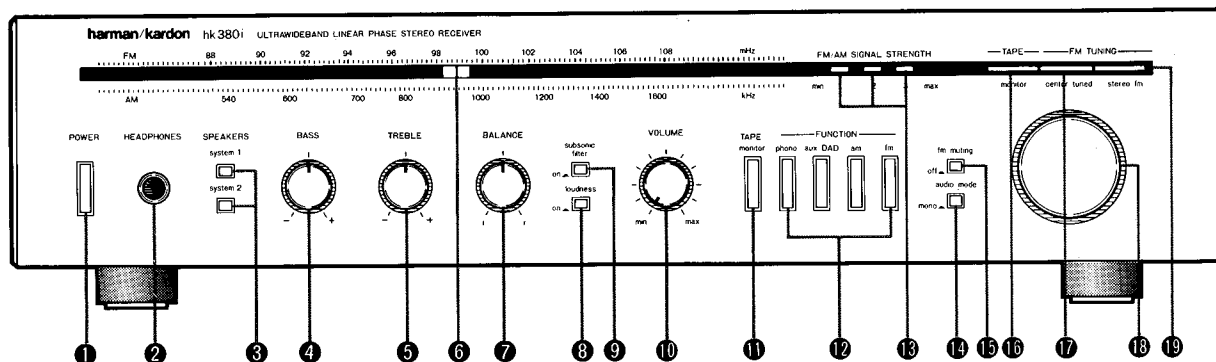
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200W (220VA)

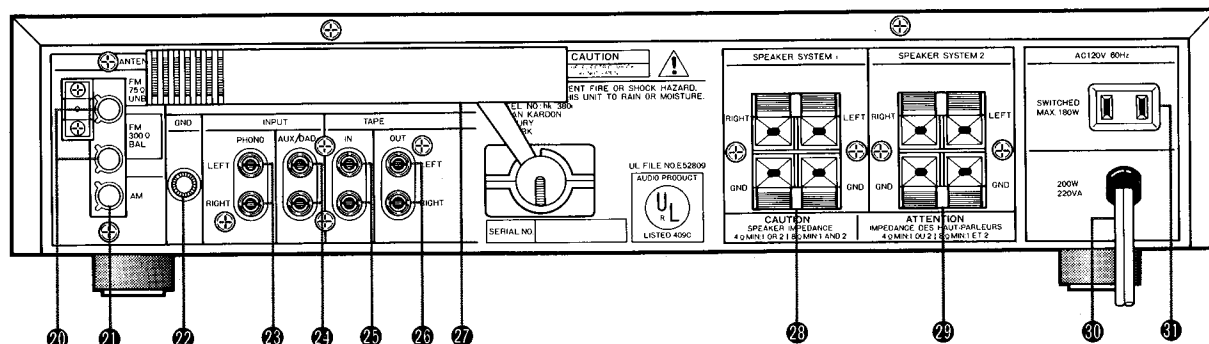
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
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㉓ PHONO INPUT TERMINALS (PHONO INPUT)

Connect these terminals with the output cords of the turntable (Use MM-type cartridges).

㉔ AUX/DAD INPUT TERMINALS (AUX/DAD INPUT)

Use these terminals when another program source (such as a television tuner or compact disc player) is desired.

㉕ TAPE INPUT TERMINALS (TAPE IN)

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㉖ TAPE OUTPUT TERMINALS (TAPE OUT)

Connect these terminals with the input terminals of tape deck.

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Connect these terminals to the speaker cords. Make certain that the left and the right channels are connected properly, and that the speaker polarities are not reversed.

㉙ SPEAKER SYSTEM 2 CONNECTOR TERMINALS (SPEAKER SYSTEM 2)

These terminals are for the 2nd speaker system. Connect them in the same manner as speaker system 1.

㉚ POWER LINE CORD

Connect this cord to the AC wall outlet.

㉛ AC CONVENIENCE OUTLET (SWITCHED)

This outlet can be used for the turntable, tape deck or other components. The component plugged in this outlet is turned ON and OFF when this unit is turned ON and OFF. The maximum allowable power is 180W.

DISASSEMBLY PROCEDURES

1 CABINET TOP REMOVAL

Remove the screws ① to ⑥ in Fig. 1 and then remove the cabinet top.

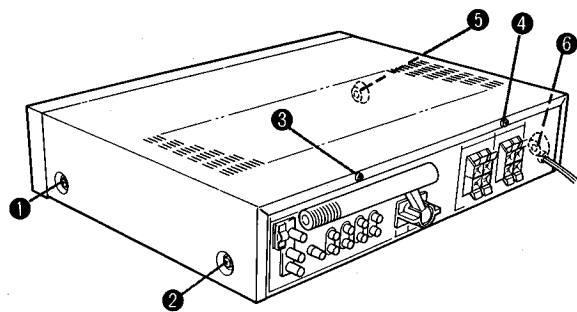


Fig. 1

2 CABINET BOTTOM REMOVAL

Remove the screws ① to ⑧ in Fig. 2 and then remove the cabinet bottom.

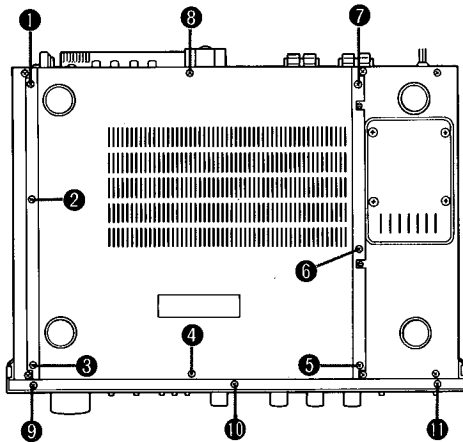


Fig. 2

3 FRONT PANEL ASSEMBLY REMOVAL

1. Remove the cabinet top. (Refer to step ①)
2. Pull out knobs of tuning, volume, balance, treble and bass.
3. Remove the screws ⑨ to ⑪ in Fig. 2 and ① to ③ in Fig. 3 and then remove the front panel assembly.

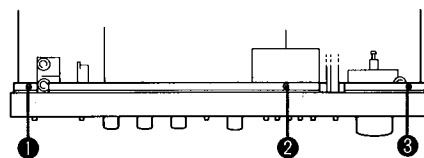


Fig. 3

4 INDICATORS HOLDER REMOVAL

1. Remove the front panel assembly. (Refer to step ③)
2. Remove the indicators holder hooks ① to ④ in Fig. 4 and then remove the indicators holder.

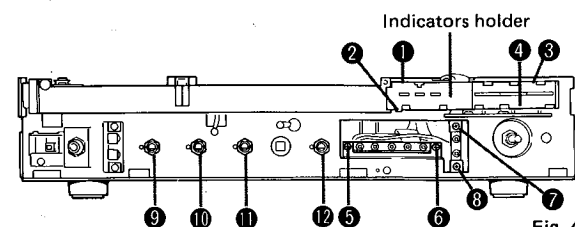


Fig. 4

5 TAPE MONITOR & FUNCTION SELECTOR SWITCHES P.C. BOARD REMOVAL

1. Remove the front panel assembly. (Refer to step ③)
2. Remove the dial string.
3. Unsolder the lead wires connected to the tape monitor & function selector switches P.C. board and disconnect the connector connected from tape monitor & function selector switches P.C. board.
4. Remove the screws ⑤ and ⑥ Fig. 4 and then remove the tape monitor & function selector switches P.C. board.

6 FM MUTING & AUDIO MODE SWITCHES P.C. BOARD REMOVAL

1. Remove the front panel assembly. (Refer to step ③)
2. Remove the screws ⑦ and ⑧ in Fig. 4 and then remove the fm muting & audio mode switches P.C. board.

7 POWER OUTPUT AND TUNER P.C. BOARDS REMOVAL

1. Remove the cabinet bottom. (Refer to step ②)
2. Remove each indicator P.C. boards of tape monitor, fm tuning and fm/am signal. (Refer to step ④)
3. Remove the tape monitor & function selector switches P.C. board. (Refer to step ⑤)
4. Unsolder the lead wires connected to the power output P.C. board and tuner P.C. board.
5. Remove the hexagonal nuts ⑨ to ⑫ in Fig. 4.
6. Unsolder each lead wires connected to the speaker terminal P.C. board, AM loopstick antenna and FM/AM antenna terminal P.C. board on the cabinet back.
7. Remove the screws ① to ⑦ in Fig. 5.
8. Remove the screws ① to ⑥ in Fig. 6 and then remove the cabinet back.
9. Remove the power output P.C. board backward, and remove the tuner P.C. board in the direction of an arrow shown in Fig. 5.

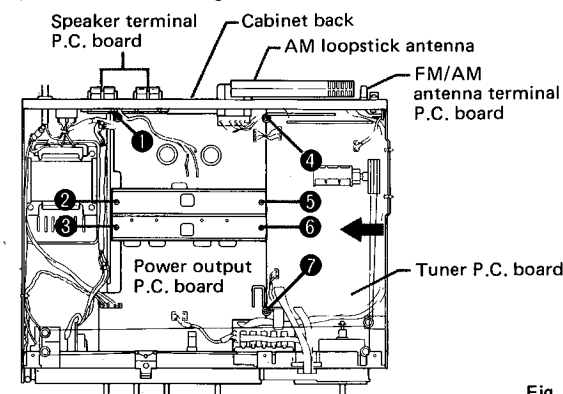


Fig. 5

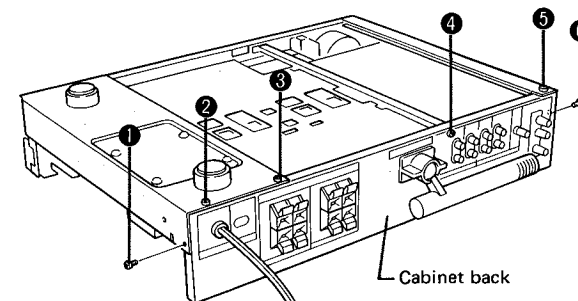
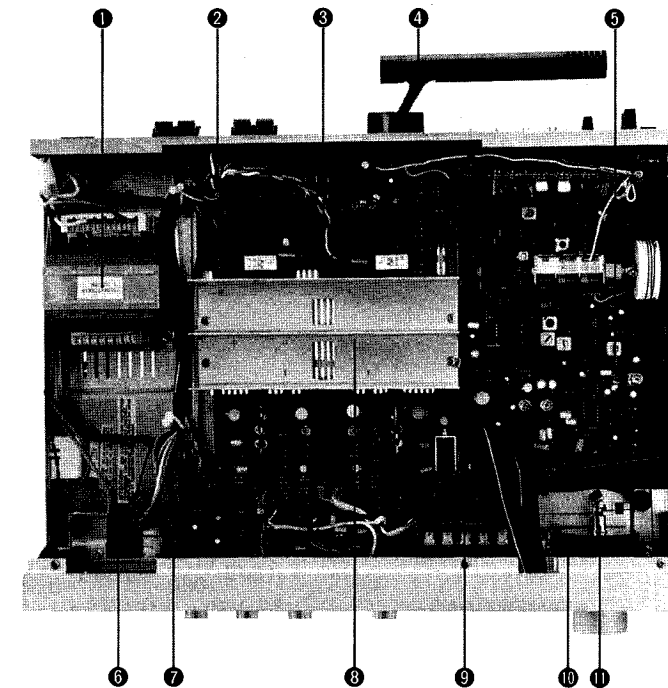


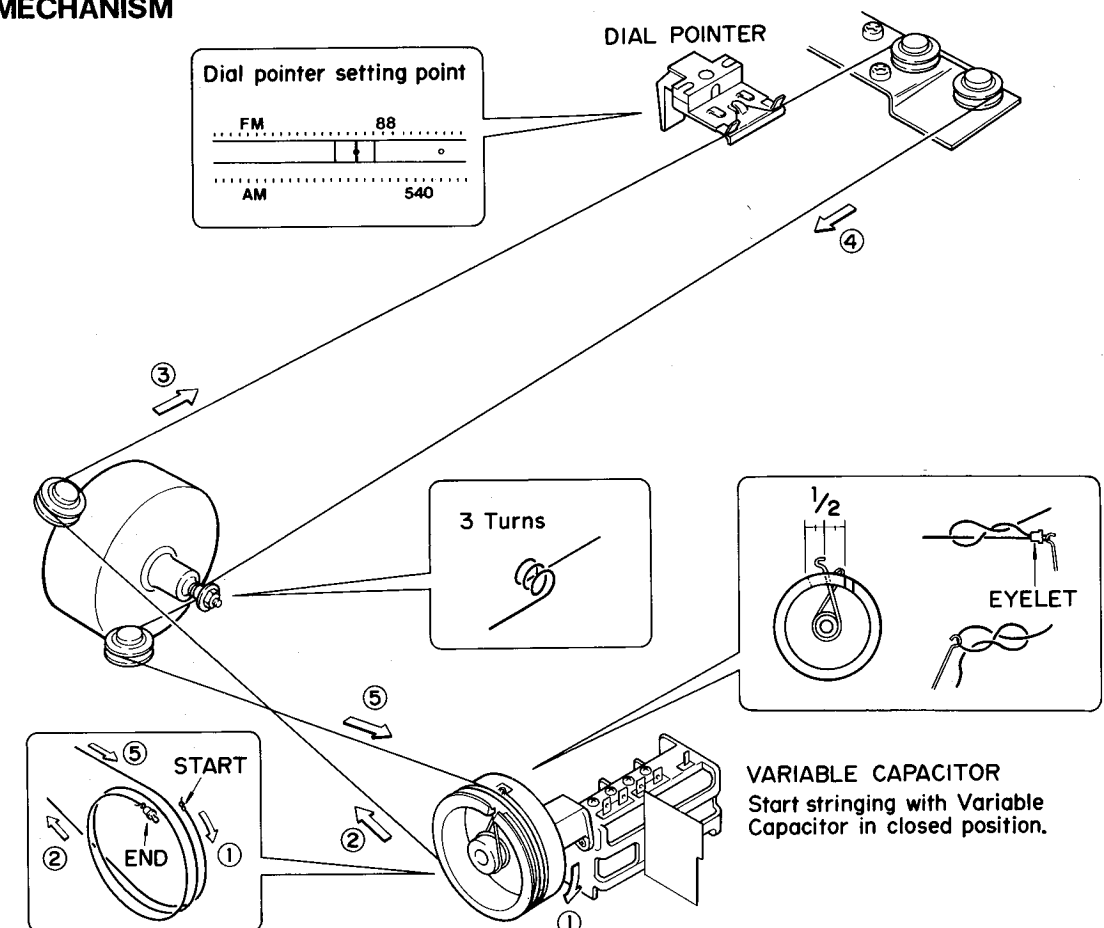
Fig. 6

INTERNAL VIEW



- ① POWER TRANSFORMER
- ② SPEAKER TERMINAL P.C. BOARD
- ③ POWER OUTPUT P.C. BOARD
- ④ FERRITE BAR ANTENNA
- ⑤ TUNER P.C. BOARD
- ⑥ HEADPHONE JACK P.C. BOARD
- ⑦ SPEAKER SELECTOR P.C. BOARD
- ⑧ HEAT SINK
- ⑨ TAPE MONITOR & FUNCTION SELECTOR SWITCHES P.C. BOARD
- ⑩ FM MUTING & AUDIO MODE SWITCHES P.C. BOARD
- ⑪ TUNING SHAFT

DIAL MECHANISM



DISASSEMBLY PROCEDURES

1 CABINET TOP REMOVAL

Remove the screws ① to ⑥ in Fig. 1 and then remove the cabinet top.

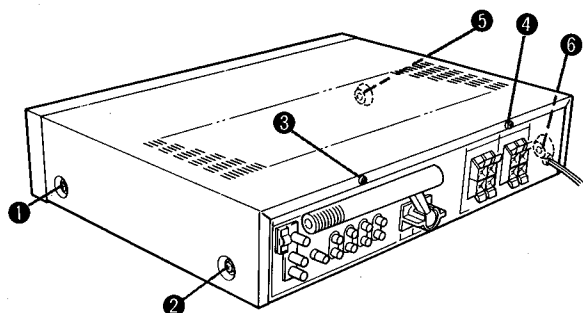


Fig. 1

2 CABINET BOTTOM REMOVAL

Remove the screws ① to ⑧ in Fig. 2 and then remove the cabinet bottom.

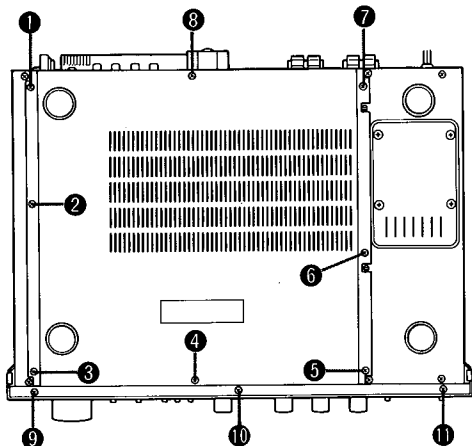


Fig. 2

3 FRONT PANEL ASSEMBLY REMOVAL

1. Remove the cabinet top. (Refer to step 1)
2. Pull out knobs of tuning, volume, balance, treble and bass.
3. Remove the screws ⑨ to ⑪ in Fig. 2 and ① to ③ in Fig. 3 and then remove the front panel assembly.

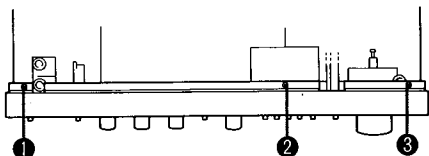


Fig. 3

4 INDICATORS HOLDER REMOVAL

1. Remove the front panel assembly. (Refer to step 3)
2. Remove the indicators holder hooks ① to ④ in Fig. 4 and then remove the indicators holder.

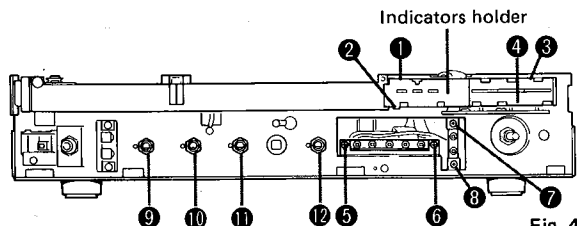


Fig. 4

5 TAPE MONITOR & FUNCTION SELECTOR SWITCHES P.C. BOARD REMOVAL

1. Remove the front panel assembly. (Refer to step 3)
2. Remove the dial string.
3. Unsolder the lead wires connected to the tape monitor & function selector switches P.C. board and disconnect the connector connected from tape monitor & function selector switches P.C. board.
4. Remove the screws ⑤ and ⑥ Fig. 4 and then remove the tape monitor & function selector switches P.C. board.

6 FM MUTING & AUDIO MODE SWITCHES P.C. BOARD REMOVAL

1. Remove the front panel assembly. (Refer to step 3)
2. Remove the screws ⑦ and ⑧ in Fig. 4 and then remove the fm muting & audio mode switches P.C. board.

7 POWER OUTPUT AND TUNER P.C. BOARDS REMOVAL

1. Remove the cabinet bottom. (Refer to step 2)
2. Remove each indicator P.C. boards of tape monitor, fm tuning and fm/am signal. (Refer to step 4)
3. Remove the tape monitor & function selector switches P.C. board. (Refer to step 5)
4. Unsolder the lead wires connected to the power output P.C. board and tuner P.C. board.
5. Remove the hexagonal nuts ⑨ to ⑫ in Fig. 4.
6. Unsolder each lead wires connected to the speaker terminal P.C. board, AM loopstick antenna and FM/AM antenna terminal P.C. board on the cabinet back.
7. Remove the screws ① to ⑦ in Fig. 5.
8. Remove the screws ① to ⑥ in Fig. 6 and then remove the cabinet back.
9. Remove the power output P.C. board backward, and remove the tuner P.C. board in the direction of an arrow shown in Fig. 5.

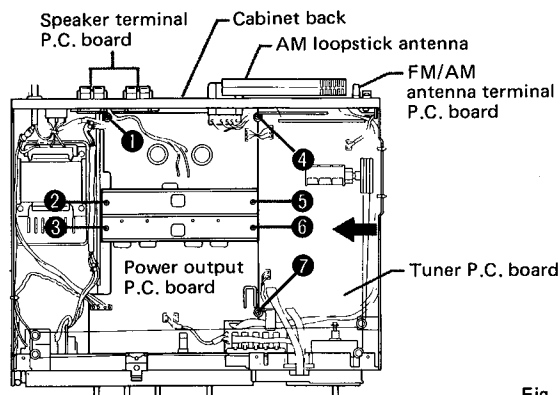


Fig. 5

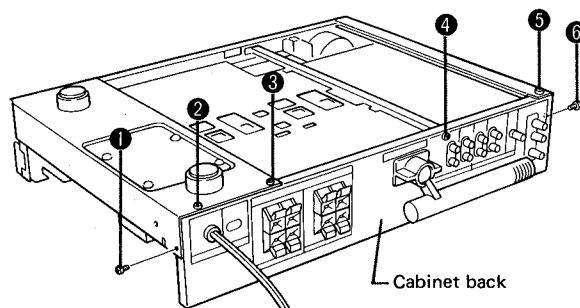
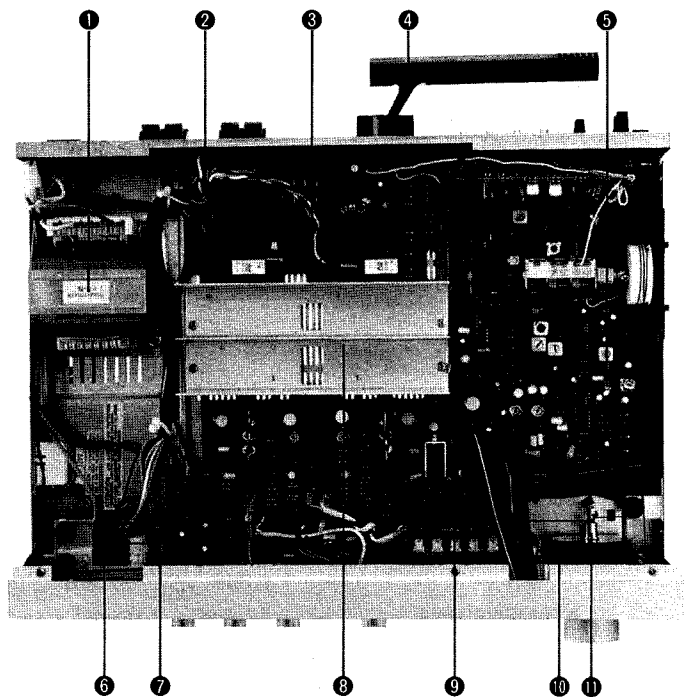


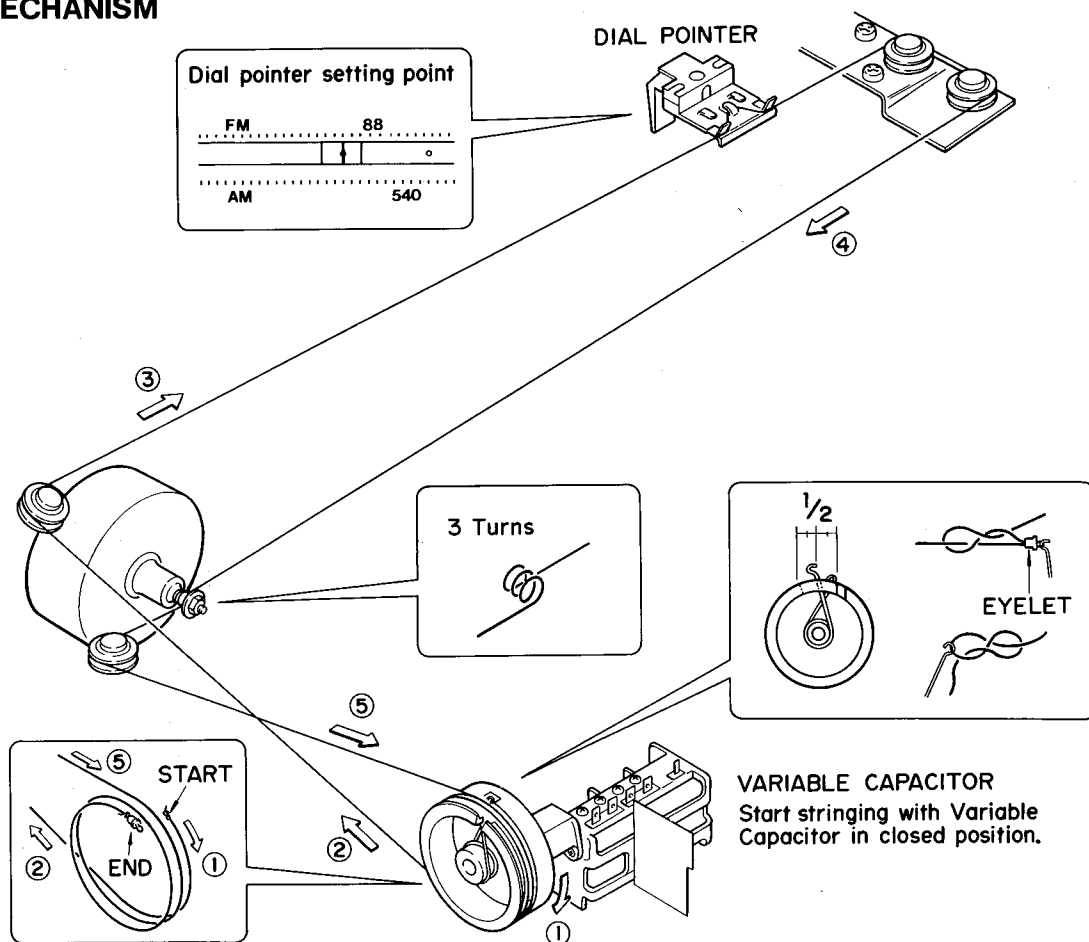
Fig. 6

INTERNAL VIEW



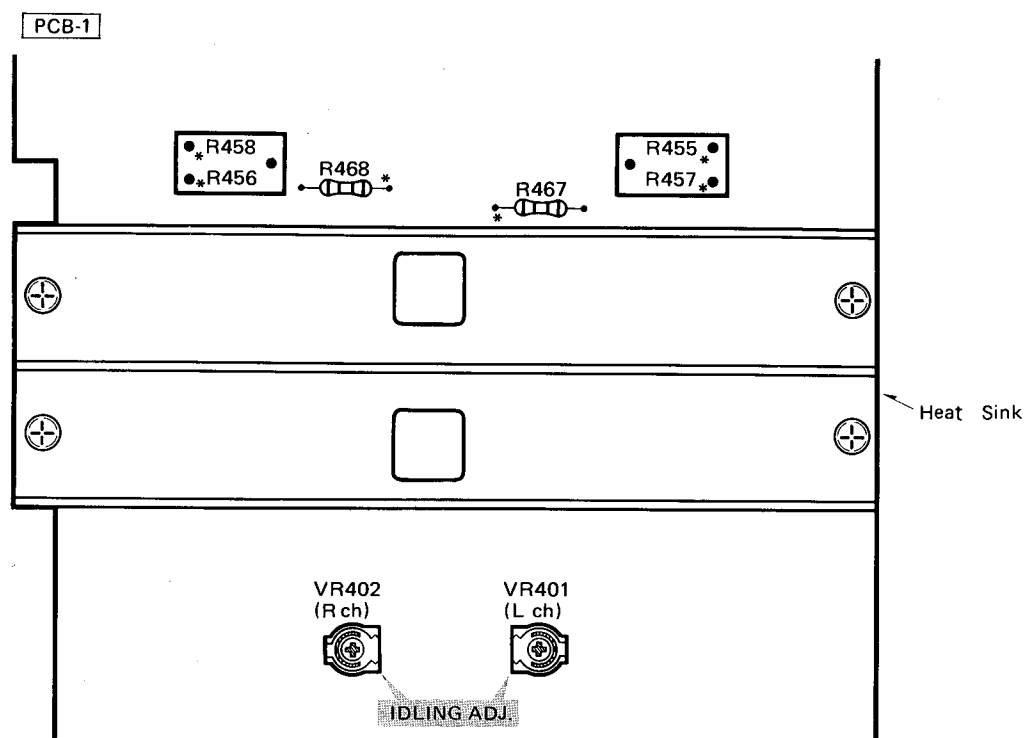
- ① POWER TRANSFORMER
- ② SPEAKER TERMINAL P.C. BOARD
- ③ POWER OUTPUT P.C. BOARD
- ④ FERRITE BAR ANTENNA
- ⑤ TUNER P.C. BOARD
- ⑥ HEADPHONE JACK P.C. BOARD
- ⑦ SPEAKER SELECTOR P.C. BOARD
- ⑧ HEAT SINK
- ⑨ TAPE MONITOR & FUNCTION SELECTOR SWITCHES P.C. BOARD
- ⑩ FM MUTING & AUDIO MODE SWITCHES P.C. BOARD
- ⑪ TUNING SHAFT

DIAL MECHANISM



ALIGNMENT PROCEDURES

■ AMPLIFIER SECTION



● Idling adjustment

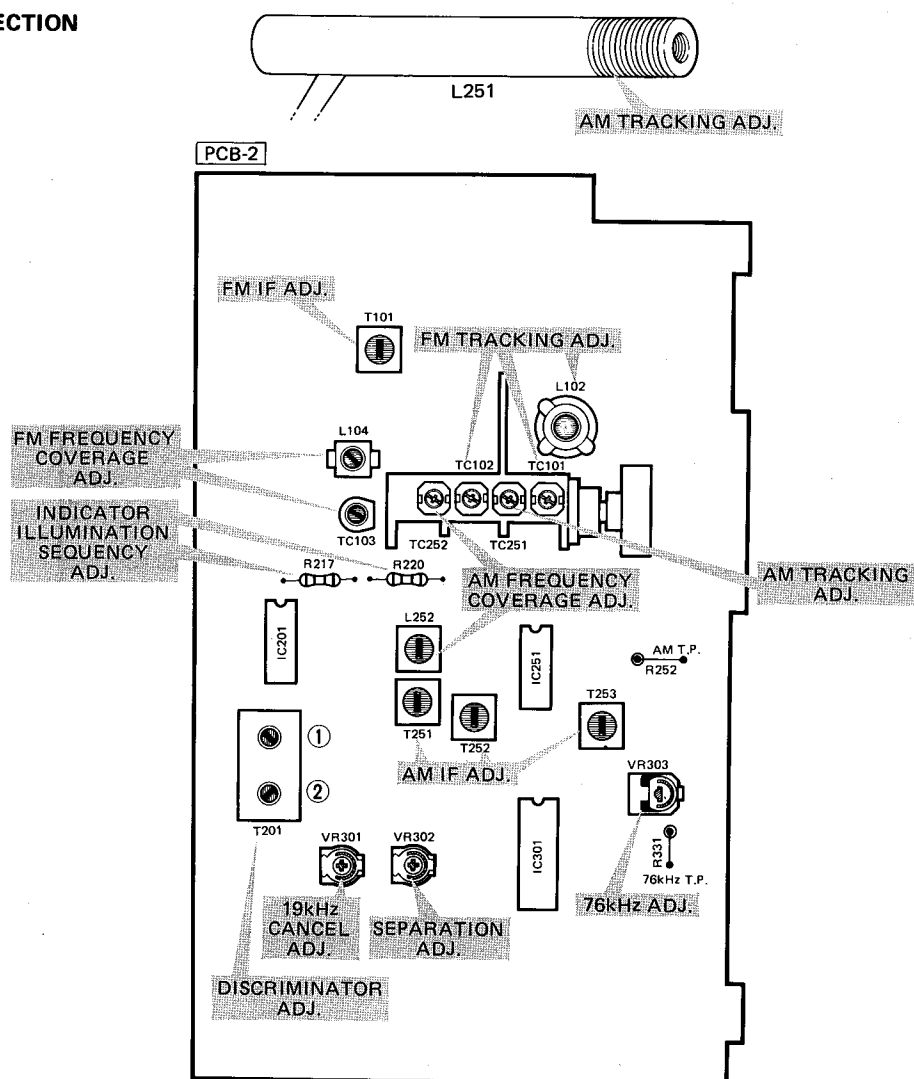
- Conditions:
- Set the function switch to AUX/DAD.
 - Set the volume to minimum.
 - Set the speaker system switches 1 and 2 to OFF.
 - Make the adjustment at a room temperature of 25°C.

Step	Connections required	Adjustment location	Adjustment value
1	Connect the digital voltmeter to the points marked * by R455 and R457.	VR401 (L channel)	39 mV
2	Connect the digital voltmeter to the points marked * by R456 and R458.	VR402 (R channel)	39 mV
3	Repeat steps 1 and 2 after aging for 15 minutes.	VR401/VR402	39 mV/39 mV

● DC Balance confirmation

Step	Connections required	Correct value
1	Connect the digital voltmeter between the point marked * by R468 (22Ω) and GND.	0 ± 60 mV
2	Connect the digital voltmeter between the point marked * by R467 (22Ω) and GND.	0 ± 60 mV

TUNER SECTION



1. AM ALIGNMENT

- Conditions:
- Set the AM switch to ON.
 - Standard modulation of the AM signal generator is 400 Hz at 30%.
 - Connect loop consisting of several turns of wire across signal generator leads. Place loop close enough to couple signal into the ferrite loopstick antenna (L251).

Step	Item	Connections required	Measurement frequency	Meter reading	Adjustment location	Adjustment method
1	IF adjustment	<ul style="list-style-type: none"> • Connect the INPUT terminals of the AM signal generator between R252 (+) and GND (-). • Set the variable condenser for tuning to the position at which its capacity is smallest. 		Maximum	T253	Turn the core of T253 all the way out.
2				Maximum	T251 T252	Adjust so that the peak of the waveform is at 450 kHz.
3				Maximum	T253	Maximize the output level.
4	Frequency coverage (band edge) adjustment	<ul style="list-style-type: none"> • Connect the VTVM between R252 (+) and GND (-). • Make the input signal as weak as possible. 	515 kHz	Minimum	L252	Maximize the output level.
5			1680 kHz	Maximum	TC252	Maximize the output level.
6		Repeat steps 4 and 5.				
7	Tracking adjustment	<ul style="list-style-type: none"> • Connect the VTVM between R252 (+) and GND (-). • Make the input signal as weak as possible. 	1400 kHz	1400 kHz	TC251	Maximize the output level.
8			600 kHz	600 kHz	L251	Maximize the output level.
9		Repeat steps 7 and 8.				

2. FM ALIGNMENT

Conditions: • Set the FM switch to ON and MUTING switch to OFF.

- Step 1 to 12: Connect the FM signal generator (1 kHz, 100% modulation) to FM 300 Ω BAL ANT terminals through the 300 Ω balanced dummy.

- Step 13 to 16: Connect the stereo modulator (L + R = 46%, L - R = 46%, 19 kHz = 8%) to FM signal generator. Apply signal generator output to FM 300 Ω BAL ANT terminals through 300 Ω balanced dummy.

Step	Item	Connections required	Measurement frequency	Meter reading	Adjustment location	Adjustment method
1	IF adjustment	• Connect the VTVM between the (+) and (-) TAPE OUT terminals.			T101	Maximize the noise level.
2	Frequency coverage adjustment	• Connect the VTVM between the (+) and (-) TAPE OUT terminals.	87.3 MHz	Minimum	L104	Maximize the output level.
3		• Apply FM MONO signal input which is as weak as possible.	108.4 MHz	Maximum	TC103	Maximize the output level.
4		Repeat steps 2 and 3.				
5	Tracking adjustment	• Connect the VTVM between the (+) and (-) TAPE OUT terminals.	90 MHz	90 MHz	L102	Maximize the output level.
6		• Apply FM MONO signal input which is as weak as possible.	106 MHz	106 MHz	TC101 TC102	Maximize the output level.
7		Repeat steps 5 and 6.				
8	Discriminator adjustment	• Connect the distortion meter and VTVM between the (+) and (-) TAPE OUT terminals.	98 MHz	98 MHz	T201 ①	Maximize the output level.
9		• Apply a 2 μ V FM MONO signal, tune, then raise the input level to 1 mV.	98 MHz	98 MHz	T201 ②	Minimize the output level.
10		Repeat steps 8 and 9.				
11		Observe the distortion.	98 MHz	98 MHz	T201 ②	Minimize the distortion level.
12	MPX adjustment	• Connect the frequency counter between R331 and GND. • Connect the VTVM between the (+) and (-) TAPE OUT terminals. • Apply a 2 μ V FM MONO signal, tune, then raise the input level to 1 mV and remove modulation.	98 MHz	98 MHz	VR303	75.95 \pm 0.05 kHz
13		• After tuning, apply a 1 mV FM STEREO signal with modulation at 19 kHz only.	98 MHz	98 MHz	VR301	Minimize leakage at 19 kHz with the R and L channels at the same level.
14		• Apply a modulated stereo signal to the L channel only.	98 MHz	98 MHz	VR302	Minimize leakage to the R channel.
15		• Apply a modulated stereo signal to the R channel only.	98 MHz	98 MHz	VR302	Minimize leakage to the L channel.
16					VR302	Adjust R and L channels leakage to the same level.

3. SIGNAL INDICATOR AND CENTER TUNING INDICATOR ILLUMINATION SEQUENCE CHECK

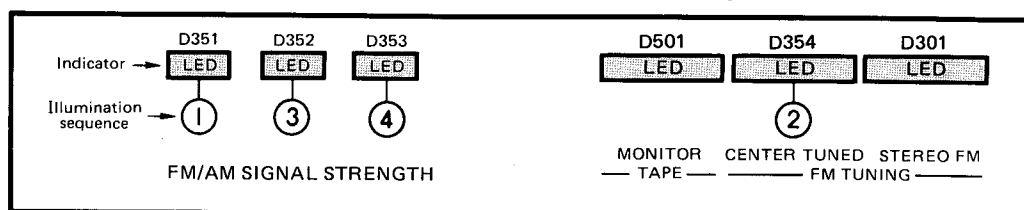
Conditions: Set the FM switch to ON and the MUTING switch to OFF.

- A) Tune with a weak FM MONO signal at 98 MHz, then raise the input level. Confirm that the indicators light in the following sequence.

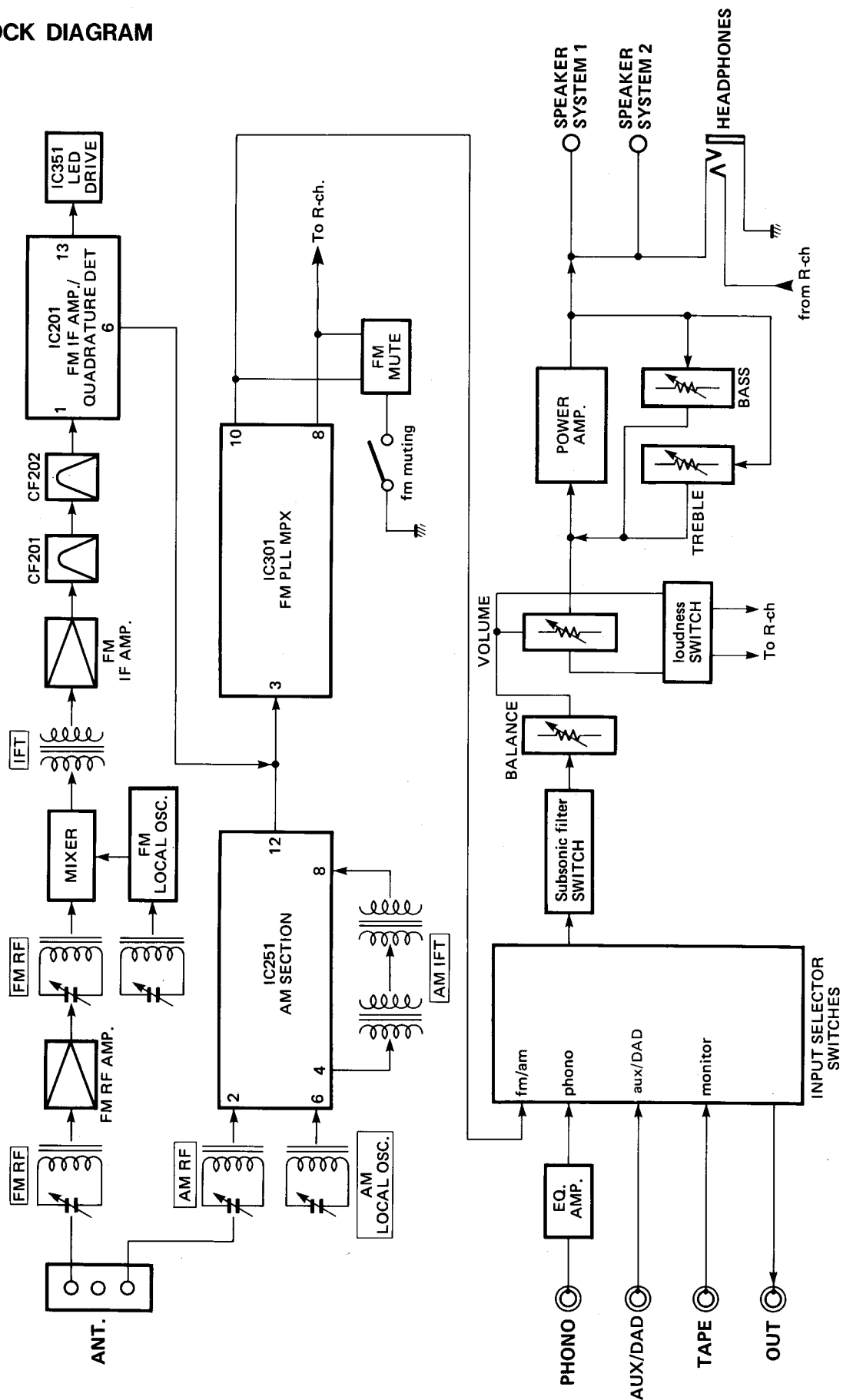
B) Adjust as follows if the indicators do not light in the indicated sequence.

* When ① and ② are reversed, remove R220 (68 k Ω) and check again.

* When ② and ③ are reversed, remove R217 (33 k Ω) and check again.



BLOCK DIAGRAM



CIRCUIT DESCRIPTION

• TUNER

1. FM Signal

The FM signal entering from the antenna passes through the FM RF coil's tuning circuit, is amplified by the FM RF amplifier, then enters the mixer. There it is mixed with the signal from the local oscillator to produce the intermediate frequency, which is fed to the IF transformer. In this superheterodyne system, the signal is then further amplified by the IF amplifier after passing through the IF transformer; then it passes through CF201 and CF202 (which increase isolation), is amplified again by the IF amplifier of IC201, and demodulated by the quadrature detector to produce the audio signal. The demodulated audio signal enters pin 4 of IC301, where it is separated into right and left channels by the FM PLL MPX circuit. These channels are then output from pins 8 (R-channel) and 10 (L-channel) to the input selector switches.

2. FM Muting

Muting of the FM signal is turned on and off by the FM muting switch on the panel. During muting, the signals from pins 10 and 8 of IC301 are cut.

3. AM Signal

As with the FM signal, the AM signal is first tuned to select the station (by the AM RF tuning circuit), after which it enters pin 2 of IC251 (the AM section). IC251 is a single chip which amplifies the AM RF signal and the AF IF signal, as well as demodulating the AM signal. The demodulated audio signal is output from pin 12 of this IC, after which it enters pin 3 of IC301 in the same manner as with the FM signal and is output from pins 8 and 10.

• AMPLIFIER

The input and output terminals include the PHONO terminal, AUX/DAD terminal, TAPE IN terminal, and OUT terminal. The signal entering from the PHONO terminal is subjected to equalization by an RIAA standard equalizer amplifier, after which it passes to the input selector switches.

The signals from the AUX/DAD and TAPE IN terminals enter the input selector switches directly.

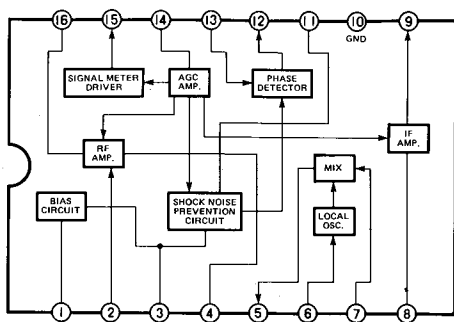
When the PHONO or AUX/DAD switches are set to ON, their respective signals are output to the OUT terminal.

The signal from the tuner is also input to the input selector switches, which select one of the signals from among the PHONO, AUX/DAD, TAPE IN, and tuner signals for output.

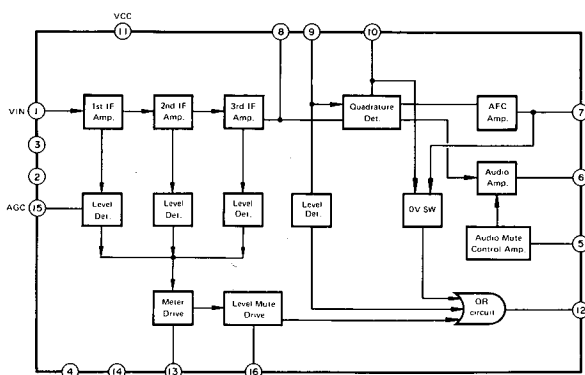
The signal output passes through the balance control and the volume control circuit, is amplified by the power output stage (which consists of a differential amplifier), then is output to the speaker terminals. The tone control circuit (for the treble and bass), which is located in this power output amplifier's feed back loop, changes the equalization characteristics of the circuit.

IC FUNCTIONAL BLOCK DIAGRAM

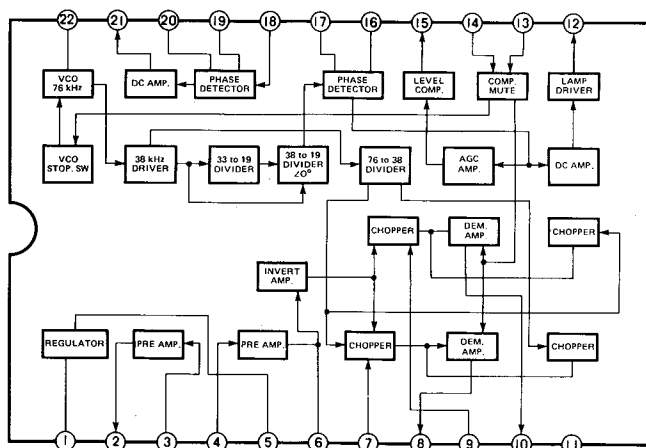
IC251 μ PC1243C



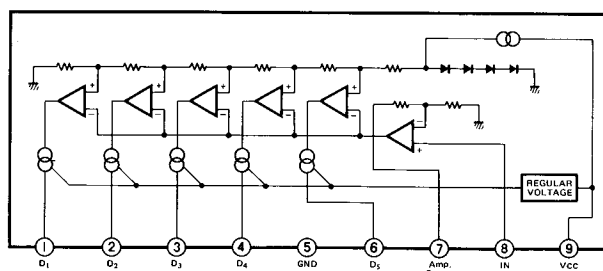
IC201 HA11225



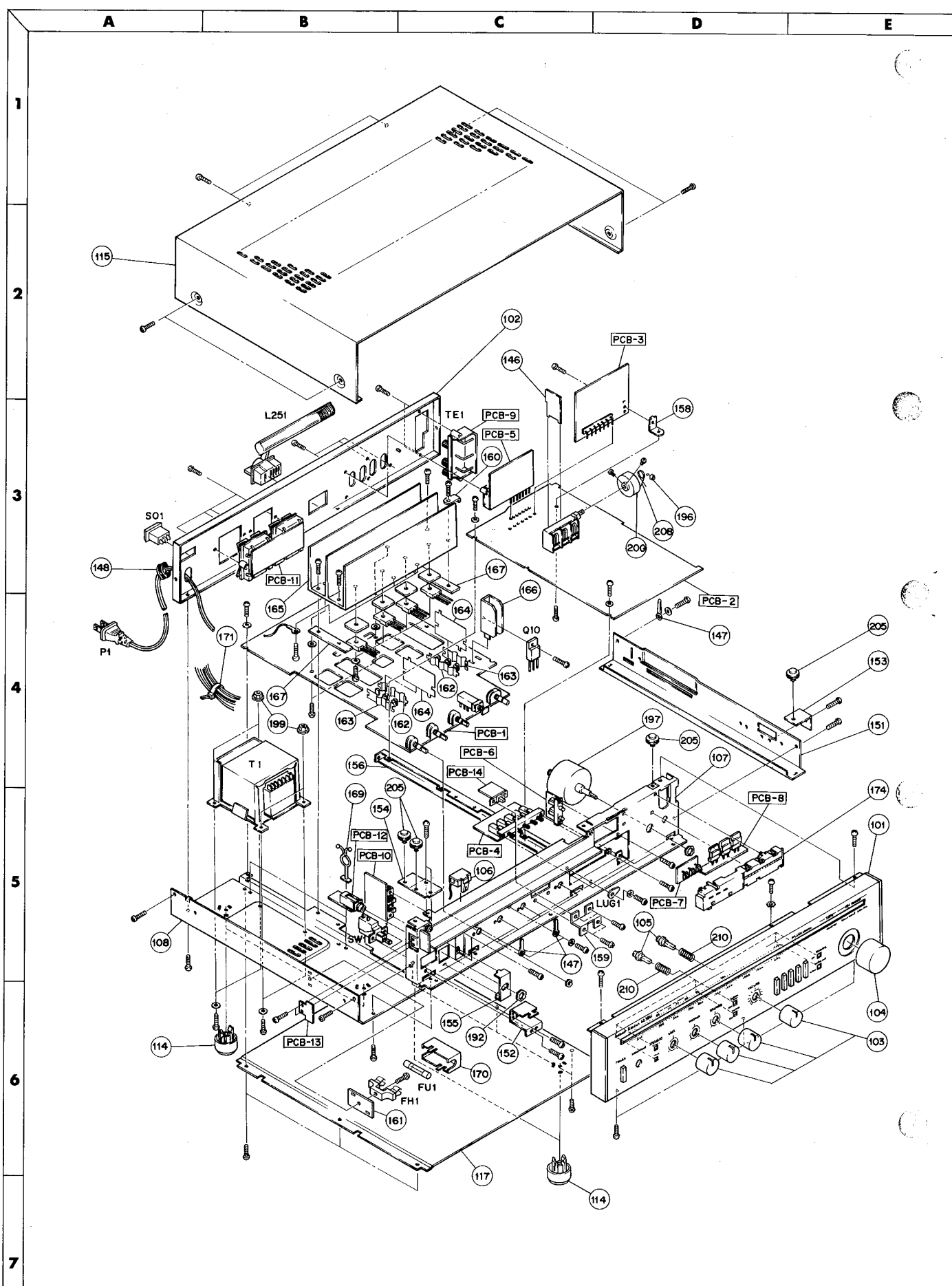
IC301 μ PC1223C



IC351 BA6124



GENERAL UNIT EXPLODED VIEW



GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-HK380A	Front Panel Assembly (Includes: Power and Function Buttons)
102	A424-HK380A	Cabinet Back Assembly (Includes: Ground Terminal)
102	A424-HK380B	Cabinet Back Assembly (for Canadian Model)
103	A630-HK380A	Knob Assembly, Bass, Treble, Balance, Volume
104	A630-HK380B	Knob Assembly, Tuning
105	A662-HK380A	Push Button Assembly, Speakers, Subsonic Filter, Loudness, FM Muting, Audio Mode
106	A672-HK380A	Dial Pointer Assembly (Includes: Lamp)
107	B211-HK380A	Chassis Assembly, Front (Includes: Dial Back Plate)
108	B211-HK380B	Chassis Assembly, Power Transformer
114	1319-0139	Foot
115	1414-03401	Cabinet Top
117	1424-08701	Cabinet Bottom
146	2216-7056	Shield Plate
147	2218-7001	Holding Bracket
148	2114-415027	Bushing
151	2211-7234	Chassis
152	2219-7782	Bracket
153	2219-7877	Bracket
154	2219-7878	Bracket
155	2219-7879	Bracket
156	2219-7880	Bracket
158	2219-7415	Bracket
159	2219-7906	Bracket
160	2214-27	Bracket
161	2224-7061	Insulator
162	2222-7100	Heat Sink
163	2222-7101	Heat Sink
164	2222-7103	Heat Sink
165	2222-7145	Heat Sink
166	2222-7089	Heat Sink
167	2224-7069	Insulator
169	2240-7050	Holder
170	2240-7118	Fuse Protector
171	2240-7120	Holder
174	2240-7195	Holder
192	2440-61	Special Nut
196	2424-20351	Eyelet
197	2602-007114	Tuning Shaft
199	2440-60	Special Nut
200	2611-7154	Dial Drum
205	2612-7001	Pulley
208	2651-0000111	Spring
210	2651-210187	Spring

ELECTRICAL PARTS LIST

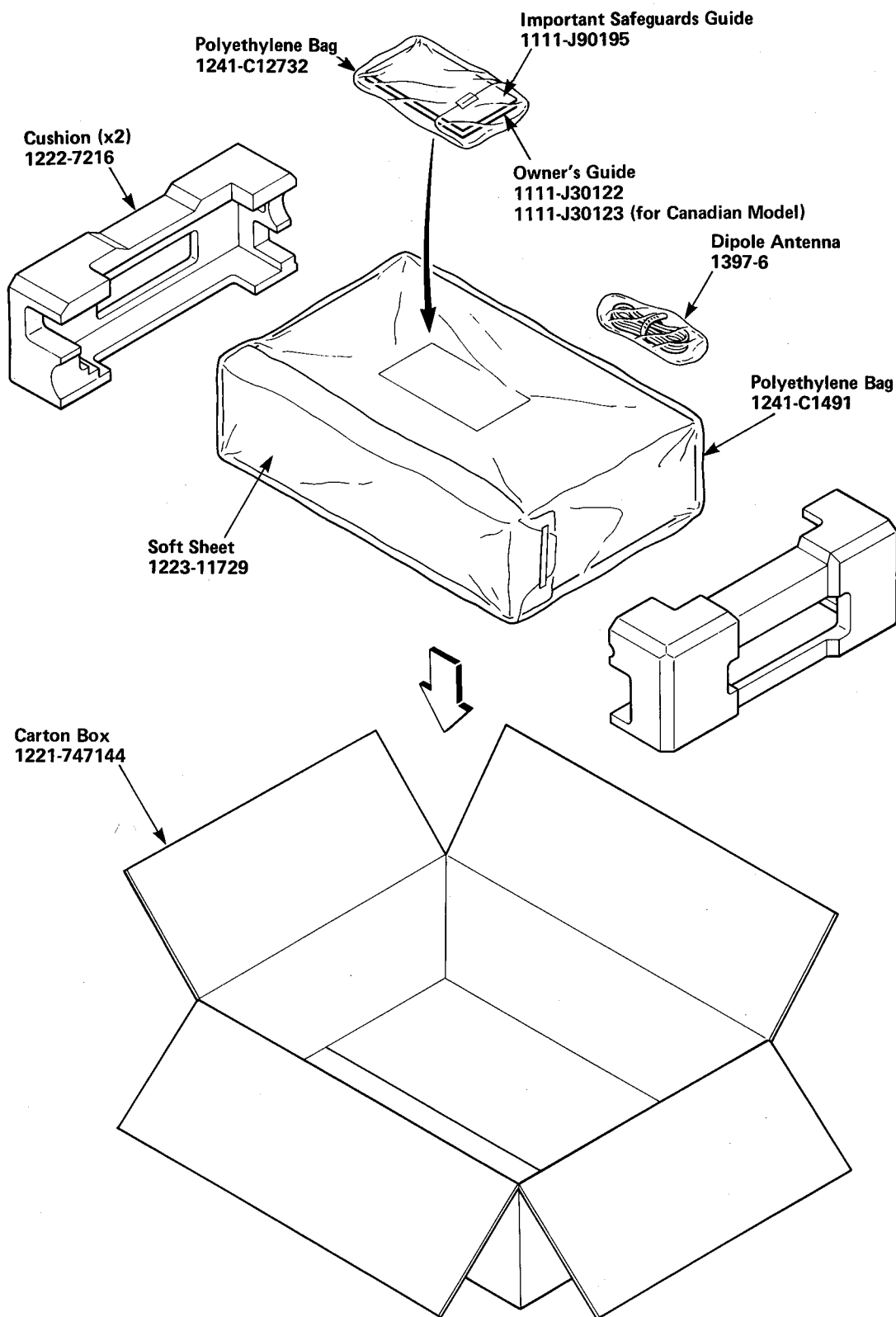
Ref. No.	Part No.	Description
CHASSIS MISCELLANEOUS		
P1	4161-71151	Power Line Cord
T1	5584-701418	Power Transformer
SO1	4474-164	AC Outlet, Switched
CO1	4443-712	Connector, Power Line Cord
SW1	4431-A01716	Push Switch, Power
FU1	5732-402031	Fuse, 4A, 125V
C16	5361-1030419	Capacitor, 0.01 μ F, +100% -0%, AC125V, Ceramic
R38	5135-335J50P	Resistor, 3.3M Ω , \pm 5%, 1/2W, Carbon
PL2	5731-1207252	Lamp, 12V, 60mA, Dial Pointer
FH1	4472-0125	Fuse Holder
L251	5911-230	AM Ferrite Loopstick Antenna
JM101, 102	4242-035202	Jumper Lead, 3-Wire
JM103	4242-070062	Jumper Lead, 7-Wire
JM104, 501, 502	4242-030012	Jumper Lead, 3-Wire
JM105	4242-047015	Jumper Lead, 4-Wire
JM351	4242-052002	Jumper Lead, 5-Wire
JM352	4242-050042	Jumper Lead, 5-Wire
JM451	4242-030802	Jumper Lead, 3-Wire
LUG1	4211-4	Lug Terminal
PCB-1 POWER OUTPUT P.C. BOARD		
RESISTORS		
R30	5102-4R74713	4.7 Ω , \pm 2%, 1/4W, Fuse
R33	5102-2714713	270 Ω , \pm 2%, 1/4W, Fuse
R34	5102-1814713	180 Ω , \pm 2%, 1/4W, Fuse
R40	5102-5604713	56 Ω , \pm 2%, 1/4W, Fuse
R415, 416	5174-681381	680 Ω , \pm 1%, 1/4W, Metal
R417, 418, 419, 420, 421, 422, 479, 480	5102-3314713	330 Ω , \pm 2%, 1/4W, Fuse
R429, 430	5174-111381	110 Ω , \pm 1%, 1/4W, Metal
R431, 432, 437, 438	5174-330381	33 Ω , \pm 1%, 1/4W, Metal
R439, 440, 445, 446	5102-2204715	22 Ω , \pm 2%, 1/4W, Fuse
R447, 448	5174-820381	82 Ω , \pm 1%, 1/4W, Metal
R455/457, 456/458	5273-R33672	0.33 Ω , \pm 10%, 3Wx2, Cement
R475, 476	5175-150571	15 Ω , \pm 5%, 3W, Metal
R487, 488	5171-1R5572	1.5 Ω , \pm 2%, 1W, Metal
CONTROLS		
VR401, 402	5101-20171920	200 Ω B
VR501, 502	5113-50385122	50k Ω MN, Balance
VR503, 504	5113-10476122	100k Ω B, Volume
VR505, 506	5113-10486122	100k Ω C, Bass
VR507, 508	5113-50387122	50k Ω C, Treble
CAPACITORS		
C3	5345-106C041	10 μ F, \pm 20%, 16V, Electrolytic
C4	5345-476C041	47 μ F, \pm 20%, 16V, Electrolytic
C5	5345-476E041	47 μ F, \pm 20%, 35V, Electrolytic
C7	5345-337C041	330 μ F, \pm 20%, 16V, Electrolytic
C10, 11	5352-1041960	0.1 μ F, \pm 20%, 100V, Metalized Polyester
C12, 13	5341-808Y0959	8000 μ F, \pm 20%, 45V, Electrolytic
C20	5345-107C041	100 μ F, \pm 20%, 16V, Electrolytic
C401, 402	5345-476B0951	47 μ F, \pm 20%, 10V, Electrolytic
C405, 406	5345-227A041	220 μ F, \pm 20%, 6.3V, Electrolytic
C407, 408, 413, 414	5345-227F041	220 μ F, \pm 20%, 50V, Electrolytic
C411, 412	5359-1015851	100pF, \pm 5%, 100V, Polypropylene
C417, 418	5345-106E041	10 μ F, \pm 20%, 35V, Electrolytic
C421, 422, 517, 518	5359-2215851	220pF, \pm 5%, 100V, Polypropylene
C427, 428	5353-020934	2pF, \pm 0.5pF, 500V, Mica

Ref. No.	Part No.	Description
C503, 504	5359-1815851	180pF, $\pm 5\%$, 100V, Polypropylene
C505, 506	5345-225F0951	2.2 μ F, $\pm 50\%$, 50V, Electrolytic
C511, 512	5345-106C0951	10 μ F, $\pm 20\%$, 16V, Electrolytic
TRANSISTORS		
Q1, 7, 8, 13	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q3, 4	5611-872(E)	2SA872(E)
Q5, 9, 405, 406	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q10	5613-1419(C)	2SC1419(C)
Q401, 402, 403, 404	5613-2240(BL)	2SC2240(BL)
Q407, 408, 409, 410	5611-970(BL)	2SA970(BL)
Q411, 412	5612-646A(C)	2SB646A(C)
Q413, 414	5614-666A(C)	2SD666A(C)
Q415, 416	5613-945(K)	2SC945(K) or 2SC945(P)
Q417, 418	5614-667A(C)	2SD667A(C)
Q419, 420	5612-647A(C)	2SB647A(C)
Q421, 422	5613-3181(O)	2SC3181(O) (w/Insulator)
Q423, 424	5611-1264(O)	2SA1264(O) (w/Insulator)
DIODES		
D1, 15, 401, 402, 403, 404	5636-1SS53	1SS53
D3	5635-RD11EB2	Zener, RD11EB2
D4, 5	5636-1S2471	1S2471
D6, 7, 8, 9	5632-ERC102FL	ERC102FL
D10	5635-RD15EB2	Zener, RD15EB2
D407, 408, 409, 410	5632-DS135E	DS135E
D411, 412	5641-MV12YM	Varistor, MV12YM
COILS		
L405, 406	5991-7165	
MISCELLANEOUS		
SW501	4431-A027410	Push Switch, Loudness
PCB-2 TUNER P.C. BOARD		
RESISTORS		
R261, 304	5102-2204713	22 Ω , $\pm 2\%$, 1/4W, Fuse
R321	5174-183381	18k Ω , $\pm 1\%$, 1/4W, Metal
CONTROLS		
VR301, 302	5101-10471920	100k Ω B
VR303	5101-1037187	10k Ω B
CAPACITORS		
C6	5345-108C041	1000 μ F, $\pm 20\%$, 16V, Electrolytic
C205	5359-1015851	100pF, $\pm 5\%$, 100V, Polypropylene
C206	5345-105-50	1 μ F, +75% -10%, 50V, Electrolytic
C207, 303	5345-L226M16	22 μ F, $\pm 20\%$, 16V, Electrolytic
C208, 351, 354, 355	5345-106-16	10 μ F, +50% -10%, 16V, Electrolytic
C254, 261, 301	5345-226-16	22 μ F, +50% -10%, 16V, Electrolytic
C264, 265	5345-475-25	4.7 μ F, +75% -10%, 25V, Electrolytic
C269	5345-L104M50	0.1 μ F, $\pm 20\%$, 50V, Electrolytic
C302	5345-L107M10	100 μ F, $\pm 20\%$, 10V, Electrolytic
C304	5345-476-16	47 μ F, +50% -10%, 16V, Electrolytic
C305	5345-227-16	220 μ F, +50% -10%, 16V, Electrolytic
C307, 308	5359-9115851	910pF, $\pm 5\%$, 100V, Polypropylene
C309, 310	5345-L225M50	2.2 μ F, $\pm 20\%$, 50V, Electrolytic
C313	5345-L106M16	10 μ F, $\pm 20\%$, 16V, Electrolytic
C314	5345-L475M25	4.7 μ F, $\pm 20\%$, 25V, Electrolytic
C315	5345-L474M50	0.47 μ F, $\pm 20\%$, 50V, Electrolytic
C318	5359-8215851	820pF, $\pm 5\%$, 100V, Polypropylene
C321, 322	5359-4715851	470pF, $\pm 5\%$, 100V, Polypropylene
C352, 353	5345-474-50	0.47 μ F, +75% -10%, 50V, Electrolytic
VC101, 102, 103, 251, 252	5315-7111	Variable Capacitor (w/Trimmers TC101, 102, 251, 252)
TC103	5371-91	Trimmer Capacitor

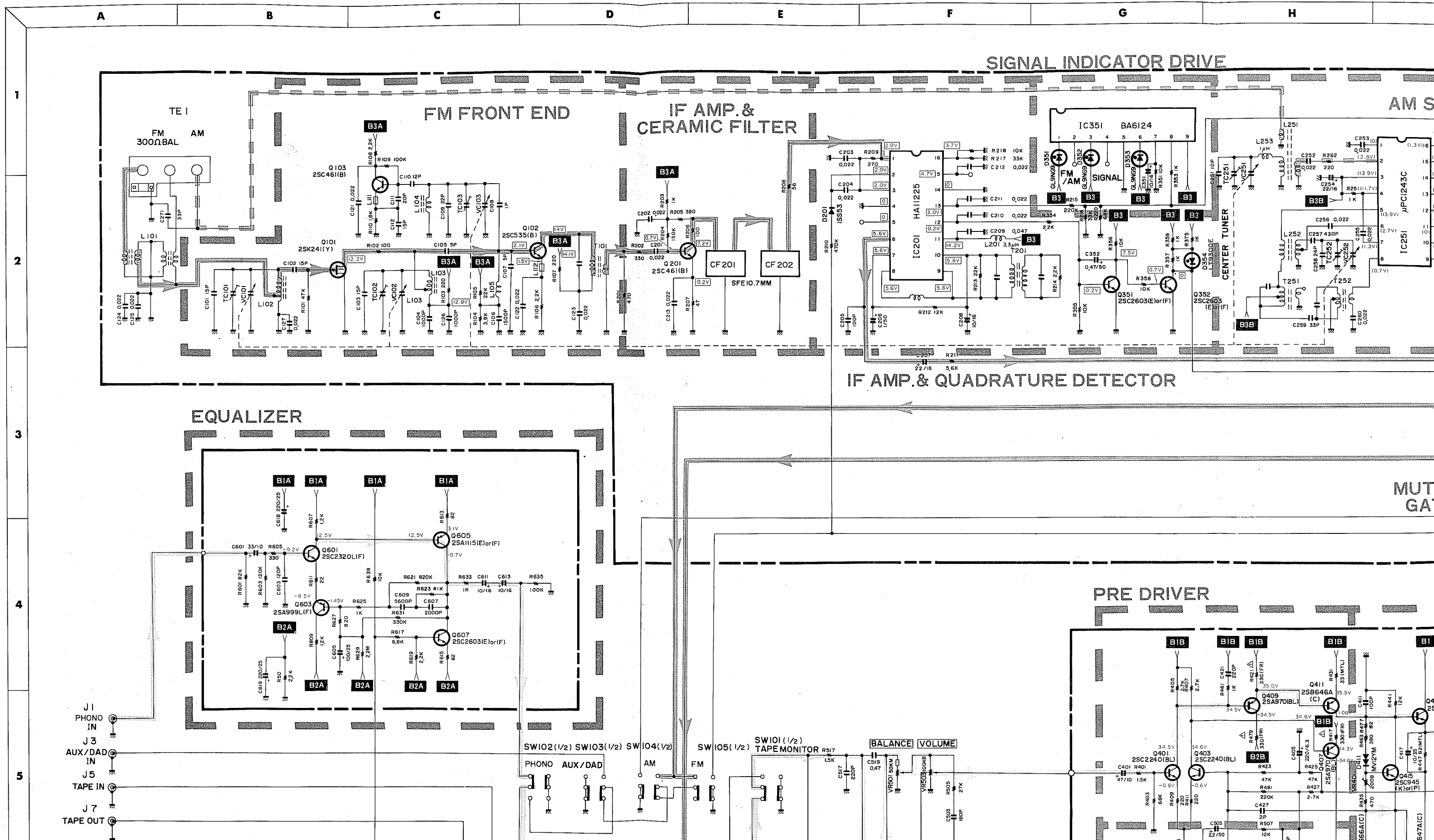
Ref. No.	Part No.	Description
INTEGRATED CIRCUIT		
IC201	5652-HA11225	HA11225
IC251	5652- μ PC1243C	μ PC1243C
IC301	5652- μ PC1223C	μ PC1223C
IC351	5652-BA6124	BA6124
TRANSISTORS		
Q101	5616-2SK241(Y)	F.E.T., 2SK241(Y)
Q102	5613-535(B)	2SC535(B)
Q103, 201	5613-461(B)	2SC461(B)
Q251, 301, 351, 352, 353, 357, 358	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q354, 355, 356	5611-1115(F)	2SA1115(F) or 2SA1115(E)
DIODES		
D201, 302, 355, 356, 357, 358	5636-1SS53	1SS53
COILS		
L102	5943-70325	
L103	5943-70225	
L104	5942-00420	
L105	5991-7065	
L106, 201	5995-3R3225	3.3 μ H
L111, 112	5597-4	Ferrite Bead
L252	5923-71027	
L301	5995-220225	22 μ H
TRANSFORMERS		
T101	5563-0027	
T201	5574-7024	
T251, 252	5553-0097	
T253	5553-0087	
MISCELLANEOUS		
CF201, 202	5671-7120Z	Ceramic Filter
P301	4443-070185	Connector, 7-Pin
PCB-3 PHONO EQUALIZER P.C. BOARD		
RESISTORS		
R623, 624	5174-Z412228	41k Ω , \pm 0.5%, 1/4W, Metal
CAPACITORS		
C14, 15	5345-476D041	47 μ F, \pm 20%, 25V, Electrolytic
C601, 602	5345-336B0951	33 μ F, \pm 20%, 10V, Electrolytic
C603, 604	5359-1215851	120pF, \pm 5%, 100V, Polypropylene
C605, 606	5345-107D0226	100 μ F, \pm 20%, 25V, Electrolytic
C607, 608	5359-2025851	2000pF, \pm 5%, 100V, Polypropylene
C611, 612, 613, 614	5345-106C0951	10 μ F, \pm 20%, 16V, Electrolytic
C617	5345-106-16	10 μ F, +50% -10%, 16V, Electrolytic
C618, 619	5345-227-25	220 μ F, +50% -10%, 25V, Electrolytic
TRANSISTORS		
Q11	5614-667(C)	2SD667(C)
Q12	5612-647(C)	2SB647(C)
Q601, 602	5613-2320L(F)	2SC2320L(F)
Q603, 604	5611-999L(F)	2SA999L(F)
Q605, 606	5611-1115(F)	2SA1115(F) or 2SA1115(E)
Q607, 608	5613-2603(F)	2SC2603(F) or 2SC2603(E)

Ref. No.	Part No.	Description
	DIODES	
D11, 12	5635-RD15EB2	Zener, RD15EB2
D601	5635-RD5R1EB2	Zener, RD5.1EB2
	COIL	
L253	5995-1R0225	1 μ H
	MISCELLANEOUS	
P601	4443-10418	Connector, 10-Pin
	PCB-4 TAPE MONITOR & FUNCTION SWITCHES P.C. BOARD	
SW101, 102, 103, 104, 105	4431-05207153	Push Switch, Tape Monitor, Phono, Aux/DAD, AM, FM
J301	4242-070702	Jumper Lead, 7-Wire
	PCB-5 PIN JACK P.C. BOARD	
J1, 2, 3, 4, 5, 6, 7, 8	4484-27	4-Pin Jack, Phono, Aux/DAD, Tape In, Tape Out
P101	4443-07418	Connector, 7-Pin
	PCB-6 FM MUTING & AUDIO MODE SWITCHES P.C. BOARD	
SW108, 109	4431-02047363	Push Switch, FM Muting, Audio Mode
	PCB-7 FM/AM SIGNAL INDICATORS P.C. BOARD	
D351, 352, 353	5637-GL9NG9	L.E.D., GL9NG9, Green, FM/AM Signal Strength
	PCB-8 TAPE MONITOR & FM TUNING INDICATORS P.C. BOARD	
D301, 501	5637-LT9300D	L.E.D., LT9300D, Red, Stereo FM, Tape Monitor
D354	5637-LT9300E	L.E.D., LT9300E, Green, Center Tuned
	PCB-9 ANTENNA TERMINAL P.C. BOARD	
	COIL	
L101	5995-703027	
	MISCELLANEOUS	
TE1	4214-130	External Antenna Terminal
	PCB-10 SPEAKER SYSTEM SELECTOR P.C. BOARD	
SW106, 107	4431-02047164	Push Switch, Speaker System 1, Speaker System 2
	PCB-11 SPEAKER TERMINAL P.C. BOARD	
TE2, 3	4214-133	Terminal, Speaker System 1, Speaker System 2
	PCB-12 HEADPHONE JACK P.C. BOARD	
J101	4451-00139	Jack, Headphones
	PCB-13 LAMP P.C. BOARD	
PL1	5731-1507345	Lamp, 15V, 100mA, Dial Illuminator
	PCB-14 SUBSONIC FILTER SWITCH P.C. BOARD	
SW502	4431-A047135	Push Switch, Subsonic Filter

PACKAGE



SCHEMATIC DIAGRAM



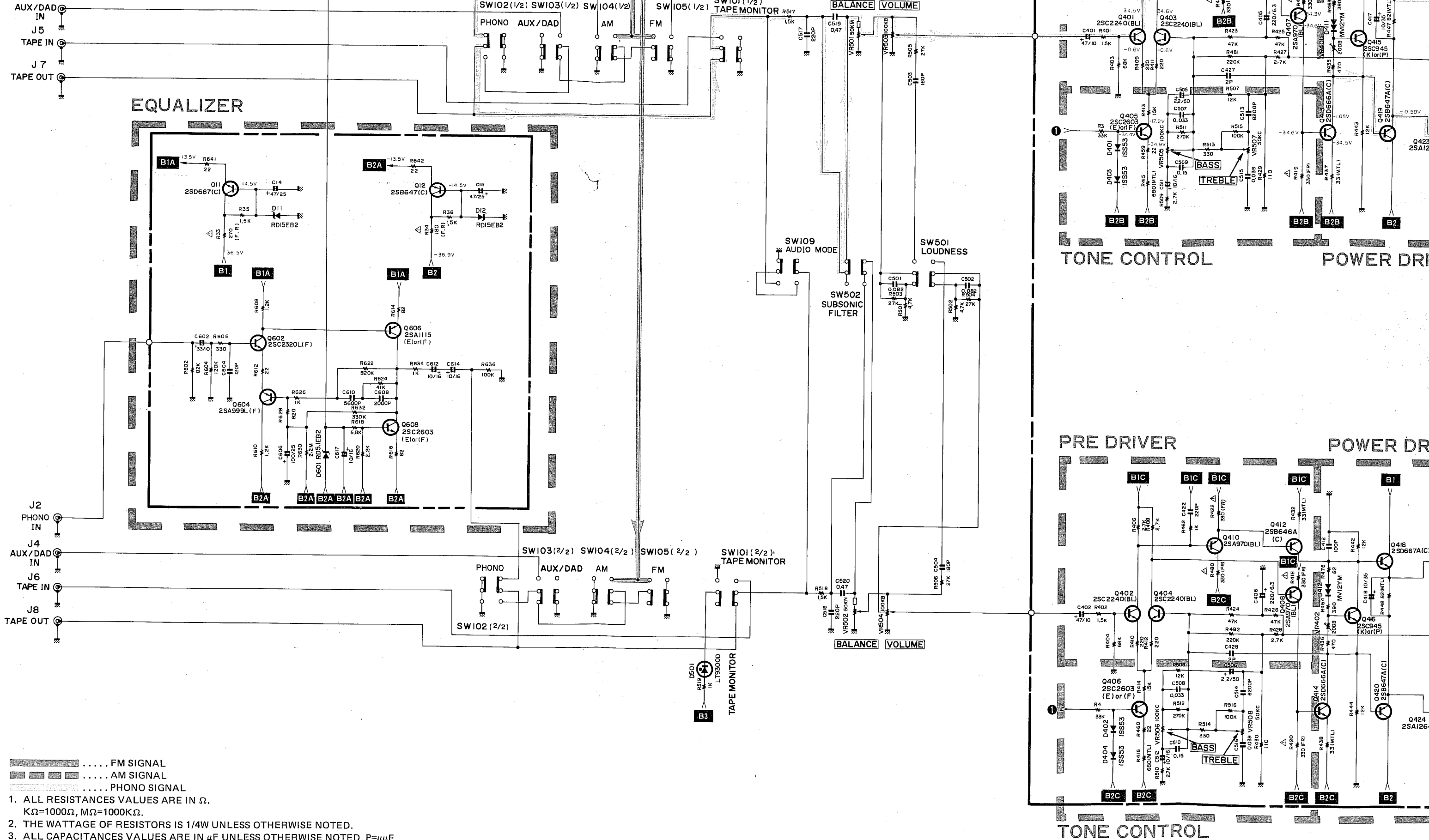
5

6

7

8

9



..... FM SIGNAL
 AM SIGNAL
 PHONO SIGNAL

1. ALL RESISTANCES VALUES ARE IN Ω .

$K\Omega=1000\Omega$, $M\Omega=1000K\Omega$.

2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.

3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. $P=\mu\mu F$

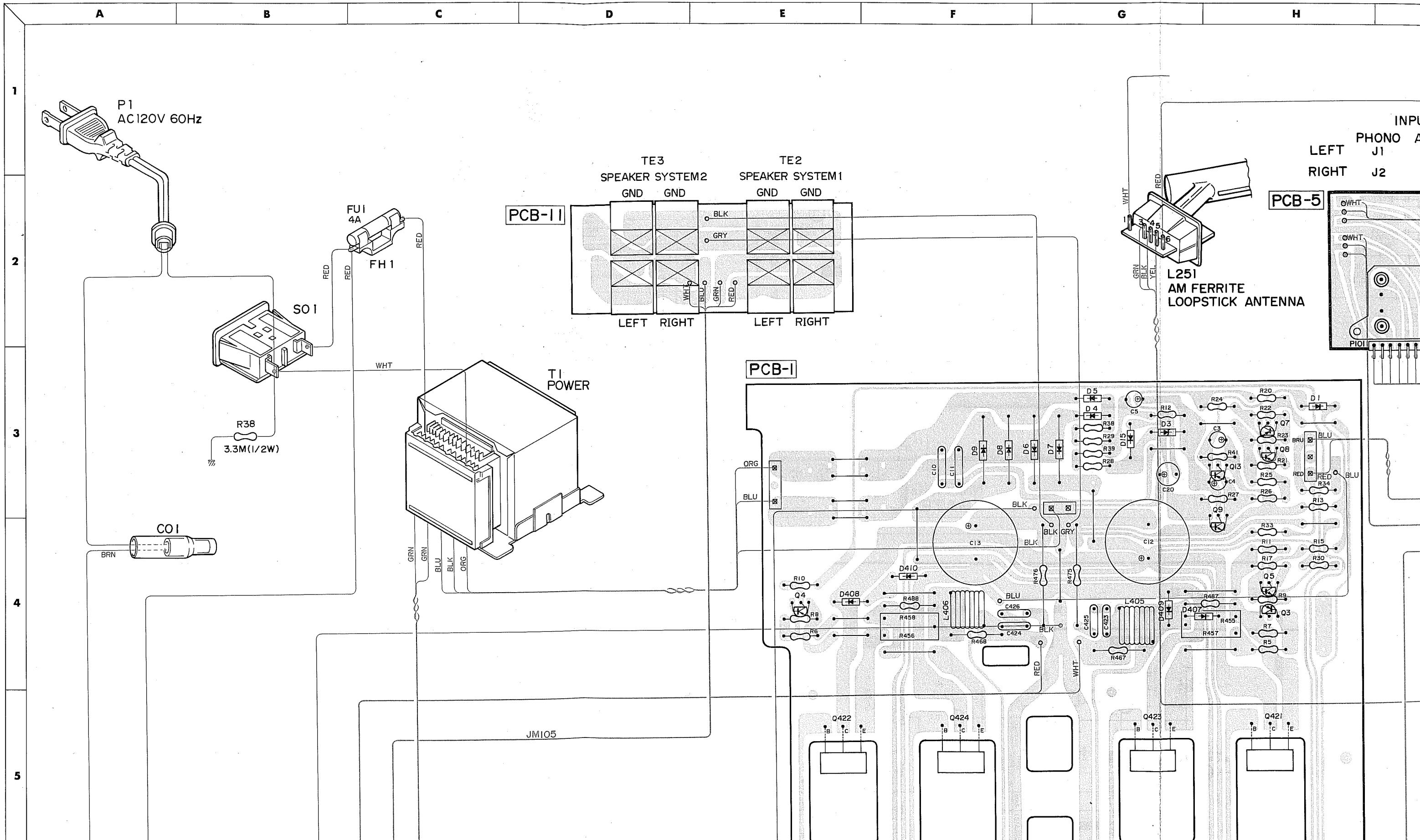
4. V: DC VOLTAGE AT NO SIGNAL

[...V] FM POSITION

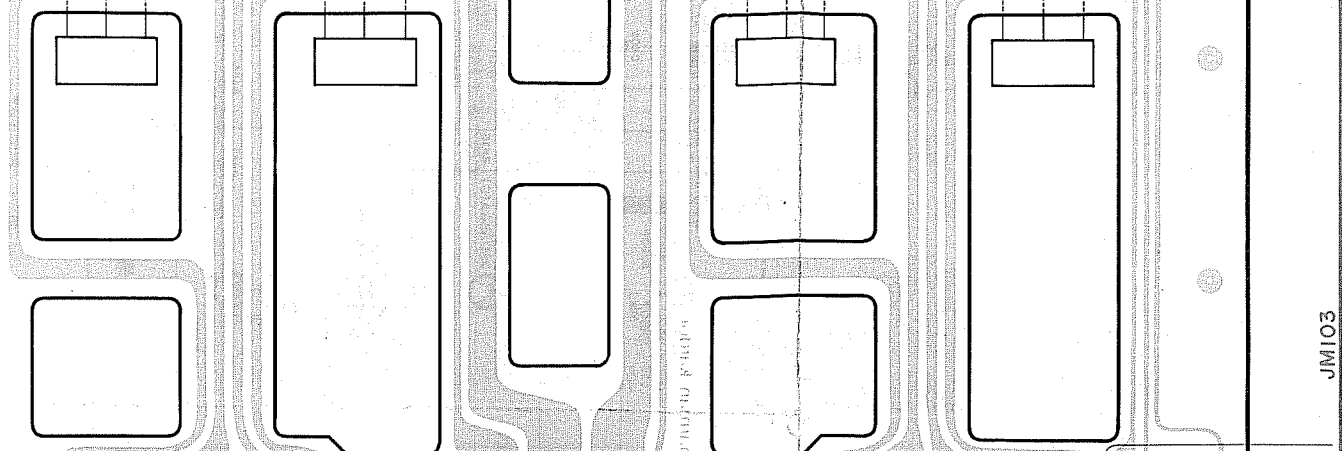
[...V] AM POSITION

5. Δ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

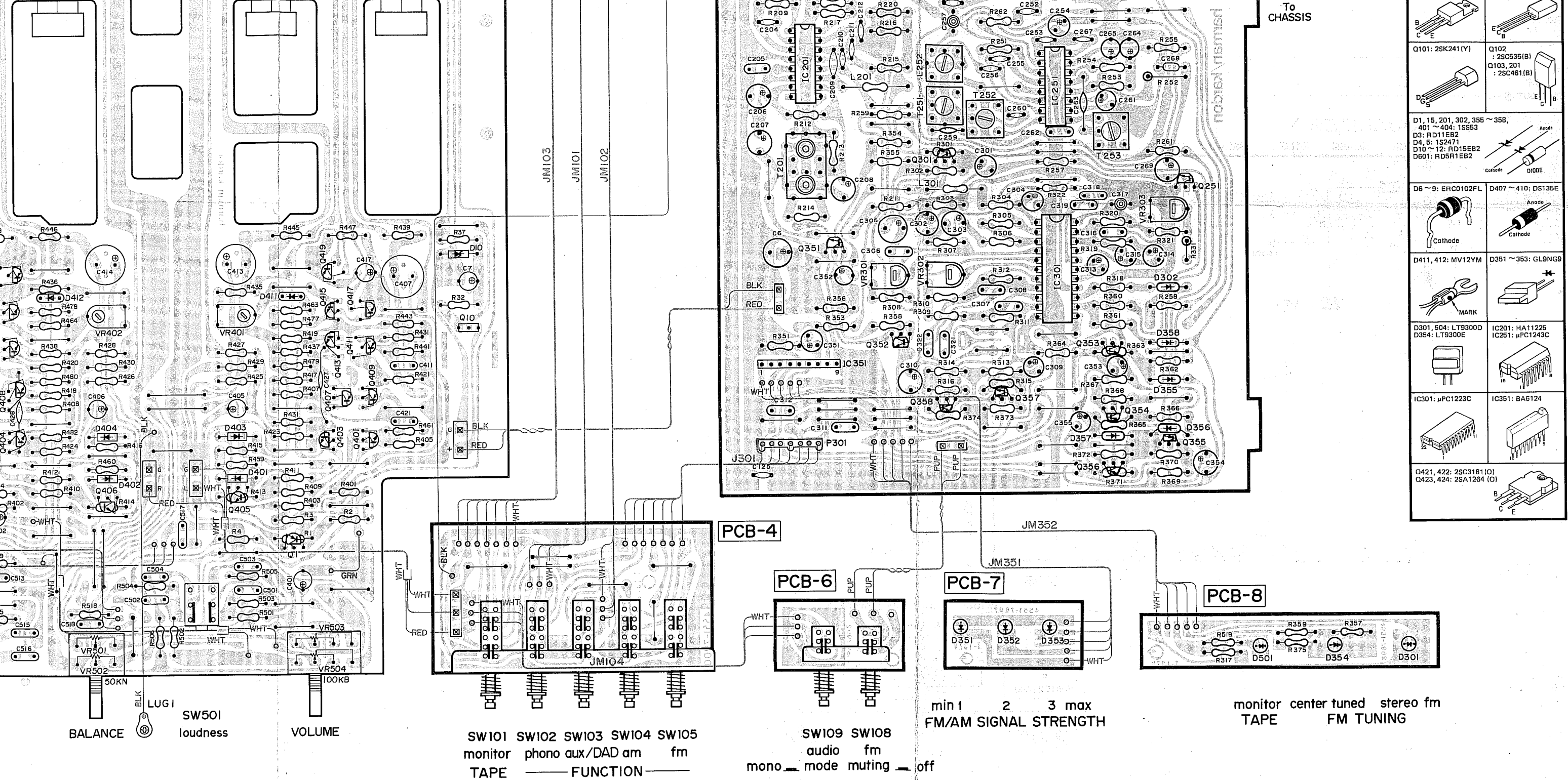
WIRING DIAGRAM







FOR CLIPPING BOTTOM HALF, (+ PROT.
CHECK FOR VARISTOR LEAD TOUCHING/
GROUNDED MTG. CLIP. (DISCONNECT B
TO DISSABLE PROTECTION CIRCUIT)



FOR CLIPPING BOTTOM HALF, (+ PROT. SHUT-DOWN)
 CHECK FOR VARISTOR LEAD TOUCHING
 GROUNDED MTG. CLIP. (DISCONNECT BASE OF Q5
 TO DISABLE PROTECTION CIRCUIT)

• WIRE COLOR ABBREVIATIONS

RED : Red	BLK : Black
ORG : Orange	YEL : Yellow
BLU : Blue	PUP : Purple
WHT : White	PIK : Pink
GRN : Green	BRN : Brown