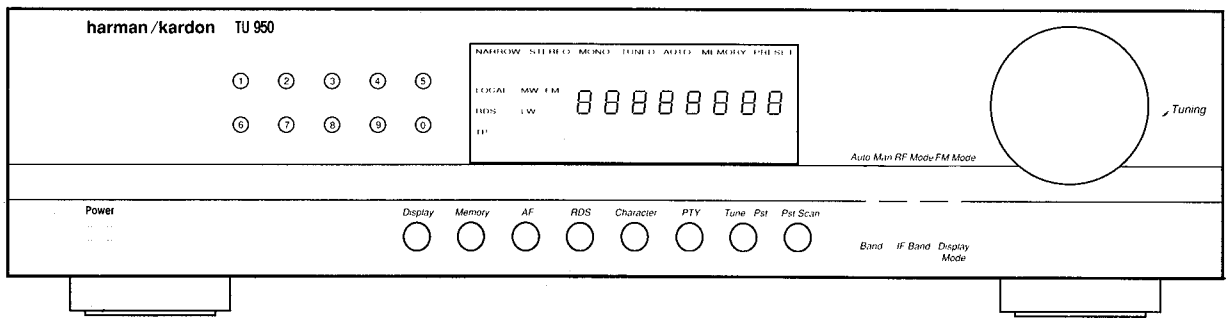
The Harman Kardon
Model TU-950

Manual A

AM/FM STEREO DIGITAL RDS TUNER

Technical Manual



■ CONTENTS ■

harman/kardon

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

LEAKAGE TEST

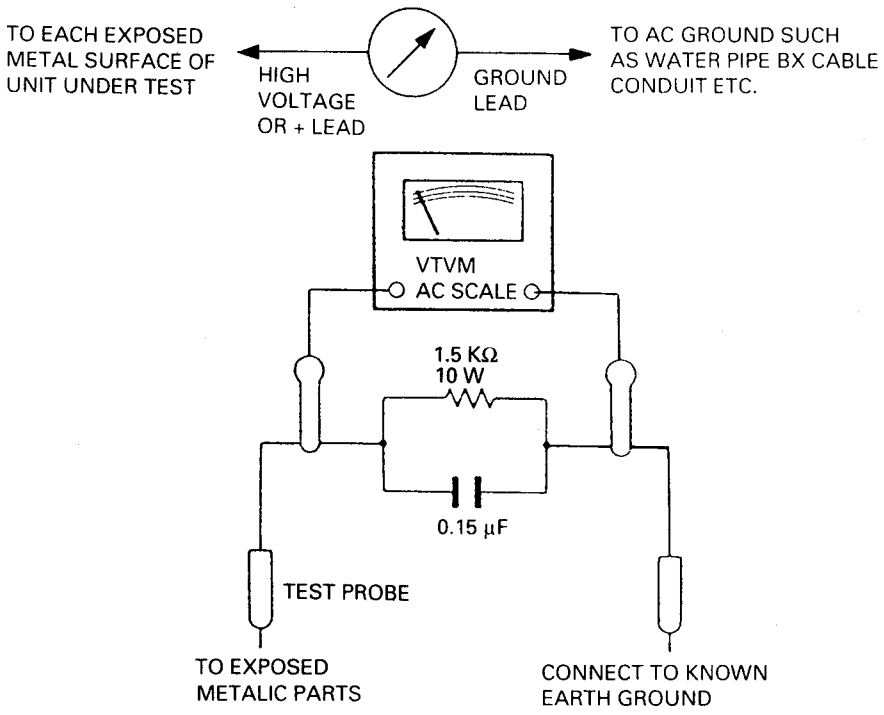
Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to makes 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, connects a 1500 ohm, 10-watt resistor paralleled by a 0.15μF 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

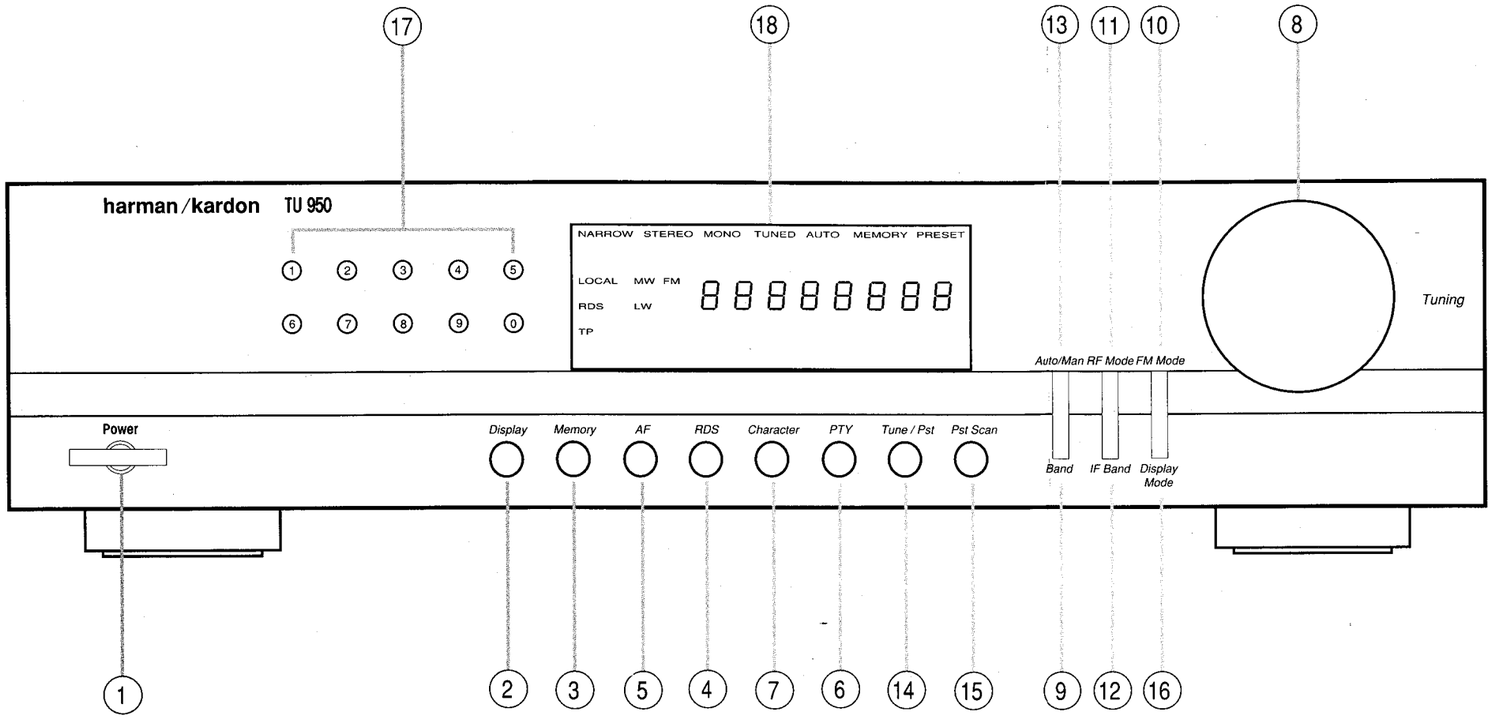
•FM SECTION	Nominal	Limit
Test Condition: 40 kHz DEV., 1 kHz Freqency.		
Tuning Range/Step	87.5 MHz - 108 MHz/50 kHz	
Usable Sensitivity (-26 dB S/N)		
Mono	≤15.2 dBf	≤19.2 dBf
Limiting Sens at -3 dB	≤12.2 dBf	≤17.2 dBf
46 dB Quieting Sens		
Stereo	≤46 dBf	≤46.8 dBf
Total Harmonic Distortion		
Mono	≤0.3%	≤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 Tereshold 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



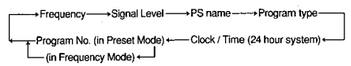
1. POWER BUTTON

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

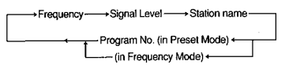
Pressing this button will display information about the current frequency or station. Each press of the button will cycle the display to the next item in the sequence. The information available will vary with the band in use and the availability of RDS information.

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

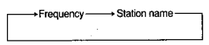


Note: Due to the nature of RDS transmissions, the unit needs to be tuned to a station for a short period before the time display will appear. This is normal and does not indicate a fault with either the unit or broadcast station.

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.

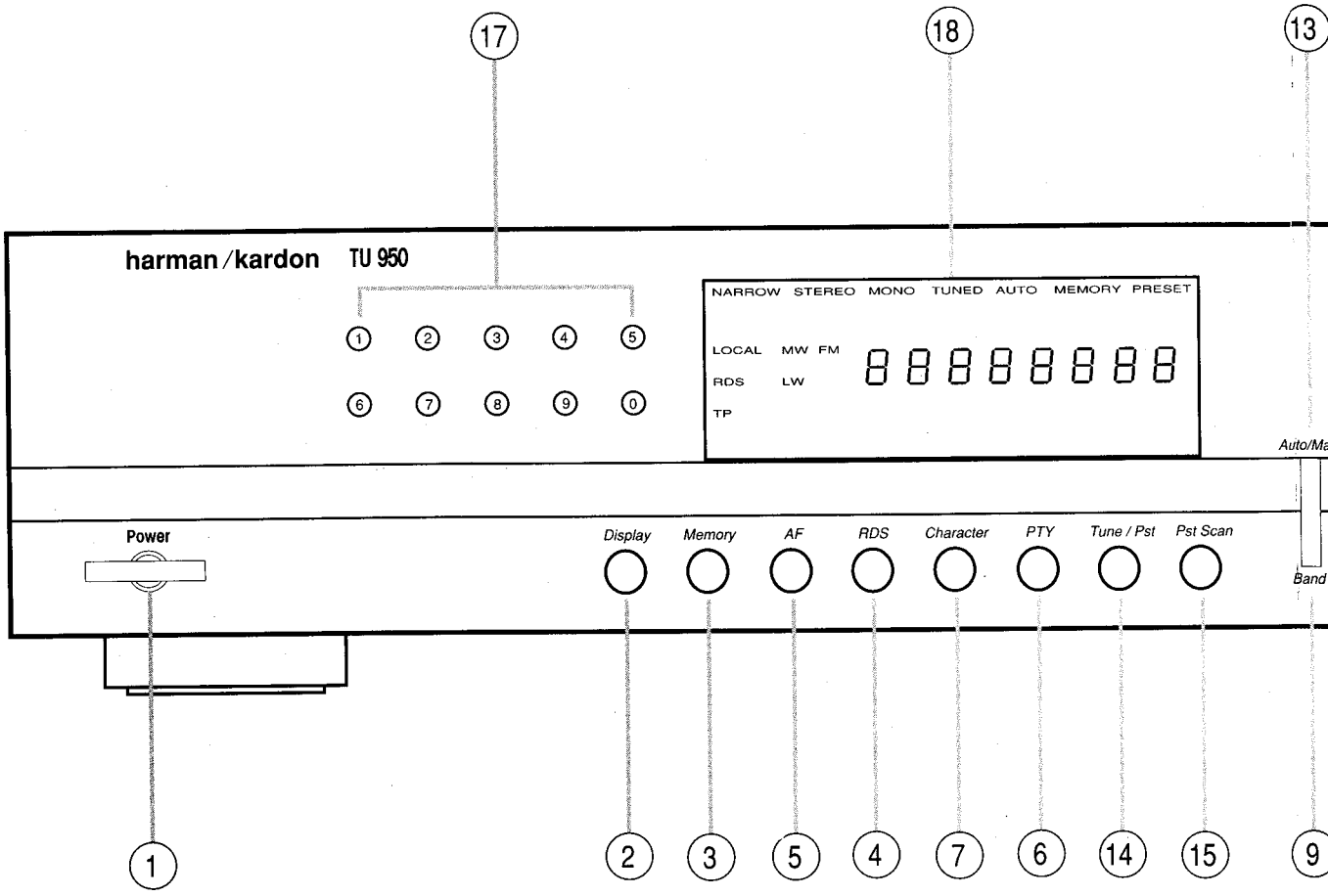
6. PTY BUTTON

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
- 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.

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.

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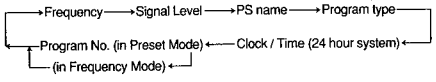
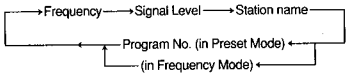
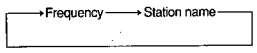


Note: Due to the nature of RDS transmissions, the unit needs to be tuned to a station for a short period before the time display will appear. This is normal and does not indicate a fault with either the unit or broadcast station.

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



c) Display for MW or LW:



3. MEMORY BUTTON

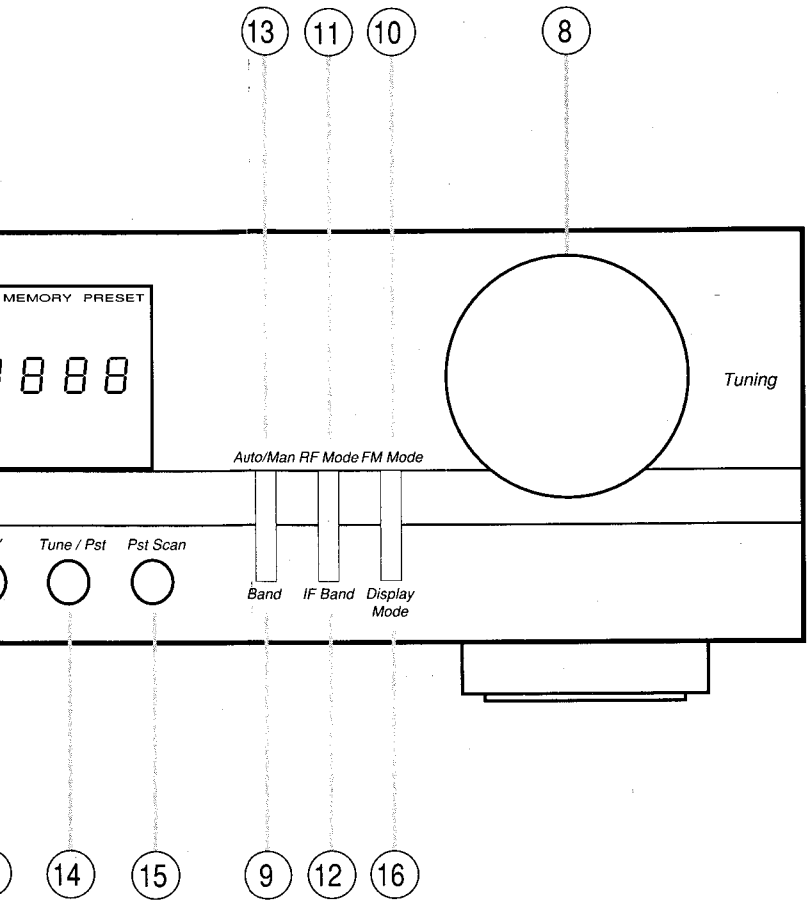
This button is used to enter stations into the preset memories. The memory indicator blinks when the button is pressed.

4. RDS BUTTON

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

When no signals are available wi RDS data, the display will indicat "NO RDS".

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



S BUTTON

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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:

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- LIGHT M: Light Classical Music
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- 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 it's 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.

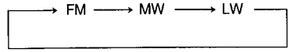
In addition to standard tuning, a number of automated tuning methods are available:

- 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.

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This knob has a number of functions, although it's 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

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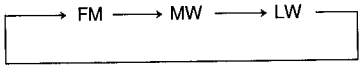

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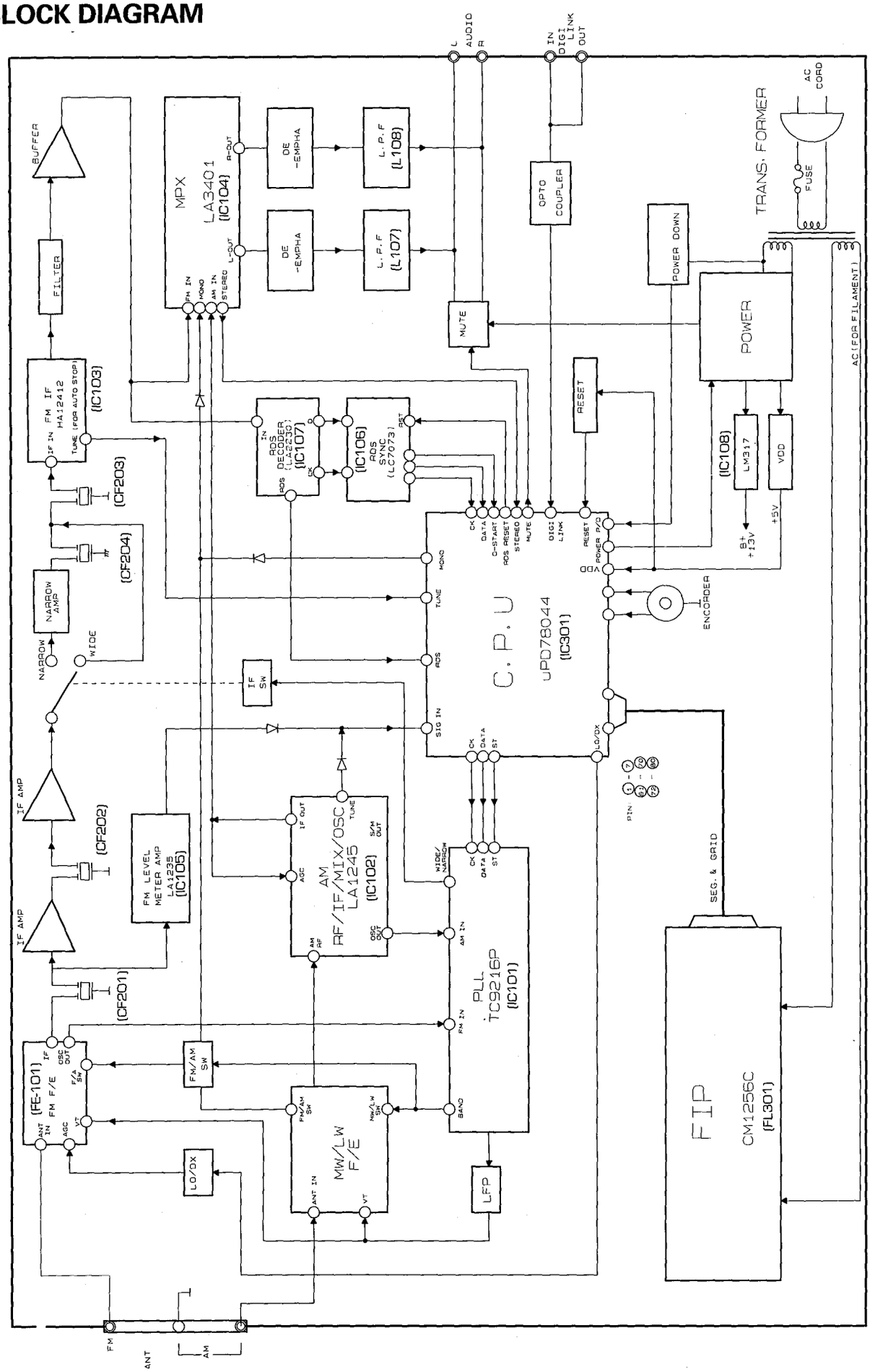
BLOCK DIAGRAM



DISASSEMBLY PROCEDURES

[1] COVER TOP REMOVAL

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

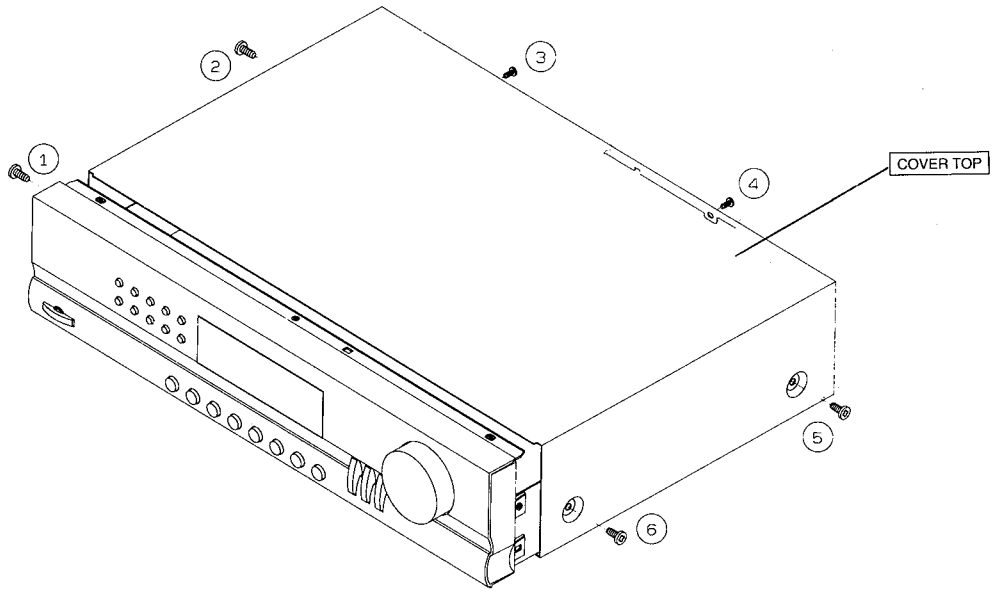


Fig. 1

[2] FRONT PANEL ASSEMBLY REMOVAL

1. Remove the cover top. (Refer to step [1])
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.

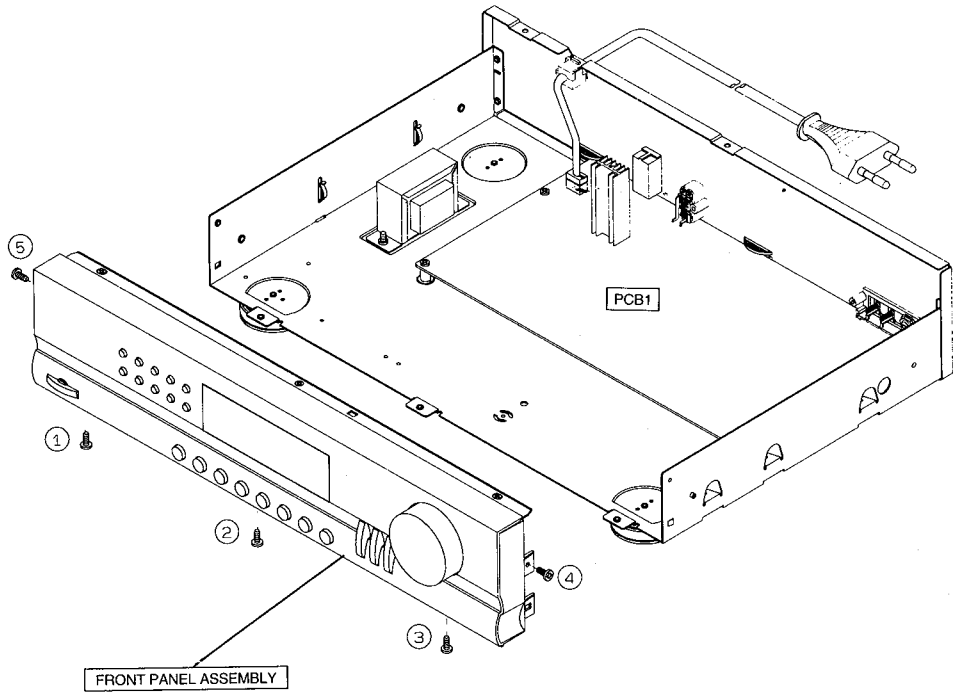


Fig. 2

[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 arround it outward.

[4] PCB3(POWER) REMOVAL

1. Remove the front Panel assembly (Refer to step [2]).
2. Remove PCB3 by pressing the hooks arround 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.

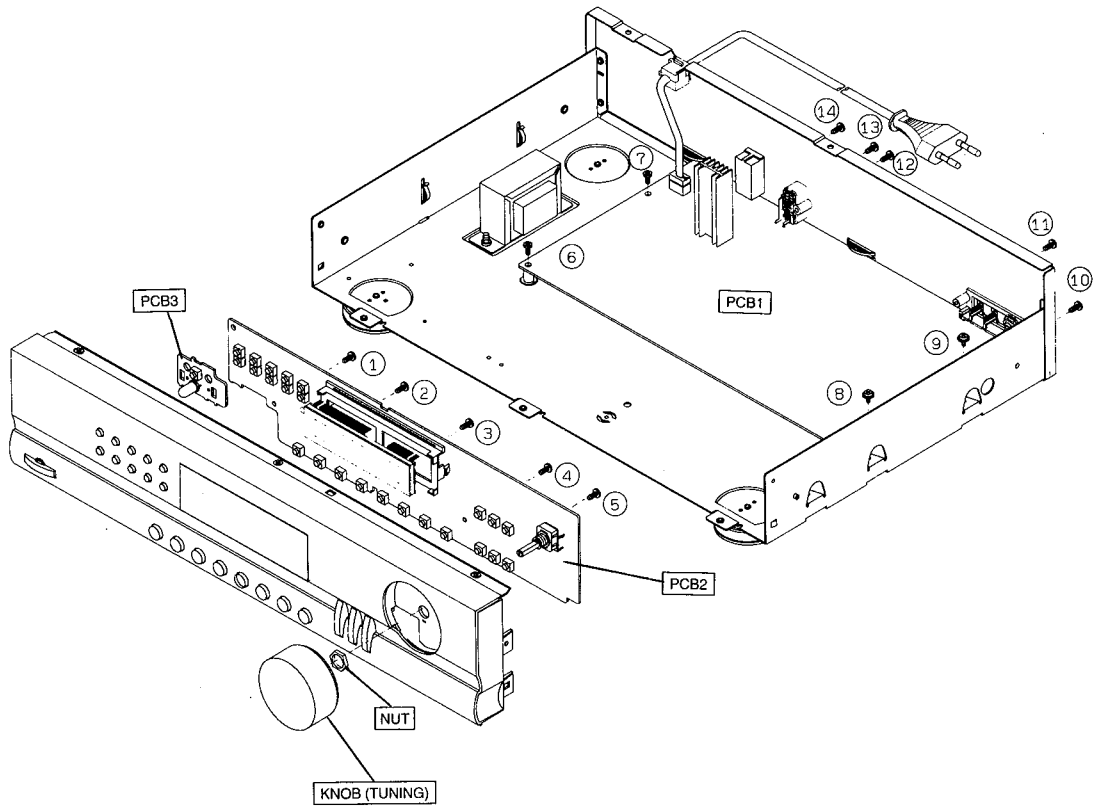
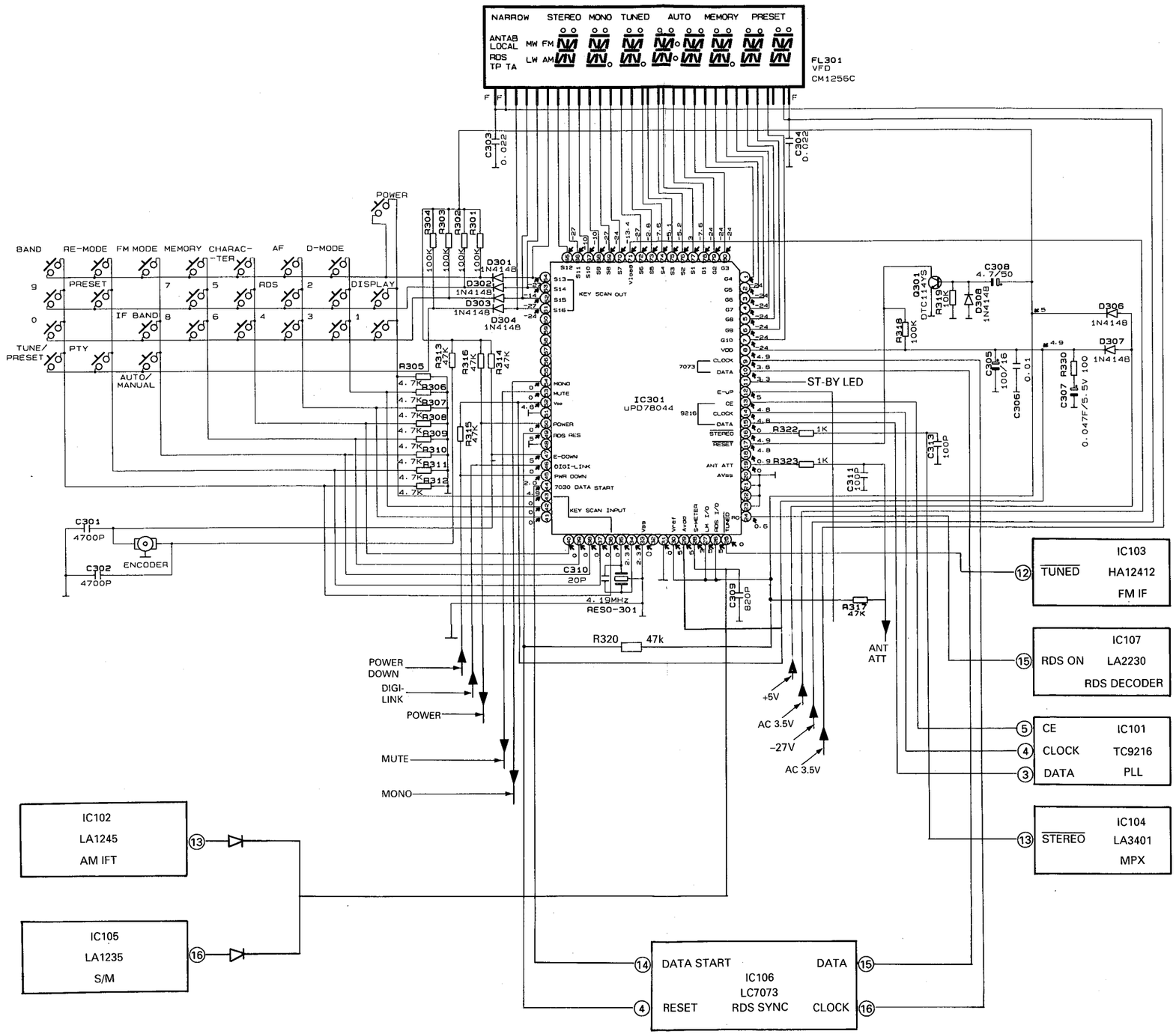


Fig. 3

CIRCUIT DESCRIPTION

µPD78044 (IC301)

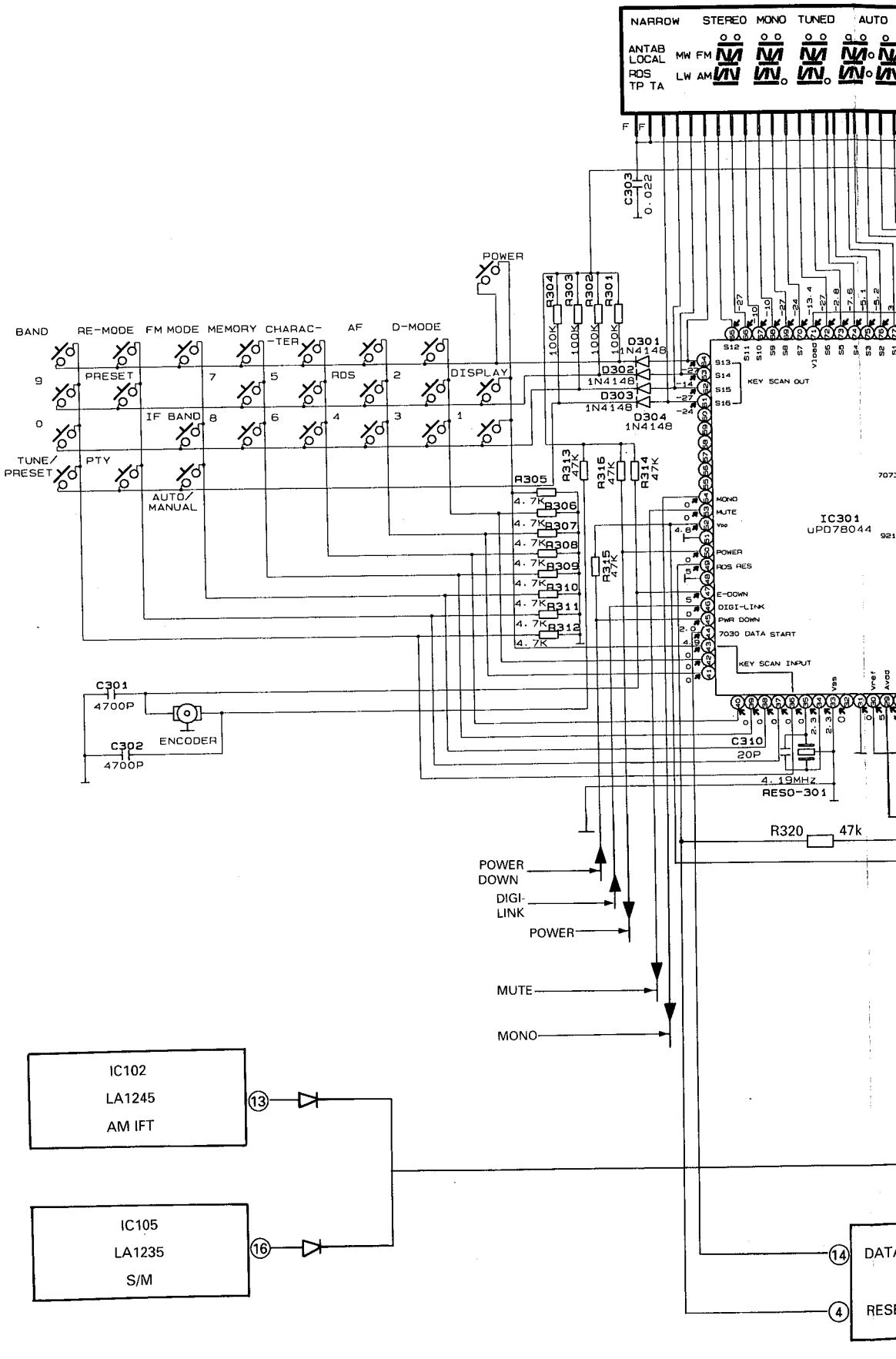
1. CPU Pin Configration

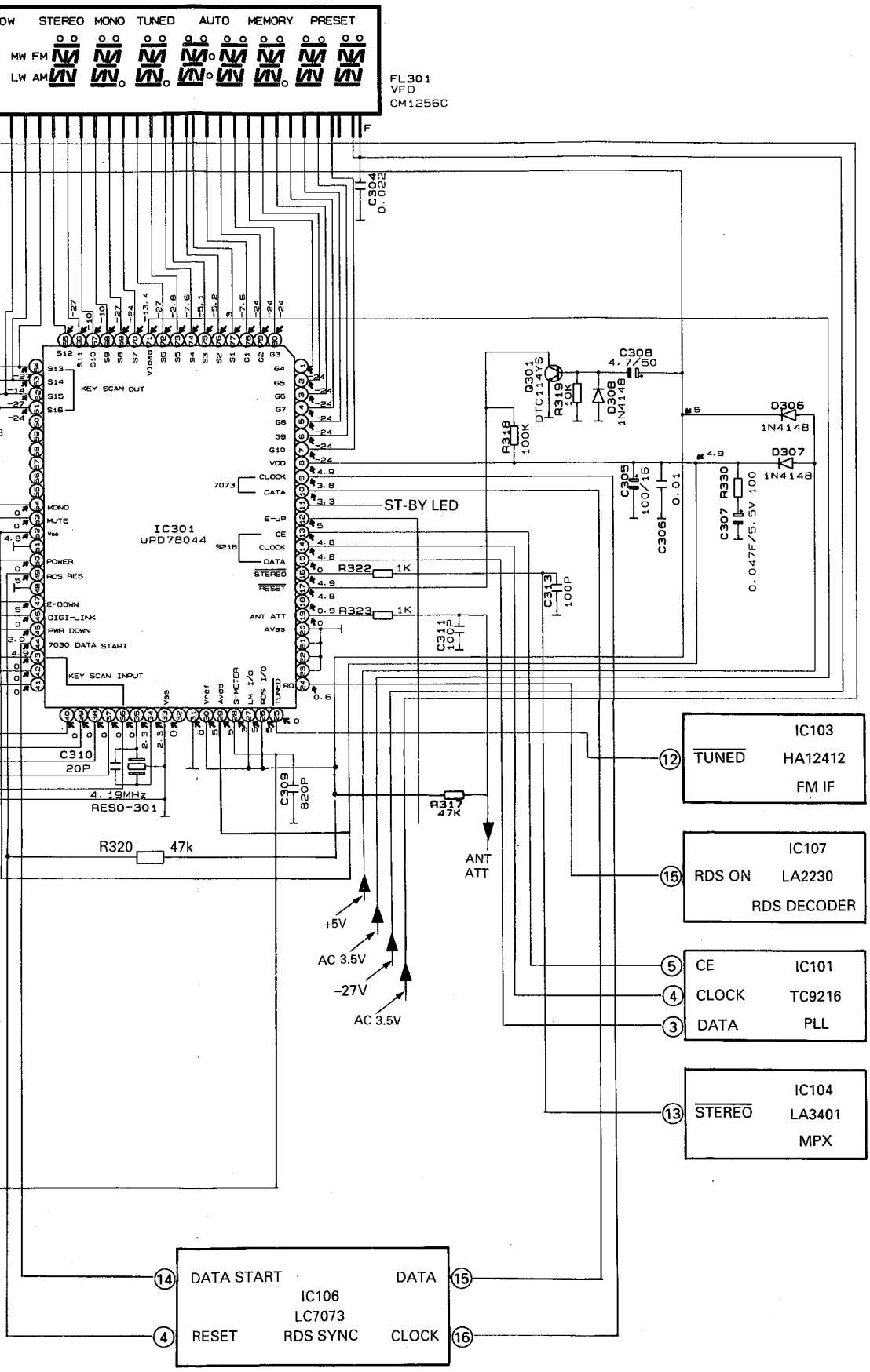


CIRCUIT DESCRIPTION

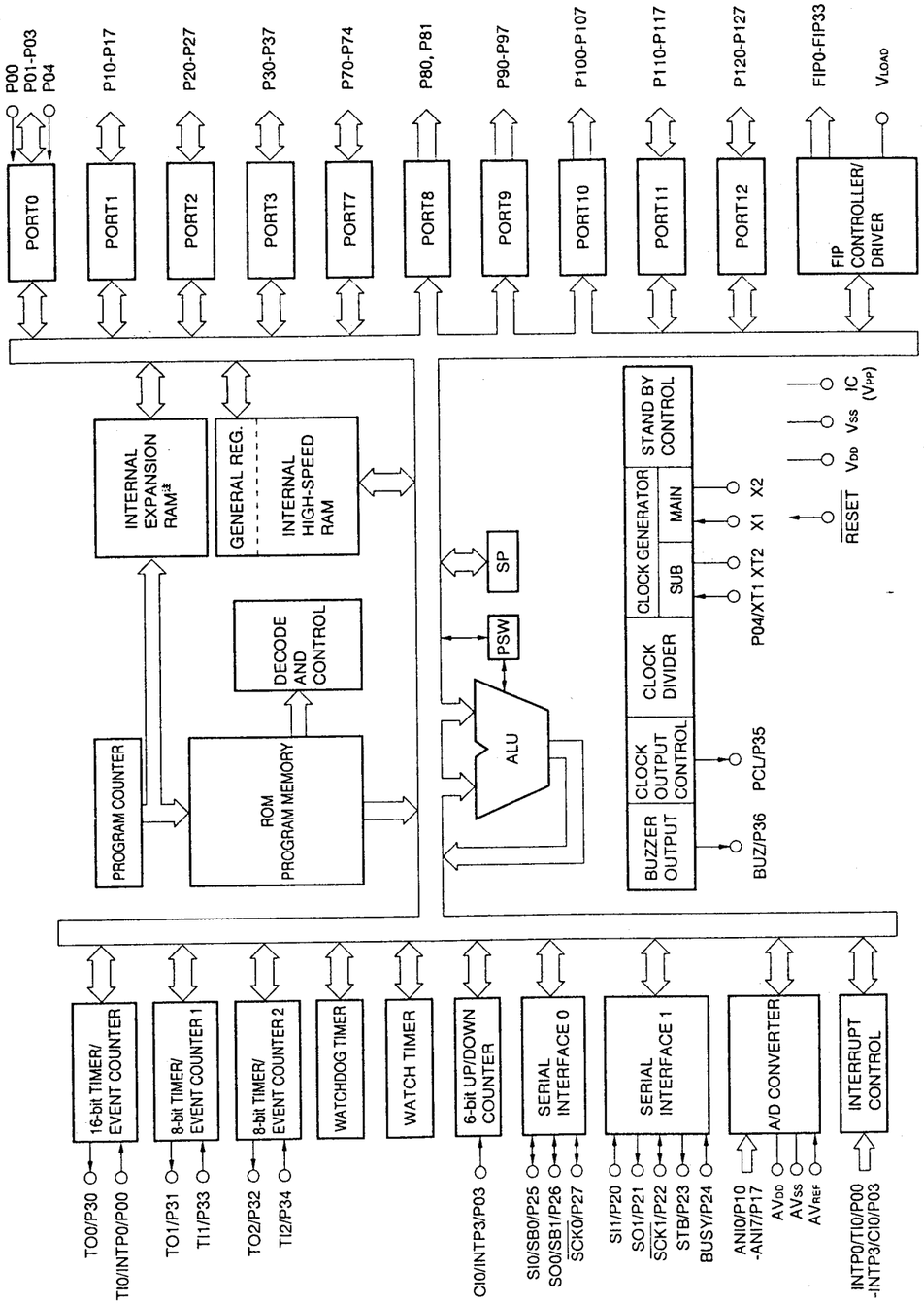
μPD78044 (IC301)

1. CPU Pin Configration




STEREO
MONO
TUNED
AUTO
MEMORY
PRESET
MW FM
LW AM
FL301
VFD
CM1256C
IC301
uPD78044
KEY SCAN OUT
KEY SCAN INPUT
ST-BY LED
C304
0.022
C308
4.7/50
Q301
DTC114YS
R319
10K
D308
1N4148
R318
100K
D306
1N4148
D307
1N4148
C305
100/16
C306
0.01
C307
0.047F/5.5V
R330
100
R322
1K
R323
1K
C313
100P
C311
10P
C310
20P
4.19MHz
RES0-301
C309
820P
R317
47K
R320
47k
ANT
ATT
+5V
AC 3.5V
-27V
AC 3.5V
IC103
TUNED
HA12412
FM IF
IC107
RDS ON
LA2230
RDS DECODER
CE
CLOCK
DATA
IC101
TC9216
PLL
STEREO
IC104
LA3401
MPX
DATA START
RESET
IC106
LC7073
RDS SYNC
DATA
CLOCK

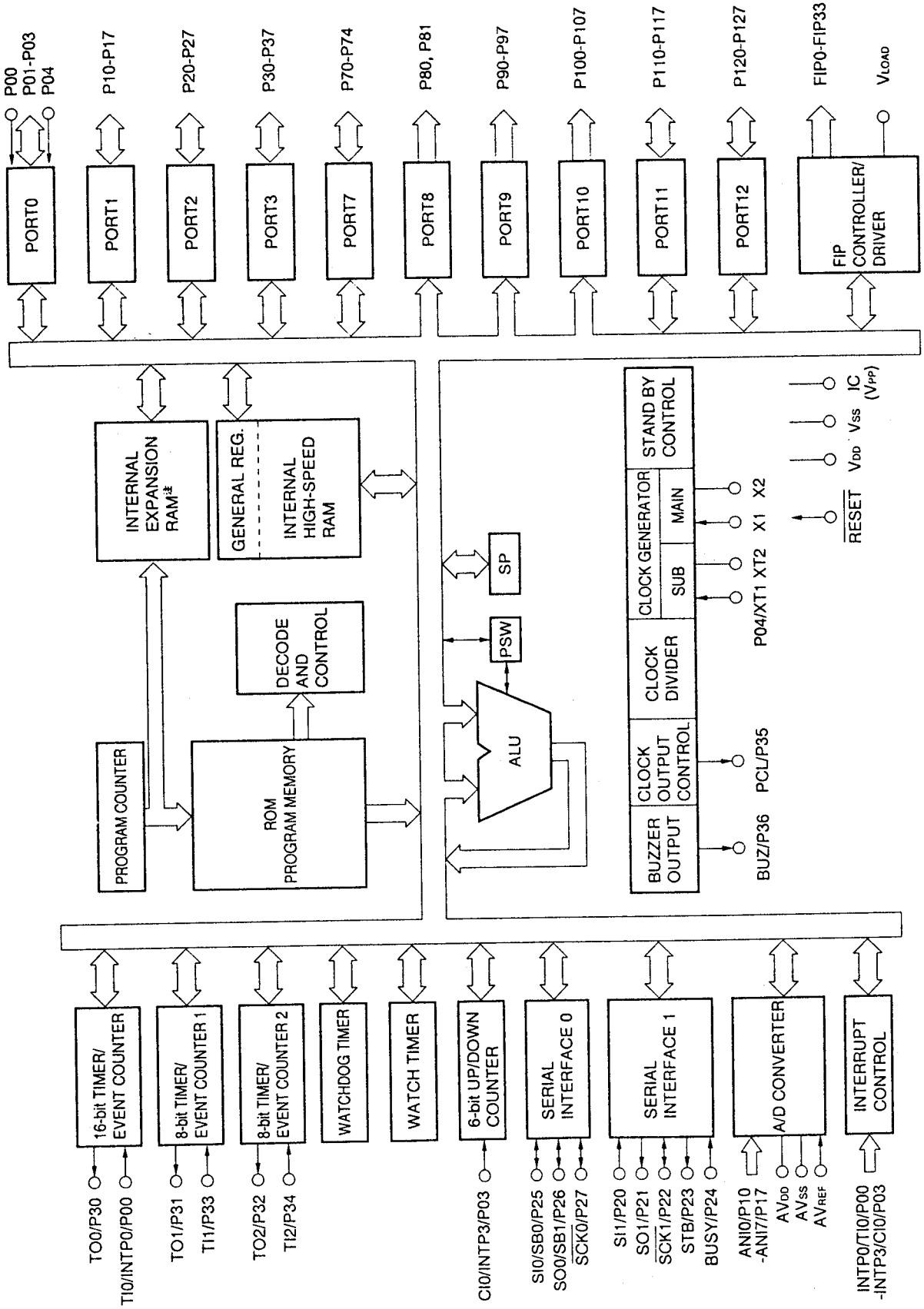
2. Block Diagram



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	$\overline{\text{STEREO}}$	Input to light "STEREO" indicator. (At "L", it is active)
17	$\overline{\text{RESET}}$	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	$\overline{\text{TUNED}}$	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	$\overline{\text{RDS RES}}$	Output to reset LC7073 when RDS button is pressed. (At "H", it is active)
50	$\overline{\text{POWER}}$	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.

2. Block Diagram



3. Pin

Pin N
1 ~ 7
8
9/10
11
12
13
14/1
16
17
18
19
20
21 ~
24
25
26
27
28
29
30
31
32
33
34/3
36 ~
44
45
46
47
48
49
50
51
52
53
54
55 ~
61 ~
71
72 ~
78 ~

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	$\overline{\text{STEREO}}$	Input to light "STEREO" indicator. (At "L", it is active)
17	$\overline{\text{RESET}}$	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	$\overline{\text{TUNED}}$	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	$\overline{\text{RDS RES}}$	Output to reset LC7073 when RDS button is pressed. (At "H", it is active)
50	$\overline{\text{POWER}}$	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.

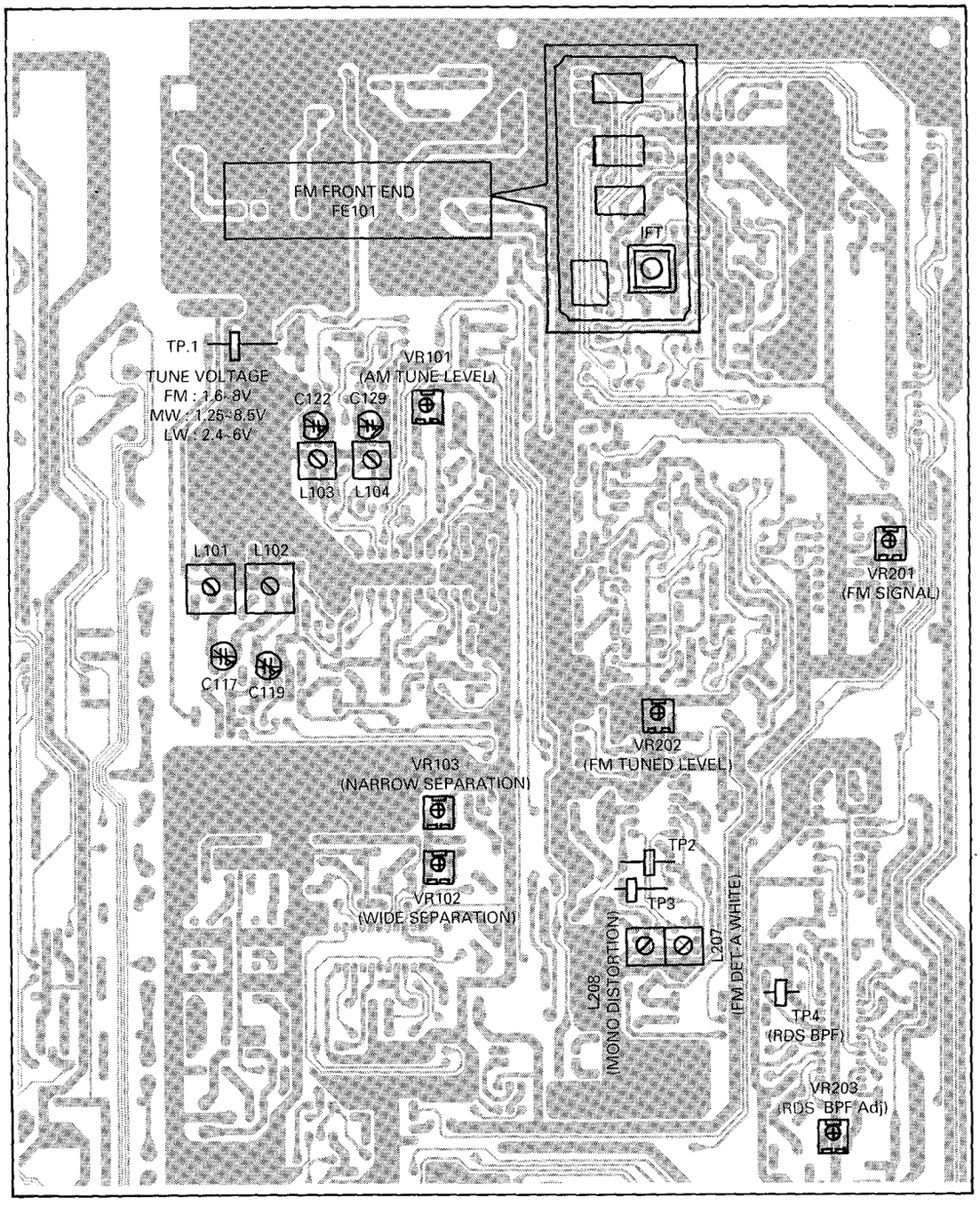
ALIGNMENT PROCEDURES

1. Equipment Required

- AM Standard Signal Generator (AM SSG.)
- Oscilloscope
- AC Voltmeter
- FM Standard Signgl 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.

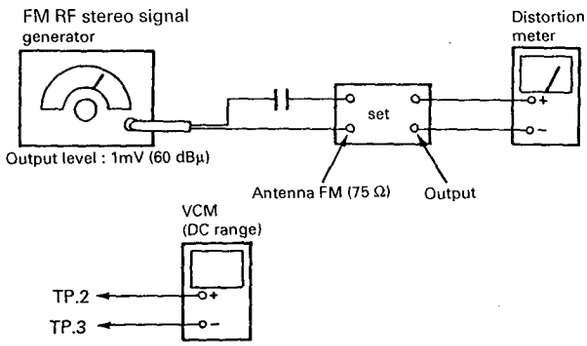
FM SECTION

• 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)

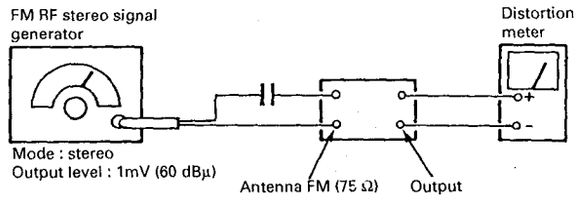


Procedure :

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 meter ·····MONO 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.

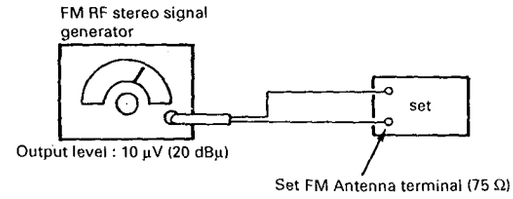
FM Stereo Distortion Adjustment



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.

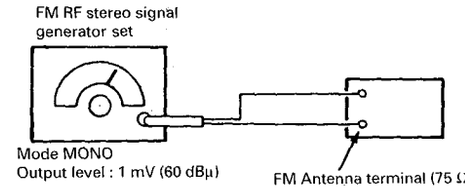
FM Tuned Indication Lighting Level Adjustment



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.

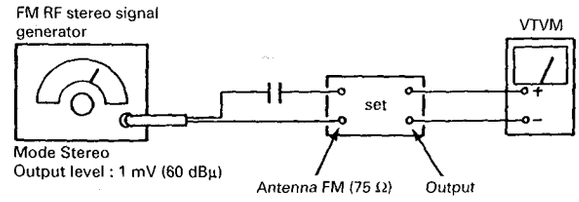
FM Signal Level Adjustment



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

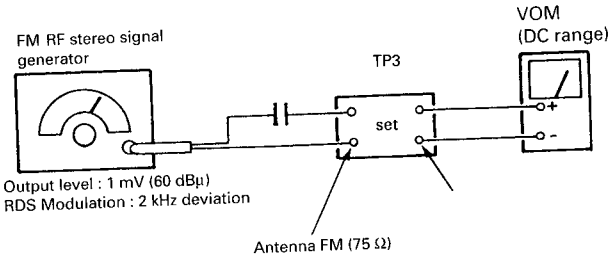


Procedure :

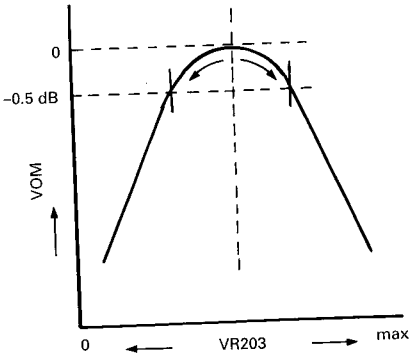
FM stereo signal generator output channel	VTVM Connection	VTVM reading (dB)
L-CH.	L-CH.	Ⓐ
R-CH.	L-CH.	Ⓑ Adjust VR102 minimum reading.
R-CH.	R-CH.	Ⓒ
L-CH.	R-CH.	Ⓓ Adjust VR102 for minimum reading.

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.

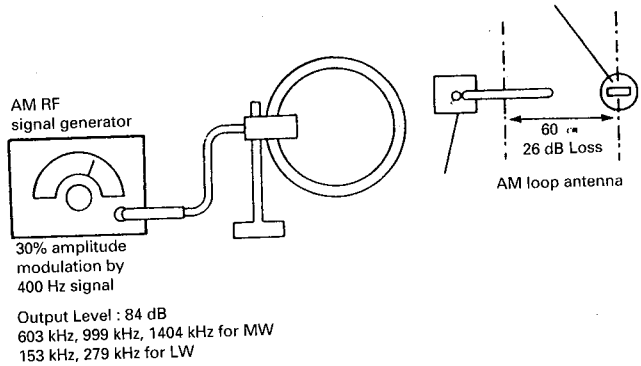
RDS, BPF Adjustment



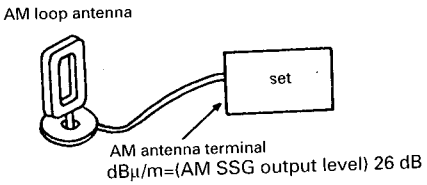
Procedure :
1. Tune the set to 98 MHz.
2. Adjust VR203 to maximum level (tolerance : –0.5 dB) on the VOM near center position not left or right end. (refer to below drawing)



AM SECTION



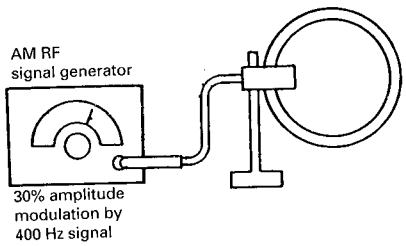
Output Level : 84 dB
603 kHz, 999 kHz, 1404 kHz for MW
153 kHz, 279 kHz for LW

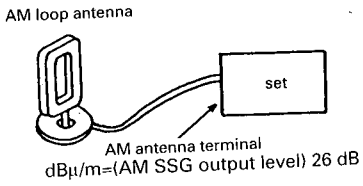


AM VT Adjustment

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

AM Tracking Adjustment





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.

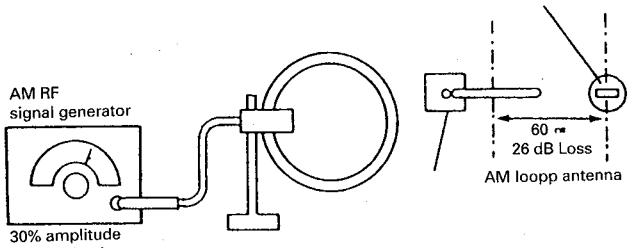
AM TUNED Level Adjustment

Procedure :

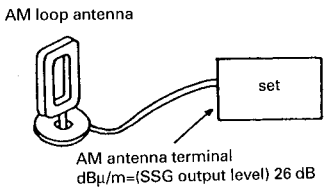
1. Set AM SSG output level so that antenna input level of the set becomes 630 µV (56 dBµ/m).
2. Adjust VR101 to the point that the "TUNED" indicator begins to illuminate.

LW SECTION

LW VT Adjustment

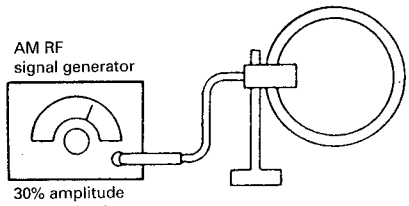


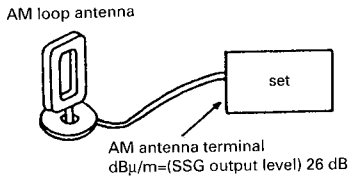
Output Level : 84 dB
603 kHz, 999 kHz, 1404 kHz for MW
153 kHz, 279 kHz for LW



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

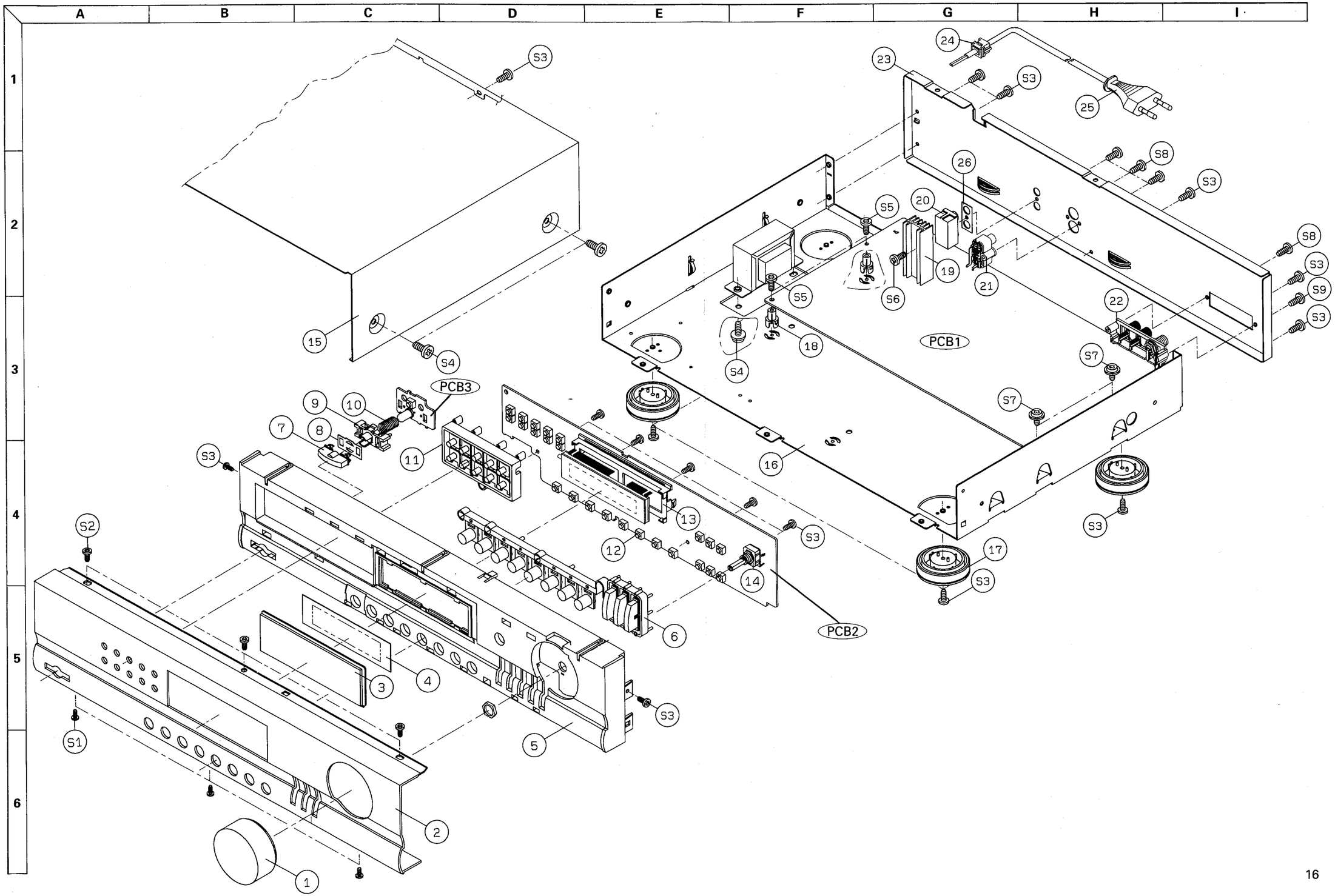
LW Tracking Adjustment



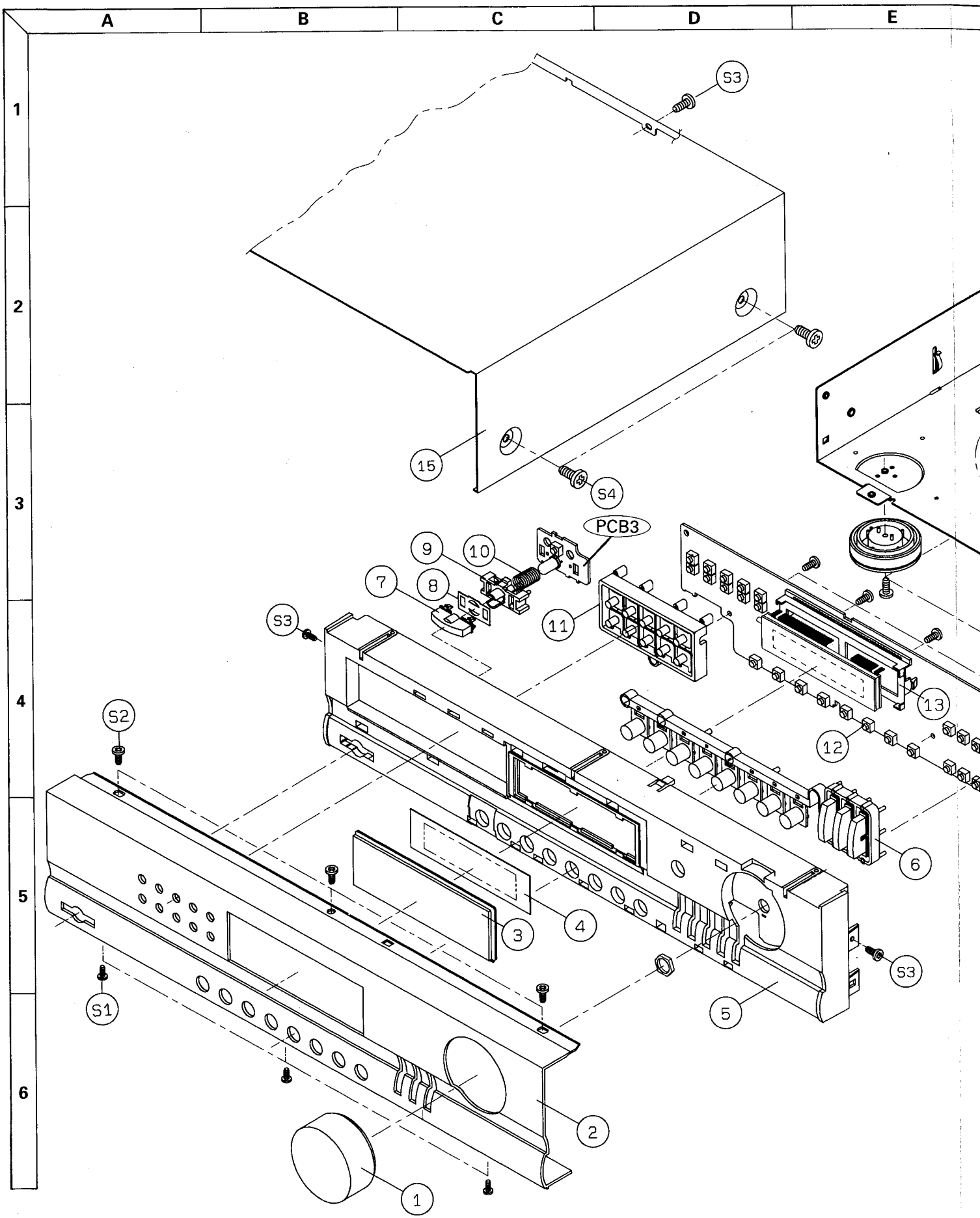


1. Set to LW 153 kHz and adjust L104 to maximize AUDIO output level.
2. Set to LW 279 kHz and adjust C129 to maximize AUDIO output level.
3. Repeat the above adjustments 1 and 2.

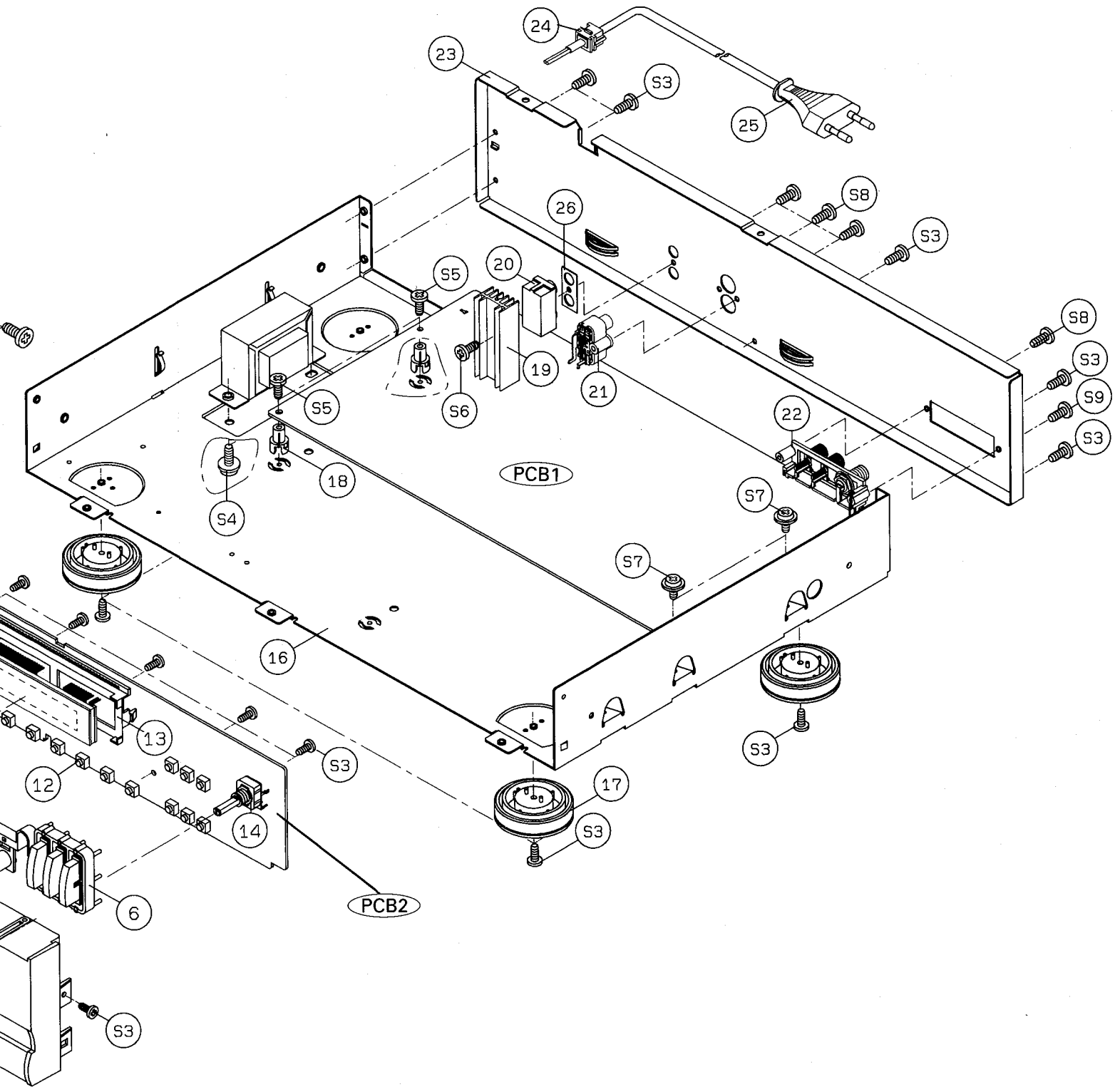
GENERAL UNIT EXPLODED VIEW



GENERAL UNIT EXPLODED VIEW

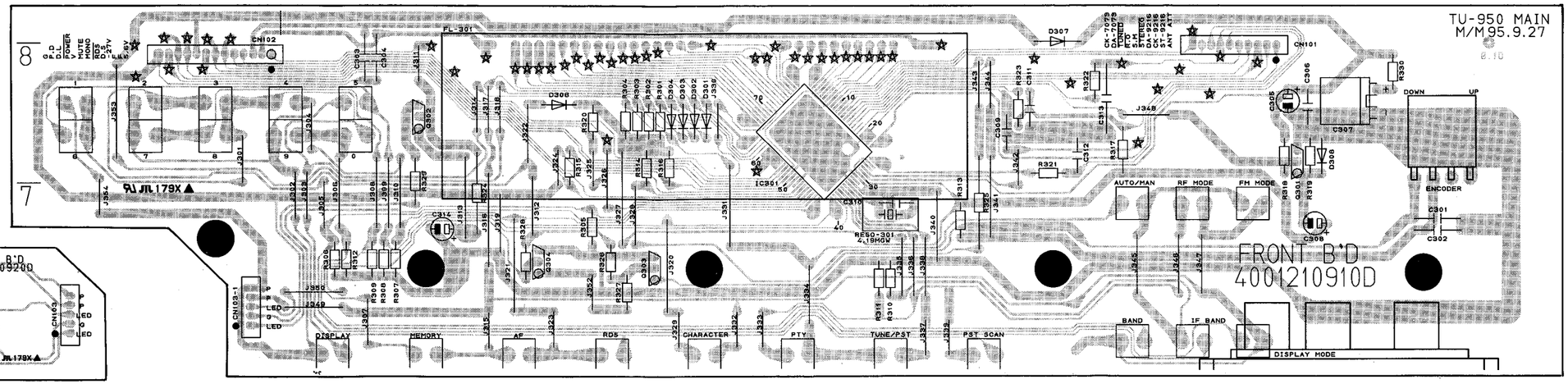


E	F	G	H	I

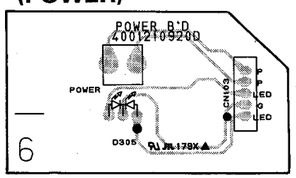

24
23
S3
25
26
S8
S3
20
S5
S8
S3
S9
S3
19
21
S6
S5
22
18
PCB1
S4
S7
S7
16
13
S3
12
14
17
S3
S3
PCB2
6
S3

PRINTED CIRCUIT BOARDS

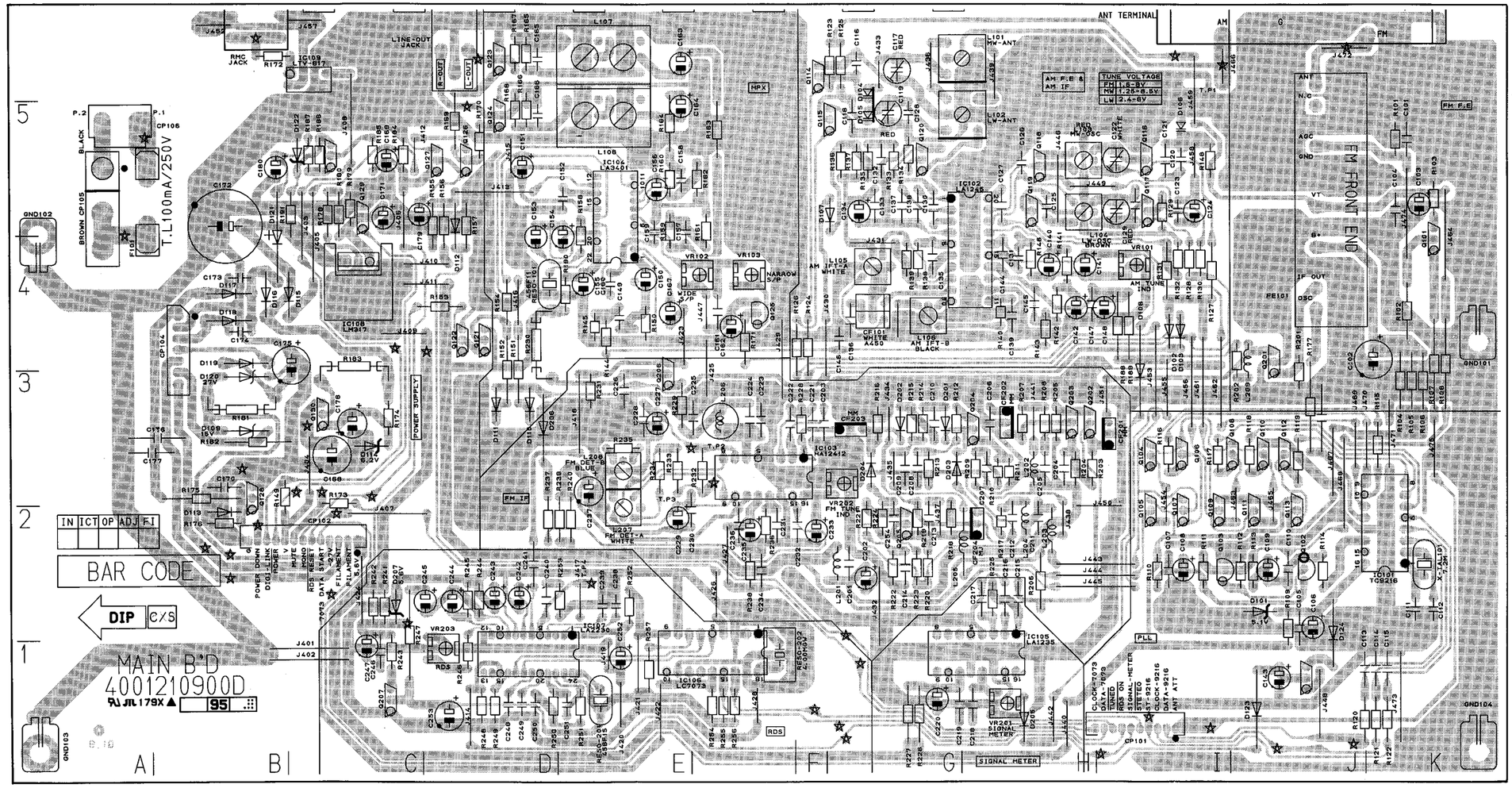
PCB2 (FRONT)



PCB3 (POWER)



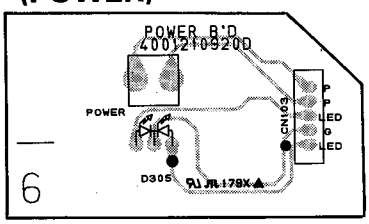
PCB1 (MAIN)

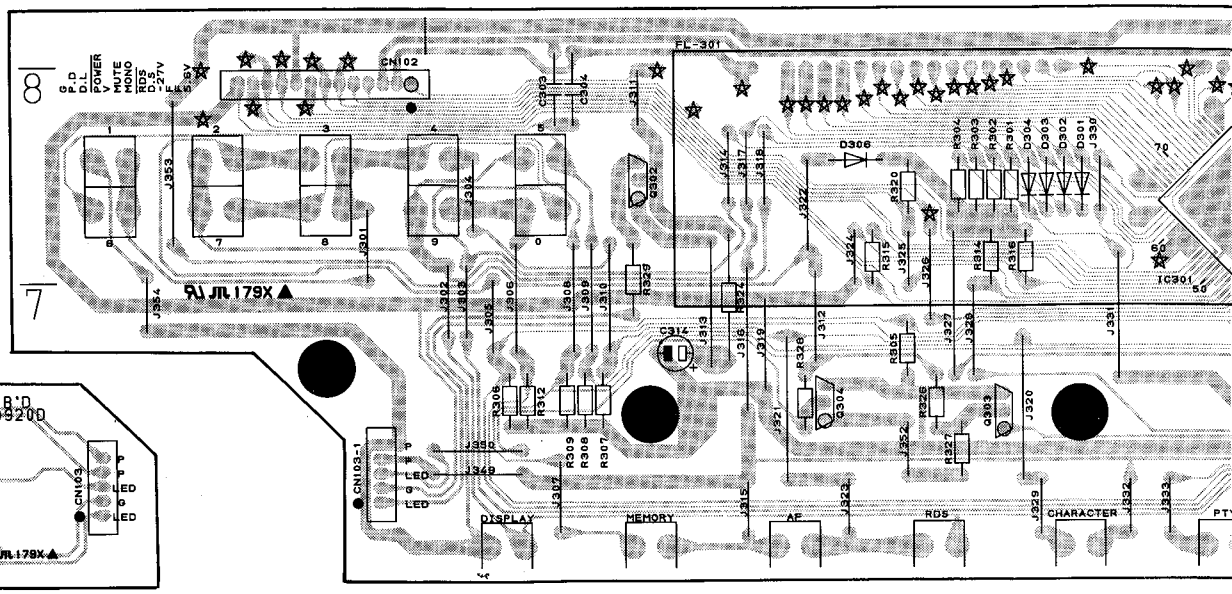


PRINTED CIRCUIT BOARDS

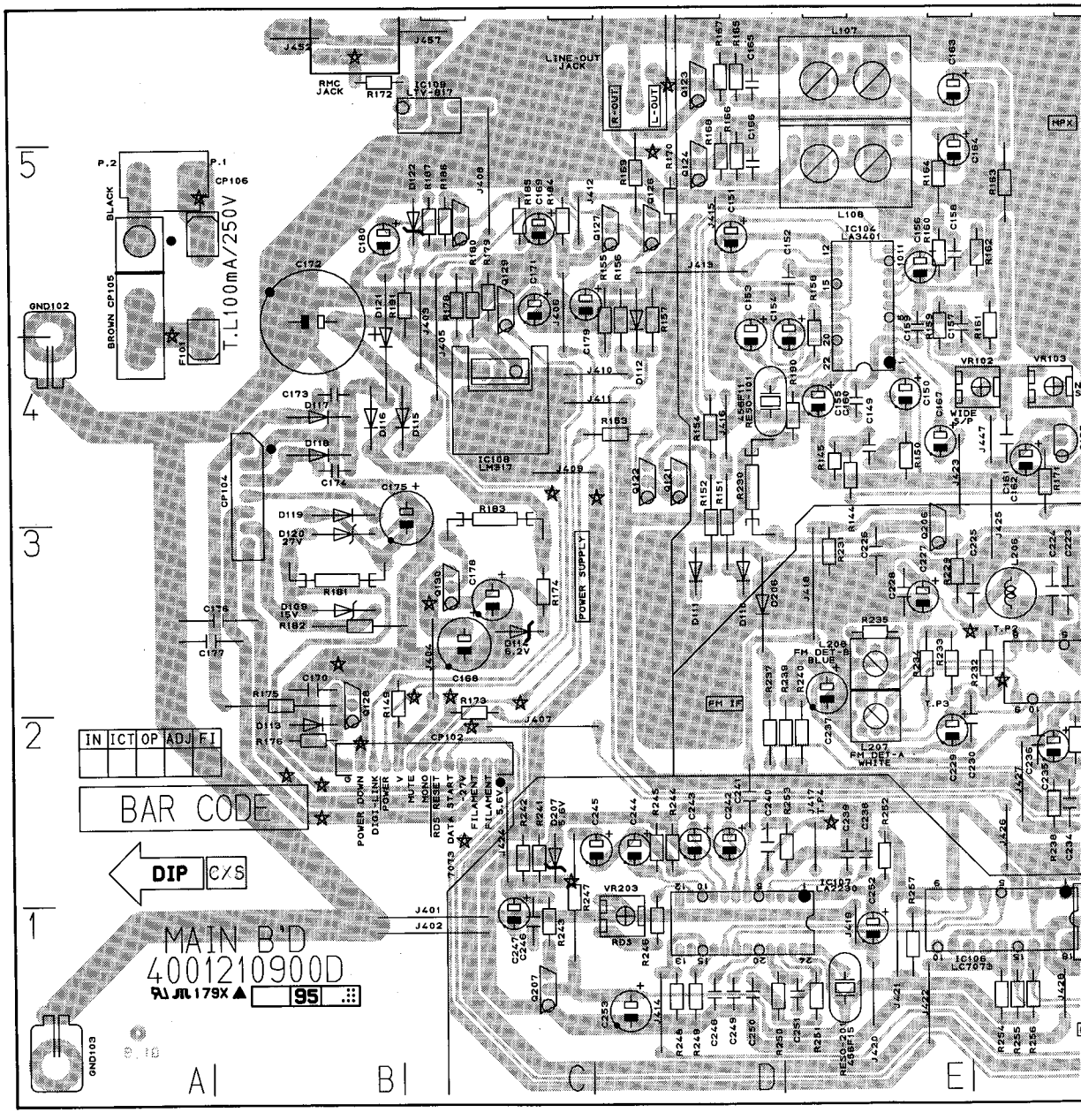
PCI

PCB3
(POWER)

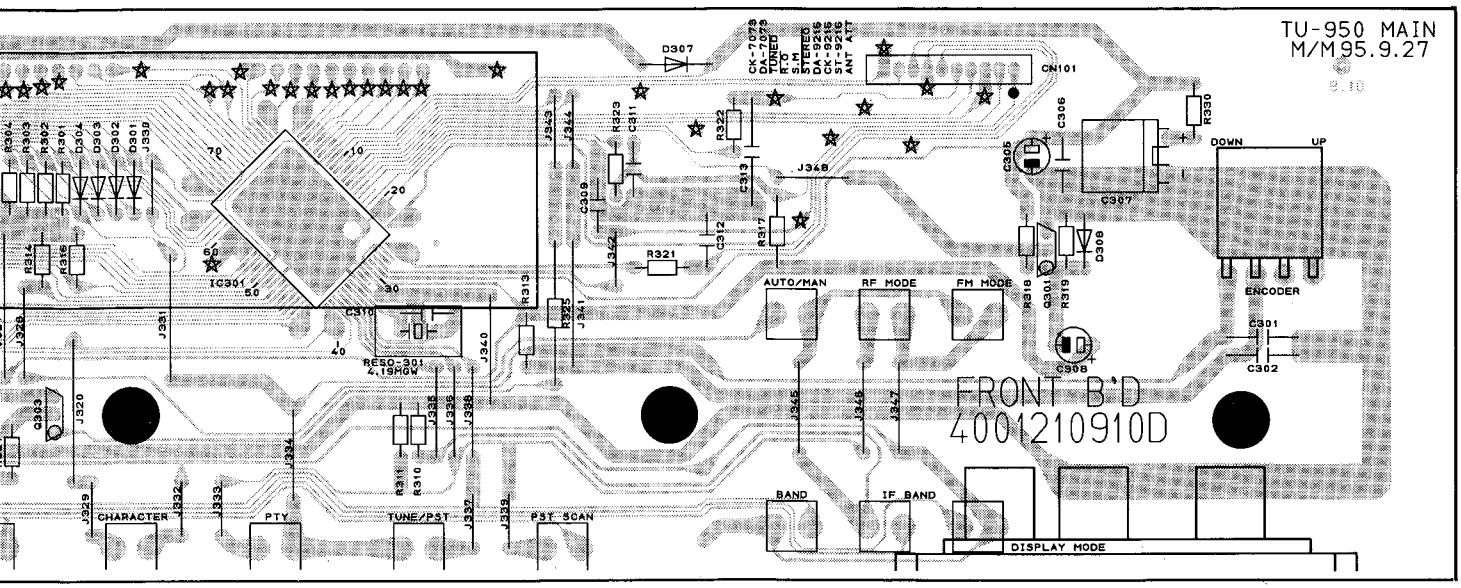


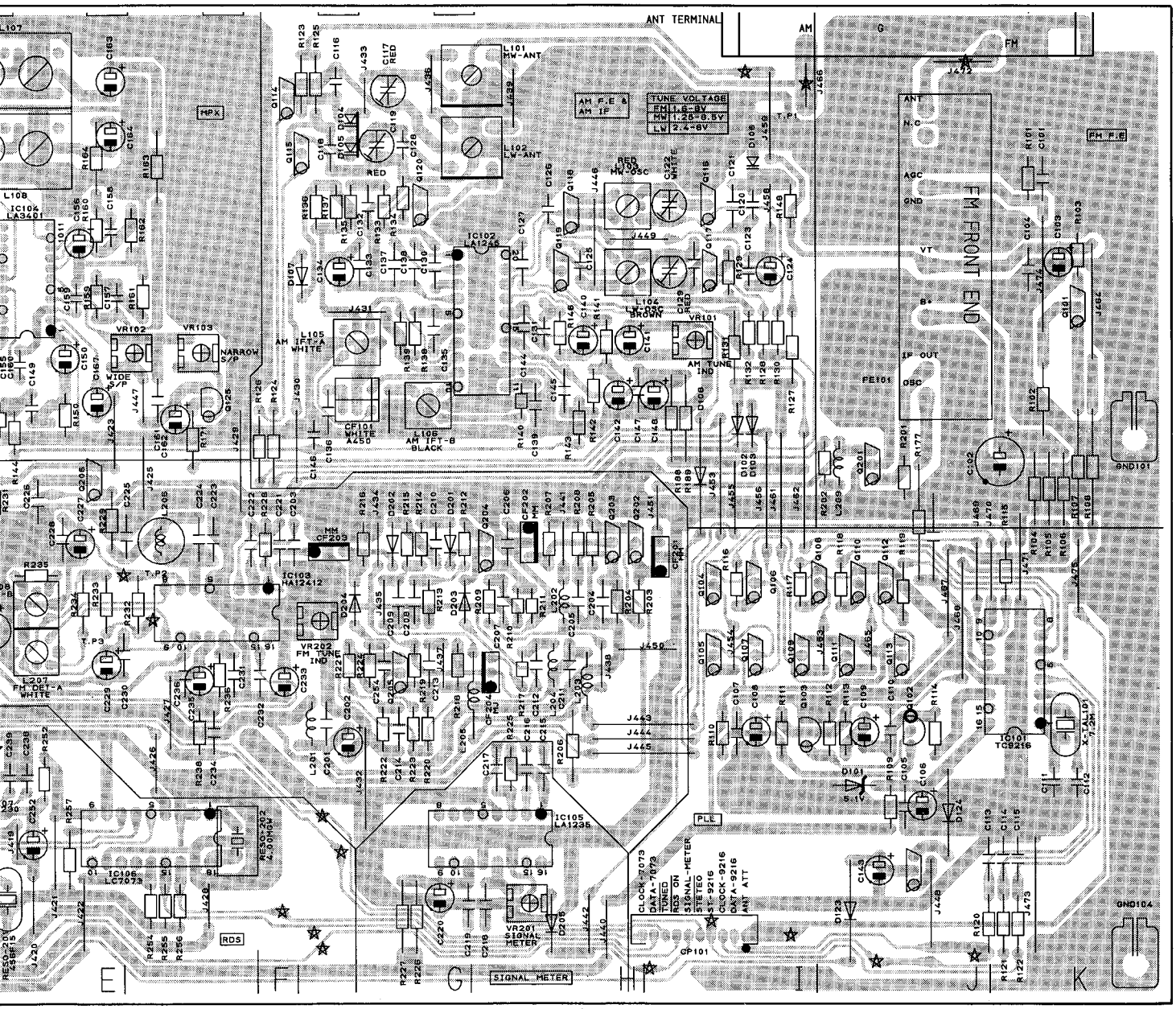


PCB1 (MAIN)



PCB2 (FRONT)


TU-950 MAIN
M/M95.9.27
FRONT B'D
4001210910D
AUTO/MAN
RF MODE
FM MODE
ENCODER
DOWN
UP
BAND
IF BAND
DISPLAY MODE
CHARACTER
PTY
TUNE/PST
PST SCAN
IC301
RESO-301
4.19MHz


ANT TERMINAL
AM
FM
FM FRONT END
AM F.E & AM IF
TUNE VOLTAGE
FM 1.5-8V
MW 1.25-8.5V
LW 2.4-8V
IC102 LA1245
IC103 HA12412
IC104 LA3401
IC105 LA1235
IC106 LC7073
IC107 TC9216
MPX
RDS
PLL
SIGNAL METER
RESO-202 4.50MHz
RESO-201 4.19MHz
X'TAL101 7.2MHz
GND101
GND104

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 ⚠ in the part list are of special significance to safety. When replacing a component identified with ⚠ , 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 ⚠ 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 : (±0.5%), J : (±5%), K : (±10%), M : (±20%), Z : +80, – 20%)

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

Ref. No.	Description	Mfr. part No.	Q'ty
L103	MW-OSC	2638201150	1
L104	LW-OSC	2638401060	1
L105	AM-IFT-A	2848001070	1
L106	AM-IFT-B	2848001250	1
L107	FM MPX-L	2658001020	1
L108	FM MPX-R	2658001020	1
L201-L205	Inductor, 56 uH	2648656082	5
L206	Inductor, 20.8 mH	2648601430	1
L207	FM-DET-A	2838501110	1
L208	FM-DET-B	2838501120	1
L209	Inductor, 56 uH	2648656082	1
	TRANSISTORS		
Q101	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q102	FET, 2SK168DTZ	2218211100	1
Q103	KTC2240BL/KTC3200BL, NPN	2208606108	1
Q104	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q105	DTA114YS	2208222105	1
Q106	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q107	DTA114YS	2208222105	1
Q108	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q109	DTA114YS	2208222105	1
Q110	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q111	DTA114YS	2208222105	1
Q112	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q113	DTA114YS	2208222105	1
Q114-Q119	BKTC3199Y/2SC3199Y, NPN	2208610109	6
Q120	FET, 2SK192GR	2218207115	1
Q121	DTA114YS	2208222105	1
Q122	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q123/Q124	KTD1303	2208606115	2
Q125	FET, 2SK117Y	2218207106	1
Q126	DTA114YS	2208222105	1
Q127	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q128	DTC114YS	2208622106	1
Q129	DTC114TS	2208622108	1
Q130	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q131	KTA1267Y, PNP	2208206109	1
Q132	DTA114YS	2208222105	1
Q201	FET, 2SK192GR	2218207115	1
Q202-Q205	KTC3195Y, NPN	2208406127	4
Q206	BKTC3199Y/2SC3199Y, NPN	2208610109	1
Q207	DTA114YS	2208222105	1
	RESISTORS		
R101	Carbon Film 47 kohm 1/5 W J	3069473970	1
R102	Carbon Film 100 kohm 1/5 W J	3069104970	1
R103	Metal Film 560 ohm 1/5 W J	3029561970	1
R104-R106	Metal Film 220 ohm 1/5 W J	3029221970	3
R107	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R108	Metal Film 1 kohm 1/5 W J	3029102970	1
R109	Metal Film 330 ohm 1/5 W J	3029331970	1
R110	Metal Film 220 ohm 1/5 W J	3029221970	1
R111	Carbon Film 10 kohm 1/5 W J	3069103970	1
R112	Metal Film 100 ohm 1/5 W J	3029101970	1
R113	Carbon Film 1.5 kohm 1/5 W J	3069152970	1
R114	Metal Film 820 ohm 1/5 W J	3029821970	1
R115-R119	Carbon Film 4.7 kohm 1/5 W J	3069472970	4
R120-R122	Metal Film 1 kohm 1/5 W J	3029102970	3
R123	Carbon Film 100 kohm 1/5 W J	3069104970	1
R124	Carbon Film 47 kohm 1/5 W J	3069473970	1
R125	Carbon Film 100 kohm 1/5 W J	3069104970	1
R126-R128	Carbon Film 47 kohm 1/5 W J	3069473970	3
R129	Carbon Film 1.5 Mohm 1/5 W J	3069155970	1
R130	Carbon Film 100 kohm 1/5 W J	3069104970	1
R131	Carbon Film 47 kohm 1/5 W J	3069473970	1
R132	Carbon Film 100 kohm 1/5 W J	3069104970	1
R133	Metal Film 820 ohm 1/5 W J	3029821970	1
R134	Metal Film 82 ohm 1/5 W J	3029820970	1
R135	Metal Film 470 ohm 1/5 W J	3029471970	1
R136/R137	Metal Film 220 ohm 1/5 W J	3029221970	2
R138	Carbon Film 1.5 kohm 1/5 W J	3069152970	1
R139	Carbon Film 100 kohm 1/5 W J	3069104970	1
R140	Metal Film 100 ohm 1/5 W J	3029101970	1
R141/R142	Carbon Film 10 kohm 1/5 W J	3069103970	2
R143	Metal Film 1 kohm 1/5 W J	3029102970	1
R144	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R145	Carbon Film 10 kohm 1/5 W J	3069103970	1
R146	Metal Film 22 ohm 1/5 W J	3029220970	1
R147	Carbon Film 27 kohm 1/5 W J	3069273970	1
R148	Carbon Film 100 kohm 1/5 W J	3069104970	1
R149	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R150	Carbon Film 100 kohm 1/5 W J	3069104970	1
R151/R152	Carbon Film 10 kohm 1/5 W J	3069103970	2

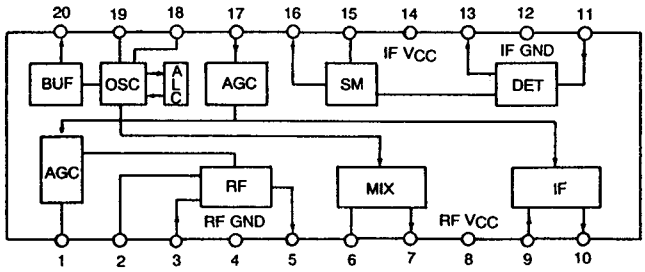
Ref. No.	Description	Mfr. part No.	Q'ty
R153	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R154	Carbon Film 10 kohm 1/5 W J	3069103970	1
R155	Carbon Film 5.6 kohm 1/5 W J	3069562970	1
R156	Carbon Film 10 kohm 1/5 W J	3069103970	1
R157	Carbon Film 100 kohm 1/5 W J	3069104970	1
R158	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R159/R160	Carbon Film 100 kohm 1/5 W J	3069104970	2
R161/R162	Carbon Film 120 kohm 1/5 W J	3069124970	2
R163/R164	Carbon Film 3 kohm 1/5 W J	3069302970	2
R165/R166	Carbon Film 3.3 kohm 1/5 W J	3069332970	2
R167/R168	Carbon Film 1.5 kohm 1/5 W J	3069152970	2
R169/R170	Carbon Film 3.3 kohm 1/5 W J	3069332970	2
R171	Carbon Film 100 kohm 1/5 W J	3069104970	1
R172	Metal Film 270 ohm 1/5 W J	3029271970	1
R173	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R174	Metal Film 1 kohm 1/5 W J	3029102970	1
R175	Carbon Film 22 kohm 1/5 W J	3069223970	1
R176	Carbon Film 10 kohm 1/5 W J	3069103970	1
R177	Metal Film 470 ohm 1/5 W J	3029471970	1
R178	Metal Film 22 ohm 1/5 W J	3029220970	1
R179	Carbon Film 1.8 kohm 1/5 W J	3069182970	1
R180	Metal Film 180 ohm 1/5 W J	3029181970	1
R181	Metal Film 330 ohm 1 W J	3029331470	1
R182	Carbon Film 10 kohm 1/5 W J	3069103970	1
R183	Metal Film 270 ohm 1 W J	3029271470	1
R184	Carbon Film 56 kohm 1/5 W J	3069563970	1
R185	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R186	Carbon Film 82 kohm 1/5 W J	3069823970	1
R187	Carbon Film 10 kohm 1/5 W J	3069103970	1
R188/R189	Metal Film 220 ohm 1/5 W J	3029221970	2
R190	Metal Film 100 ohm 1/5 W J	3029101970	1
R191	Metal Film 270 ohm 1/5 W J	3029271970	1
R201	Metal Film 1 kohm 1/5 W J	3029102970	1
R202/R203	Metal Film 330 ohm 1/5 W J	3029331970	2
R204	Carbon Film 27 kohm 1/5 W J	3069273970	1
R205	Metal Film 150 ohm 1/5 W J	3029151970	1
R206	Metal Film 470 ohm 1/5 W J	3029471970	1
R207	Metal Film 330 ohm 1/5 W J	3029331970	1
R208	Carbon Film 15 kohm 1/5 W J	3069153970	1
R209	Metal Film 390 ohm 1/5 W J	3029391970	1
R210	Carbon Film 6.8 kohm 1/5 W J	3069682970	1
R211	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R212	Metal Film 22 ohm 1/5 W J	3029220970	1
R213/R214	Metal Film 390 ohm 1/5 W J	3029391970	2
R215	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R216-R218	Metal Film 330 ohm 1/5 W J	3029331970	3
R219	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R220	Carbon Film 6.8 kohm 1/5 W J	3069682970	1
R221	Carbon Film 39 ohm 1/5 W J	3069390970	1
R222	Metal Film 390 ohm 1/5 W J	3029391970	1
R223	Metal Film 330 ohm 1/5 W J	3029331970	1
R224	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R225	Metal Film 330 ohm 1/5 W J	3029331970	1
R226/R227	Metal Film 220 ohm 1/5 W J	3029221970	2
R228	Metal Film 330 ohm 1/5 W J	3029331970	1
R229	Carbon Film 1 kohm 1/5 W J	3069102970	1
R230	Metal Film 10 ohm 1 W J	3029100470	1
R231	Carbon Film 10 kohm 1/5 W J	3069103970	1
R232	Metal Film 1 kohm 1/5 W J	3029102970	1
R233	Carbon Film 18 kohm 1/5 W J	3069183970	1
R234	Carbon Film 33 kohm 1/5 W J	3069333970	1
R235	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R236	Carbon Film 100 kohm 1/5 W J	3069104970	1
R237	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R238	Carbon Film 47 kohm 1/5 W J	3069473970	1
R239/R240	Metal Film 120 ohm 1/5 W J	3029121970	2
R241/R242	Metal Film 220 ohm 1/5 W J	3029221970	2
R243	Metal Film 10 ohm 1/5 W J	3029100970	1
R244	Carbon Film 1.5 Mohm 1/5 W J	3069155970	1
R245	Metal Film 1 kohm 1/5 W J	3029102970	1
R246	Carbon Film 5.6 kohm 1/5 W J	3069562970	1
R247	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R248	Carbon Film 10 kohm 1/5 W J	3069103970	1
R249	Carbon Film 33 kohm 1/5 W J	3069333970	1
R250	Carbon Film 10 kohm 1/5 W J	3069103970	1
R251	Carbon Film 22 kohm 1/5 W J	3069223970	1
R252	Carbon Film 680 kohm 1/5 W J	3069684970	1
R253	Metal Film 1 kohm 1/5 W J	3029102970	1
R254-R257	Carbon Film 10 kohm 1/5 W J	3069103970	4
	RESONATORS		
RESO-101	CSB456F11	3938001009	1
RESO-201	CSB456F15	3938131600	1
RESO-202	CST4.00MGW-TF01	3938124004	1
X-TAL	Crystal, 7.2 MHz	3978101031	1

Ref. No.	Description	Mfr. part No.	Q'ty
	SEMI FIXED RESISTORS		
VR101	EVE-DJAA03B, 4.7 k(B)	3248047243	1
VR102	EVE-DJAA03B54, 50 k(B)	3248050343	1
VR103	EVE-DJAA03B25, 200 k(B)	3248020443	1
VR201	EVE-DJAA03B54, 50 k(B)	3248050343	1
VR202	EVE-DJAA03B24, 20 k(B)	3248020343	1
VR203	EVE-DJAA03B14, 10 k(B)	3248010343	1
	MISCELLANEOUS		
19	Heatsink Regulator TR	7505206220	1
20	Jack, Remote	4438007510	1
21	Jack, RCA, 2P	4438111510	1
22	Terminal Antenna, AM/FM	4408108210	1
GND101-10	Terminal Ground	4235007310	4
	Clip Fuse	4255001010	2
PCB2	**ASSEMBLY P.C.BOARD FRONT**		
	CAPACITORS		
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		
CN101	Lead Ass'y, 10P, 220mm	436210223332	1
CN102	Lead Ass'y, 13P, 260mm	436213263332	1
CN103-1	Lead Ass'y, 5P, 100mm	436405103232	1

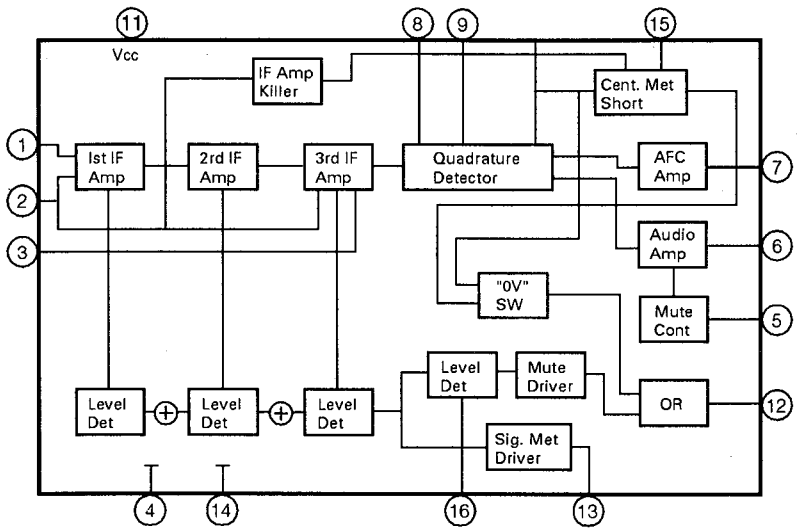
Ref. No.	Description	Mfr. part No.	Q'ty
	DIODES		
D301-D308	1N4148, Switching	2058322101	8
	INTEGRATED CIRCUIT		
IC301	uPD78044AGF-140-3B9, CPU	2139313113	1
	TRANSISTORS		
Q301	DTC114YS	2208622106	1
Q302-Q304	BKTC3199Y/2SC3199Y, NPN	2208610109	3
	RESISTORS		
R301-R304	Carbon Film 100 kohm 1/5 W J	3069104970	4
R305-R312	Carbon Film 4.7 kohm 1/5 W J	3069472970	8
R313-R317	Carbon Film 47 kohm 1/5 W J	3069473970	5
R318	Carbon Film 100 kohm 1/5 W J	3069104970	1
R319	Carbon Film 10 kohm 1/5 W J	3069103970	1
R320	Carbon Film 47 kohm 1/5 W J	3069473970	1
R321-R323	Metal Film 1 kohm 1/5 W J	3029102970	3
R324	Carbon Film 33 kohm 1/5 W J	3069333970	1
R325	Carbon Film 3.3 kohm 1/5 W J	3069332970	1
R326	Carbon Film 4.7 kohm 1/5 W J	3069472970	1
R327	Metal Film 1 kohm 1/5 W J	3029102970	1
R328	Metal Film 150 ohm 1/5 W J	3029151970	1
R329	Metal Film 15 ohm 1/5 W J	3029150970	1
R330	Metal Film 100 ohm 1/5 W	3029101970	1
	MISCELLANEOUS		
12	Switch Tact	4658003710	24
13	Holder FL, Black, ABS	6043010210	1
14	Switch, Encoder	4608400210	1
RESO-301	CST4.19MGW-TF01	3938124006	1
FL301	VFD CM1256C	2328000304	1
PCB3	**ASSEMBLY P.C.BOARD POWER**		
CP103	Lead Ass'y, 5P, 100mm	436405103232	1
D305	SPR-54MDW3, Green/Amber	2308222205	1
12(POWER)	Switch Tact	4658003710	1

IC FUNCTIONAL BLOCK DIAGRAM

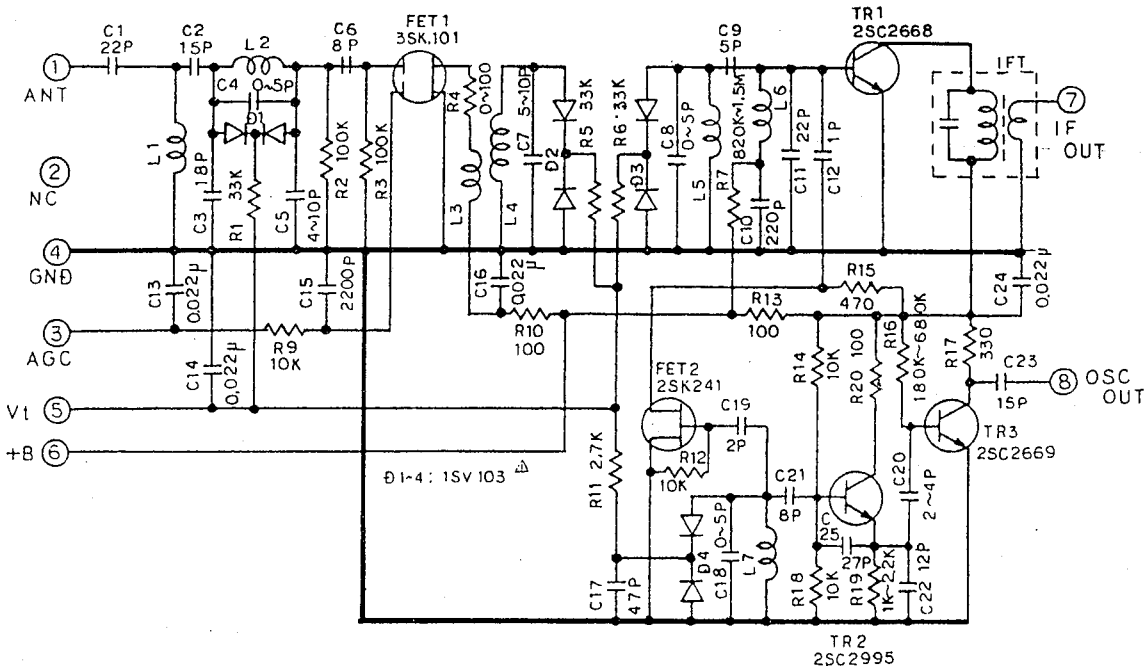
IC102 : LA1245



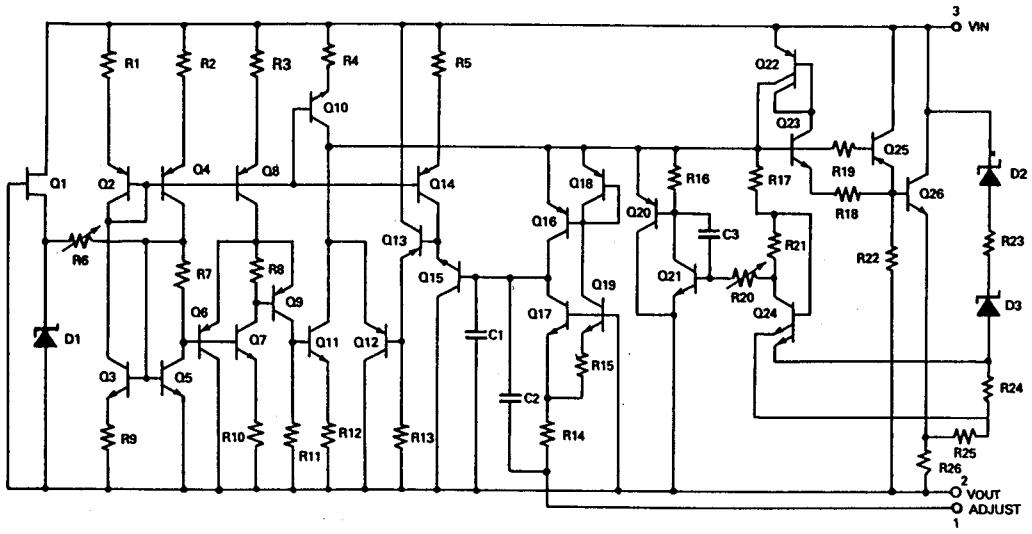
IC103 : HA12412



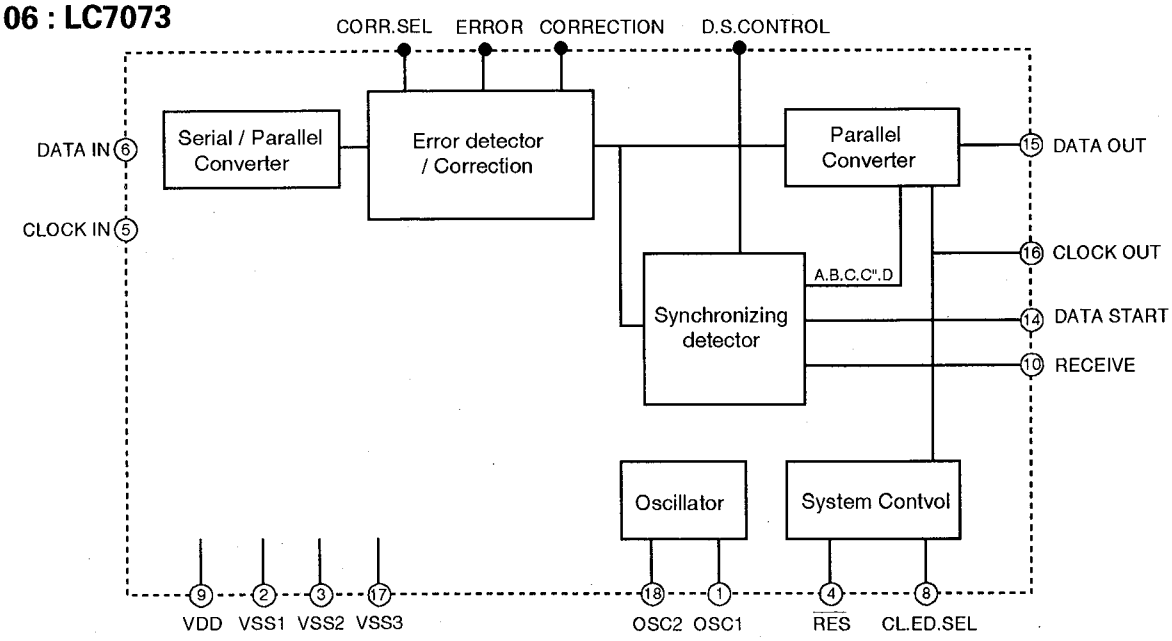
FE101 : FE415-G11



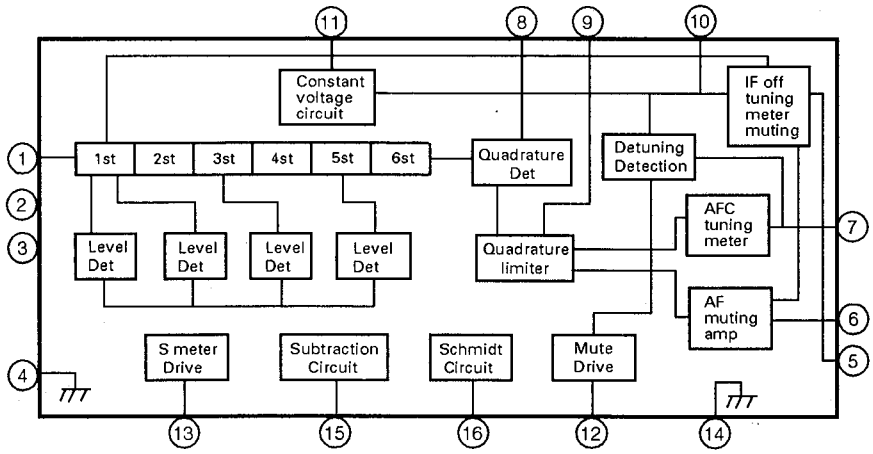
IC108 : LM317T



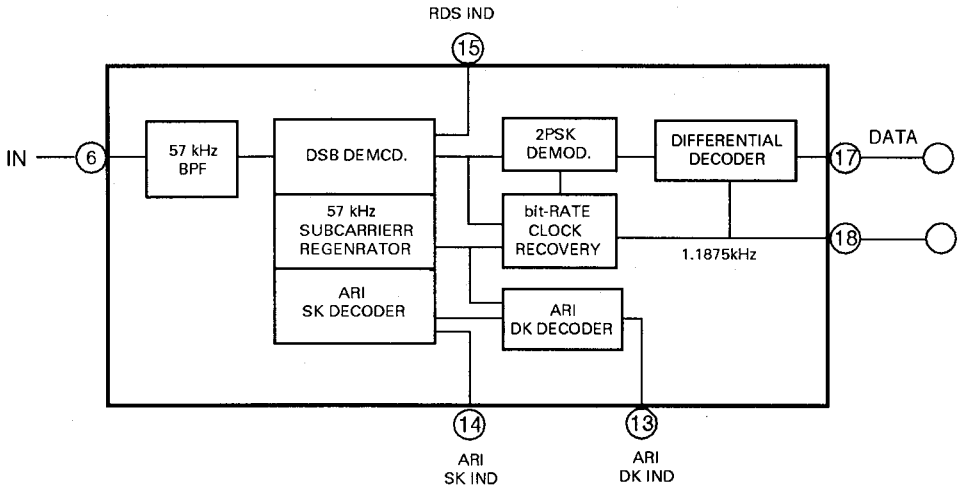
IC106 : LC7073



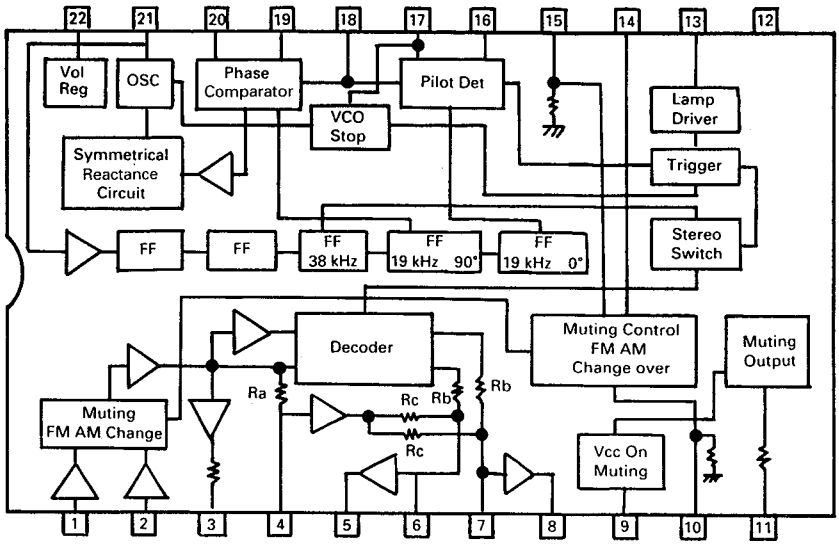
IC105 : LA1235



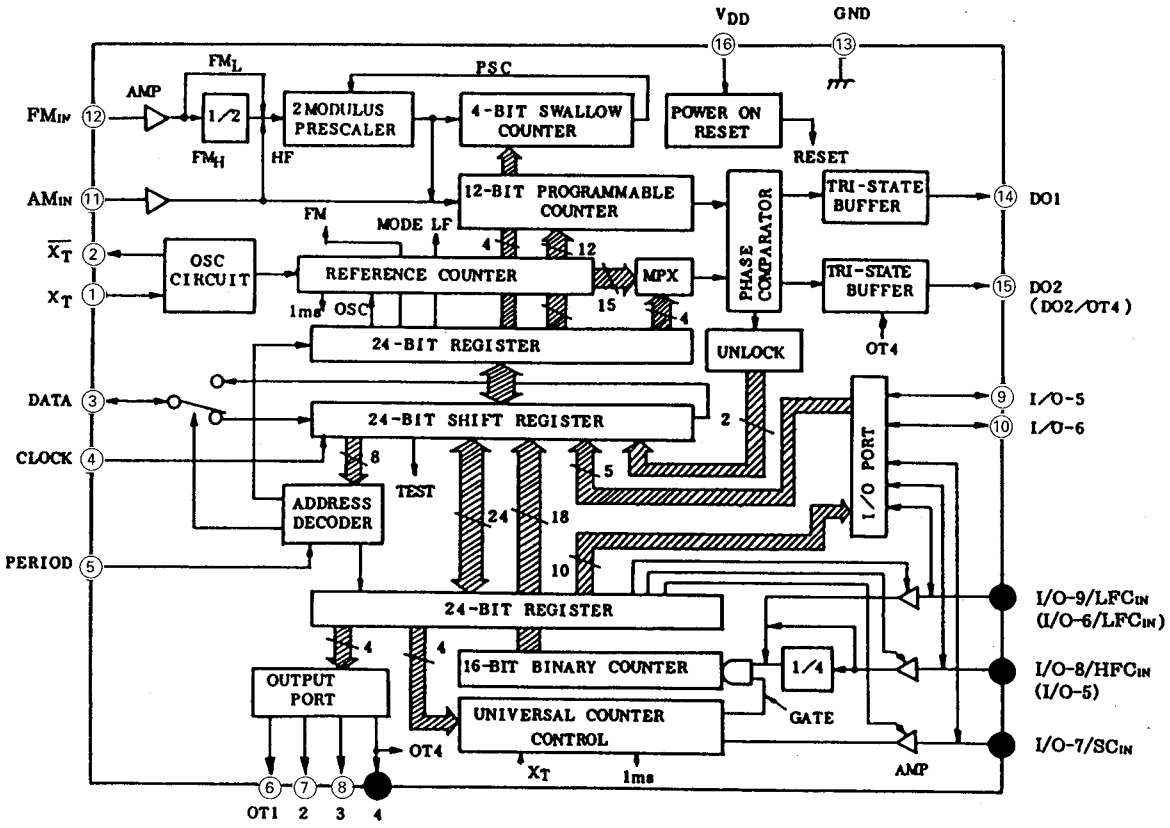
IC107 : LA2230



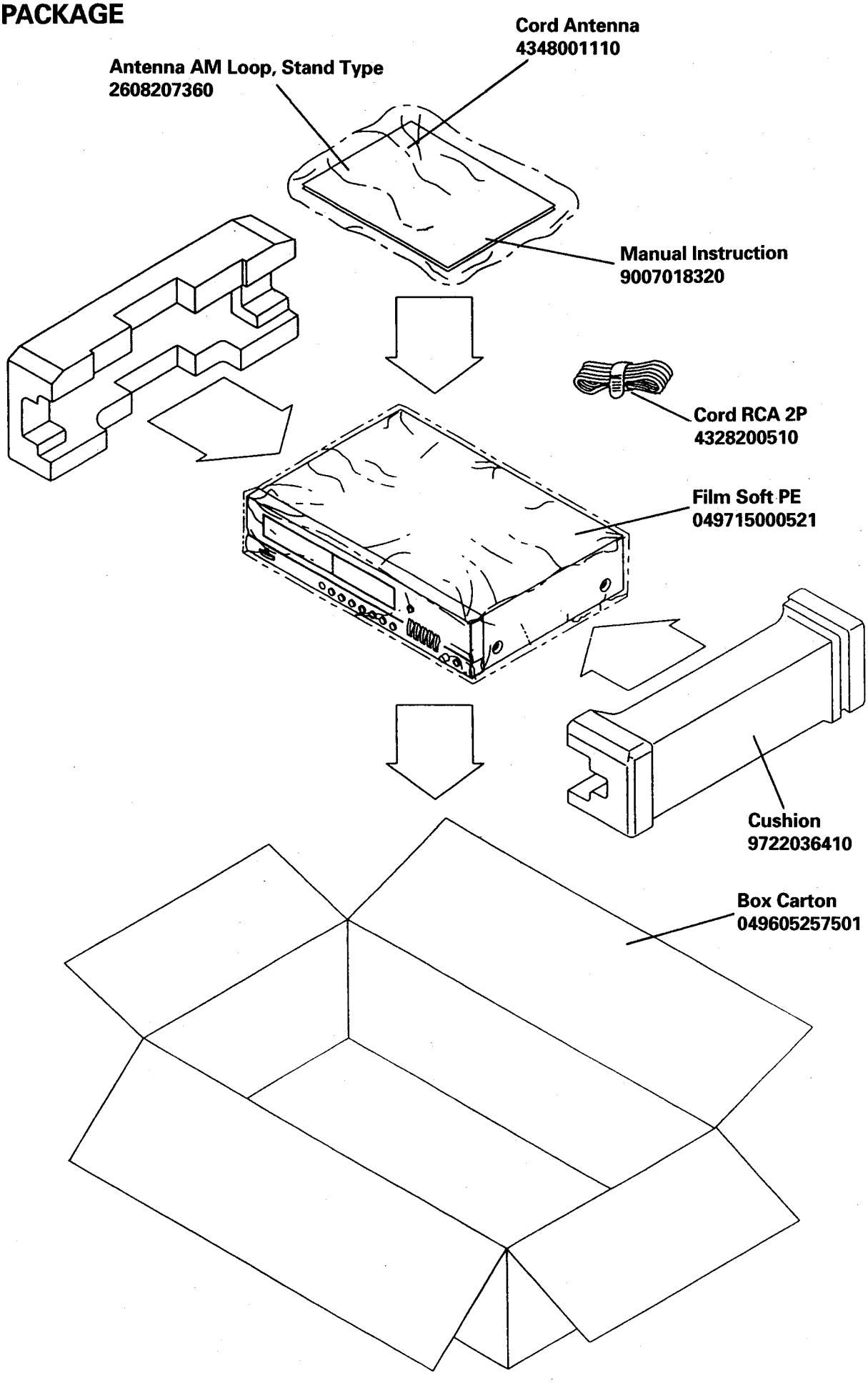
IC104 : LA3401



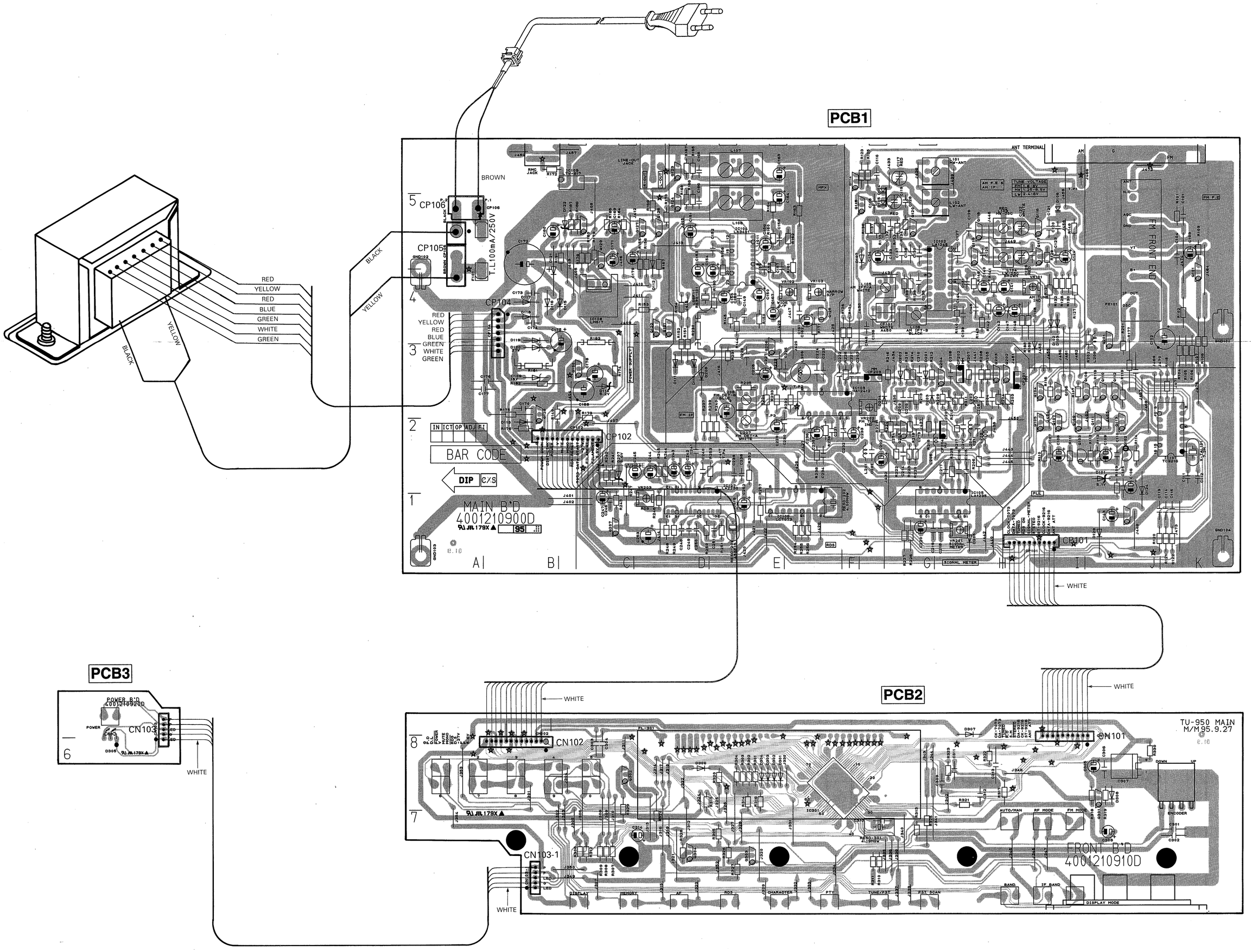
IC401 : TC9216P



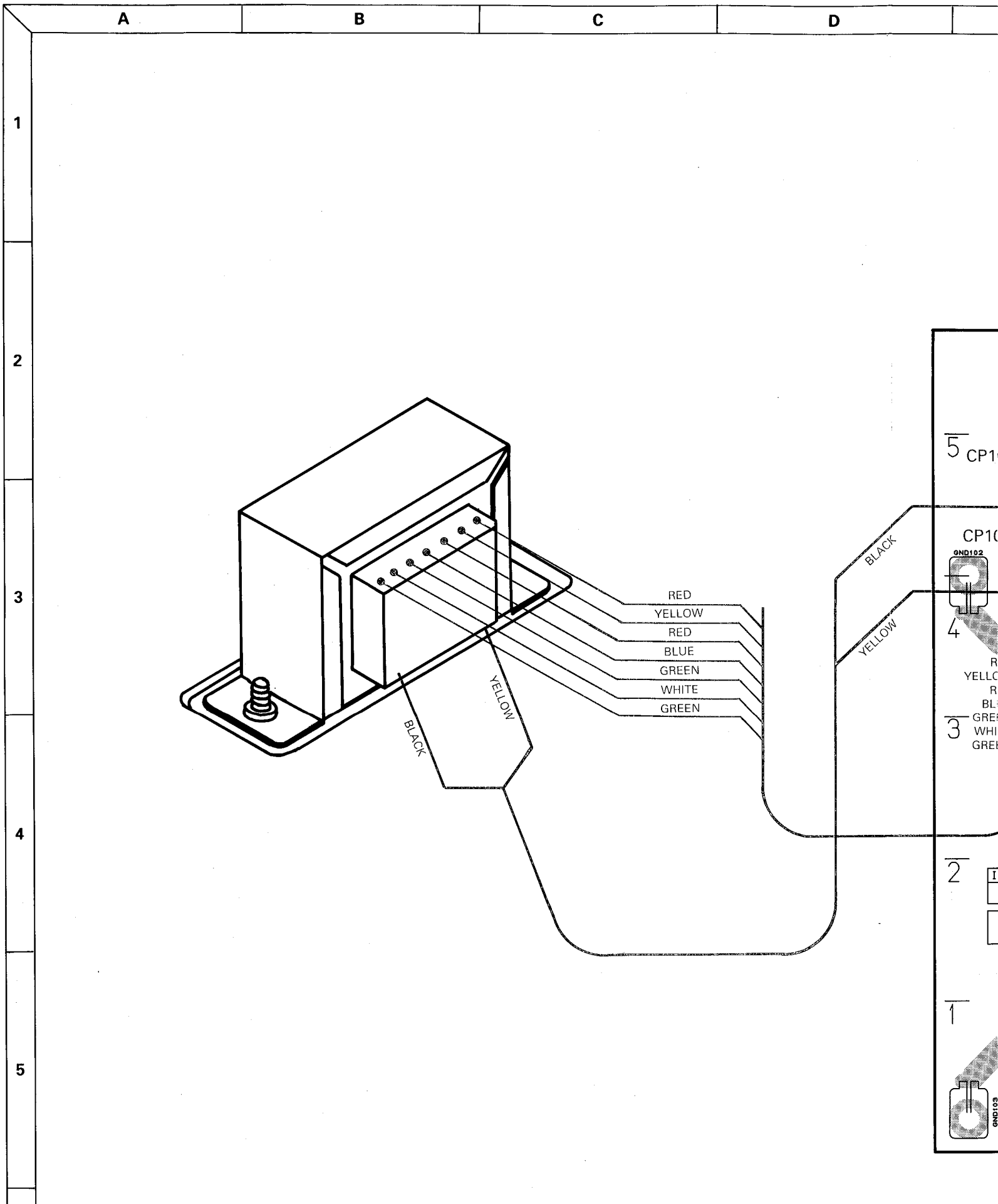
PACKAGE

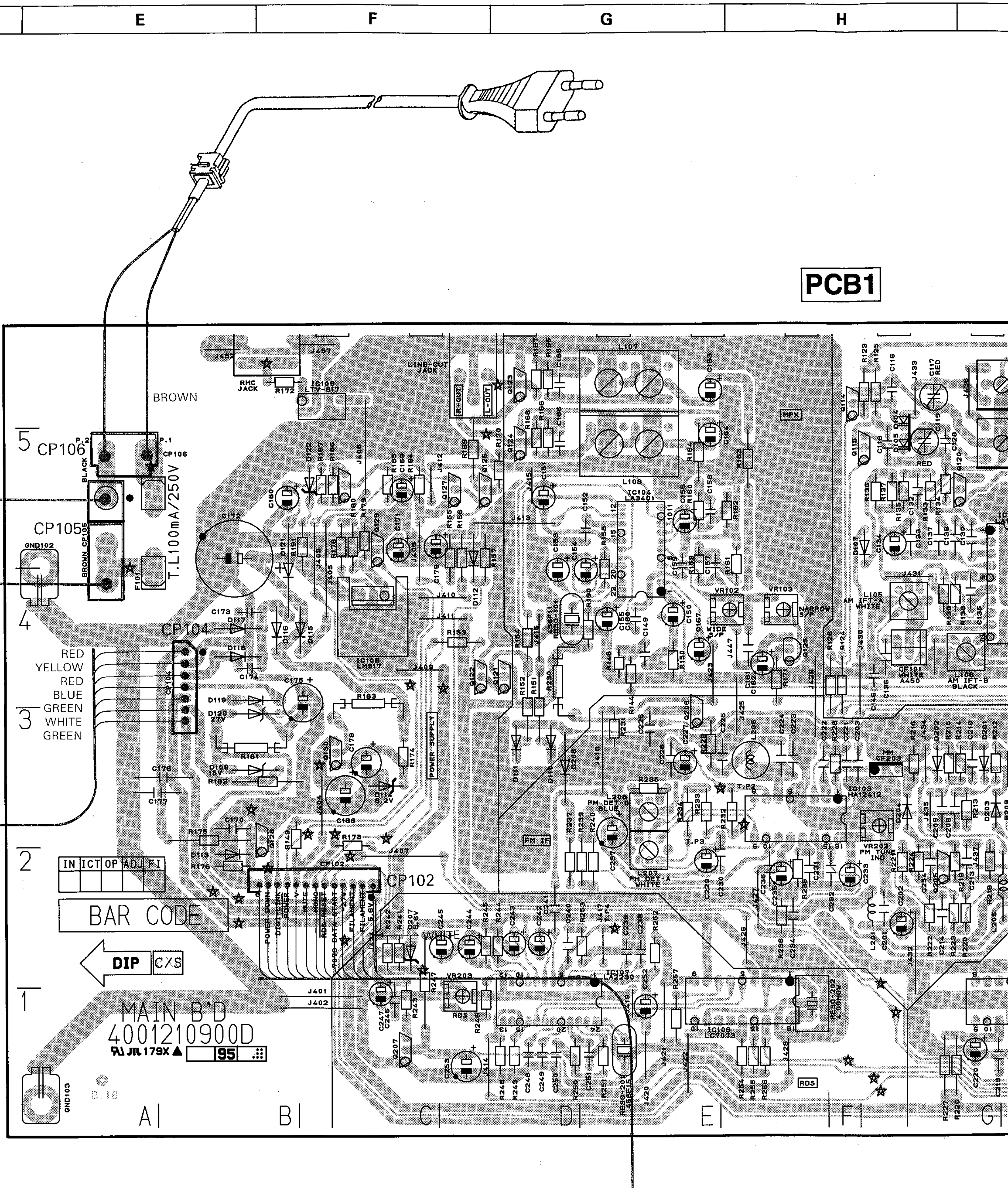

Cord Antenna
4348001110
Antenna AM Loop, Stand Type
2608207360
Manual Instruction
9007018320
Cord RCA 2P
4328200510
Film Soft PE
049715000521
Cushion
9722036410
Box Carton
049605257501

WIRING DIAGRAM



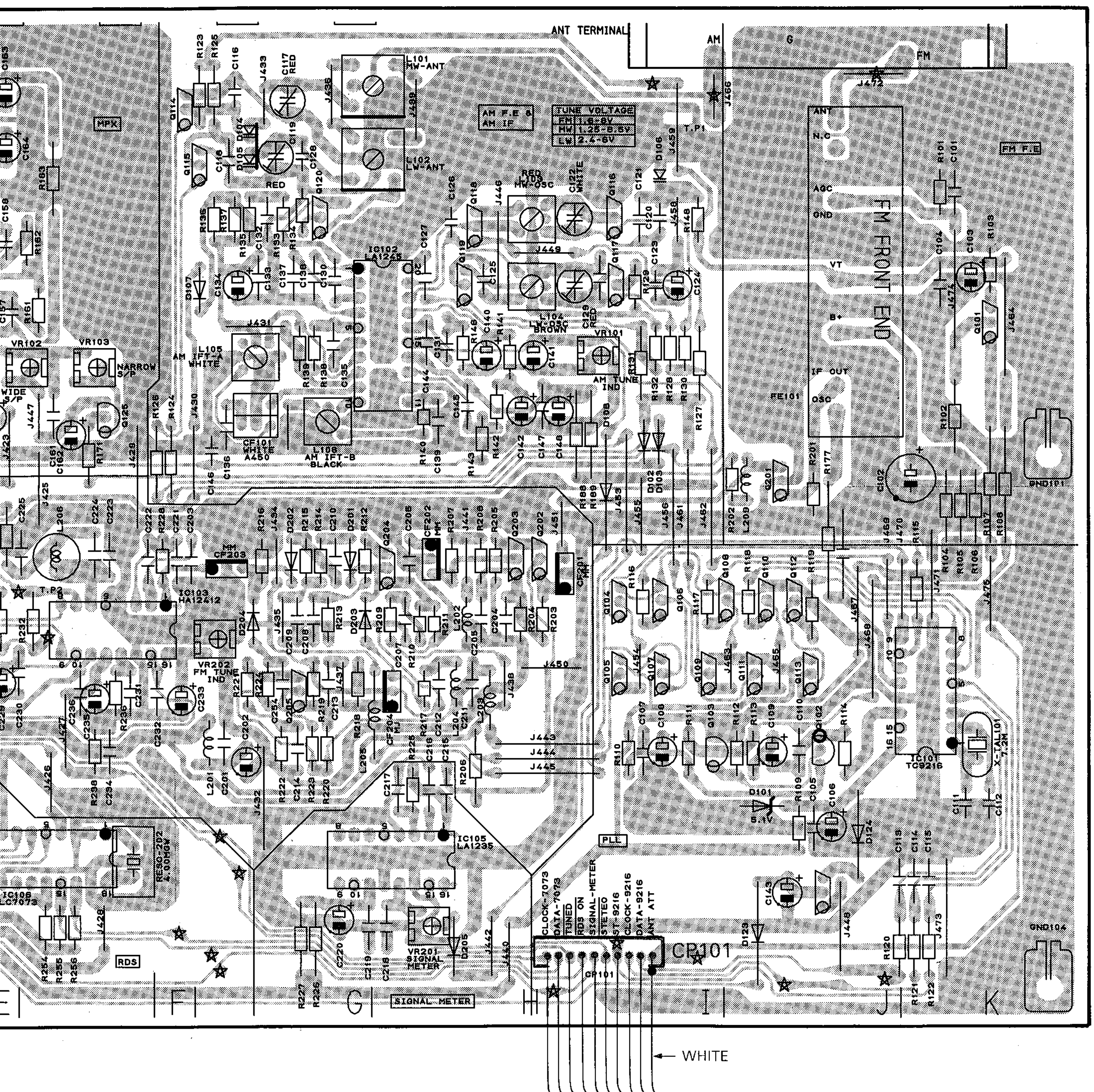
WIRING DIAGRAM

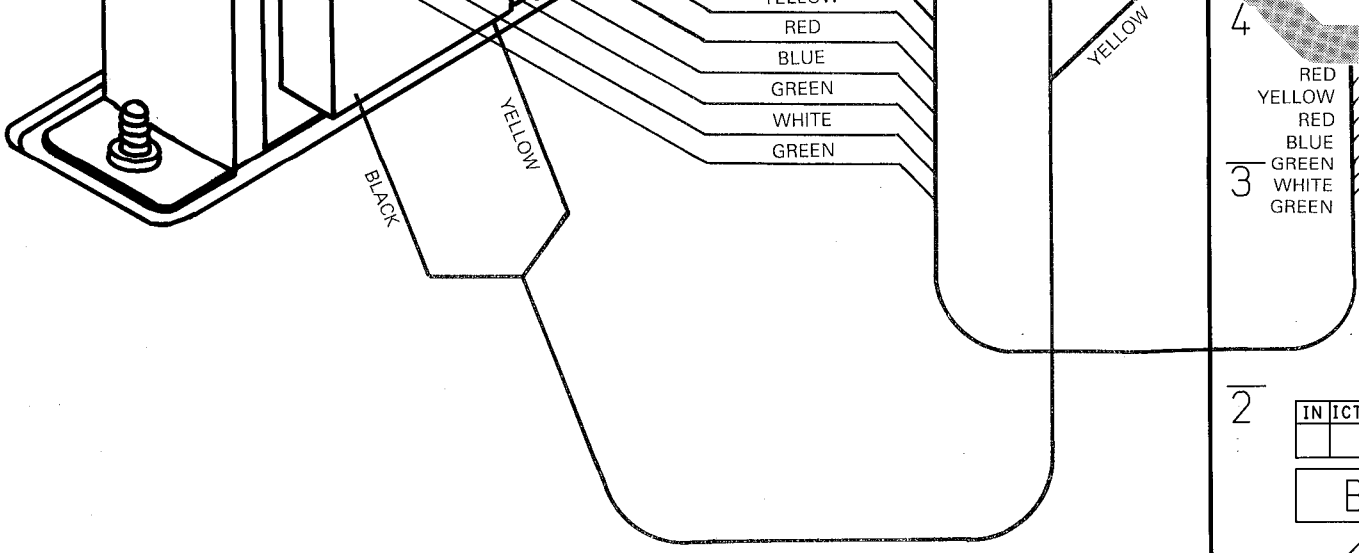


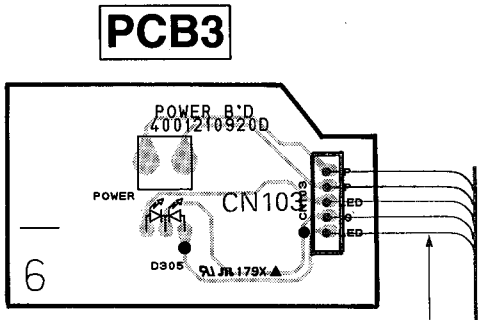

E
F
G
H
PCB1
BROWN
CP106
BLACK
CP105
T.L100mA/250V
GND102
CP104
RED
YELLOW
RED
BLUE
GREEN
WHITE
GREEN
CP102
IN ICT OP ADJ FI
BAR CODE
DIP
C/S
MAIN B'D
4001210900D
179X
95
GND103
LINE-OUT JACK
RMC JACK
IC109 LTV-817
IC108 LM817
IC104 LA3401
POWER SUPPLY
FM IF
FM DET-B BLUE
L207 FM DET-A WHITE
IC103 HA12412
VR202 FM TUNE IND
IC102 LA2230
IC106 LC7073
RESO-202 4.00MGW
RDS
MPX
NARROW S/P
WIDE S/P
CF101 WHITE A450
L108 AM IFT-B BLACK
L105 AM IFT-A WHITE
A| B| C| D| E| F| G|

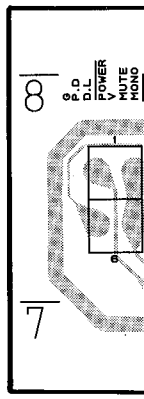
H	I	J	K

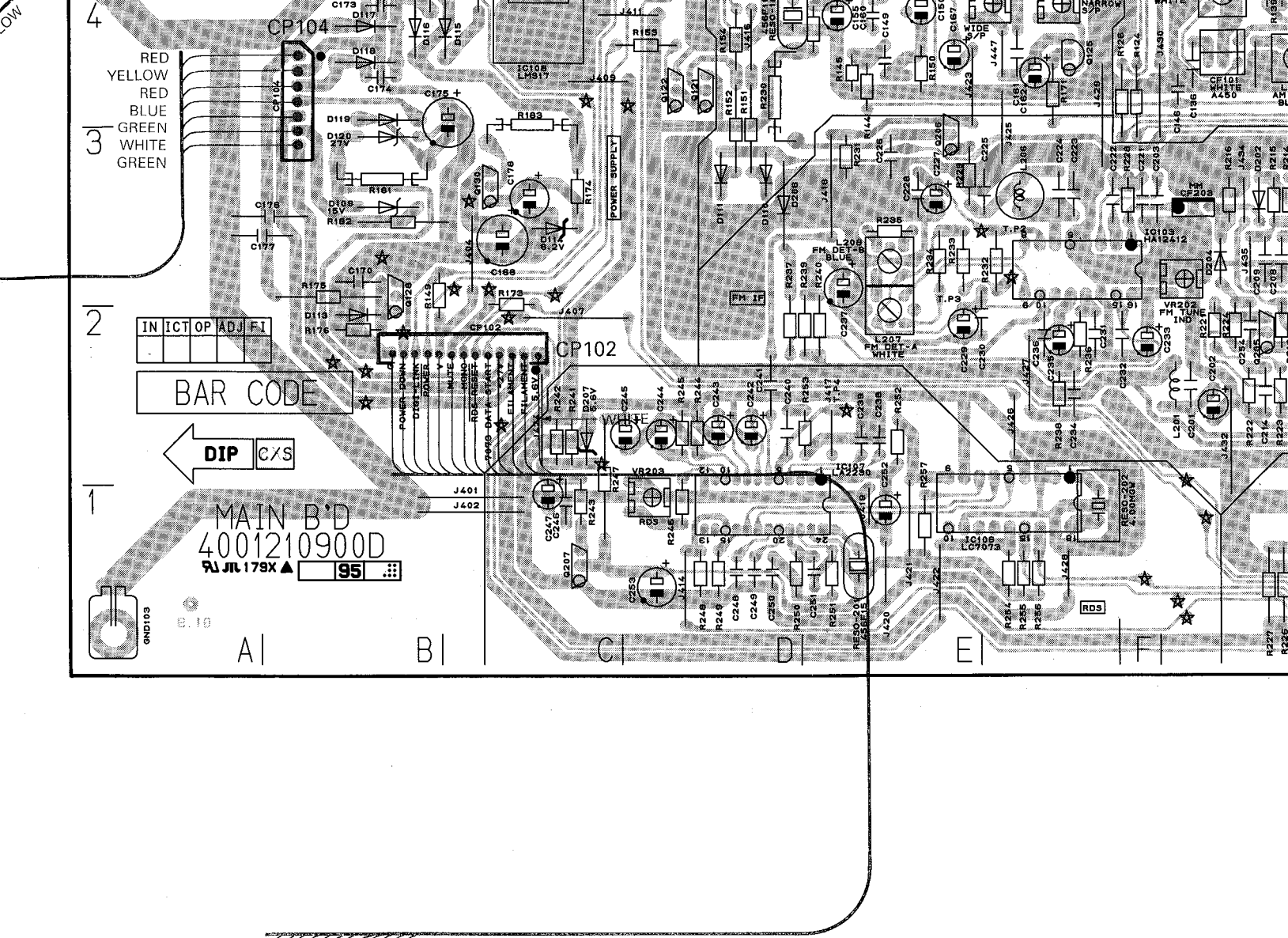
PCB1

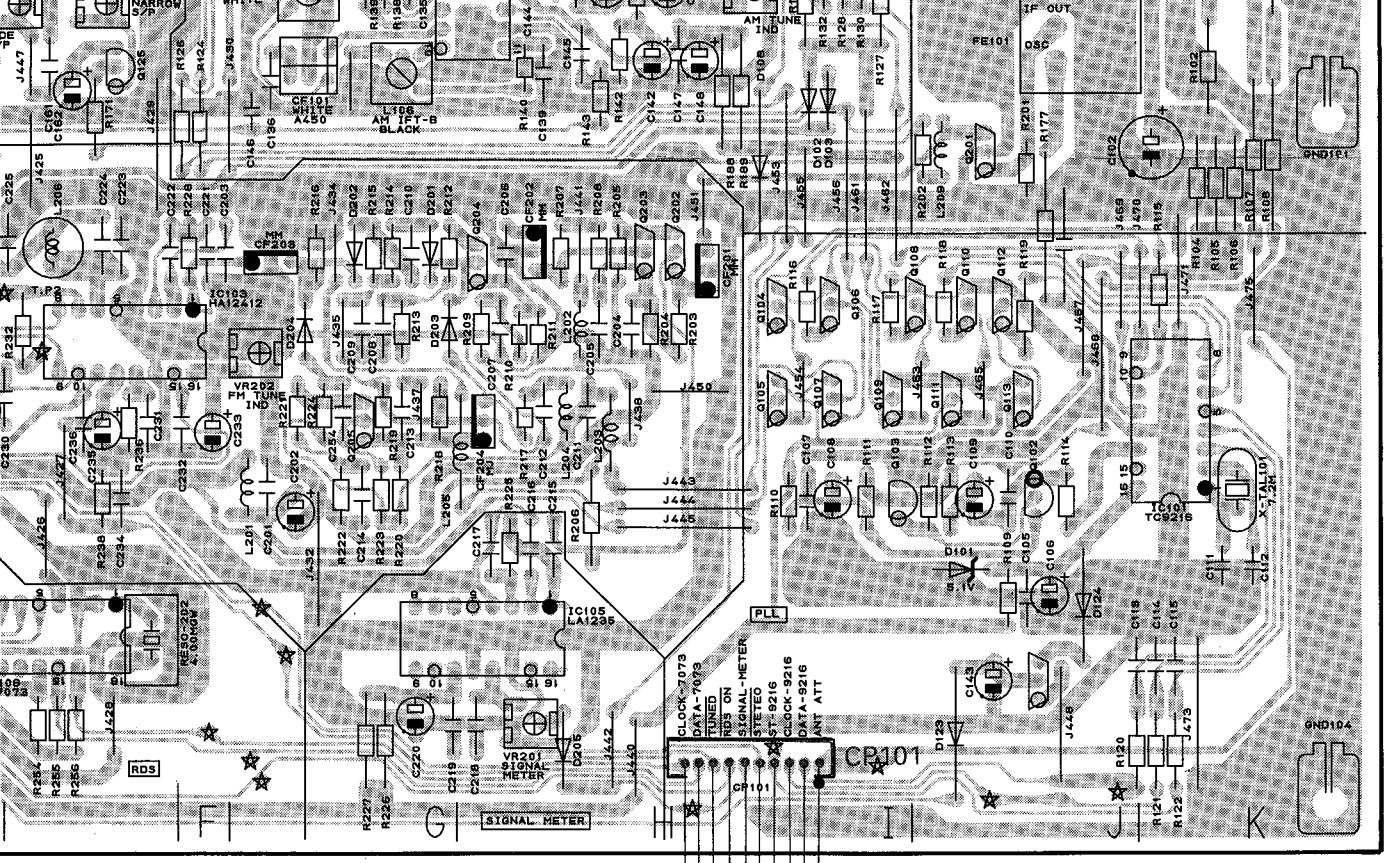

ANT TERMINAL
AM
G
FM
L101 MW-ANT
L102 LW-ANT
AM F.E & AM IF
TUNE VOLTAGE
FM 1.8-8V
MW 1.25-8.5V
LW 2.4-8V
MPX
FM F.E
FM FRONT END
ANT
N.C
AGC
GND
VT
B+
IF OUT
OSC
FE101
IC102 LA1245
L103 MW-OSC
L104 LW-OSC BROWN
VR101 AM TUNE IND
L105 AM IFT-A WHITE
CF101 WHITE A450
L108 AM IFT-B BLACK
VR102 WIDE S/P
VR103 NARROW S/P
IC103 HA12412
VR202 FM TUNE IND
IC105 LA1235
VR201 SIGNAL METER
IC106 LC7073
RESO-202 4.00MHz
IC101 TC9216
X-TAL101 7.2M
D101 5.1V
PLL
RDS
SIGNAL METER
CLOCK-7073
DATA-7073
TUNED
RDS ON
SIGNAL-METER
STEREO
ST-9216
CLOCK-9216
DATA-9216
ANT ATT
CP101
GND101
GND104
WHITE


RED
BLUE
GREEN
WHITE
GREEN
YELLOW
BLACK
YELLOW
RED
YELLOW
RED
BLUE
GREEN
WHITE
GREEN
4
3
2
1
IN
GND103


PCB3
POWER B'D
4001210920D
POWER
CN103
D305
6
WHITE


8
7
P.D
D.L
POWER
MUTE
MONO

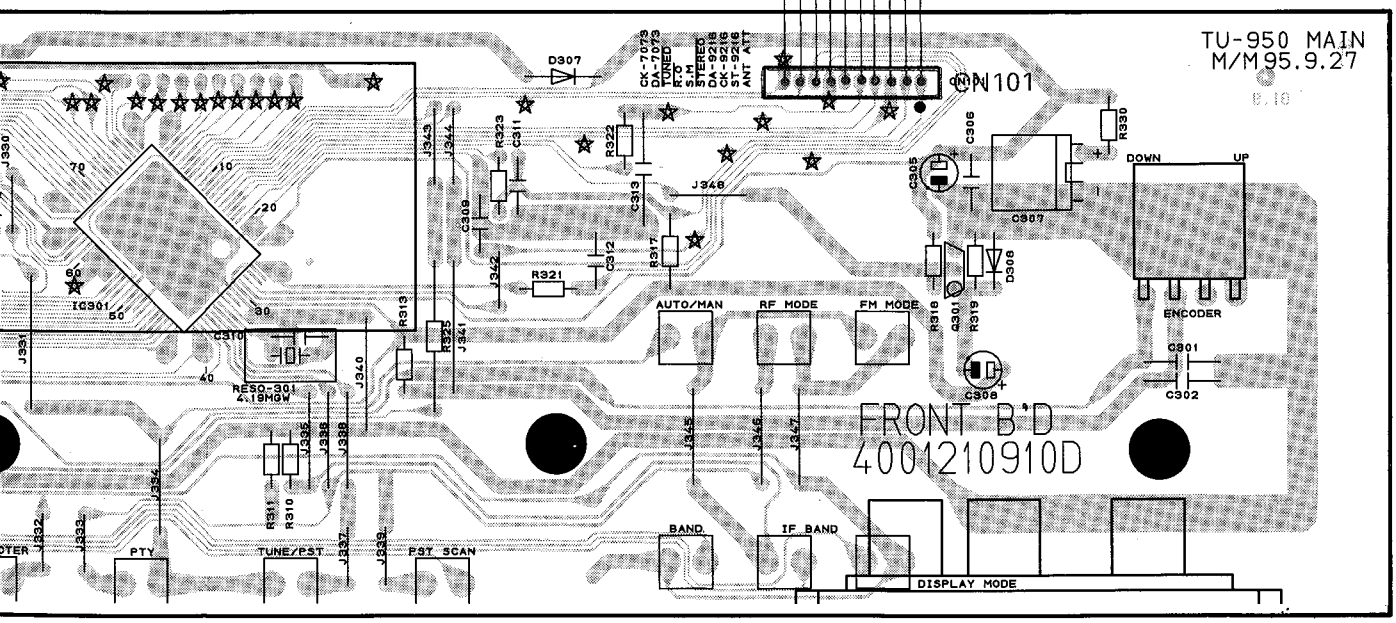

CP104
RED
YELLOW
RED
BLUE
GREEN
WHITE
GREEN
CP102
BAR CODE
IN ICT OP ADJ FI
DIP C/S
MAIN B'D
4001210900D
95
GND103
A
B
C
D
E
F
WHITE
WHITE
CN102
CN103-1
P
P
LED
G
LED
DISPLAY
MEMORY
AF
RDS
CHARACTER
PTY
TUNE/PST
PCB



← WHITE

← WHITE

PCB2



SCHEMATIC DIAGRAM I

PCB1 (MAIN)

FE-101 FE415-G11

FM ANT 75 Ohm

AM-LOOP-ANT

FM STEREO DISTORTION ADJ.

FM SIGNAL

WIDE SIGNAL

NARROW SIGNAL

FM TUNED LEVEL ADJ.

FM SIGNAL LEVEL ADJ.

AM TRACKING ADJ.

AM TUNED LEVEL ADJ.

TUNE VOLTAGE ADJ.

FM : 1.6 ~ 8 V
MW : 1.25 ~ 8.5 V
LW : 2.4 ~ 6 V

LW VT ADJ.

MW VT ADJ.

LW TRACKING ADJ.

RDS BPF ADJ.

CENTER TUNE

MONO DISTORTION ADJ.

NARROW SEPARTION ADJ.

WIDE SEPARATION ADJ.

AM, FM Rch SIGNAL

AM SIGNAL

FM SIGNAL

IC101 TC9216

IC102 LA1245

IC103 HA12149

IC104 LA3401

IC105 LA1235

IC106 LC7073

IC107 LA2230

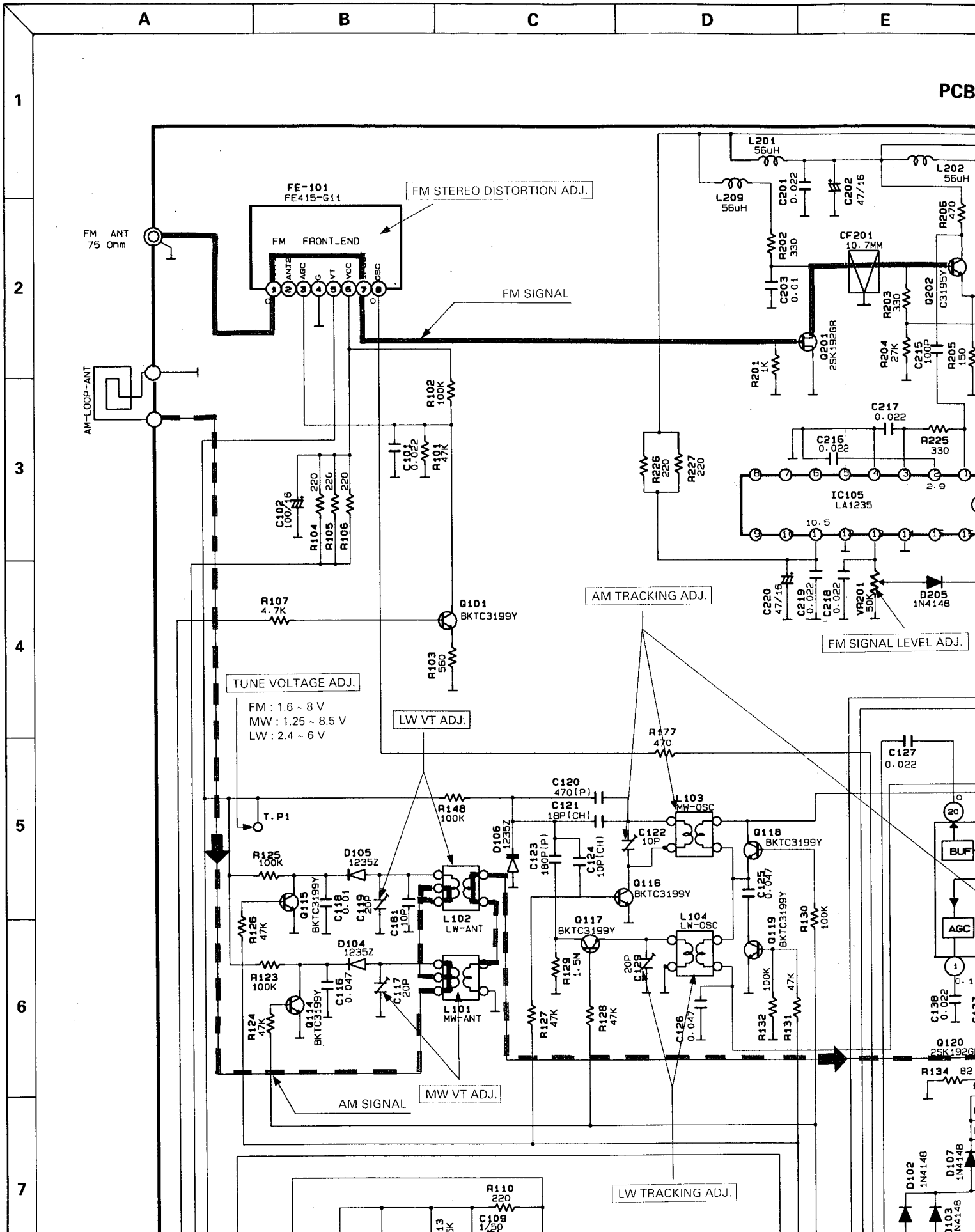
IC108 LM317T

IC109 LTV817

CP101 FROM FRONT SCHEMATIC DIAGRAM(II) Page(28) J 8 B

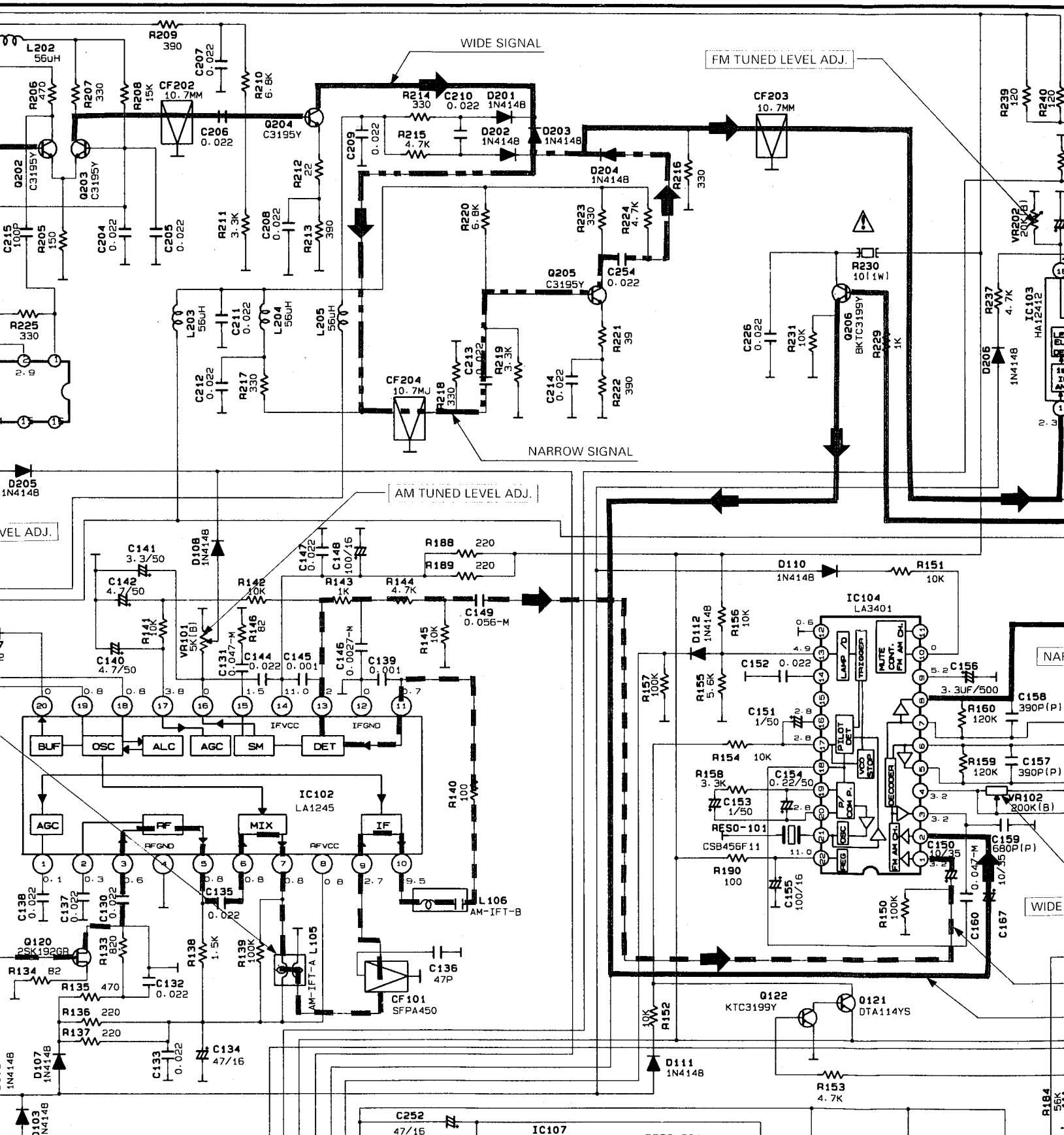
CP102 FROM FRONT SCHEMATIC DIAGRAM(III) Page(29) F 8 A

SCHEMATIC DIAGRAM I

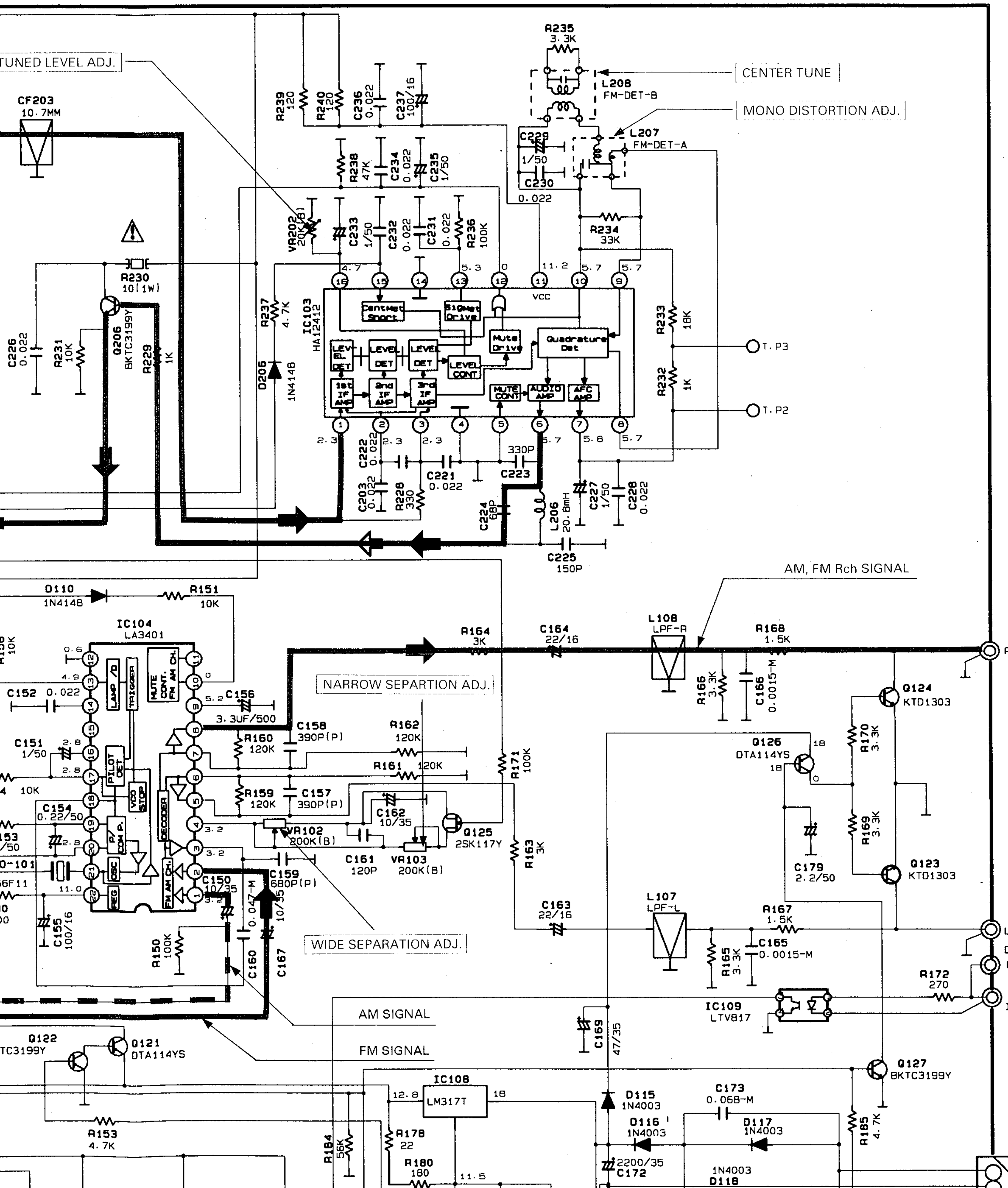


	F	G	H	I	J	

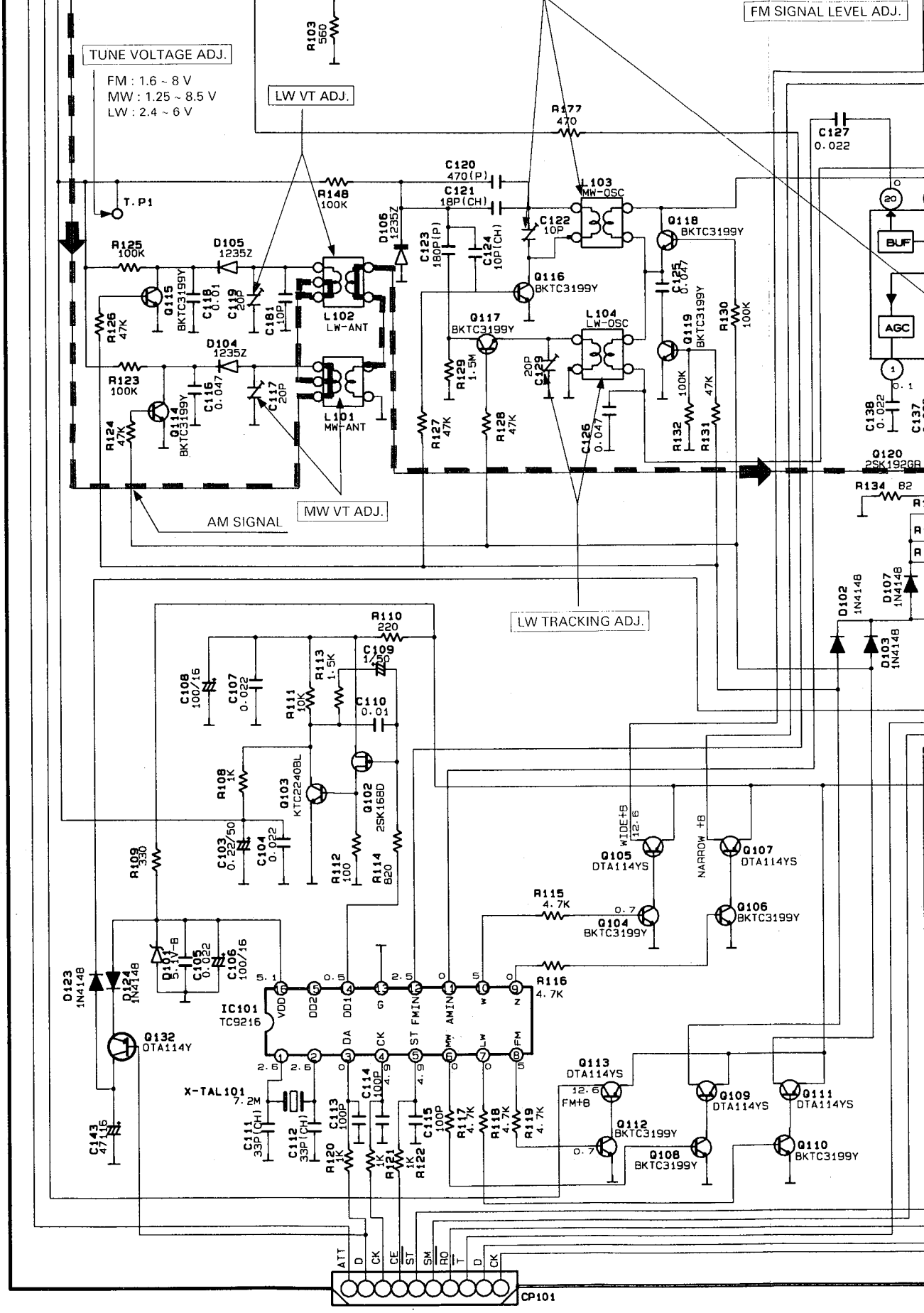
PCB1 (MAIN)



	J	K	L	M	N	

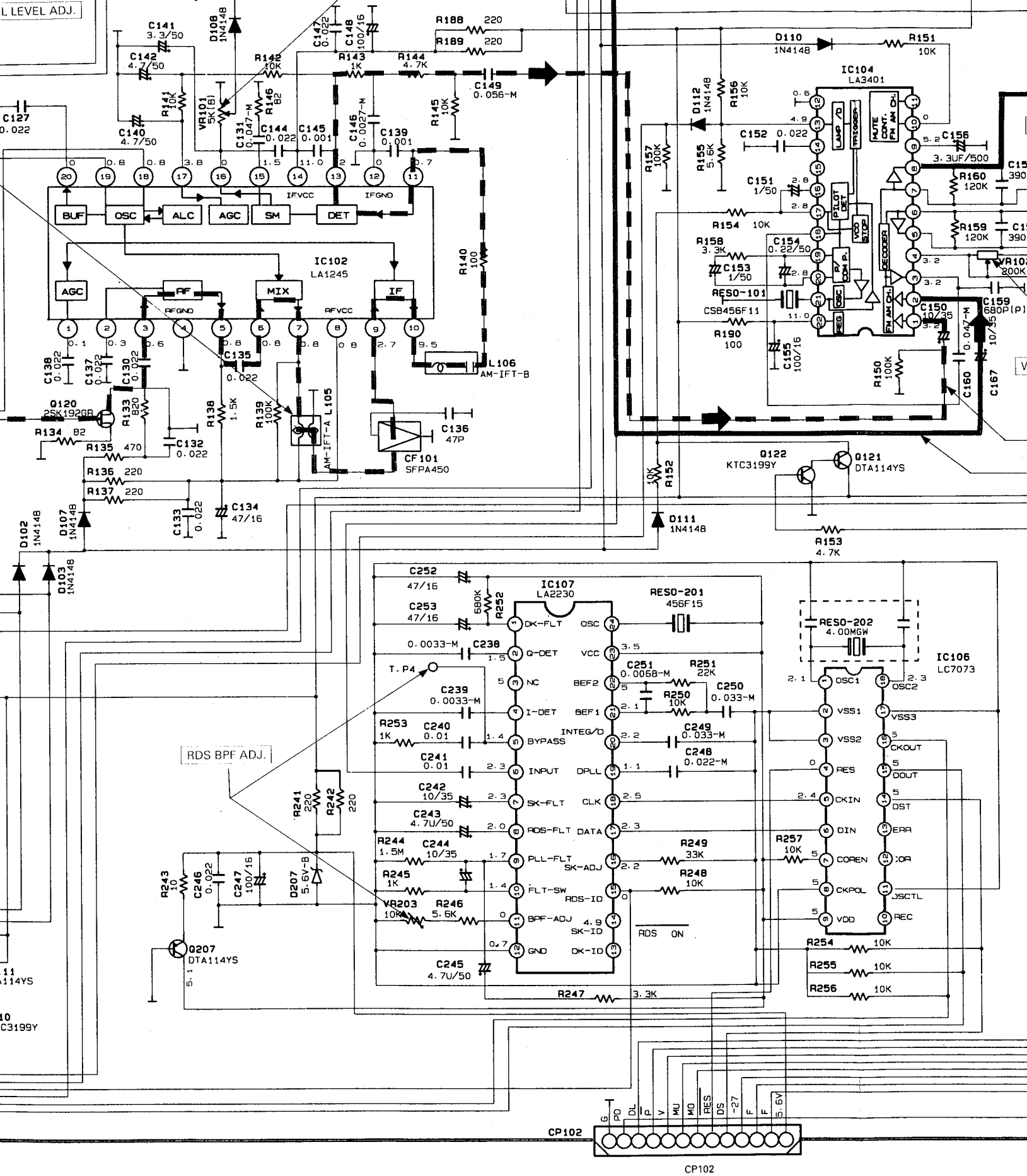


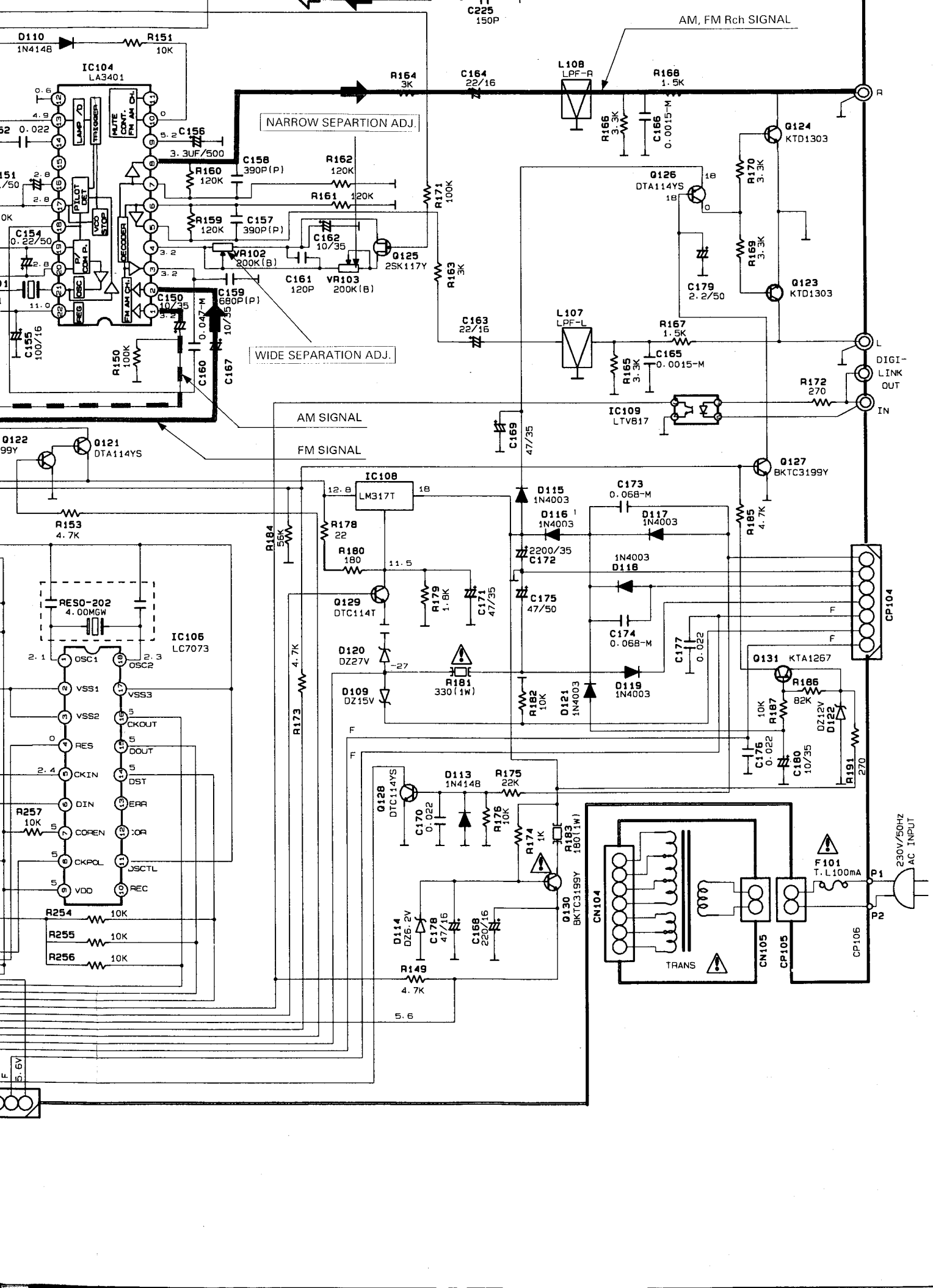
TUNED LEVEL ADJ.
CF203
10.7MM
R235
3.3K
CENTER TUNE
L208
FM-DET-B
MONO DISTORTION ADJ.
L207
FM-DET-A
R239 120
R240 120
C236 0.022
C237 100/16
R238 47K
C234 0.022
C235 1/50
C229 1/50
C230 0.022
VR202 20K(B)
C233 1/50
C232 0.022
C231 0.022
R236 100K
R234 33K
R230 10(1W)
Q206 BKTC3199Y
C226 0.022
R231 10K
R229 1K
R237 4.7K
D206 1N4148
IC103 HA12412
VCC
Quadrature Det
Mute Drive
LEVEL DET
1st IF AMP
2nd IF AMP
3rd IF AMP
LEVEL CONT
MUTE CONT
AUDIO AMP
AFC AMP
R233 18K
R232 1K
T.P3
T.P2
C222 0.022
C221 0.022
330P
C223
C203 0.022
R228 330
C224 68P
L206 20.8mH
C227 1/50
C228 0.022
C225 150P
AM, FM Rch SIGNAL
D110 1N4148
R151 10K
IC104 LA3401
LAMP /D
TRIGGER
MUTE CONT. FM AM CH.
PILOT DET
VCO STOP
DECODER
FM AM CH.
R164 3K
C164 22/16
L108 LPF-R
R168 1.5K
R166 3.3K
C166 0.0015-M
C152 0.022
C156 3.3UF/500
NARROW SEPARTION ADJ.
C151 1/50
C158 390P(P)
R162 120K
R160 120K
R161 120K
R171 100K
Q124 KTD1303
Q126 DTA114YS
R170 3.3K
C154 0.22/50
R159 120K
C157 390P(P)
C162 10/35
Q125 2SK117Y
VR102 200K(B)
C161 120P
VR103 200K(B)
R163 3K
R169 3.3K
C179 2.2/50
Q123 KTD1303
C155 100/16
C150 10/35
C159 680P(P)
C160 0.047-M
C167 10/35
R150 100K
WIDE SEPARATION ADJ.
C163 22/16
L107 LPF-L
R167 1.5K
R165 3.3K
C165 0.0015-M
R172 270
DIGI-LINK OUT
IN
AM SIGNAL
FM SIGNAL
IC109 LTV817
C169 47/35
Q122 BKTC3199Y
Q121 DTA114YS
Q127 BKTC3199Y
IC108 LM317T
D115 1N4003
C173 0.068-M
D116 1N4003
D117 1N4003
R185 4.7K
R153 4.7K
R184 56K
R178 22
R180 180
C172 2200/35
D118 1N4003



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

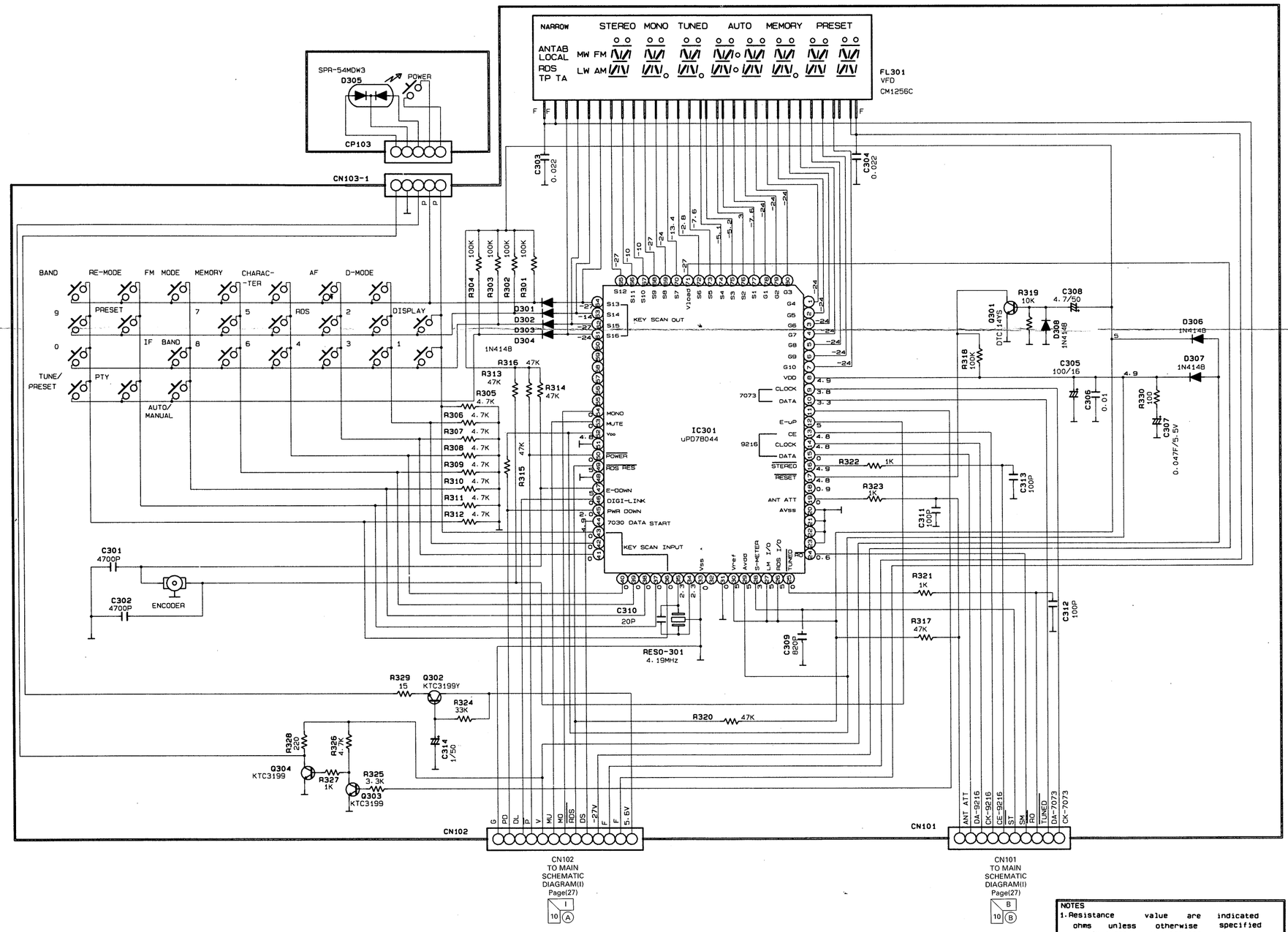
J
8 B


IC102
LA1245
BUF
OSC
ALC
AGC
SM
DET
IFVCC
IFGND
RFGND
RFVCC
MIX
IF
RF
IC104
LA3401
IC107
LA2230
IC106
LC7073
RDS BPF ADJ.
RDS ON
CP102
CP102
FROM FRONT
SCHEMATIC
DIAGRAM(II)
Page(28)


AM, FM Rch SIGNAL
NARROW SEPARTION ADJ.
WIDE SEPARATION ADJ.
AM SIGNAL
FM SIGNAL
DIGI-LINK OUT
IN
IC104 LA3401
IC105 LC7073
IC108 LM317T
IC109 LTV817
L107 LPF-L
L108 LPF-R
Q121 DTA114YS
Q122
Q123 KTD1303
Q124 KTD1303
Q125 2SK117Y
Q126 DTA114YS
Q127 BKTC3199Y
Q128 DTC114YS
Q129 DTC114T
Q130 BKTC3199Y
Q131 KTA1267
D109 DZ15V
D110 1N4148
D113 1N4148
D114 DZ6.2V
D115 1N4003
D116 1N4003
D117 1N4003
D118 1N4003
D119 1N4003
D120 DZ27V
D121 1N4003
D122 DZ12V
CP104
CP105
CP106
CN104
CN105
TRANS
F101 T.L100mA
230V/50Hz AC INPUT
P1
P2
RES0-202 4.00MGW

SCHEMATIC DIAGRAM II

PCB2 (FRONT)



CN102 TO MAIN SCHEMATIC DIAGRAM(I) Page(27) I 10 A

CN101 TO MAIN SCHEMATIC DIAGRAM(I) Page(27) B 10 B

NOTES

1. Resistance value are indicated ohms unless otherwise specified (K=1.000 M=1.000.000)
2. Capacitance value are shown in microfarades unless otherwise noted (P=micro-microfarade)

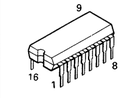
CAUTION

Safty precaution to be followed during servicing

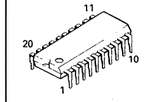
1) Since these parts maked with ⚠ are critical part for safty use the one deservised the part list
2) Before returning the receiver to the customer make appropriate leakage current or resistance exposed part are property insulated from the supply circuit

PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

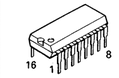
IC103 : HA12412



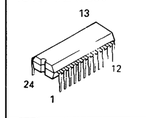
IC102 : LA1245



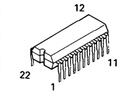
IC106 : LC7073
IC101 : TC9216P
IC105 : LA1235



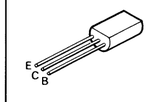
IC107 : LA2230



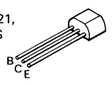
IC104 : LA3401



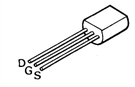
Q103 : KTC2240



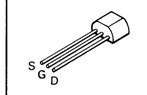
Q131 : KTA1267Y,
Q202~205 : KTC3195Y
Q123, 124 : KTD1303
Q105, 107, 109, 111, 113, 121, 126, 132, 207 : DTA114YS
Q128, 301, 129 : DC114YS
Q101, 104, 106, 108, 110, 112, 114~119, 122, 127, 130, 206, 302~304 : KTC3199



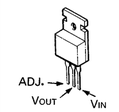
Q125 : 2SK117Y
Q102 : 2SK168DTZ



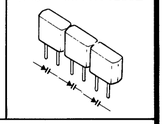
Q120, 201 : 2SK192GR



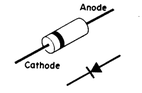
IC108 : LM317T



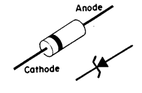
D104~106 : KV1235Z



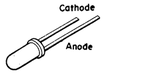
D107, 108, 110~113, 123, 102, 103, 201~206, 301~308 : 1N4148
D115~119 : 1N4002
D121 : 1N4003



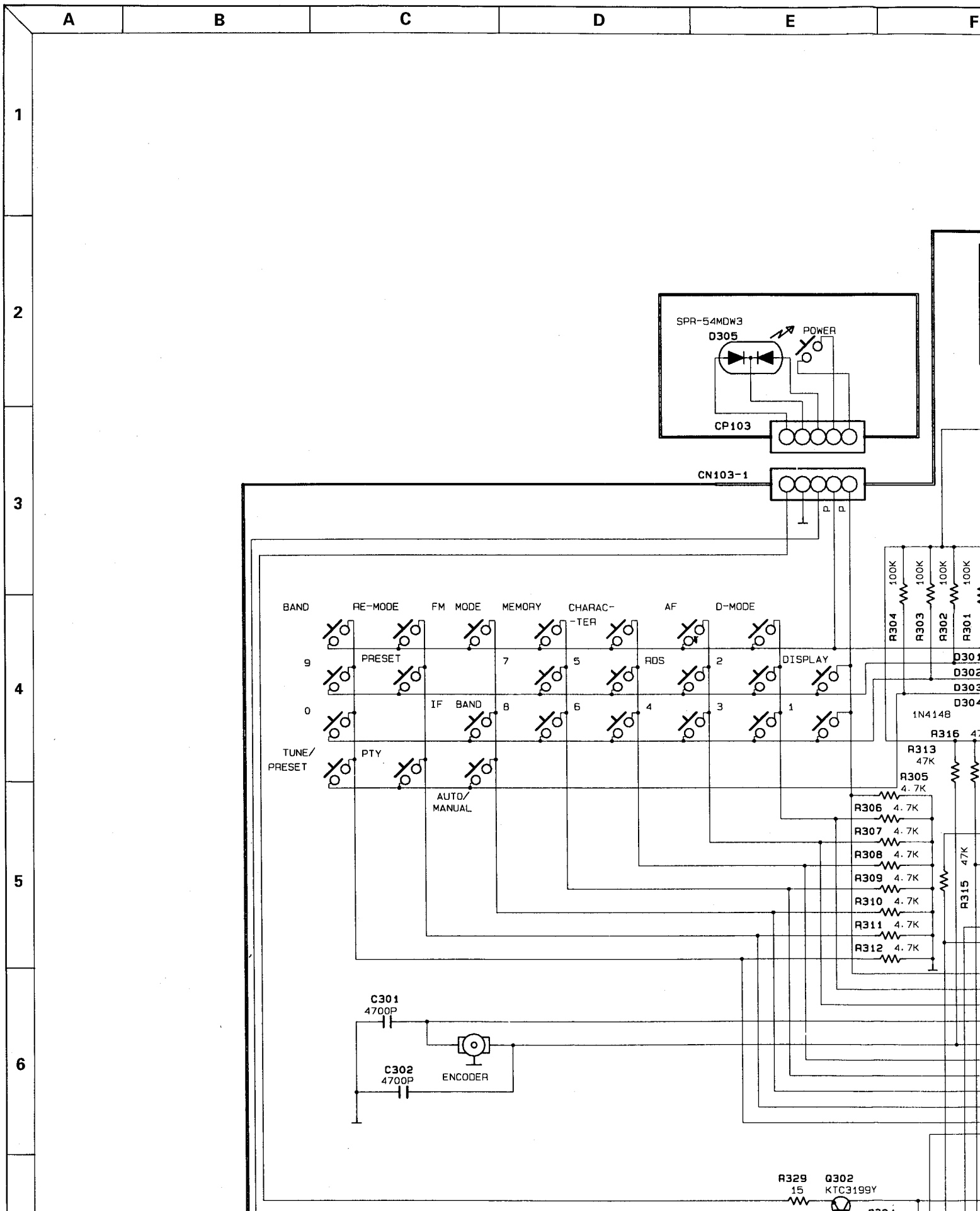
D109, 101, 207, 114, 120, 122 : ZENER



D305 : SPR-54MDW3 (Green/Amber)

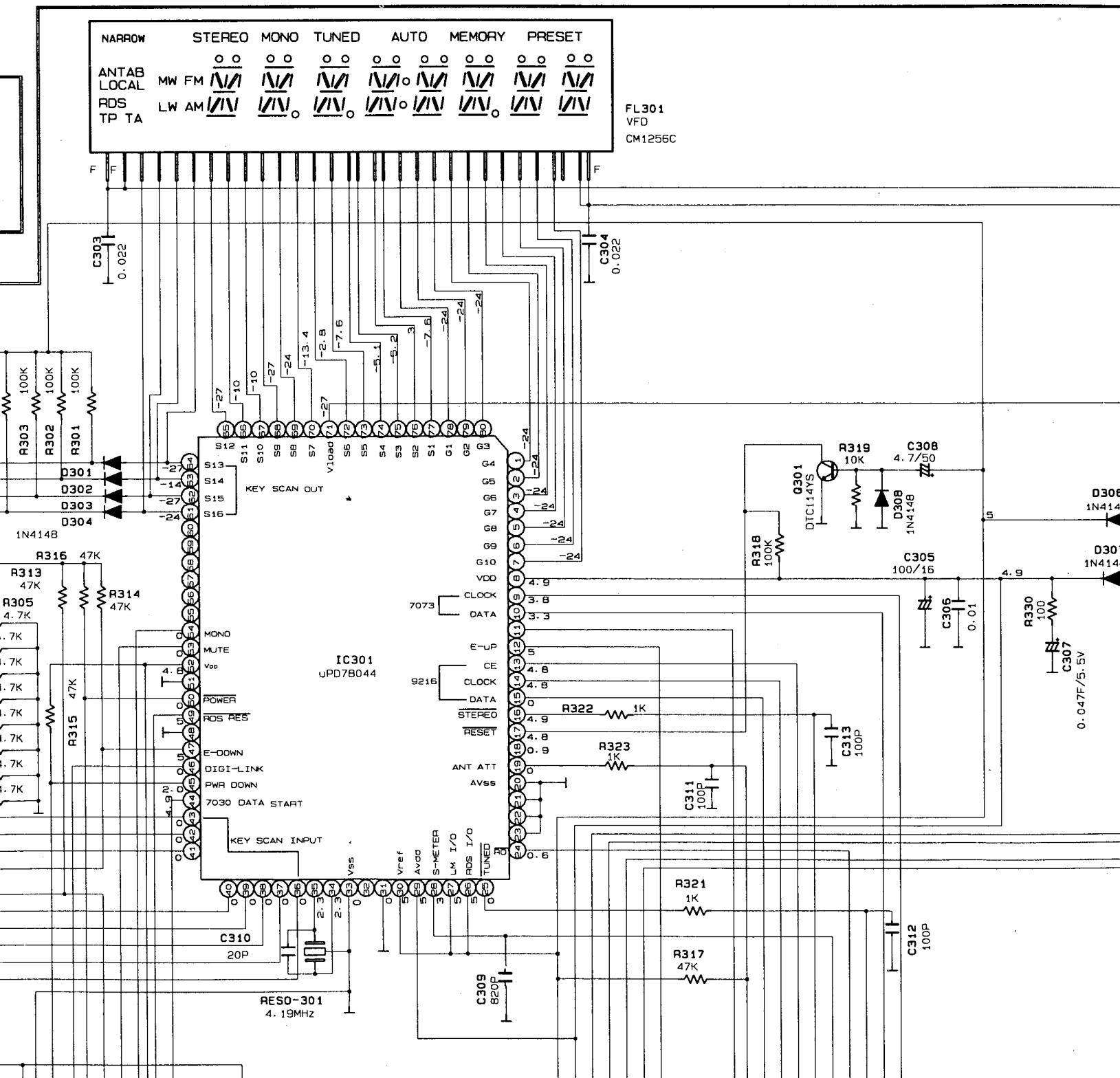


SCHEMATIC DIAGRAM II

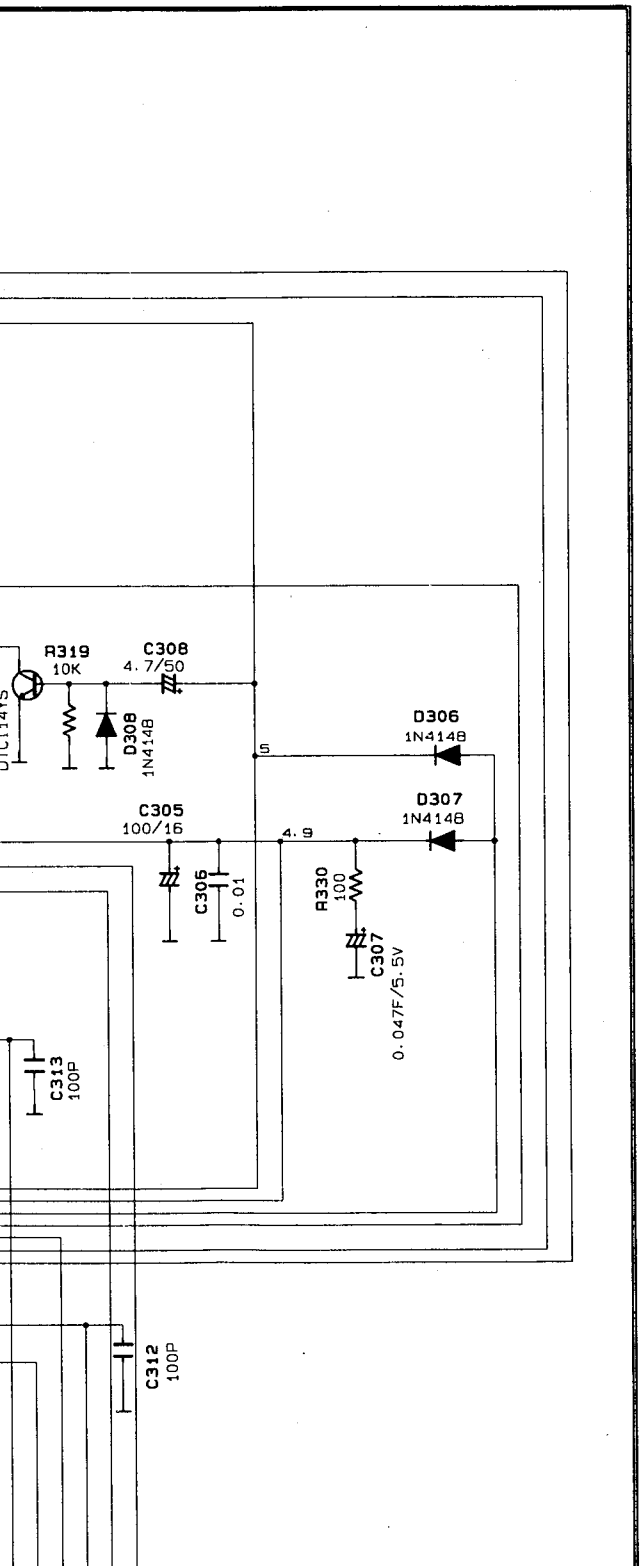


F	G	H	I	J	K

PCB2 (FRONT)

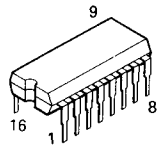


J	K	L	M	N	

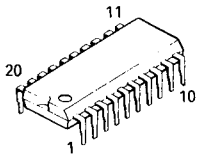


PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

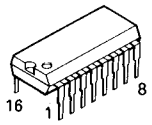
IC103 : HA12412



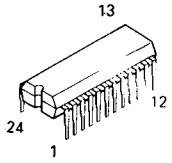
IC102 : LA1245



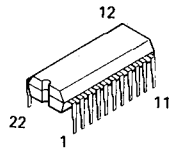
IC106 : LC7073
IC101 : TC9216P
IC105 : LA1235



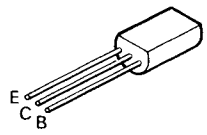
IC107 : LA2230



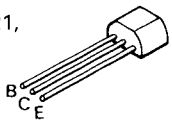
IC104 : LA3401



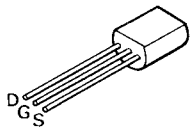
Q103 : KTC2240



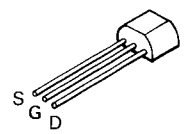
Q131 : KTA1267Y,
Q202~205 : KTC3195Y
Q123, 124 : KTD1303
Q105, 107, 109, 111, 113, 121, 126, 132, 207 : DTA114YS
Q128, 301, 129 : DC114YS
Q101, 104, 106, 108, 110, 112, 114~119, 122, 127, 130, 206, 302~304 : KTC3199



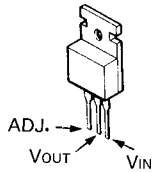
Q125 : 2SK117Y
Q102 : 2SK168DTZ



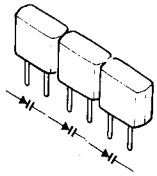
Q120, 201 : 2SK192GR



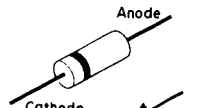
IC108 : LM317T

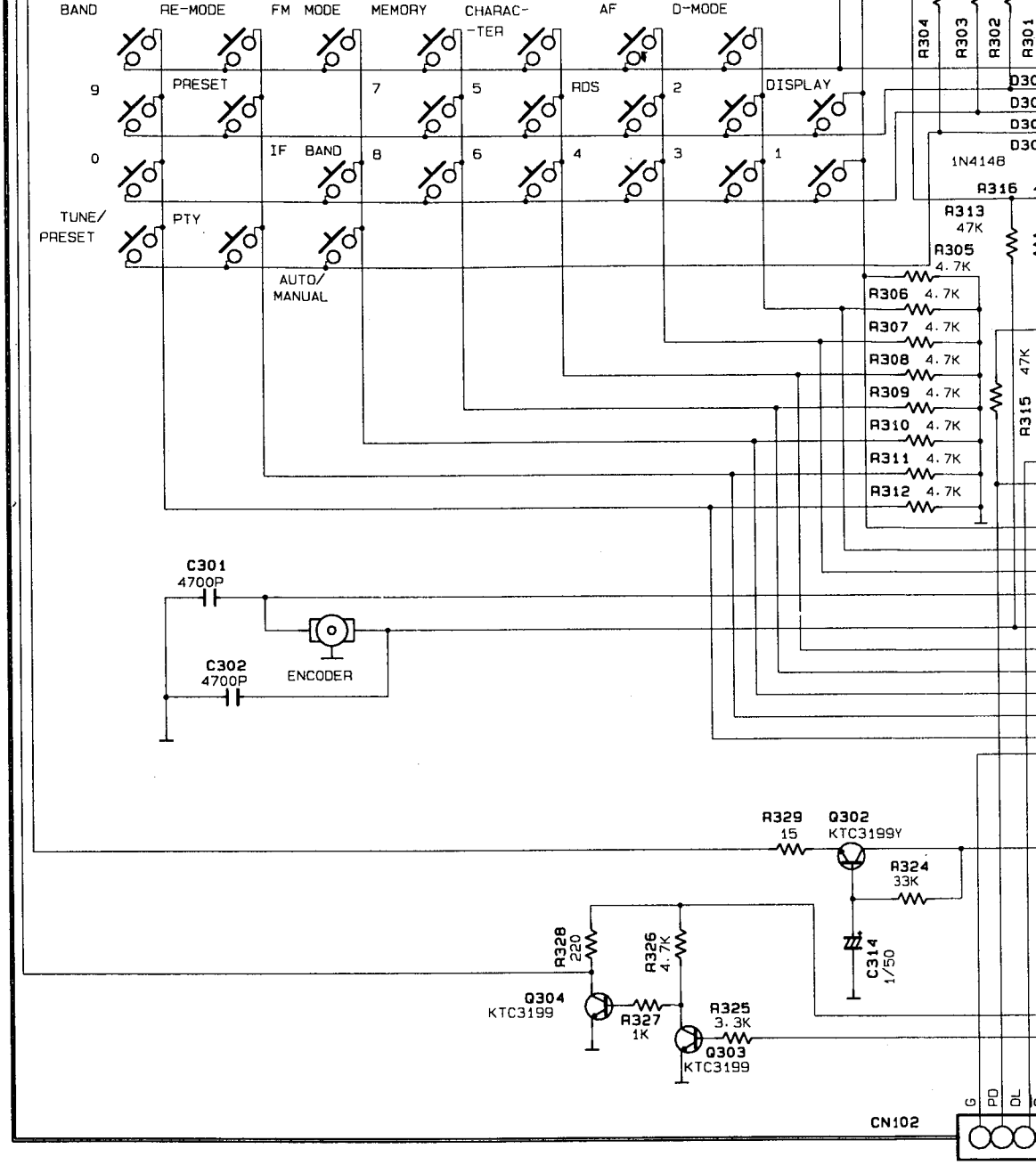


D104~106 : KV1235Z



D107, 108, 110~113, 123, 102, 103, 201~206, 301~308 : 1N4148
D115~119 : 1N4002
D121 : 1N4003




BAND
RE-MODE
FM MODE
MEMORY
CHARAC-
-TER
AF
D-MODE
9
PRESET
7
5
RDS
2
DISPLAY
0
IF BAND
8
6
4
3
1
TUNE/
PRESET
PTY
AUTO/
MANUAL
1N4148
R316
R313
47K
R305
4.7K
R306 4.7K
R307 4.7K
R308 4.7K
R309 4.7K
R310 4.7K
R311 4.7K
R312 4.7K
R315 47K
C301
4700P
C302
4700P
ENCODER
R329
15
Q302
KTC3199Y
R324
33K
R328
220
R326
4.7K
C314
1/50
Q304
KTC3199
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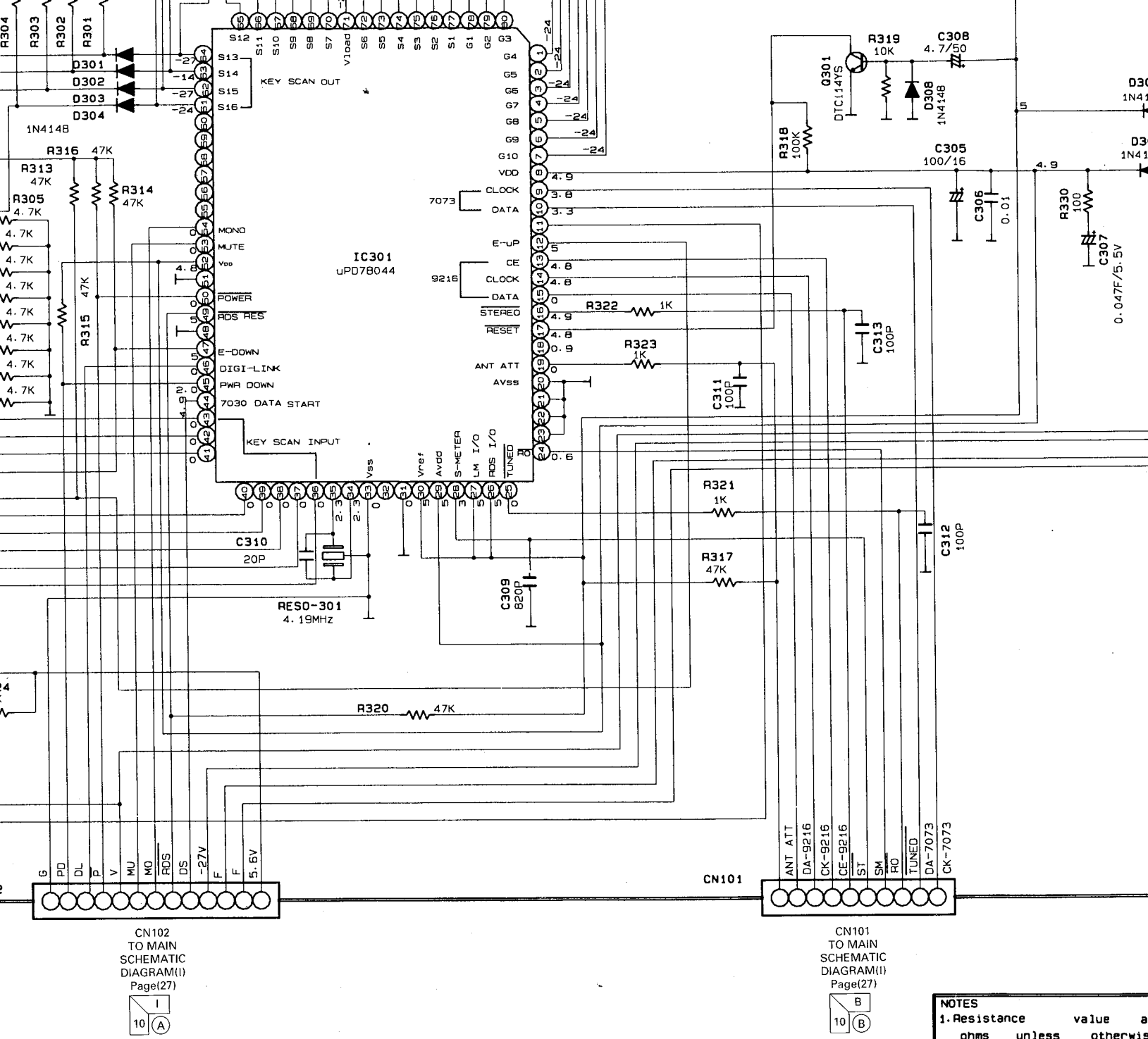
3.3K
Q303
KTC3199
CN102
G
PD
DL



NOTES

1. Resistance value a
ohms unless otherwis
[K=1.000 M=1.000.0

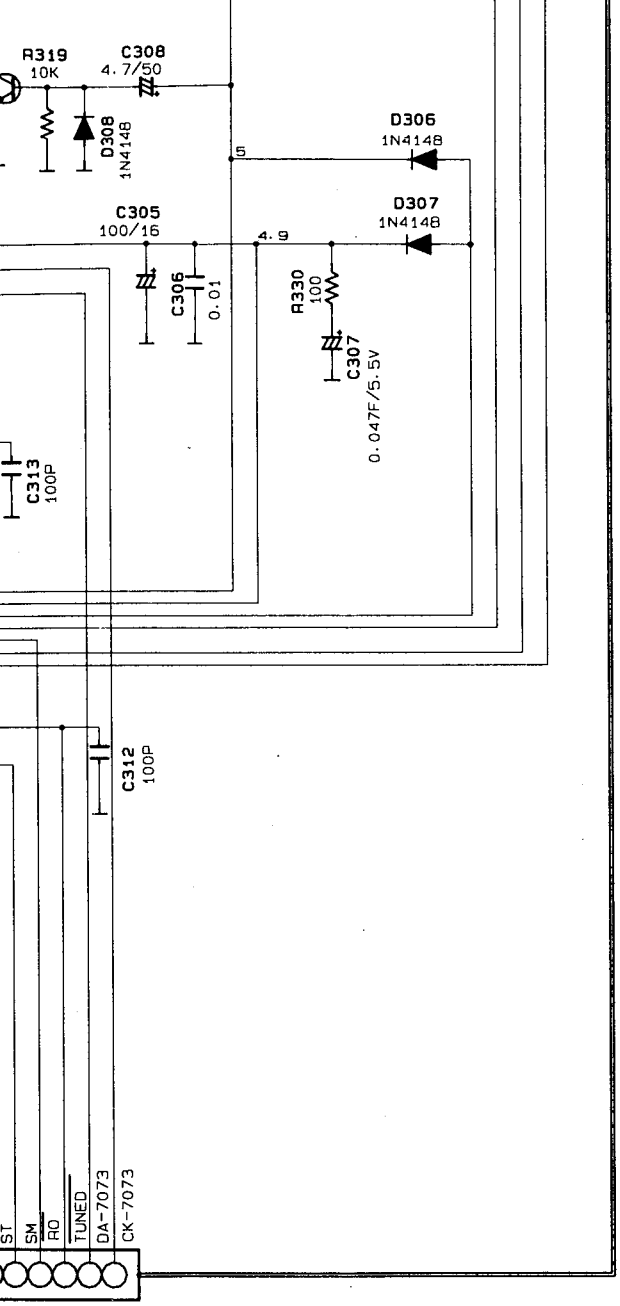
2. Capacitance value
microfarades unless
noted [P=micro-microfa

CAUTION

Safty precaution to
during servicing

1]Since these parts
are critical p
use the one des
part list

2]Before returning t
the customer make
leakage current or
exposed part are
insulated from th
circuit



01
AIN
MATIC
AM(I)
(27)

NOTES
1. Resistance value are indicated ohms unless otherwise specified (K=1.000 M=1.000.000)
2. Capacitance value are shown in microfarades unless otherwise noted (P=micro-microfarade)

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1|Since these parts maked with ⚠ are critical part for safty use the one deservised the part list

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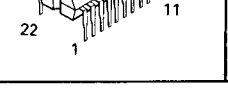
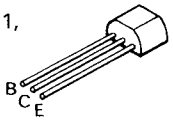
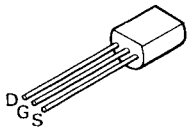


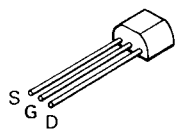
Q131 : KTA1267Y,
Q202~205 : KTC3195Y
Q123, 124 : KTD1303
Q105, 107, 109, 111, 113, 121, 126, 132, 207 : DTA114YS
Q128, 301, 129 : DC114YS
Q101, 104, 106, 108, 110, 112, 114~119, 122, 127, 130, 206, 302~304 : KTC3199



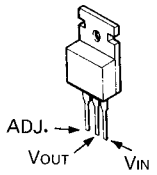
Q125 : 2SK117Y
Q102 : 2SK168DTZ



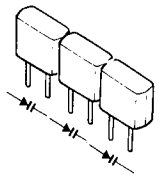
Q120, 201 : 2SK192GR



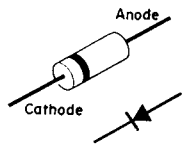
IC108 : LM317T



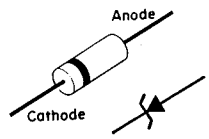
D104~106 : KV1235Z



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)