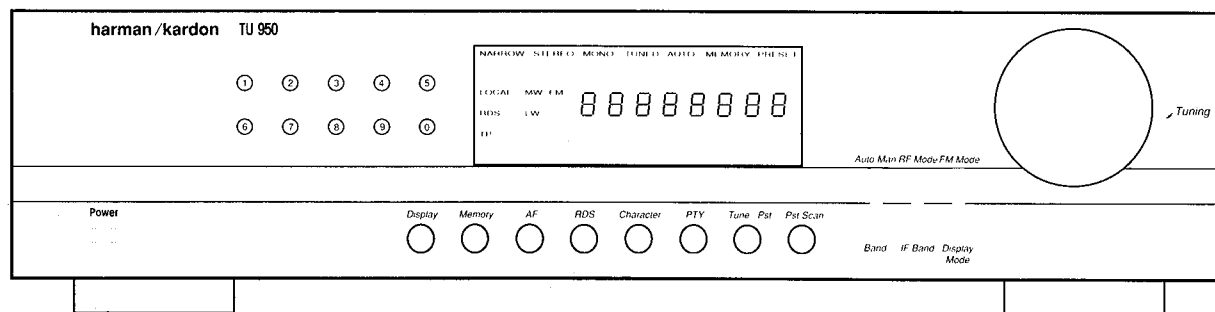


The Harman Kardon Model TU-950

Manual A

AM/FM STEREO DIGITAL RDS TUNER

Technical Manual



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harman/kardon

Parts and Service Office
80 Crossways Park West, Woodbury, N.Y. 11797
1112-TU-950 P9604 1200 Printed in Korea

LEAKAGE TEST

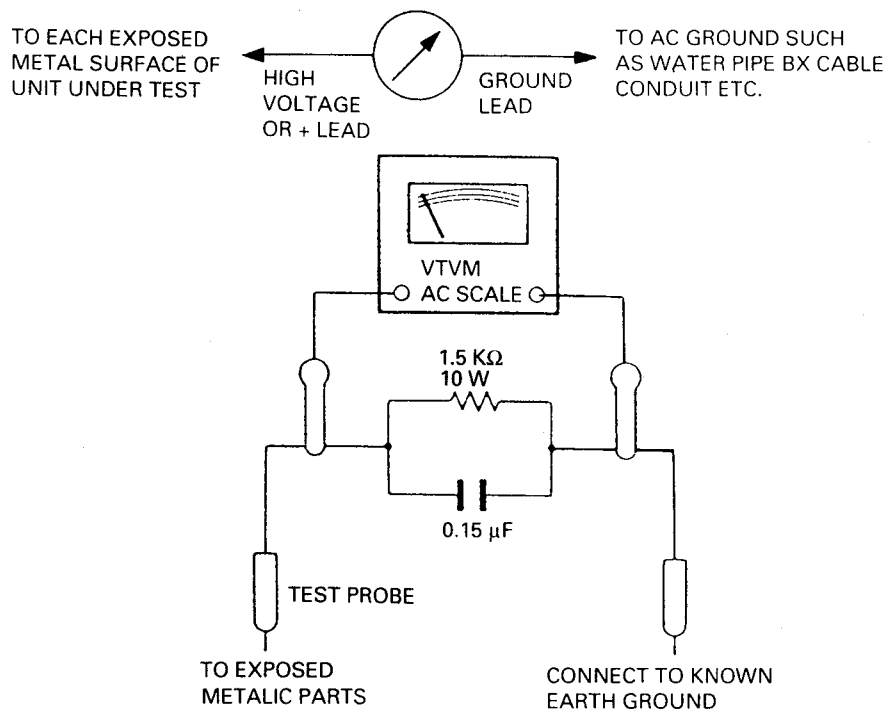
Before returning the unit to the user, perform the following safety checks:

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 μ 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.

SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST



SPECIFICATIONS

•FM SECTION

	Nominal	Limit
Test Condition: 40 kHz DEV., 1 kHz Frequency.		
Tuning Range/Step	87.5 MHz - 108 MHz/50 kHz	
Usable Sensitivity (-26 dB S/N)		
Mono	≤ 15.2 dBf	≤ 19.2 dBf
Limiting Sens at -3 dB	≤ 12.2 dBf	≤ 17.2 dBf
46 dB Quieting Sens		
Stereo	≤ 46 dBf	≤ 46.8 dBf
Total Harmonic Distortion		
Mono	≤ 0.3%	≤ 0.5%
Stereo	≤ 0.5%	≤ 0.7%
Signal to Noise Ratio (1 mV RF INPUT)		
Mono	≥ 70 dB	≥ 65 dB
Stereo	≥ 65 dB	≥ 60 dB
Stereo Separation at 98 MHz (NORMAL)		
1 kHz	≥ 42 dB	≥ 38 dB
10 kHz	≥ 33 dB	≥ 30 dB
Muting and Automatic Threshold at 98 MHz		
	31.2 ± 3 dBf	31.2 ± 6 dBf
Auto Stop Level	31.2 ± 3 dBf	31.2 ± 6 dBf
Selectivity WIDE/NARROW ± 300 kHz		
	≥ 43/63 dB	≥ 40/60 dB
Auto Scan Error	± 12 kHz	± 15 kHz
Frequency Response at 20 Hz - 15 kHz		
	≥ -1.5 dB	≥ -3 dB
Image Rejection at 106 MHz	≥ 68 dB	≥ 65 dB
AM Suppression	≥ 55 dB	≥ 50 dB
RDS Sensitivity	≤ 39.2 dBf	≤ 40.8 dBf
Output Voltage		
Mono	500 ± 50 mV	500 ± 100 mV

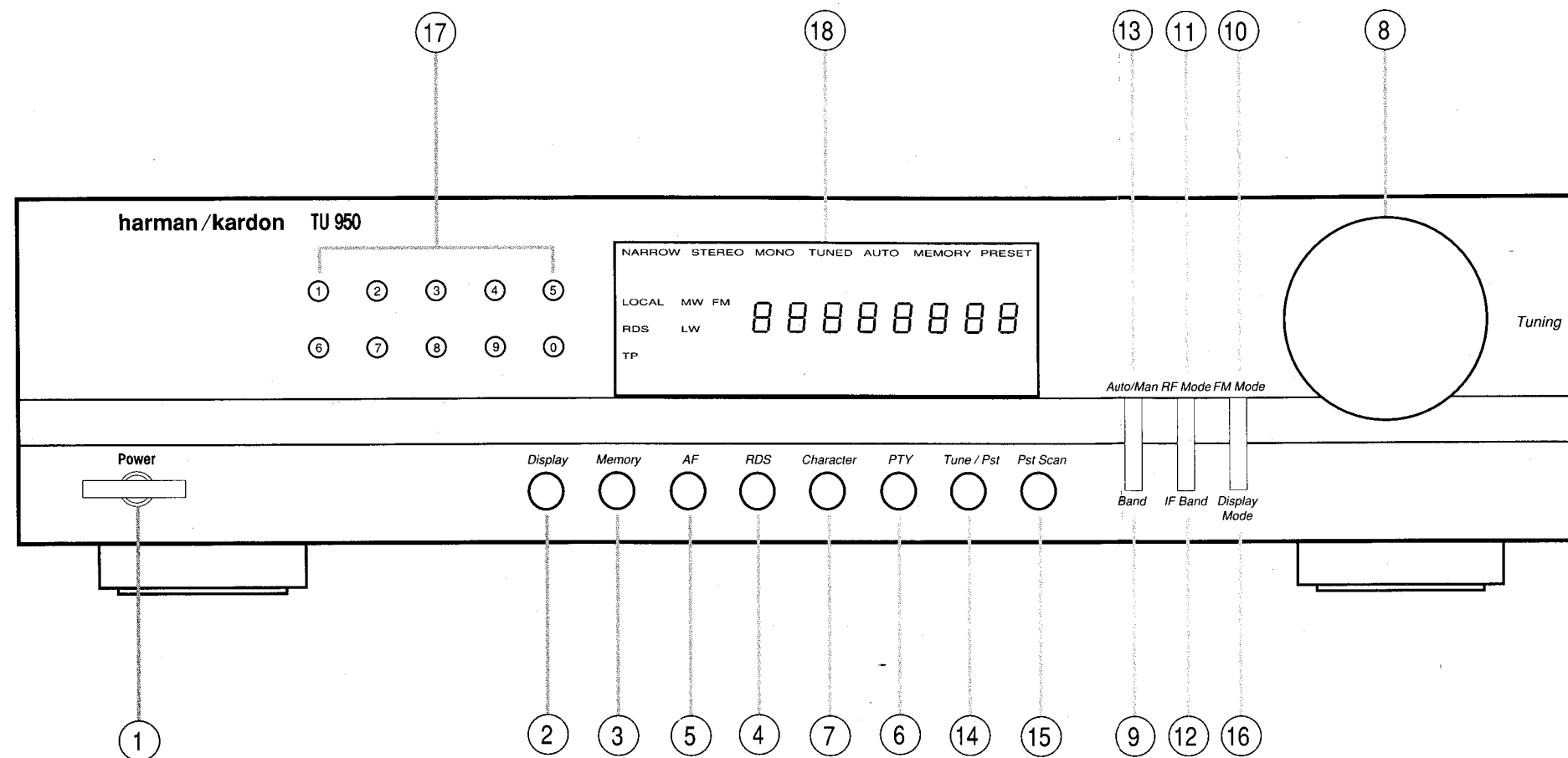
•DIMENSIONS (W × H × D)	440 × 95 × 300
•WEIGHT	4.3 kg
•POWER SUPPLIES	230 V, 50 Hz
•POWER CONSUMPTION	12 W

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

•MW/LW SECTION

	Nominal	Limit
Test Condition: 400 Hz, 30% Modulation		
Tuning Range/Step		
MW	522 kHz - 1611 kHz/9 kHz	
LW	153 kHz - 279 kHz/1 kHz	
Usable Sensitivity (-20 dB S/N)		
MW: 594 kHz, 1404 kHz	≤ 500 mV	≤ 1000 mV
LW: 162 kHz, 252 kHz	≤ 800 mV	≤ 1200 mV
Signal to Noise ratio (10 mV INPUT)		
MW: 999 kHz	≥ 43 dB	≥ 40 dB
LW: 216 kHz	≥ 38 dB	≥ 33 dB
Frequency Response at -6 dB		
MW	80 Hz - 2.2 kHz	100 Hz - 2 kHz
LW	80 Hz - 2 kHz	100 Hz - 1.8 kHz
Selectivity at ± 9 kHz		
MW: 999 kHz	≥ 33 dB	≥ 30 dB
LW: 216 kHz	≥ 28 dB	≥ 25 dB
A.G.C. Figure of Merit at 999 kHz		
	≥ 48 dB	≥ 45 dB
Image Rejection		
MW: 1404 kHz	≥ 35 dB	≥ 30 dB
LW: 252 kHz	≥ 40 dB	≥ 35 dB
Total Harmonic Distortion (10 mV INPUT)		
MW: 999 kHz	≤ 1.2%	≤ 1.5%
Tuned Level		
MW: 999 kHz	500 mV ± 3 dB	500 mV ± 6 dB
LW: 216 kHz	800 mV ± 3 dB	800 mV ± 6 dB
Output Voltage (10 mV INPUT)		
	165 ± 30 mV	165 ± 50 mV

CONTROL AND FUNCTIONS



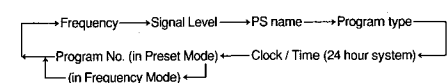
1. POWER BUTTON

Press this button to turn the unit on. Press it again to turn the unit off. Note that the rings above and below the button will glow green when the unit is on.

2. DISPLAY BUTTON

Pressing this button will display information about the current frequency or station. Each press of the button will cycle the display to the next item in the sequence. The information available will vary with the band in use and the availability of RDS information.

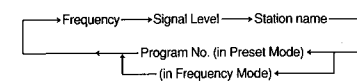
a) Display for FM stations when RDS is turned on:



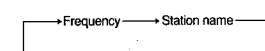
Note: Due to the nature of RDS transmissions, the unit needs to be tuned to a station for a short period

before the time display will appear. This is normal and does not indicate a fault with either the unit or broadcast station.

b) Display for FM station when RDS is turned off:



c) Display for MW or LW:



3. MEMORY BUTTON

This button is used to enter stations into the preset memories. The memory indicator blinks when the button is pressed.

4. RDS BUTTON

Pressing this button once turns on the RDS system for FM broadcasts and is confirmed by illumination of the RDS indicator on the display panel. When the unit is in the RDS mode and is tuned to a station transmitting RDS data, the station's frequency will be shown briefly and the display will then switch to the call letters or other identifying information contained in the RDS data signal.

When no signals are available with RDS data, the display will indicate "NO RDS".

Pressing this button twice, or until the RDS and TP indicators light up activates the RDS Traffic Program. When in this mode, the tuner will display RDS data if it is transmitted, as well as special traffic advisories when available.

5. AF BUTTON

Pressing this button when the RDS system is turned on and RDS data is present will cause the tuner to automatically scan up to six alternative frequencies for the same network or service tuned. It will then select the frequency that offers the best reception. If no list of alternate frequencies are available, the tuner will display a "NO AF" message. This feature is particularly useful when listening to national radio networks where the same program is broadcast on a number of transmitters.

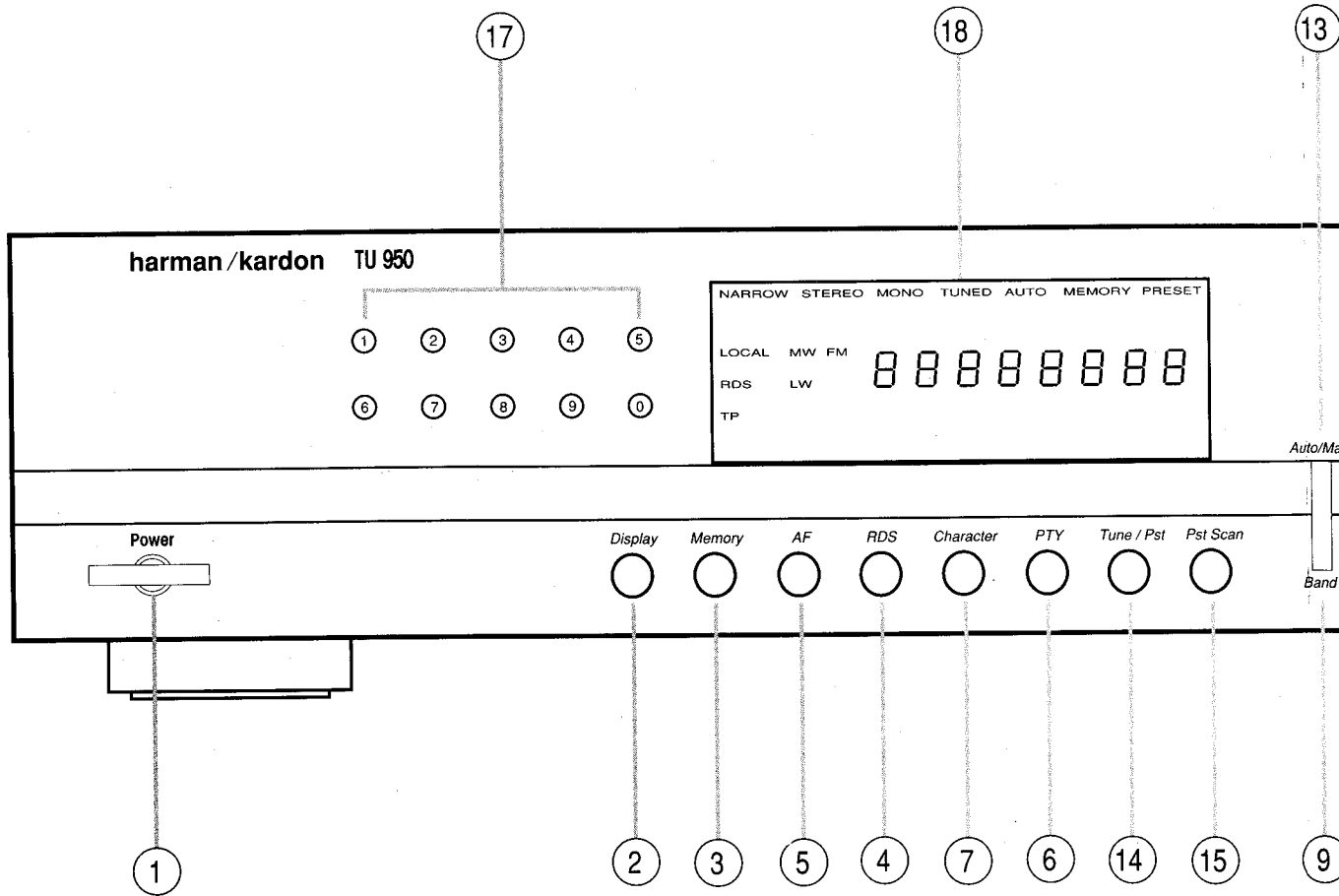
6. PTY BUTTON

Press this button to select a particular PTY (Program Type) according to the information transmitted by an RDS station. After pressing PTY, turn the Tuning Knob (#8) to select from one of the following program types:

- NEWS
- AFFAIRS: Political and current events
- INFO: General information, financial and trading news, medical conference and weather information
- SPORT: Sporting events
- EDUCATE: Scholastic and industrial education programs
- DRAMA: Broadcast plays and literature performances
- CULTURE: Cultural, religion and community programs
- SCIENCE: Scientific and technical programs
- VARIOUS: Entertainment
- POP M: Popular music
- ROCK M: Rock music
- M O R: Middle of the Road Music
- LIGHT M: Light Classical Music
- CLASSICS: Serious Classical Music
- OTHER M: Other types of musical programs, i.e. Jazz, Reggae, Rap, etc.
- ALARM

After selecting a program choice, press the PTY button again to begin the search. The unit will scan all RDS stations and tune to the station with the strongest signal transmitting the selected program type. If no station with the selected program type is available in your area, the display will show NO PTY and return to the previous station.

CONTROL AND FUNCTIONS



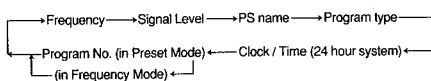
1. POWER BUTTON

Press this button to turn the unit on. Press it again to turn the unit off. Note that the rings above and below the button will glow green when the unit is on.

2. DISPLAY BUTTON

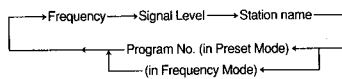
Pressing this button will display information about the current frequency or station. Each press of the button will cycle the display to the next item in the sequence. The information available will vary with the band in use and the availability of RDS information.

- a) Display for FM stations when RDS is turned on:

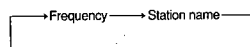


before the time display will appear. This is normal and does not indicate a fault with either the unit or broadcast station.

- b) Display for FM station when RDS is turned off:



- c) Display for MW or LW:



3. MEMORY BUTTON

This button is used to enter stations into the preset memories. The memory indicator blinks when the button is pressed.

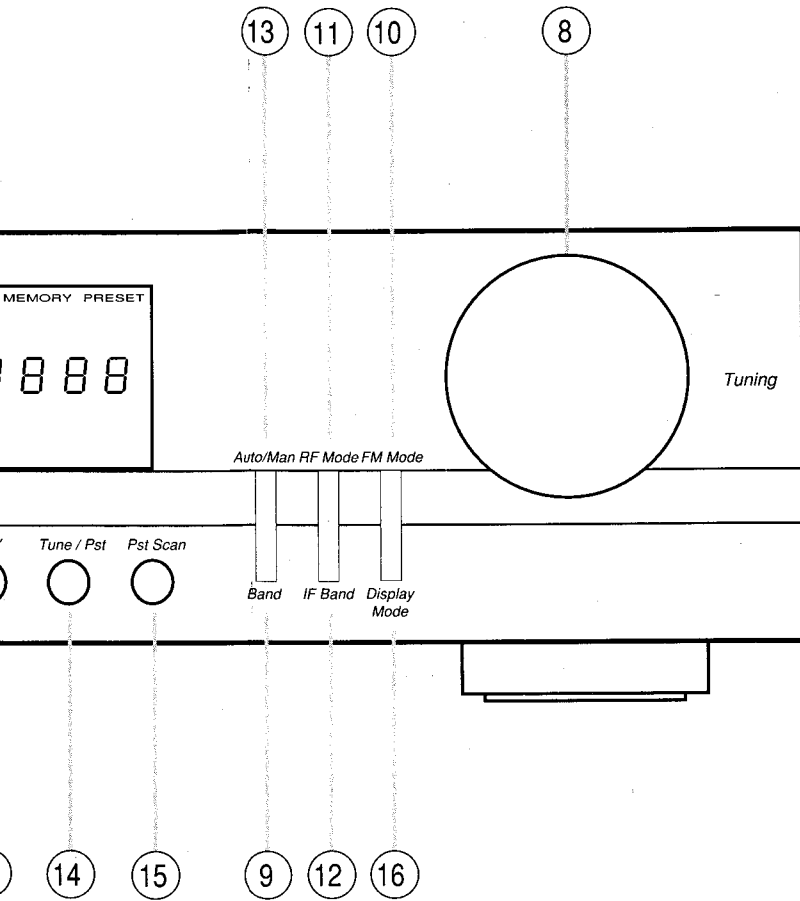
4. RDS BUTTON

Pressing this button once turns on the RDS system for FM broadcasts and is confirmed by illumination of the RDS indicator on the display panel. When the unit is in the RDS mode and is tuned to a station transmitting RDS data, the station's frequency will be shown briefly and the display will switch to the call letters or other identifying information contained in the RDS data signal.

When no signals are available with RDS data, the display will indicate "NO RDS".

Pressing this button twice, or until the RDS and TP indicators light up, activates the RDS Traffic Program. When in this mode, the tuner will display RDS data if it is transmitting, as well as special traffic advisories when available.

Note: Due to the nature of RDS transmissions, the unit needs to be tuned to a station for a short period



PTV BUTTON

Pressing this button once turns on the RDS system for FM broadcasts and is indicated by illumination of the RDS indicator on the display panel. When the radio is in the RDS mode and is tuned to a station transmitting RDS data, the station's frequency will be displayed briefly and the display will then show the call letters or other identifying information contained in the RDS data signal.

If no RDS signals are available with the selected station, the display will indicate "NO RDS".

Pressing this button twice, or until the RDS TP indicators light up, enters the RDS Traffic Program. In this mode, the tuner will scan for RDS data if it is transmitted, and will display special traffic advisories if available.

5. AF BUTTON

Pressing this button when the RDS system is turned on and RDS data is present will cause the tuner to automatically scan up to six alternative frequencies for the same network or service tuned. It will then select the frequency that offers the best reception. If no list of alternate frequencies are available, the tuner will display a "NO AF" message. This feature is particularly useful when listening to national radio networks where the same program is broadcast on a number of transmitters.

6. PTY BUTTON

Press this button to select a particular PTY (Program Type) according to the information transmitted by an RDS station. After pressing PTY, turn the Tuning Knob (#8) to select from one of the following program types:

- NEWS
- AFFAIRS: Political and current events
- INFO: General information, financial and trading news, medical conference and weather information
- SPORT: Sporting events
- EDUCATE: Scholastic and industrial education programs
- DRAMA: Broadcast plays and literature performances
- CULTURE: Cultural, religion and community programs
- SCIENCE: Scientific and technical programs
- VARIED: Entertainment
- POP M: Popular music
- ROCK M: Rock music
- M O R: Middle of the Road Music
- LIGHT M: Light Classical Music
- CLASSICS: Serious Classical Music
- OTHER M: Other types of musical programs, i.e. Jazz, Reggae, Rap, etc.
- ALARM

After selecting a program choice, press the PTY button again to begin the search. The unit will scan all RDS stations and tune to the station with the strongest signal transmitting the selected program type. If no station with the selected program type is available in your area, the display will show NO PTY and return to the previous station.

7. CHARACTER BUTTON

This button enables the system which permits you to enter or modify the name of any FM, LW or MW station which is not broadcasting in RDS.

To enter a name, press the CHARACTER button once and observe that a line will flash under the first digit of the display.



Turn the tuning knob until the desired letter, number or symbol appears. Press the button again to advance to the next digit. Repeat the procedure for all places in the display, using the tuning knob to select a character and the CHARACTER button to advance to the next digit.

When all eight digits have been programmed, press the MEMORY button (#3), then select a memory location (1-30) using the NUMERIC buttons (#17).

The name may be called up at any time by pressing the DISPLAY button.

8. TUNING/SELECT KNOB

This knob has a number of functions, although its primary use is to select stations. In normal use, turn the knob in either direction to move through the selected band to find a station. When the "TUNED" indicator lights, the station is properly locked in.

In addition to standard tuning, a number of automated tuning methods are available:

- In the FM mode, when the AUTO/MAN button (#13) is pressed so that the "AUTO" indicator is illuminated, turning the tuning knob will cause the tuner to scan higher frequencies when moved clockwise and lower frequencies when moved counterclockwise. The tuner will stop at the first station that has sufficient signal to be properly tuned. Turn the knob again to tune to the next available station. Note that when the RDS system is turned on, the tuner will only stop at stations transmitting RDS data

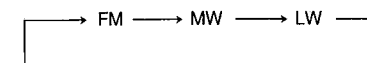
but it will pause briefly without stopping at all other stations that may be received if the RDS system is turned off.

- When the TUNE/PST button is pressed so that the "PRESET" indicator is illuminated, turning the tuning knob will move the tuner up or down through the stations programmed into the unit's memory. When the desired preset station number appears, press the button to view the station's frequency.

As described above, the Tuning/Select Knob also functions as a selector for the PTY (#6) and CHARACTER (#7) functions.

9. BAND BUTTON

Each time this button is pressed the frequency band being tuned is changed in the following order:



10. FM MODE BUTTON

Pressing this button changes mode of FM reception.

- When the button is pressed so that the red "STEREO" indicator is illuminated, the unit will tune to FM stations broadcasting a stereo signal.
- When the button is pressed so that the "STEREO" indicator is not lit, the unit will tune to all FM stations. When a stereo signal is tuned in the mono mode, the left and right channel signals are mixed together and sent to both channels.

NOTE: When experiencing weak or noisy reception of a stereo broadcast, reception quality may be improved by pressing the FM MODE button to switch to mono.

11. RF MODE BUTTON (FM TUNING ONLY)

Pressing this button adjusts the tuner to compensate for RF intermodulation noise caused by interference from other stations in your area.

- In urban areas where reception is strong and there are many stations, press the button until "LOCAL" indicator is illuminated. This will reduce intermodulation noise and provide better sound quality.
- When tuning distant stations press the button so that the "LOCAL" indicator is not lit. This improves the tuner's ability to receive weak signals with lower noise.

12. IF BAND BUTTON (FM TUNING ONLY)

Pressing this button changes the pass band of the intermediate frequency to compensate for interference from adjacent stations.

- NARROW:** When reception is disturbed by interference from other stations, press the IF BAND button until the "NARROW" indicator is lit. This improves reception.
- WIDE:** For normal reception, press the IF BAND so that the "NARROW" button is not lit.

13. AUTO/MANUAL SWITCH

Pressing this button so that the "AUTO" indicator is illuminated engages the automatic tuning system. When in the "AUTO" mode, turning the Tuning Knob (#8) causes the tuner to scan to the next available station and stop. Turn the Tuning Knob again to continue through the frequency band to another station.

14. TUNE/PST BUTTON

Pressing this button so that the "PRESET" indicator is illuminated allows tuning through the preset stations in ascending or descending order using the tuning knob (#8). When the button is pressed so that the "PRESET" indicator is not lit, tuning is manual.

15. PST SCAN BUTTON

Pressing this button puts the tuner into an automatic mode that steps through each of the stations that have been preset into the unit's memory. Each programmed station will be played for approximately five seconds and then the next programmed station will be played. To stop the tuner at a desired station, simply press the PST SCAN button.

16. DISPLAY MODE BUTTON

Pressing this button dims the intensity of the front panel display indicators. Press the button again to return indicators to their normal brightness.

17. NUMERIC PRESET BUTTONS

These buttons are used to select stations that have been entered into the preset memories or to enter those stations in conjunction with the MEMORY button (#3).

- To recall a previously programmed station, press the appropriate button. For single digit numbers (1-9), press the number and the station will be tuned in a few seconds. To recall preset locations 10 through 30, press the desired buttons in order and the station will be tuned in a few seconds.

18. FLUORESCENT DISPLAY

The display panel contains a large 8 digit display for station frequency information and RDS data, as well as status indicators for various tuner functions and operating states.

7. CHARACTER BUTTON

This button enables the system which permits you to enter or modify the name of any FM, LW or MW station which is not broadcasting in RDS.

To enter a name, press the CHARACTER button once and observe that a line will flash under the first digit of the display.



Turn the tuning knob until the desired letter, number or symbol appears.

Press the button again to advance to the next digit. Repeat the procedure for all places in the display, using the tuning knob to select a character and the CHARACTER button to advance to the next digit.

When all eight digits have been programmed, press the MEMORY button (#3), then select a memory location (1-30) using the NUMERIC buttons (#17).

The name may be called up at any time by pressing the DISPLAY button.

8. TUNING/SELECT KNOB

This knob has a number of functions, although its primary use is to select stations. In normal use, turn the knob in either direction to move through the selected band to find a station. When the "TUNED" indicator lights, the station is properly locked in.

In addition to standard tuning, a number of automated tuning methods are available:

- In the FM mode, when the AUTO/MAN button (#13) is pressed so that the "AUTO" indicator is illuminated, turning the tuning knob will cause the tuner to scan higher frequencies when moved clockwise and lower frequencies when moved counterclockwise. The tuner will stop at the first station that has sufficient signal to be properly tuned. Turn the knob again to tune to the next available station. Note that when the RDS system is turned on, the tuner will only stop at stations transmitting RDS data

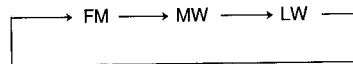
but it will pause briefly without stopping at all other stations that may be received if the RDS system is turned off.

- When the TUNE/PST button is pressed so that the "PRESET" indicator is illuminated, turning the tuning knob will move the tuner up or down through the stations programmed into the unit's memory. When the desired preset station number appears, press the button to view the station's frequency.

As described above, the Tuning/Select Knob also functions as a selector for the PTY (#6) and CHARACTER (#7) functions.

9. BAND BUTTON

Each time this button is pressed the frequency band being tuned is changed in the following order:



10. FM MODE BUTTON

Pressing this button changes mode of FM reception.

- When the button is pressed so that the red "STEREO" indicator is illuminated, the unit will tune to FM stations broadcasting a stereo signal.
- When the button is pressed so that the "STEREO" indicator is not lit, the unit will tune to all FM stations. When a stereo signal is tuned in the mono mode, the left and right channel signals are mixed together and sent to both channels.

NOTE: When experiencing weak or noisy reception of a stereo broadcast, reception quality may be improved by pressing the FM MODE button to switch to mono.

11. RF MODE BUTTON (TUNING ONLY)

Pressing this button adjusts the tuner to compensate for RF interference caused by other stations in your area.

- In urban areas where there are many strong stations, press the button so that the "LOCAL" indicator is lit. This will reduce interference and provide better reception quality.
- When tuning distant stations, press the button so that the "LOCAL" indicator is not lit. This will improve the tuner's ability to receive signals with lower noise.

12. IF BAND BUTTON (TUNING ONLY)

Pressing this button changes the IF band of the intermediate frequency to compensate for interference from adjacent stations.

- **NARROW:** When reception is disturbed by interference from other stations, press the button until the "NARROW" indicator is lit. This improves reception.
- **WIDE:** For normal reception, press the IF BAND button so that the "NARROW" button is not lit.

13. AUTO/MANUAL TUNING

Pressing this button switches the tuner to "AUTO" mode. The "AUTO" indicator is illuminated and the tuner engages the automatic tuning system. When in the "AUTO" mode, turning the Tuning Knob (#8) causes the tuner to scan to the next available station and stop. Turn the knob again to continue scanning to the next frequency band to another station.

1. RF MODE BUTTON (FM TUNING ONLY)

Pressing this button adjusts the tuner to compensate for RF intermodulation noise caused by interference from other stations in your area.

In urban areas where reception is strong and there are many stations, press the button until "LOCAL" indicator is illuminated. This will reduce intermodulation noise and provide better sound quality.

When tuning distant stations press the button so that the "LOCAL" indicator is not lit. This improves the tuner's ability to receive weak signals with lower noise.

2. IF BAND BUTTON (FM TUNING ONLY)

Pressing this button changes the pass band of the intermediate frequency to compensate for interference from adjacent stations.

NARROW: When reception is disturbed by interference from other stations, press the IF BAND button until the "NARROW" indicator is lit. This improves reception.

WIDE: For normal reception, press the IF BAND so that the "NARROW" button is not lit.

3. AUTO/MANUAL SWITCH

Pressing this button so that the "AUTO" indicator is illuminated engages the automatic tuning system. When in the "AUTO" mode, turning the Tuning Knob (#8) causes the tuner to scan to the next available station and stop. Turn the Tuning Knob again to continue through the frequency band to another station.

14. TUNE/PST BUTTON

Pressing this button so that the "PRESET" indicator is illuminated allows tuning through the preset stations in ascending or descending order using the tuning knob (#8). When the button is pressed so that the "PRESET" indicator is not lit, tuning is manual.

15. PST SCAN BUTTON

Pressing this button puts the tuner into an automatic mode that steps through each of the stations that have been preset into the unit's memory. Each programmed station will be played for approximately five seconds and then the next programmed station will be played. To stop the tuner at a desired station, simply press the PST SCAN button.

16. DISPLAY MODE BUTTON

Pressing this button dims the intensity of the front panel display indicators. Press the button again to return indicators to their normal brightness.

17. NUMERIC PRESET BUTTONS

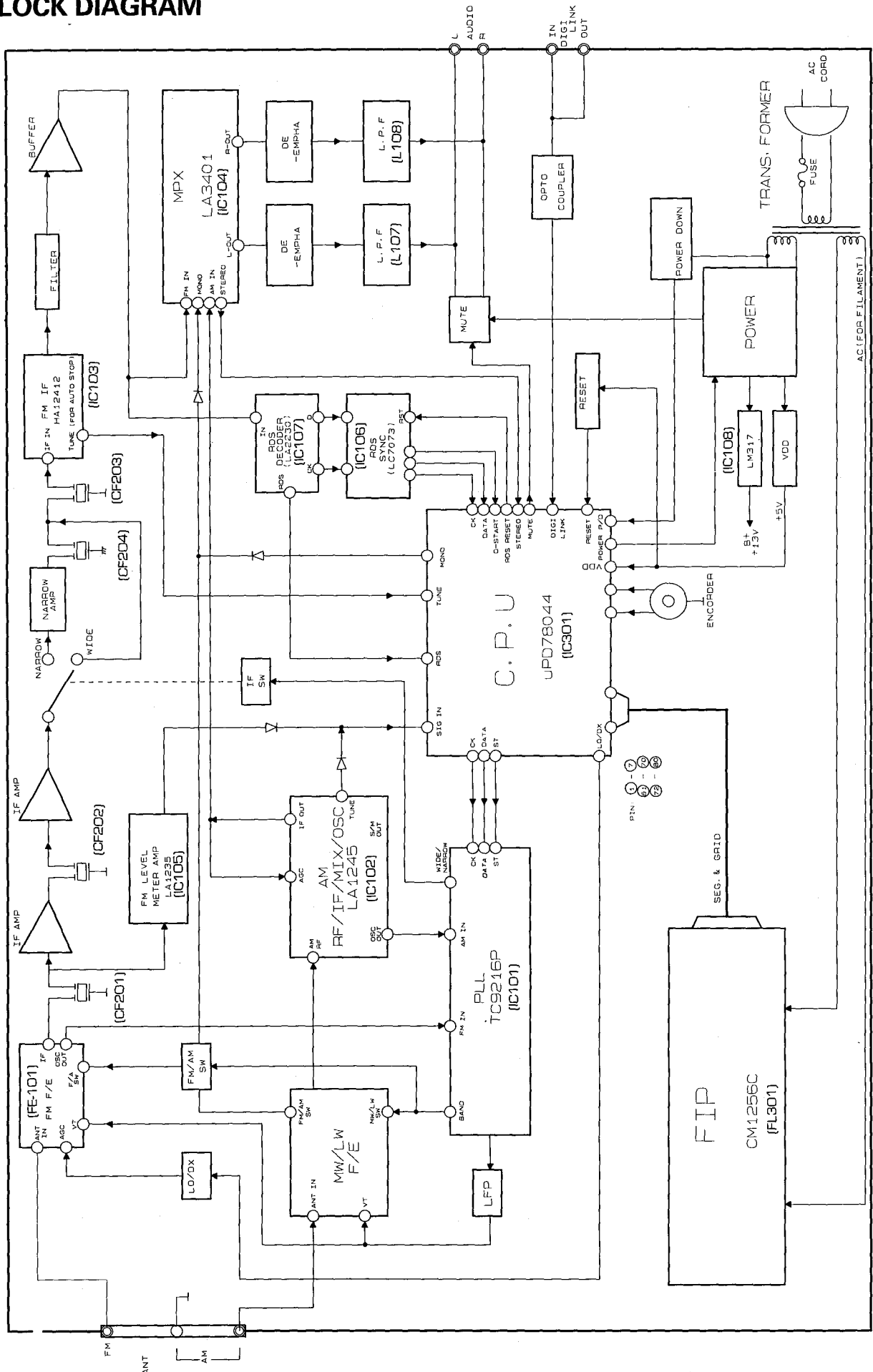
These buttons are used to select stations that have been entered into the preset memories or to enter those stations in conjunction with the MEMORY button (#3).

- To recall a previously programmed station, press the appropriate button. For single digit numbers (1 - 9), press the number and the station will be tuned in a few seconds. To recall preset locations 10 through 30, press the desired buttons in order and the station will be tuned in a few seconds.

18. FLUORESCENT DISPLAY

The display panel contains a large 8 digit display for station frequency information and RDS data, as well as status indicators for various tuner functions and operating states.

BLOCK DIAGRAM



DISASSEMBLY PROCEDURES

I COVER TOP REMOVAL

1. Remove screws ① to ⑥ in Fig. 1, and then remove the cover by sliding it to its rear a little.

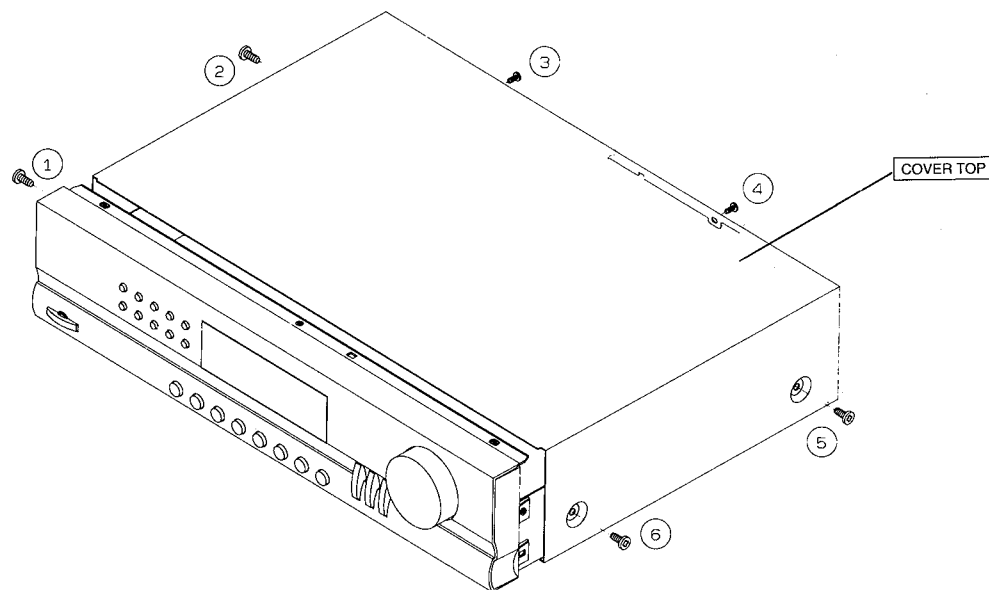


Fig. 1

II FRONT PANEL ASSEMBLY REMOVAL

1. Remove the cover top. (Refer to step I)
2. Remove screws ① to ⑤ in Fig. 2.
3. Detach the connectors CNT101 and CP102 from the PCB1.
4. Remove the front panel assembly by pressing the hooks of both sides and pulling it toward you gently.

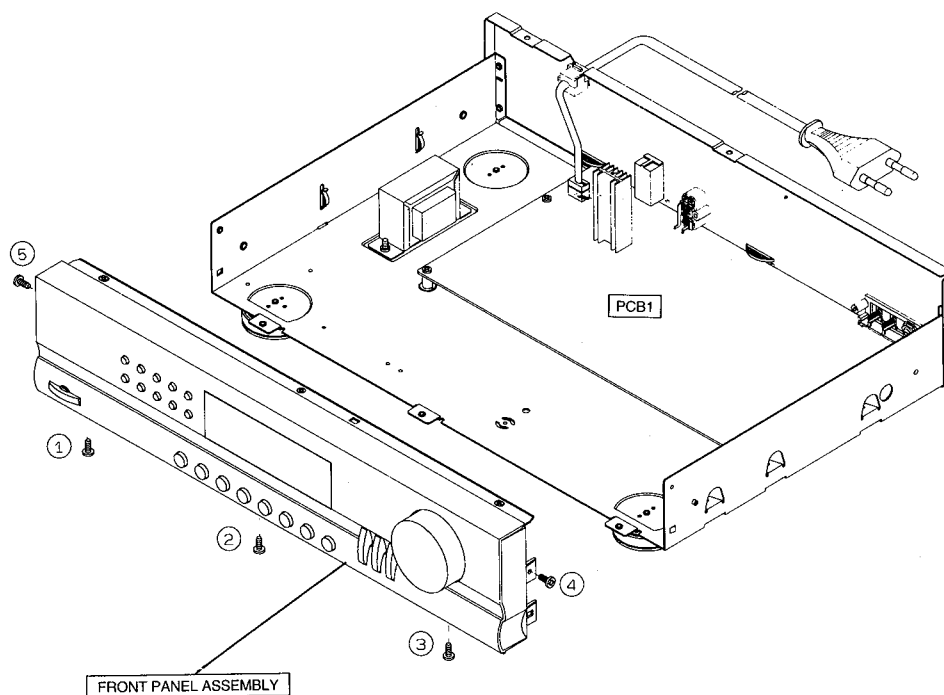


Fig. 2

3 PCB2(FRONT) REMOVAL

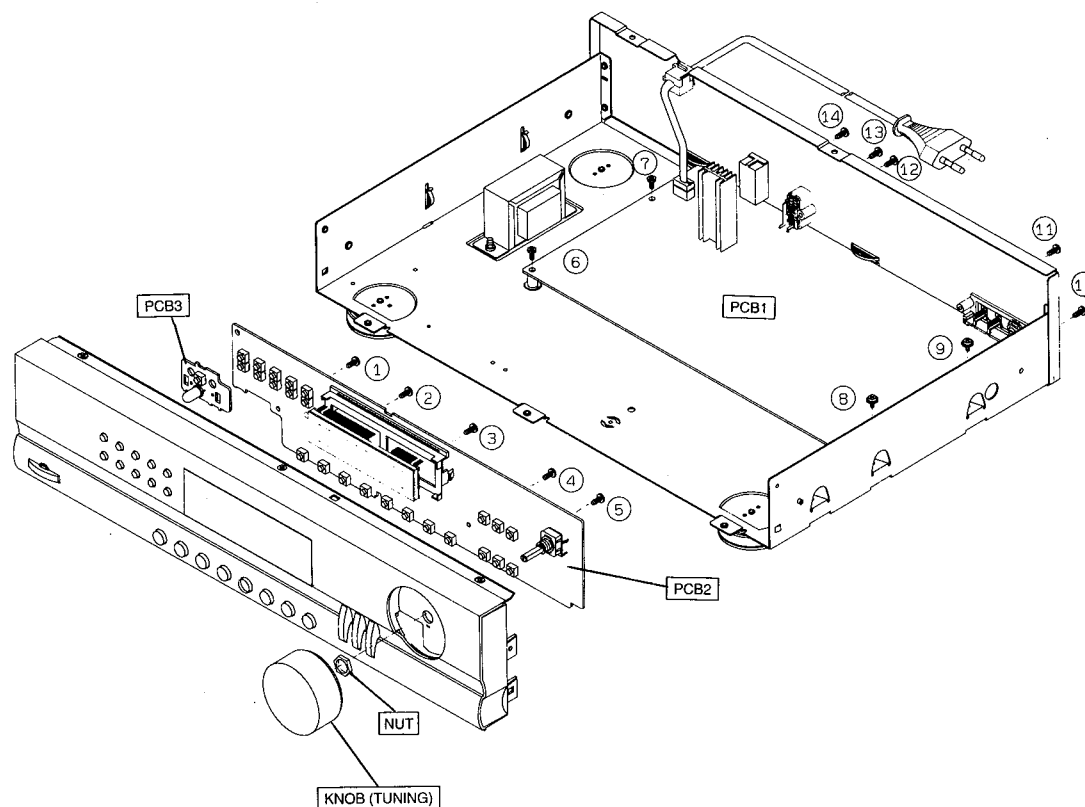
1. Remove the front panel assembly (Refer to step 2).
2. Pull out the knob (Tuning) in Fig. 3.
3. Remove the hex nut (Tuning) in Fig. 3.
4. Remove screws ① to ⑤ in Fig. 3 and remove PCB2 by Pressing the hooks around it outward.

4 PCB3(POWER) REMOVAL

1. Remove the front Panel assembly (Refer to step 2).
2. Remove PCB3 by pressing the hooks around it outward.
3. Unsolder the lead wires which are connected to PCB3.

5 PCB1(MAIN) REMOVAL

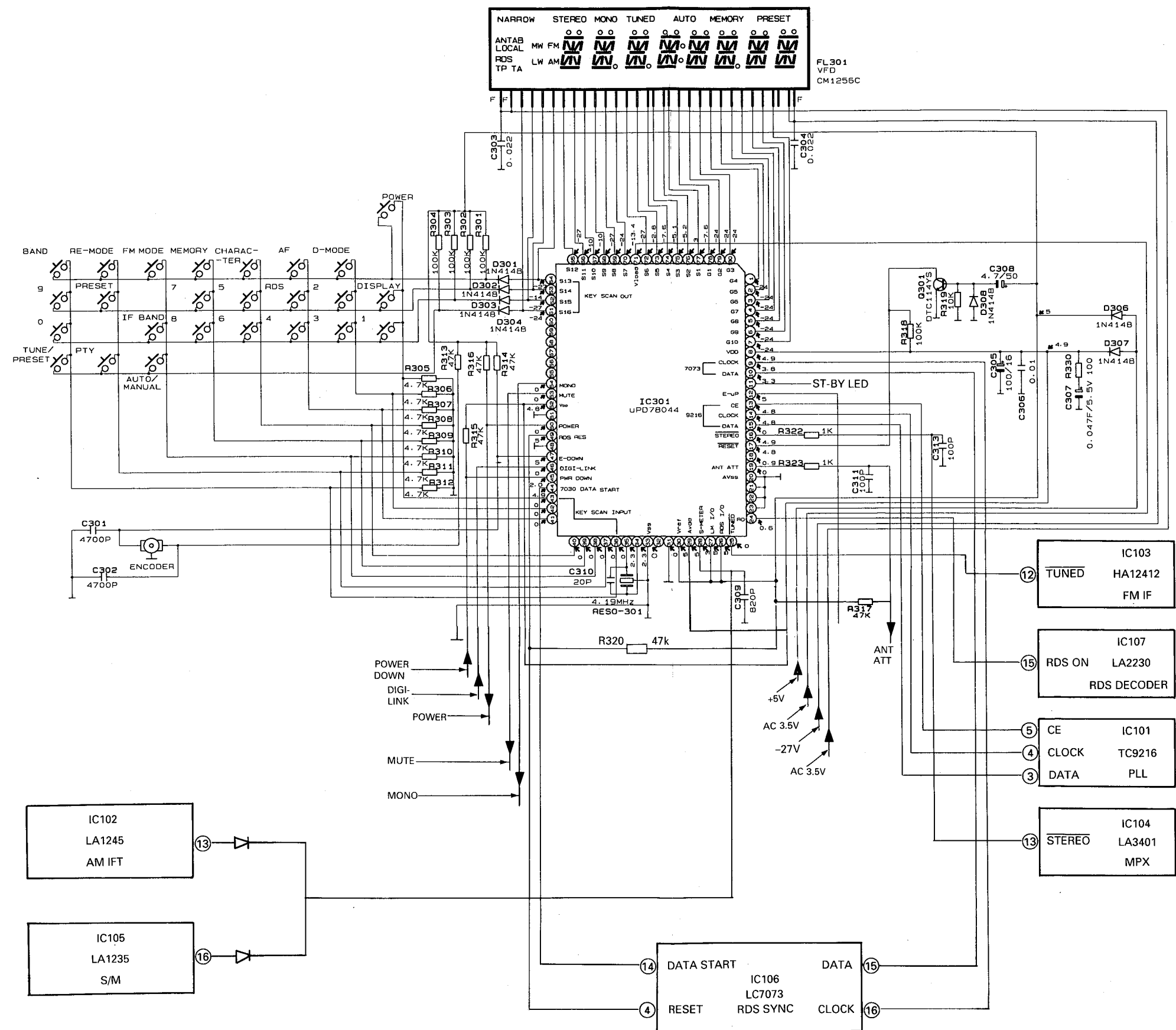
1. Remove the cover top (Refer to step 1).
2. Detach the connectors CP101, CP102, CP104, CP105, CP106 from the PCB1.
3. Remove screws ⑥ to ⑭ in Fig. 3 and then remove PCB1.

**Fig. 3**

CIRCUIT DESCRIPTION

μPD78044 (IC301)

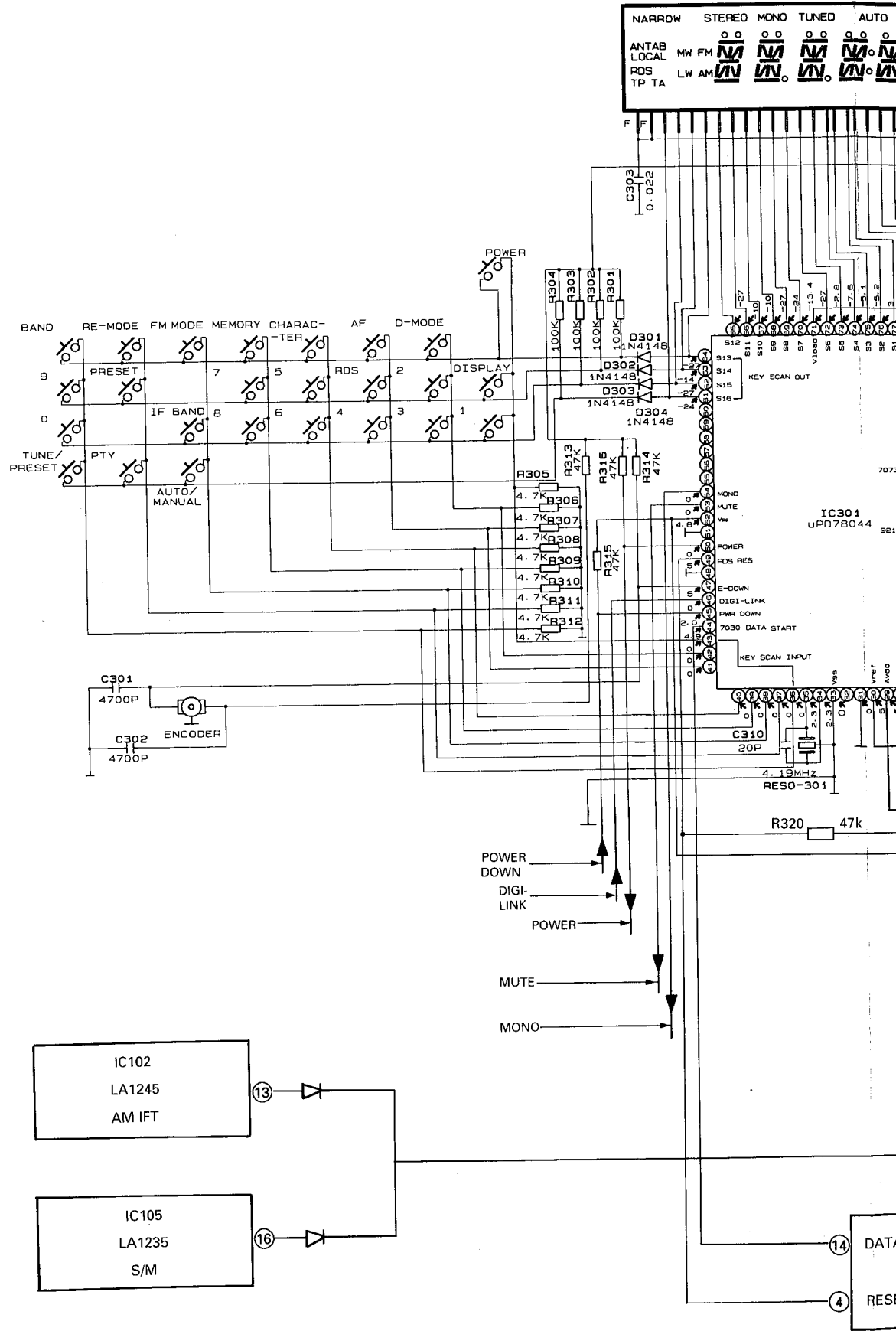
1. CPU Pin Configuration

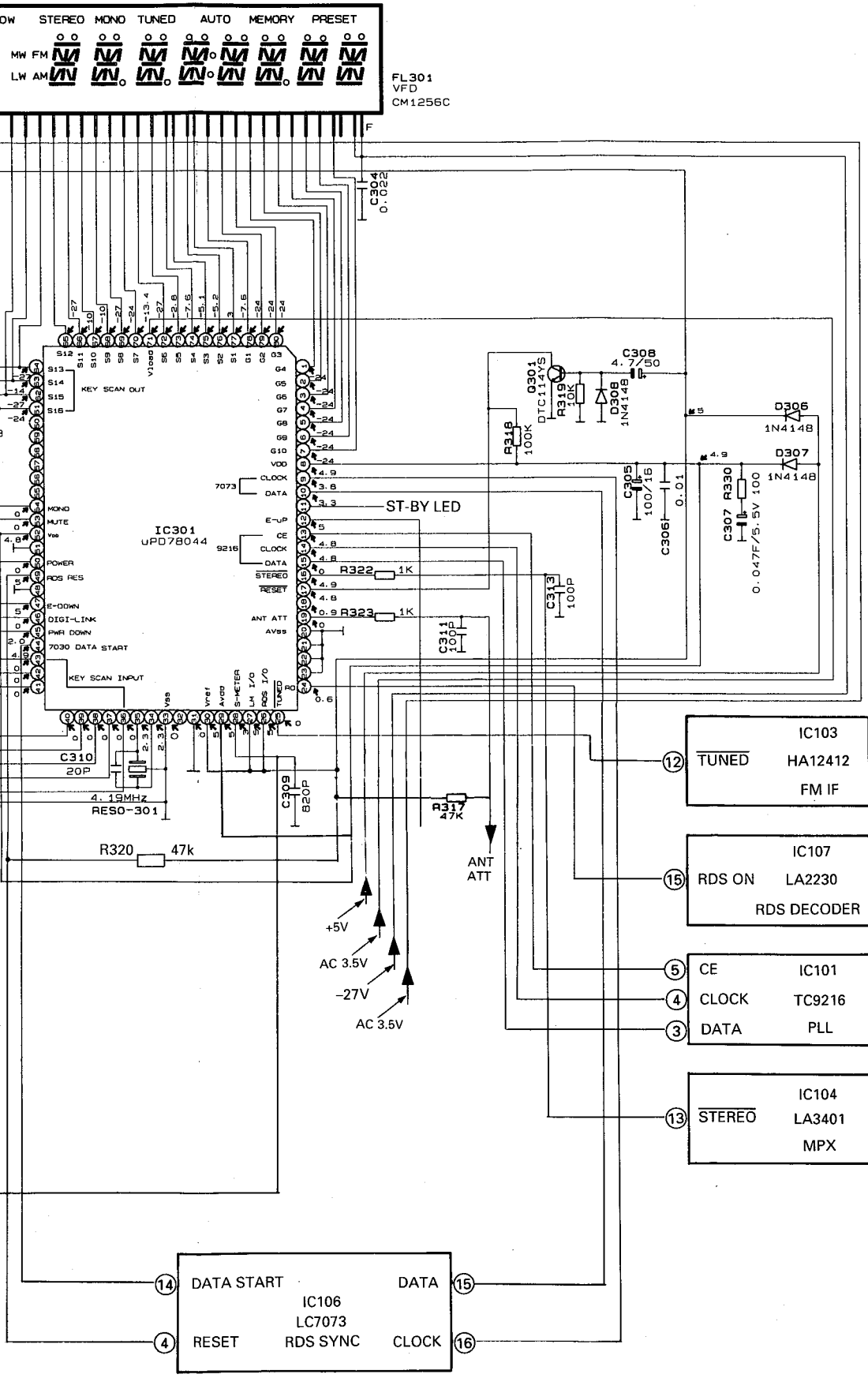


CIRCUIT DESCRIPTION

μPD78044 (IC301)

1. CPU Pin Configuration





⑫	TUNED	IC103
		HA12412
		FM IF

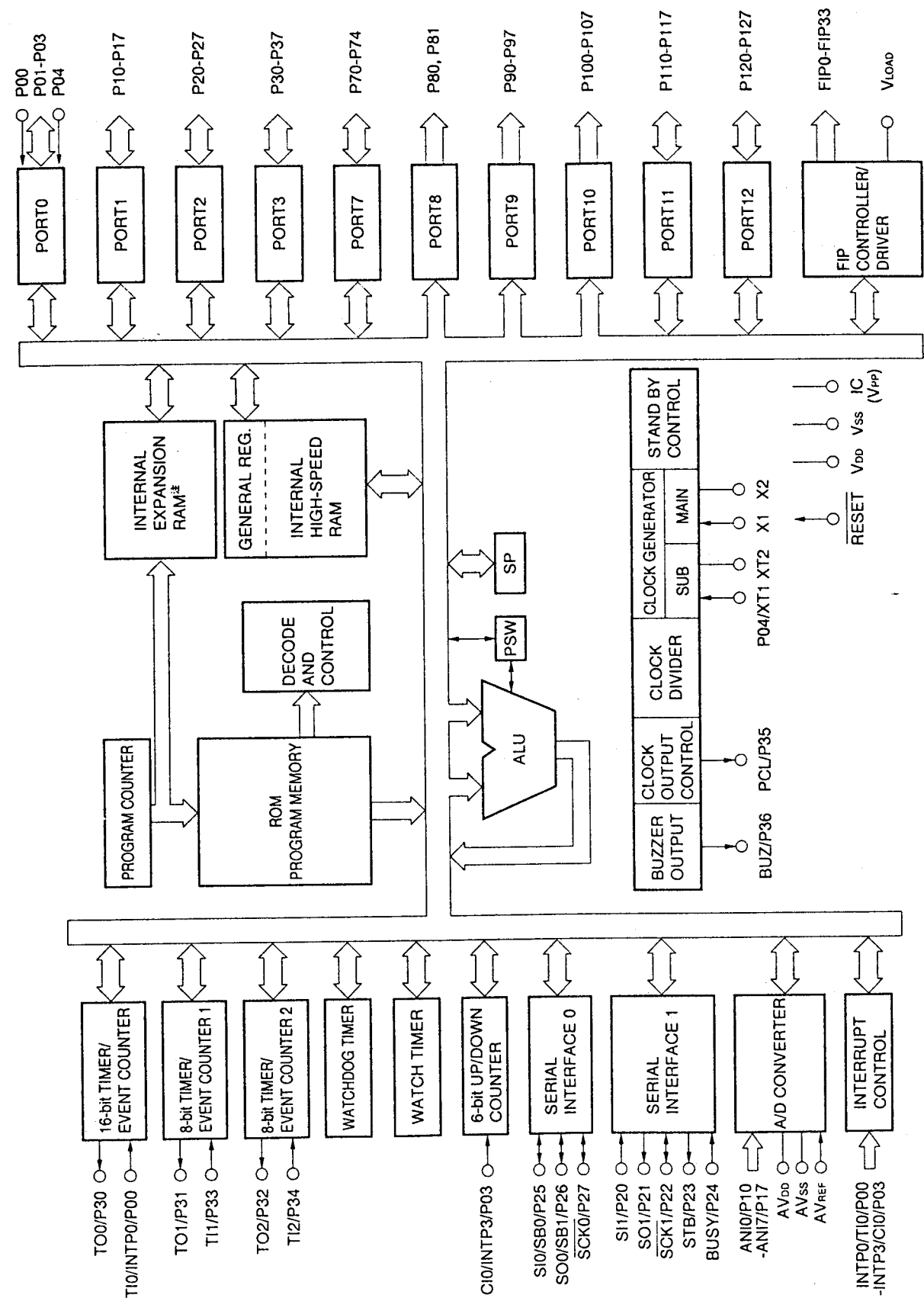
⑮	RDS ON	IC107
		LA2230
		RDS DECODER

⑤	CE	IC101
④	CLOCK	TC9216
③	DATA	PLL

⑬	STEREO	IC104
		LA3401
		MPX

⑭	DATA START	IC106	DATA	⑮
		LC7073		
④	RESET	RDS SYNC	CLOCK	⑯

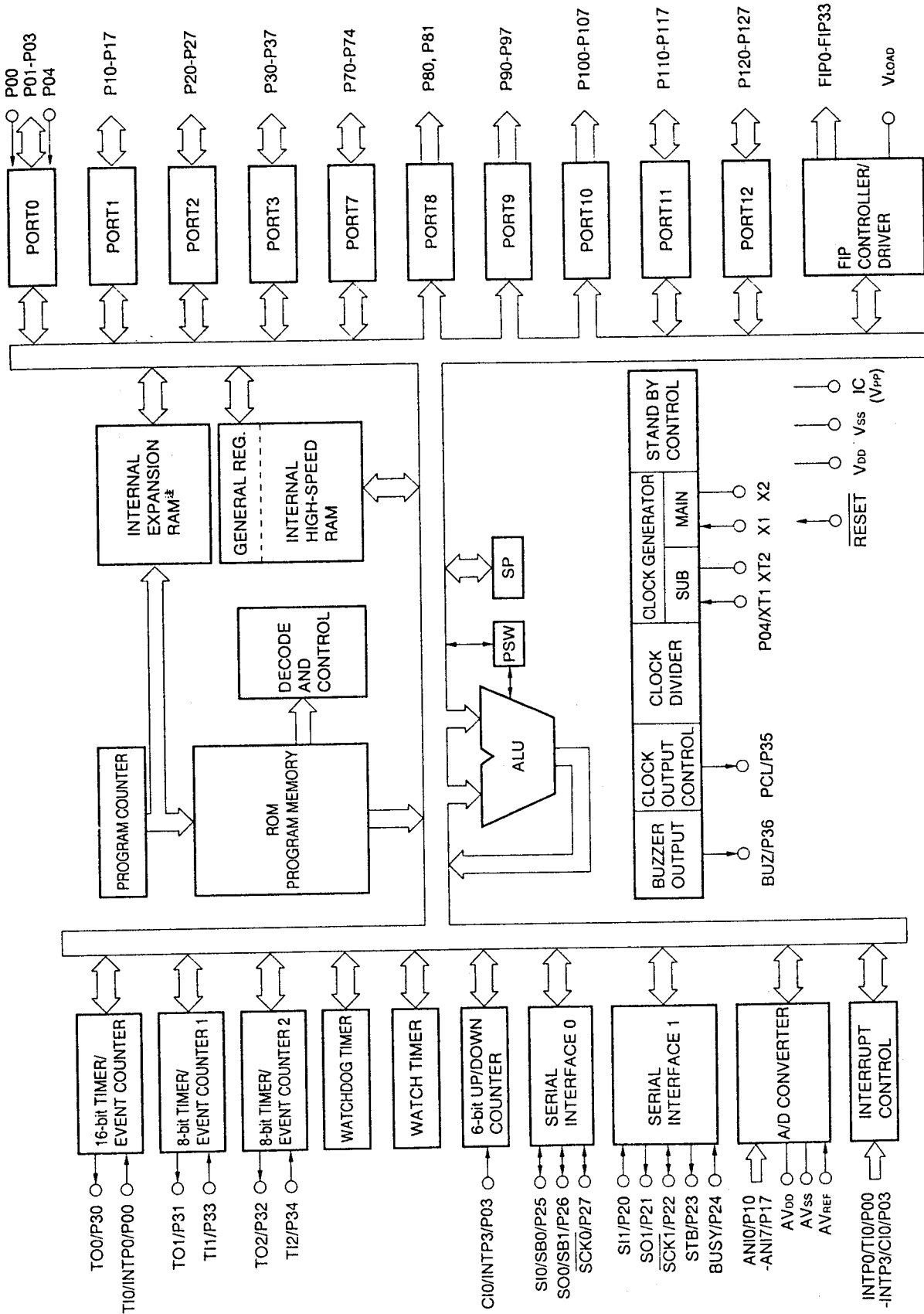
2. Block Diagram



3. Pin Functions

Pin No.	Symbol	Description
1~7	G4~G10	Grid signal output for FIP.
8	V _{DD}	+5 V Power supply.
9/10	CLOCK/DATA	Clock/Data output for LC7073.
11	ST-BY LED	Output to light ST-BY LED. (At "L", it is active)
12	E. UP	Input to detect encoder signal.
13	CE	Chip enable output for TC9216.
14/15	CLOCK/DATA	Clock/Data output for TC9216.
16	STEREO	Input to light "STEREO" indicator. (At "L", it is active)
17	RESET	Input to reset CPU. (At "L", it is active)
18	N.C.	Not used !
19	ANT. ATT.	Output to select normal or narrow mode. At "H", normal mode is selected and at "L", narrow is selected.
20	A.V _{SS}	Ground
21~23	N.C.	Not used ! (Connected to ground)
24	RO	Input to detect wheater the station is RDS broadcast or not. (At "H", it is RDS broadcast)
25	TUNED	Input to detect station during tuning. If "L" is inputed during tuning, tuning stops at that frequency.
26	RDS I/O	Input to select RDS function for europe. (At "H", RDS function is selected.)
27	LW I/O	Input to select LW band for euprope. (At "H", LW band is selected.)
28	S-METER	Input to detect the receiving signal level.
29	A.V _{DD}	+5 V Power supply.
30	A.V _{REF}	Reference voltage for A/D converter. (Connected to 5 V, not V _{DD})
31	N.C.	Not used ! (Connected to ground)
32	N.C.	Not used !
33	V _{SS}	Ground
34/35	X1/X2	Input and output for 4.19 MHz resonator.
36~43	KEY SCAN	Data output for key scan.
44	DATA START	Input to synchronize RDS block data from LC7073.
45	PWR. DOWN	Input to detect power down. (At "L", ti is active)
46	DIGI-LINK	Input to receive remote control data from amplifier.
47	E. DOWN	Input to detect encoder signal.
48	N.C.	Not used ! (Connected to ground)
49	RDS RES	Output to reset LC7073 when RDS button is pressed. (At "H", it is active)
50	POWER	When power is on, control data output is "H". When power is off, control data output is "L" and last memory function is activated.
51	N.C.	Not used ! (Connected to ground)
52	V _{DD}	+5 V Power supply.
53	MUTE	Output for mute. (At "H", it is active)
54	MONO	Output to select FM MONO or STEREO. At "H", FM MONO is selected and at "L", FM STEREO is selected.
55~60	N.C.	Not used !
61~70	S16~S7	Segment signal output for FIP and data output for key scan.
71	V _{load}	Power supply for FIP controller.
72~77	S6~S1	Segment signal output for FIP.
78~80	G1~G3	Grid signal output for FIP.

2. Block Diagram



3. Pin

Pin N	Pin N
1 ~ 7	1 ~ 7
8	8
9/10	9/10
11	11
12	12
13	13
14/15	14/15
16	16
17	17
18	18
19	19
20	20
21 ~ 23	21 ~ 23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34/35	34/35
36 ~ 39	36 ~ 39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55 ~ 59	55 ~ 59
60	60
61 ~ 64	61 ~ 64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72 ~ 76	72 ~ 76
77	77
78 ~ 80	78 ~ 80

3. Pin Functions

Pin No.	Symbol	Description
1~7	G4~G10	Grid signal output for FIP.
8	VDD	+5 V Power supply.
9/10	CLOCK/DATA	Clock/Data output for LC7073.
11	ST-BY LED	Output to light ST-BY LED. (At "L", it is active)
12	E. UP	Input to detect encoder signal.
13	CE	Chip enable output for TC9216.
14/15	CLOCK/DATA	Clock/Data output for TC9216.
16	STEREO	Input to light "STEREO" indicator. (At "L", it is active)
17	RESET	Input to reset CPU. (At "L", it is active)
18	N.C.	Not used !
19	ANT. ATT.	Output to select normal or narrow mode. At "H", normal mode is selected and at "L", narrow is selected.
20	A.Vss	Ground
21~23	N.C.	Not used ! (Connected to ground)
24	RO	Input to detect wheater the station is RDS broadcast or not. (At "H", it is RDS broadcast)
25	TUNED	Input to detect station during tuning. If "L" is inputed during tuning, tuning stops at that frequency.
26	RDS I/O	Input to select RDS function for europe. (At "H", RDS function is selected.)
27	LW I/O	Input to select LW band for euprope. (At "H", LW band is selected.)
28	S-METER	Input to detect the receiving signal level.
29	A.VDD	+5 V Power supply.
30	A.Vref	Reference voltage for A/D converter. (Connected to 5 V, not VDD)
31	N.C.	Not used ! (Connected to ground)
32	N.C.	Not used !
33	Vss	Ground
34/35	X1/X2	Input and output for 4.19 MHz resonator.
36~43	KEY SCAN	Data output for key scan.
44	DATA START	Input to synchronize RDS block data from LC7073.
45	PWR. DOWN	Input to detect power down. (At "L", ti is active)
46	DIGI-LINK	Input to receive remote control data from amplifier.
47	E. DOWN	Input to detect encoder signal.
48	N.C.	Not used ! (Connected to ground)
49	RDS RES	Output to reset LC7073 when RDS button is pressed. (At "H", it is active)
50	POWER	When power is on, control data output is "H". When power is off, control data output is "L" and last memory function is activated.
51	N.C.	Not used ! (Connected to ground)
52	VDD	+5 V Power supply.
53	MUTE	Output for mute. (At "H", it is active)
54	MONO	Output to select FM MONO or STEREO. At "H", FM MONO is selected and at "L", FM STEREO is selected.
55~60	N.C.	Not used !
61~70	S16~S7	Segment signal output for FIP and data output for key scan.
71	Vload	Power supply for FIP controller.
72~77	S6~S1	Segment signal output for FIP.
78~80	G1~G3	Grid signal output for FIP.

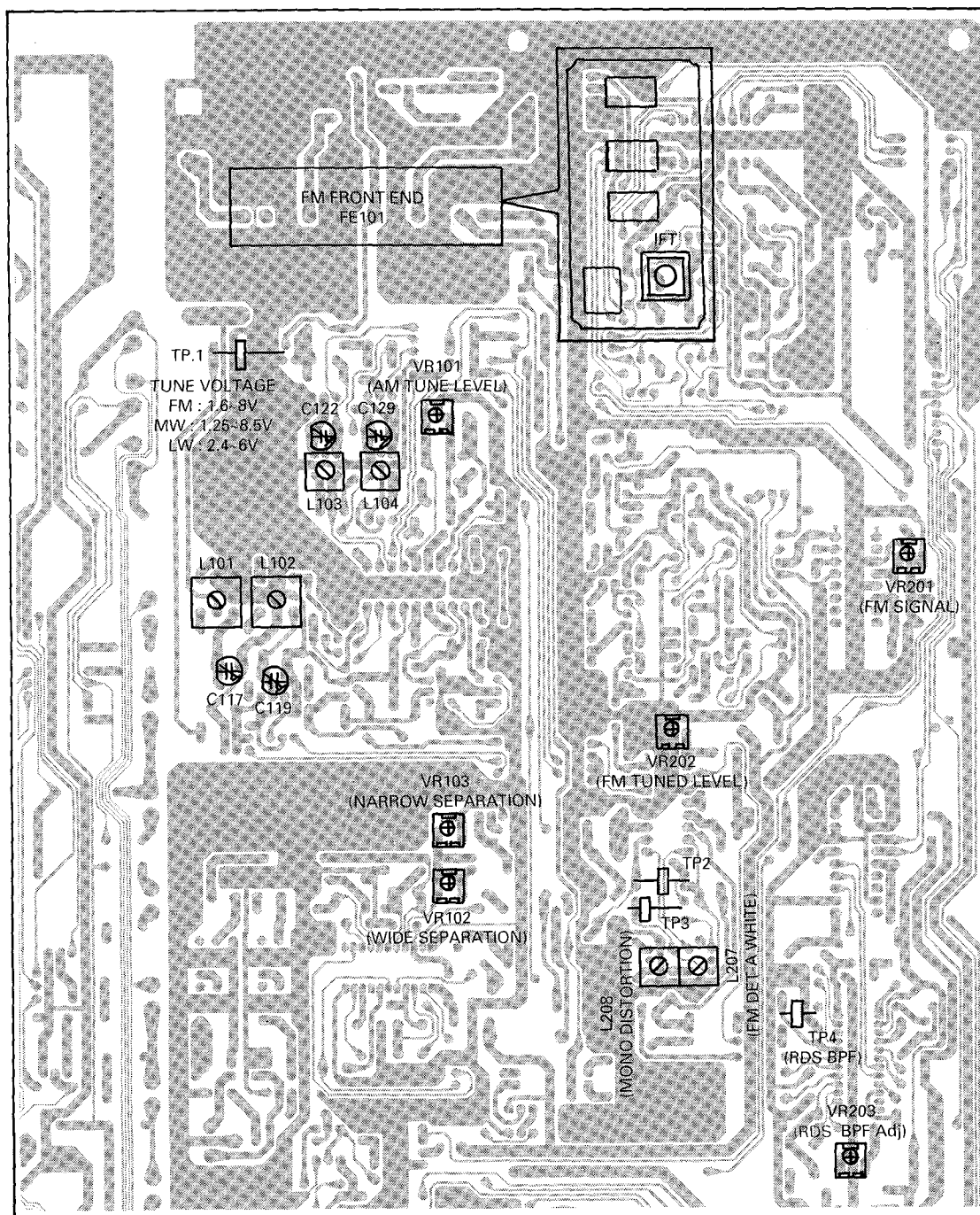
ALIGNMENT PROCEDURES

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 : Remove FM external antenna from terminal when aligning.

2. Alignment and Test Points (PCB1)



• Refer to Adjustment Location on page 12

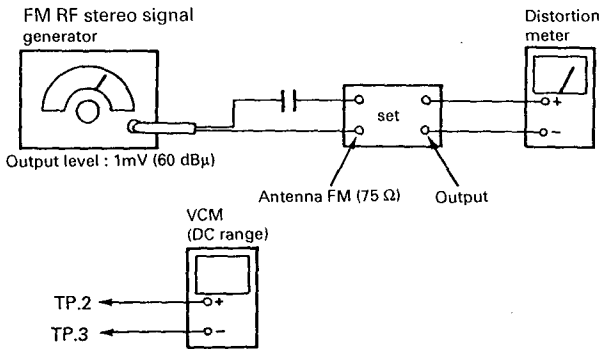
Note : As a front-end (FE101) is difficult to repair if faulty, replace it with new one.

FM SECTION

• Standard Setting of FM Stereo RF Signal Generator.

STEREO STANDARD SIGNAL	MONAURAL STANDARD SIGNAL
Carrier frequency 98 MHz. Modulation : Audio 1 kHz, 40 kHz deviation. Pilot 19 kHz, 7.5 kHz deviation.	98 MHz. 1 kHz, 40 kHz deviation.

FM Discriminator Adjustment
(NULL and MONO Distortion)

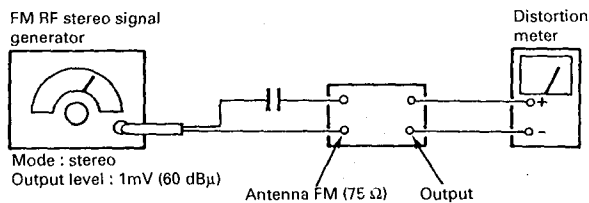


Procedure :

1. Tune the set to 98 MHz.
2. Adjust L207 to obtain 0V between TP 2 and TP 3 reading on the VOM.NULL.
3. Adjust L208 for a minimum reading on the distortion meterMONO Distortion
4. Repeat adjustments in step 2 and 3 several times until optimum measurements are obtained.

Note : When replacing the ceramic filter, perform this alignment.

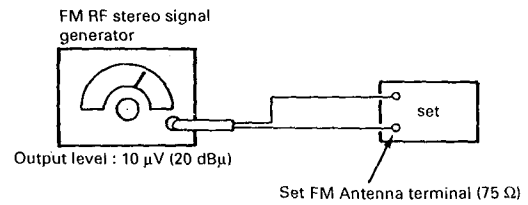
FM Stereo Distortion Adjustment



Procedure :

1. Tune the set to 98 MHz.
Set FM SSG. output level to 1 mV (60 dBμ)
2. Adjust IFT in FE101 for a minimum reading on the distortion meter.

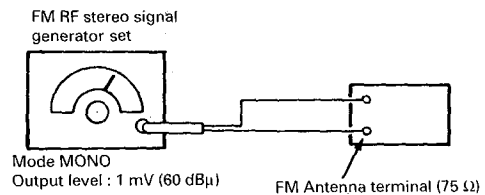
FM Tuned Indication Lighting Level Adjustment



Procedure :

1. Tune the set to 98 MHz.
Set FM SSG. output level to 20 dBμ.
2. Adjust VR202 to the point that the "TUNED" indicator begins to illuminate.

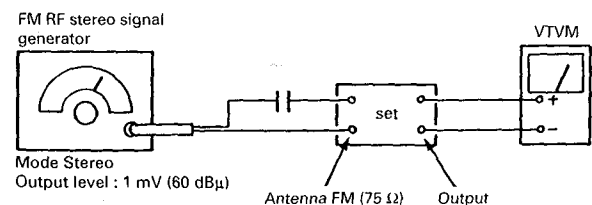
FM Signal Level Adjustment



Procedure :

1. Tune the set to 98 MHz.
2. Push the display button to change the display mode for signal strength indication.
3. Adjust VR201 to the place where level in the signal strength "60 dB" indicator lights on fluorescent tube.

FM Stereo Separation Adjustment



Procedure :

FM stereo signal generator output channel	VTVM Connection	VTVM reading (dB)
L-CH.	L-CH.	Ⓐ
R-CH.	L-CH.	Ⓑ [Ⓐ] Adjust VR102 minimum reading.
R-CH.	R-CH.	Ⓒ
L-CH.	R-CH.	Ⓓ [Ⓒ] Adjust VR102 for minimum reading.

L-CH. Stereo separation : Ⓐ — Ⓑ

R-CH. Stereo separation : Ⓒ — Ⓓ

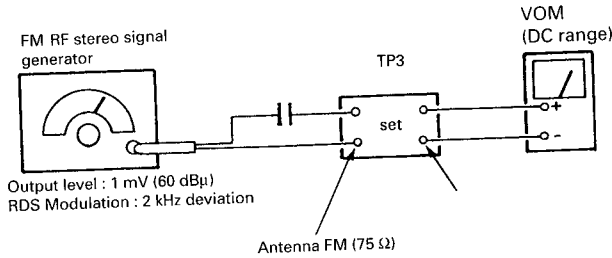
※ IF BAND Switch

WIDE : Adjust VR102

NARROW : Adjust VR103

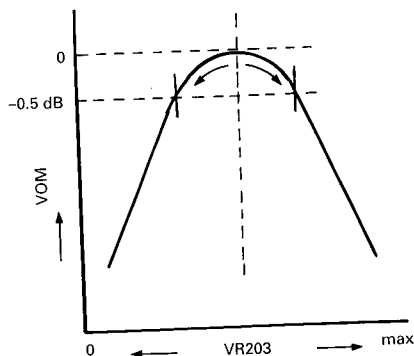
The separation of both channels should be equal.

RDS, BPF Adjustment

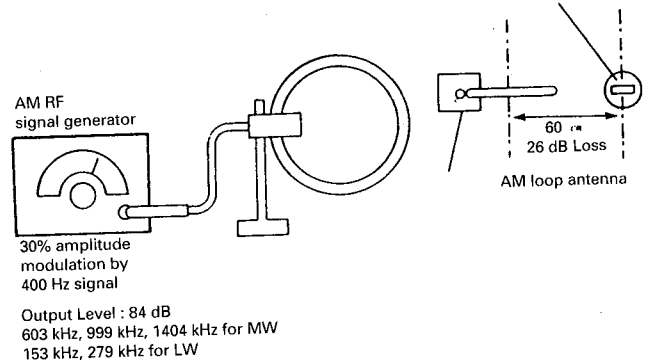


Procedure :

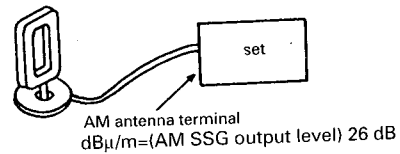
1. Tune the set to 98 MHz.
2. Adjust VR203 to maximum level (tolerance : -0.5 dB) on the VOM near center position not left or right end. (refer to below drawing)



AM SECTION



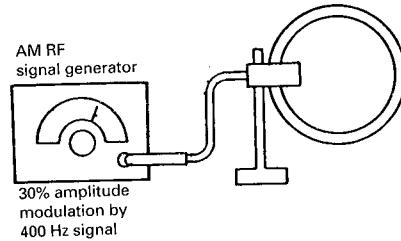
AM loop antenna



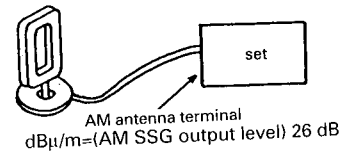
AM VT Adjustment

1. Set to AM 522 kHz and adjust L101 so that voltage of TP1 becomes $1.25V \pm 0.05V$
2. Set to AM 1611 kHz and adjust C117 so that voltage of TP1 becomes $8.5 \pm 0.05V$
3. Repeat the above adjustments 1 and 2.

AM Tracking Adjustment



AM loop antenna



1. Set to AM 603 kHz and adjust L103 to maximize AUDIO output level.
2. Set to AM 1404 kHz and adjust C122 to maximize AUDIO output level.
3. Set to AM 999 kHz and adjust L105 to maximize AUDIO output level.
4. Repeat the above adjustments 1, 2 and 3.

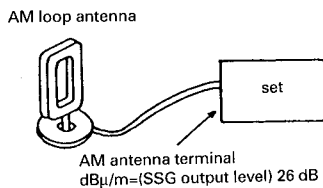
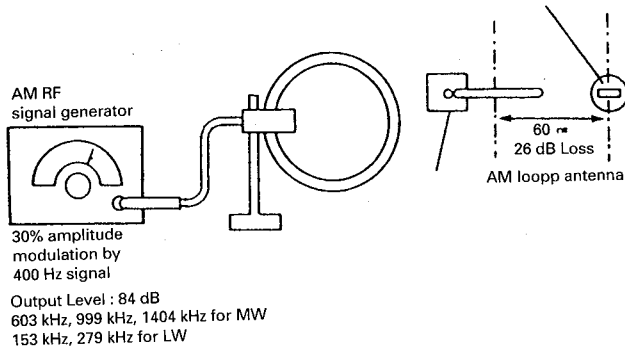
AM TUNED Level Adjustment

Procedure :

1. Set AM SSG output level so that antenna input level of the set becomes $630 \mu\text{V}$ ($56 \text{ dB}\mu/\text{m}$).
2. Adjust VR101 to the point that the "TUNED" indicator begins to illuminate.

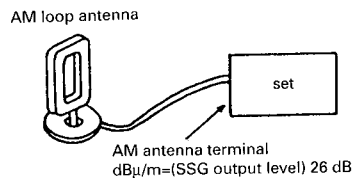
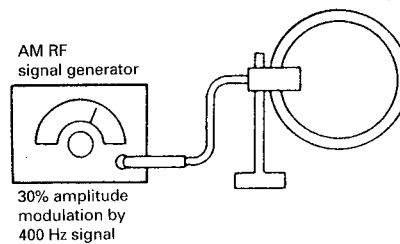
LW SECTION

LW VT Adjustment



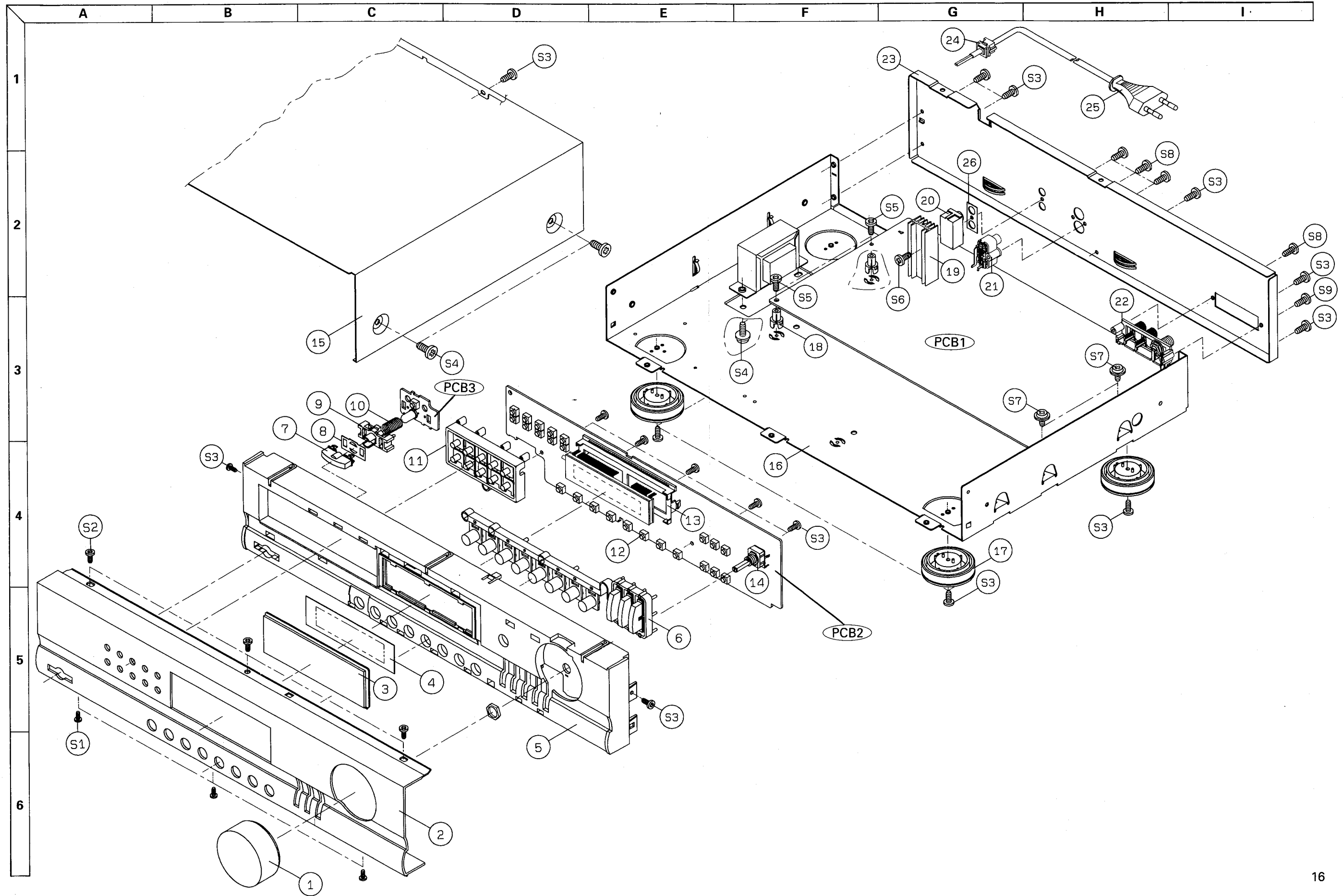
1. Set to LW 153 kHz and adjust L102 so that voltage of TP1 becomes $2.4\text{V} \pm 0.05\text{V}$.
2. Set to LW 279 kHz and adjust C119 so that voltage of TP1 becomes $6\text{V} \pm 0.05\text{V}$.
3. Repeat the above adjustments 1 and 2.

LW Tracking Adjustment

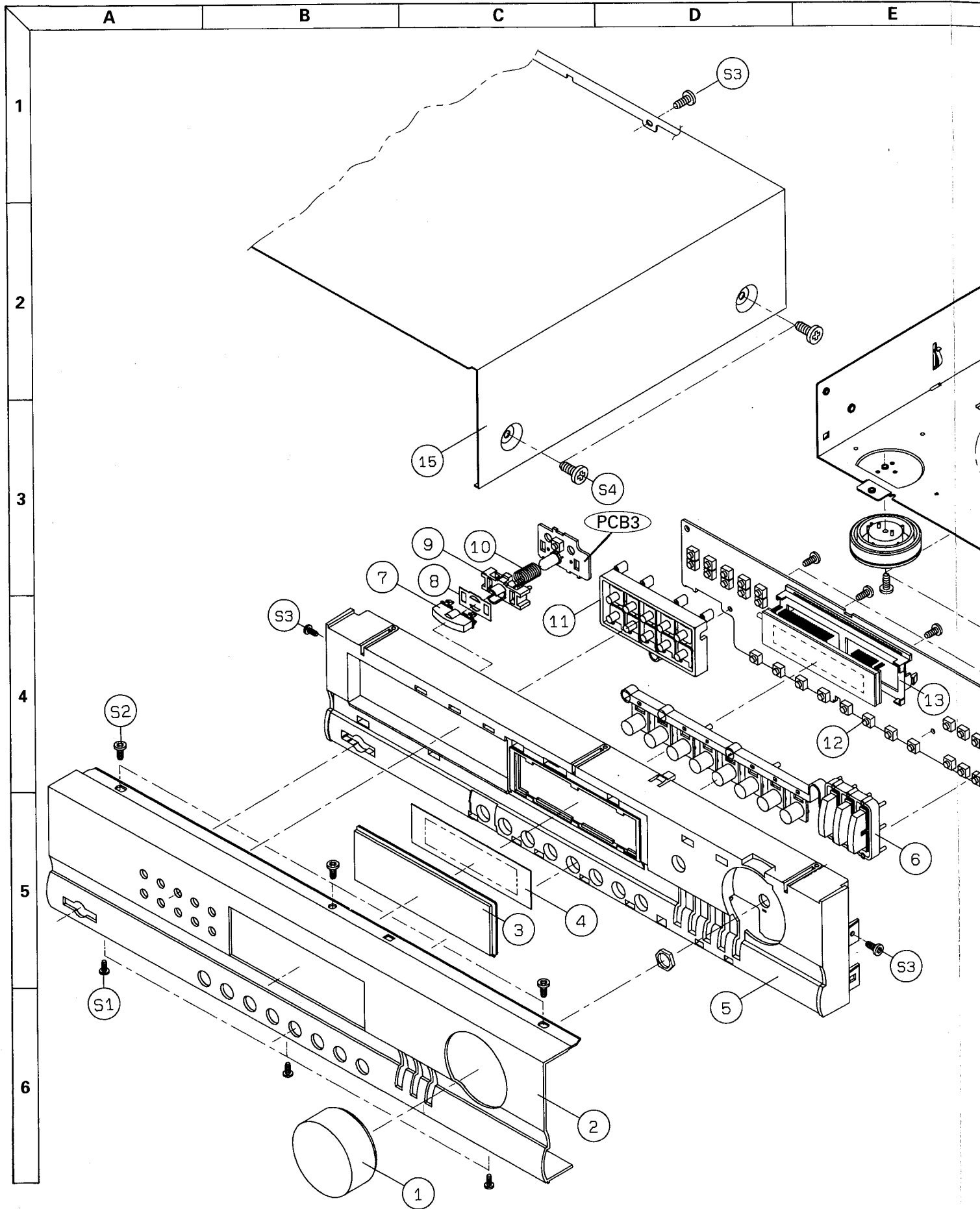


1. Set to LW 153 kHz and adjust L104 to maximize AUDIO output level.
2. Set to LW 279 kHz and adjust C129 to maximize AUDIO output level.
3. Repeat the above adjustments 1 and 2.

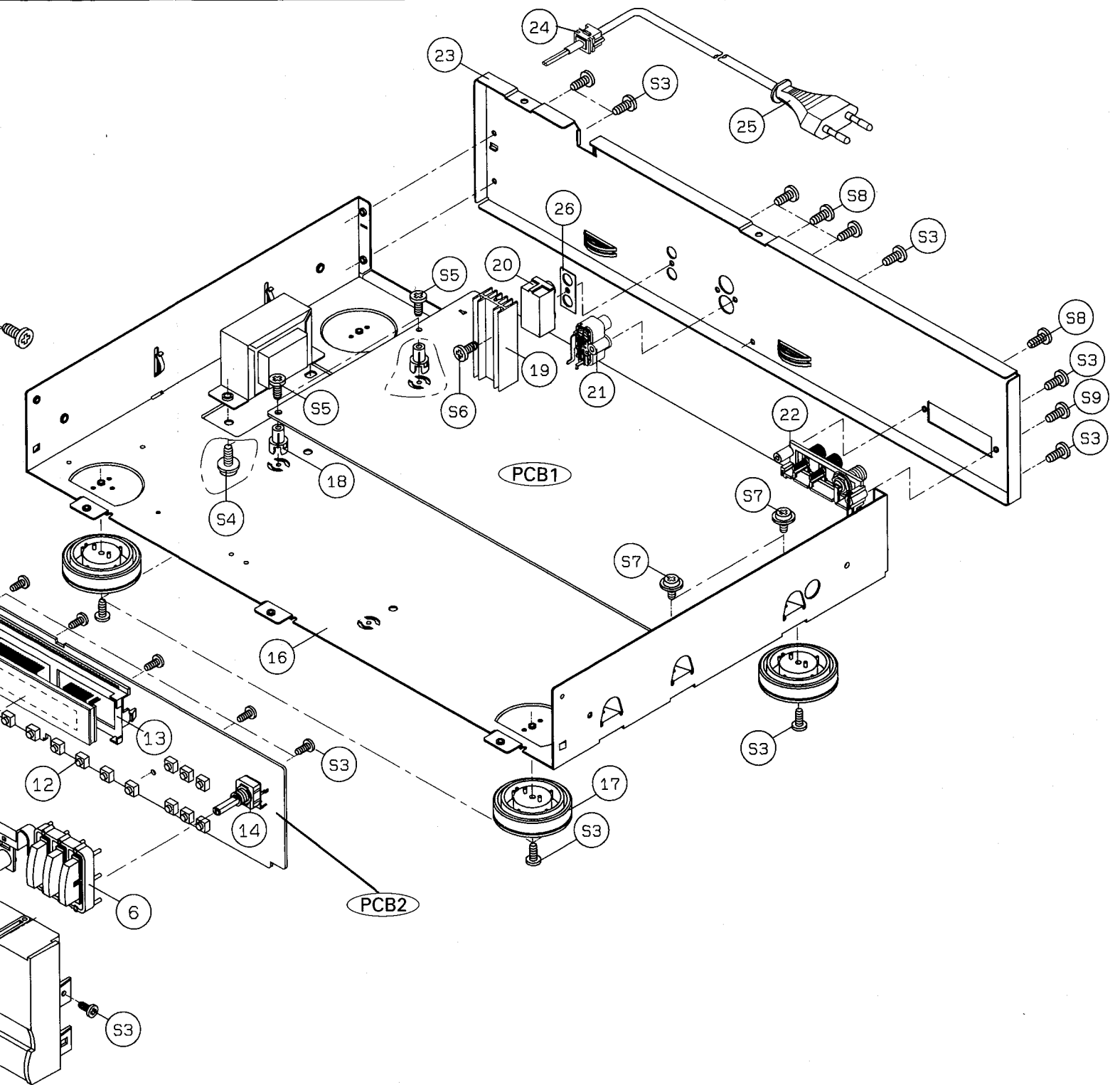
GENERAL UNIT EXPLODED VIEW



GENERAL UNIT EXPLODED VIEW



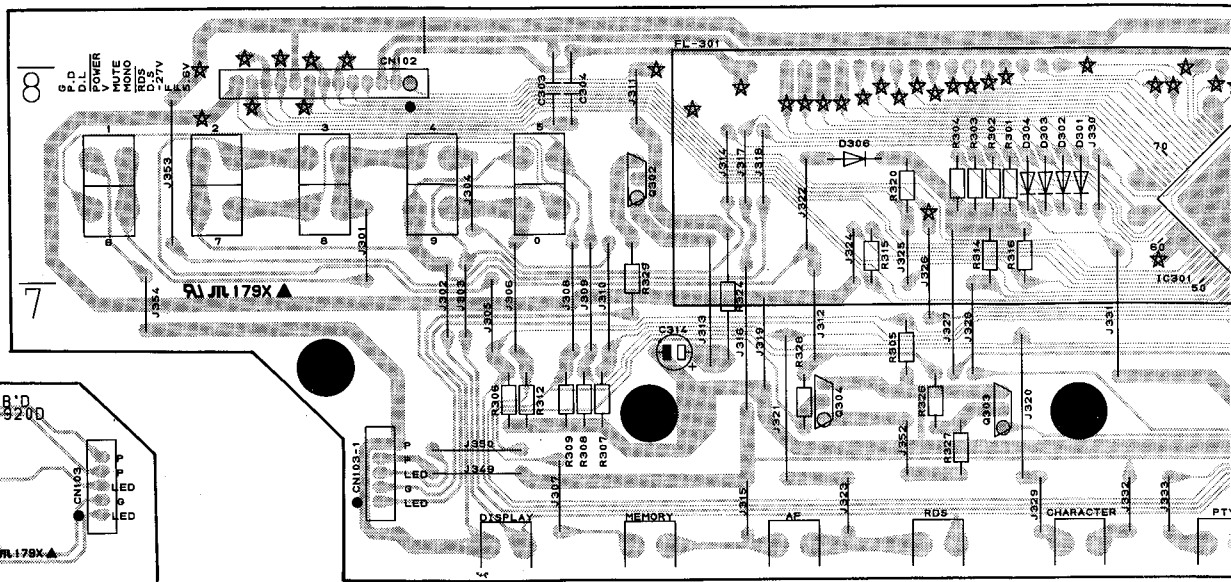
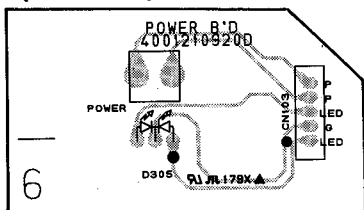
E F G H I



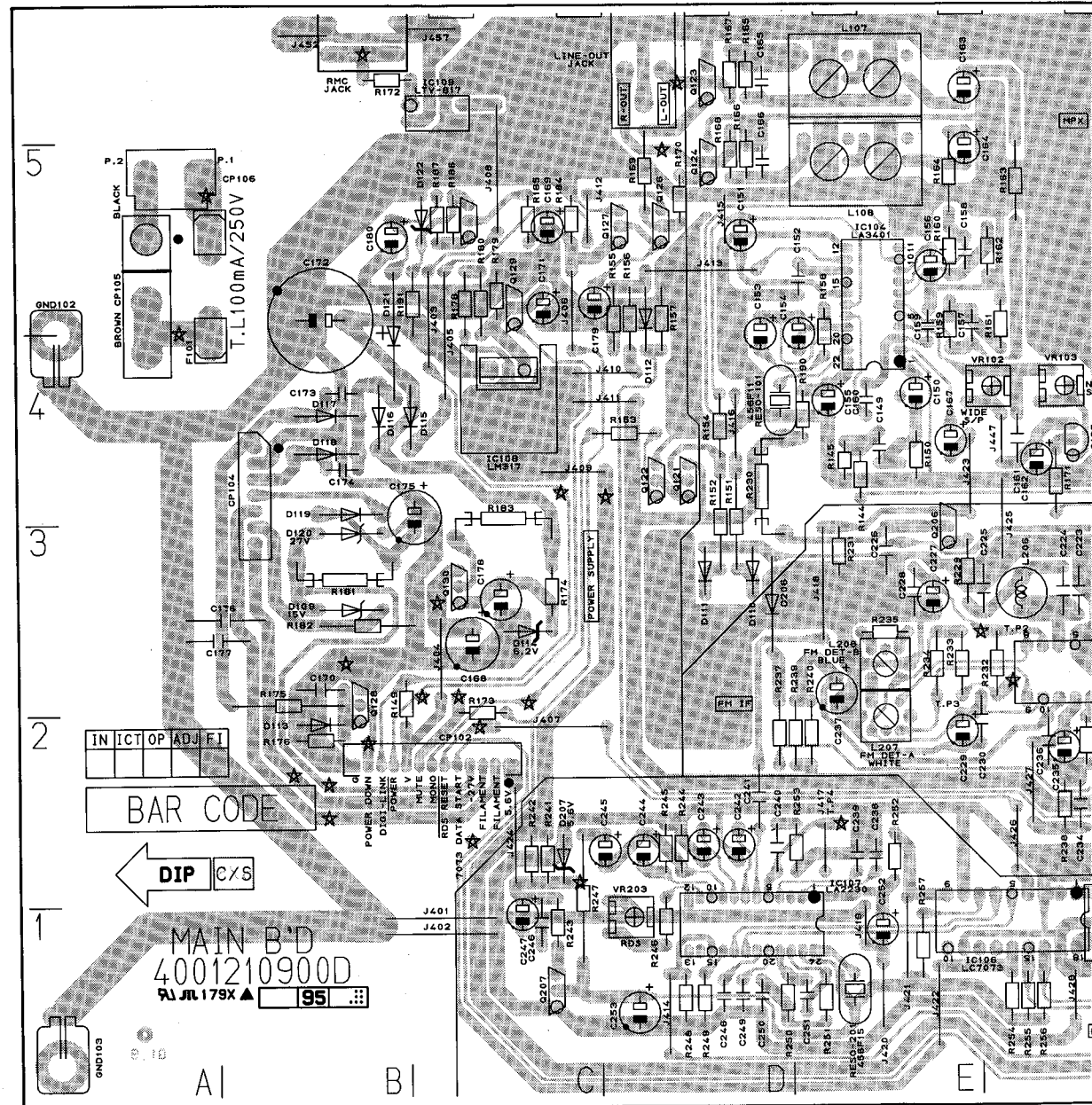
PRINTED CIRCUIT BOARDS

PC

PCB3 (POWER)



PCB1 (MAIN)



GENERAL UNIT PARTS LIST

Ref. No.	Description	Mfr. part No.	Q'ty
CABINET AND CHASSIS			
1	Knob, Encoder, Black	048643007511	1
2	Panel, Front, Black	048602019611	1
3	Window Display	8553023310	1
4	Filter, FL	048555052311	1
5	Body, Front, Black	8521009410	1
6	Button, Tact, Black, 14 key	048542007811	1
7	Button, Power, Black	048545130811	1
8	Light Shield, Black	8535046010	1
9	Indicator, Power	8555052110	1
10	Spring, Power	6555010720	1
11	Button Tact, 10 key, Black	048543069611	1
12	Switch, Tact	4658003710	25
13	Holder FL, Black	6043010210	1
14	Switch, Volume Encoder	4608400210	1
15	Cover, Top, Black	6122030020	1
16	Chassis, Main, SECC	6121614710	1
17	Foot, Hot-stamping	046033102511	4
18	Spacer, Black	6705024310	2
19	Heatsink Regulator TR	7505206220	1
20	Jack, Remote	4438007520	1
21	Jack, RCA, 2P	4438111510	1
22	Terminal Antenna, AM/FM	4408108210	1
23	Chassis, Back, Black	046102044111	1
24	Stopper Holder, Black	6518002310	1
25	Cord, AC Power	4308009510	1
26	Cover Plate	8535046310	1
HARDWARE KIT			
S1	Screw #2FTC 3x12B	8129230123	3
S2	Screw #2FTC 3x8B	8129230083	3
S3	Screw #2BTC 3x8B	8109230083	17
S4	Screw BSAM 4x8B	8109440083	6
S5	Screw #2BTC 3x20Y	8109230201	2
S6	Screw #2BTC 3x6Y	8109230061	1
S7	Screw #2WPTC 3x8Y	8159230081	2
S8	Screw #1PT 3x10B	8119130103	4
S9	Screw Ground	8155000710	1
MISCELLANEOUS			
	△ Power Transformer, 230 V, 50 Hz	2828009581	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.

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.

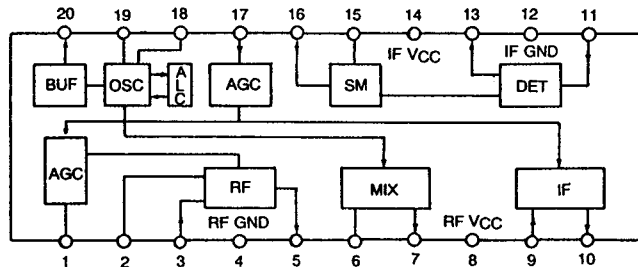
Resistor/Capacitor tolerance - D : ($\pm 0.5\%$), J : ($\pm 5\%$), K : ($\pm 10\%$), M : ($\pm 20\%$), Z : +80, - 20%

Ref. No.	Description	Mfr. part No.	Q'ty	Ref. No.	Description	Mfr. part No.	Q'ty
PCB1 ASSEMBLY P.C. BOARD MAIN				C221/C222 Ceramic Tubular 0.022 uF 25 V Z 3519223520 2			
CAPACITORS				C223 Ceramic Tubular 330 pF 50 V J 3519331935 1			
C101	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	C224	Ceramic Tubular	68 pF 50 V J	3519680935 1
C102	Electrolytic SG	100 uF 16 V M	3479310131 1	C225	Ceramic Tubular	150 pF 50 V J	3519151935 1
C103	Electrolytic SG	0.22 uF 50 V Z	3479322871 1	C226	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C104/C105	Ceramic Tubular	0.022 uF 25 V Z	3519223520 2	C227	Electrolytic SG	1 uF 50 V M	3479310971 1
C106	Electrolytic SG	100 uF 16 V M	3479310131 1	C228	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C107	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	C229	Electrolytic SG	1 uF 50 V M	3479310971 1
C108	Electrolytic SG	100 uF 16 V M	3479310131 1	C230-C232	Ceramic Tubular	0.022 uF 25 V Z	3519223520 3
C109	Electrolytic SG	1 uF 50 V M	3479310971 1	C233	Electrolytic SG	1 uF 50 V M	3479310971 1
C110	Ceramic Tubular	0.01 uF 50 V Z	3519103935 1	C234	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C111/C112	Ceramic Disc C	33 pF 50 V J	3528330210 2	C235	Electrolytic SG	1 uF 50 V M	3479310971 1
C113-C115	Ceramic Tubular	100 pF 50 V J	3519101935 3	C236	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C116	Ceramic Disc	0.047 uF 25 V Z	3579473530 1	C237	Electrolytic SG	100 uF 16 V M	3479310131 1
C117	Trimmer, 20 pF		3838001010 1	C238/C239	Mylar	0.003 uF 100 V J	367932120 2
C118	Ceramic Tubular	0.01 pF 50 V Z	3519103935 1	C240/C241	Ceramic Tubular	0.01 uF 50 V Z	3519103935 2
C119	Trimmer, 20 pF		3838001010 1	C242	Electrolytic SG	10 uF 35 V M	3479310061 1
C120	Poly	470 pF 50 V J	3615471110 1	C243	Electrolytic SG	4.7 uF 50 V M	3479347971 1
C121	Ceramic Tubular	18 pF 50 V J	3511186135 1	C244	Electrolytic SG	10 uF 35 V M	3479310061 1
C122	Trimmer, 10 pF		3838001000 1	C245	Electrolytic SG	4.7 uF 50 V M	3479347971 1
C123	Ceramic Disc C	10 pF 50 V J	3528100210 1	C246	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C124	Poly	180 pF 50 V J	3615181110 1	C247	Electrolytic SG	100 uF 16 V M	3479310131 1
C125/C126	Ceramic Disc	0.047 pF 25 V Z	3579473530 2	C248	Mylar	0.022 uF 100 V J	3679223120 1
C127	Ceramic Tubular	0.022 pF 25 V Z	3519223520 1	C249/C250	Mylar	0.003 uF 100 V J	3679332120 2
C128	Ceramic Disc C	10 pF 50 V J	3528100210 1	C251	Mylar	0.007 uF 100 V J	3679682120 1
C129	Trimmer, 20 pF		3838001010 1	C252	Electrolytic SG	47 uF 16 V M	3479347031 1
C130	Ceramic Tubular	0.022 pF 25 V Z	3519223520 1	C253	Electrolytic SG	47 uF 16 V M	3479347031 1
C131	Mylar	0.047 uF 100 V J	3679473120 1	C254	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1
C132/C133	Mylar	0.022 uF 100 V J	3679223120 2	FILTERS			
C134	Electrolytic SG	47 uF 16 V M	3479347031 1	CF101	AVFMF-450B, AM Filter		3908001390 1
C135	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	CF201-203	SFE10.7MM-A		3908011940 3
C136	Ceramic Tubular	47 pF 50 V J	3519470935 1	CF204	SFE10.7MJ		3908011131 1
C137/C138	Ceramic Tubular	0.022 uF 25 V Z	3519223520 2	CONNECTORS			
C139	Ceramic Tubular	0.001 uF 50 V Z	3519102935 1	CP101	Wafer, 10P		4428516910 1
C140	Electrolytic SG	4.7 uF 50 V M	3479347971 1	CP102	Wafer, 13P		4428517210 1
C141	Electrolytic SG	3.3 uF 50 V M	3479333971 1	CP104	Wafer, 7P		4428505410 1
C142	Electrolytic SG	4.7 uF 50 V M	3479347971 1	CP105	Wafer, 3P LV		4428525790 1
C143	Electrolytic SG	47 uF 16 V M	3479347031 1	CP106	Plug, AC GSCS-1301		4428100291 1
C144	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	DIODES			
C145	Ceramic Tubular	0.001 uF 50 V Z	3519102935 1	D101	Zener, 5.1 BSB		2258599103 1
C146	Mylar	0.003 uF 100 V J	3679272120 1	D102/D103	1N4148, Switching		2058322101 2
C147	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	D104-D106	Varactor, KV1235Z		2058819105 3
C148	Electrolytic SG	100 uF 16 V M	3479310131 1	D107/D108	1N4148, Switching		2058322101 2
C149	Mylar	0.056 uF 100 V K	3679563120 1	D109	Zener, 15 BSC		2058599109 1
C150	Electrolytic SG	10 uF 35 V M	3479310061 1	D110-D113	1N4148, Switching		2058322101 4
C151	Electrolytic SG	1 uF 50 V M	3479310971 1	D114	Zener, 6.2 BSB		2258599105 1
C152	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	Δ D115-D119	1N4002, Rectifier		2258100135 5
C153	Electrolytic SG	1 uF 50 V M	3479310971 1	D120	Zener, 27 BSC		2258599115 1
C154	Electrolytic SG	0.22 uF 50 V M	3479322871 1	D121	1N4003, Rectifier		2058512108 1
C155	Electrolytic SG	100 uF 16 V M	3479310131 1	D122	Zener, 12 BSC		2258599116 1
C156	Electrolytic SG	3.3 uF 50 V M	3479333971 1	D123	1N4148, Switching		2058322101 1
C157/C158	Poly	470 pF 50 V J	3615471110 2	D201-D206	1N4148, Switching		2058322101 6
C159	Poly	680 pF 50 V J	3615681110 1	D207	Zener, 5.6 BSB		2258599104 1
C160	Mylar	0.047 uF 100 V J	3679473120 1	FUSE			
C161	Ceramic Tubular	120 pF 50 V J	3519121935 1	Δ F101	T.L, 250 V, 100 mA		5508300735 1
C162	Electrolytic SG	10 uF 35 V M	3479310061 1	FRONT-END			
C163/C164	Electrolytic SG	22 uF 16 V M	3479322031 2	Δ FE-101	FE415-G11		3928801891 1
C165/C166	Mylar	0.002 uF 100 V J	3679152120 2	INTEGRATED CIRCUITS			
C167	Electrolytic SG	10 uF 35 V M	3479310061 1	IC101	TC9216P		2168007205 1
C168	Electrolytic SG	220 uF 16 V M	3479322131 1	IC102	LA1245		2168417100 1
C169	Electrolytic SG	47 uF 35 V M	3479347061 1	IC103	HA12412		2168411106 1
C170	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1	IC104	LA3401		2168417120 1
C171	Electrolytic SG	47 uF 35 V M	3479347061 1	IC105	LA1235		2168017146 1
C172	Electrolytic SG	2200 uF 35 V M	3409322269 1	IC106	LC7073		2168017145 1
C173/C174	Mylar	0.068 uF 100 V J	3679683120 2	IC107	LA2230		2138317004 1
C175	Electrolytic SG	47 uF 50 V M	3479347071 1	IC108	LM317T		2168600112 1
C176/C177	Ceramic Tubular	0.022 uF 25 V Z	3519223520 2	IC109	LTV817, Optocoupler		2408000136 1
C178	Electrolytic SG	47 uF 16 V M	3479347031 1	COILS			
C179	Electrolytic SG	2.2 uF 50 V M	3479322971 1	L101	MW-ANT		2608207352 1
C180	Electrolytic SG	10 uF 35 V M	3479310061 1	L102	LW-ANT		2608201130 1
C201	Ceramic Tubular	0.022 uF 25 V Z	3519223520 1				
C202	Electrolytic SG	47 uF 16 V M	3479347031 1				
C203	Ceramic Tubular	0.01 uF 50 V Z	3519103935 1				
C204-C214	Ceramic Tubular	0.022 uF 25 V Z	3519223520 11				
C215	Ceramic Tubular	100 pF 50 V J	3519101935 1				
C216-C219	Ceramic Tubular	0.022 uF 25 V Z	3519223520 4				
C220	Electrolytic SG	47 uF 16 V M	3479347031 1				

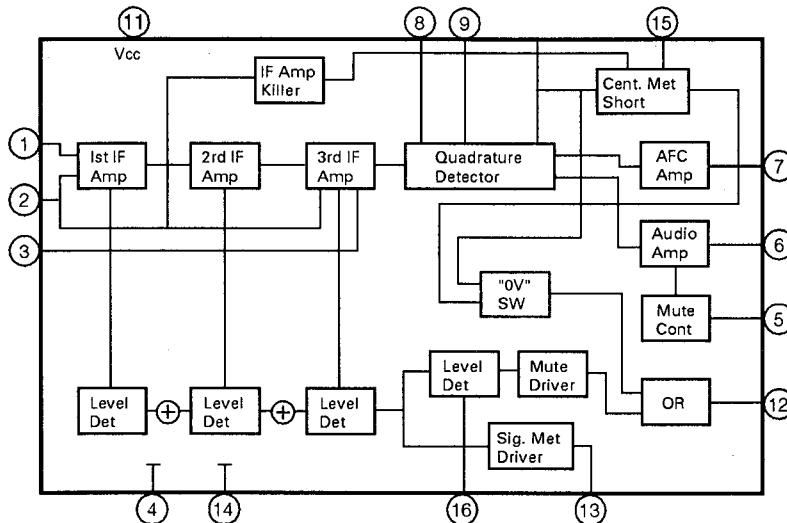
Ref. No.	Description	Mfr. part No.	Q'ty	Ref. No.	Description	Mfr. part No.	Q'ty	
SEMI FIXED RESISTORS				DIODES				
VR101	EVE-DJAA03B, 4.7 k(B)	3248047243	1	D301-D308	1N4148, Switching	2058322101	8	
VR102	EVE-DJAA03B54, 50 k(B)	3248050343	1	INTEGRATED CIRCUIT				
VR103	EVE-DJAA03B25, 200 k(B)	3248020443	1	IC301	uPD78044AGF-140-3B9, CPU	2139313113	1	
VR201	EVE-DJAA03B54, 50 k(B)	3248050343	1	TRANSISTORS				
VR202	EVE-DJAA03B24, 20 k(B)	3248020343	1	Q301	DTC114YS	2208622106	1	
VR203	EVE-DJAA03B14, 10 k(B)	3248010343	1	Q302-Q304	BKTC3199Y/2SC3199Y, NPN	2208610109	3	
MISCELLANEOUS				RESISTORS				
19	Heatsink Regulator TR	7505206220	1	R301-R304	Carbon Film	100 kohm 1/5 W J	3069104970	4
20	Jack, Remote	4438007510	1	R305-R312	Carbon Film	4.7 kohm 1/5 W J	3069472970	8
21	Jack, RCA, 2P	4438111510	1	R313-R317	Carbon Film	47 kohm 1/5 W J	3069473970	5
22	Terminal Antenna, AM/FM	4408108210	1	R318	Carbon Film	100 kohm 1/5 W J	3069104970	1
GND101-10	Terminal Ground	4235007310	4	R319	Carbon Film	10 kohm 1/5 W J	3069103970	1
	Clip Fuse	4255001010	2	R320	Carbon Film	47 kohm 1/5 W J	3069473970	1
PCB2 ASSEMBLY P.C. BOARD FRONT				MISCELLANEOUS				
CAPACITORS				12	Switch Tact	4658003710	24	
C301/C302	Ceramic Tubular	4700 pF	16 V J	3519472935	2			
C303/C304	Ceramic Tubular	0.022 uF	25 V Z	3519223520	2			
C305	Electrolytic SG	100 uF	16 V M	3479310131	1			
C306	Ceramic Tubular	0.01 uF	16 V Z	3519103935	1			
C307	Electrolytic	0.047 F	5.5 V M	3438247315	1			
C308	Electrolytic SG	4.7 uF	50 V M	3479347971	1			
C309	Ceramic Tubular	820 pF	50 V J	3519821935	1			
C310	Ceramic Tubular	20 pF	50 V J	3519200935	1			
C311-C313	Ceramic Tubular	100 pF	50 V J	3519101935	3			
C314	Electrolytic SG	1 uF	50 V M	3479310971	1			
CONNECTORS				13	Holder FL, Black, ABS	6043010210	1	
CN101	Lead Ass'y, 10P, 220mm	436210223332	1	14	Switch, Encoder	4608400210	1	
CN102	Lead Ass'y, 13P, 260mm	436213263332	1	RESO-301	CST4.19MGW-TF01	3938124006	1	
CN103-1	Lead Ass'y, 5P, 100mm	436405103232	1	FL301	VFD CM1256C	2328000304	1	
PCB3 ASSEMBLY P.C. BOARD POWER				MISCELLANEOUS				
CP103	Lead Ass'y, 5P, 100mm	436405103232	1	12(Power)	Switch Tact	4658003710	1	
D305	SPR-54MDW3, Green/Amber	2308222205	1					

IC FUNCTIONAL BLOCK DIAGRAM

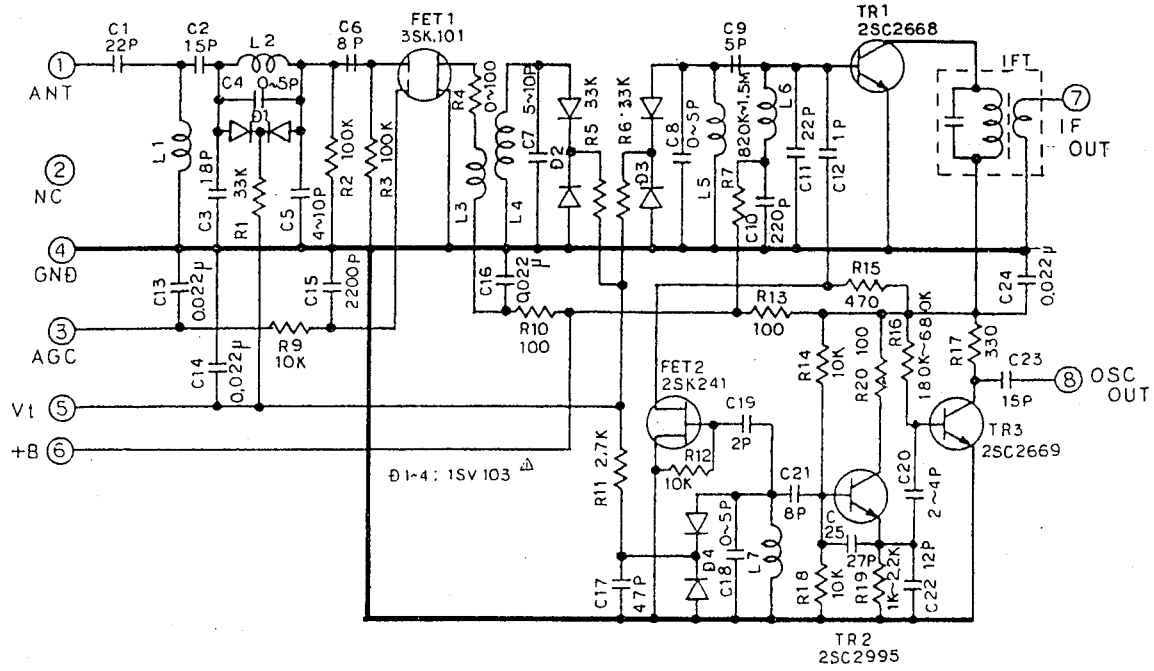
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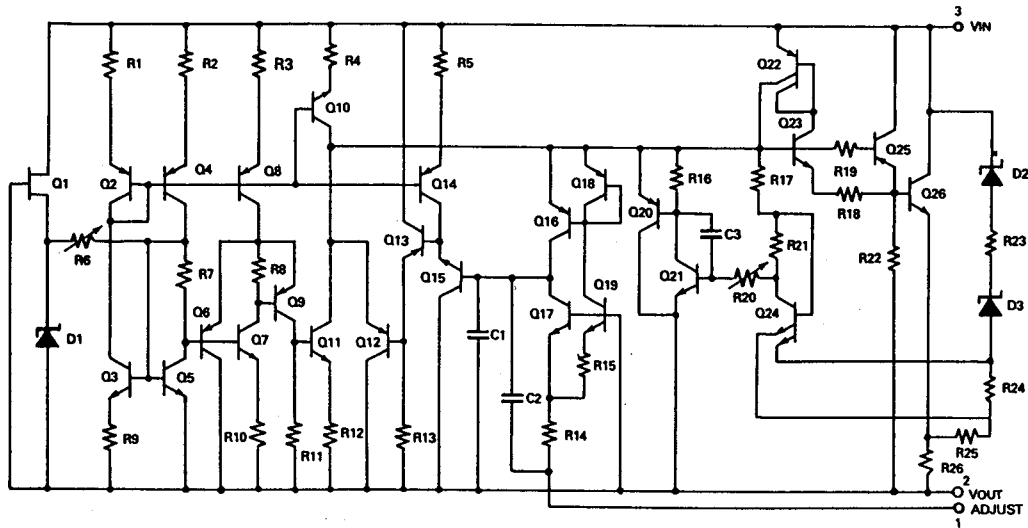
IC103 : HA12412



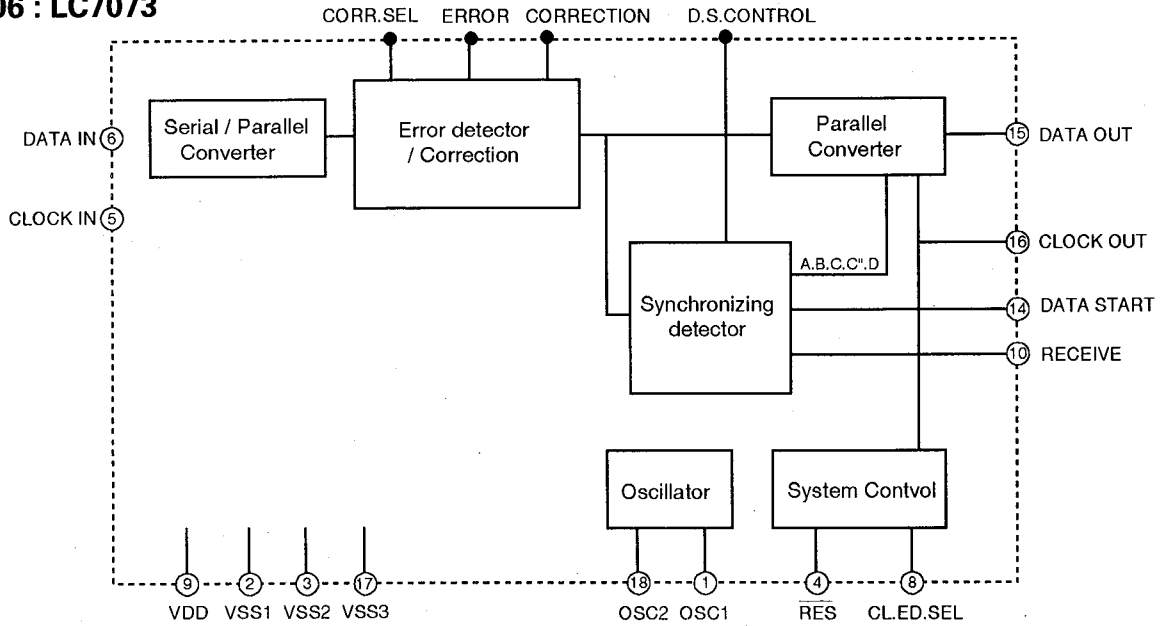
FE101 : FE415-G11



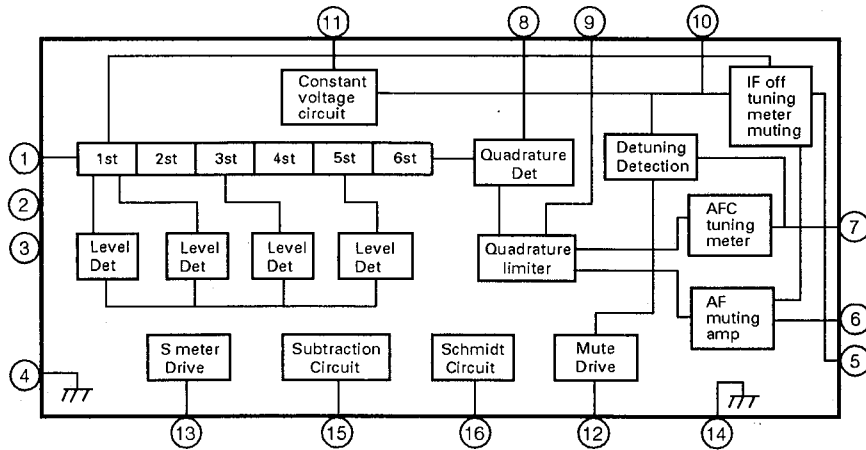
IC108 : LM317T



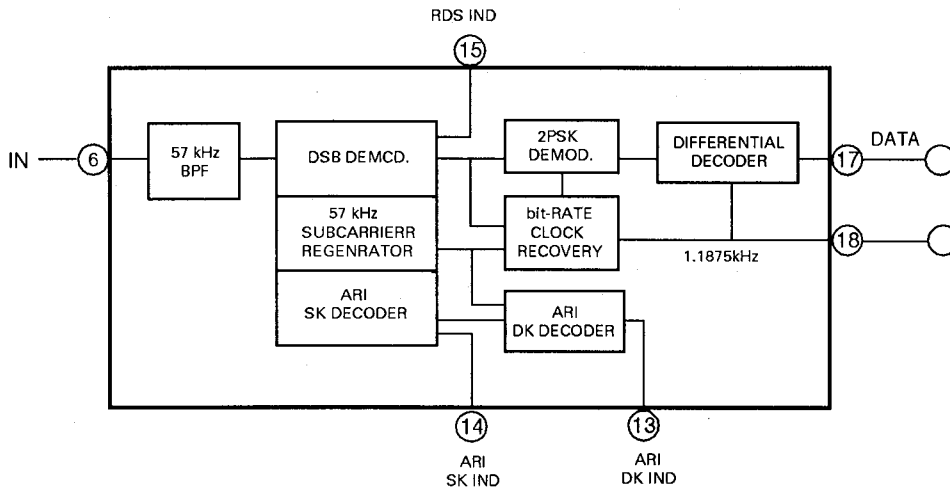
IC106 : LC7073



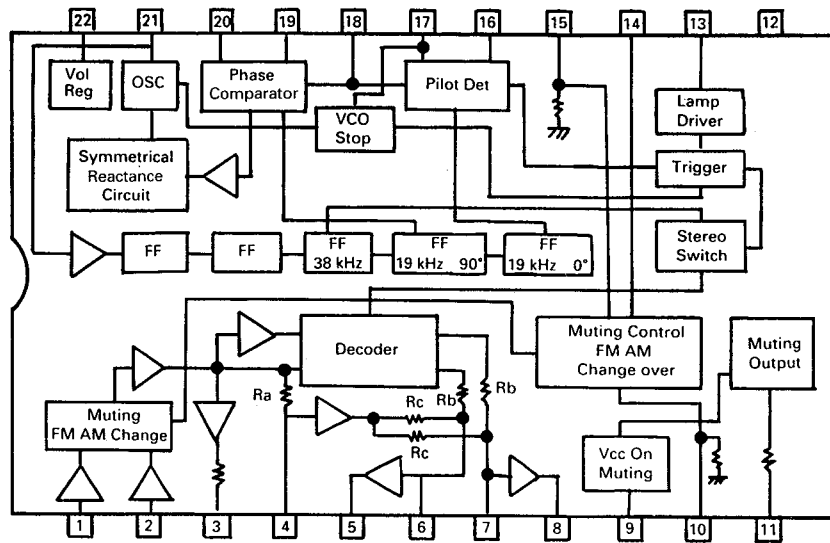
IC105 : LA1235



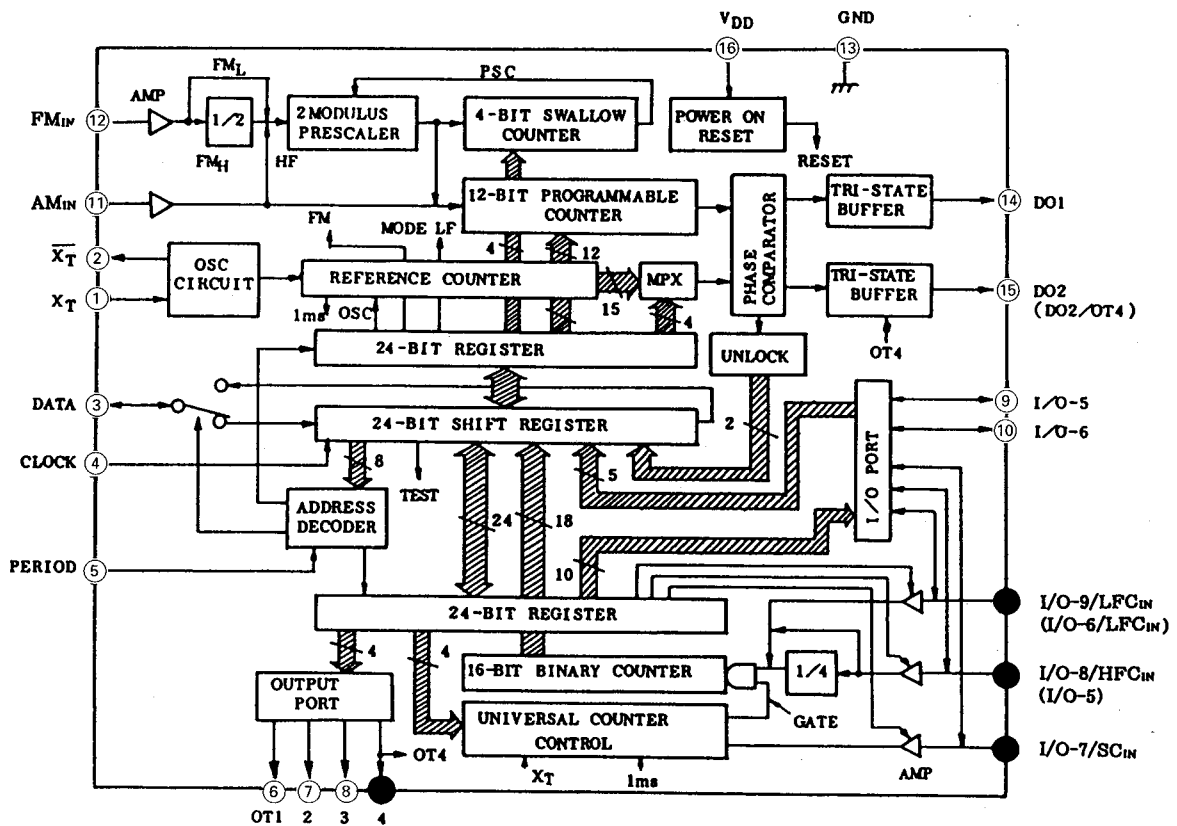
IC107 : LA2230



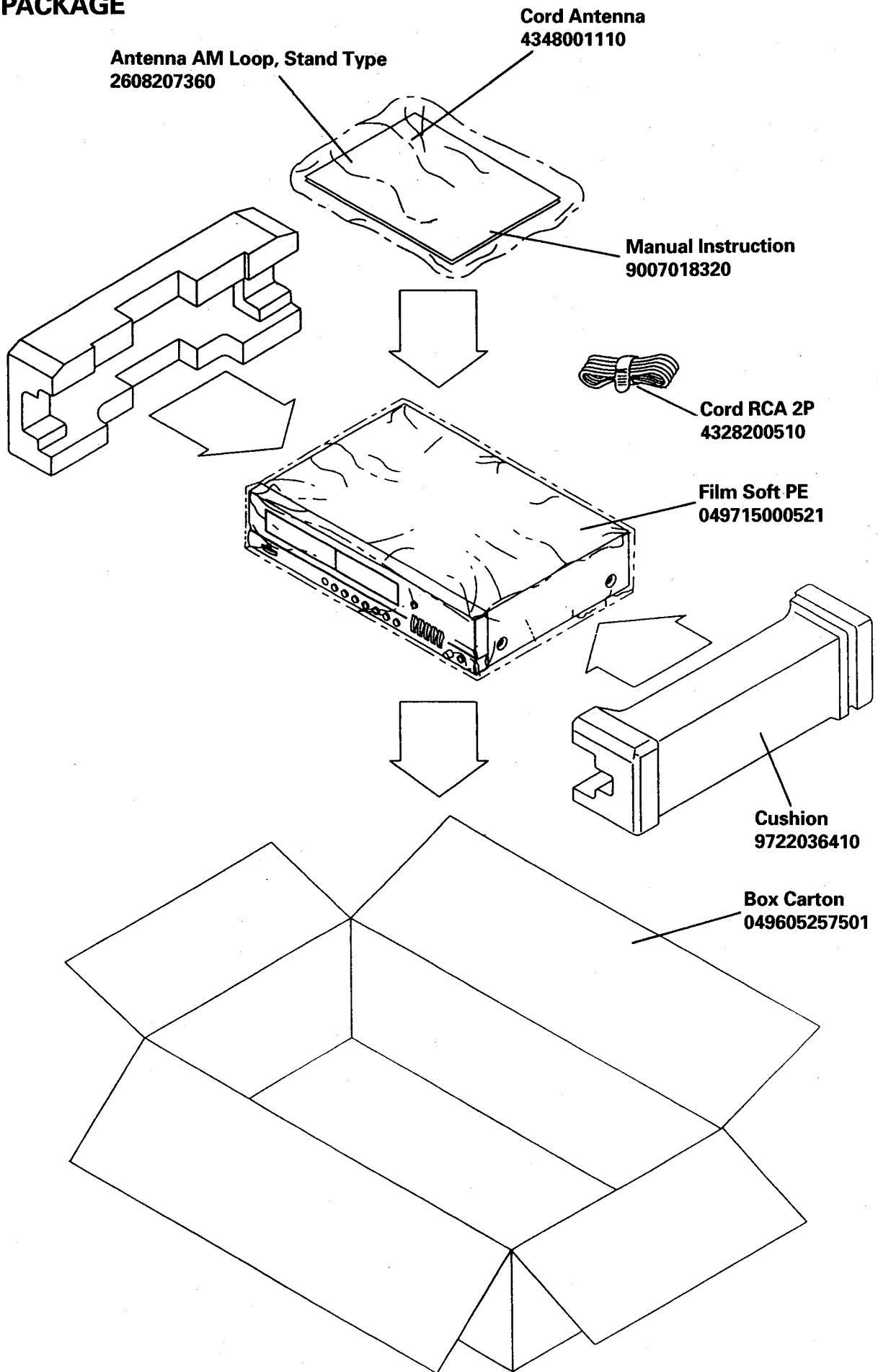
IC104 : LA3401



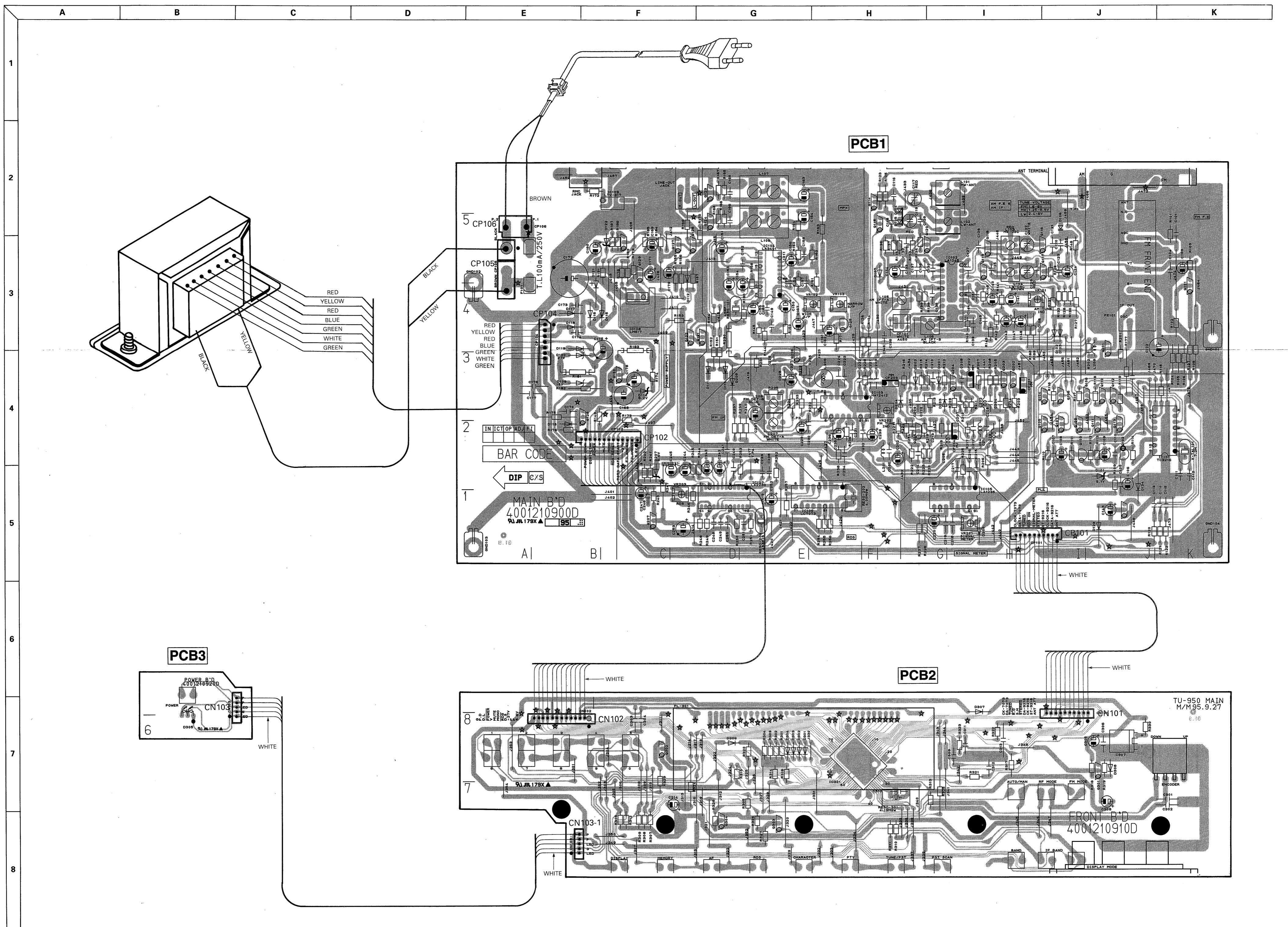
IC401 : TC9216P



PACKAGE



WIRING DIAGRAM



WIRING DIAGRAM

A B C D

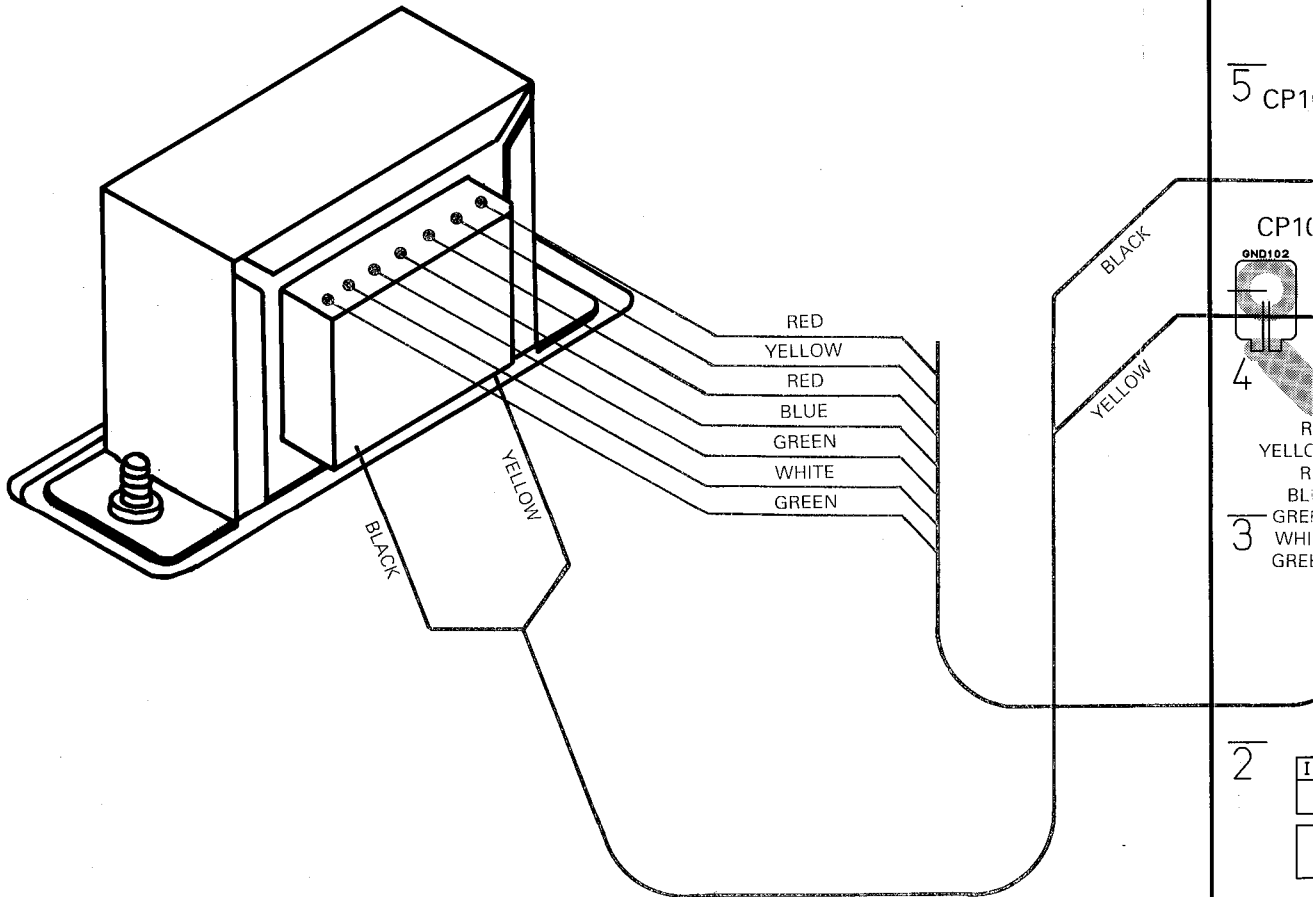
1

2

3

4

5



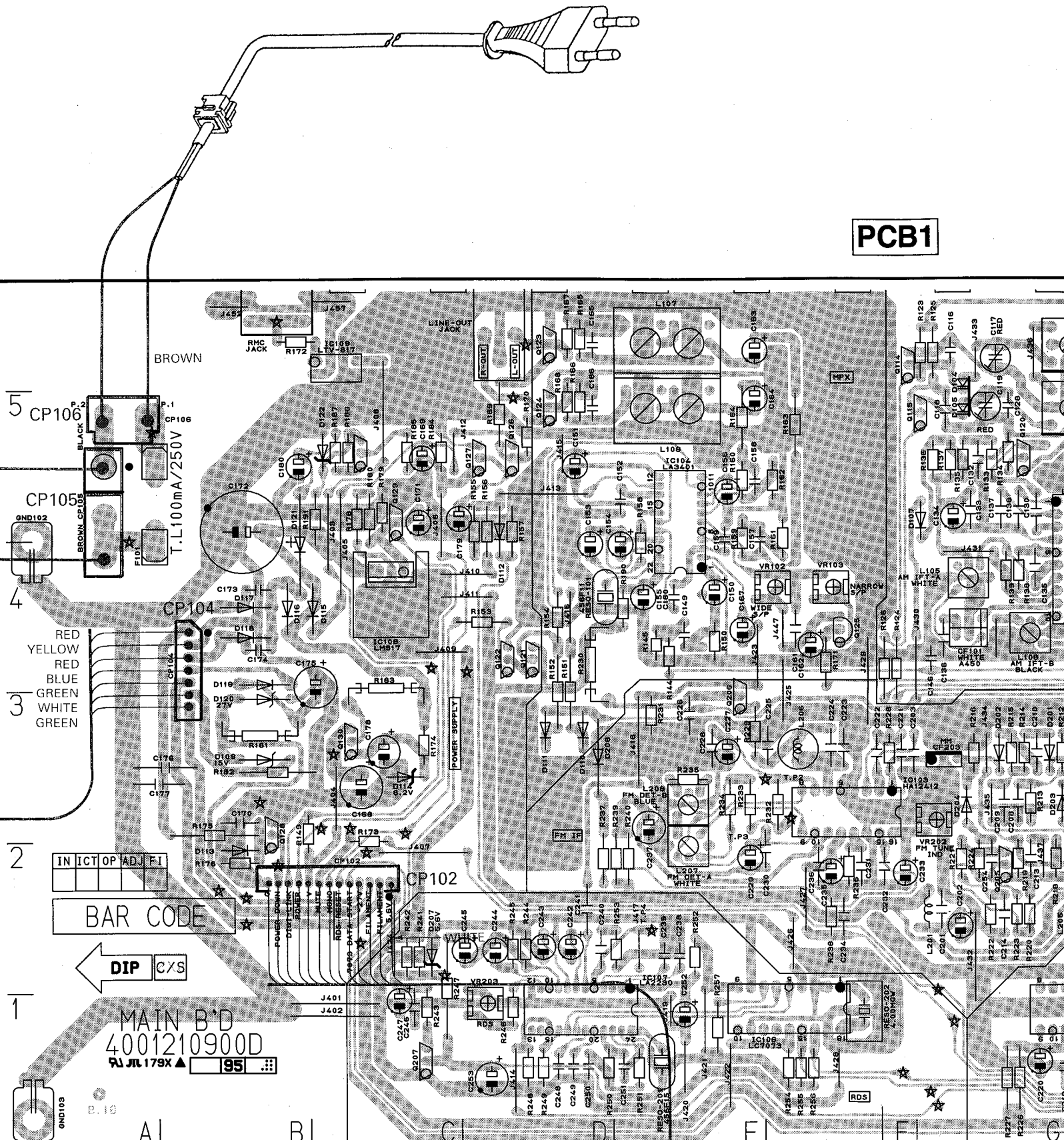
E

F

G

H

PCB1



5

4

3

2

1

A

B

C

D

E

F

G

RED
YELLOW
RED
BLUE
GREEN
WHITE
GREEN

MAIN B'D
4001210900D
RJL 179X

95

95

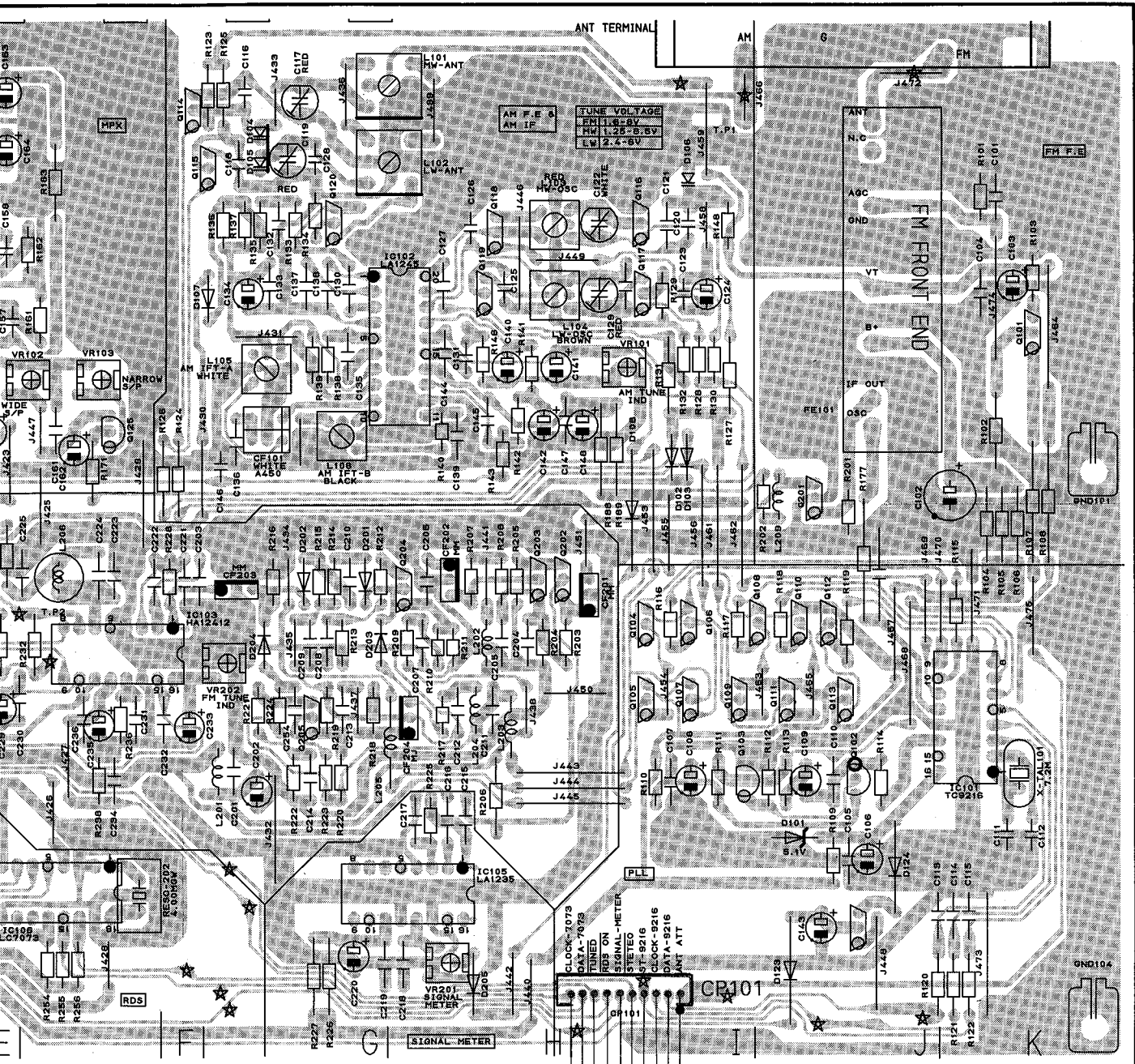
H

I

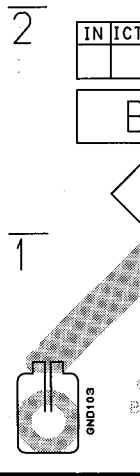
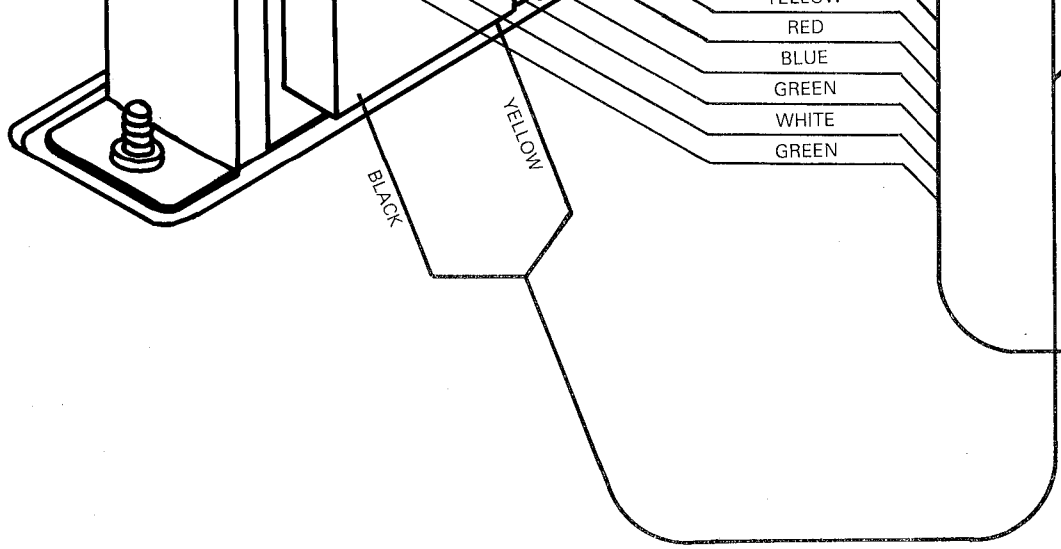
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K

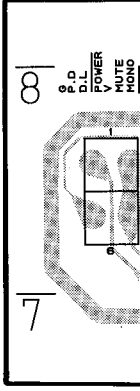
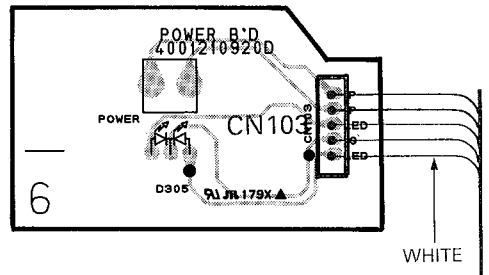
PCB1



WHITE



PCB3



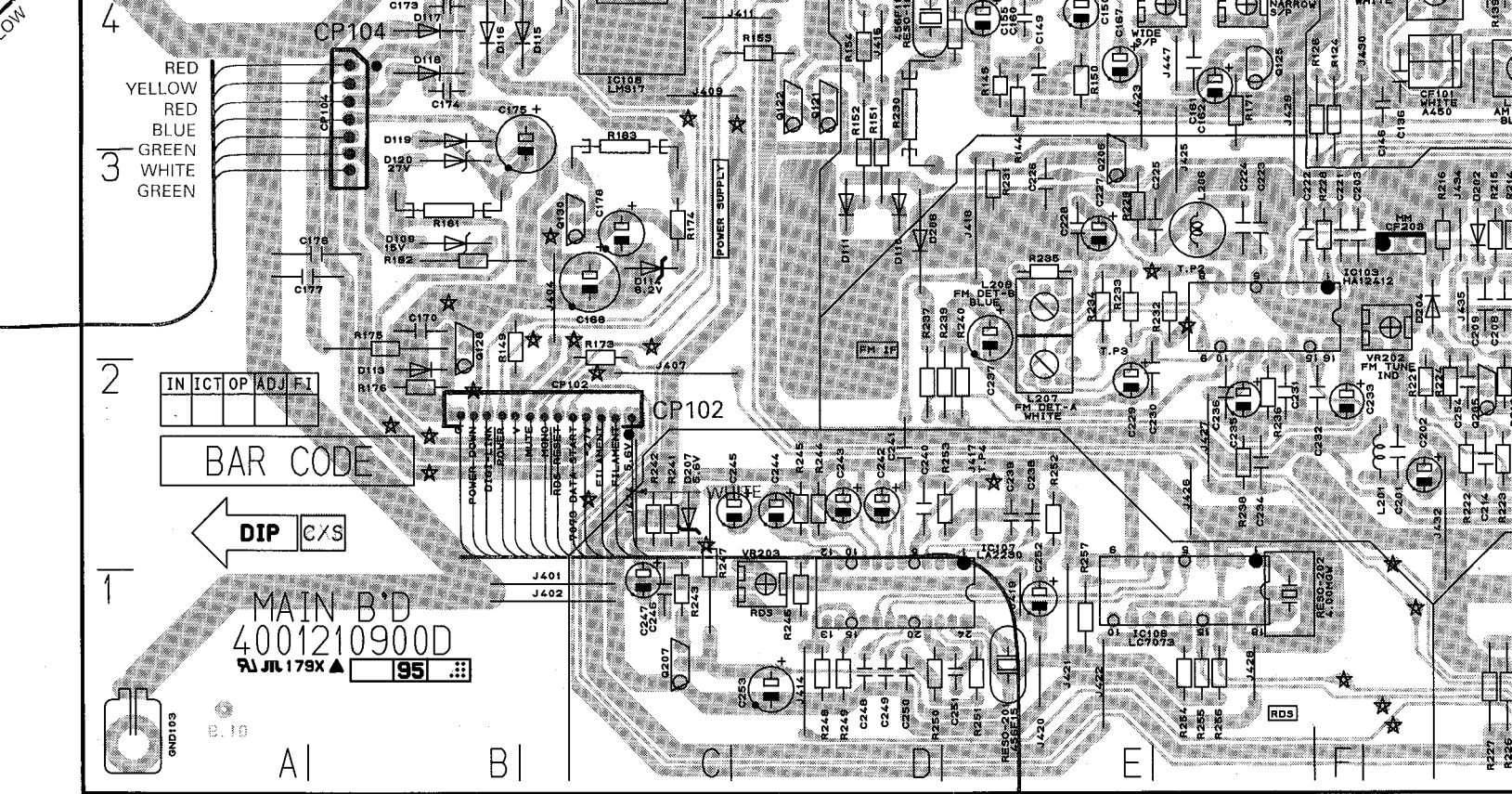
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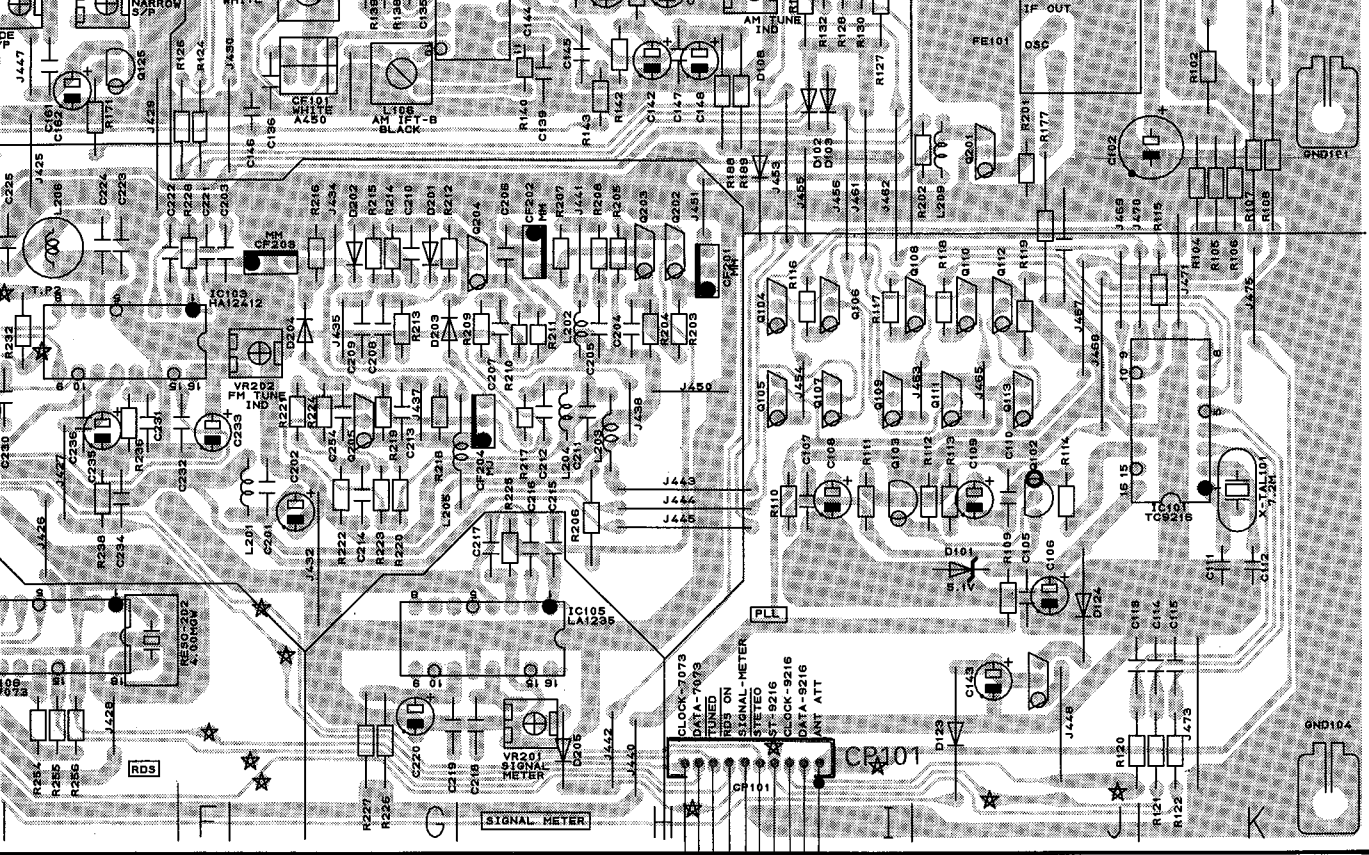
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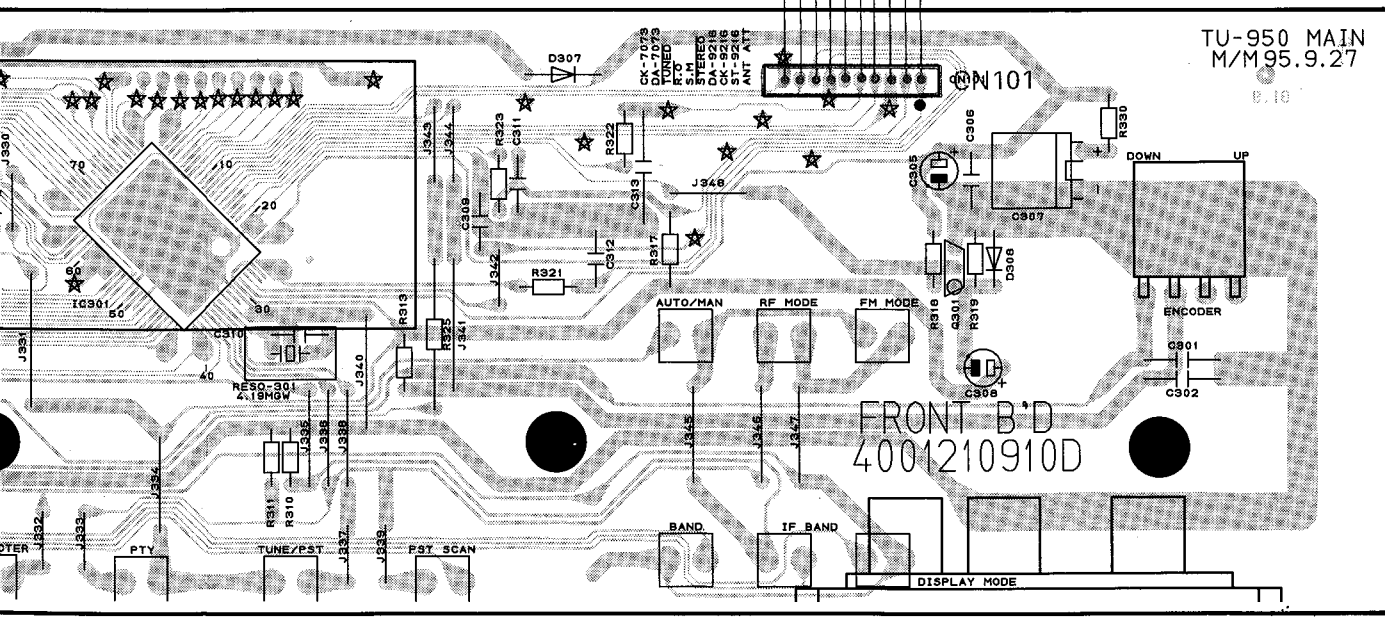
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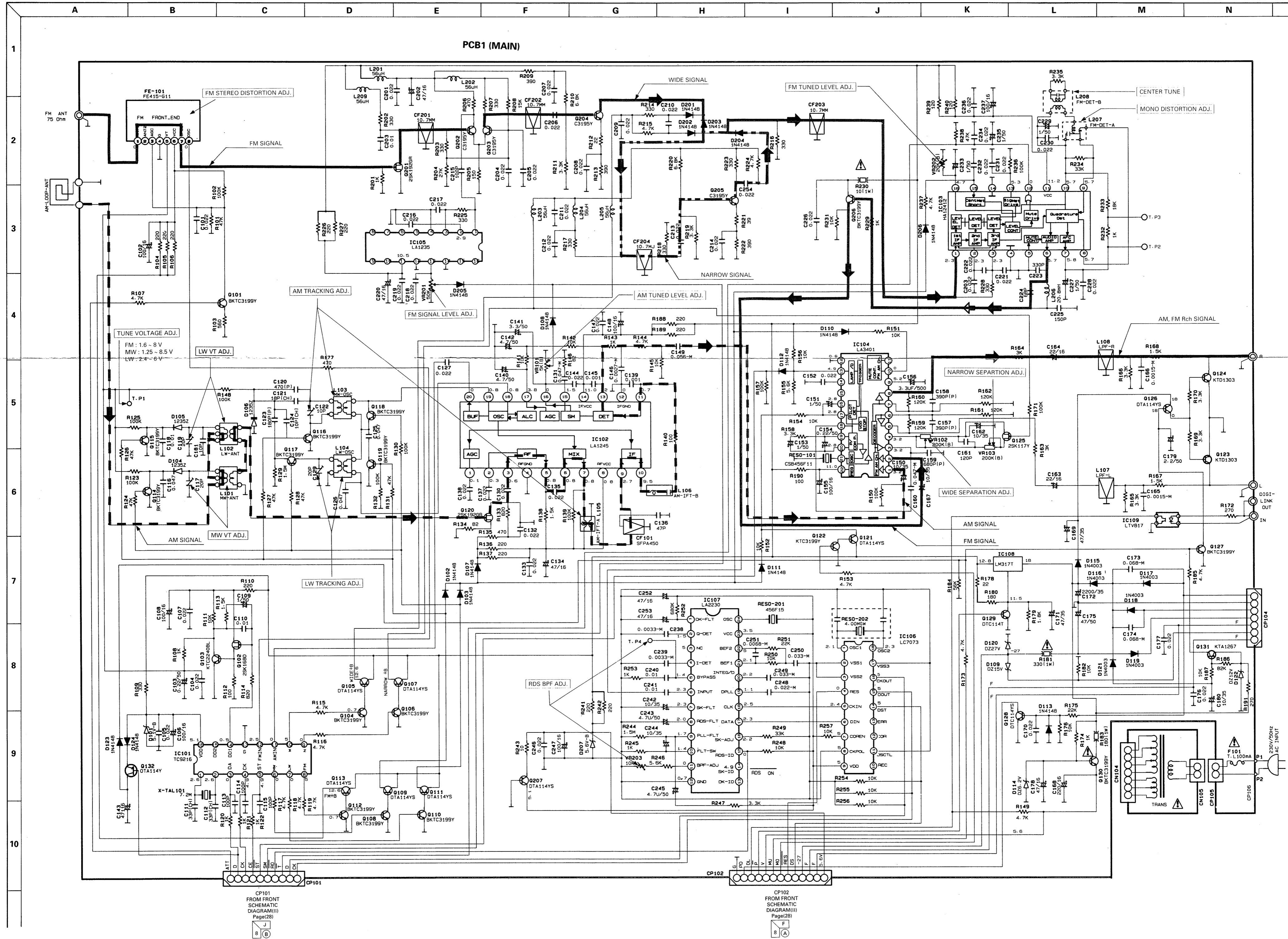




PCB2



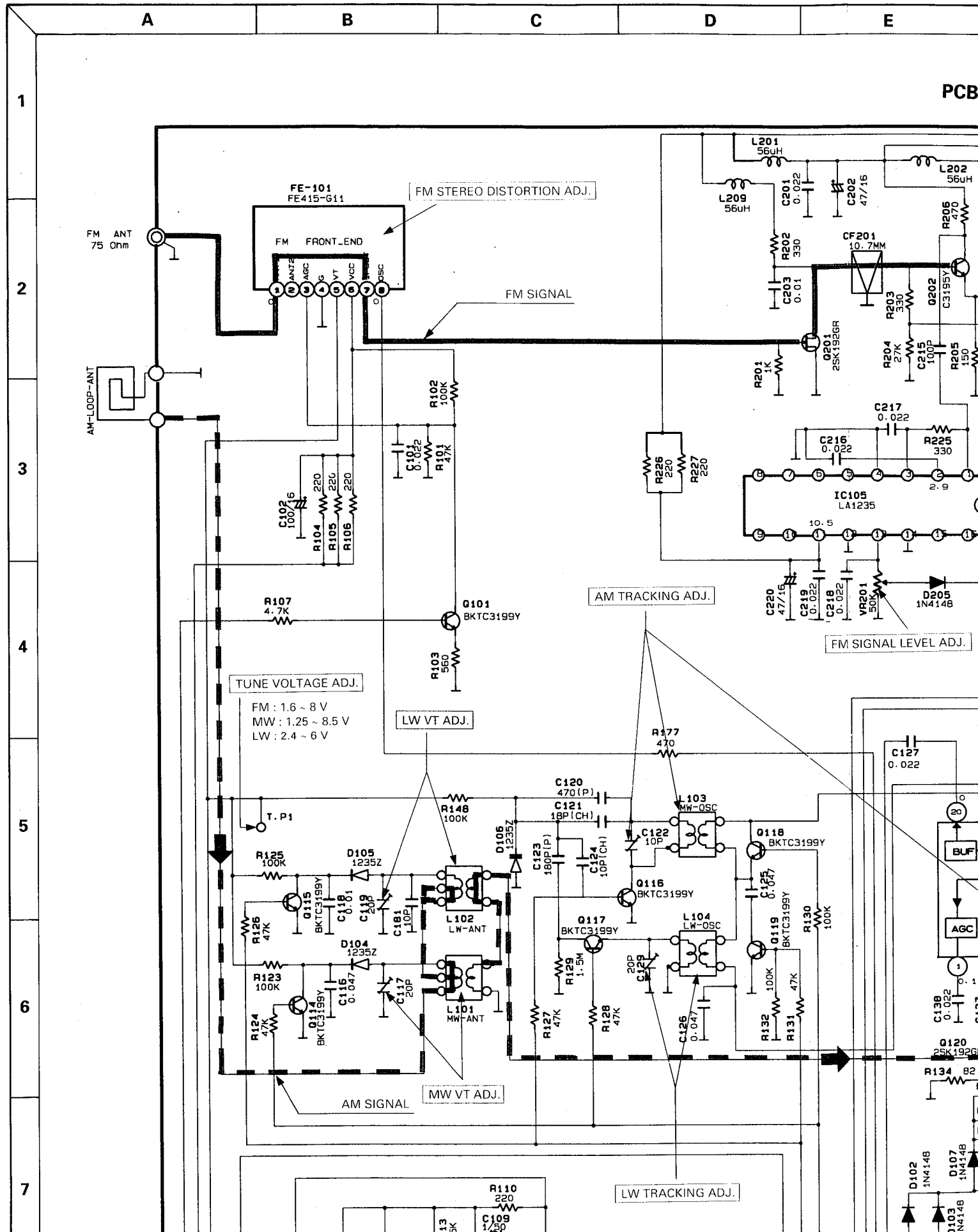
SCHEMATIC DIAGRAM I



CP101 FROM FRONT SCHEMATIC DIAGRAM(III) Page(28)

CP102 FROM FRONT SCHEMATIC DIAGRAM(III) Page(28)

SCHEMATIC DIAGRAM I



F

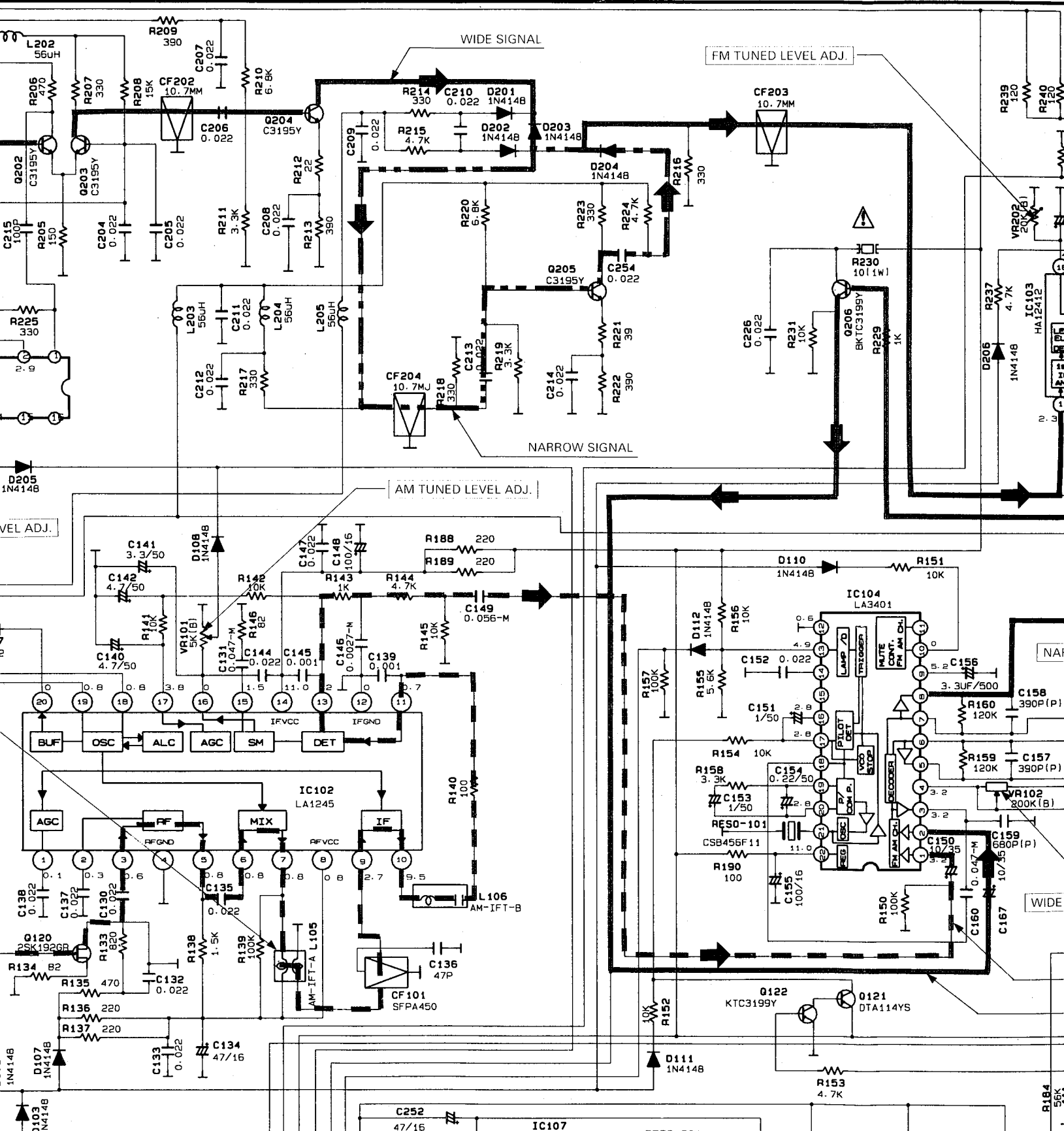
G

H

I

J

PCB1 (MAIN)



4

5

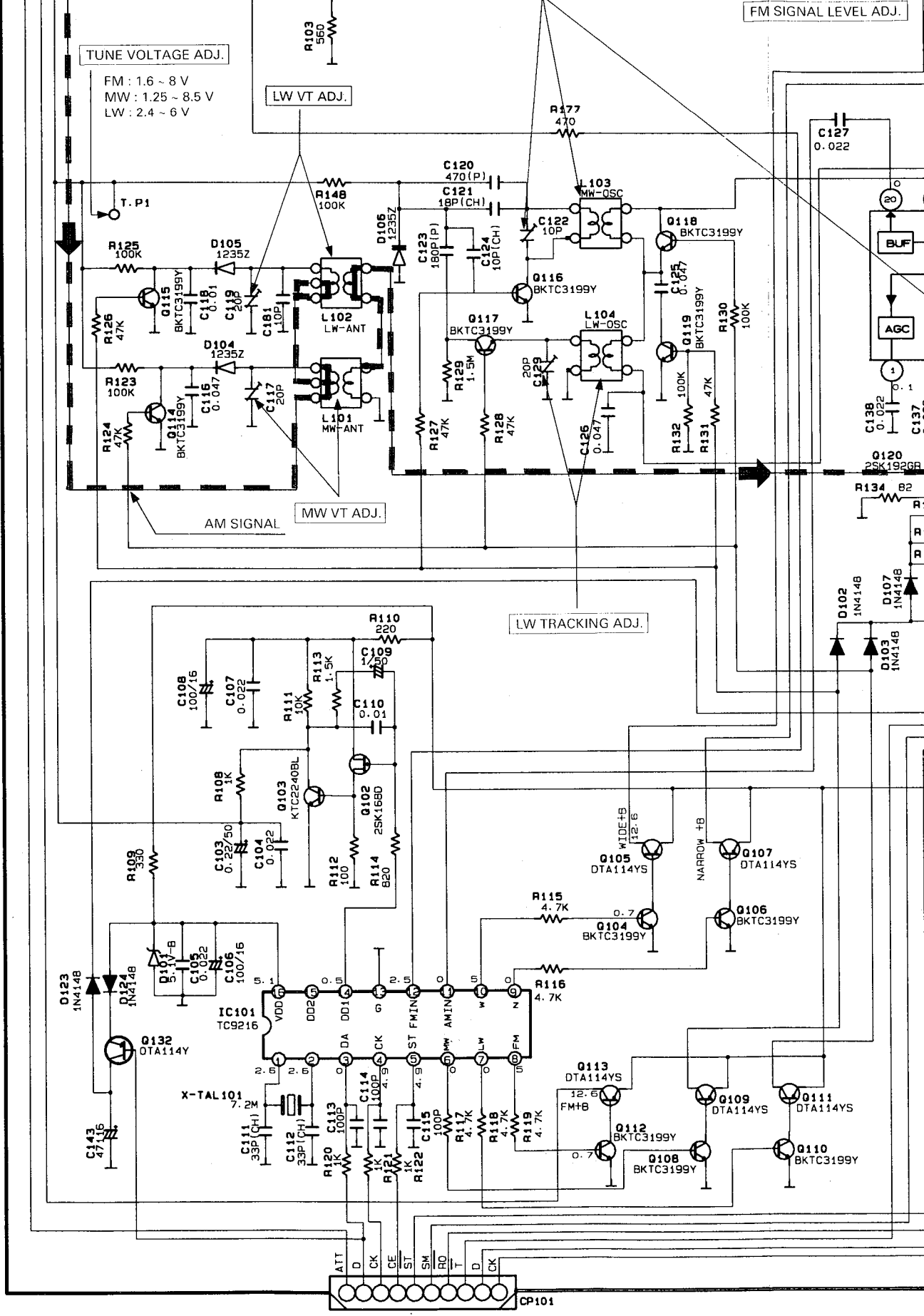
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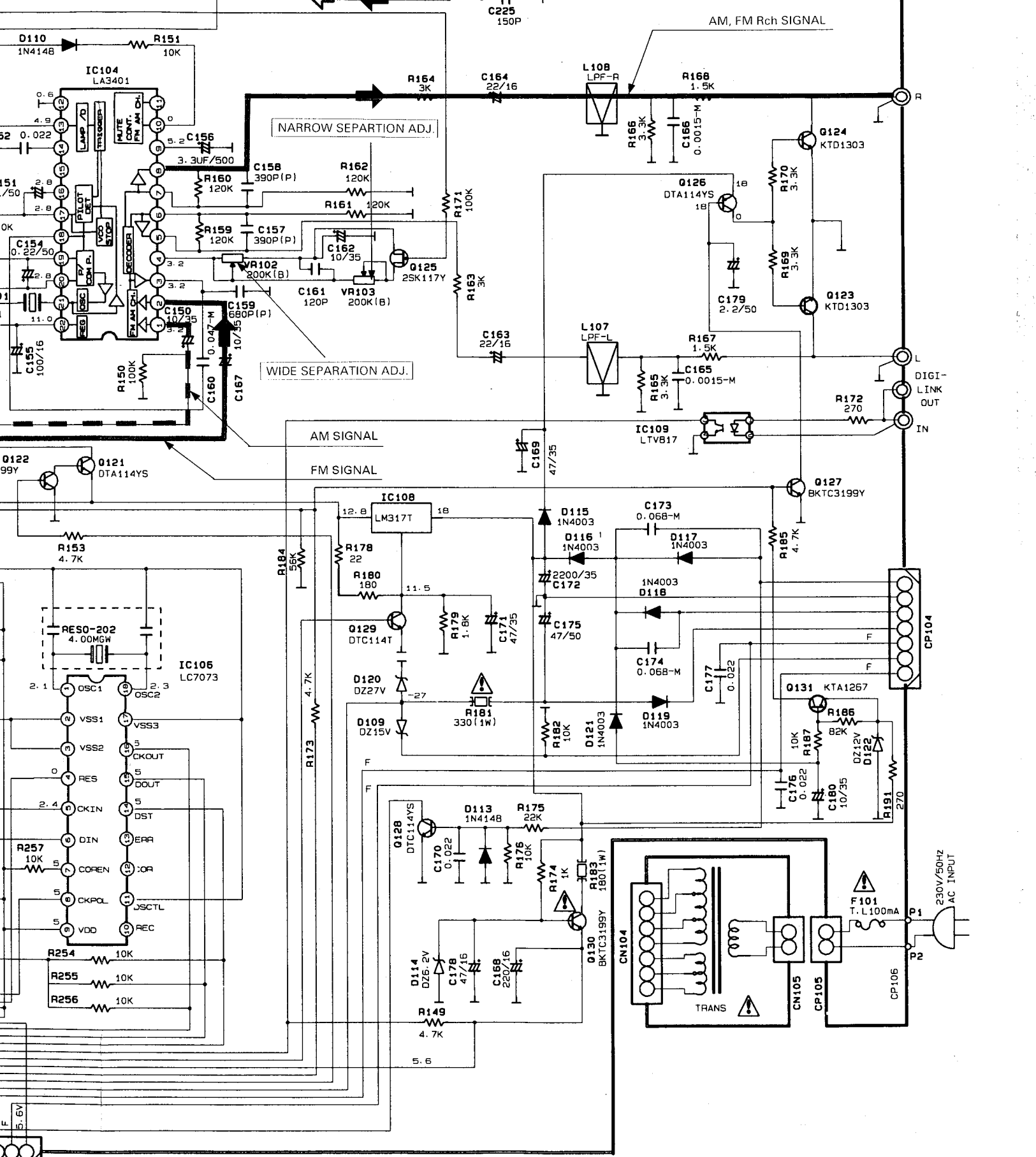
9

10



CP101
 FROM FRONT
 SCHEMATIC
 DIAGRAM(III)
 Page(28)





SCHEMATIC DIAGRAM II

A B C D E F G H I J K L M N

1

2

3

4

5

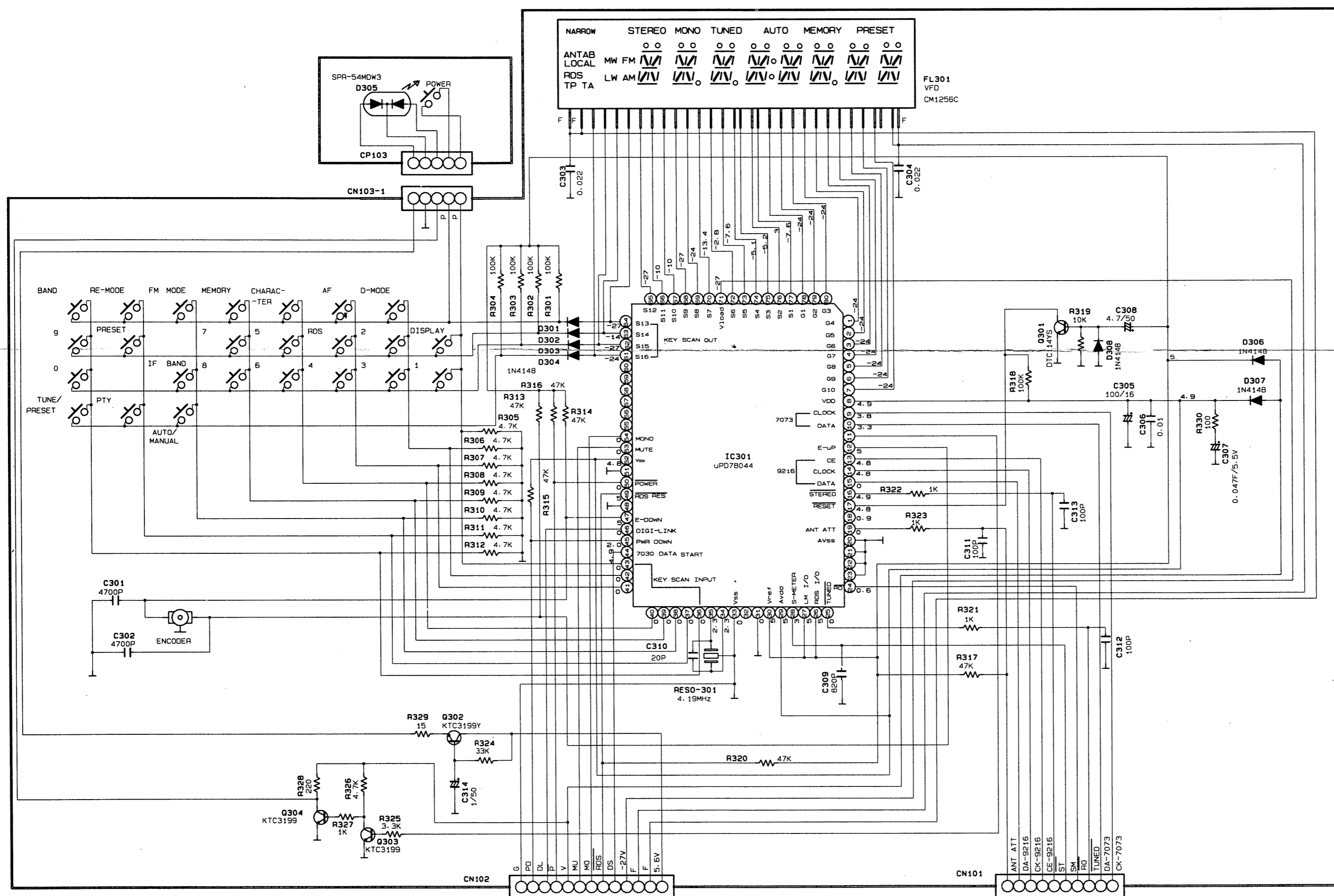
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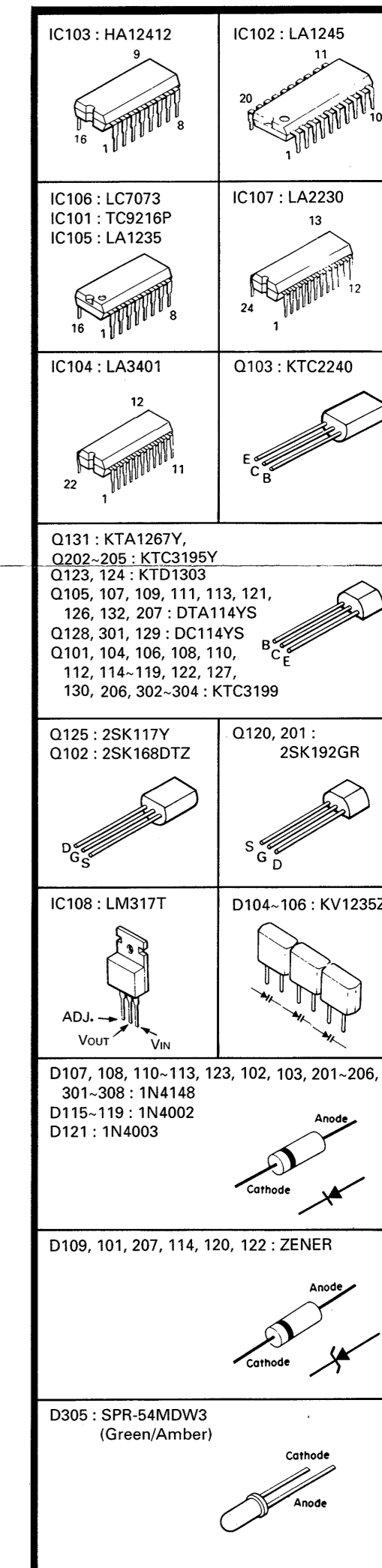
8

9

PCB2 (FRONT)



PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.



NOTES
 1. Resistance value are indicated ohms unless otherwise specified (K=1,000 M=1,000,000)
 2. Capacitance value are shown in microfarads unless otherwise noted (P=micro-microfarade)
CAUTION
 Safety precaution to be followed during servicing
 1) Since these parts made with are critical part for safety use the one deservised the part list
 2) Before returning the receiver to the customer make appropriate leakage current or resistance exposed part are property insulated from the supply circuit

CN102 TO MAIN SCHEMATIC DIAGRAM(II) Page(27)

CN101 TO MAIN SCHEMATIC DIAGRAM(II) Page(27)

SCHEMATIC DIAGRAM II

A B C D E F

1

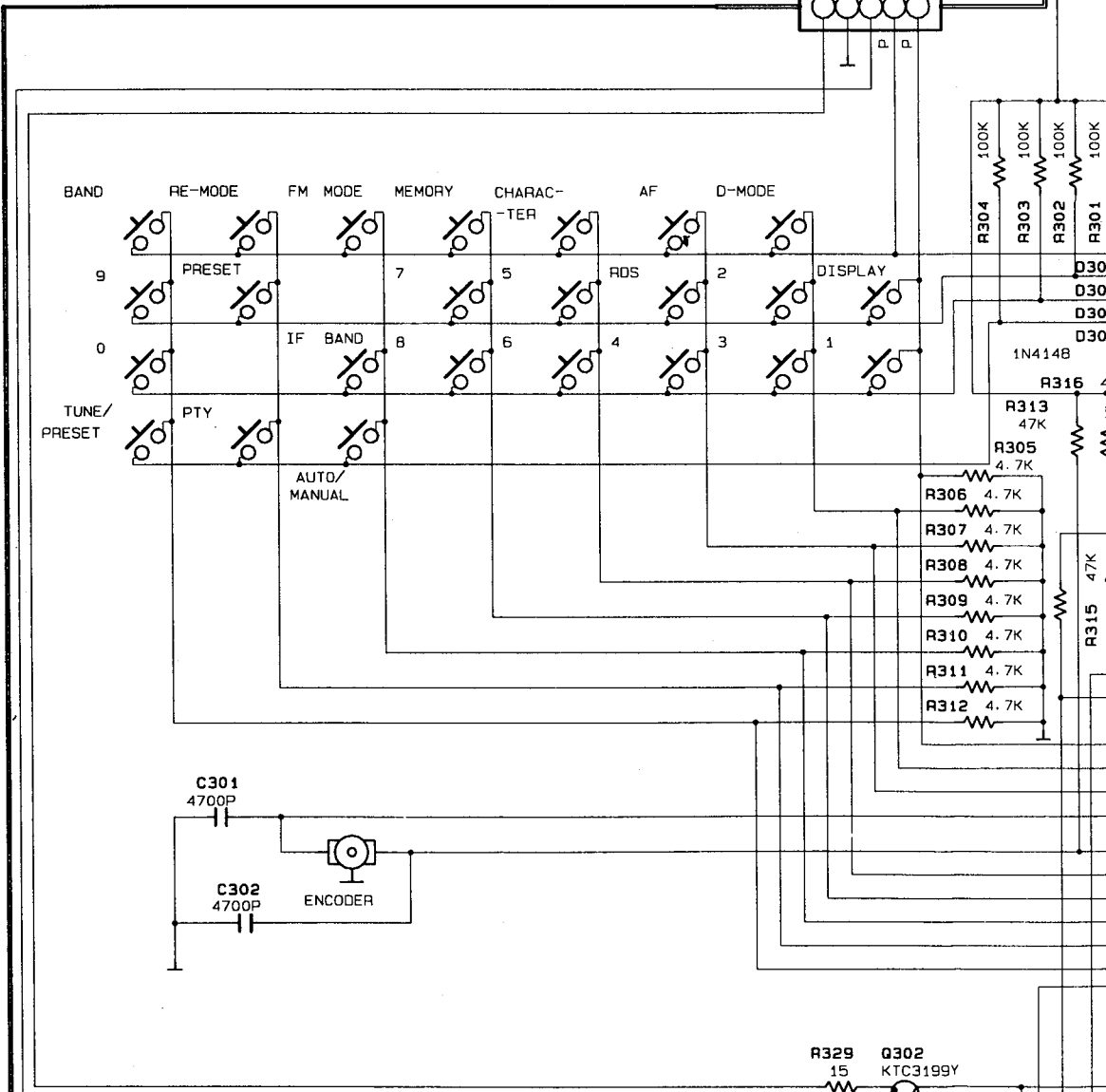
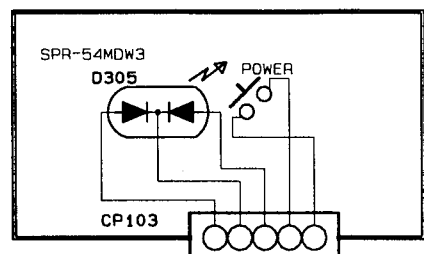
2

3

4

5

6



R329 15 Q302 KTC3199Y

F

G

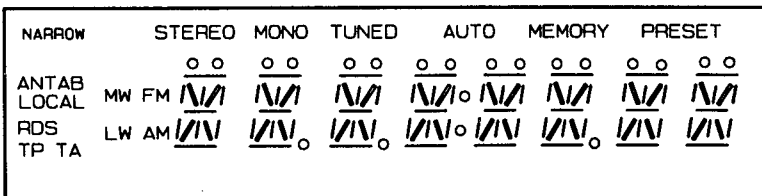
H

I

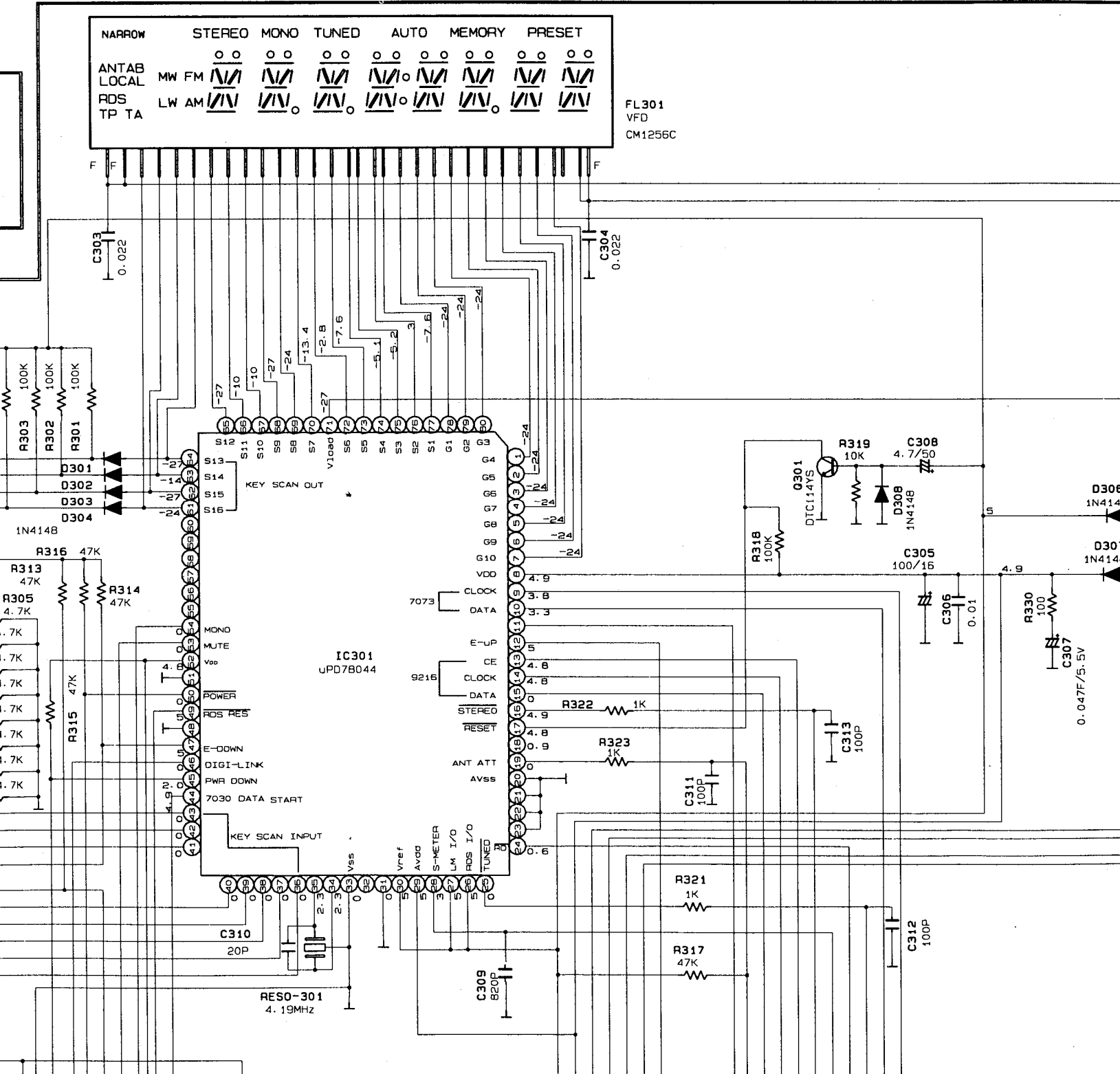
J

K

PCB2 (FRONT)



FL301
VFD
CM1256C



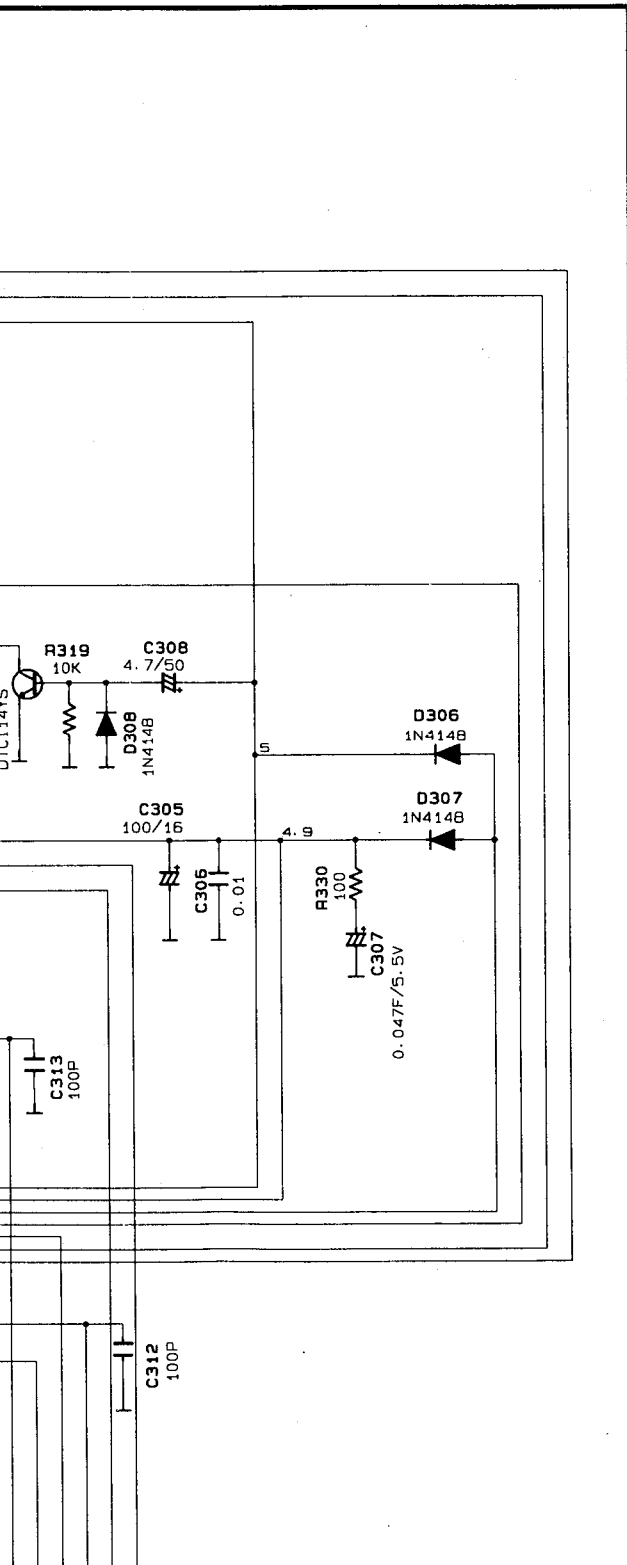
J

K

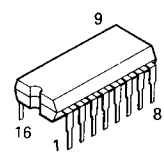
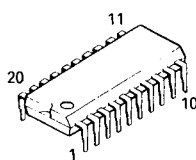
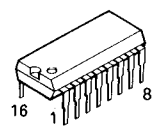
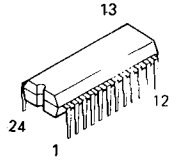
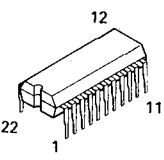
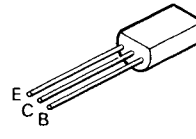
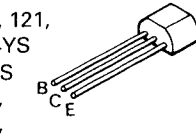
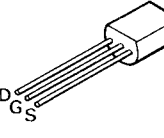
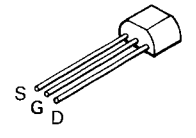
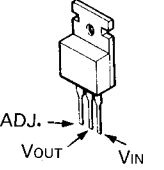
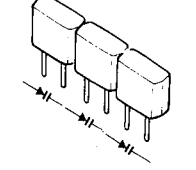
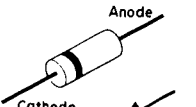
L

M

N



PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.

<p>IC103 : HA12412</p> 	<p>IC102 : LA1245</p> 
<p>IC106 : LC7073 IC101 : TC9216P IC105 : LA1235</p> 	<p>IC107 : LA2230</p> 
<p>IC104 : LA3401</p> 	<p>Q103 : KTC2240</p> 
<p>Q131 : KTA1267Y, Q202~205 : KTC3195Y Q123, 124 : KTD1303 Q105, 107, 109, 111, 113, 121, 126, 132, 207 : DTA114YS Q128, 301, 129 : DC114YS Q101, 104, 106, 108, 110, 112, 114~119, 122, 127, 130, 206, 302~304 : KTC3199</p> 	
<p>Q125 : 2SK117Y Q102 : 2SK168DTZ</p> 	<p>Q120, 201 : 2SK192GR</p> 
<p>IC108 : LM317T</p> 	<p>D104~106 : KV1235Z</p> 
<p>D107, 108, 110~113, 123, 102, 103, 201~206, 301~308 : 1N4148 D115~119 : 1N4002 D121 : 1N4003</p> 	

4

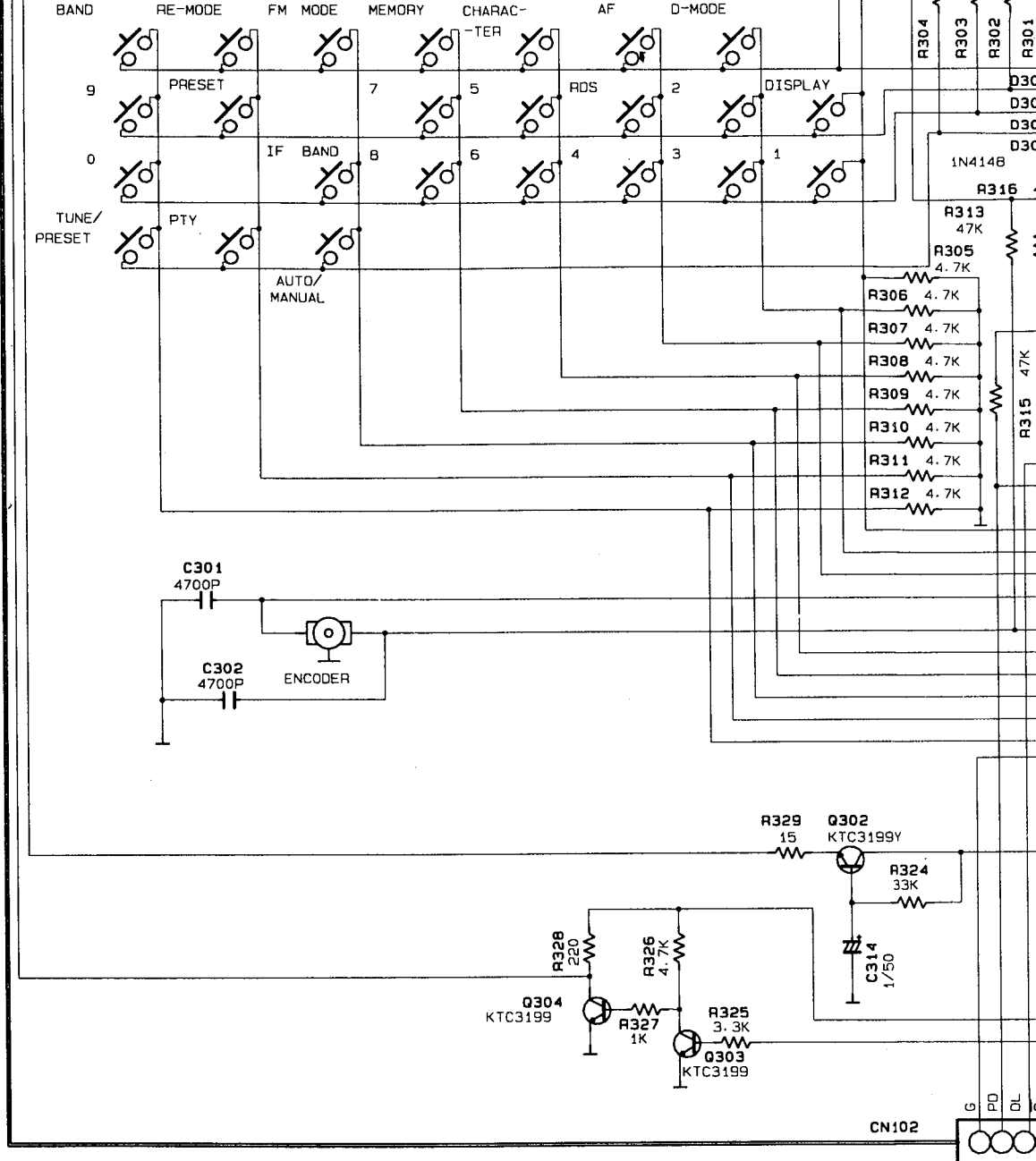
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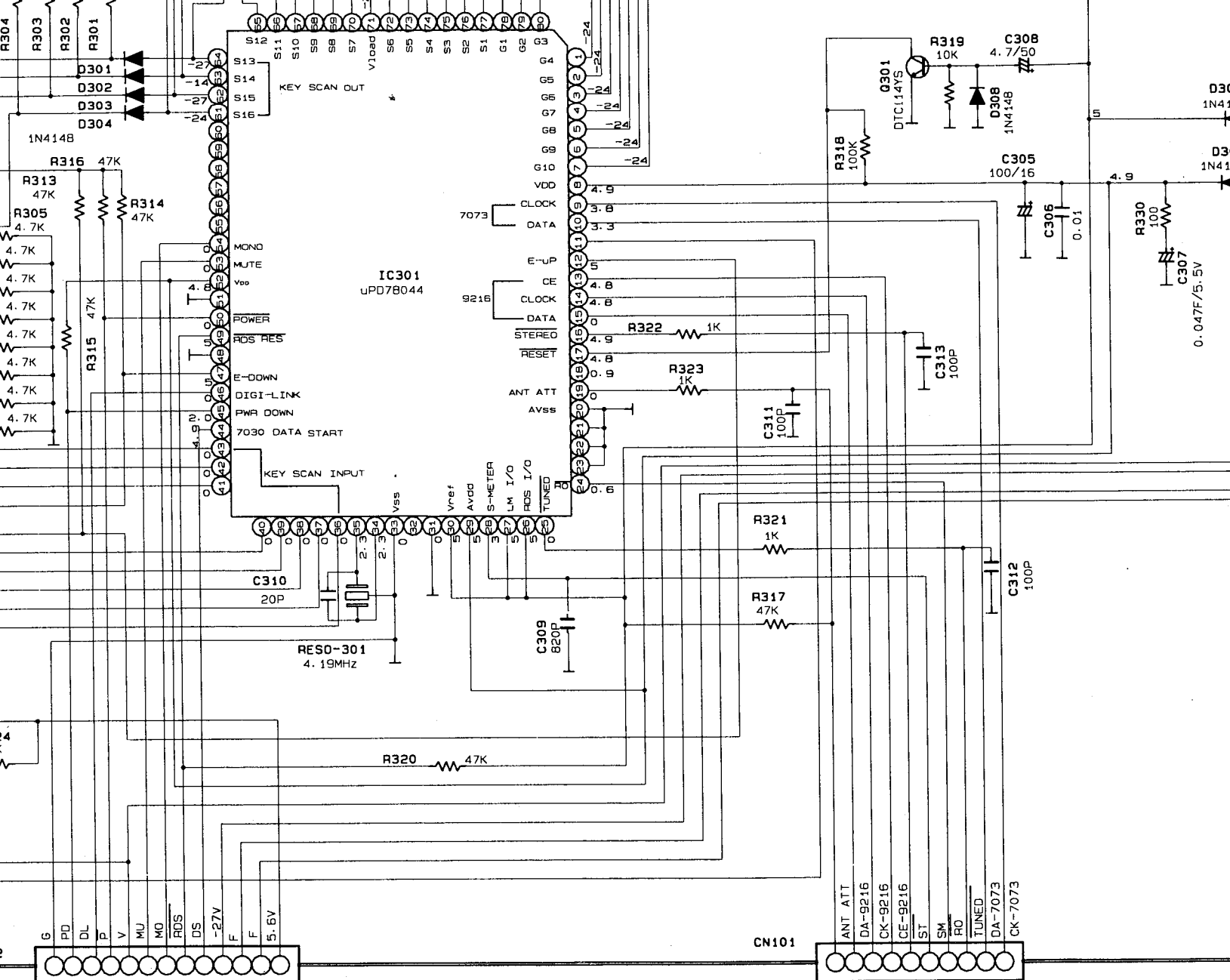
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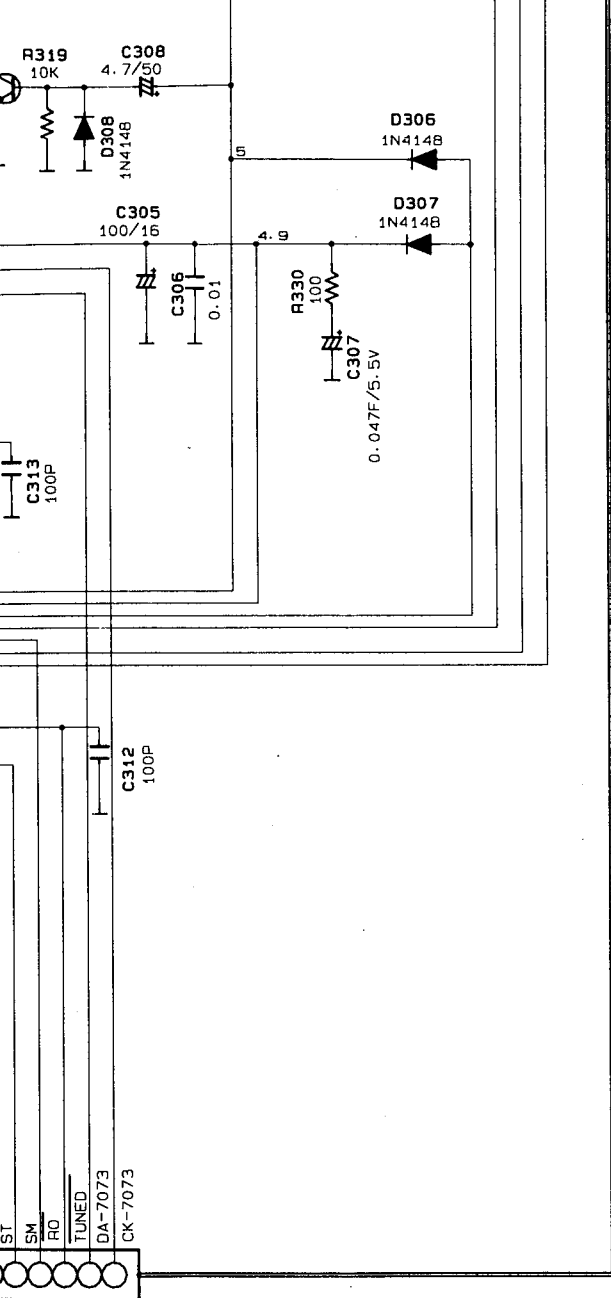
NOTES

- Resistance value a ohms unless otherwise [K=1.000 M=1.000.0
- Capacitance value microfarades unless noted (P=micro-microfarades)

CAUTION

Safety precaution to during servicing

- Since these parts are critical please use the one designated part list
- Before returning to the customer make leakage current or exposed part are insulated from the circuit



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NOTES

- Resistance value are indicated ohms unless otherwise specified [K=1.000 M=1.000.000]
- Capacitance value are shown in microfarades unless otherwise noted [P=micro-microfarade]

CAUTION

Safety precaution to be followed during servicing

- Since these parts made with are critical part for safety use the one deservised the part list
- Before returning the receiver to the customer make appropriate leakage current or resistance exposed part are property insulated from the supply circuit

Q131 : KTA1267Y, Q202~205 : KTC3195Y Q123, 124 : KTD1303 Q105, 107, 109, 111, 113, 121, 126, 132, 207 : DTA114YS Q128, 301, 129 : DC114YS Q101, 104, 106, 108, 110, 112, 114~119, 122, 127, 130, 206, 302~304 : KTC3199	
Q125 : 2SK117Y Q102 : 2SK168DTZ	Q120, 201 : 2SK192GR
IC108 : LM317T	D104~106 : KV1235Z
D107, 108, 110~113, 123, 102, 103, 201~206, 301~308 : 1N4148 D115~119 : 1N4002 D121 : 1N4003	
D109, 101, 207, 114, 120, 122 : ZENER	
D305 : SPR-54MDW3 (Green/Amber)	