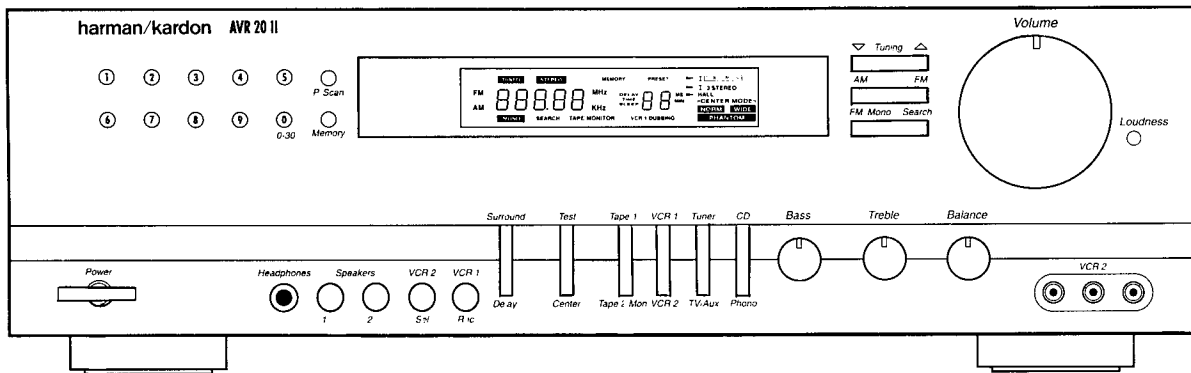


The Harman Kardon Model AVR20MKII AUDIO AND VIDEO RECEIVER

Technical Manual



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harman/kardon

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1112-AVR20MKII G9604 1200 Printed in Korea

SPECIFICATIONS

FRONT AMP SECTION

	Nominal	Limit
RMS Output Power		
(STERE MODE), Input: CD	≥ 65 W	≥ 63 W
THD: 0.09%, 8 ohms		
Both Channel Driven (40 Hz - 10 kHz)		
(SURROUND MODE)	≥ 55 W	≥ 50 W
THD: 0.09%, 8 ohms, 1 kHz		
THD (40 Hz - 10 kHz) at 63 W, 8 ohms, Input: CD		
40 kHz	≤ 0.06%	≤ 0.09%
1 kHz	≤ 0.06%	≤ 0.09%
10 kHz	≤ 0.06%	≤ 0.09%
IM Distortion at 63 W, 8 ohms, Input: CD		
60:7000 Hz = 4:1	≤ 0.2%	≤ 0.3%
Input Sensitivity		
PHONO (MM)	2.5 mV	2.5 ± 0.4 mV
CD, AUX, VCR	150 mV	150 ± 30 mV
S/N Ratio Input Shorted at Volume Max. (WTD IHF-A)		
PHONO	≥ 74 dB	≥ 70 dB
CD, TAPE1,2	≥ 92 dB	≥ 90 dB
TV, VCR1,2	≥ 82 dB	≥ 80 dB
Phono Overload at 1 kHz, THD: 0.5%		
Phono Input → Tape Output	≥ 140 mV	≥ 130 mV
Phono Equalization (RIAA 30 Hz - 15 kHz)		
Tape Monitor Output	RIAA	RIAA ± 1.5 dB
Tone Control		
Bass: 100 Hz	+10 dB	+10 ± 2.0 dB
	-10 dB	-10 ± 2.0 dB
Treble: 10 kHz	+10 dB	+10 ± 2.0 dB
	-10 dB	-10 ± 2.0 dB
Loudness Contour at -40 dB		
100 Hz	+6 dB	+6 ± 2.0 dB
10 kHz	+3 dB	+3 ± 2.0 dB
Frequency Response (CD/AUX)		
20 Hz, 20 kHz	± 0.5 dB	± 1 dB
Channel Crosstalk Input Shorted		
1 kHz	≥ 60 dB	≥ 50 dB
10 kHz	≥ 50 dB	≥ 40 dB

CENTER AMP SECTION

	Nominal	Limit
RMS Output Power		
THD (0.3%, 8 ohms, 1 kHz)		
Only Center Channel Driven	≥ 55 W	≥ 50 W
S/N Ratio (Input Level: 350 mV)		
Input Shorted, IHF-A WTD	≥ 67 dB	≥ 65 dB
Frequency Response at -3 dB		
Normal	100 Hz - 20 kHz	150 Hz - 15 kHz
Wide	20 Hz - 20 kHz	50 Hz - 15 kHz

REAR AMP SECTION

	Nominal	Limit
RMS Output Power		
THD (0.7%, 8 ohms, 1 kHz)		
Only Rear Channel Driven	≥ 55 W	≥ 50 W
S/N Ratio (Input Shorted, IHF-A WTD)		
Delay: 20 ms, Input Level: 350 mV		
Dolby	≥ 60 dB	≥ 55 dB
Hall	≥ 60 dB	≥ 55 dB
Frequency Response at -3 dB		
8 ohms, Dolby Pro-Logic	80 Hz - 7 kHz	100 Hz - 6 kHz

VIDEO AMP SECTION

	Nominal	Limit
Input Sensitivity/Impedance		
VCR1, VCR2, VDP	1 V _{p-p} /75 Ω	± 1 dB
Output Level/Impedance		
VCR1, REC out, TV Monitor out	1 V _{p-p} /75 Ω	± 1 dB
Frequency Response at -3 dB	DC-10 MHz	5 - 6 MHz
Crosstalk at 1.0 MHz	≥ 45 dB	≥ 40 dB

FM SECTION

	Nominal	Limit
Tuning Cover Range		
USA/Canada: 75 kHz DIV.	87.5 - 107.9 MHz	
Europe: 40 kHz DIV.	87.5 - 108.0 MHz	
Usable Sensitivity (75 ohms Input)		
USA/Canada: 30 dB S/N	≤ 11.2 dbf	≤ 17.2 dbf
Europe: 26 dB S/N		
Image Rejection (at 106 MHz)		
USA/Canada	≥ 45 dB	≥ 35 dB
Europe	≥ 100 dB	≥ 90 dB
IF Rejection (at 90 MHz)	≥ 110 dB	≥ 100 dB
Full Limiting (at -3 dB)	≤ 12.2 dbf	≤ 15.2 dbf
50 dB Quieting Sensitivity (at 98.1 MHz, 100% MOD.)		
IHF Band Pass Filter		
Mono	≤ 17.2 dbf	≤ 23.2 dbf
Stereo: USA/Canada	≤ 40.2 dbf	≤ 43.3 dbf
Europe	≤ 45.3 dbf	≤ 48.3 dbf
Distortion (1 kHz, 100% MOD. at 98.1 MHz)		
IHF Band Pass Filter		
Mono	≤ 0.2%	≤ 0.5%
Stereo	≤ 0.4%	≤ 0.7%
S/N Ratio (1 mV Input, 100% MOD. at 98.1 MHz)		
IHF Band Pass Filter		
Mono	≥ 70 dB	≥ 65 dB
Stereo	≥ 65 dB	≥ 60 dB
Frequency Response (at +1 dB, -3 dB)		
	20 Hz - 15.5 kHz	30 Hz - 15 kHz
AM Rejection Ratio (100 uV - 20 mV Input)		
	≥ 60 dB	≥ 50 dB
Search Level (at 98.1 MHz)	31.2 dbf	31.2 ± 5 dbf
Automatic Stereo Threshold (at 98.1 MHz)		
	31.2 dbf	31.2 ± 5 dbf
Muting Threshold (at 98.1 MHz)	31.2 dbf	31.2 ± 5 dbf
Overload at 98.1 MHz		
(100% MOD. 100 mV RF Input)	≤ 0.2%	≤ 0.5%
Suprious Response (at 98.1 MHz)		
Antenna Input 3 uV	≥ 70 dB	≥ 60 dB
Capture Ratio at 40/60 dbf	≤ 2 dB	≤ 2.5 dB
Alternative Channel Selectivity (at 98.1 MHz ± 400 kHz)		
	≥ 65 dB	≥ 55 dB
Stereo Separation (at 98.1 MHz, 100% MOD., 1 mV Input)		
IHF Band Pass Filter		
100 Hz	≥ 40 dB	≥ 35 dB
1 kHz	≥ 45 dB	≥ 40 dB
10 kHz	≥ 35 dB	≥ 30 dB
Output Voltage (at 100% MOD., 1 kHz Input)		
Mono	500 mV	500 ± 150 mV
Stereo	450 mV	450 ± 150 mV

AM SECTION

	Nominal	Limit
Tuning Cover Range		
USA/Canada: 10 kHz Step	520 - 1710 kHz	
Europe: 9 kHz Step	522 - 11611 kHz	
Usable Sensitivity (400 Hz, 30% MOD., S/N 20 dB)		
	≤ 500 uV/m	≤ 1000 uV/m
Image Rejection (at 1400 kHz)	≥ 35 dB	≥ 30 dB
IF Rejection (at 600 kHz)	≥ 60 dB	≥ 50 dB
AGC Figure of Merit (From 100 mV/m at 1000 kHz)		
	≥ 50 dB	≥ 45 dB
Distortion (400 Hz, 30% MOD. 5 mV/m Input)		
	≤ 0.8%	≤ 1.5%
IF Bandwidth (6 dB Down, 350 uV/m)		
	6 kHz	4 - 11 kHz
Audio Response (5 mV/m Input 1 kHz 0 dB, 1000 kHz)		
at -6 dB	80 Hz - 2.3 kHz	100 Hz - 2 kHz
Selectivity (at 350 uV/m)		
± 10 kHz	≥ 35 dB	≥ 25 dB
S/N Ratio (1000 kHz, With Antenna Input 5 mV/m)		
	≥ 45 dB	≥ 40 dB

RF Overload (400 Hz 80% MOD, 100 mV/m Input)	≤ 5%	≤ 10%
Search Level (at 1000 kHz)	800 μ V	800 μ V \pm 6 dB
Output Voltage (400 Hz 30% MOD., 5 mV/m Input)	165 mV	165 \pm 40 mV
Whistle	≤ 10%	≤ 15%

GENERAL

Power Consumption;		
USA/Canada		180 W
Europe		500 W
Power Supplies;		
USA/Canada		AC 120 V, 60 Hz
Europe		AC 230 V, 50 Hz
Dimensions (W x H x D);		
inches		17 ^{3/8} x 6 ^{1/8} x 16 ^{1/2}
mm		440 x 155 x 420
Weight (lbs/kgs)		26.9/12.2

These specifications are service target specs.
 Specifications and components are subject to change without notice.
 Overall performance will be maintained or improved.

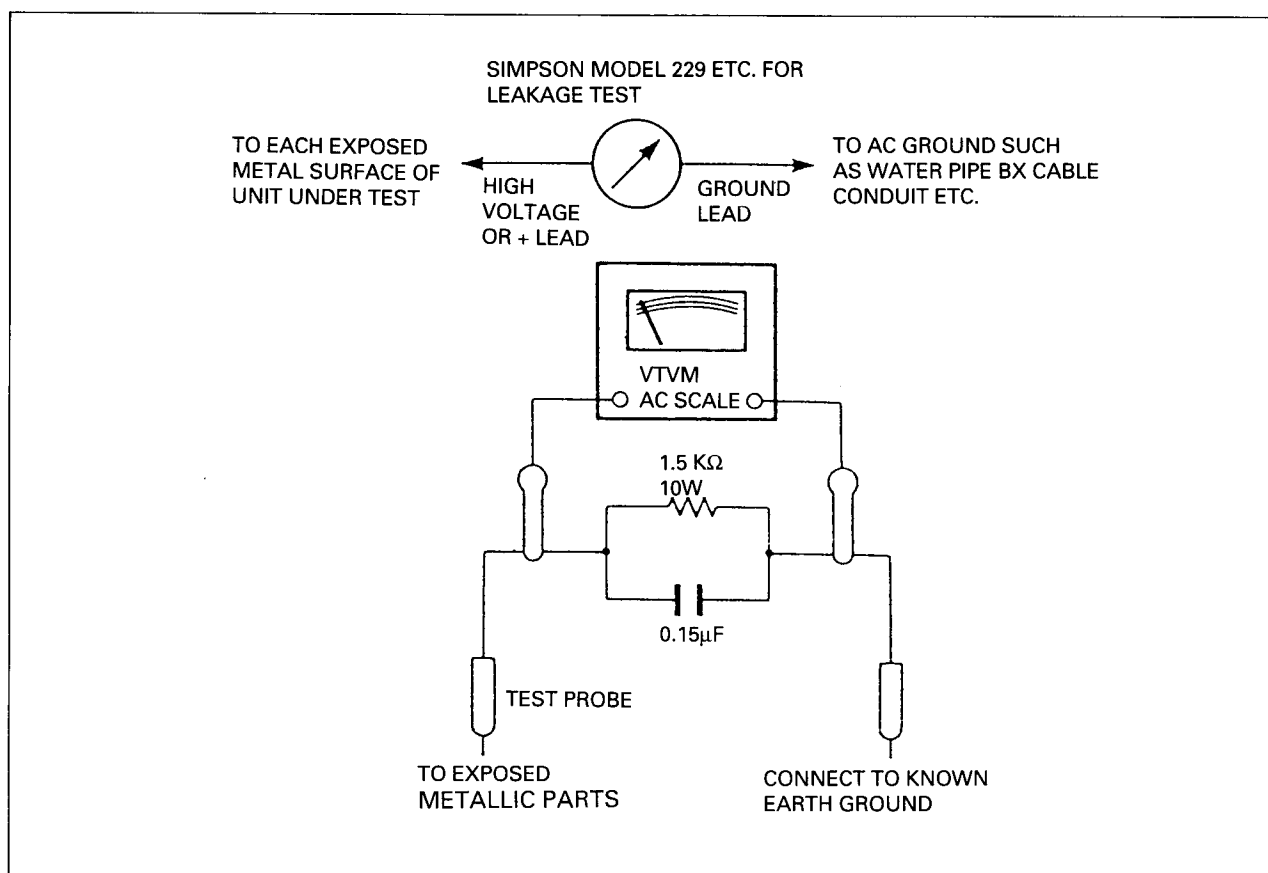
LEAKAGE TEST

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

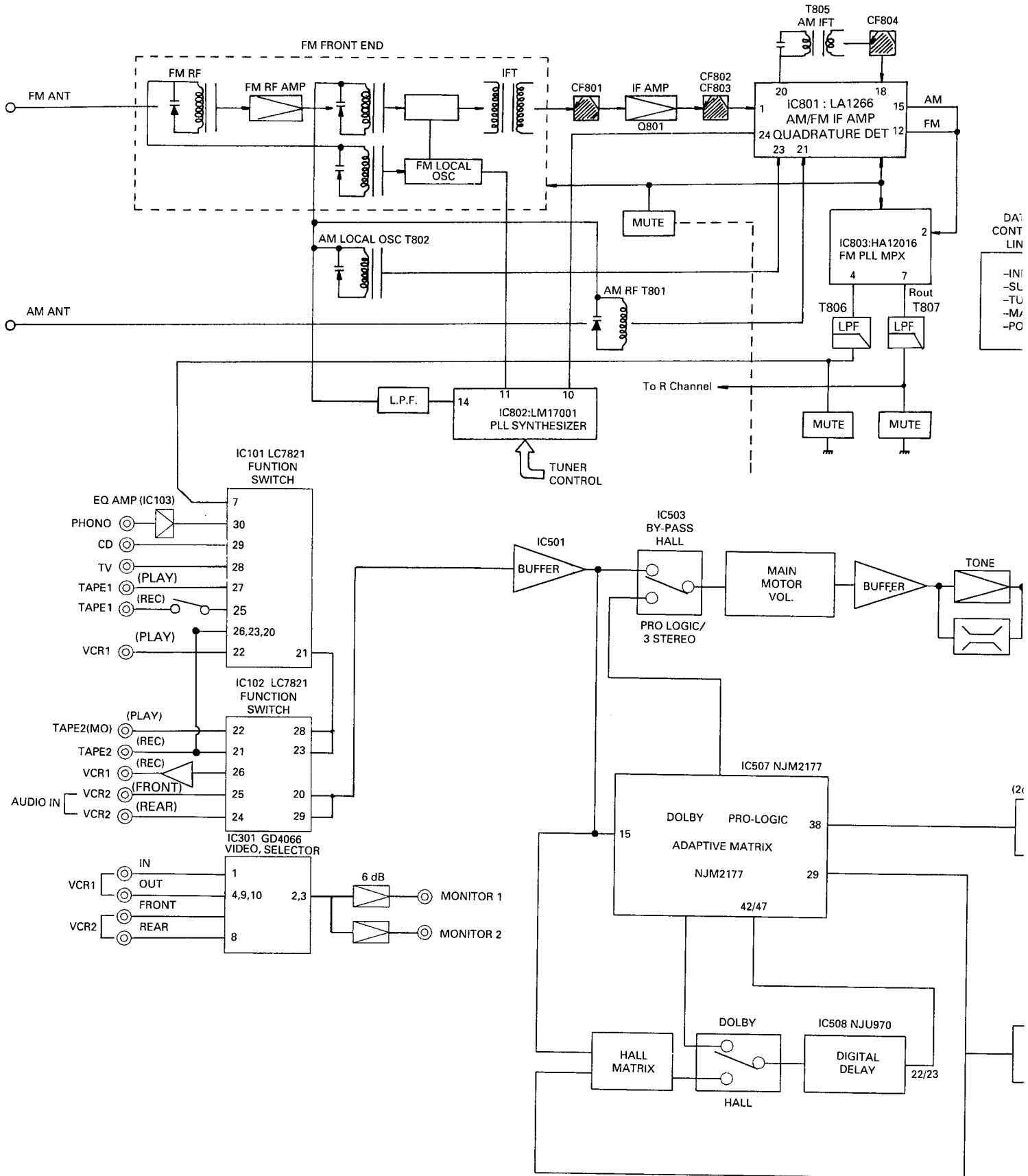
1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metallic parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. Which were removed for servicing are properly reinstalled.
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 power cord directly into a 230-volt AC receptacle (do not use an Isolation Transformer for this test).

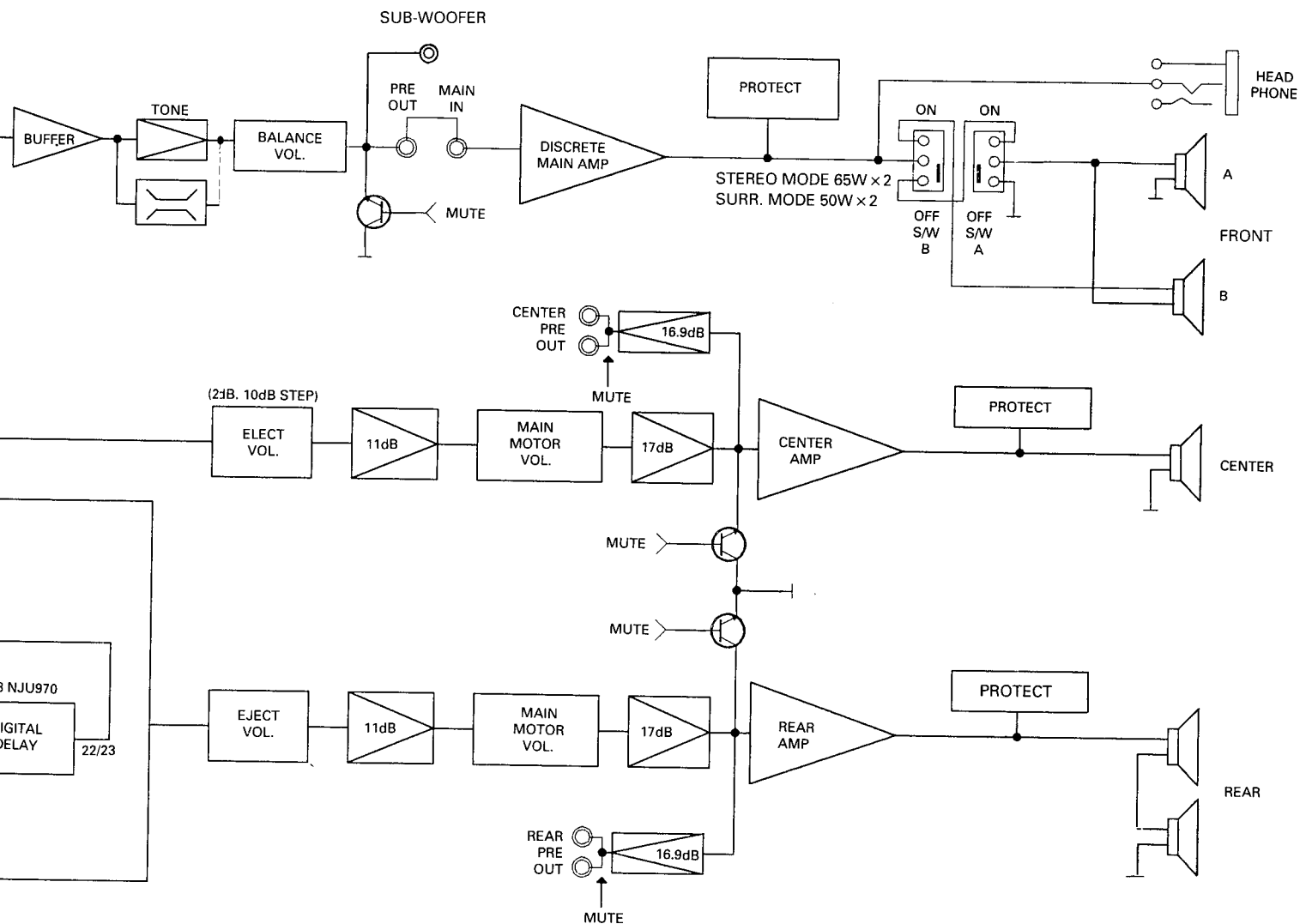
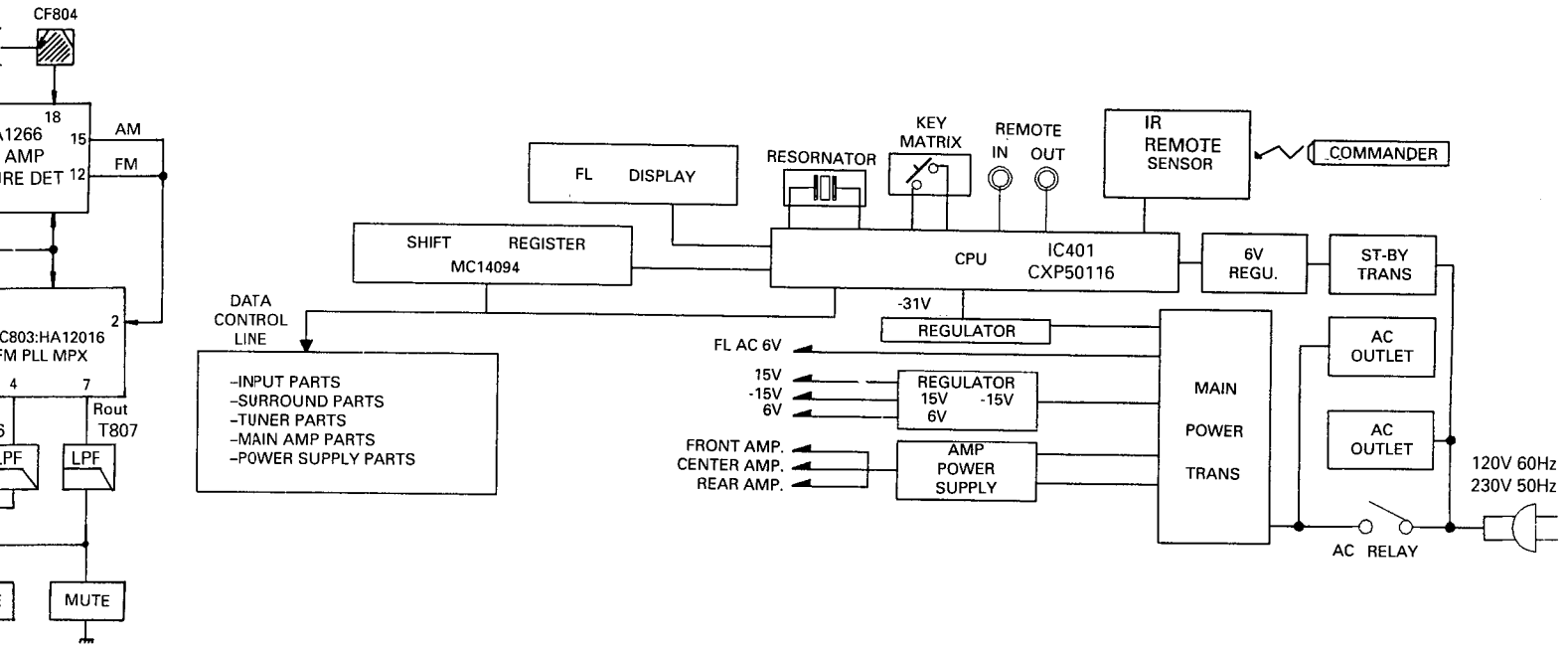
Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a $0.15\mu\text{F}$ capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher sensitivity to measure the AC voltage 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.

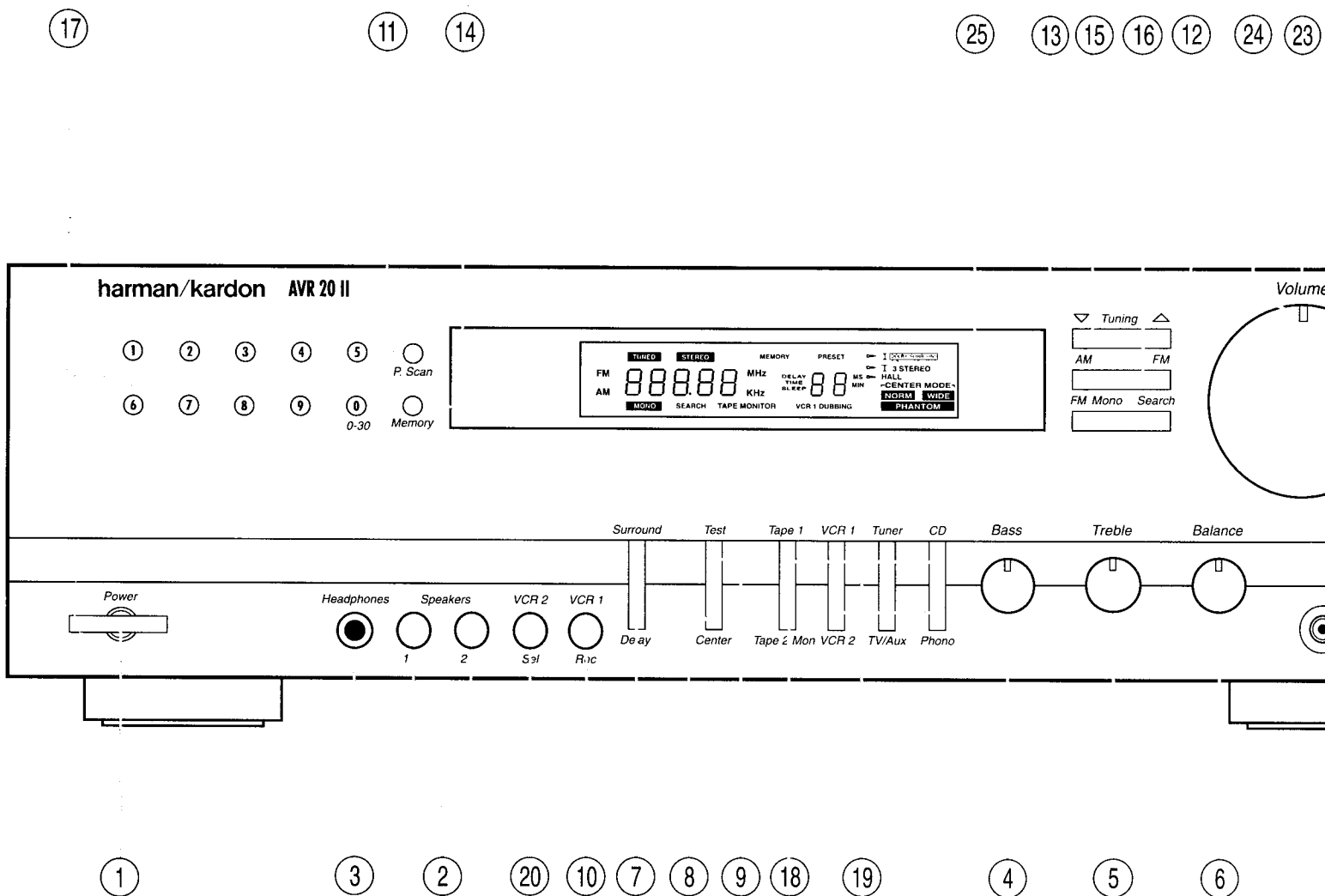


BLOCK DIAGRAM





CONTROLS AND FUNCTIONS

**1. POWER BUTTON**

Press this button to turn the power on. Press again to turn the power off. It can also be used as a system power button, if you connect the other components to the switched outlets.

NOTE: In POWER OFF state, the POWER indicator will light up orange and power is partially supplied to the infrared remote control receiver and the memory circuitry.

2. 1/2 SPEAKER SWITCHES

These switches allow you to select various combinations of speakers as follows:

- To drive 1 pair of speakers, push only the speaker 1 switch in.
- To drive a second pair of speakers, push only the speaker 2 switch in.
- To drive both pairs of speakers, push both 1 and 2 switches in.

- To use headphones for private listening or monitoring, leave both 1 and 2 switches pushed out.

NOTE: If both speaker switches are pushed in and only one set of speakers is connected to the receiver, no sound will be heard.

3. HEADPHONE JACK

Stereo headphones can be plugged into this jack for private listening. Headphone impedance should be between 8 and 2K ohms. Best results between 200 and 400 ohms.

4. BASS CONTROL

Modifies the low-frequency sound of the left and right channels as much as +/- 10dB. Set this control at a suitable position for your taste and room acoustics.

5. TREBLE CONTROL

Modifies the high-frequency sound of the left and right channels as much as +/- 10dB. Set this control at a suitable position for your taste and room acoustics.

6. BALANCE CONTROL

This control is used for balancing the relative sound volume of the left and right channel speakers. Clockwise rotation reduces the volume from the left speaker, counterclockwise rotation reduces the volume from the right speaker.

7. SURROUND-OFF MODE SELECTOR

Press this switch to select normal stereo mode.

8. DELAY TIME

Adjusts time delay for rear channels, open surround mode is 16ms.

Adjusts the surround steps. For Dolby standard.

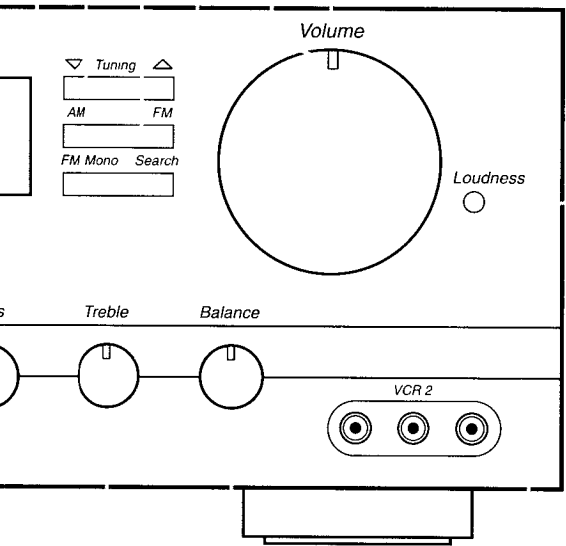
→ 16ms → 18ms →

9. PRO LOGIC

Press this button for

10. 3 CHANNEL

The 3 channel mode when rear speakers are connected to provide a center channel.

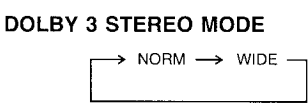
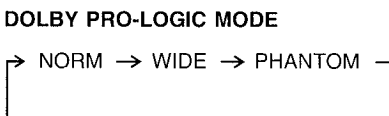


11. STADIUM/THEATER MODE

Switches for selecting desired surround mode; Stadium or Theater. See Surround Sound Effects on page 13.

12. CENTER MODE SELECTOR

This button operates only in DOLBY PRO-LOGIC and DOLBY 3 STEREO mode. The mode changes as below, when the button is pressed in succession.



The display window shows each mode.

NORM: Select this mode if you use a small center speaker. The bass sound of the center channel is reproduced from the front speakers, because the small speaker cannot produce enough bass.

WIDE: Select this mode if you use a medium-to-large center speaker. The bass sound is reproduced from the center speaker.

PHANTOM: Select this mode if you don't use a center speaker. The center speaker's sound is reproduced from the front speakers.

13. TEST TONE BUTTON

This button operates only in DOLBY PRO-LOGIC and DOLBY 3 STEREO mode. When the button is pressed, 2 seconds of test tone is generated in all channels (Left, Center, Right, and Rear) in succession. The display window shows TEST Left, Center, Right, and Rear in succession (in DOLBY PRO-LOGIC mode) or Left Center or Right (in DOLBY 3 STEREO mode) in succession. Use this button to test speaker connections.

14. SOURCE/DIRECT BUTTON

This feature bypasses the tone control circuitry, resulting in flatter frequency response and wider bandwidth. When it is activated, "DIRECT" illuminates in the display.

15. PRESET SCAN BUTTON

Press this button to scan the preset station frequencies. The receiver stops at each preset location that contains a frequency for about 4 seconds, so you can hear a station. The preset location indicator blinks 4 times. Press this button again to stop scanning.

16. SEARCH SELECTOR

Press this button to select AUTO or MANUAL tuning.

■ In AUTO mode, scanning is automatically continued up or down until the next station is picked up by pressing the UP/DOWN tuning buttons. The display window shows 'AUTO'. Use this mode to quickly find strong AM or FM stations.

■ In MANUAL mode, the frequency is changed by a step with the UP/DOWN button. If you keep pressing the UP/DOWN tuning buttons, scanning is continued until the button is released.

NOTE: Tuning Intervals:

BAND	USA/CANADA
FM	50 KHz
AM	10 KHz

17. FM MODE BUTTON

Press this button to select stereo or mono mode.

■ **STEREO:** Provides stereophonic reception of an FM stereo broadcast. The display window shows 'FMST'.

■ **MONO:** The left and right channel signals detected from an FM stereo broadcast are mixed and reproduced through both channels. If you want to find a weak FM station, select this mode.

18. STATION MEMORY BUTTON

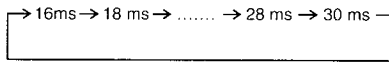
Use this button to store an AM or FM frequency. Press this button and select one of 30 preset locations to store the frequency with the STATION PRESET buttons while the memory indicator, 'MEMORY' blinks.

NOTE: When you store a frequency in a memory location that already contains a frequency, you replace the previous frequency. If your receiver is disconnected from AC power for more than about 10 days, it loses all stored frequencies.

8. DELAY TIME

Adjusts time delay between front and rear channels, operates only when the surround mode is on. (see Delay Time button on page 16).

Adjusts the surround delay time in steps. For Dolby Surround 20ms is standard.



9. PRO LOGIC MODE

Press this button for Pro-Logic mode.

10. 3 CHANNEL MODE

The 3 channel mode can be used when rear speakers are not being used to provide a center (dialog) channel.

19. UP/DOWN TUNING BUTTONS

Press the DOWN button (v) to tune in lower frequency stations, the UP button (^) to tune in higher frequency stations. If you press the DOWN button when the display is at the bottom of the frequency range, the display returns to the top of the range. If you press the UP button when the display is at the top of the frequency range, the display returns to the bottom of the range. When the receiver finds a strong frequency, the display window shows 'TUNED'.

20. FM/AM BAND SELECTOR

Press these buttons to select the FM or AM radio band. When you select the AM or FM radio band, the receiver displays the last frequency selected on that band.

21. STATION PRESET BUTTONS

Select one of 30 preset locations to recall the station stored in memory. The input function is automatically changed to TUNER when the button is pressed. When you select numbers from 10 through 29, you must select the second digit within about 2 seconds. To select preset 30, simply press "0".

22. TAPE 2 MONITOR BUTTON

Set TAPE 2 MONITOR to the "off" position when you want to hear the other input functions. Press this button to monitor the cassette deck connected to the TAPE 2 MON input jacks.

23. INPUT FUNCTION SELECTOR

Press the button to select the desired input function: VCR 1, VCR 2, VDP, TAPE 1, TV/Aux, Tuner, CD or Phono.

To dub from VCR 2 to VCR 1, press the VCR 2 button and then press the VCR 1 REC button.

For the input function of VCR 1 press the VCR 2 button and VCR1 DUBBING button. Set the recording VCR (VCR 1) to recording mode. Set the playback VCR (VCR 2) to play a tape.

Dubbing will start.

■ To hear another input source during video tape dubbing: Press the input function you want to hear, and play the input source.

NOTE: If you press the TEST TONE button during VCR 1 DUBBING, the audio signal is not recorded.

24. VCR 2 SELECTOR

Push in this button to select the VCR 2 jacks on the front, rather than the VCR 2 jacks on the rear.

25. VCR 2/CAMCORDER INPUT JACKS

VIDEO IN:

Connect to the VIDEO OUTPUT jack of a VCR (yellow jack).

AUDIO IN:

Connect to the AUDIO OUTPUT jacks of a VCR (red and white jacks).

26. LOUDNESS BUTTON

Press this button to compensate for the response of the human ear at low listening levels (known as the Fletcher-Munson hearing curve). The high and low frequencies are automatically boosted when this button is pushed in. In the OFF position, the frequency response is flat at all volume levels. This button does not work at high volume levels.

27. VOLUME CONTROL

Turn the VOLUME clockwise to increase the volume and counterclockwise to decrease it. The volume of the front, center, and rear channels is changed at the same time.

28. VOLUME LEVEL INDICATOR

This indicator moves in accordance with the volume level. The indicator blinks when the mute button on the remote commander is pressed.

29. DISPLAY WINDOW

This window shows the state of operation for easier control of the receiver. It also contains the IR Remote Sensor.

DISASSEMBLY PROCEDURES

REFER TO PAGE 21 and 33.

1 COVER TOP REMOVAL

Remove 8 screws (A) and then remove the Cover Top (51).

2 COVER BOTTOM REMOVAL

Remove 10 screws (B) and then remove the Cover Bottom (29).

3 FRONT PANEL ASSEMBLY REMOVAL

1. Remove the Cover Top (51), referring to the previous step 1.
2. Remove the flat cable from wafer (CP401) on the Volume P.C.Board (PCB9).
3. Disconnect (CP102) from the Volume P.C.Board (PCB6).
4. Disconnect (CNT602) from the Surround P.C.Board (PCB11).

5. Disconnect (CP701 and CP702) from the Input P.C.Board (PCB9).
6. Disconnect (CP703) from the Video P.C.Board (PCB2).
7. Remove 8 screws (C) and then remove the Front Panel Assembly (AA).

4 VOLUME P.C.Board (PCB9) REMOVAL

1. Remove the Cover Top (51), referring to the previous step 1.
2. Pull out the Volume Knob (1) with Volume LED P.C.Board (PCB8).
3. Disconnect (CP102 and CP503) from the Volume P.C.Board (PCB6).
4. Remove the Hex Nut from the Volume-motor to remove the Volume P.C.Board (PCB6).
5. Remove 3 screws (M) and then remove the Volume P.C.Board (PCB6).

5 SPEAKER SEL. P.C.Board (PCB7) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Remove the Front Panel Assembly (AA), referring to the Previous step **3**.
3. Remove 4 screws (D) and then remove the Speaker Sel. P.C.Board (PCB7).

6 TONE P.C.Board (PCB5) REMOVAL

1. Remove the Cover Top(51), referring to the Previous step **1**.
2. Remove the Front Panel Assembly (AA), referring to the previous step **3**.
3. Pull the Bass, Treble, Balance Knobs (3).
4. Remove the Hex Nuts from the variable resistors (17, 18).
5. Remove 3 screws (E) and then Tone P.C.Board (PCB5).

7 FRONT P.C.Board (PCB4) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Remove the Front Panel Assembly (AA), referring to the previous step **3**.
3. Remove 9 screws (F) and then remove the Front P.C.Board (PCB4).

8 TUNER P.C.Board (PCB10) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Remove 3 screws (G) and then remove the Tuner P.C.Board (PCB10).

9 SURROUND P.C.Board (PCB11) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Disconnect (CNT602) from the Surround P.C.Board (PCB11).
3. Remove 2 screws (H) and then remove the Surround P.C.Board (PCB11).

10 VIDEO P.C.Board (PCB2) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Remove the Surround P.C.Board (PCB11), referring to the previous step **9**.
3. Disconnect (PC703, CP101 and CN301) from the Video P.C.Board (PCB2).
4. Disconnect (CP902) from the Sub-Woofer P.C.Board (PCB3).
5. Disconnect (CP301) from the Main P.C.Board (PCB1).
6. Remove 5 screws (I) and then remove the Video P.C.Board (PCB2).

11 SURROUND P.C.Board (PCB3) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Disconnect (CP902 and CP110) from the Sub-Woofer P.C.Board (PCB3).
3. Remove 4 Screws (K) and then remove the Sub-Woofer P.C.Board (PCB3).

12 CHASSIS BACK REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Do Steps **2**, **8**, **9**, **10** and **11**.
3. Remove 15 screws (J) and then remove the Chassis Back (34).

13 MAIN P.C.Board (PCB1) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Do Steps **2**, **4**, **8**, **9** and **12**.
3. Unsolder all leads of (Q116, Q112, Q115, Q123, Q126 and Q127) from copper track on the Input P.C.Board (PCB9).
4. Disconnect (CP103, CP109 and CP206) from the Main P.C.Board (PCB1).
5. Disconnect (CP110, CP701, CP702, CP204 and CP207) from the Input P.C.Board (PCB9).
6. Remove the flat cable from wafer (CP401) on the Input P.C.Board (PCB9).
7. Remove 5 screws (L) and then remove the Input P.C.Board (PCB9).

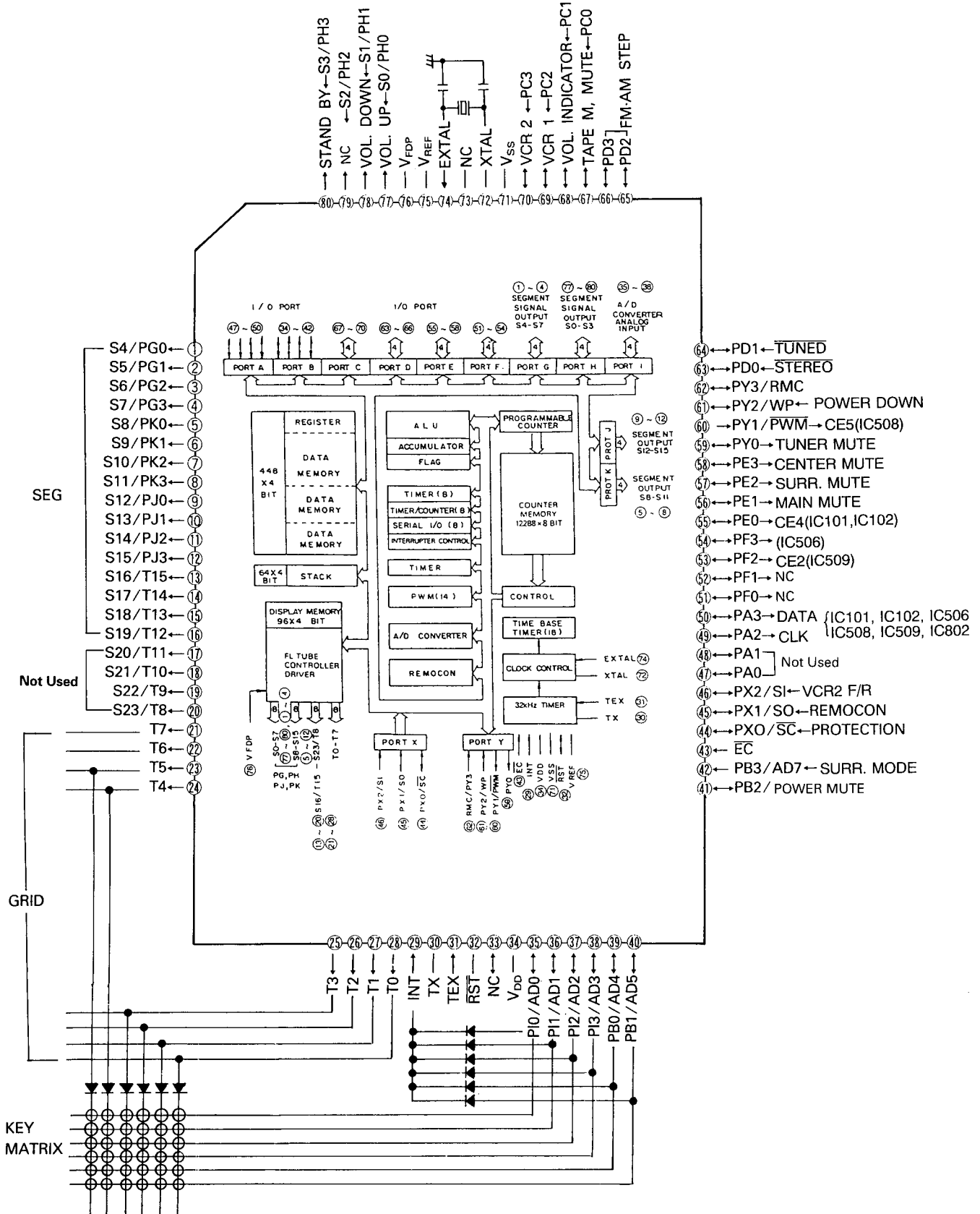
14 MAIN P.C.Board (PCB1) REMOVAL

1. Remove the Cover Top (51), referring to the previous step **1**.
2. Do Steps **2**, **8**, **9**, **10**, **11** and **12**.
3. Unsolder all leads of (Q216L/R, Q217L/R and Q213L/R) from copper track on the Main P.C.Board (PCB1).
4. Disconnect (CP201, CP202, CP203, CP204, CP206, CP207H and CP207T) from the Main P.C.Board (PCB1).
5. Remove 6 screws (N) and then remove the Main P.C.Board (PCB1).

CIRCUIT DESCRIPTION

CPU (4 bit CMOS MICROPROCESSOR : CXP50116-530Q)

1. Pin Description & Block Diagram



2. Input and Output Terminal Functions

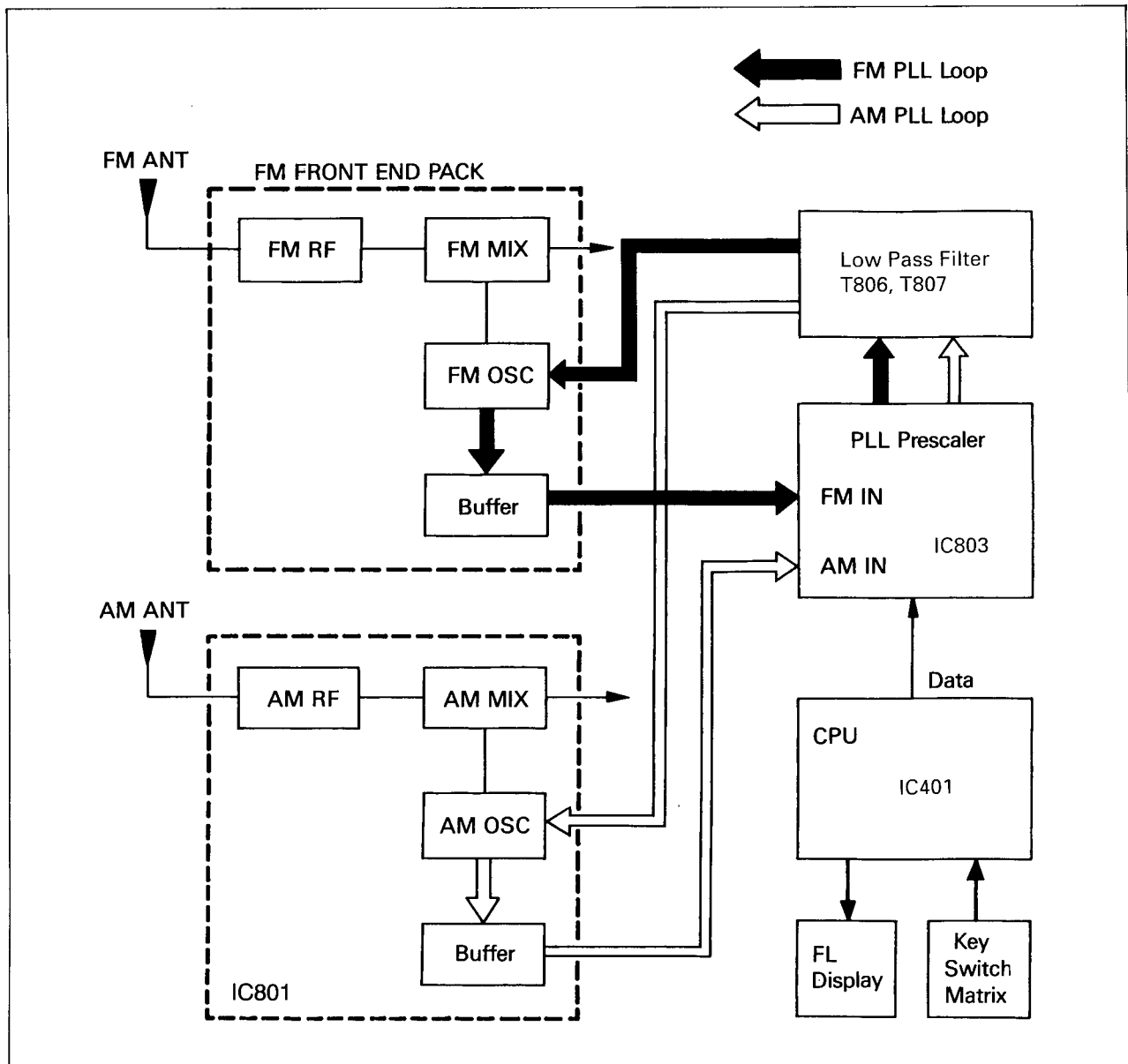
Code	Function
S4/PG0-S19/T12	These are segment signal output pins of FL controller/driver.
S20/T1-S23/T8	Not used
T7-T 0	These are timing signal output pins of FL controller/driver and key scan pins.
INT	This is external interrupt dedicated pin.
TX, TEX	Not used
RST	This is the system reset of the device.
NC	No connection
V _{DD}	This is the power supply pin.
PI0/AD0-PB1/AD5	These are the key input pins.
PB2/AD6	This is the power mute output pin.
PB3/AD7	This is the channel mode control pin of surround mode.
EC	Not used.
PX0	This is the protection input pin.
PX1	This is the remote control input pin.
PX2	This is the VCR2 front and rar input control pin.
PA0	Not used.
PA1	Not used.
PA2-PA3	These are used to control the PLL IC, analog switching IC. Shift register IC, volume IC, delay IC. (CLK, DATA)
PF0	This is the FM mode colntrol pin.
PF1	This is used to control the PLL IC.
PF2	This is used to control the shift register IC.
PF3	This is used to control the volume IC.
PE0	This is used to control at analog switching IC.
PE1	This is the main mute output pin.
PE2	This is the surround mute output pin.
PE3	This is the center mute output pin.
PY0	This is the tuner mute output in.
PY1	This is used to control the delay IC.
PY2	This is the power down pin.
PY3	Not used.
PD0	This is the tuner stereo input pin.
PD1	This is the tuner tuned input pin.
PD2-PD3	These are used to control FM and AM step.
PC0	This is used to eliminate the noise of the PLL IC in the Tape 2 Monitor mode.
PC1	This is used to control volume indicator.
PC2	This is used to control VCR1
PC3	This is used to control VCR2
V _{SS}	This pin provides the ground potential.
XTAL, EXTAL	These pin serve for connecting a clock oscillator crystal.
NC	No connection.
V _{REF}	Not used.
V _{FDP}	This is the power supply pin of the FL controller.
PH0-PH1	These are used to control the motor volume.
PH2	Not used.
PH3	This is used to control stand-by mode.

3. Key Matrix

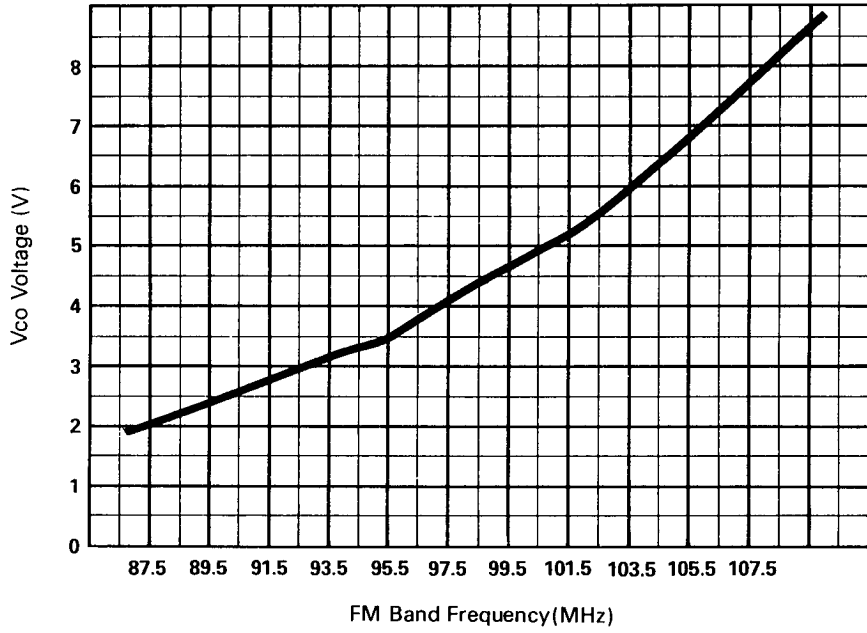
Pin No.	35	36	37	38	39	40
22	4	9	CD	O	5	PHONO
23	VCR1	VCR2	TV	T2M	T1	TUNER
24		VCR1 REC	SURR MODE	MEMORY		SCAN
25	▼	▲	FM MODE	AUTO MANUAL	FM	AM
26	2	6	3	2	7	8
27				POWER		
28	DELAY TIME		TEST TONE		CENTER MODE	

4. Digital Tuning System Description

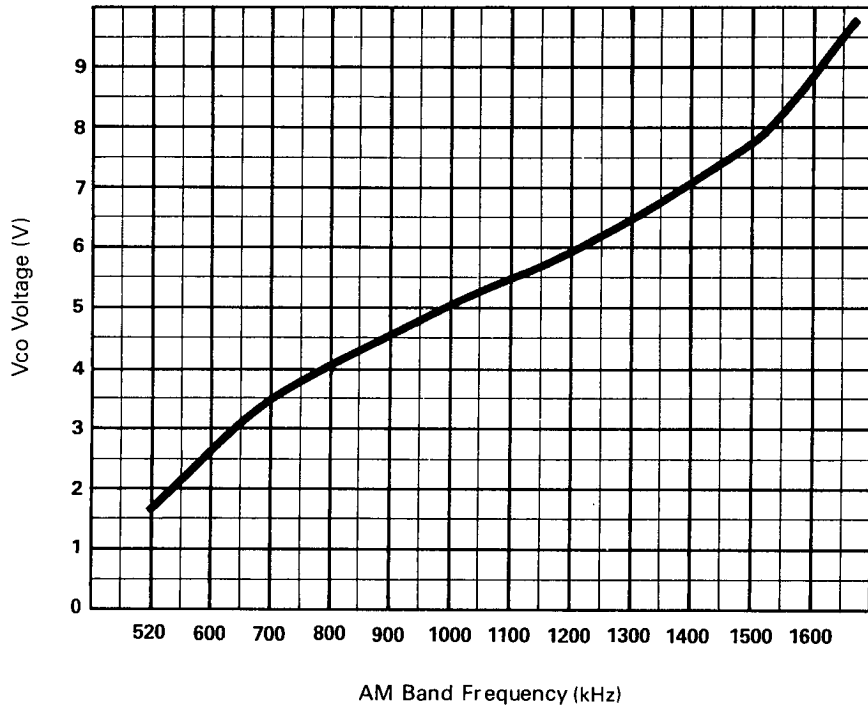
Digital Turing System



• Vco vs. FM Band Frequency Curve



• Vco vs. AM Band Frequency Curve

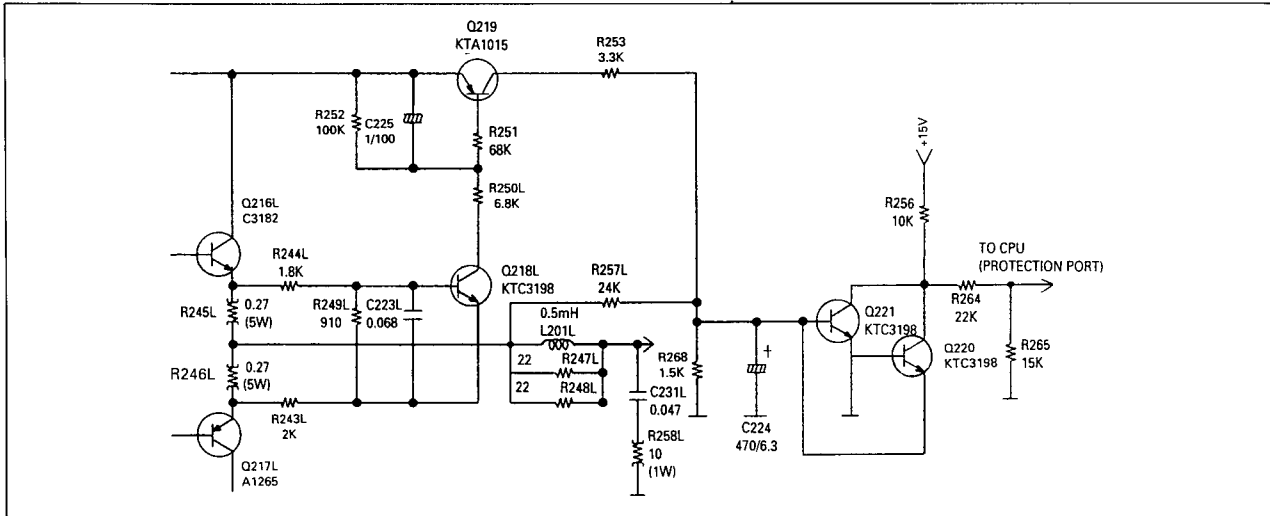


5. Protection Circuits

Speaker Protection Circuit

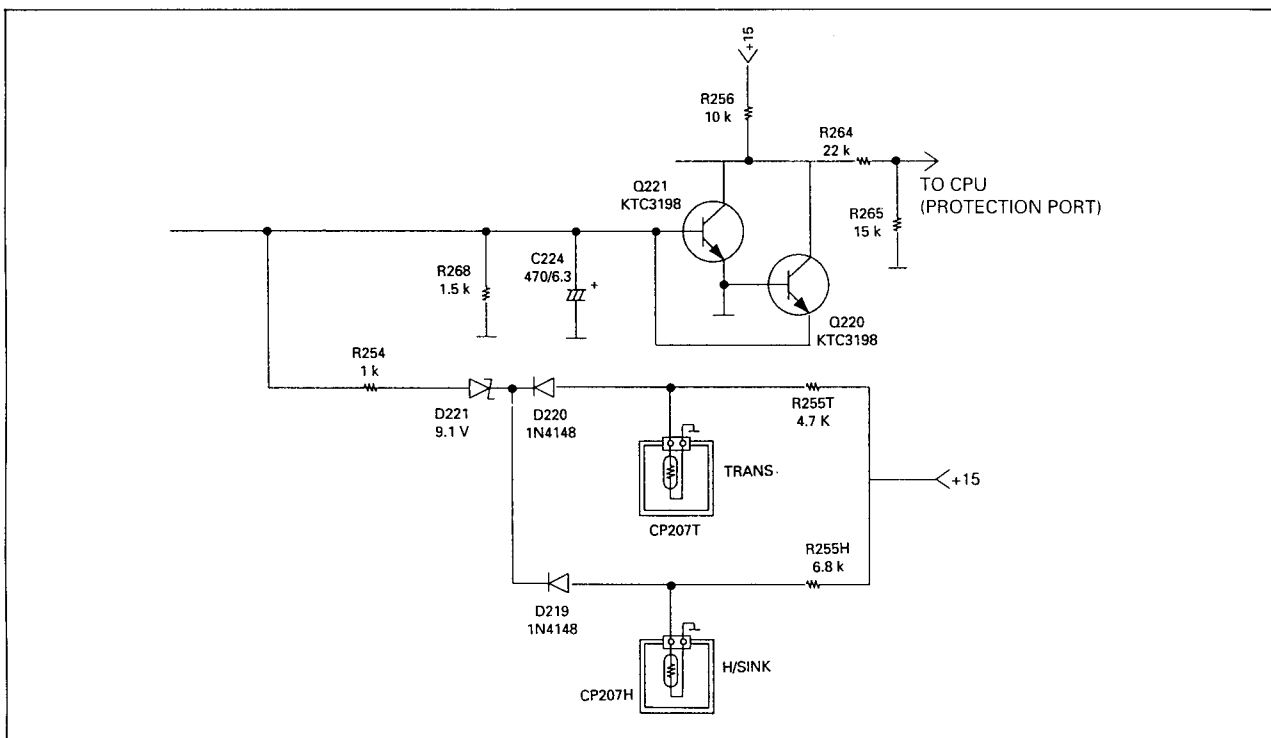
The CPU protects both this unit and the speakers when an abnormally high current flows in Q216 L/R and Q217 L/R due to excessive input drive, too low of a load impedance, or short of the speaker terminals. If current increase is excessive, the voltage across R245 L/R or R246 L/R turns on Q218 L/R, then Q219 turns on Q221.

It makes the protection port of the CPU to low state. Then the power is turned off.



Thermal Protection Circuit

This receiver has a overload thermal protection circuits to guard against abnormal operation. When the temperature of TRANS POSISTOR installed with the main transformer or H/SINK POSISTOR rises abnormally, the resistance of the posistor becomes larger and Q221 is turned on. It makes the protection port of the CPU to low state. Then the power is turned off.



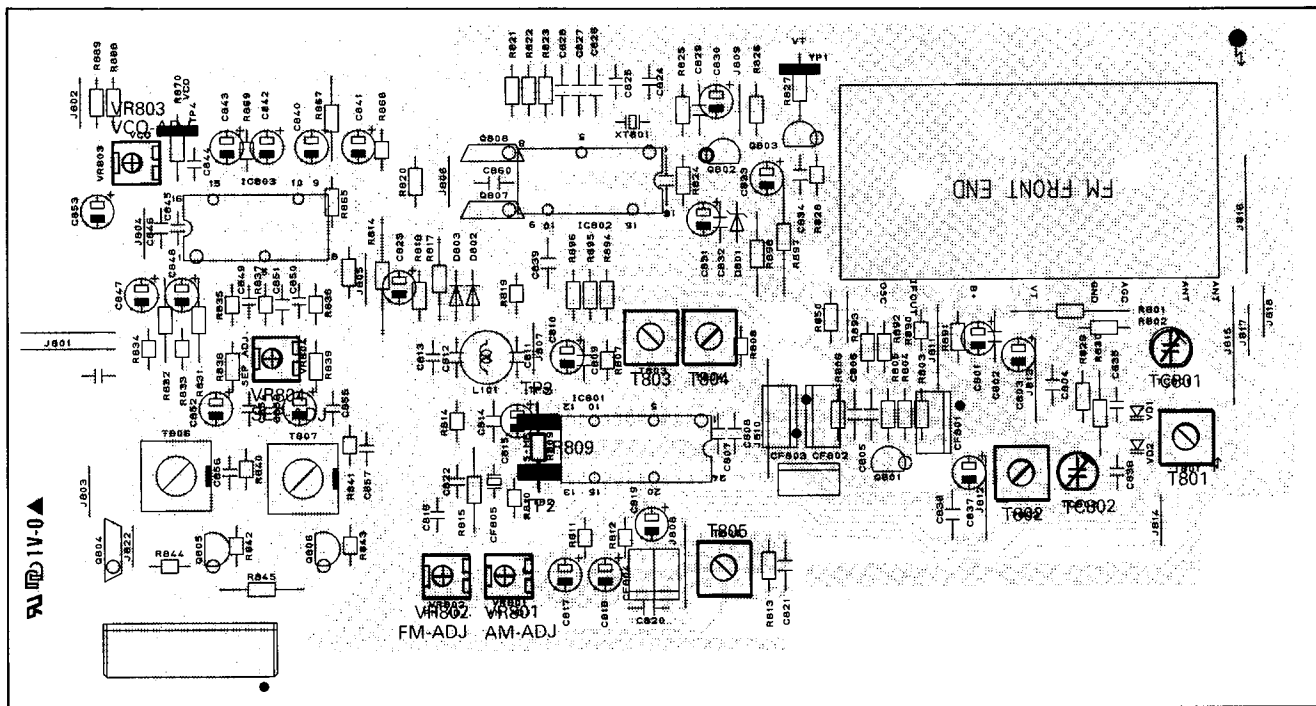
ALIGNMENT PROCEDURES

1. Equipment Required

- AM Standard Signal Generator (AM SSG)
- Oscilloscope
- AC Voltmeter
- FM Standard Signal Generator (FM SSG)
- Stereo Modulator
- Audio Generator
- Distortion Meter
- DC Voltmeter
- Frequency Counter

Note : Disconnect external FM antenna prior to alignment.

2. Alignment and Test Points (PCB10)



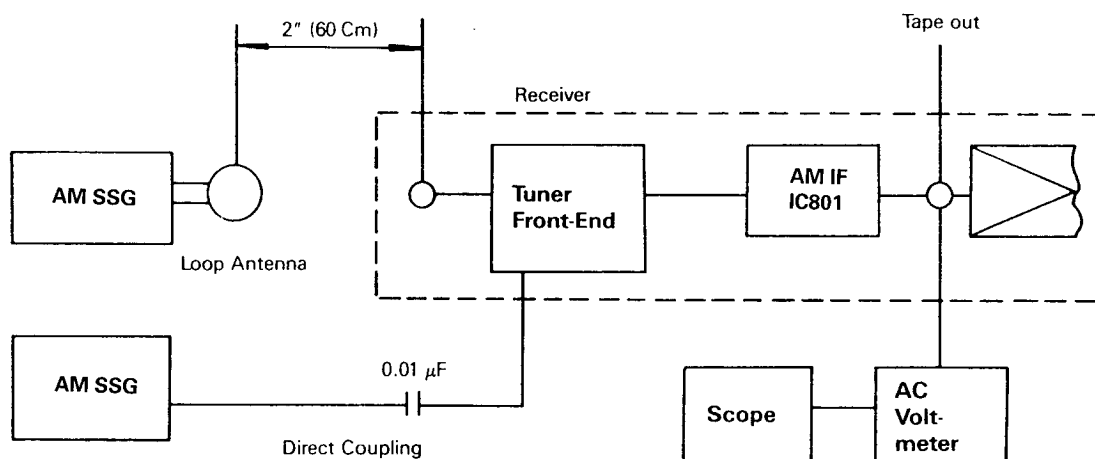
3. AM IF and RF Alignment

Preparation

1. Output of Signal Generator should not be higher than necessary to obtain an optimum output reading.
2. Signal Generator Modulation: 30%.
3. Switch: Press to AM.

Step	Signal Generator Frequency	Receiver Frequency on the Display	Equipment Connection	Adjustment Point	Adjust for
1	999 kHz (400 Hz, Mod.)	522 kHz	DC Voltmeter TP1	T802	1.2 V reading
		1611 kHz	DC Voltmeter TP1	TC802	8.5 V reading
2	594 kHz (400 Hz, Mod.)	594 kHz	AC voltmeter to TAPE OUT jack.	T801 (ANT Coil)	Maximum reading
3	1404 kHz (400 Hz, Mod.)	1404 kHz	AC voltmeter to TAPE OUT jack.	TC801 (ANT Trimmer)	Maximum reading

4	450 kHz (400 Hz, Mod.)	999 kHz	AC voltmeter to TAPE OUT jack.	T805 (IFT)	Maximum reading
5	999 kHz (400 Hz, Mod.)	999 kHz	Same as Step 1.	VR801	FL display 'TUNED' Indication on receiver with AM SSG Output level of 800 μ V/m



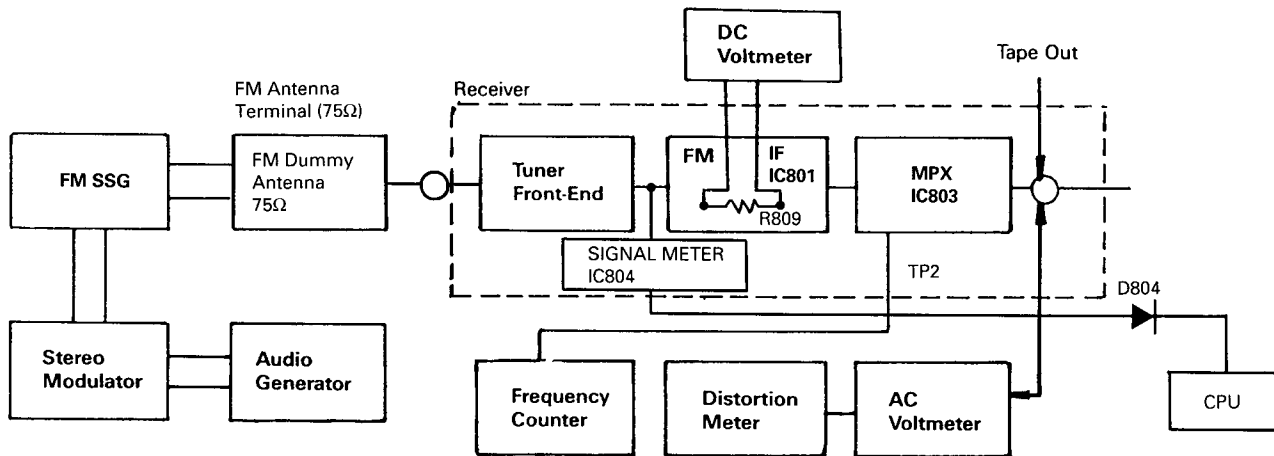
AM Alignment Connection

4. FM IF Alignment

Preparation

1. Signal Generator output should be no higher than necessary to obtain an optimum output reading.
2. Switch Press to FM.
3. Signal generator deviation : 40 kHz.

Step	Signal Generator Frequency	Receiver Frequency Display	Equipment Connection	Adjustment Point	Adjust for
1	98.0 MHz (1 kHz, Mod.)	98.0 MHz	DC Volt meter to R809 (PCB10)	T803	Zero reading on DC volt meter.
2	98.0 MHz (1 kHz, Mod.)	98.0 MHz	Distortion meter to TAPE OUT jack	T804	Minimum distortion
3	98.0 MHz (1 kHz, Mod.)	98.0 MHz	Same as Step 1	VR802	FL display 'TUNED' Indication on receiver with FM SSG output level of 10 μ V/m



FM RF/IF and MPX Alignment Connection

5. MPX Alignment, SM Alignment Preparation

1. Switch : Press to FM.
2. Tuner for 98 MHz on band.
3. Signal Generator output level : 1000 μ V.
- 4 Deviation : 40 kHz, at 100% modulation of composite signal.
5. Connect Signal Generator to FM antenna terminal through FM dummy antenna (75 Ω).

Step	19 kHz Modulation Level	Signal Generator Frequency Setting	Equipment Connection	Adjustment Point	Adjust for
1	Pilot off	Carrier only	Frequency counter connect to TP2 (HOT) of PCB and ground	VR803	76 kHz
2	8% Mod.	Composite to channel 1kHz R	AC voltmeter to TAPE OUT jack of R channel	-	Adjust for about 450mV of audio output
3	8% Mod.	Composite to channel 1 kHz L	AC voltmeter to TAPE OUT jack of R channel	VR804	AC voltmeter reading should be at least 40 dB below.
4	8% Mod.	Composite to channel 1 kHz R	AC voltmeter to TAPE OUT jack of L channel	VR804	Same as Step 3.
5	8% Mod.	Composite to channel 1 kHz L or R	AC voltmeter to TAPE OUT jack Lor R channel	VR805	FL display 'SIG 60 dB' indication on receiver with FM SSG output lenel of 1000 μ V/m

If you could not obtain -40dB readings in Steps 3 and 4 (compared with Step 2), readjust VR804 until you obtain -40dB readings for both Steps 3 and 4. Nominal is -45 dB.

TROUBLESHOOTING

Symptom	Cause and Remedy
Receiver inoperative (FL indicator does not light)	<p>A) Faulty AC power cord. Replace.</p> <p>B) Defective the power switch. Replace.</p> <p>C) Broken wire in the power transformer. Replace the power transformer.</p> <p>D) Blown fuse. Replace the fuse.</p>
Fuse blows when power is turned on.	<p>A) Defective power transformer. Replace.</p> <p>B) Short on the primary or secondary of the transformer circuitry. Repair the trace.</p> <p>C) Damaged rectifier (D208 to D211) or damaged transistor (Q216 to Q217). Replace the defective component(s).</p> <p>D) Short circuit in the amplifier circuit. Replace the shorted component(s) in the amplifier circuit.</p>
Power indicator lights but no sound from both channels	<p>A) Speaker switch 1 or 2 defective. Replace the defective switch (es)</p> <p>B) Defect in transistor Q216 L/R, Q217 L/R on the Main Amp Board. Replace the defective component(s).</p>
Speaker A inoperative	<p>A) Speaker switch A defective. Replace</p>
Speaker B inoperative	<p>A) Speaker switch B defective. Replace.</p>
One channel does not work when Volume is at maximum with a test signal applied to the center terminal of Volume control VR5 of the dead channel	<p>A) Defect in transistor Q216 L/R, Q217 L/R on the Main Amp Board Locate and correct the defect.</p> <p>B) Break in copper foil of printed circuit board. Repair the circuit trace.</p> <p>C) Short in speaker output terminal. Repair or replace.</p>
Speaker works normally but headphones inoperative	<p>A) Headphone plug does not mate with jack. Replace the jack.</p> <p>B) Defective resistor R901, R902. Replace.</p>
PHONO input inoperative	<p>A) Poor contact in phono input jack. Repair or replace the jack.</p> <p>B) Defective phono switch or IC103. Replace.</p>
LOUDNESS has no effect	<p>A) Defective loudness switch. Replace.</p> <p>B) Defective resistor R601, R602, C601, C602. Replace the defective components(s).</p>
FM inoperative	<p>A) Defective front-end. (FE407-G60) Replace.</p> <p>B) Defective FM switch. Replace the switch</p>

Symptom	Cause and Remedy
FM inoperative	<p>C) Defective transistor Q801, Q805, Q806, IC801, IC803 Replace the defective transistor(s) or IC(s).</p> <p>D) Defective coil T803 or T804 Replace the coil(s).</p> <p>E) Defective lead-in. Repair or replace the lead-in.</p> <p>F) Ceramic filter CF801, CF802, CF803 defective. Replace the defective ceramic filter(s).</p> <p>G) Defective controller circuit component. Replace.</p>
Poor multiplex separation	<p>A) Improper adjustment. Readjust VR803 and VR804. (Refer to MPX Alignment.)</p> <p>B) IC803 defective. Replace.</p> <p>C) Variable resistor VR803 or VR804 defective. Replace the variable resistor(s).</p>
STEREO indicator does not light	<p>A) Defective indicator in FL. Replace.</p> <p>B) Improper adjustment of VR803 of tuner board. Make readjustment.</p> <p>C) Defective IC803 Replace the defective component.</p>
FM volume not sufficient	<p>A) If volume from both L and R channels is not loud enough : Front end Section defective. Faulty IC801, Coil T803, Defective C838 of tuner Board. If sound of one channel is not loud enough: Defective T806, T807</p>
FM Mono has no effect	<p>A) Defective FM MODE switch. Replace.</p>
AM inoperative	<p>A) Damaged IC801 of tuner board. Replace.</p> <p>B) Defective T801, T802, T805 or CF804 of tuner board. Replace the defective component(s).</p> <p>C) Resistor R829, R817 defective. Replace the defective component(s).</p> <p>D) Capacitor C836, C818, C813 defective. Replace the defective capacitor(s).</p> <p>E) Defective AM switch Replace.</p> <p>F) Defective varicap diode VD1, VD2 Replace varicap diods(s).</p> <p>G) Damaged AM loop antenna. Repair or replace.</p> <p>H) Defective controller circuit component. Replace.</p>
Bass control has no effect	<p>A) Variable resistor BASS defective. Replace.</p> <p>B) Defective R709L/R, R710L/R, C702L/R, C708L/R Replace the defective component(s).</p>

Symptom	Cause and Remedy
Treble control has no effect	A) Variable resistor TREBLE defective. B) Defective R711 L/R, R712 L/R, C709 L/R, C710L/R Replace the defective components(s).
Auto tune inoperative (UP/DOWN)	A) Poor contact in Up/Down key. Repair or replace. B) Defective IC401 Replace. C) Defective FL401. Replace. D) Defective tuner circuit component. Replace. E) In case of FM only, improper adjustment of FM front-end. Readjust.
Manual tune inoperative (UP/DOWN) (AM or FM)	A) Poor contact in Up/Down key. Replace. B) Defective IC401. Replace.
Memory setting (keys 1-10) inoperative	A) Poor contact in memory keys 1-10. Replace. B) Poor contact in memory set key. Replace. C) Defective IC401. Replace the defective component.
FL inoperative	A) FL defective. Replace. B) Defective IC401. Replace C) Defective X401. Replace.
Noise Volume control	A) Defective IC603. Replace. B) Defective capacitor C615 or C616. Replace the defective capacitor(s).
Remote Control Unit inoperative	A) Weak Battery. Replace. B) Defective. Replace. C) Defective IC401(CPU Board) or IC01. Replace.

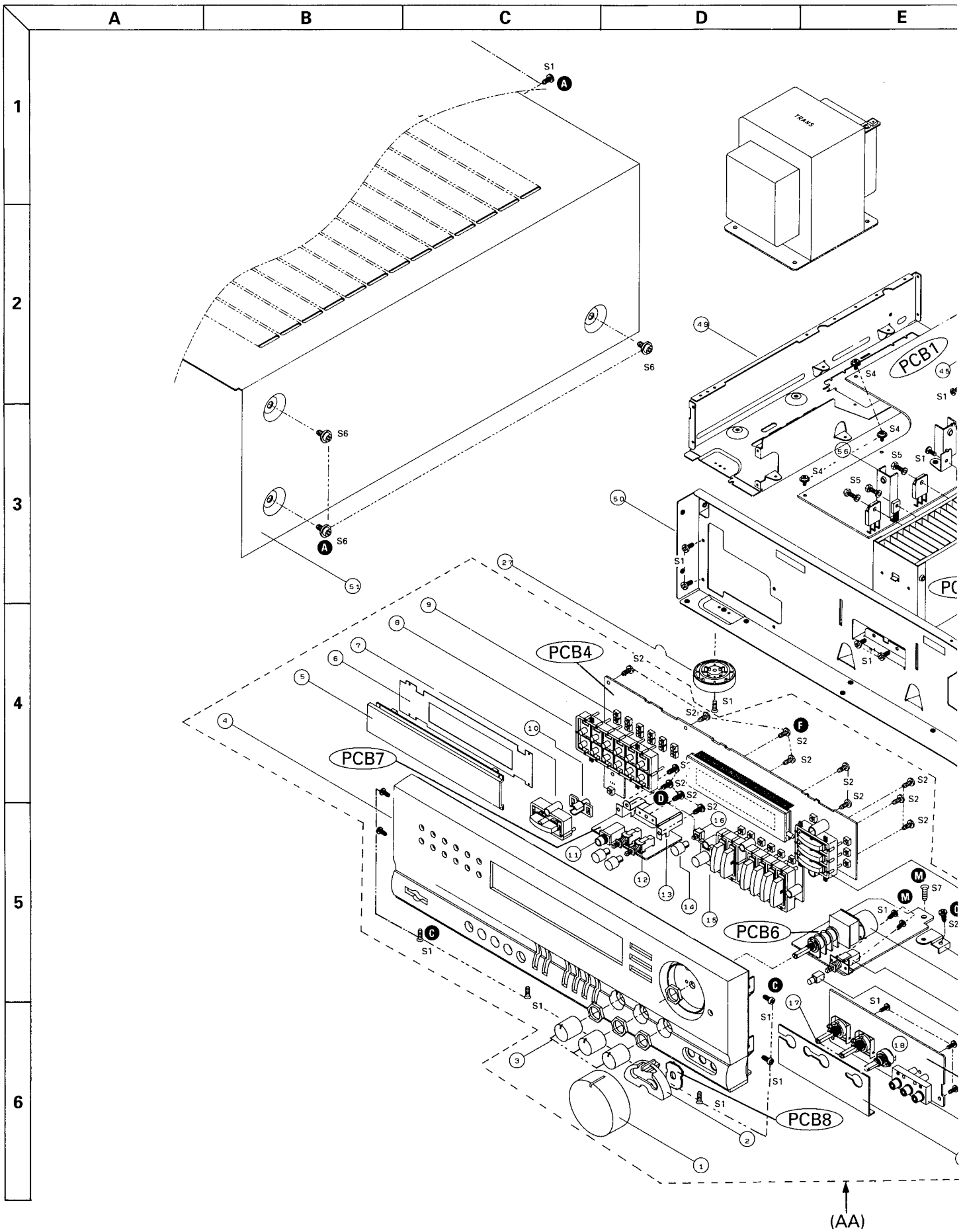
GENERAL UNIT PARTS LIST

Ref. No.	Description	Mfr. Part No.	Q'ty	Version
CABINET AND CHASSIS				
1	Knob, Volume	048543059811	1	
2	Indicator, Volume	8555048610	1	
3	Knob, Rotary	048545124311	3	
4	Panel, Front	048501033812	1	
5	Window, Display	8553019710	1	
6	Filter	048555048511	1	
7	Button, Power	048545124011	1	
8	Button, Preset	048543059611	1	
9	Switch, Tact	4658003710	32	
10	Indicator, Power	8555048710	1	
11	Jack, Phone	4438005020	1	
12	Switch, Push	4628043810	2	
13	Shield, Fence, knob	6165147910	1	
14	Button, Speaker	048545124111	2	
15	Button, Function	048543059911	1	
16(SW433)	Switch, Push	4628054410	1	
17	Volume, Bass/Treble	3208049510	2	
18	Volume, Balance	3208052010	1	
19	Shield Fence	6165148410	1	
20	Jack, RCA, 3P, VCR	4438109710	1	
21	Button, Loud	048545124211	1	
22	Switch, Loud	4628059610	1	
23	Volume, Motor	3228019410	1	
24	Bracket, Volume	6505138410	1	
25	Button, Tuning	048543059711	2	
26	Foot	6033102510	2	USA/CANADA
(27)	Foot, Hot-stamping	046033102511	2	USA/CANADA
27	Foot, Hot-stamping	046033102511	4	EUROPE
28	Frame, Cover	6123205210	1	
29	Cover, Bottom	6122418120	1	
30	Bracket, PCB	6505111710	2	
31	Frame, Right	6122636410	1	
32	Jack, RCA, 4P	4438108110	1	
33	Terminal, Antenna	4408108210	1	
34	Chassis, Back	046102044251	1	EUROPE
(34)	Chassis, Back	046102042211	1	USA/CANADA
35	Jack, RCA, 6P	4438103210	1	
36	Frame, Center	6123205110	1	
37	Bracket, Jack	6505138510	1	
38	Terminal, Speaker, 4P	4408106410	1	
39	Jack, Multi	4438006510	2	
40	Jack, RCA, 2P	4438109310	2	
41	Jack, RCA, 1P	4438113810	1	
42	Bracket, Heatsink	6505135010	1	
43	Heatsink, Power	7502008510	1	
44	Heatsink, Regulator TR.	7505206220	1	
45	Heatsink, Regulator TR.	7505206120	2	
46	Bracket, PCB	6505134910	2	
47	Terminal, Speaker, 8P	4408105810	1	
49	Frame, Left	6121608930	1	
50	Chassis, Front	6122214510	1	
51	Cover, Top	046122022421	1	
52	Stopper, AC Cord	6518002320	1	EUROPE
(52)	Stopper, AC Cord	6518002310	1	USA/CANADA
53	Cord, AC Power	4408001430	1	EUROPE
(53)	Cord, AC Power	4408001410	1	USA/CANADA
54	System Ground	4408103710	1	
55	Jack, RCA, 4P	4438103410	2	
56	Heatsink, Regulator TR.	7505202410	4	
57	Jack RCA, 4P	4438103110	1	
58	Jack, RCA, 6P	4438108010	1	
59	Terminal Speaker, 2P	4408108710	1	
60	Jack RCA, 2P	4438111310	1	
HARDWARE KIT				
S1	Screw, #2BTC 3x8 (B)	8109230083	25	
S2	Screw, #1PT 3X10B	8119130103	18	
S3	Screw, #2BTC 3x8 (Y)	8109230081	7	
S4	Screw, #2WPTC 3x8 (B)	8159230081	38	
S5	Screw, #HEX MSPW 3x12	8099130121	12	
S6	Screw, WSAM 4X8B	8159440083	10	
S7	Screw, #2BTC 3x6 (B)	8109230063	18	
S8	Screw, Ground	8155000710	4	
MISCELLANEOUS				
TRANS	Power Transformer, 230V 50Hz	2828100257	1	EUROPE
(TRANS)	Power Transformer, 120V 60Hz	2828009981	1	USA/CANADA
	Ass'y Posistor	052438012202	2	
	Card Cable, 25P, 210mm	4118625215	1	

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol Δ in the part list are of special significance to safety. When replacing a component identified with Δ , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

GENERAL UNIT



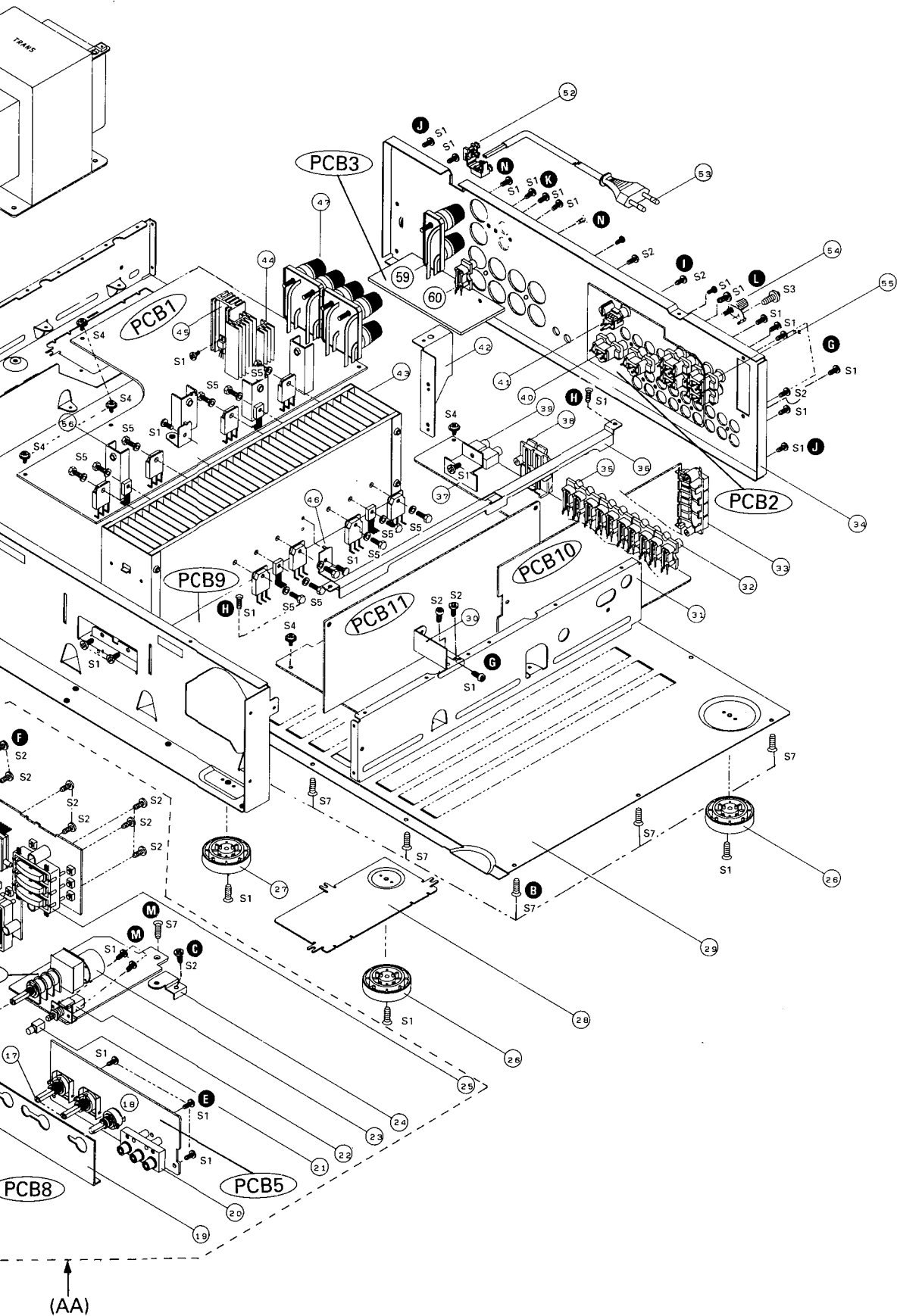
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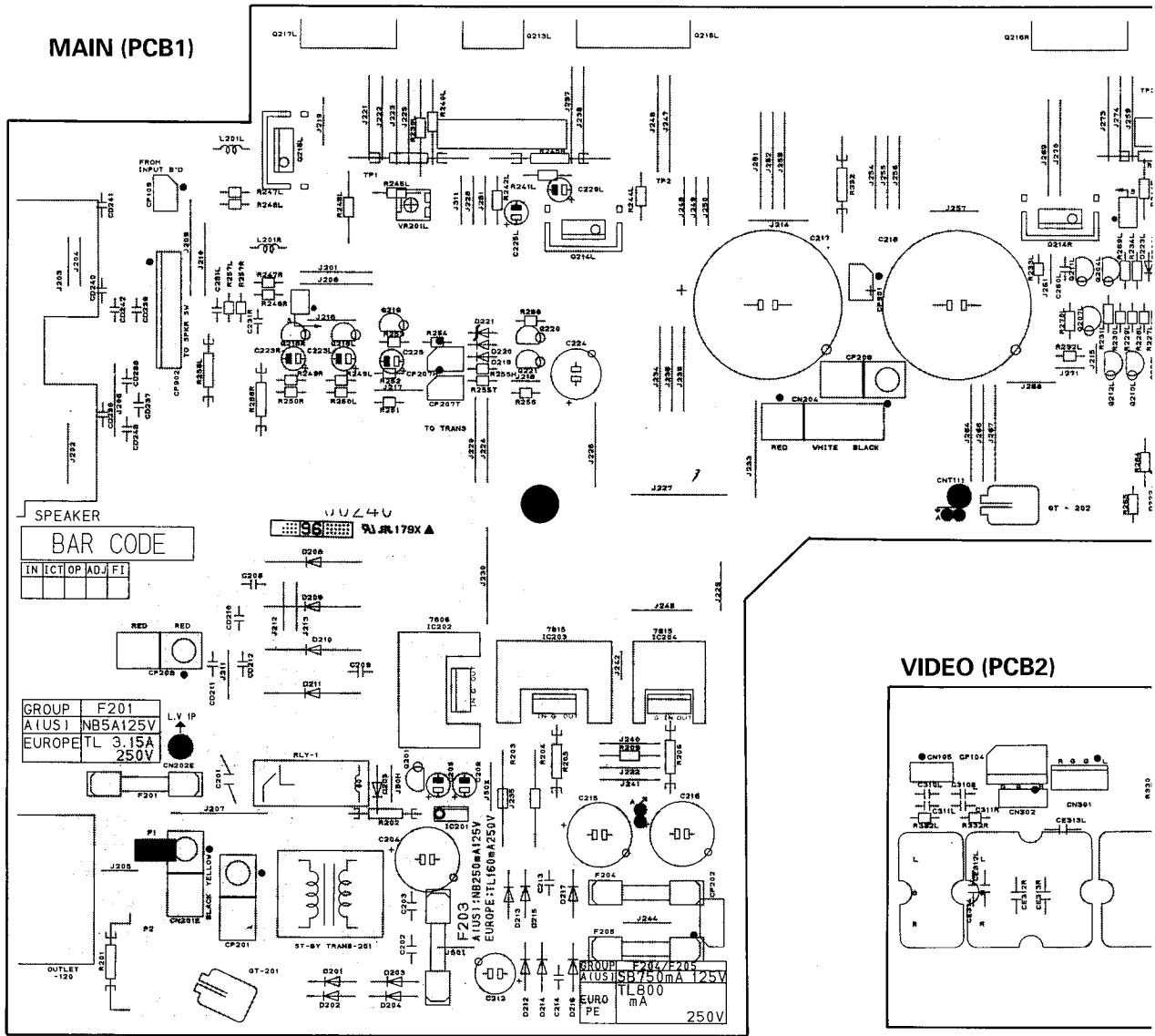
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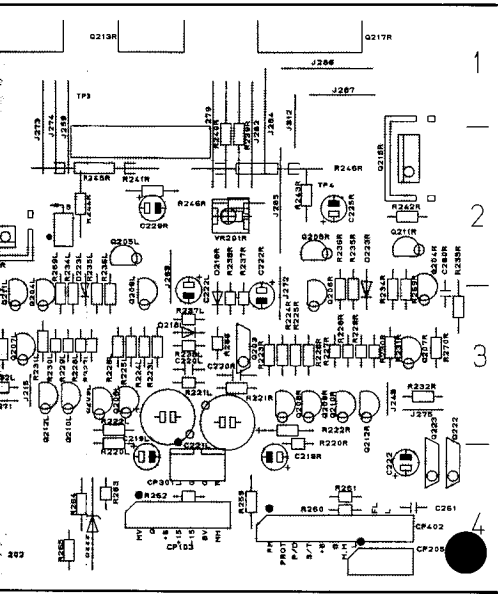
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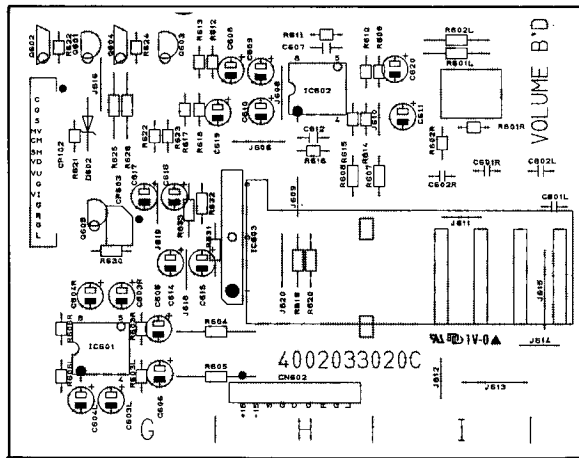


PRINTED CIRCUIT BOARDS

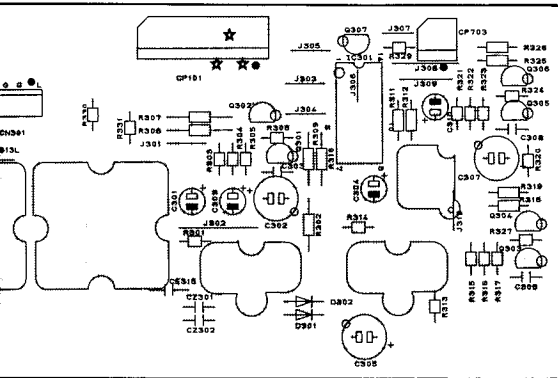
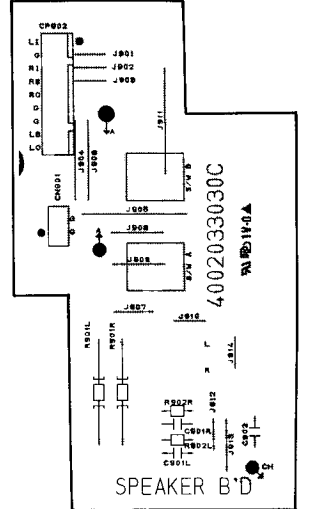




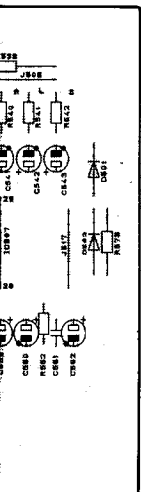
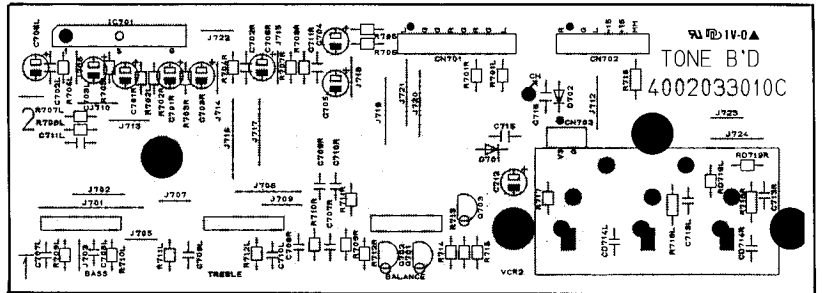
VOLUME (PCB6)



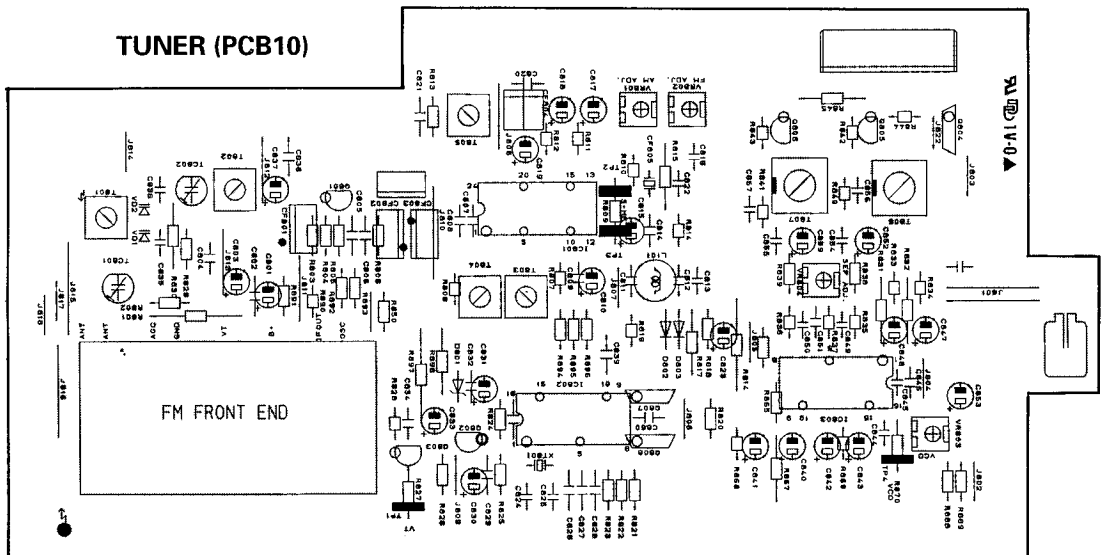
SPEAKER SEL. (PCB7)



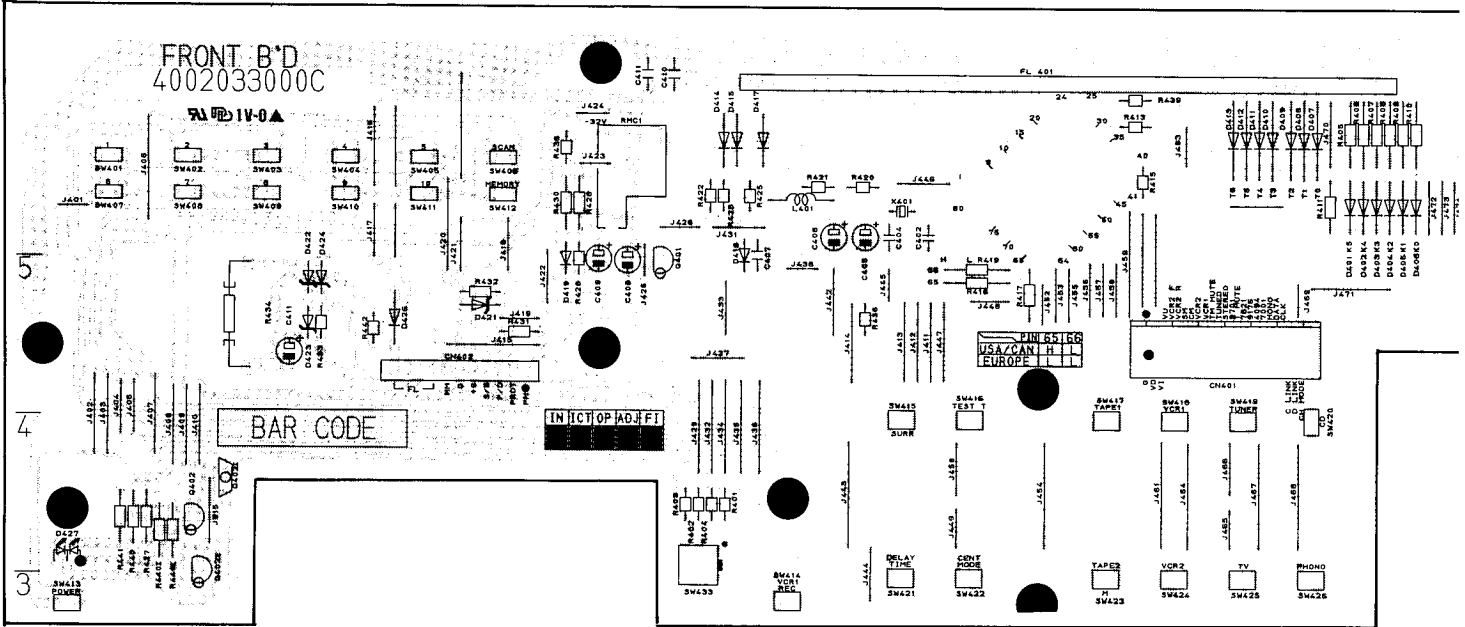
TONE (PCB5)



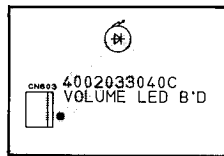
TUNER (PCB10)



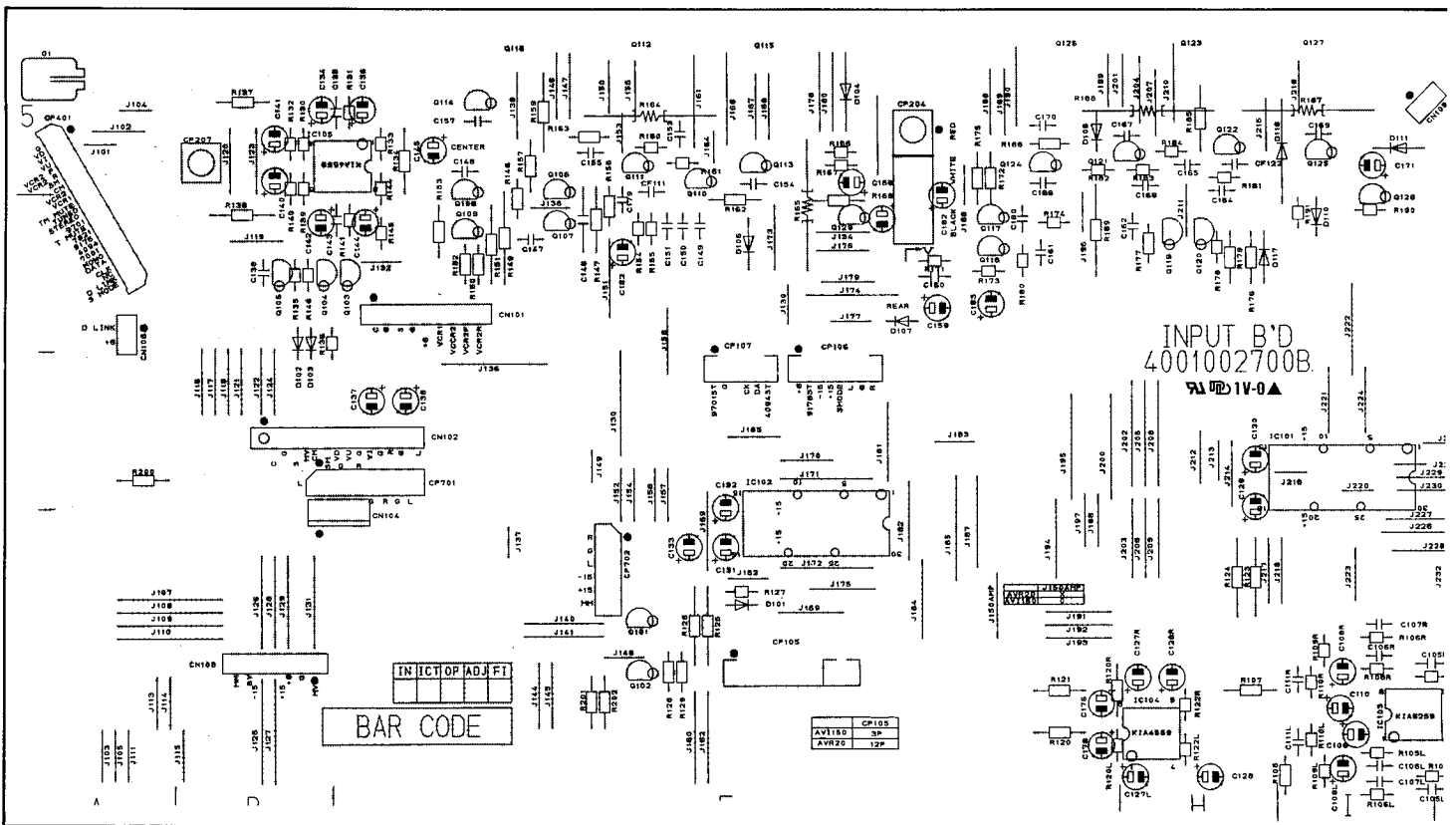
FRONT (PCB4)



VOLUME LED (PCB8)

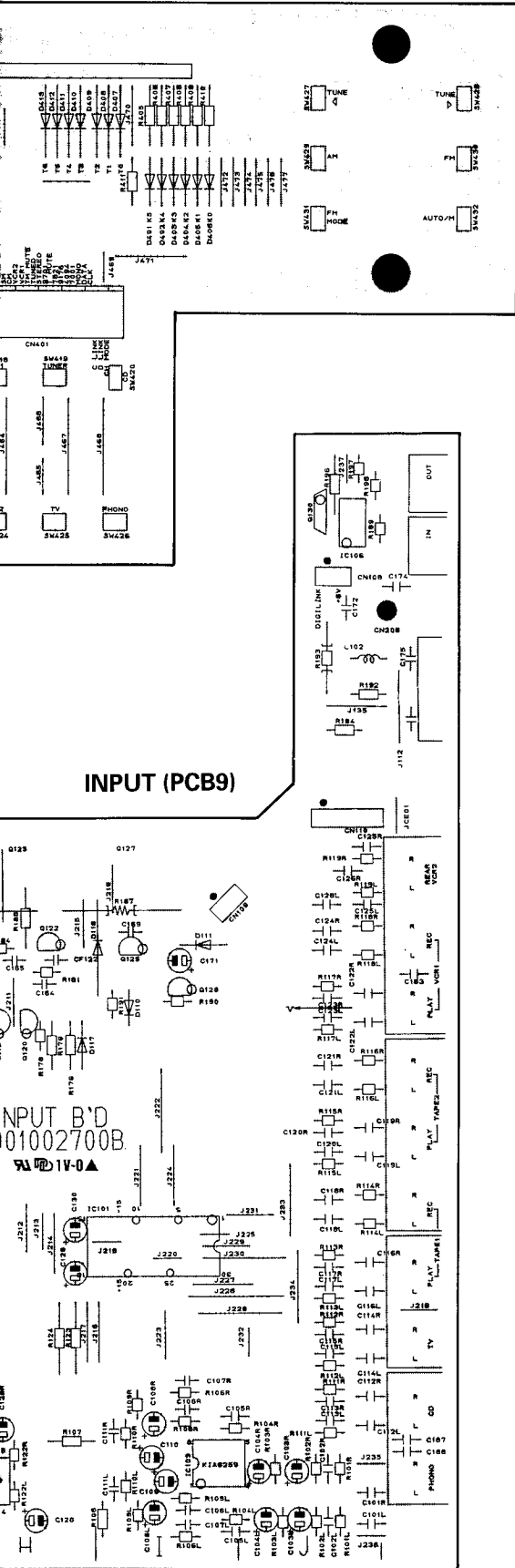


INPUT (PCB9)



ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTICE : Products marked with Δ have special characteristics important to safety. If you replace any of these components, read carefully the product safety notice in this manual.
 Don't degrade the safety of the product through improper servicing.
 Resistor/Capacitor tolerance - D : ($\pm 0.5\%$), J : ($\pm 5\%$), K : ($\pm 10\%$), M : ($\pm 20\%$), Z : +80, - 20%)



Ref. No.	Description	Mfr. Part No.	Q'ty	Version
PCB1 ASSEMBLY P.C. BOARD MAIN				
CAPACITORS				
C201	Ceramic Disc	0.0047	uF 400 V K	3548472340 1
C202/203	Mylar	0.047	uF 100 V J	3679473120 2
C204	Electrolytic SG	470	uF 16 V M	3479347139 1
C206	Electrolytic SG	22	uF 50 V M	3479322071 1
C208/209	Mylar	0.1	uF 250 V J	3679104257 2
C212	Ceramic Tubular	100	pF 35 V K	3519101935 1
C213/214	Mylar	0.047	uF 100 V J	3679473120 2
C215/216	Electric SG	1000	uF 35 V M	3409310269 2
C217/218	Electrolytic HM	8200	uF 63 V M	3419582235 2
C219L/R	Electrolytic SG	47	uF 25 V M	3479347041 2
C220L/R	Electrolytic SG	100	uF 50 V J	3479310171 2
C221L/R	Electrolytic SG	470	uF 10 V M	3479347121 2
C222	Electrolytic SG	10	uF 50 V M	3479310071 1
C222L/R	Electrolytic SG	1	uF 50 V M	3479310971 2
C223L/R	Mylar	0.068	uF 100 V J	3679683120 2
C224	Electrolytic SG	470	uF 10 V M	3479347121 1
C225	Electrolytic SA	10	uF 50 V M	3479310071 1
C225L/R	Electrolytic SG	10	uF 50 V M	3479310071 2
C229L/R	Electrolytic SG	4.7	uF 50 V M	3479347971 2
C231L/R	Mylar	0.047	uF 100 V J	3679473120 2
C260L/R	Ceramic Disc	5	pF 50 V D	3579509030 2
CD237-243	Ceramic Tubular	0.0047	uF 50 V K	3519472935 3 EUROPE
CD210-212	Mylar	0.1	uF 250 V J	3679104257 3 EUROPE
COILS				
L201L/R	Inductor, 0.5 uH			2648001010 2
CONNECTORS				
CN204	Lead Ass'y 3P 530mm			4358800353 1
CP103	Wafer 7P			4428505410 1
CP109	Wafer 2P			4428508210 1
CP201	Wafer 2P, LV			4428525780 1
CP202	Wafer 3P			4428505710 1
CP203	Wafer 2P, LV			4428525780 1
CP205	Wafer 4P			4428505610 1
CP206	Wafer 1P, LV			4428525860 1
CP207H	Wafer 2P			4428508210 1
CP207T	Wafer 2P			4428508210 1
CP301	Wafer, 4P			4428517710 1
CP402	Wafer 11P			4428510710 1
CP901	Wafer 2P			4428508210 1
CP902	Wafer 9P			4428518210 1
DIODES				
D201-205	1N4002, Rectifier			2258100135 5
D208-211	PX6A03, Rectifier			2058100138 4
D212-217	1N4002, Rectifier			2258100135 6
D218L/R	1N4148M, Switching			2058322101 2
D219/220	1N4148M, Switching			2058322101 2
D221	Zener, UZ 9.1 BSC			2258599107 1
D222	Zener, UZ 4.3 BSB			2258599102 1
D223L/R	1N4148M, Switching			2058322101 2
INTEGRATED CIRCUITS				
IC201/202	GL7806, Regulator			2168601110 2
IC203	GL7815, Regulator			2168602105 1
IC204	GL7915, Regulator			2168602114 1
TRANSISTORS				
Q112	2SC4137, Bias NPN			2008622110 1
Q115	2SC3854, NPN			2028416107 1
Q116	2SA1490, PNP			2028116104 1
Q123	2SC4137, Bias NPN			2008622110 1
Q126	2SC3854, NPN			2028416107 1
Q127	2SA1490, PNP			2028116104 1
Q201	KTC1815Y/BKTC3198Y, NPN			2208606104 1
Q203	DTC114YS, NPN			2208622106 1
Q204L/R	KTA970/KTA1268, PNP			2208206104 2
Q205L/R	KTA1015Y/BKTA1266Y, PNP			2208206105 2
Q206L/R	KTA970/KTA1268, PNP			2208206104 2
Q207L/R	KTC2240/BKTC3200, NPN			2208606108 2
Q208L/R	KTA970/KTA1268, PNP			2208206104 2
Q209L/R	KTA970/KTA1268, PNP			2208206104 2
Q210L/R	KTC2240/BKTC3200, NPN			2208606108 2

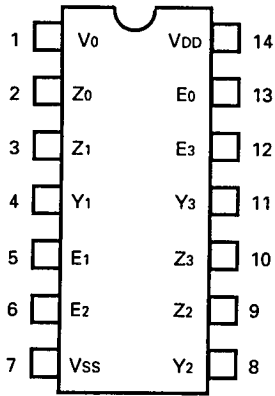
Ref. No.	Description	Mfr. Part No.	Q'ty	Version	Ref. No.	Description	Mfr. Part No.	Q'ty
Q211/LR	BKTA949/BKTA1024, PNP	2208206102	2		PCB2 ASSEMBLY P.C. BOARD VIDEO			
Q212/LR	KTC2229/KTC3206, NPN	2208606107	2		CAPACITORS			
Q213/LR	2SC4137, Bias NPN	2008622110	2		C301	Electrolytic SG	33 uF 25 V M	3479333041 1
Q214/LR	2SC4883A, NPN	2028316100	2		C302	Electrolytic SG	470 uF 10 V M	3479347121 1
Q215/LR	2SA1859A, PNP	2028016100	2		C303	Ceramic Disc	470 pF 50V D	3579471130 1
Q216/LR	2SC3182N-O	2028307101	2		C304	Electrolytic SG	33 uF 25 V M	3479333041 1
Q217/LR	2SA1265N-O	2028007101	2		C305	Electrolytic SG	470 uF 10 V M	3479347121 1
Q218/LR	KTC1815Y/BKTC3198Y,NPN	2208606104	2		C306	Ceramic Tubular	1 pF 50 V K	3519010935 1
Q219	KTA1015Y/BKTA1266Y, PNP	2208206105	1		C307	Electrolytic SG	470 uF 10 V M	3479347121 1
Q220/221	KTC1815Y/BKTC3198Y,NPN	2208606104	2		C308	Ceramic Tubular	1 pF 50 V K	3519010935 1
Q222/223	DTC114YS, NPN	2208622106	2		C309	Electrolytic SG	100 uF 10 V M	3479310121 1
					C311	Ceramic Tubular	0.1 uF 50 V K	3519104935 1
					CZ301/302	Ceramic Disc	0.1 uF 50 V Z	3579104534 2
	RESISTORS					CONNECTORS		
R201	Carbon Film	3.3 Mohm 1/5 W J	3069335970	1		Lead Ass'y, 4P, 600mm	436204608331	1
R202	Metal Film	4.7 ohm 1 W J	3029479472	1		Lead Ass'y, 3P, 300mm	436103303331	1
R203/204	Metal Film	22 ohm 2 W J	3029220572	2	CN301			
R205	Metal Film	10 ohm 1 W J	3029100472	1	CN302			
R206	Metal Film	4.7 ohm 1 W J	3029479472	1	CP101	Wafer, 9P, Angle	4428513490	1
R209	Carbon Film	3.3 kohm 1/5 W J	3069332970	1	CP104	Wafer 4P, Angle	4428513440	1
R220/LR	Carbon Film	330 ohm 1/5 W J	3069331970	2	CP703	Wafer 2P, Angle	4428513420	1
R221/LR	Carbon Film	33 kohm 1/5 W J	3069333970	2				
R222/LR	Carbon Film	1 kohm 1/5 W J	3069102970	2				
R223/LR	Carbon Film	1.5 kohm 1/5 W J	3069152970	2	D301/302	DIODES		
R224/LR	Carbon Film	390 ohm 1/5 W J	3069391970	2		1N4148M, Switching	2058322101	2
R225/LR	Carbon Film	1.5 kohm 1/5 W J	3069152970	2				
R226/LR	Carbon Film	390 ohm 1/5 W J	3069391970	2				
R227/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2	IC301	INTEGRATED CIRCUIT		
R228/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2		GD4066, Switching	2138001101	1
R229/LR	Carbon Film	82 ohm 1/5 W J	3069820970	2				
R230/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2				
R231/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2	Q301	TRANSISTORS		
R232/LR	Carbon Film	22 kohm 1/5 W J	3069223970	2	Q302	KTA1015Y/BKTA1266Y, PNP	2208206105	1
R233/LR	Carbon Film	22 kohm 1/5 W J	3069223970	2	Q303	KTC1815Y/BKTC3198Y,NPN	2208606104	1
R234/LR	Carbon Film	82 ohm 1/5 W J	3069820970	2	Q304	KTA1015Y/BKTA1266Y, PNP	2208206105	1
R235/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2	Q305	KTC1815Y/BKTC3198Y,NPN	2208606104	1
R236/LR	Carbon Film	270 ohm 1/5 W J	3069271970	2	Q306	KTA1015Y/BKTA1266Y, PNP	2208206105	1
R237/LR	Carbon Film	10 kohm 1/5 W J	3069103970	2	Q307	KTC1815Y/BKTC3198Y,NPN	2208606104	1
R238/LR	Carbon Film	33 kohm 1/5 W J	3069333970	2	Q307	FEET, 2SK117Y	2218207106	1
R239/LR	Carbon Film	360 ohm 1/4 W J	3069361970	2				
R240/LR	Carbon Film	1.2 kohm 1/4 W J	3069122970	2	R301/302	RESISTORS		
R241/LR	Carbon Film	82 ohm 1/5 W J	3069820970	2	R303	Carbon Film	75 ohm 1/5 W J	3069750970
R242/LR	Carbon Film	33 kohm 1/5 W J	3069333970	2	R304	Carbon Film	12 kohm 1/5 W J	3069123970
R243/LR	Carbon Film	1.5 kohm 1/5 W J	3069152970	2	R305	Carbon Film	1.2 kohm 1/5 W J	3069122970
R244/LR	Carbon Film	1.8 kohm 1/5 W J	3069182970	2	R306	Carbon Film	180 ohm 1/5 W J	3069181970
R245/LR	Cement	0.27 ohm 5 W K	3059278782	2	R307	Carbon Film	150 ohm 1/5 W J	3069151970
R246/LR	Cement	0.27 ohm 5 W K	3059278782	2	R308	Carbon Film	8.2 kohm 1/5 W J	3069822970
R247/LR	Carbon Film	22 ohm 1/5 W J	3069220970	2	R309-312	Carbon Film	1.2 kohm 1/5 W J	3069122970
R248/LR	Carbon Film	22 ohm 1/5 W J	3069220970	2	R313/314	Carbon Film	100 kohm 1/5 W J	3069104970
R249/LR	Carbon Film	910 ohm 1/5 W J	3069911970	2	R315	Carbon Film	75 ohm 1/5 W J	3069750970
R250/LR	Carbon Film	6.8 kohm 1/5 W J	3069882970	2	R316	Carbon Film	12 kohm 1/5 W J	3069123970
R251	Carbon Film	68 kohm 1/5 W J	3069883970	2	R317	Carbon Film	1.2 kohm 1/5 W J	3069122970
R252	Carbon Film	100 kohm 1/5 W J	3069104970	2	R318	Carbon Film	180 ohm 1/5 W J	3069181970
R253	Carbon Film	3.3 kohm 1/5 W J	3069332970	2	R319	Carbon Film	150 ohm 1/5 W J	3069151970
R254	Carbon Film	1 kohm 1/5 W J	3069102970	2	R320	Carbon Film	8.2 kohm 1/5 W J	3069822970
R255T	Carbon Film	6.8 kohm 1/5 W J	3069882970	1	R321	Carbon Film	75 ohm 1/5 W J	3069750970
R256	Carbon Film	10 kohm 1/5 W J	3069103970	1	R322	Carbon Film	12 kohm 1/5 W J	3069123970
R257/LR	Carbon Film	24 kohm 1/5 W J	3069243970	2	R323	Carbon Film	1.2 kohm 1/5 W J	3069122970
R258/LR	Metal Film	10 ohm 1 W J	3029100472	2	R324	Carbon Film	180 ohm 1/5 W J	3069181970
R259	Carbon Film	10 kohm 1/5 W J	3069103970	1	R325	Carbon Film	1.2 kohm 1/5 W J	3069122970
R260	Carbon Film	10 kohm 1/5 W J	3069103970	1	R326	Carbon Film	150 ohm 1/5 W J	3069151970
R261	Carbon Film	10 kohm 1/5 W J	3069103970	1	R327	Carbon Film	8.2 kohm 1/5 W J	3069822970
R262	Carbon Film	1 kohm 1/5 W J	3069102970	1	R327	Carbon Film	1.2 kohm 1/5 W J	3069122970
R263	Carbon Film	2.4 kohm 1/5 W J	3069242970	1	R329	Carbon Film	1 Mohm 1/5 W J	3069105970
R264	Carbon Film	22 kohm 1/5 W J	3069223970	1	R330/331	Carbon Film	470 ohm 1/5 W J	3069471970
R265	Carbon Film	15 kohm 1/5 W J	3069153970	1				
R266	Carbon Film	150 kohm 1/5 W J	3069154970	1				
R269/LR	Carbon Film	560 ohm 1/5 W J	3069561970	2				
R270/LR	Carbon Film	2.4 kohm 1/5 W J	3069242970	2				
	FUSES					MISCELLANEOUS		
F201	5T 250 V, 3.15 A	5508302735	1	EUROPE	40	Jack, RCA, 2P	4438109310	2
(F201)	NB 125 V, 5 A	5508203021	1	USA/CANADA	41	Jack, RCA, 1P	4438113810	1
F203	TL 250 V, 160 mA	5508301035	1	EUROPE	55	Jack, RCA, 4P	4438103410	2
(F203)	NB 125 V, 250 mA	5508201221	1	USA/CANADA				
F204/205	TL 250 V, 800 mA	5508301934	2	EUROPE				
(F204/205)	NB 125 V, 750 mA	5508101821	2	USA/CANADA				
	MISCELLANEOUS				PCB3 ASSEMBLY P.C. BOARD SUB-WOOFER			
GT201/202	Ground Plate	4235007310	2		C158	CAP, Mylar	0.047 uF 100 V J	3679473120
RLY-1	Relay, SDT-SS-112DM	5528043000	1		C174	CAP, Ceramic	0.047 uF 50 V K	3519473935
TRANS201	Transformer, Standby, 230V, 50Hz	2828090901	1	EUROPE	C312	CAP, Ceramic	0.047 uF 50 V K	3519473935
(TRANS201)	Transformer, Standby, 120V, 60Hz	2828096001	1	USA/CANADA	R169	RES, Carbon Film	10 ohm 1/5 W J	3069100970
44	Heatsink, Regulator TR.	7505206220	1		R170	RES, Carbon Film	10 ohm 1/4 W J	3069100270
45	Heatsink, Regulator TR.	7505206120	2		R195	RES, Carbon Film	24 kohm 1/5 W J	3069243970
47	Terminal, Speaker, 8P	4408105810	1		R333/LR	RES, Carbon Film	1 kohm 1/5 W J	3069102970
56	Heatsink, Regulator TR.	7505202410	4		L101	Coil, Inductor, 0.5 uH		2648001010
					CP110	Connector, Wafer, 5P		4428506910
					CP302	Connector, Wafer, 3P		4428505710
					59	Terminal Speaker, 2P		4408108710
					60	Jack RCA, 2P		4438111310
					PCB4 ASSEMBLY P.C. BOARD FRONT			
					CAPACITORS			
					C402	Ceramic CH	56 pF 50 V J	3528560210
					C404	Ceramic CH	56 pF 50 V J	3528560210

Fr. Part No.	Q'ty	Version	Ref. No.	Description	Mfr. Part No.	Q'ty	Version	Ref. No.	Description	Mfr. Part No.	Q'ty	Version
			C405	Electric SS	47	uF	10 V	M	3409247022	1		
			C406	Electrolytic, Back	0.047	uF	5.5 V	K	3438247315	1		
347933041	1		C407	Ceramic Disc	0.1	uF	50 V	Z	3579104534	1		
3479347121	1		C408	Electrolytic SG	1	uF	50 V	M	3479310971	1		
3579471130	1		C409	Electrolytic SG	10	uF	50 V	M	3479310071	1		
347933041	1		C410	Mylar	0.047	uF	100 V	J	3679473120	1		
3479347121	1		C411	Electrolytic SG	100	uF	50 V	M	3479310171	1		
3519010935	1		C411	Mylar	0.047	uF	100 V	J	3679473120	1		
3479347121	1											
3519010935	1											
3479310121	1		CN401	Wafer 25P, 52575-2530					4428525826	1		
3519104935	1		CN402	Lead Ass'y, 11P, 200 mm					436111203331	1		
3579104534	2											
				COIL								
			L401	Inductor, 100 uH					2648610182	1		
				DIODES								
			D401-415	1N4148M, Switching					2058322101	8		
			D417-419	1N4148M, Switching					2058322101	3		
			D421	Zener, UZ 4.3 BSB					2258599102	1		
			D422/423	Zener, UZ 16.0 BSD					2258599117	2		
			D424	Zener, UZ 9.1 BSC					2258599107	1		
			D426	1N4002, Rectifier					2258100135	1		
			D427	LED, SPR54MVW3, RED/GREEN					2308222302	1		
				INTEGRATED CIRCUIT								
			IC401	CPU, CXP50112-568Q					213822181	1		
				TRANSISTORS								
			Q401/402	KTC1815Y/BKTC3198Y,NPN					2208606104	2		
				RESISTORS								
			R401-403	Carbon Film	10	kohm	1/5 W	J	3069103970	4		
			R404	Carbon Film	22	kohm	1/5 W	J	3069223970	1		
			R405-410	Carbon Film	47	kohm	1/5 W	J	3069473970	6		
			R411	Carbon Film	220	kohm	1/5 W	J	3069224970	1		
			R413	Carbon Film	330	kohm	1/5 W	J	3069334970	1		
			R415	Carbon Film	10	kohm	1/5 W	J	3069103970	1		
			R417-402	Carbon Film	10	kohm	1/5 W	J	3069103970	4		
			R421	Carbon Film	100	kohm	1/5 W	J	3069104970	1		
			R422/423	Carbon Film	47	kohm	1/5 W	J	3069473970	2		
			R425	Carbon Film	47	kohm	1/5 W	J	3069473970	1		
			R426	Carbon Film	10	kohm	1/5 W	J	3069103970	1		
			R427	Carbon Film	1	kohm	1/5 W	J	3069102970	1		
			R428	Carbon Film	330	ohm	1/5 W	J	3069331970	1		
			R430	Carbon Film	47	kohm	1/5 W	J	3069473970	1		
			R431/432	Carbon Film	4.7	kohm	1/5 W	J	3069472970	2		
			R433	Carbon Film	15	kohm	1/5 W	J	3069153970	1		
			R434	Metal Film	390	ohm	1 W	J	3029391472	1		
			R436	Carbon Film	330	ohm	1/5 W	J	3069331970	1		
			R438	Carbon Film	3.3	kohm	1/5 W	J	3069332970	1		
			R439	Carbon Film	220	ohm	1/5 W	J	3069221970	1		
			R440	Carbon Film	270	ohm	1/5 W	J	3069271970	1		
			R441	Carbon Film	220	ohm	1/5 W	J	3069221970	1		
			R442	Carbon Film	100	ohm	1/5 W	J	3069101970	1		
				MISCELLANEOUS								
			16(SW433)	Switch, Push					4628054410	1		
			9	Switch, Tact					4658003710	32		
			FL401	FIP, 11CM9, FL Display					2328130925	1		
			RMC1	TFMTS380, 38 kHz, Remocon sensor					2408005001	1		
			X401	Resonator, 4.19MHz					3938124005	1		
				Sponge, Rubber					6715020730	1		
				ASSEMBLY P.C. BOARD TONE								
				CAPACITORS								
			C701L/R	Electrolytic SG	10	uF	50 V	M	3479310071	2		
			C702L/R	Ceramic Tubular	47	pF	50 V	K	3519470935	2		
			C703L/R	Electrolytic SG	4.7	uF	50 V	M	3479347971	2		
			C704/705	Electrolytic SG	47	uF	25 V	M	3479347041	2		
			C706L/R	Electrolytic SG	10	uF	50 V	M	3479310071	2		
			C707L/R	Mylar	0.018	uF	100 V	J	3679183120	2		
			C708L/R	Mylar	0.082	uF	63 V	K	3679823297	2		
			C709L/R	Mylar	0.0039	uF	100 V	J	3679392120	2		
			C710L/R	Mylar	0.018	uF	100 V	J	3679183120	2		
			C711L/R	Ceramic Tubular	560	pF	50 V	K	3519561935	2		
			C712	Electrolytic SG	33	uF	25 V	M	3479333041	1		
			C713L/R	Ceramic Tubular	100	pF	50 V	K	3519101935	2		
			C715/716	Ceramic Tubular	0.1	uF	50 V	K	3519104935	2		
				CONNECTORS								
			CN701	Lead Ass'y, 8P, 200mm					436108203331	1		
			CN702	Lead Ass'y, 6P, 220mm					436106223331	1		
			CN703	Lead Ass'y 2P, 480 mm					436102483331	1		
				INTEGRATED CIRCUIT								
			IC701	KIA7559S/KIA4559S,OP AMP							2168206103	1
				TRANSISTORS								
			Q701/702	KTD1302, NPN							2208606112	2
			Q703	KTA1015Y/BKTA1266Y, PNP							2208206105	1
				RESISTORS								
			R701L/R	Carbon Film	1	kohm	1/5 W	J	3069102970	2		
			R702L/R	Carbon Film	100	kohm	1/5 W	J	3069104970	2		
			R703L/R	Carbon Film	220	kohm	1/5 W	J	3069221970	2		
			R704L/R	Carbon Film	1	Mohm	1/5 W	J	3069105970	2		
			R705/706	Carbon Film	47	ohm	1/5 W	J	3069470970	2		
			R707L/R	Carbon Film	1	kohm	1/5 W	J	3069102970	2		
			R708L/R	Carbon Film	100	kohm	1/5 W	J	3069104970	2		
			R709L/R	Carbon Film	18	kohm	1/5 W	J	3069183970	2		
			R710L/R	Carbon Film	3.9	kohm	1/5 W	J	3069392970	2		
			R711L/R	Carbon Film	2.7	kohm	1/5 W	J	3069272970	2		
			R712L/R	Carbon Film	750	ohm	1/5 W	J	3069751970	2		
			R713/714	Carbon Film	1	kohm	1/5 W	J	3069102970	2		
			R715	Carbon Film	10	kohm	1/5 W	J	3069103970	1		
			R716	Carbon Film	470	ohm	1/5 W	J	3069471970	1		
			R717	Carbon Film	75	ohm	1/5 W	J	3069750970	1		
			R718L/R	Carbon Film	1	kohm	1/5 W	J	3069102970	2		
				MISCELLANEOUS								
			17	Volume, Bass/Treble							3208049510	2
			18	Volume, Balance							3208052010	1
			20	Jack, RCA, 3P, VCR							4438109710	1
				LUG, HI-WP #24BK LF 280							152824102857	1
				ASSEMBLY P.C. BOARD VOLUME								
				CAPACITORS								
			C601L/R	Mylar	0.1	uF	63 V	K	3679104297	2		
			C602L/R	Ceramic Tubular	680	pF	50 V	K	3519681935	2		
			C603L/R	Electrolytic SG	4.7	uF	50 V	M	3479347971	2		
			C604L/R	Electrolytic SG	4.7	uF	50 V	M	3479347971	2		
			C605/606	Electrolytic SG	47	uF	25 V	M	3479347041	2		
			C607	Ceramic Disc	1000	pF	50 V	Z	3579102530	1		
			C608	Electrolytic SG	1	uF	50 V	M	3479310971	1		
			C609/610	Electrolytic SG	47	uF	25 V	M	3479347041	2		
			C611	Electrolytic SG	1	uF	50 V	M	3479310971	1		
			C612	Ceramic Disc	1000	pF	50 V	Z	3579102530	1		
			C614	Electrolytic SG	10	uF	50 V	M	3479310071	1		
			C615/616	Electrolytic SG	100	uF	10 V	M	3479310121	2		
			C617	Electrolytic SG	100	uF	16 V	M	3479310131	1		
			C619									

Ref. No.	Description	Mfr. Part No.	Q'ty	Version	Ref. No.	Description	Mfr. Part No.	Q'ty	Version
R616	Carbon Film	6.2 kohm 1/5 W J	3069622970	1	C184	Ceramic Disc	8 pF 50 V D	3579809030	1
R617	Carbon Film	100 kohm 1/5 W J	3069104970	1	C166	Ceramic Disc	15 pF 50 V J	3579150130	1
R618	Carbon Film	470 ohm 1/5 W J	3069471970	1	C167	Ceramic Disc	1000 pF 50 V Z	3579102530	1
R619/620	Carbon Film	100 ohm 1/5 W J	3069101970	2	C168/169	Ceramic Tubular	220 pF 50 V K	3519221935	2
R621	Carbon Film	3.3 kohm 1/5 W J	3069332970	1	C170	Mylar	0.047 uF 100 V J	3679473120	1
R622-624	Carbon Film	1 kohm 1/5 W J	3069102970	3	C171	Electrolytic SG	1 uF 50 V M	3479310971	1
R625-628	Carbon Film	470 ohm 1/5 W J	3069471970	1	C172	Mylar	0.047 uF 100 V J	3679473120	1
R630	Carbon Film	560 ohm 1/5 W J	3069561970	1	C173-175	Ceramic Disc	0.0047 uF 50 V Z	3579472530	3
R631	Carbon Film	47 ohm 1/5 W J	3069479970	1	C176	Electrolytic SG	47 uF 25 V M	3479347041	1
R632	Carbon Film	10 kohm 1/5 W J	3069103970	1	C178	Electrolytic SG	47 uF 25 V M	3479347041	1
R633	Carbon Film	3 kohm 1/5 W J	3069302970	1	C187	Ceramic Disc	0.1 uF 50 V Z	3579104534	1
					C188	Ceramic Tubular	0.047 uF 50 V K	3519473935	1
MISCELLANEOUS					CONNECTORS				
22	Switch, Loud		4628059610	1	CN101	Lead Ass'y, 9P, 300mm		436109303331	1
23	Volume, Motor		3228019410	1	CN102	Lead Ass'y, 15P, 160mm		436215163332	1
PCB7 ASSEMBLY P.C. BOARD SPEAKER					CP105				
CN901	Connector, Lead Ass'y, 2P, 280mm		436102283321	1	CN103	Lead Ass'y, 7P, 460mm		436107463331	1
CN902	Connector, Lead Ass'y, 9P, 400mm		435209403401	1	CN104	Lead Ass'y, 4P, 300mm		436104308331	1
R901/902	RES, Metal Film	270 ohm 2 W J	3029271572	2	CN108	Lead Ass'y, 2P, 440mm		436402443231	1
11	Jack, Phone		4438005020	1	CN109	Lead Ass'y, 2P, 220mm		436102233331	1
12	Switch, Push		4628043810	2	CN110	Lead Ass'y, 5P, 260mm		436105263331	1
13	Shield, Fence, knob		6165147910	1	CP105	Wafer 12P		4428550120	1
	LUG, HI-W AWG #24BK60		152624100626	1	CP106	Wafer 8P		4428550080	1
					CP107	Wafer 6P		4428550060	1
PCB8 ASSEMBLY P.C. BOARD VOLUME LED					CN204(CP110)				
CN603	Connector, Lead Ass'y, 2P, 180mm		435102183181	1	CP207	Wafer, 1P AC		4428525790	1
D601	LED, SLR 40MG3		2308220324	1	CP401	Wafer, FPC, 25P		4428526370	1
					CP701	Wafer 8P		4428505510	1
					CP702	Wafer 6P		4428505810	1
PCB9 ASSEMBLY P.C. BOARD INPUT					COILS				
CAPACITORS					L101/LR				
C101L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	L102	Inductor, 0.5 uH		2648001010	1 EUROPE
C102L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2		Inductor, 50 uH		2648601470	1
C103L/R	Electrolytic SG	1 uF 50 V M	3479310971	2	DIODES				
C104L/R	Electrolytic SG	33 uF 25 V M	3479333041	1	D101-104	1N4148M, Switching		2058322101	4
C105L/R	Ceramic Tubular	2200 pF 50 V K	3519222935	2	D106-108	1N4148M, Switching		2058322101	3
C106L/R	Mylar	0.0056 uF 100 V J	3679562120	2	D110/111	1N4148M, Switching		2058322101	2
C107L/R	Mylar	0.0018 uF 100 V J	3679182120	2	D116/117	1N4148M, Switching		2058322101	2
C108L/R	Electrolytic SG	1 uF 50 V M	3479310971	2	INTEGRATED CIRCUITS				
C109/110	Electrolytic SG	47 uF 25 V M	3479347041	2	IC101/102	LC7821		2168017132	2
C111L/R	Mylar	0.0018 uF 100 V J	3679182120	2	IC103	KIA6259P, OP AMP		2168206107	1
C112L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	IC104/105	KIA7559P/KIA4559P, OP AMP		2168206104	2
C113L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	IC106	LTV817, Photo-Coupler		2408000136	1
C114L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	TRANSISTORS				
C115L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q103/104	KTC1815Y/BKTC3198Y, NPN		2208606104	2
C116L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	Q105	KTA114Y/KRA107M, PNP		2238006103	1
C117L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q106/107	KTC2240/BKTC3200, NPN		2208606108	2
C118L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q108/109	KTC1815Y/BKTC3198Y, NPN		2208606104	2
C119L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	Q110	BKTA949/KTA1024, PNP		2208206102	1
C120L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q111	KTC2229/KTC3206, NPN		2208606107	1
C121L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q113	BKTC2235/KTC1027, NPN		2228406120	1
C122L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	Q114	BKTA965/KTA1023, PNP		2228106107	1
C123L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q117/118	KTC2240/BKTC3200, NPN		2208606108	2
C124L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q119/120	KTC1815Y/BKTC3198Y, NPN		2208606104	2
C125L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2 EUROPE	Q121	BKTA949/KTA1024, PNP		2208206102	1
C126L/R	Ceramic Tubular	100 pF 50 V K	3519101935	2	Q122	KTC2229/KTC3206, NPN		2208606107	1
C127L/R	Electrolytic SG	4.7 uF 50 V M	3479347971	2	Q124	BKTC2235/KTC1027, NPN		2228406120	1
C128L/R	Electrolytic SG	4.7 uF 50 V M	3479347971	2	Q125	BKTA965/KTA1023, PNP		2228106107	1
C129-132	Electrolytic SG	47 uF 25 V M	3479347041	4	Q128/129	KTC1815Y/BKTC3198Y, NPN		2208606104	2
C133/134	Electrolytic SG	1 uF 50 V M	3479310971	2	Q130	KTA114Y/KRA107M, PNP		2238006103	1
C135	Ceramic Disc	1000 pF 50 V Z	3579102530	1	RESISTORS				
C136	Electrolytic SG	1 uF 50 V M	3479310971	1	R101L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C137	Electrolytic SG	47 uF 16 V M	3479347031	1	R102L/R	Carbon Film	91 kohm 1/5 W J	3069913970	2
C138	Electrolytic SG	22 uF 25 V M	3479322041	1	R103L/R	Carbon Film	91 kohm 1/5 W J	3069913970	2
C139	Mylar	0.022 uF 100 V J	3679223120	1	R104L/R	Carbon Film	820 ohm 1/5 W J	3069821970	2
C140/141	Electrolytic SG	47 uF 25 V M	3479347041	2	R105L/R	Carbon Film	560 kohm 1/5 W J	3069564970	2
C142	Electrolytic SG	1 uF 50 V M	3479310971	1	R106L/R	Carbon Film	43 kohm 1/5 W J	3069433970	2
C143	Ceramic Disc	1000 pF 50 V Z	3579102530	1	R107/108	Carbon Film	47 ohm 1/5 W J	3069470970	2
C144/145	Electrolytic SG	1 uF 50 V M	3479310971	1	R109L/R	Carbon Film	470 ohm 1/5 W J	3069471970	2
C146	Ceramic Tubular	680 pF 50 V K	3519681935	1	R110L/R	Carbon Film	100 kohm 1/5 W J	3069104970	2
C147	Ceramic Tubular	470 pF 50 V K	3519471935	1	R111L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C148	Ceramic Tubular	27 pF 50 V J	3519270935	1	R112L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C149	Ceramic Tubular	15 pF 50 V J	3519150935	1	R113L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C151	Ceramic Disc	8 pF 50 V D	3579809030	1	R114L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C152	Electrolytic SG	33 uF 25 V M	3479333041	1	R115L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C153	Ceramic Disc	1000 pF 50 V Z	3579102530	1	R116L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C154	Ceramic Tubular	220 pF 50 V K	3519221935	1	R117L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C155	Mylar	0.047 uF 100 V J	3679473120	1	R118L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C156	Electrolytic SG	1 uF 50 V M	3479310971	1	R119L/R	Carbon Film	1 kohm 1/5 W J	3069102970	2
C157	Ceramic Tubular	220 pF 50 V K	3519221935	1	R120L/R	Carbon Film	47 kohm 1/5 W J	3069473970	2
C159	Electrolytic SG	0.47 uF 50 V M	3479347871	1	R121	Carbon Film	470 ohm 1/5 W J	3069471970	1
C160	Ceramic Tubular	680 pF 50 V K	3519681935	1					
C161	Ceramic Tubular	470 pF 50 V K	3519471935	1					
C162	Ceramic Tubular	27 pF 50 V J	3519270935	1					
C163	Electrolytic SG	33 uF 25 V M	3479333041	1					

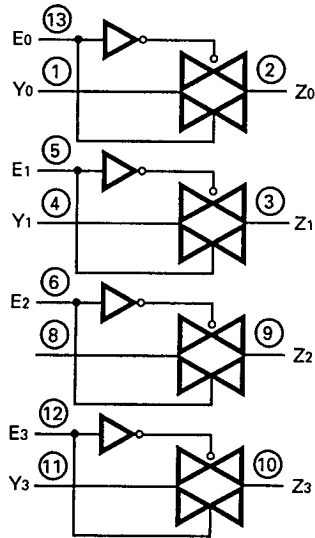
IC301 GD4066

**CONNECTION DIAGRAM
DIP(TOP VIEW)**



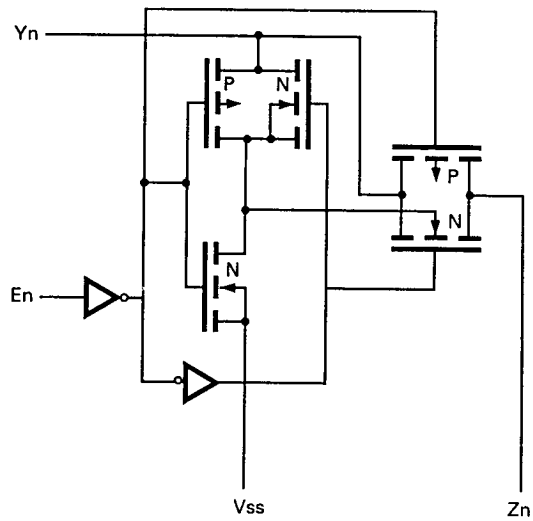
NOTE:
The SO Package has the same pinout (Connection Diagram) as the Dual-In-Line Package.

LOGIC SYMBOL

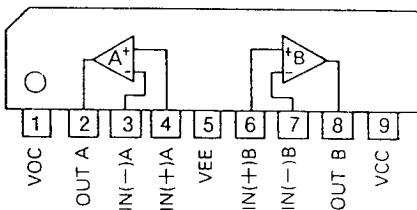


VDD = Pin14
VSS = Pin7
○ = Pin Numbers

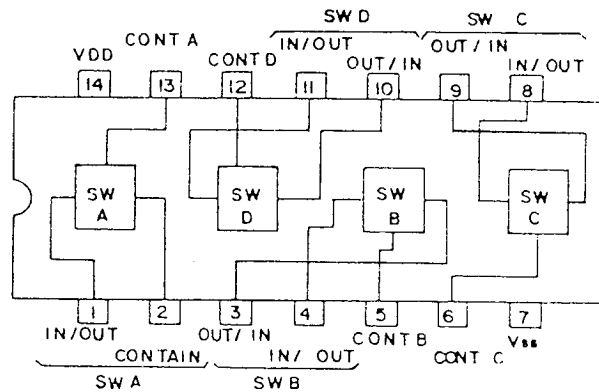
LOGIC DIAGRAM (1/4 OF A 4066B)



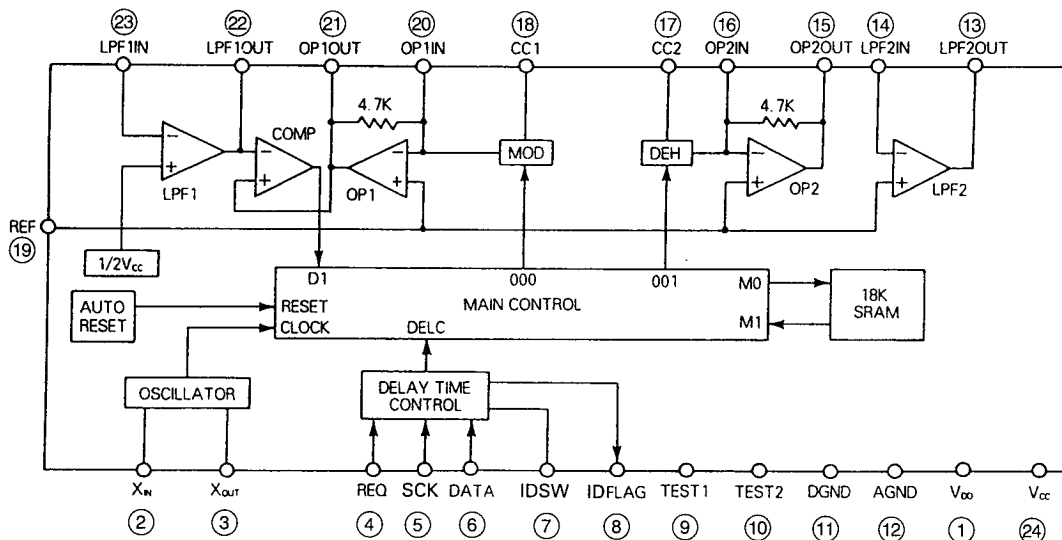
IC701, IC501, IC502 KIA75559/KIA4559S



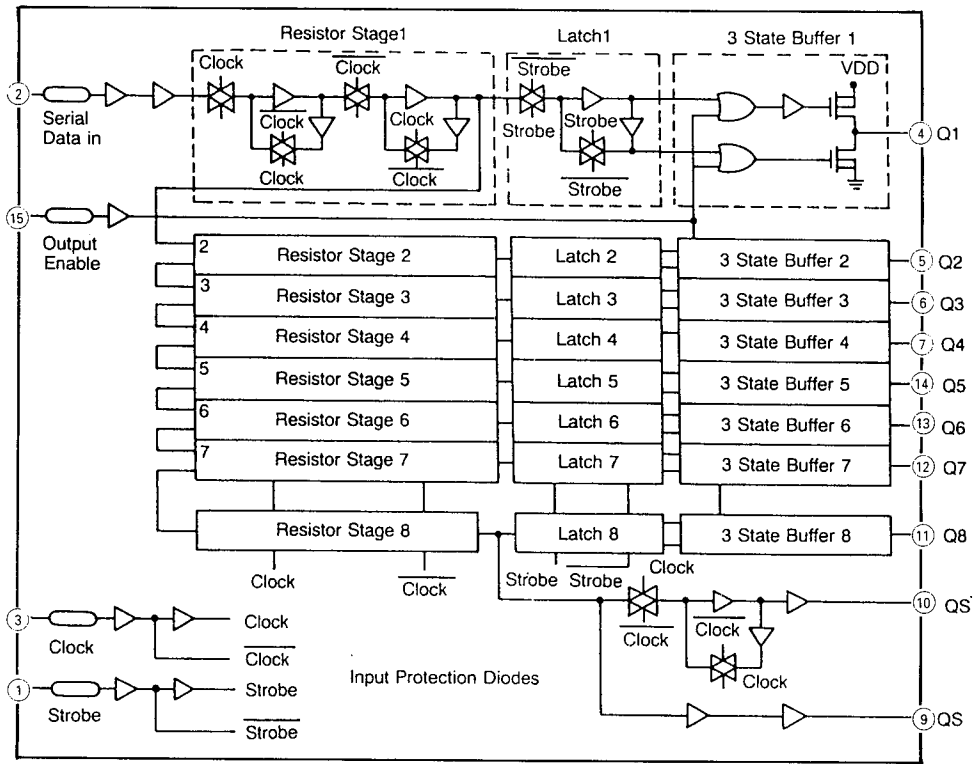
IC503, IC504 LC4966



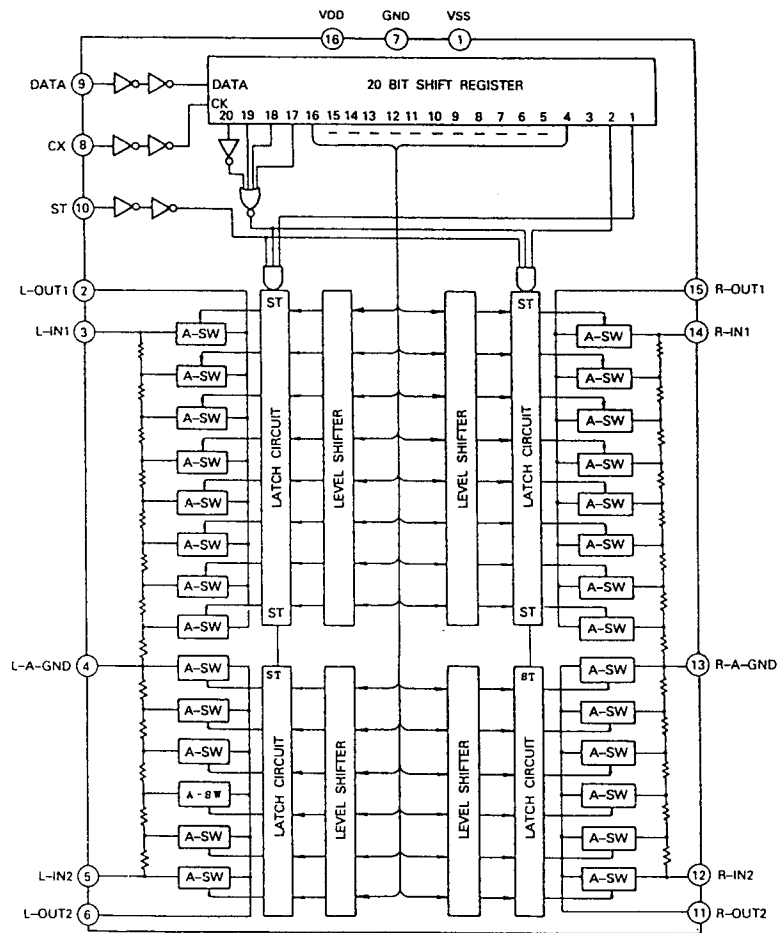
IC508 NJM9701D



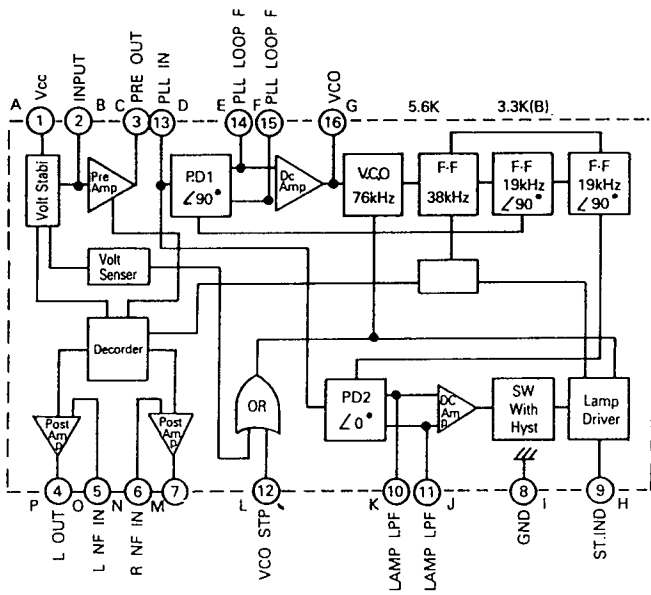
IC509 MC14094BCP



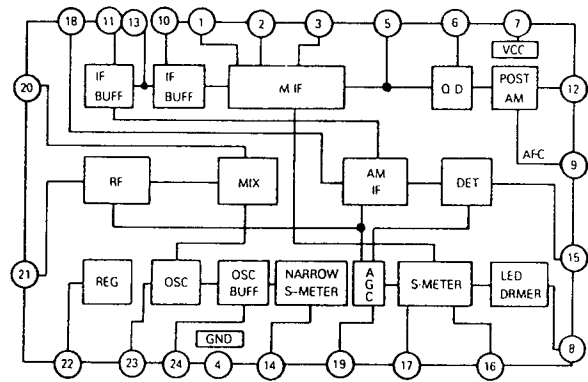
IC506 TC9176P



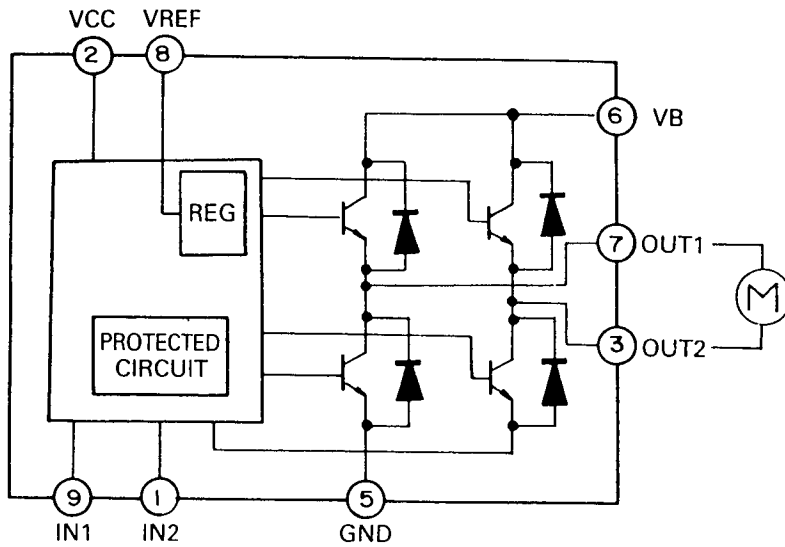
IC803 HA12016



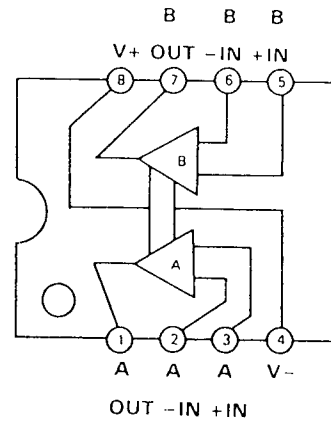
IC801 LA1266



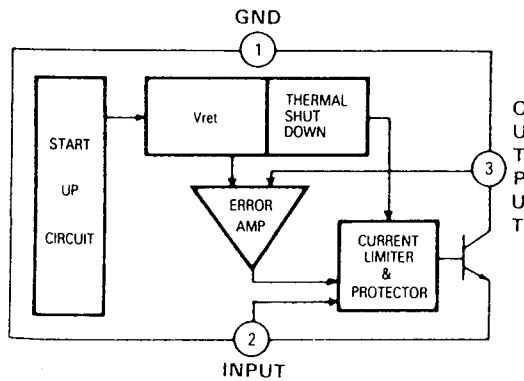
IC603 TA7291S



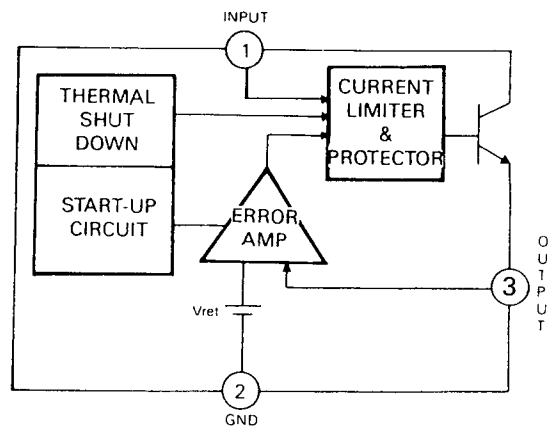
**IC601, IC602, IC104, IC105
KIA 75559P/KIA 4559P
IC103 KIA 6259P**



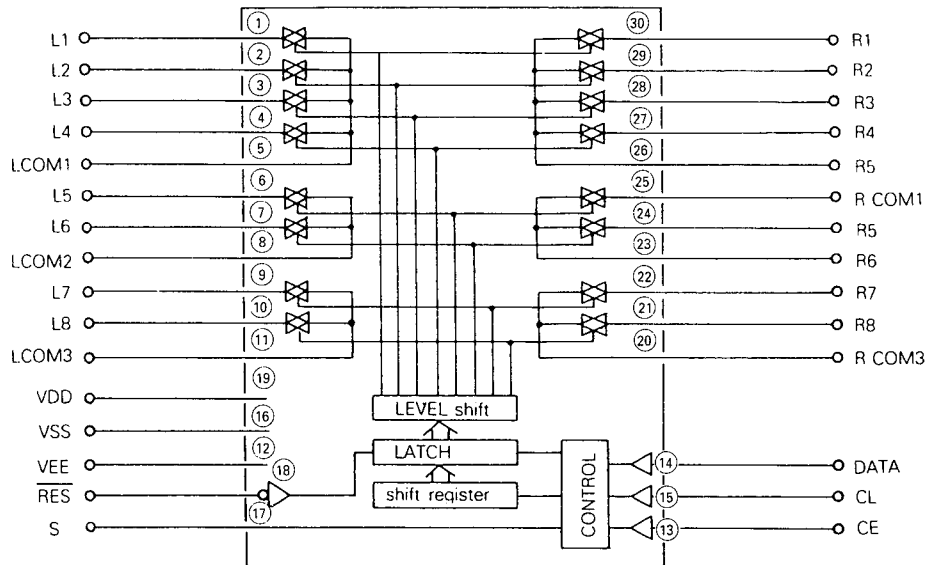
IC204 GL7915



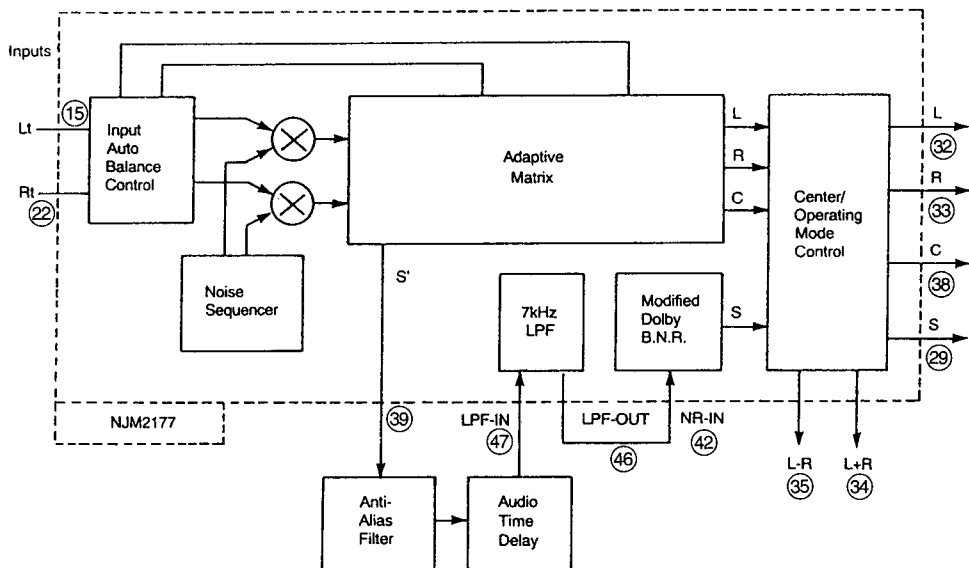
IC201, 202, IC203 GL7806, GL07815



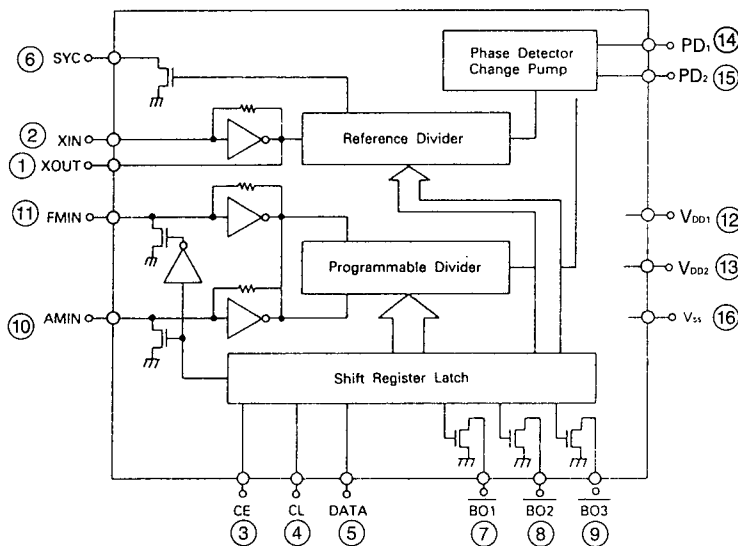
IC101, IC102 LC7821



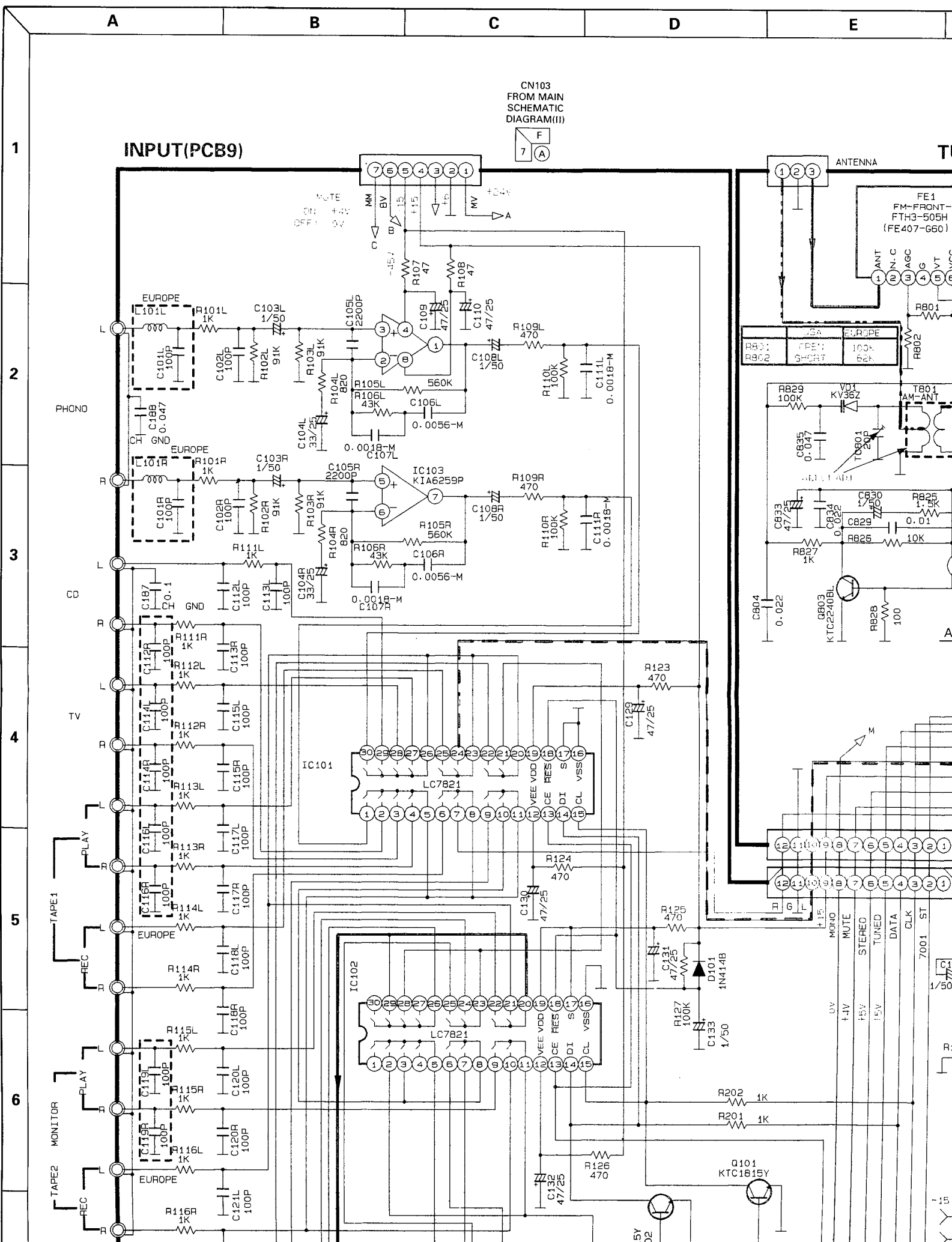
IC507 NJM2177L



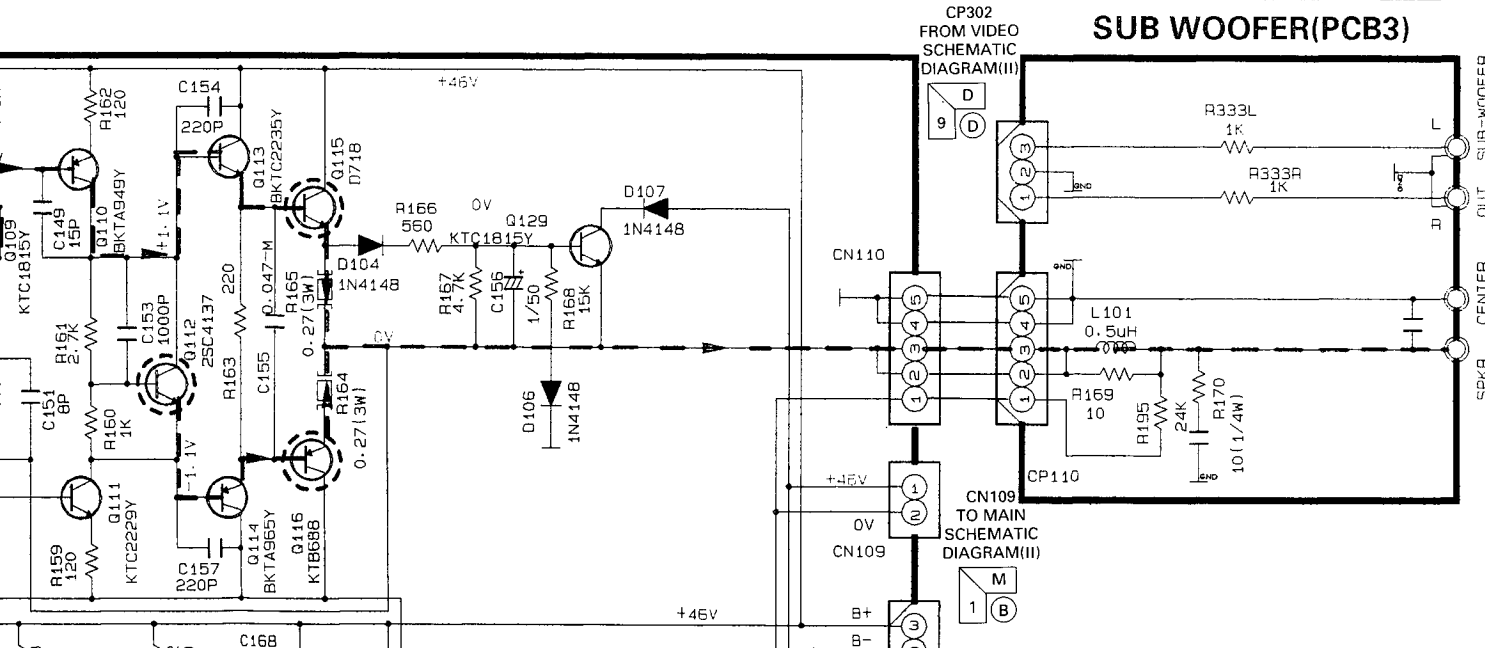
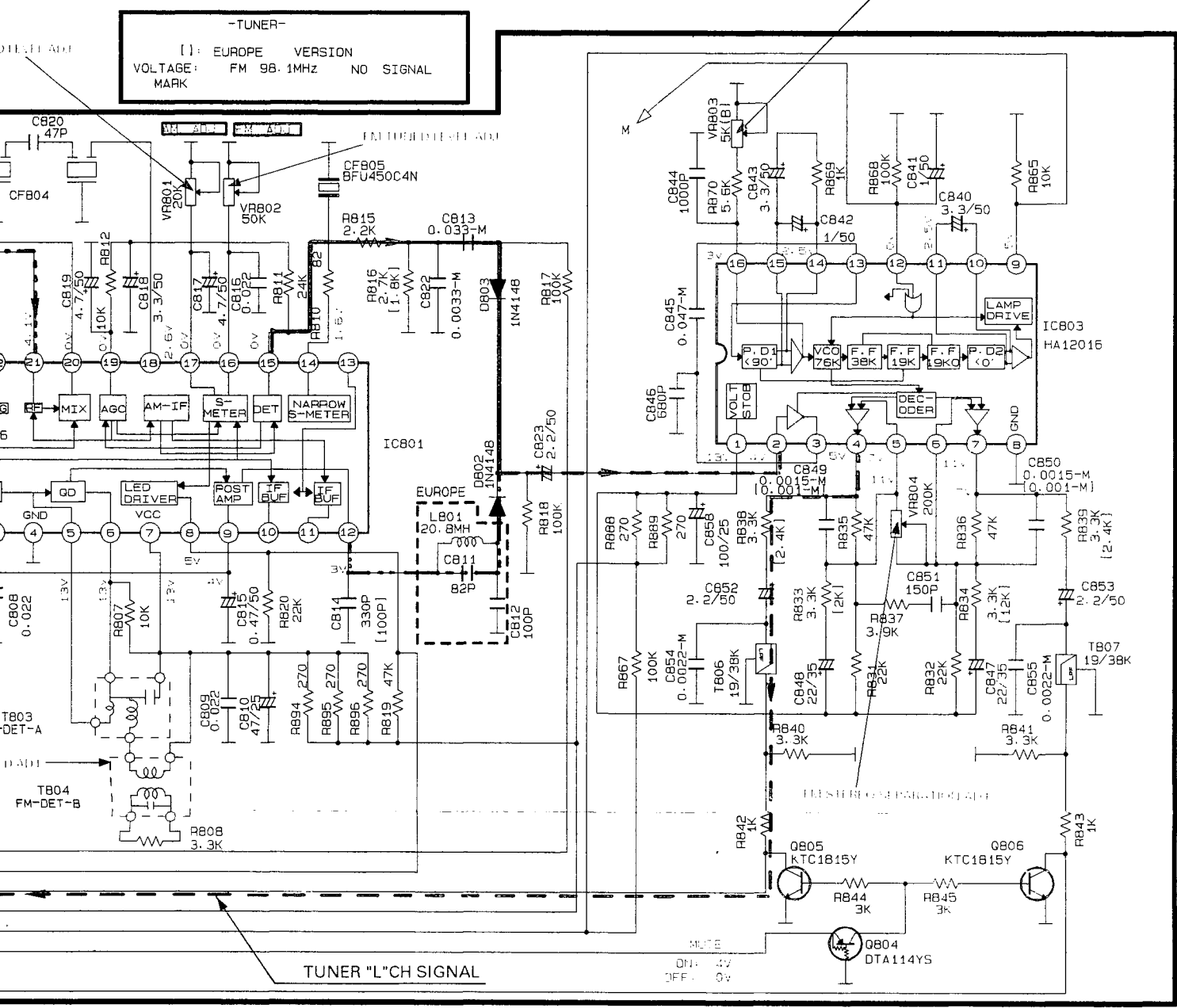
IC802 LM7001



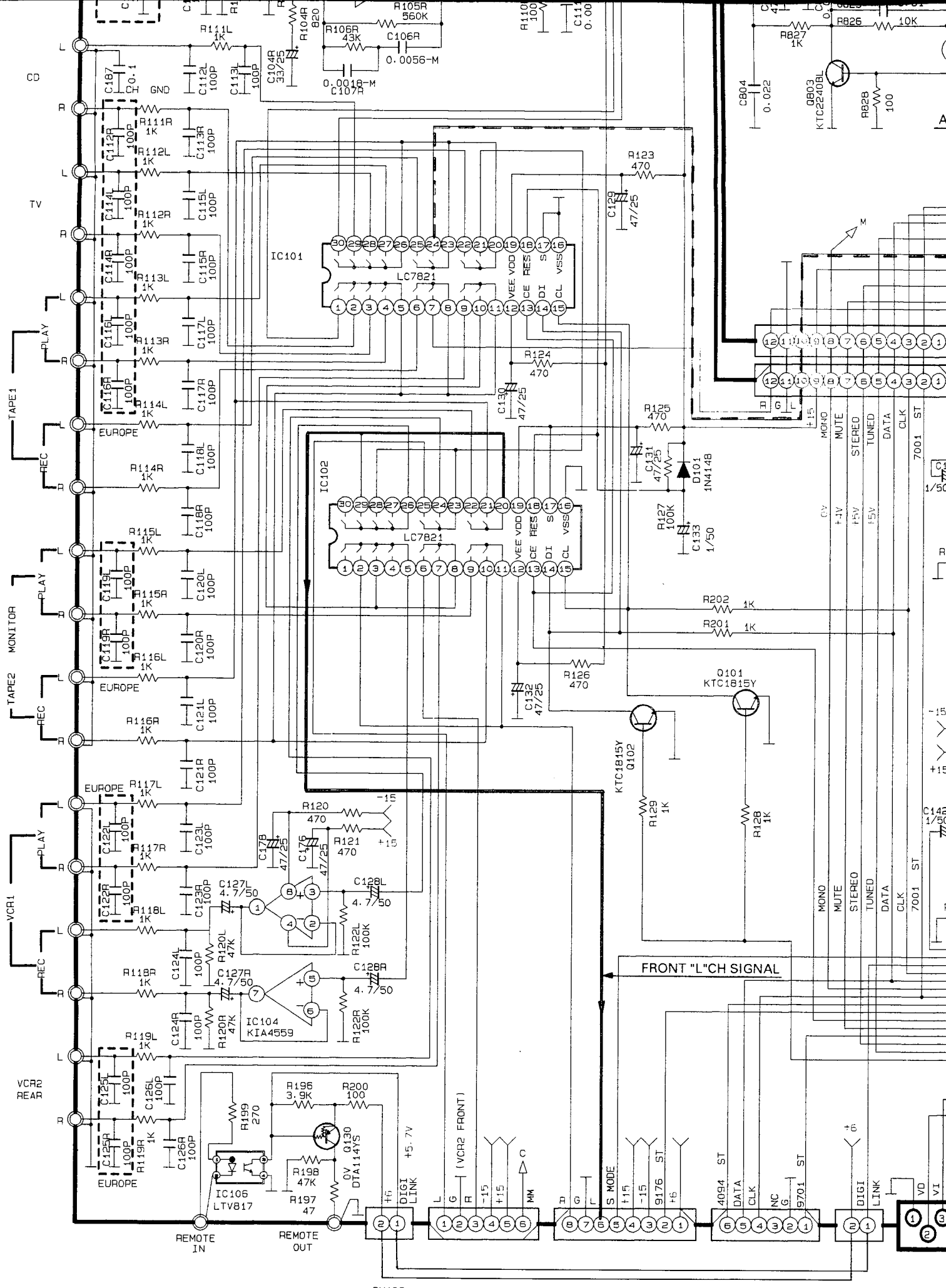
SCHEMATIC DIAGRAMS I



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CN10B

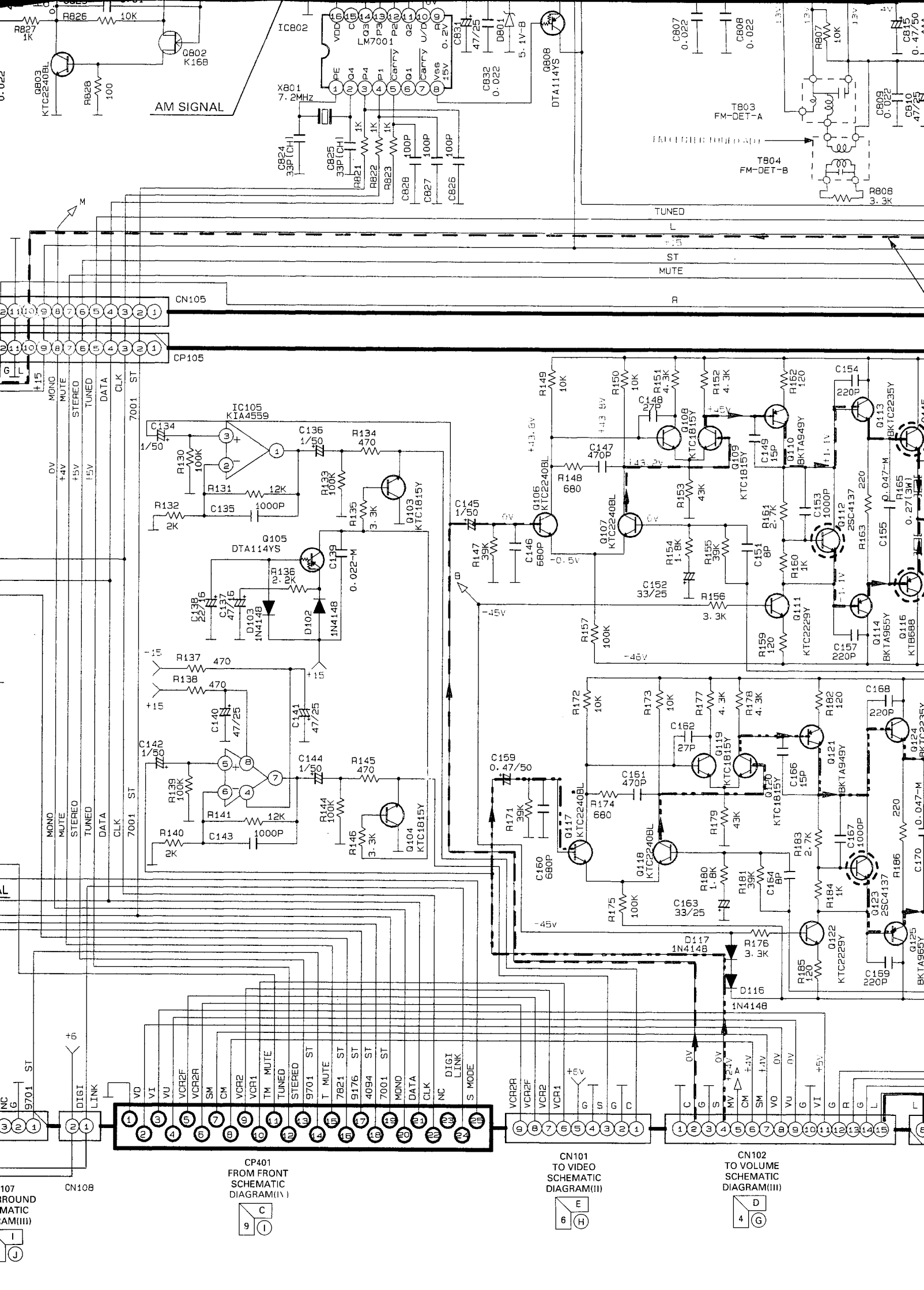
CP702
FROM TONE
SCHEMATIC
DIAGRAM(III)

CP106
TO SURROUND
SCHEMATIC
DIAGRAM(III)

CP107
TO SURROUND
SCHEMATIC
DIAGRAM(III)

CN108





AM SIGNAL

TUNED

ST

MUTE

R

CN105

CP105

IC105 KIA4559

Q105 DTA114YS

Q106 KTC2240BL

Q107 KTC2240BL

Q108 KTC1815Y

Q109 KTC1815Y

Q104 KTC1815Y

Q103 KTC1815Y

Q102 0.022-M

Q101 0.022-M

Q110 BKT A949Y

Q111 KTC2229Y

Q100 KTC1815Y

Q109 KTC1815Y

Q108 KTC1815Y

Q107 KTC2240BL

Q106 KTC1815Y

Q105 BKT A949Y

Q104 KTC1815Y

Q103 KTC1815Y

Q102 0.022-M

Q101 0.022-M

Q110 BKT A949Y

Q111 KTC2229Y

Q104 KTC1815Y

Q103 KTC1815Y

Q102 0.022-M

Q101 0.022-M

Q110 BKT A949Y

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Q103 KTC1815Y

Q102 0.022-M

Q101 0.022-M

Q110 BKT A949Y

Q111 KTC2229Y

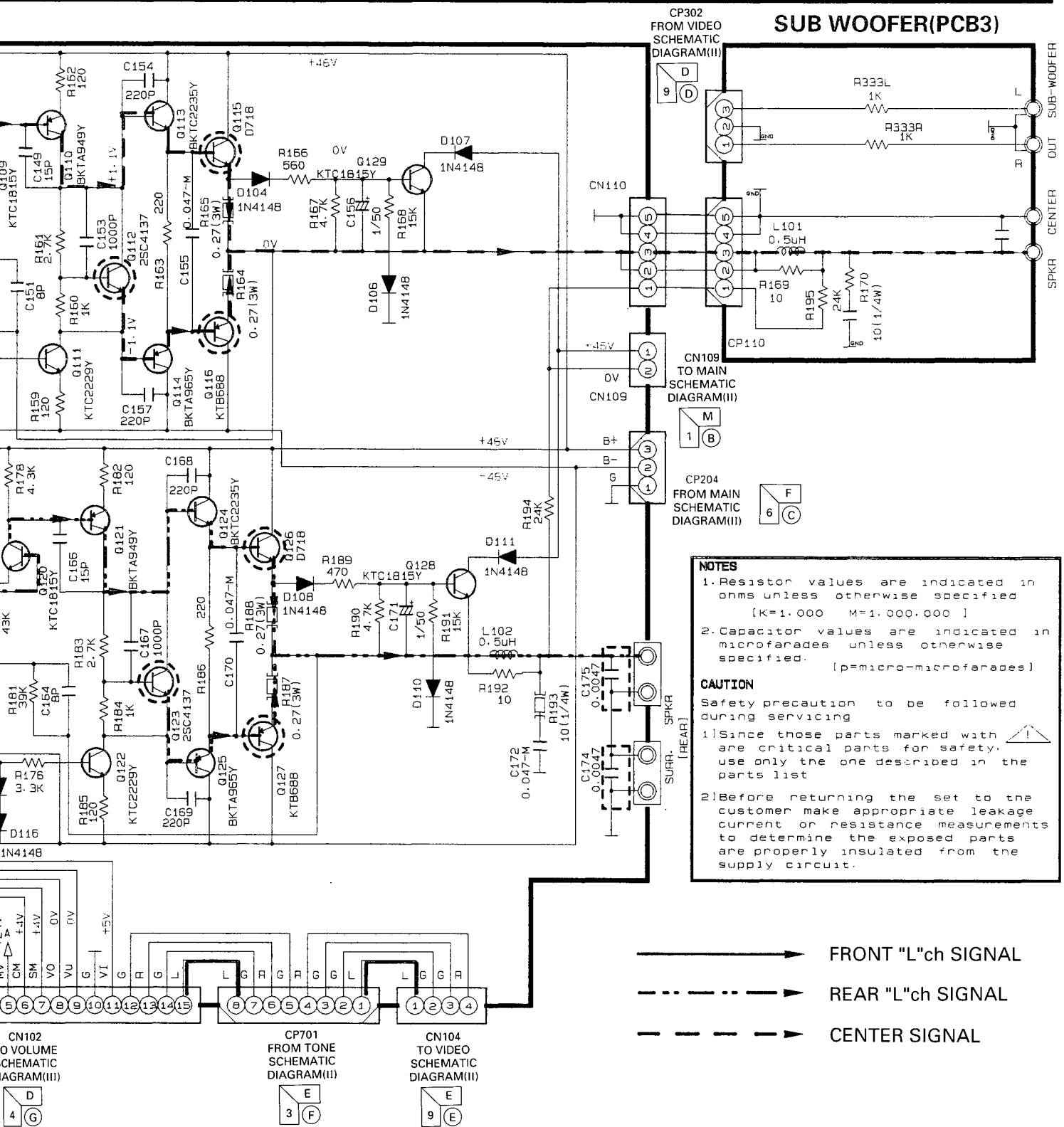
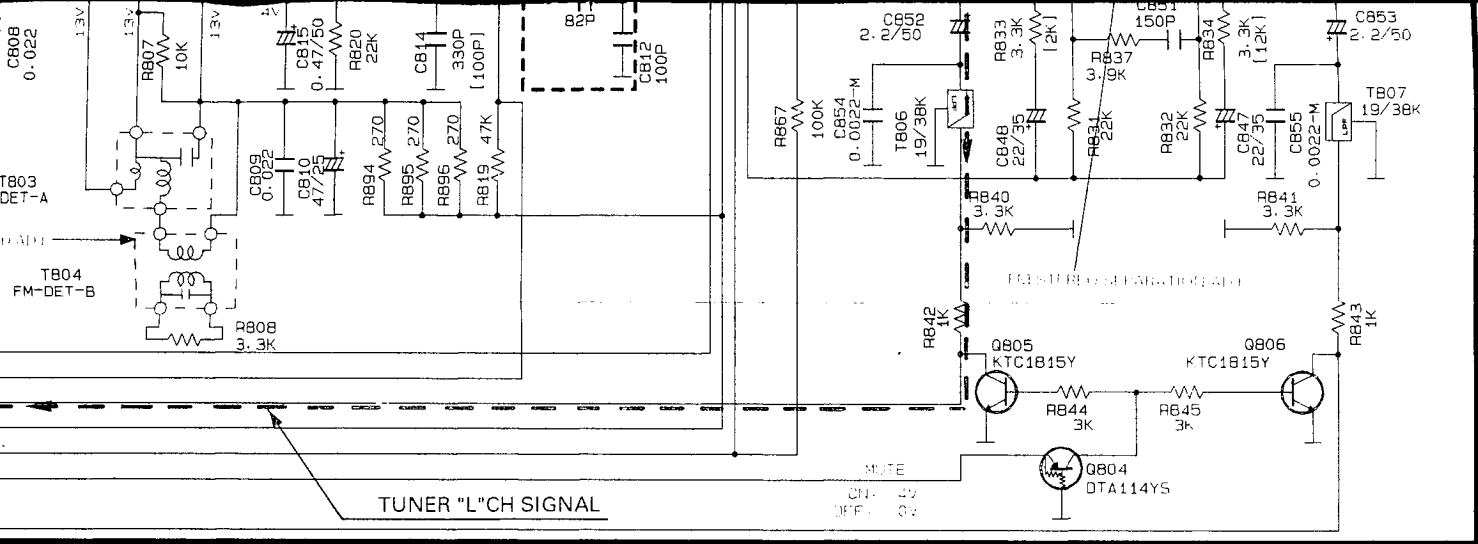
CP401 FROM FRONT SCHEMATIC DIAGRAM(I)

CN101 TO VIDEO SCHEMATIC DIAGRAM(II)

CN102 TO VOLUME SCHEMATIC DIAGRAM(III)

107 GROUND MATRIC (AM(III))





NOTES

1. Resistor values are indicated in ohms unless otherwise specified
[K=1.000 M=1.000.000]
2. Capacitor values are indicated in microfarads unless otherwise specified.
[p=micro-microfarades]

CAUTION

Safety precaution to be followed during servicing

- 1) Since those parts marked with a critical parts for safety, use only the one described in the parts list
- 2) Before returning the set to the customer make appropriate leakage current or resistance measurements to determine the exposed parts are properly insulated from the supply circuit.

FRONT "L"ch SIGNAL

REAR "L"ch SIGNAL

CENTER SIGNAL

E

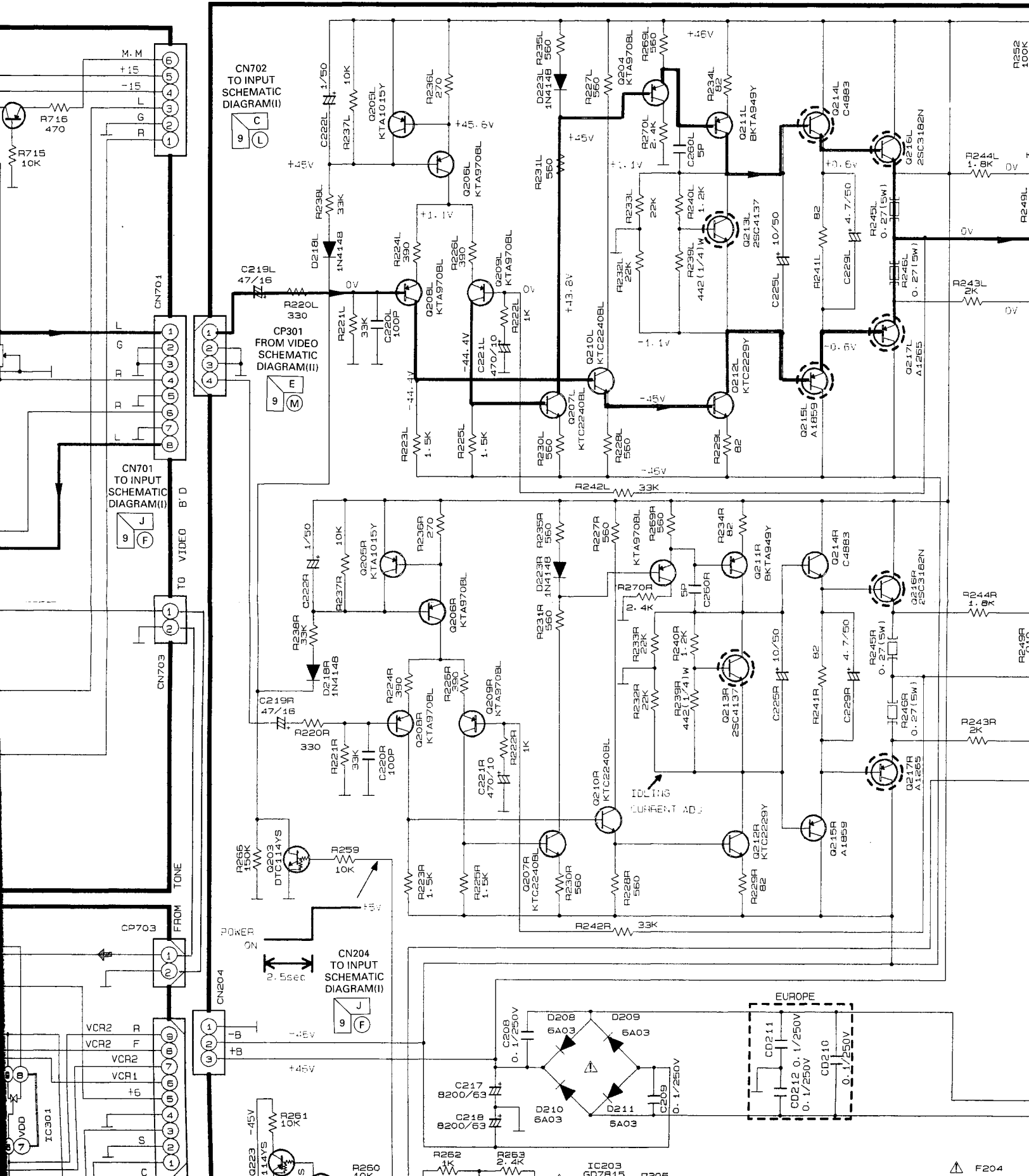
F

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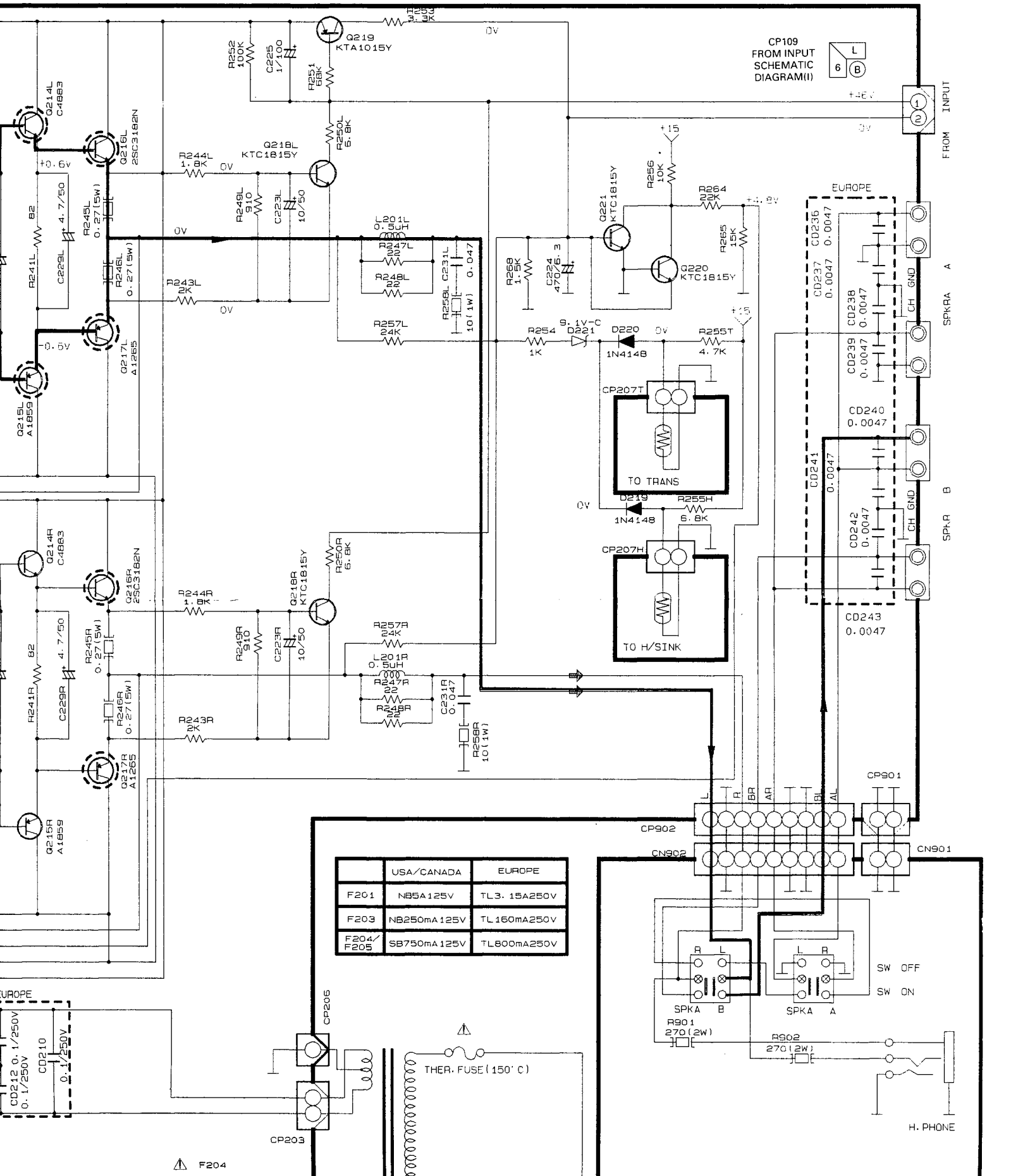
H

I

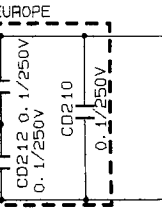
MAIN(PCB1)



MAIN(PCB1)



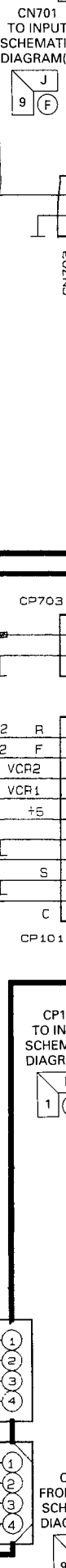
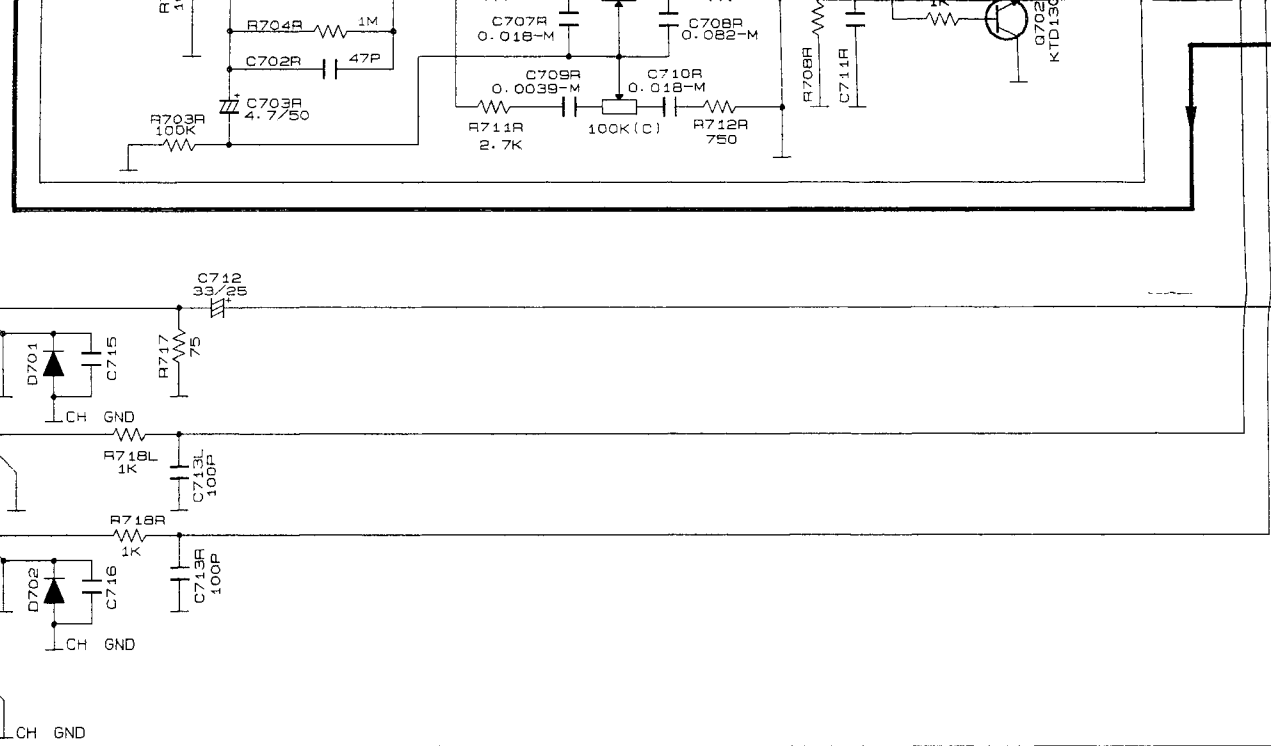
	USA/CANADA	EUROPE
F201	NB5A125V	TL3-15A250V
F203	NB250mA125V	TL160mA250V
F204/ F205	SB750mA125V	TL800mA250V



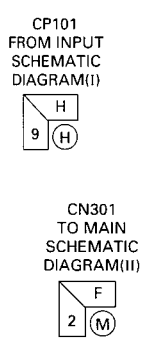
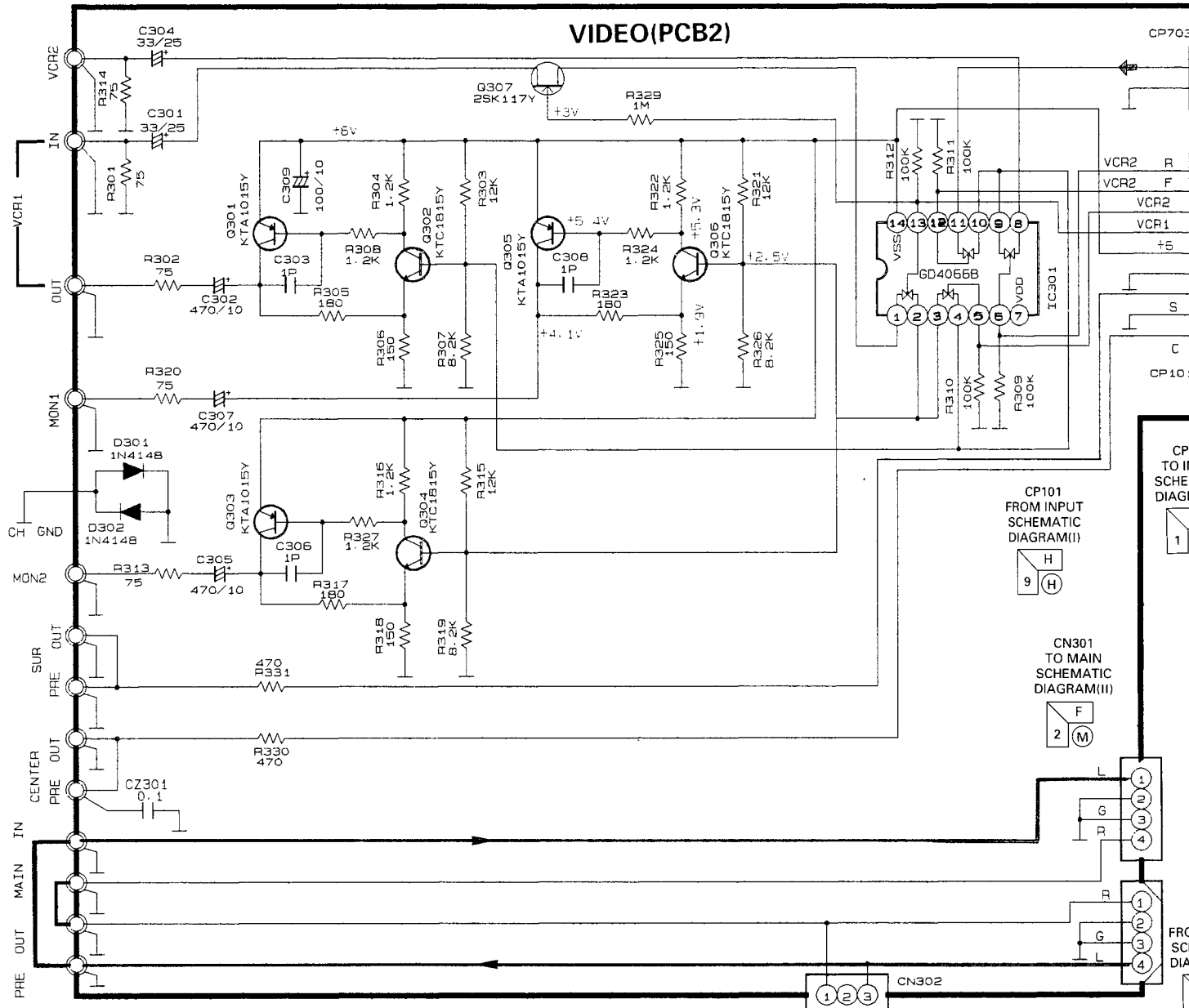
F204

H. PHONE

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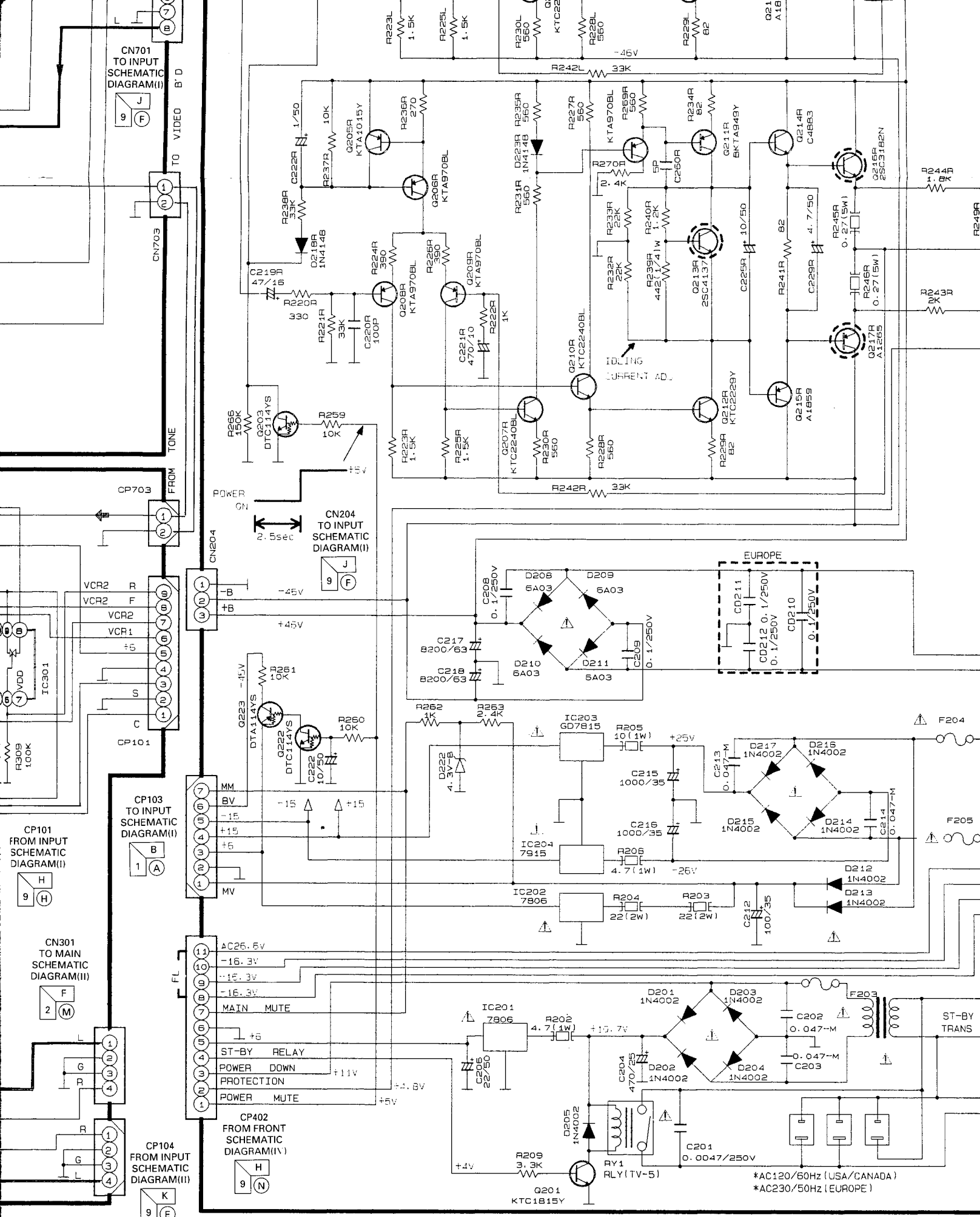


VIDEO(PCB2)



CN302
TO SUB WOOFER
SCHEMATIC
DIAGRAM(I)





CN701 TO INPUT SCHEMATIC DIAGRAM(II)

TO VIDEO B'D

FROM TONE

CP703

VCR2 R
VCR2 F
VCR1
+5

IC301

CP101

CP103 TO INPUT SCHEMATIC DIAGRAM(II)

MM
BV
-15
+15
+5
MV

CN301 TO MAIN SCHEMATIC DIAGRAM(II)

AC26.5V
-16.3V
+16.3V
-16.3V
MAIN MUTE
+5

ST-BY RELAY
POWER DOWN
PROTECTION
POWER MUTE

CP104 FROM INPUT SCHEMATIC DIAGRAM(III)

CP402 FROM FRONT SCHEMATIC DIAGRAM(IV)

9 (E)

CN204 TO INPUT SCHEMATIC DIAGRAM(II)

POWER ON
2.5sec

DTA114YS
DTC114YS

DTA114YS
DTC114YS

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EUROPE

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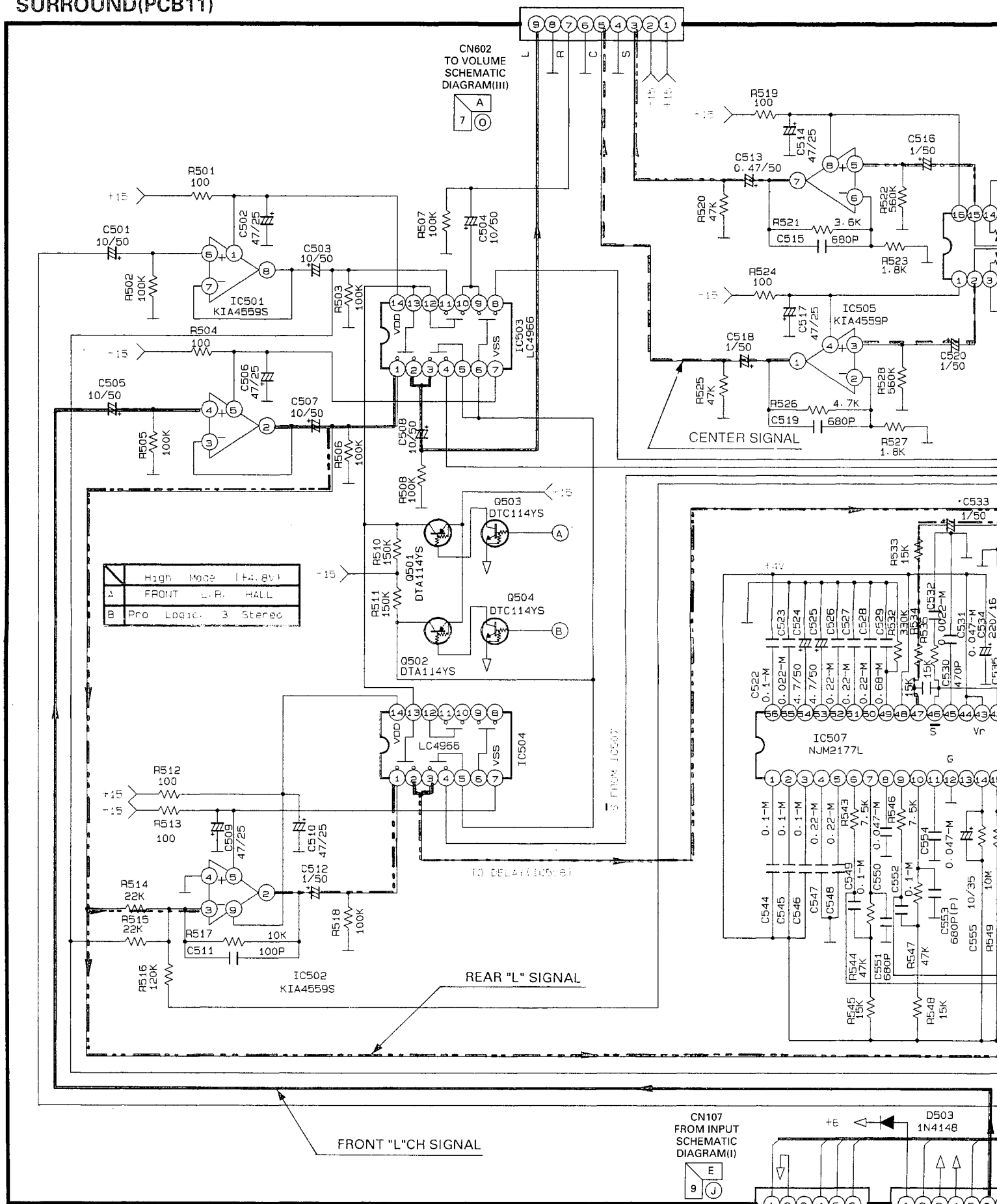
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SURROUND(PCB11)

CP102
FROM INPUT
SCHEMATIC
DIAGRAM(I)

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CN602
TO VOLUME
SCHEMATIC
DIAGRAM(III)



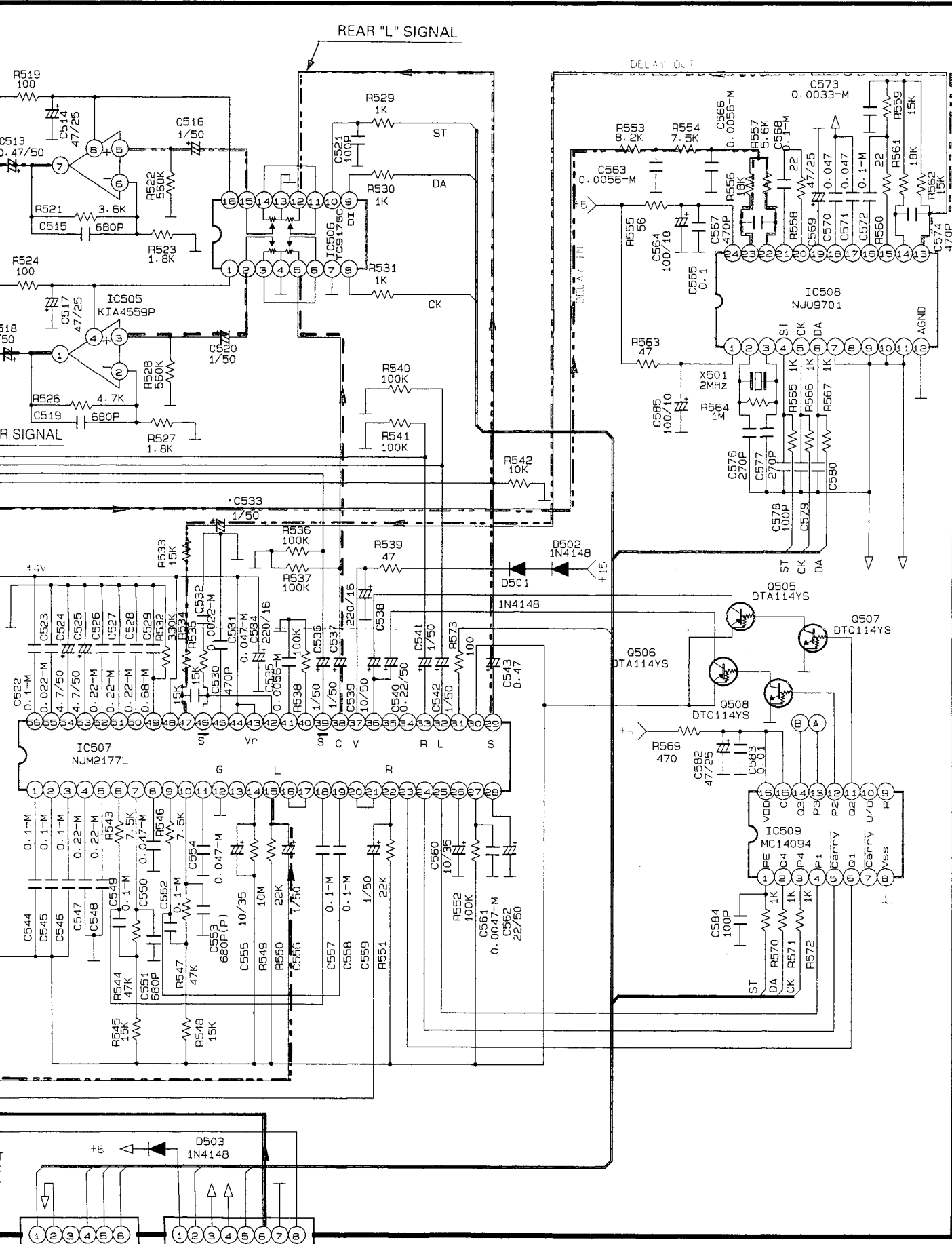
CN107
FROM INPUT
SCHEMATIC
DIAGRAM(I)



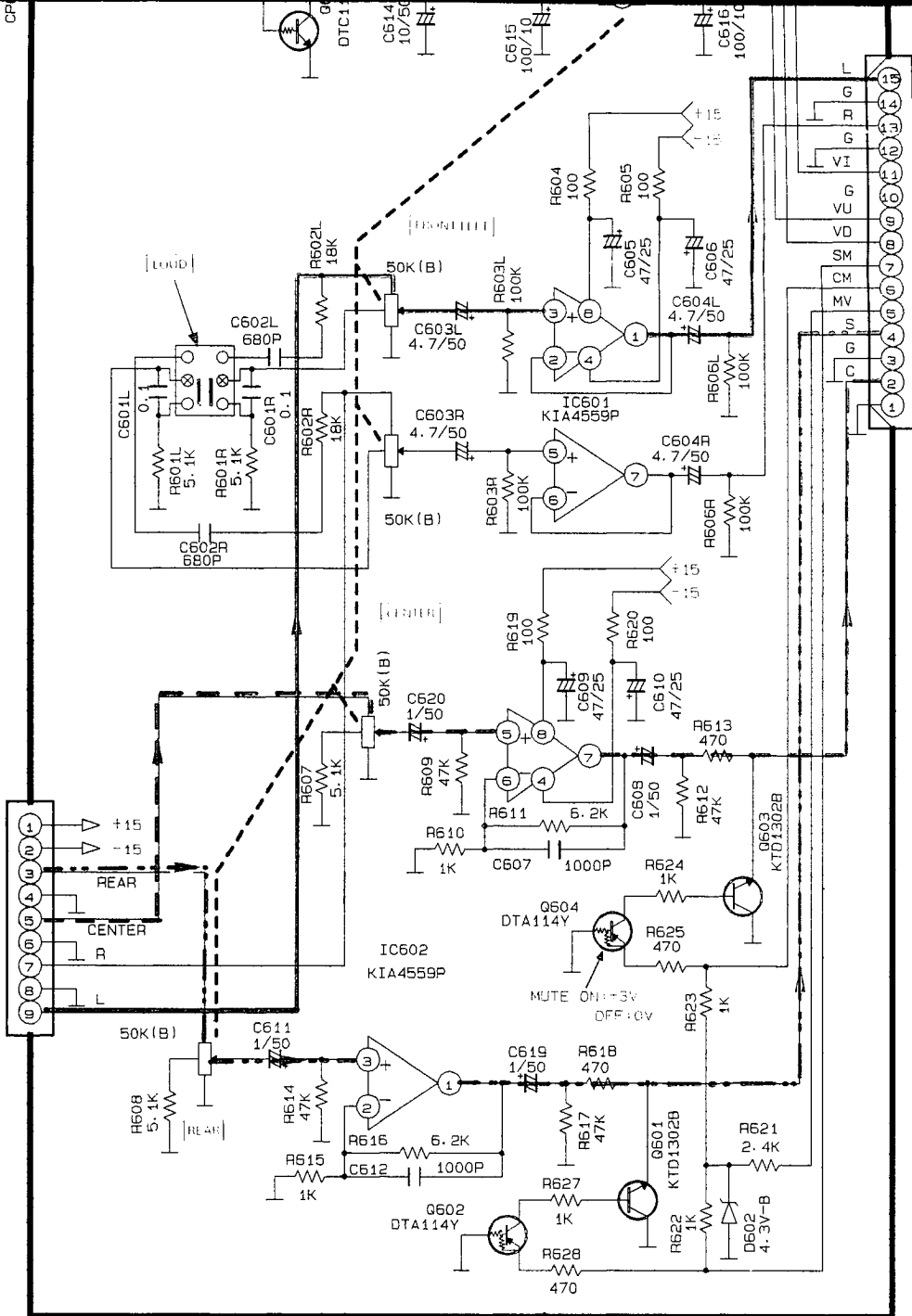
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9 J

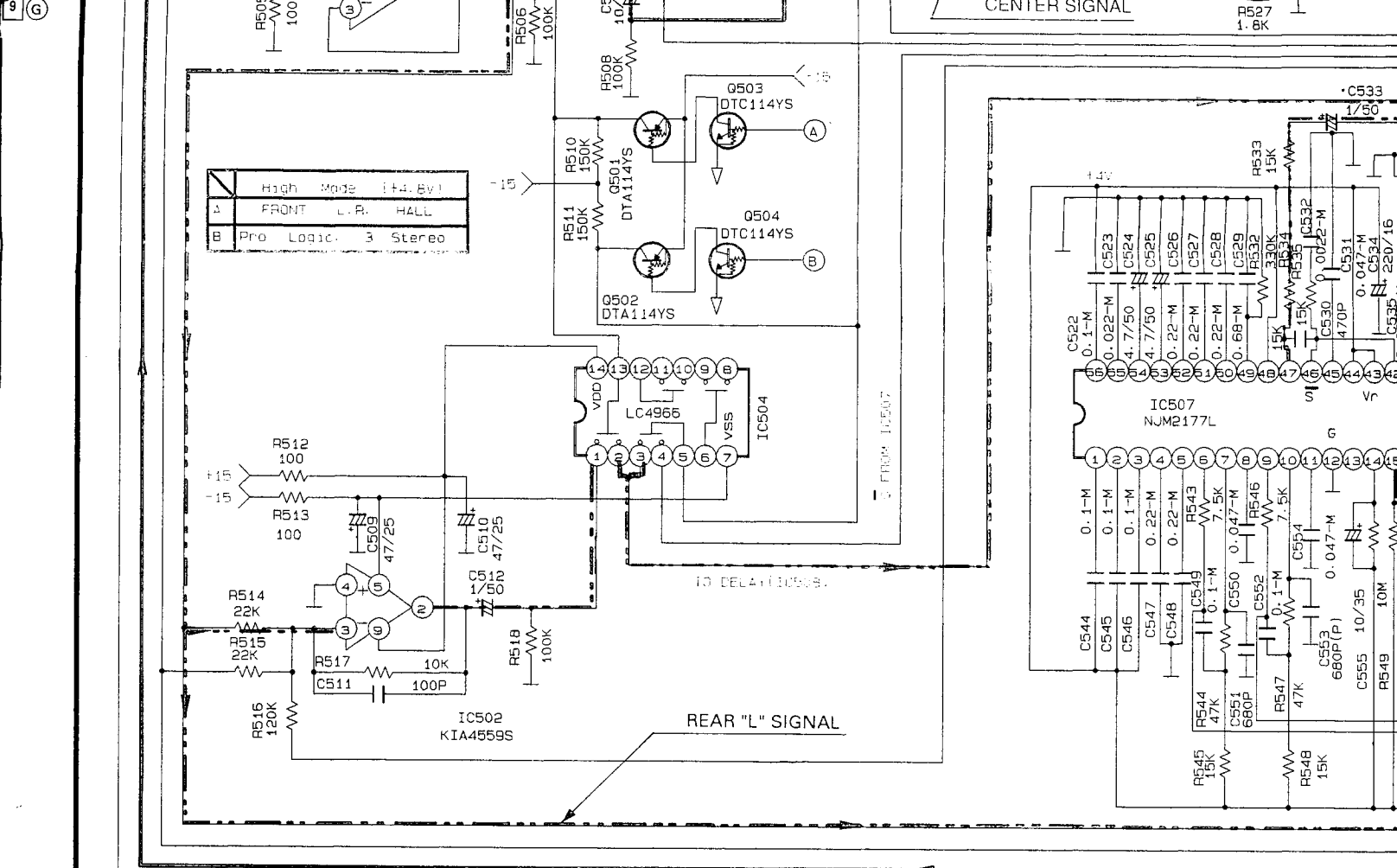


CN602
FROM SURROUND
SCHEMATIC
DIAGRAM(III)

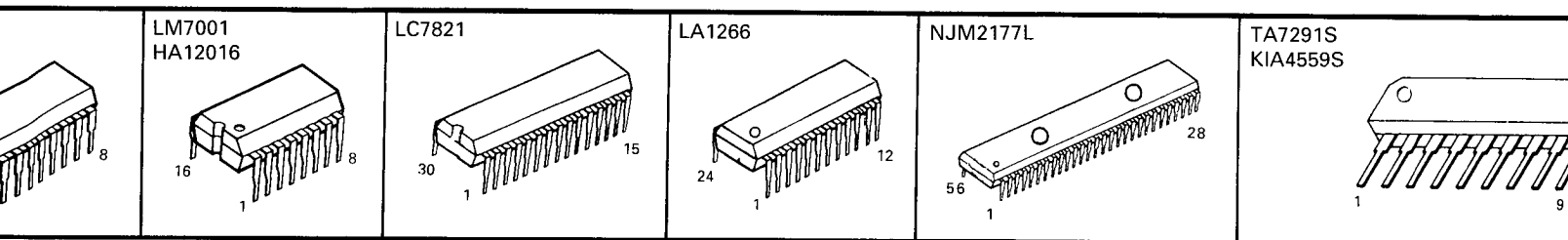
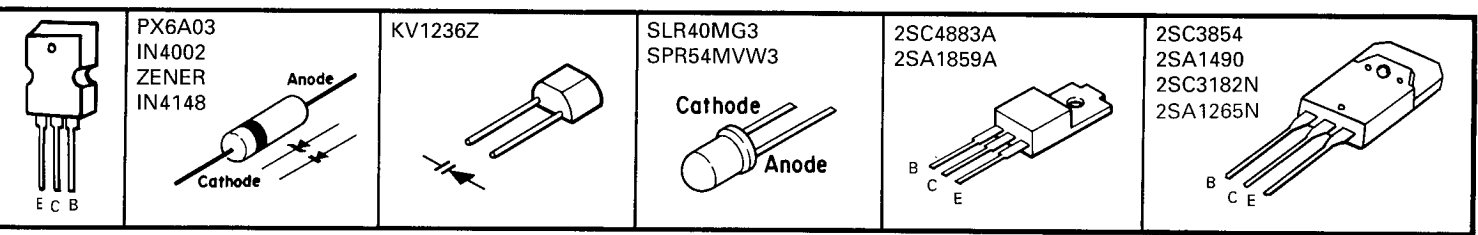
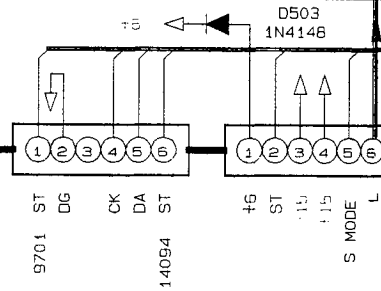


PIN CONNECTION OF TRANSISTORS, DIODES AND ICS.

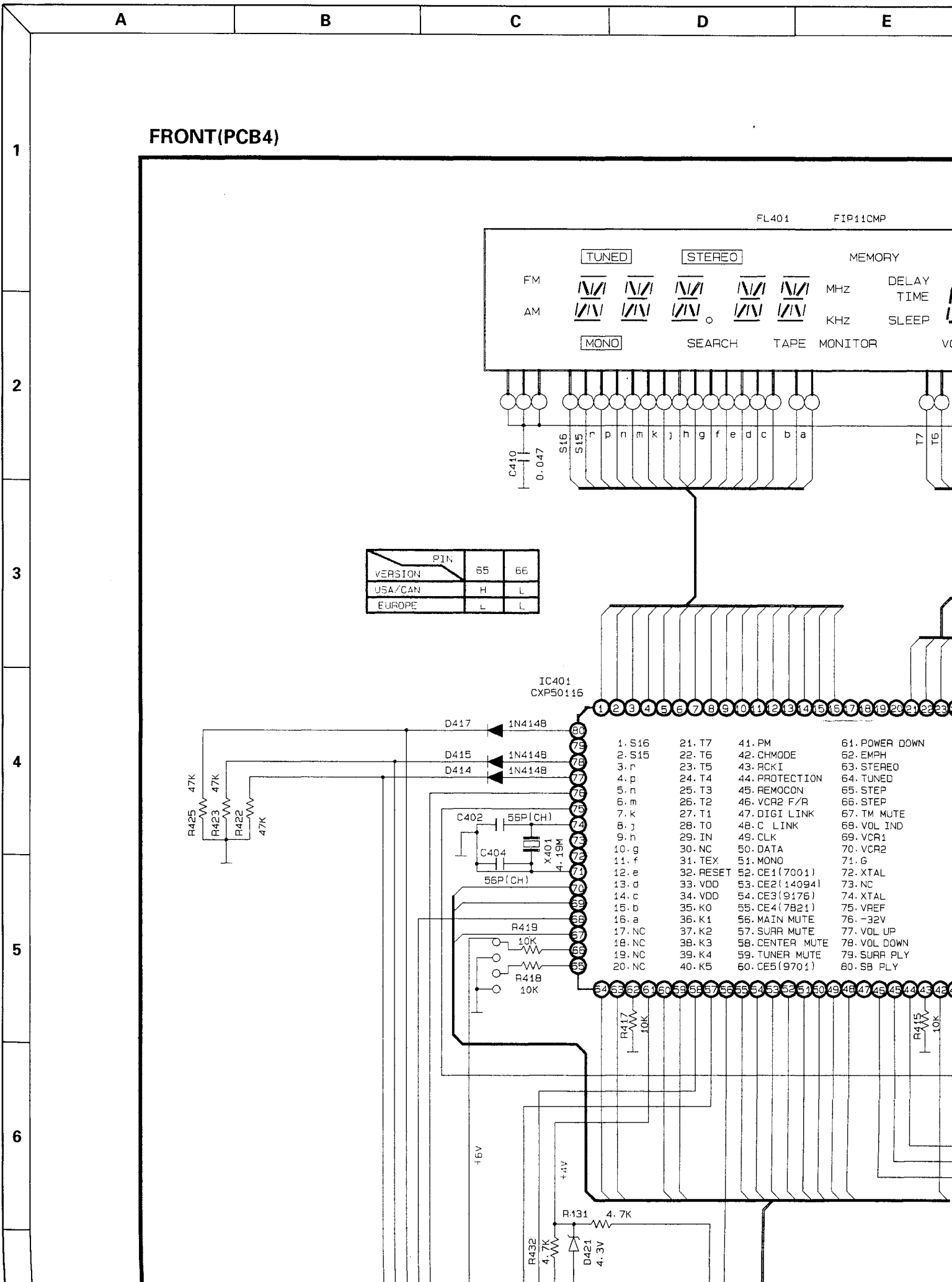
<p>KTA949 KTA965 KTC2229 KTC2235</p>	<p>KTA970 KTA1015 KTC1923 KTC2240 KTD1302 KTC1815Y</p>	<p>DTA114YS DTC114YS DTC114TS</p>	<p>2SK168 2SK117</p>	<p>2SC4137</p>	<p>PX6A03 IN4002 ZENER IN4148</p>
<p>GL7806 GL7815</p>	<p>GL7915</p>	<p>LC4966</p>	<p>KIA4559P KIA6259P</p>	<p>TC9176 MC14094</p>	<p>LM70 HA12</p>



CN107 FROM INPUT SCHEMATIC DIAGRAM (I)



SCHEMATIC DIAGRAM IV



E

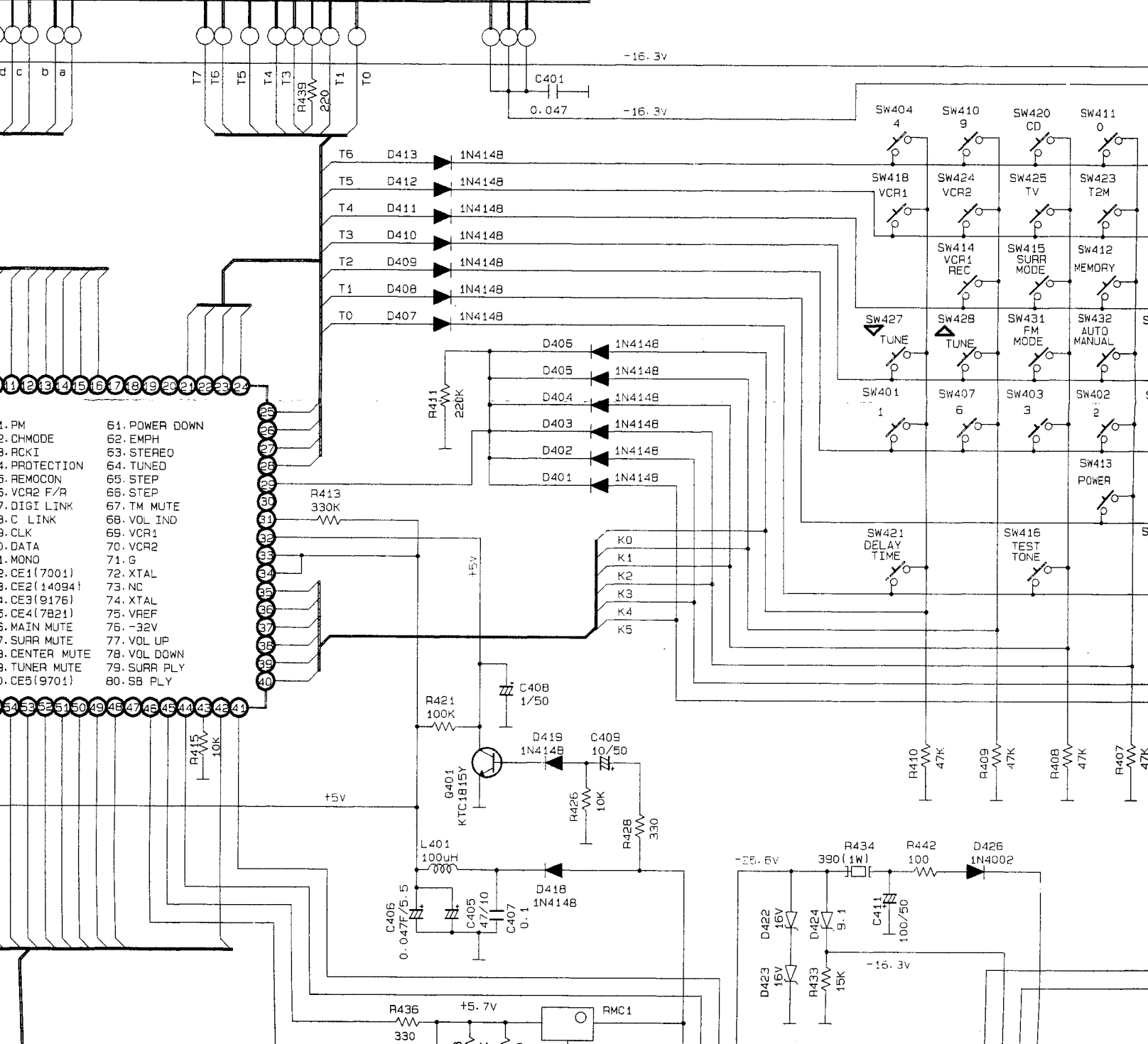
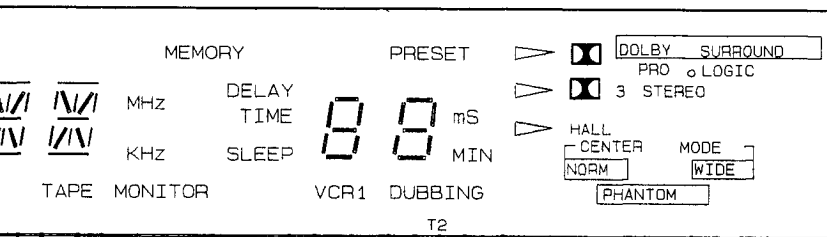
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FL401 FIP11CMP



- 1. PM
- 2. CHMODE
- 3. RCKI
- 4. PROTECTION
- 5. REMOCON
- 6. VCR2 F/R
- 7. DIGI LINK
- 8. C LINK
- 9. CLK
- 10. DATA
- 11. MONO
- 12. CE1(7001)
- 13. CE2(14094)
- 14. CE3(9176)
- 15. CE4(7821)
- 16. MAIN MUTE
- 17. SURR MUTE
- 18. CENTER MUTE
- 19. TUNER MUTE
- 20. CE5(9701)
- 61. POWER DOWN
- 62. EMPH
- 63. STEREO
- 64. TUNED
- 65. STEP
- 66. STEP
- 67. TM MUTE
- 68. VOL IND
- 69. VCR1
- 70. VCR2
- 71. G
- 72. XTAL
- 73. NC
- 74. XTAL
- 75. VREF
- 76. -32V
- 77. VOL UP
- 78. VOL DOWN
- 79. SURR PLY
- 80. SB PLY

I

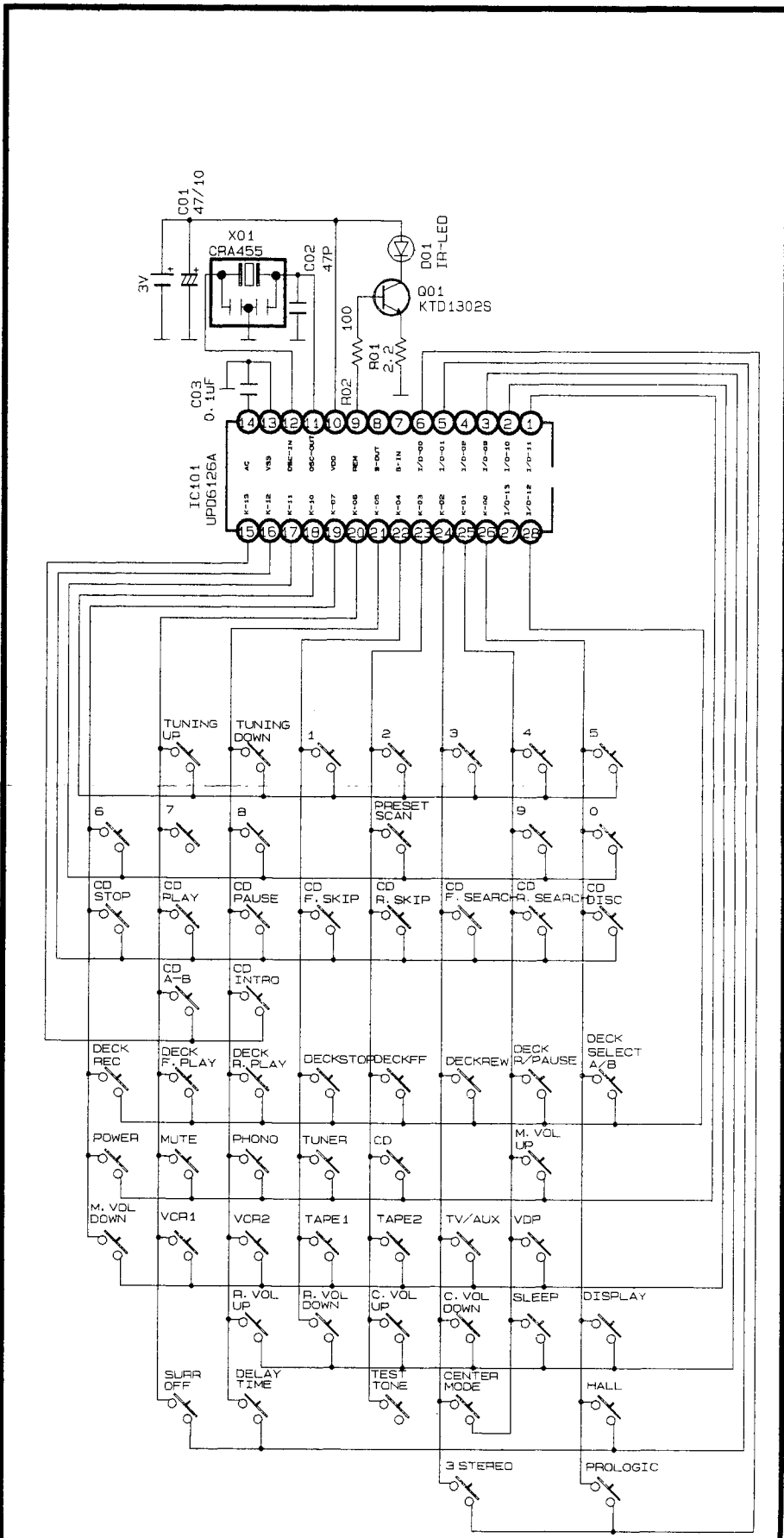
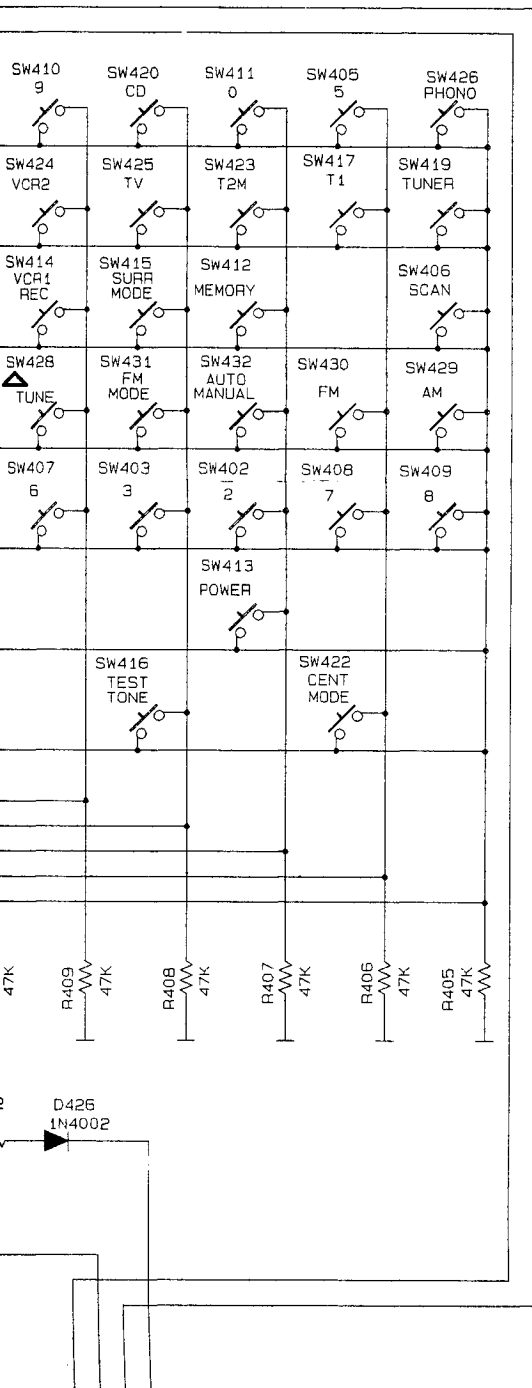
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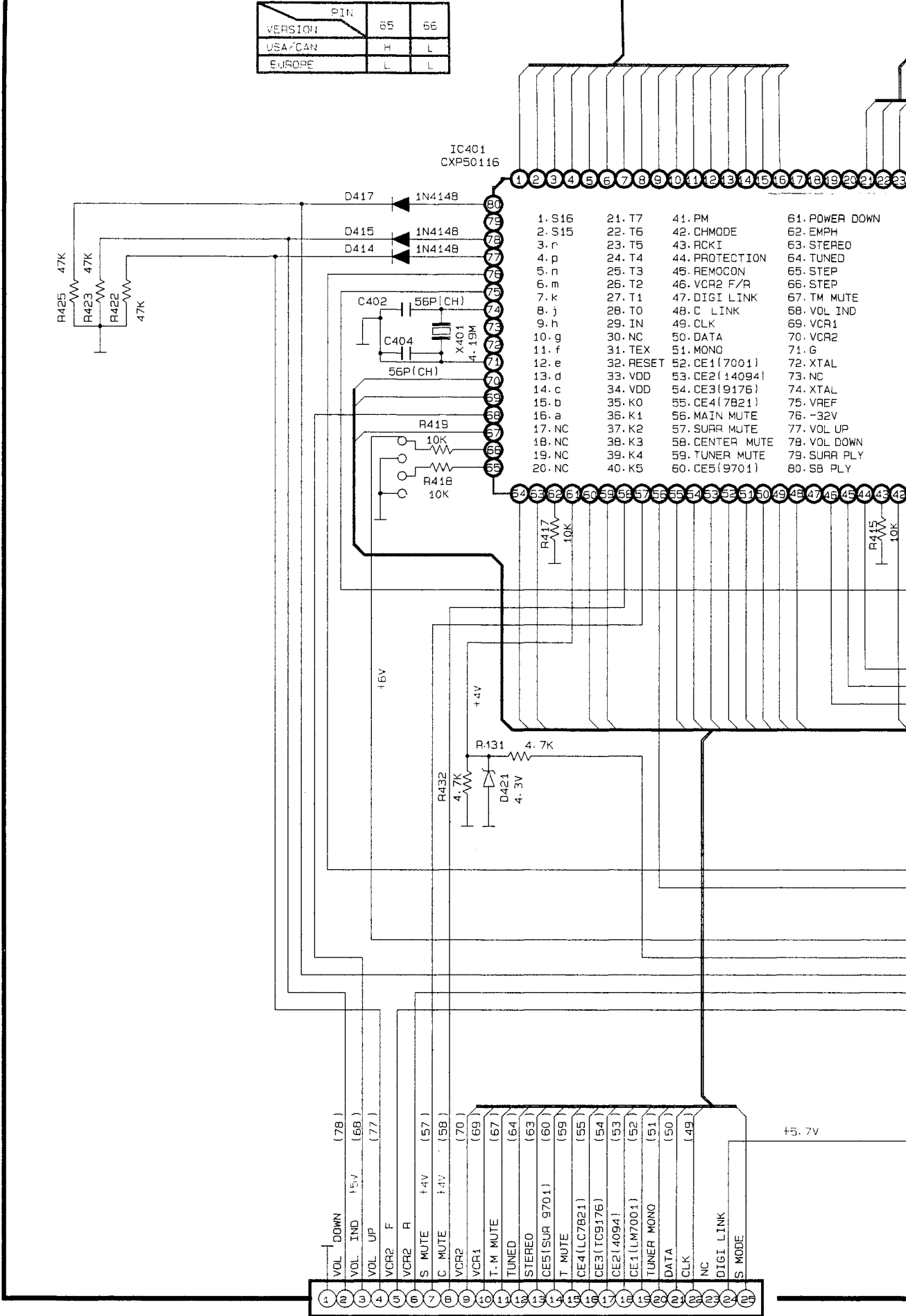
M

COMMANDER

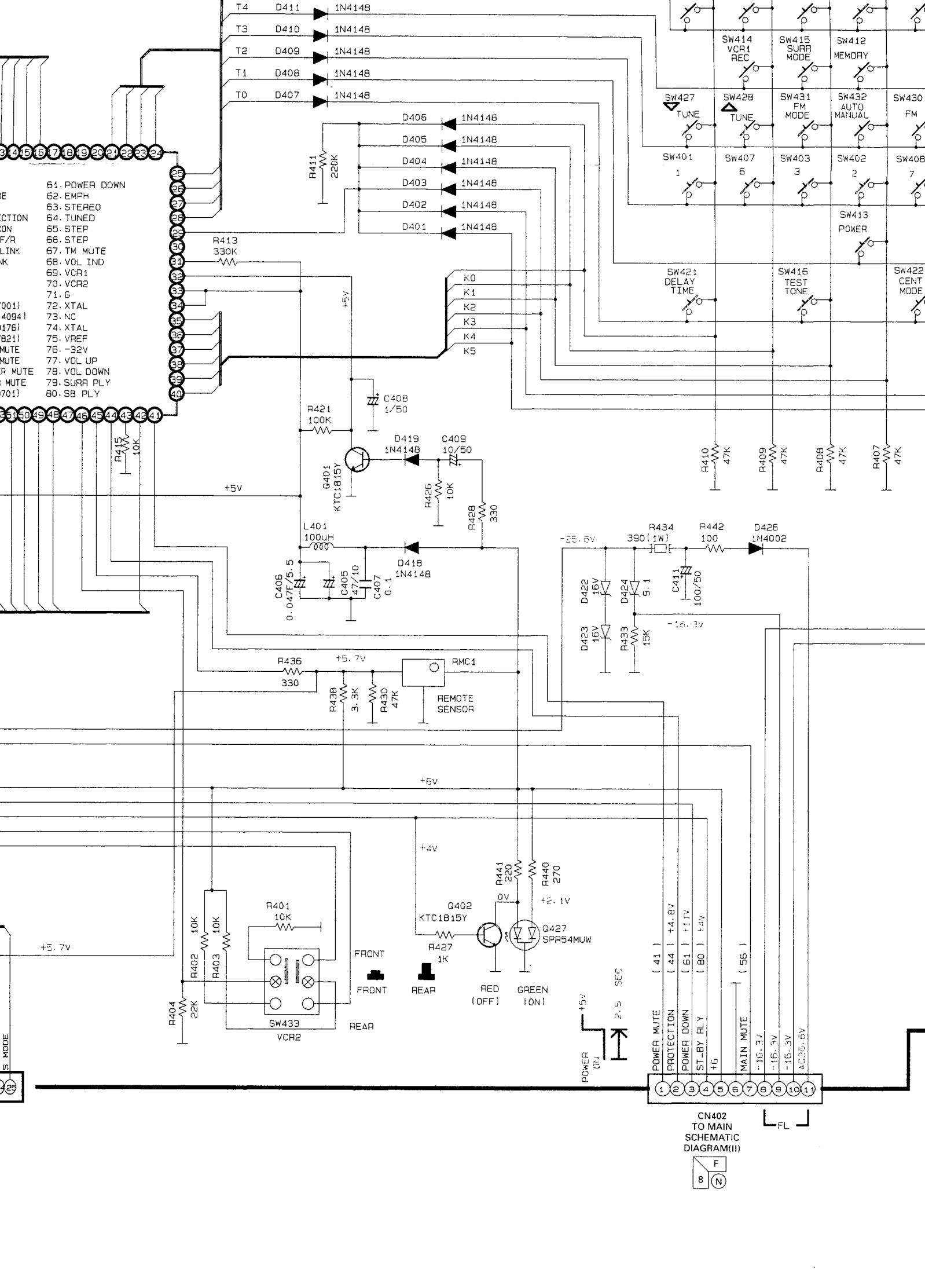


VERSION	PIN	
	65	66
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EUROPE	L	L

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CN401
TO INPUT
SCHEMATIC
DIAGRAM(I)

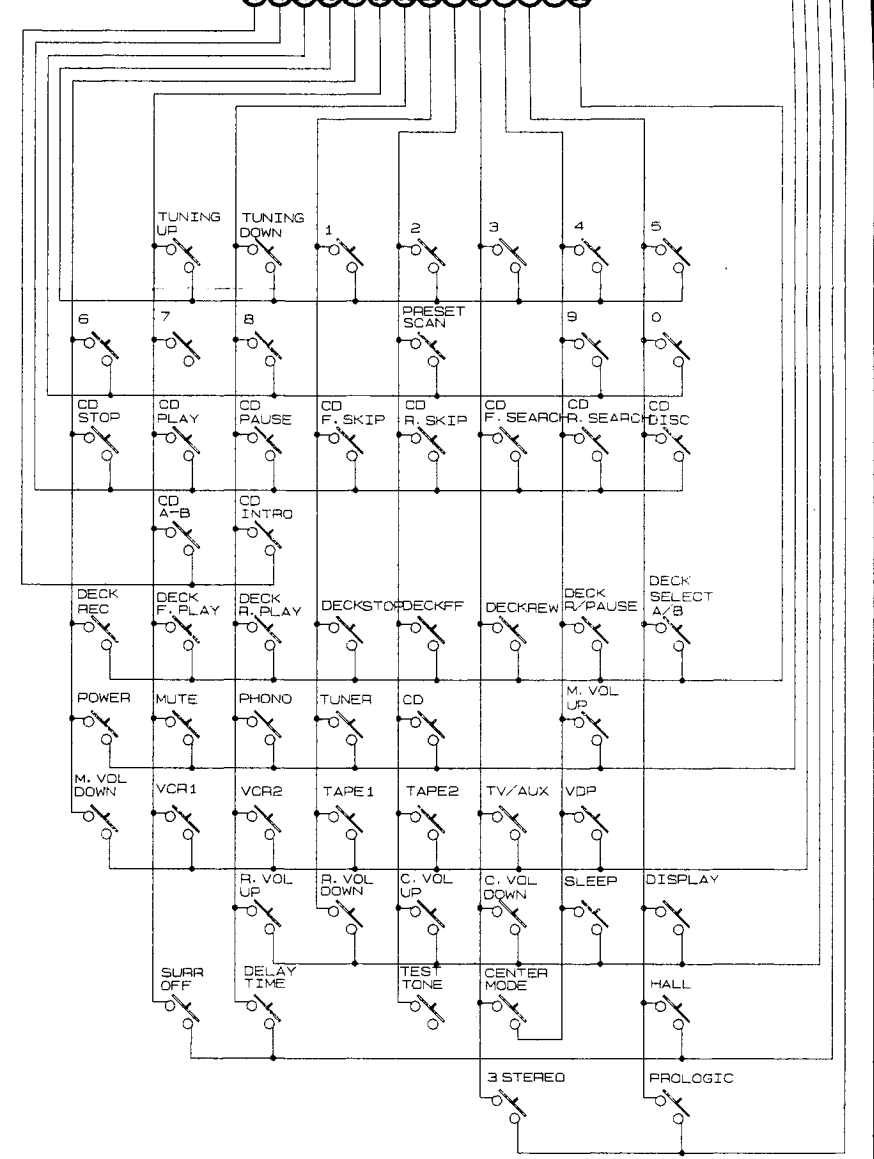
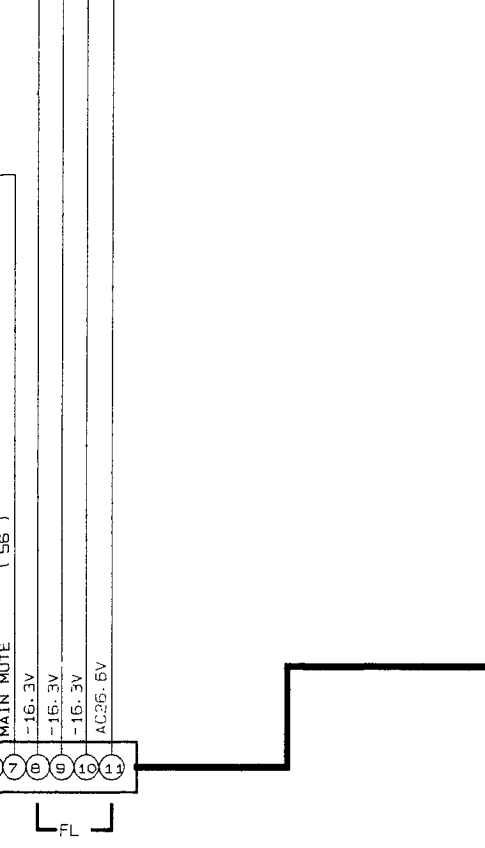
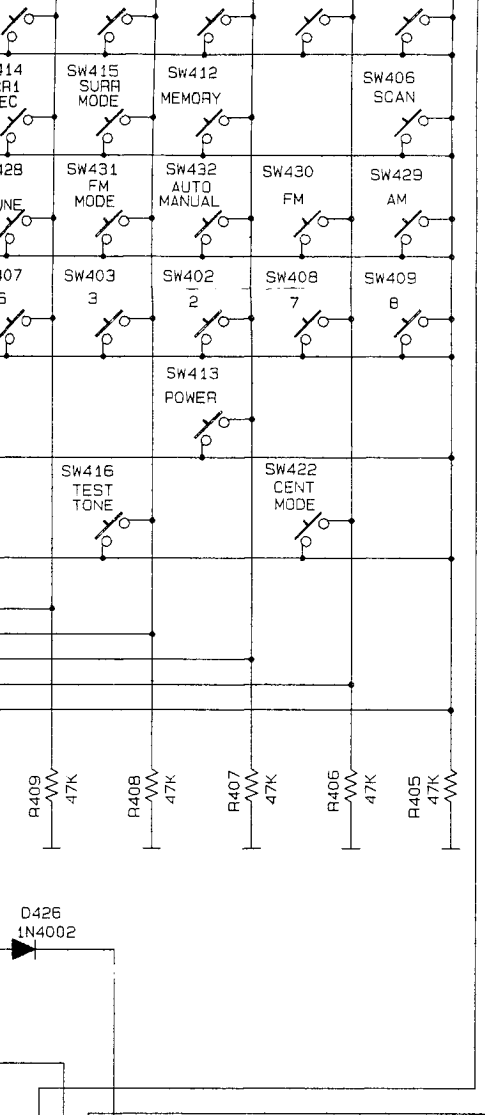


- 61. POWER DOWN
- 62. EMPH
- 63. STEREO
- 64. TUNED
- 65. STEP
- 66. STEP
- 67. TM MUTE
- 68. VOL IND
- 69. VCR1
- 70. VCR2
- 71. G
- 72. XTAL
- 73. NC
- 74. XTAL
- 75. VREF
- 76. -32V
- 77. VOL UP
- 78. VOL DOWN
- 79. SURR PLY
- 80. SB PLY

1	POWER MUTE	(41)
2	PROTECTION	(44) +4.8V
3	POWER DOWN	(61) +11V
4	ST-BY RLY	(80) +5V
5	+5	
6	MAIN MUTE	(56)
7	-15.8V	
8	-15.3V	
9	-16.5V	
10	-16.5V	
11	AC35.8V	

CN402
TO MAIN
SCHEMATIC
DIAGRAM(II)

F
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


NOTES

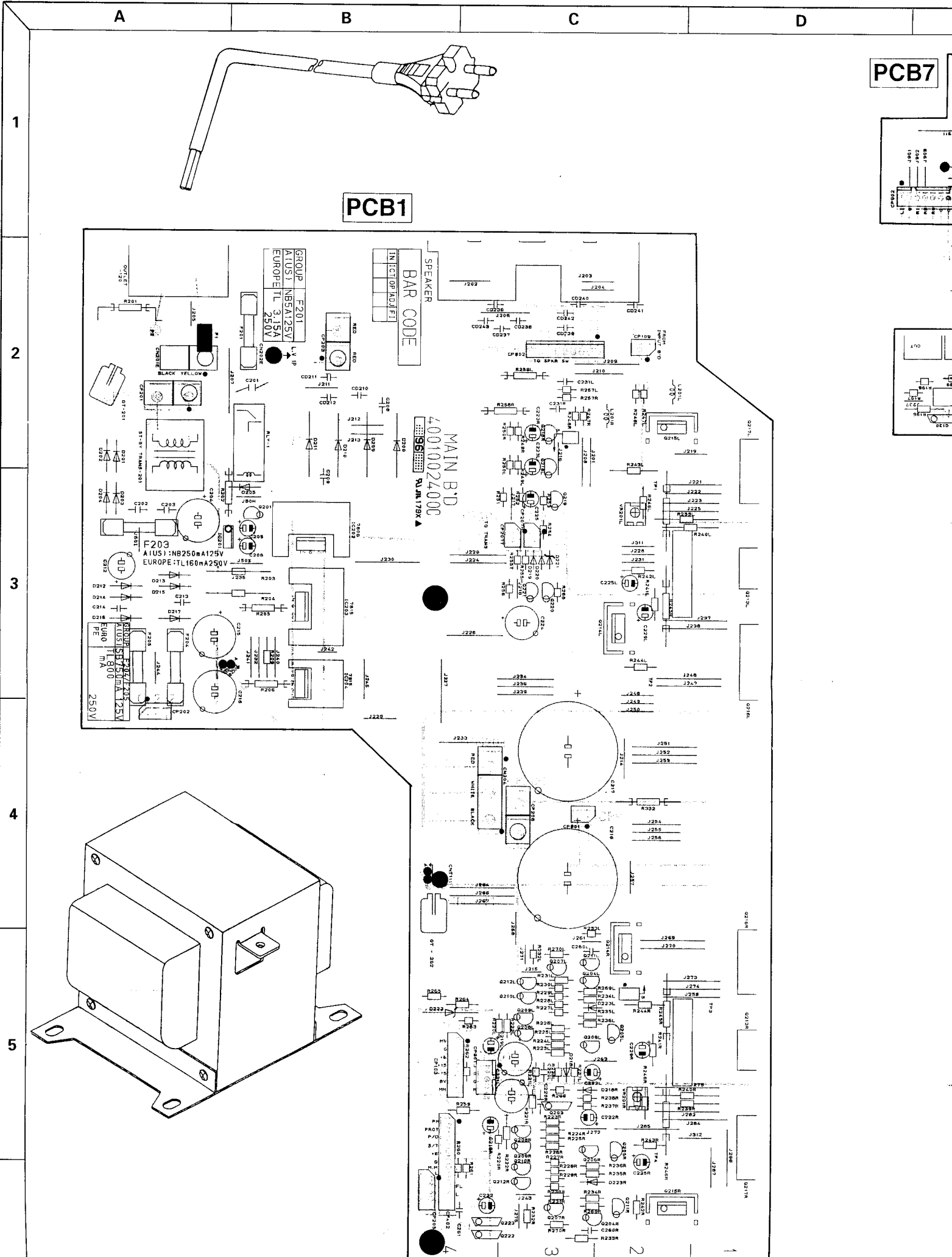
1. Resistor values are indicated in ohms unless otherwise specified
[K=1,000 M=1,000,000]
2. Capacitor values are indicated in microfarads unless otherwise specified.
[p=micro-microfarads]

CAUTION

Safety precaution to be followed during servicing

- 1) Since those parts marked with  are critical parts for safety, use only the one described in the parts list
- 2) Before returning the set to the customer make appropriate leakage current or resistance measurements to determine the exposed parts are properly insulated from the supply circuit.

WIRING DIAGRAM

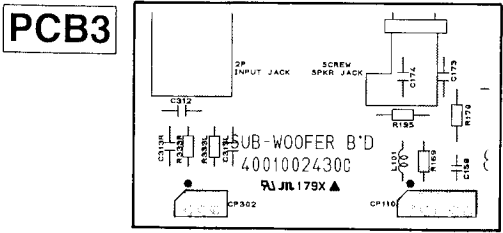
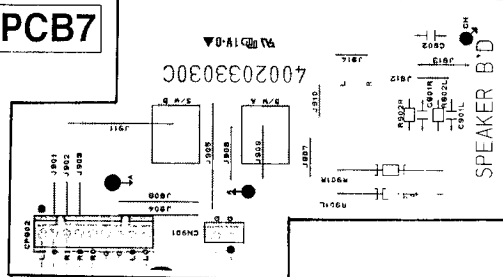


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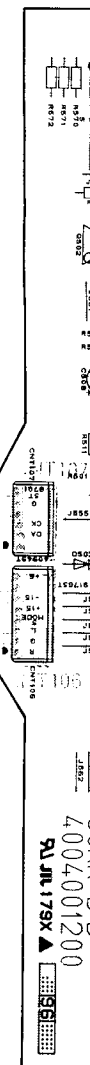
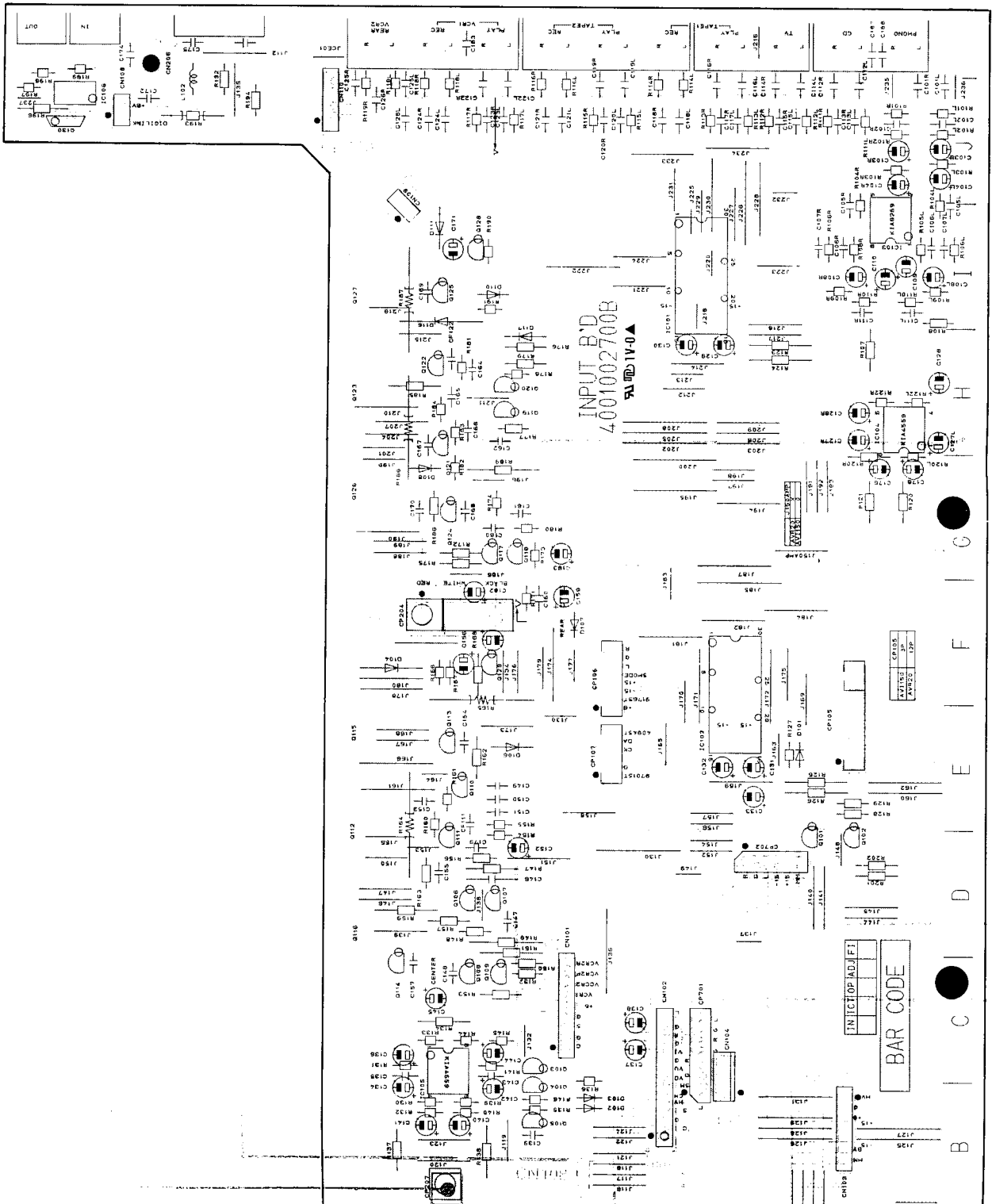
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PCB9



4004001200

JL 179X

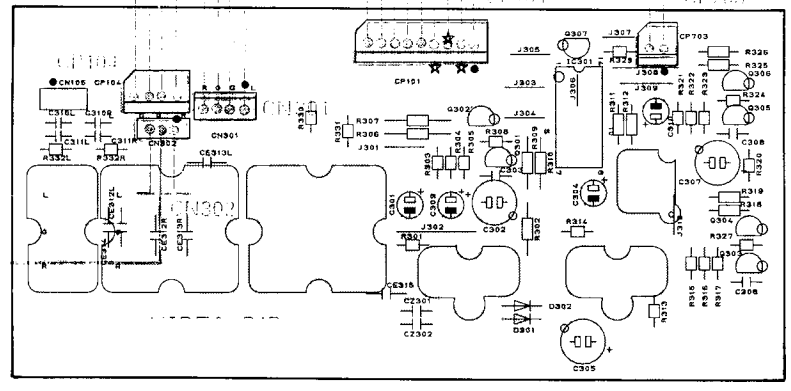
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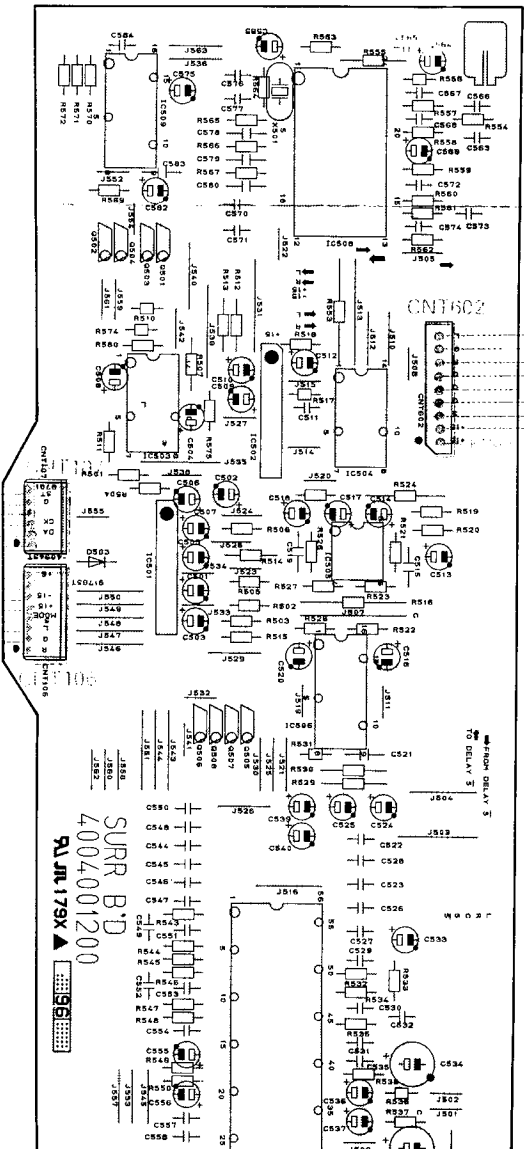
J

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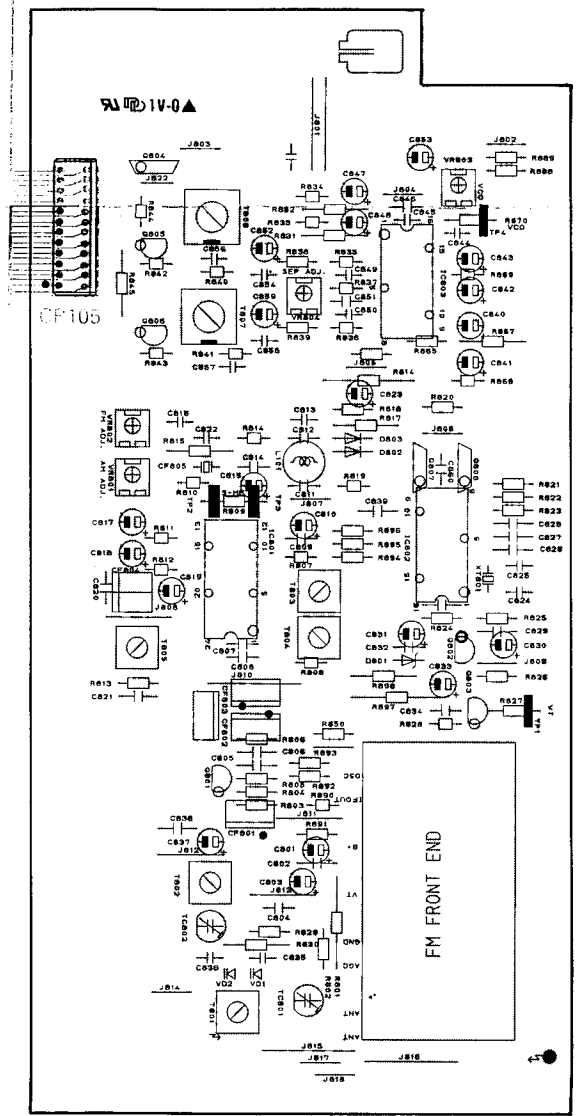
PCB2



PCB11



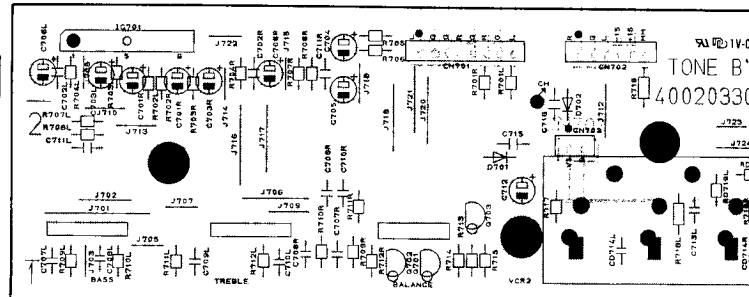
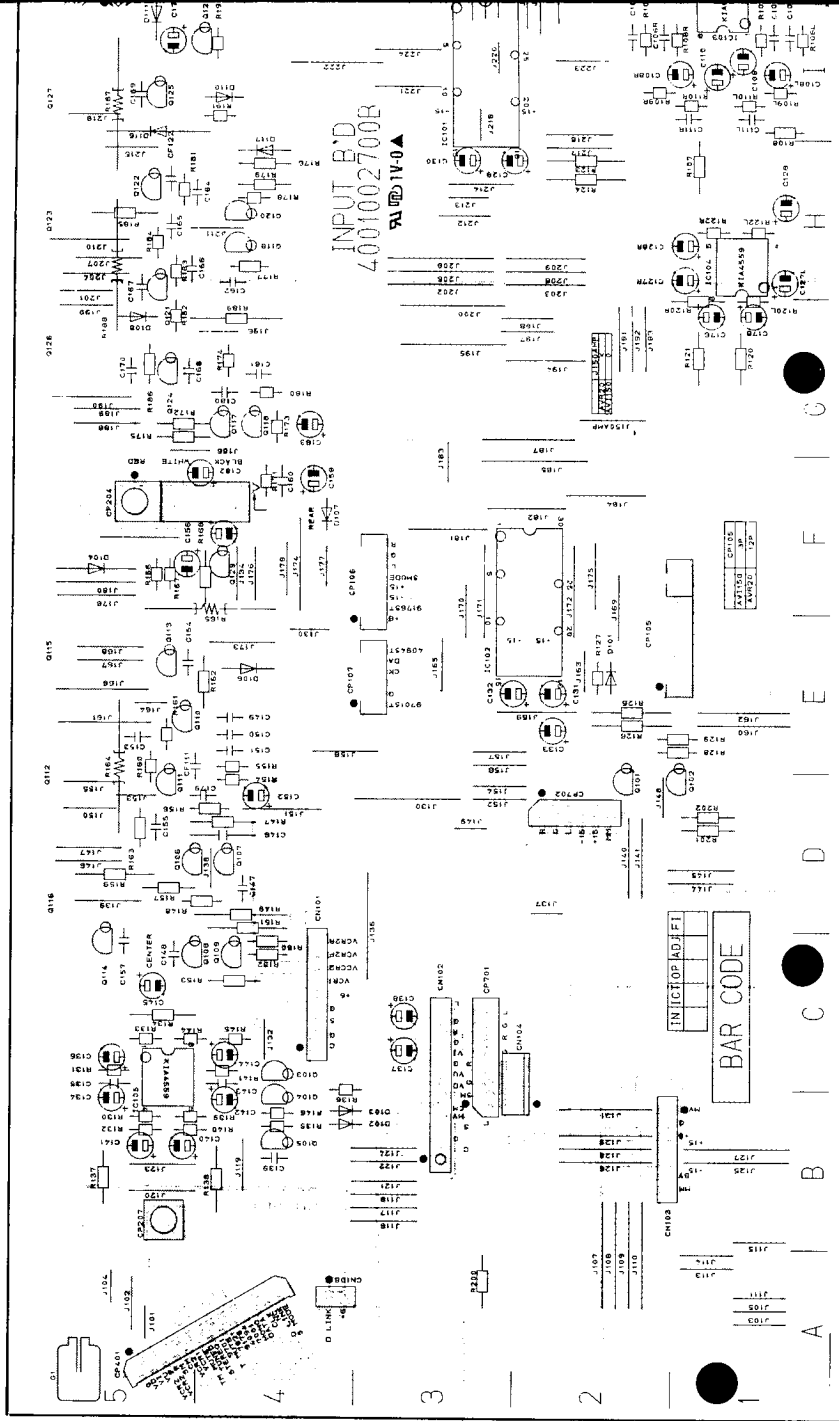
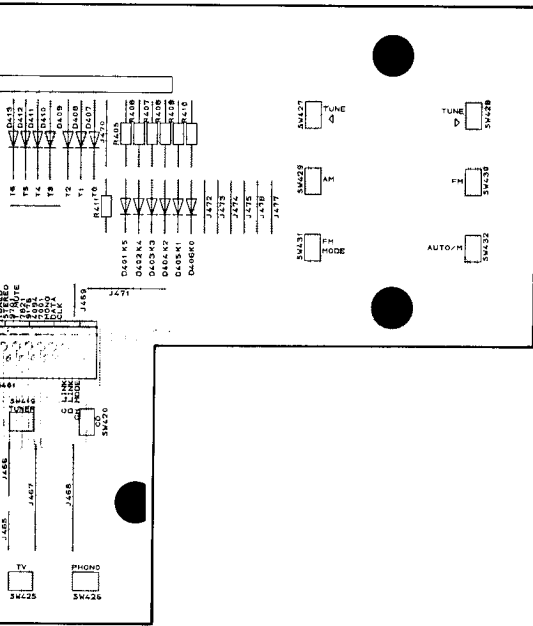
PCB10



BAR CODE

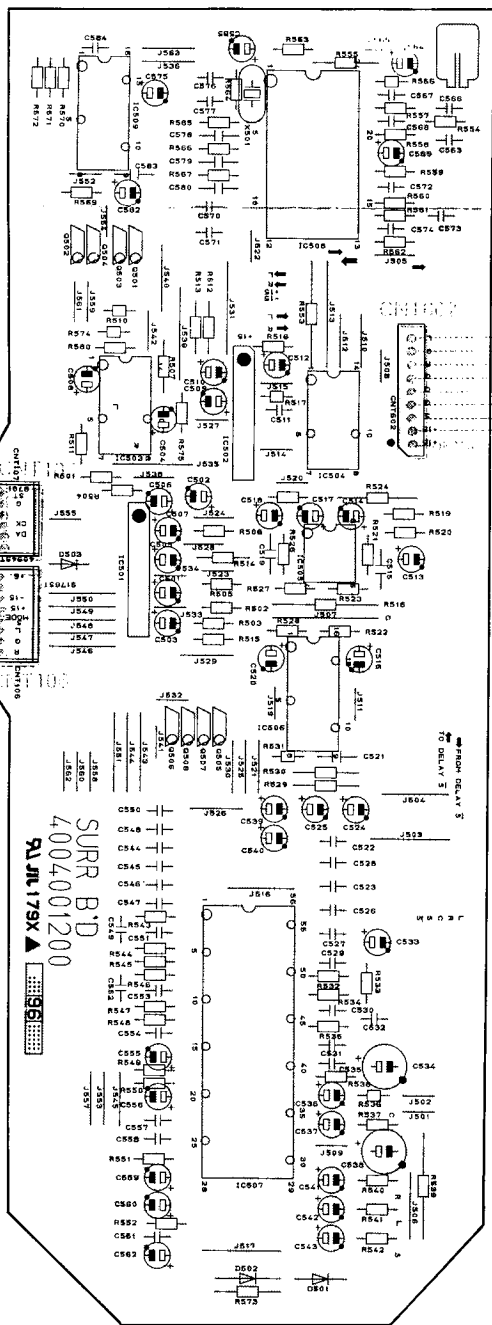
SURR B.D
4004001200
PALM 179X

FM FRONT END

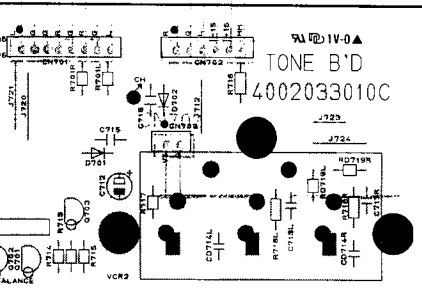
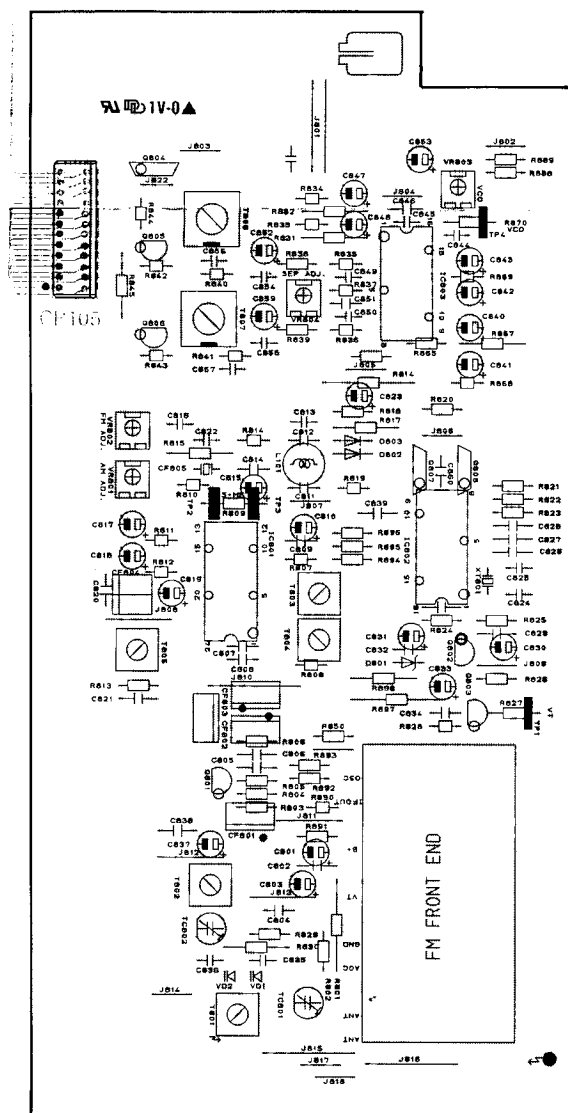


A | B | C | D | E | F | G | H

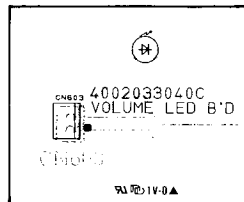
PCB11



PCB10



PCB8



PCB6

