

# Service Manual

**QUARTZ Synthesizer**  
**LW/MW/FM Stereo Tuner**

**Tuner**  
**ST-G90L**

**Color**  
 (K)...Black Type

Area	
Color	Area
(K)	(EK).....United Kingdom.
(K)	(EB).....Belgium.
(K)	(EF).....France.
(K)	(EW).....Switzerland..



## SPECIFICATIONS (DIN 45 500)

### ■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz
	87.525~108.00MHz (+25kHz shift)
Sensitivity	1.5µV (IHF, usable)
S/N 30dB	1.3µV (75Ω)
S/N 26dB	1.2µV (75Ω)
S/N 20dB	0.9µV (75Ω)
IHF 46dB stereo quieting sensitivity	28µV/75Ω
Total harmonic distortion	
MONO (normal)	0.015%
STEREO (normal)	0.02%
S/N	
MONO	80dB (86dB, IHF)
STEREO	74dB (79dB, IHF)
Frequency response	4Hz~15kHz, +0.5dB~-0.5dB
Alternate channel selectivity	
normal ±400kHz	55dB
super narrow ±200kHz	30dB
Capture ratio	1.0dB
Image rejection at 98MHz	130dB
IF rejection at 98MHz	130dB
Spurious response rejection at 98MHz	130dB
AM suppression	55dB
Stereo separation	
1kHz	60dB
10kHz	45dB

Carrier leak	
19kHz	-75dB (-80dB, IHF)
38kHz	-75dB (-80dB, IHF)
Channel balance (250Hz~6,300Hz)	±1.0dB
Limiting point	0.85µV
Bandwidth	
IF amplifier	180kHz
FM demodulator	1000kHz
Antenna terminals	75Ω (unbalanced)

### ■ AM TUNER SECTION

Frequency range	
MW	522kHz~1611kHz (9kHz-steps)
	530kHz~1620kHz (10kHz-steps)
	155kHz~353kHz (9kHz-steps)
	153kHz~351kHz (-2kHz shift)
LW	
Sensitivity (S/N 20dB)	
MW	20µV, 300µV/m
LW	50µV
Selectivity (±9kHz)	
MW (at 999kHz)	50dB
LW (at 254kHz)	50dB

**Technics**

Matsushita Electric Industrial Co., Ltd.  
 Central P.O. Box 288, Osaka 530-91, Japan

<b>Image rejection</b>	
MW (at 999 kHz)	40dB
LW (at 254 kHz)	40dB
<b>IF rejection</b>	
MW (at 999 kHz)	60dB
LW (at 254 kHz)	35dB

**GENERAL**

Output voltage	0.3V (0.6V IHF)
Power consumption	9.5W
Power supply	
For United Kingdom	AC 50Hz/60Hz, 240V

**For continental Europe**  
**Dimensions (W x H x D)**  
**Weight**

AC 50 Hz/60Hz, 220V  
 430 x 93.5 x 288 mm  
 (16-30/32" x 2-22/32" x 9-11/32")  
 3.5kg (7.7lb.)

**Notes:**

1. Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).
2. Specifications are subject to change without notice. Weight and dimensions are approximate.

**CONTENTS**

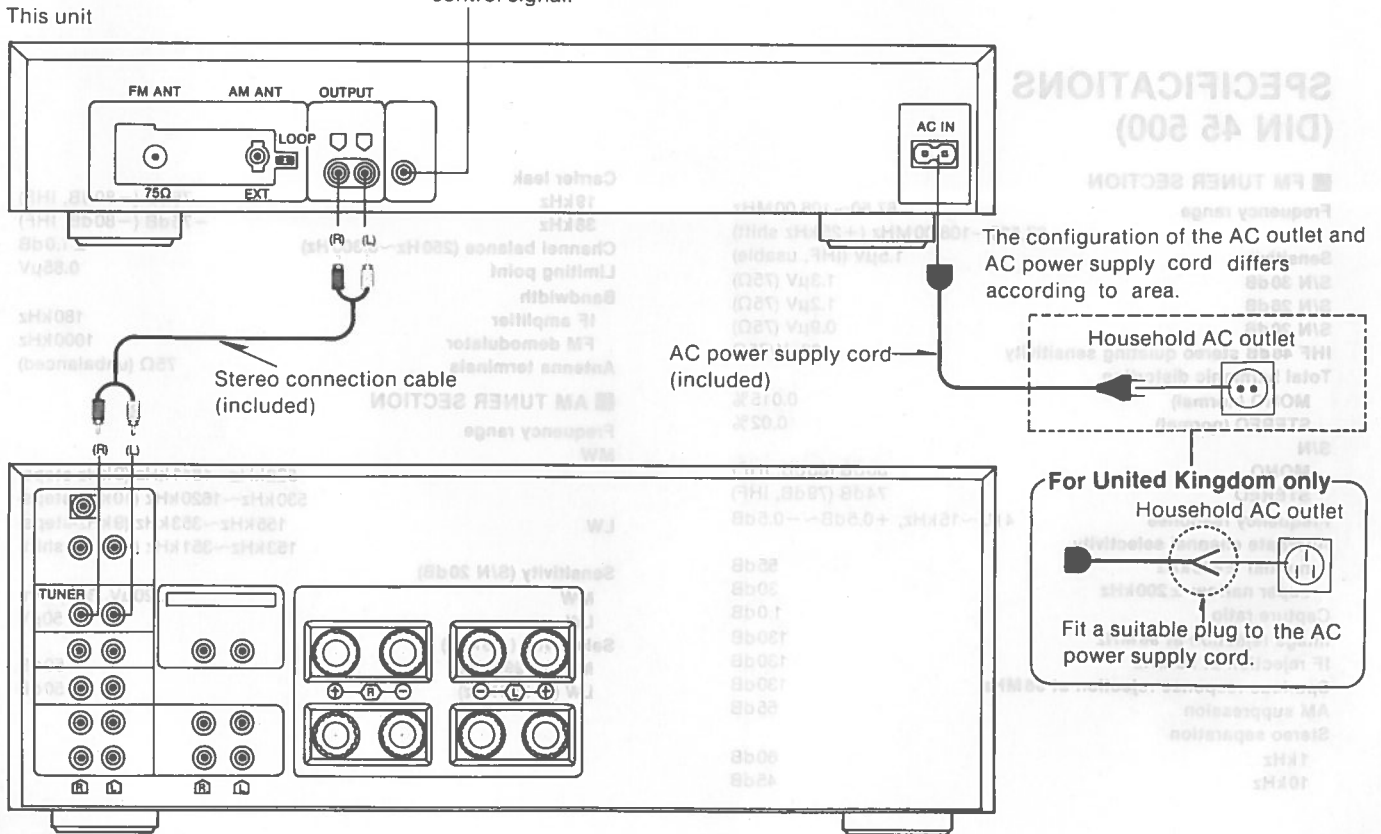
	Page
CONNECTIONS .....	2
LOCATION OF CONTROLS .....	3, 4
DISASSEMBLY INSTRUCTIONS .....	5
MEASUREMENTS AND ADJUSTMENTS .....	6~10
FUNCTION OF TERMINAL (IC901: M50941-421SP) .....	11, 12
RESISTORS & CAPACITORS .....	13, 14
REPLACEMENT PARTS LIST .....	15, 16
CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM .....	17~19

	Page
BLOCK DIAGRAM .....	20, 21
SCHEMATIC DIAGRAM .....	22~27
TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES .....	28
DESCRIPTION OF FL PANEL .....	29
EXPLODED VIEW .....	30, 31
REPLACEMENT PARTS LIST .....	32
ACCESSORIES .....	32

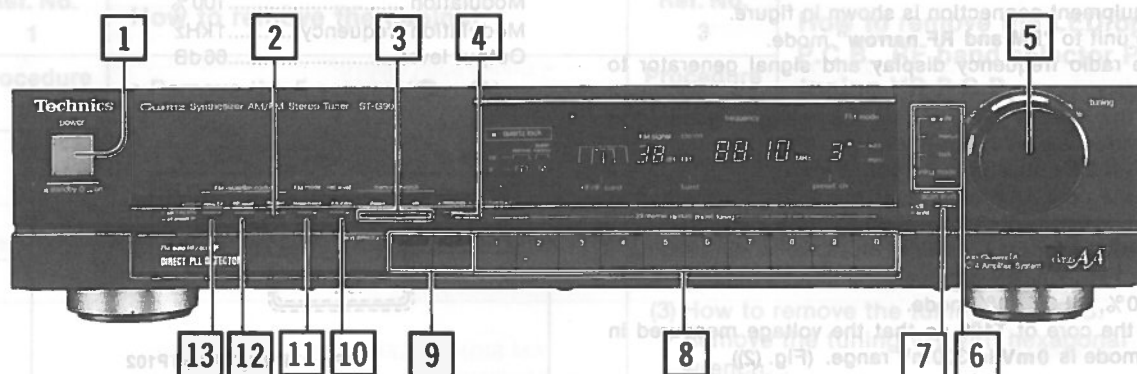
**CONNECTIONS**

**Control input terminal (CONTROL INPUT):**

This terminal is used for the connection of a timer for the purpose of controlling the tuner by means of an external control signal.



## LOCATION OF CONTROLS



### Control section

#### 1 Power "standby $\phi$ /on" switch (power "standby $\phi$ /on")

This switch switches ON and OFF the secondary circuit power only. The unit is in the "standby" condition when this switch is set to the "standby  $\phi$ " position. Regardless of the switch setting, the primary circuit is always "live" as long as the power cord is connected to an electrical outlet.

#### 2 FM IF band selector (IF band)

The built-in computer of this unit detects the signal condition and functions accordingly to select the FM IF band automatically. This button is used to change it manually.

#### 3 Memory-search button (memory search)

This button is used to confirm a memory presetting. If the button is pressed, the memorized frequency and "channel" number will be shown one after the other in order.

#### 4 Memory button (memory)

This button is used when preset memory setting of the preset-tuning buttons is made.

#### 5 Tuning control (tuning)

This control is used to select an FM or AM broadcast. When turning the control to the left, the frequency change downward. When turning the control to the right, the frequency change upward.

#### 6 Tuning-mode selector/indicator (tuning mode)

Each time this selector is pressed, the selection changes, in sequence, to "auto", "manual" and "lock".

##### auto:

At this position, broadcast stations are automatically found when the tuning control is turned to the left or right until the frequency changes.

##### manual:

At this position, the tuning control can be used to locate the desired station.

##### lock:

At this position, the broadcast station now being heard is locked in, and other broadcast stations cannot be tuned to, even if turning the tuning control.

#### 7 Scan level selector (scan level)

This button is used for setting or confirming the level of the reception signal during automatic FM tuning.

#### 8 Preset-tuning buttons (39 channel random preset tuning)

These buttons are used to preset FM and AM broadcast frequencies into the memory of this unit, and are also pressed to select the desired preset frequencies.

#### 9 Band selectors (band selector)

##### FM:

Press this button to listen to an FM broadcast.

##### freq shift:

When the button is pressed slightly longer, the reception frequency increases by 0.025 MHz (25 kHz).

(The final figure of the frequency display changes to "2" or "7".)

In order to return to the original frequency indication, press this button for about 2 seconds again.

##### MW:

Press this button to listen to an MW broadcast.

##### allocation:

This button is also used to select a frequency step of either 9 kHz or 10 kHz.

When the MW button is pressed for about 4 seconds, the MW frequency step will change to 10 kHz per step.

(This step is set to 9 kHz before shipment.)

Set to the appropriate position for your locality.

##### LW:

Press this button to listen to an LW broadcast.

##### freq shift:

When the LW button is pressed for about 4 seconds during reception of an LW broadcast, the LW frequency will decrease by 2 kHz.

So, for example, to receive 153 kHz, tune to 155 kHz, and then press this button.

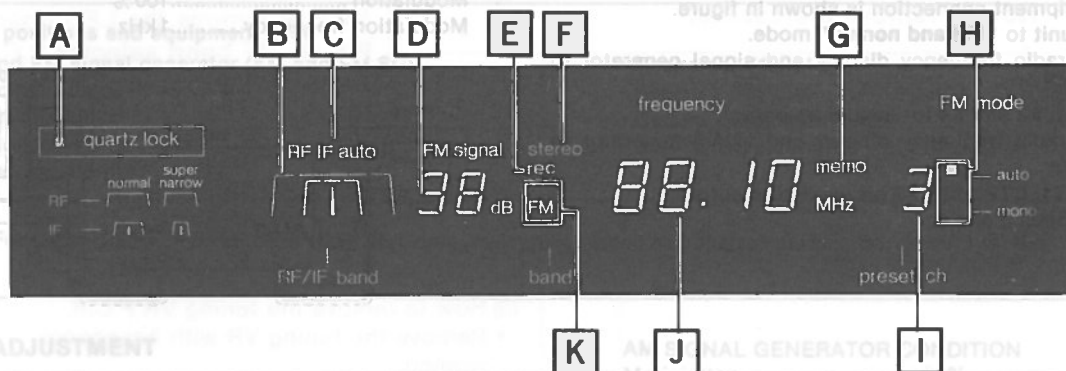
In order to return to the original frequency indication, press this button for about 4 seconds again.

#### 10 Recording-level check button (rec level)

This button is to be used for adjustment of the recording level when recording an FM broadcast.

Other operations cannot be performed while the recording-level-check indicator is illuminated.

To perform other operations, first be sure that the recording-level-check indicator is OFF.



## Display section

### 11 FM mode selector (FM mode)

If noise is excessive in stereo broadcasts, a switchover to monaural reception can be made.

When there is a change to monaural reception, the illumination of the FM mode indicator changes to the "mono" position.

### 12 FM RF-band selector (RF band)

This button can be used to switch the RF bandwidth to either the "normal" width or the "super narrow" width by manual operation.

Interference signals are removed if switched to "super narrow".

### 13 FM RF-band automatic-selector (auto RF)

It sometimes happens, during the reception of FM broadcasts, that a station other than the desired station is received, or interference noise is excessive, even though there is no broadcast station other than the desired station on a nearby frequency.

The reason for this is that interference signals are produced in a frequency band in which there is actually no broadcast station when two or more strong broadcast stations' signals (interference signals) are input to the unit's "front end" (input stage). These interference signals are known as "cross modulation" interference signals, and they cause interference noise to be heard in the signals from the desired broadcast station.

This model is designed to eliminate such cross modulation interference signals by automatically switching the bandwidth of the RF (radio frequency; high frequency) band to the "super narrow" bandwidth.

#### - set freq only:

By lightly tapping this selector, the presence or not of interference signals within the broadcast signals being received is detected, and there is an automatic switchover to either the "normal" or "super narrow" circuitry as appropriate.

#### - all preset ch:

If this selector is pressed and held for a slightly longer time, the presence or not of interference signals within the broadcast signals of all FM broadcast stations that have been preset to the unit's memory is detected. There is then an automatic switchover to either the "normal" or "super narrow" circuitry as appropriate, and then an entry is automatically made (to the memory for these same "channels") of the "normal" or "super narrow" reception condition.

### A Quartz-lock indicator (quartz lock)

This indicator illuminates when tuned precisely to an FM or AM station.

### B FM RF/IF band indicator (RF/IF band)

These indicators show the FM reception conditions.

### C FM RF/IF automatic-select indicator (RF IF auto)

This indicator illuminates when the FM RF-band automatic-selector is pressed.

### D FM signal-strength display (FM signal)

This display usually shows the reception level of FM broadcasts (maximum 86 dB); when the scan-level selector is pressed and held, the station-tuning level is displayed in the sequence 30 → 40 → 50.

### E Recording-level-check indicator (rec)

### F FM stereo indicator (stereo)

This indicator automatically illuminates when an FM stereo broadcast is being received.

It will not illuminate if the FM mode selector is set to the monaural mode.

### G Memory indicator (memo)

This indicator illuminates when the memory button is pressed.

### H FM mode indicator (FM mode)

When FM broadcasts are being received, usually the "auto" indication is illuminated. When the FM mode selector is used to select monaural reception, the illumination of the FM mode indicator changes to the "mono" position.

### I Channel display (preset ch)

The channel number selected by the preset-tuning buttons is displayed.

### J Digital frequency display

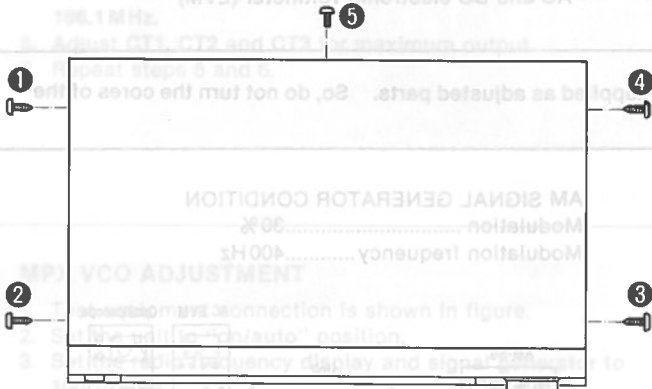
The reception frequency of the FM or AM broadcast selected by using the tuning control or the preset-tuning buttons is indicated.

### K Band indicator (band)

# DISASSEMBLY INSTRUCTIONS

**Ref. No. 1**  
**How to remove the cabinet**

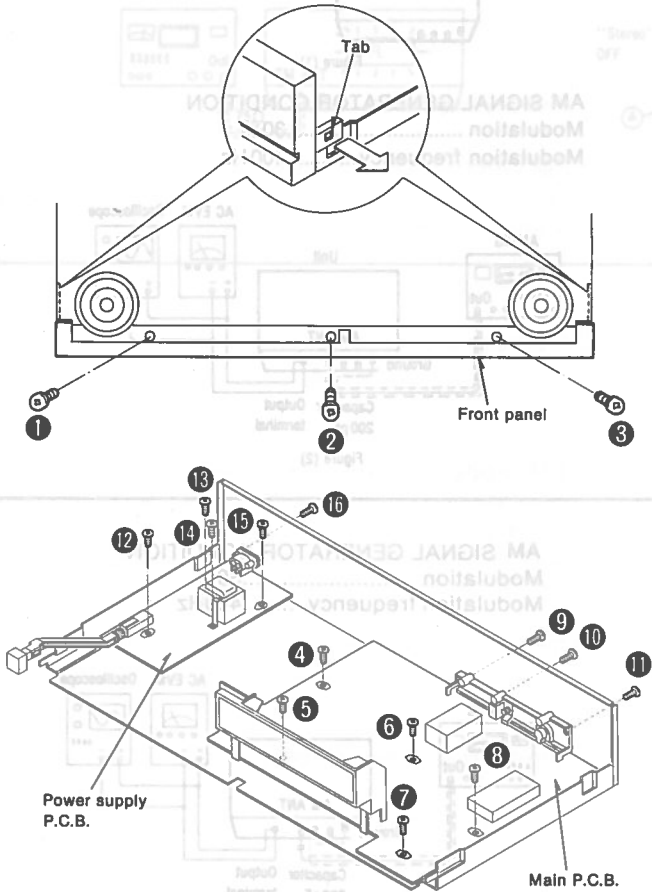
**Procedure 1**  
• Remove the 5 screws (①~⑤).



**Ref. No. 2**  
**How to remove the main P.C.B. and power supply P.C.B.**

**Procedure 1 → 2**  
(1) How to remove the main P.C.B.  
• Remove the 3 screws (①~③).  
• Remove the 2 tabs and the front panel.  
• Remove the 8 screws (④~⑪).

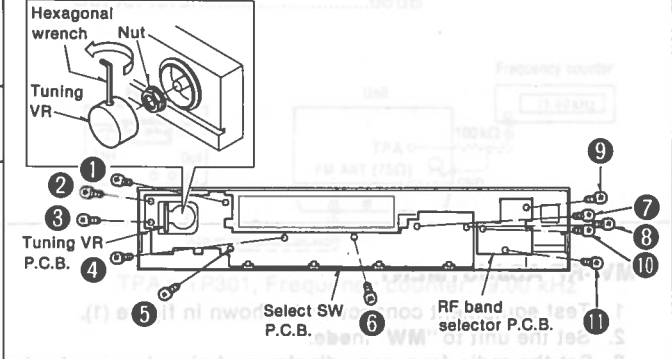
(2) How to remove the power supply P.C.B.  
• Remove the 5 screws (⑫~⑯).



**Ref. No. 3**  
**How to remove the LED/operation SW P.C.B., RF band selector P.C.B. and tuning VR P.C.B.**

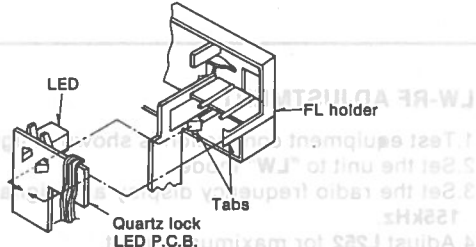
**Procedure 1 → 2 → 3**

- (1) How to remove the LED/operation SW P.C.B.  
• Remove the 8 screws (①~⑧).
- (2) How to remove the RF band selector P.C.B.  
• Remove the 3 screws (⑨~⑪).
- (3) How to remove the tuning VR P.C.B.  
• Remove the tuning VR with hexagonal wrench.  
• Remove the nut.



**Ref. No. 4**  
**How to remove the quartz lock LED P.C.B.**

**Procedure 1 → 2 → 4**  
• Remove the 2 tabs.



## MEASUREMENTS AND ADJUSTMENTS

### LW/MW/FM

#### Control positions and equipment used

- AM and FM signal generator (AM and FM-SG)
- Stereo modulator
- Distortion analyser
- Oscilloscope
- Frequency counter
- Choke coil (100 $\mu$ H)
- Resistor (100k $\Omega$ )
- Ceramic capacitor (200pF)
- AC and DC electronic voltmeter (EVM)

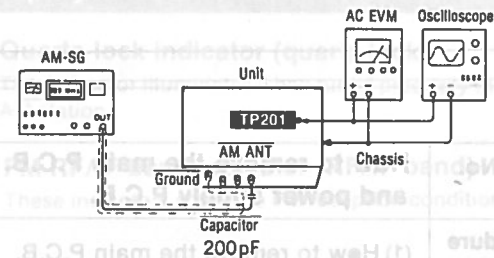
**Note:** For L302, L303 (L.P.F.) and L251 (LW ANT coll), they are supplied as adjusted parts. So, do not turn the cores of the parts

#### MW-IF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the to "MW" mode.
3. Set the radio frequency display and signal generator to 450kHz.
4. Adjust T201 for maximum output.

#### AM SIGNAL GENERATOR CONDITION

Modulation .....30 %  
Modulation frequency .....400Hz



#### MW-RF ADJUSTMENT

1. Test equipment connection is shown in figure (1).
2. Set the unit to "MW" mode.
3. Set the radio frequency display and signal generator to 522kHz.
4. Adjust L204 so that the voltage measured in signal mode is 1.0V.
5. Test equipment connection is shown in figure (2).
6. Set the radio frequency display and signal generator to 612kHz.
7. Adjust L203 for maximum output.
8. Set the radio frequency display and signal generator to 1503kHz.
9. Adjust CT201 for maximum output.
10. Repeat steps 6~9.

**Note:** Antenna input level must be as low as possible being free from AGC.

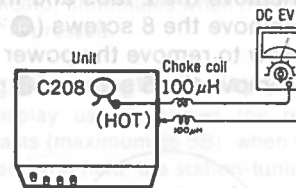


Figure (1)

#### AM SIGNAL GENERATOR CONDITION

Modulation .....30 %  
Modulation frequency .....400Hz

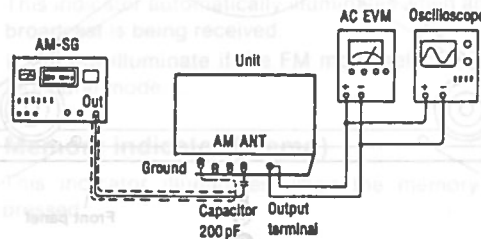


Figure (2)

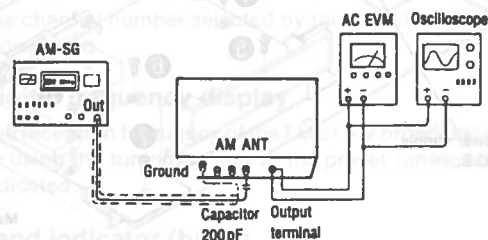
#### LW-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "LW" mode.
3. Set the radio frequency display and signal generator to 155kHz.
4. Adjust L252 for maximum output.
5. Set the radio frequency display and signal generator to 353kHz.
6. Adjust CT251 for maximum output.
7. Repeat steps 3 ~ 6.

**Note:** Antenna input level must be as low as possible being free from AGC.

#### AM SIGNAL GENERATOR CONDITION

Modulation .....30%  
Modulation frequency .....400Hz

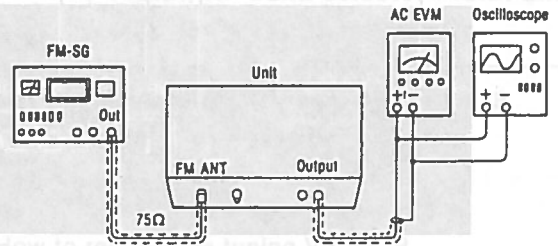


**FM-RF ADJUSTMENT**

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and normal" mode.
3. Set the radio frequency display and signal generator to 90.1 MHz.
4. Adjust L1, L2 and L4 for maximum output.
5. Set the radio frequency display and signal generator to 106.1 MHz.
6. Adjust CT1, CT2 and CT3 for maximum output.
7. Repeat steps 5 and 6.

**FM SIGNAL GENERATOR CONDITION**

Modulation .....100%  
 Modulation frequency .....1 kHz

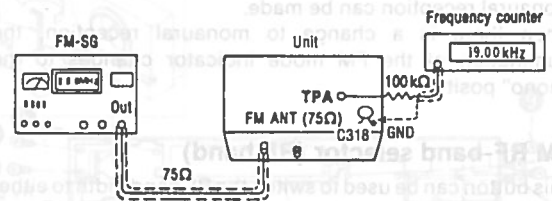


**MPX VCO ADJUSTMENT**

1. Test equipment connection is shown in figure.
2. Set the unit to "on/auto" position.
3. Set the radio frequency display and signal generator to 100.10 MHz.
4. Adjust VR302 for 19kHz±30Hz on frequency counter reading.

**FM SIGNAL GENERATOR CONDITION**

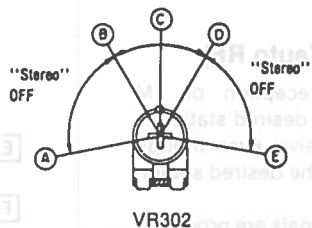
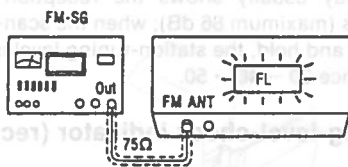
Modulation .....0%  
 Modulation frequency .....0  
 Output level .....66 dB



TPA = TP301, Frequency counter: 19.00 kHz

**USING ALTERNATE SYSTEM**

1. Apply stereo signal from generator or receive the stereo broadcast.
2. Adjust VR302 until stereo indicator lights up. Fix the arm of VR302 as shown in figure.



- A - B, D - E ..... "Stereo" OFF position
- B - D ..... "Stereo" ON position (Indicator lighting)
- C ..... Adjust point of pilot circuit

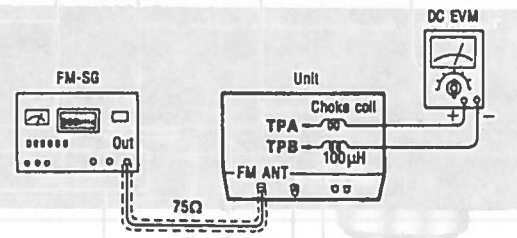
VR302

**FM DETECTION CIRCUIT ADJUSTMENT**

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and RF narrow" mode.
3. Set the radio frequency display and signal generator to 100.10MHz.
4. Adjust the core of T101 so that the voltage measured in signal mode is 0mV in 300mV range. (Fig. (1))
5. Adjust T102 for maximum output. (Fig. (2))
6. Adjust the core of T103 so that the voltage measured in signal mode is 0mV in 300mV range. (Fig. (2))
7. Adjust VR104 for maximum (+) on DC voltmeter reading.
8. Set the FM signal generator condition to STEREO L+R, 1kHz 90%, PILOT 10% mode.
9. Adjust the core of T103 so that the voltage measured in signal mode is 0mV in 300mV range. (Fig. (2))

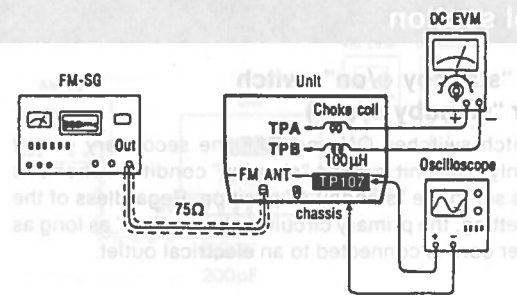
**FM SIGNAL GENERATOR CONDITION**

Modulation .....100%  
 Modulation frequency.....1 kHz  
 Output level.....66dB



TPA=TP101, TPB=TP102

Fig. (1)



TPA=TP105, TPB=TP106

Fig. (2)

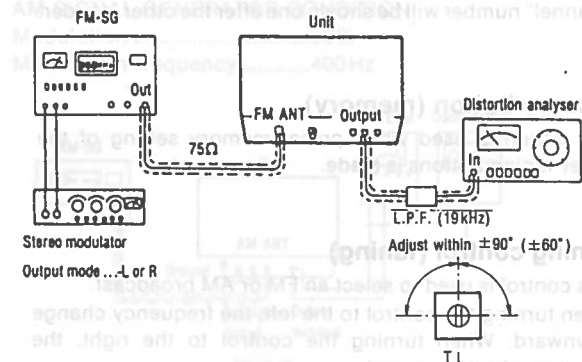
**FM STEREO DISTORTION ADJUSTMENT**

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and normal" mode.
3. Set the radio frequency display and signal generator to 100.10MHz.
4. Adjust T1 so that the distortion factor of L-CH is minimized.
5. Make sure that the distortion factors of L-CH and R-CH are nearly the same with each other to minimum.
6. Set the unit to "IF narrow" mode.
7. Adjust T104 so that the distortion factor of L-CH is minimized.
8. Make sure that the distortion factors of L-CH and R-CH are nearly the same with each other to minimum.

**Note:** 1. The adjusting screwdriver used should be made of resin.  
 2. T1 should be rotated no more 1/4 turn (90 deg.) on either side.  
 3. T104 should be rotated no more 1/6 turn (60 deg.) on either side.

**FM SIGNAL GENERATOR CONDITION**

Modulation ..... "L" mode or "R" mode 45%,  
 Pilot 10%  
 Modulation frequency.....1 kHz (Pilot 19kHz)  
 Output level.....66dB



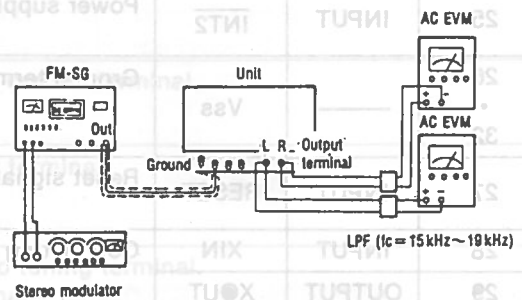


### SEPARATION ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and normal" mode.
3. Set the radio frequency display and signal generator to 100.10MHz.
4. Adjust VR303 so that the R-CH output is minimized when stereo modulator is in "L" (L-CH modulation) mode.
5. Adjust VR304 so that the L-CH output is minimized when stereo modulator is in "R" (R-CH modulation) mode.

### FM SIGNAL GENERATOR CONDITION

Modulation ..... "L" mode or "R" mode 45%,  
 Pilot 10%  
 Modulation frequency ..... 1kHz (Pilot 19kHz)  
 Output level ..... 66dB

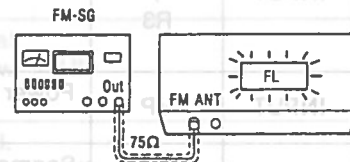


### FM SIGNAL STRENGTH LEVEL ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and normal" mode.
3. Set the radio frequency display and signal generator to 100.10MHz.
4. Change LCD display from "frequency" to "dB" by pressing the FM signal button.
5. Adjust VR103 so that 50dB is indicated. "50dB" is indicated on the LCD display.
6. Adjust VR102 so that 70dB is indicated. "70dB" is indicated on the LCD display.
7. Adjust VR101 so that 86dB is indicated. "86dB" is indicated on the LCD display.
8. Repeat steps 5~7.

### FM SIGNAL GENERATOR CONDITION

Modulation ..... 30%  
 Modulation frequency ..... 1kHz  
 Output level ..... 56, 76, 92dB

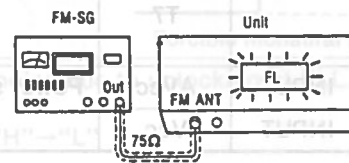


### FM IF NARROW GAIN ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM and normal" mode.
3. Change LCD display from "frequency" to "dB" by pressing the FM signal button.
4. Confirm that "dB" is indicated.
5. Set the unit to "IF narrow" mode.
6. Adjust VR105 that the "dB" of "IF normal" and "IF narrow" are the same with each other.

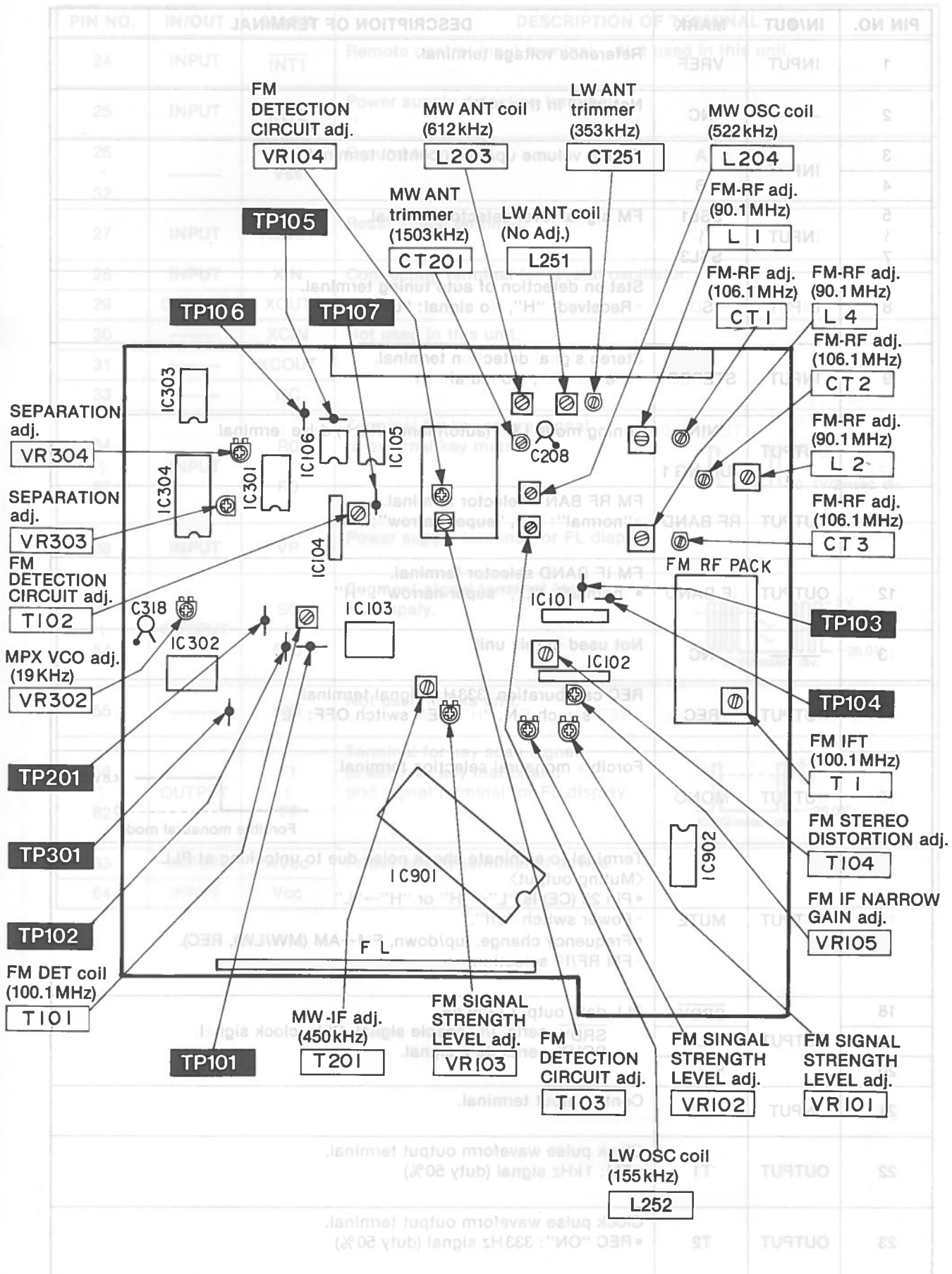
### FM SIGNAL GENERATOR CONDITION

Modulation ..... 30%  
 Modulation frequency ..... 1kHz  
 Output level ..... 26dB




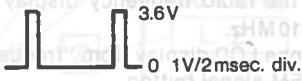
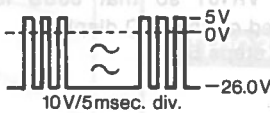
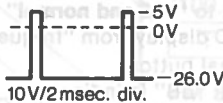
18	OUTPUT	SRDY	PLL data output terminal. SRDY: serial I/O enable signal, CLK: clock signal, SOUT: serial data signal.
19	OUTPUT	CLK	
20		SOUT	
21	INPUT	SIN	Control input terminal.
22	OUTPUT	T1	Clock pulse waveform output terminal. +FM: 1kHz signal (duty 50%)
23	OUTPUT	T2	Clock pulse waveform output terminal. +REC "ON": 333Hz signal (duty 50%)

• Adjustment Points



## FUNCTION OF TERMINAL (IC901: M50941-421SP)

PIN NO.	IN/OUT	MARK	DESCRIPTION OF TERMINAL
1	INPUT	VREF	Reference voltage terminal.
2	—	NC	Not used in this unit.
3	INPUT	A	Tuning volume up/down control terminal.
4		B	
5 6 7	INPUT	SSL1 } SSL3	FM signal level detector terminal.
8	INPUT	SD	Station detection of auto tuning terminal. • Received: "H", No signal: "L"
9	INPUT	STEREO	Stereo signal detection terminal. • Stereo: "L", Monaural: "H"
10 17	OUTPUT	TUNING 0 • TUNING 1	Tuning mode LED (auto/manual/lock) drive terminal.
11	OUTPUT	RF BAND	FM RF BAND selector terminal. • "normal": "L", "super narrow": "H"
12	OUTPUT	IF BAND	FM IF BAND selector terminal. • "normal": "L", "super narrow": "H"
13	—	NC	Not used in this unit.
14	OUTPUT	REC	REC carribration (333Hz) signal terminal. • REC switch ON: "H", REC switch OFF: "L"
15	OUTPUT	MONO	Forcible monaural selection terminal. 
16	OUTPUT	MUTE	Terminal to eliminate shock noise due to unlocking at PLL. <Muting output> • Pin 25 (CE) is "L"→"H" or "H"→"L" • Power switch "off". • Frequency change. (up/down, FM↔AM (MW/LW), REC). • FM RF/IF selection.
18	OUTPUT	SRDY	PLL data output terminal. SRDY: serial I/O enable signal, CLK: clock signal, SOUT: serial data signal.
19		CLK	
20		SOUT	
21	INPUT	SIN	Control input terminal.
22	OUTPUT	T1	Clock pulse waveform output terminal. • FM: 1kHz signal (duty 50%)
23	OUTPUT	T2	Clock pulse waveform output terminal. • REC "ON": 333Hz signal (duty 50%)

PIN NO.	IN/OUT	MARK	DESCRIPTION OF TERMINAL
24	INPUT	INT1	Remote control input terminal. Not used in this unit.
25	INPUT	INT2	Power supply detection terminal.
26 • 32	—	Vss	Ground terminal.
27	INPUT	RESET	Reset signal terminal.
28	INPUT	XIN	Connecting terminal for crystal oscillator.
29	OUTPUT	XOUT	
30	—	XCIN	Not used in this unit.
31	—	XCOUT	
33	—	NC	
34 } 37	INPUT	R0 } R3	Terminal for key return signal to external key matrix. 
38	INPUT	VP	Power supply terminal for FL display.
39 } 54	OUTPUT	S0 } S15	Segment signal terminal for FL display. 
55	—	NC	Not used in this unit.
56 } 62	OUTPUT	T1 } T7	Terminal for key scan signal to external key matrix and grid signal terminal for FL display. 
63	INPUT	AVcc	Power supply terminal of device.
64	INPUT	Vcc	

# RESISTORS & CAPACITORS

Notes : \* Important safety notice :

Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

\* Bracketed indications in Ref. No. columns specify the area. (Refer to the first page for area.) Parts without these indications can be used for all areas.

### Numbering System of Resistor

Example:

ERD	25	F	J	102
Type	Wattage (1/4W)	Shape	Tolerance	Value (1K $\Omega$ )
ERX	2	AN	J	471
Type	Wattage (2W)	Shape	Tolerance	Value (470 $\Omega$ )

### Numbering System of Capacitor

Example:

ECKD	1H	102	Z	F
Type	Voltage (50V)	Value (0.001 $\mu$ F)	Tolerance	Peculiarity
ECEA	50	M	330	
Type	Voltage (50V)	Peculiarity	Value (33 $\mu$ F)	

- Capacity are in microfarads ( $\mu$ F) unless specified otherwise, P = Pico-farads (pF) F = Farads (F).
- Resistance are in ohms ( $\Omega$ ), unless specified otherwise, 1K = 1,000 $\Omega$ , 1M = 1,000k $\Omega$

Resistor Type		Wattage		Tolerance
ERD	: Carbon	10 : 1/8W	12 : 1/2W	J : $\pm 5\%$
ERG	: Metal Oxide	14 : 1/4W	25 : 1/4W	F : $\pm 1\%$
ERO	: Fuse Type Metal	1A : 1W	1B : 1/8W	G : $\pm 2\%$
ERX	: Metal Film	S2 : 1/4W	S1 : 1/2W	J : $\pm 5\%$
ERD L	: Carbon (chip)	2F : 1/4W	50 : 1/2W	K : $\pm 10\%$
ERO K	: Metal Film (chip)	2A : 2W	3A : 3W	M : $\pm 20\%$
ERC	: Solid	6G : 1/10W	8G : 1/8W	
ERF	: Incombustible Box-Shaped			
ERM	: Wire-Wound			
RRJ	: Chip Resistor			
ERJ	: Chip Resistor			

Capacitor Type		Voltage		Tolerance
ECE	: Electrolytic	0J : 6.3V	1A : 10V	K : $\pm 10\%$
ECCD	: Ceramic	1C : 16V	1E : 25V	M : $\pm 20\%$
ECKD	: Ceramic Capacitor	1H : 50V	1V : 35V	Z : +80%
ECQM	: Polyester	50 : 50V	05 : 50V	-20
ECOP	: Polypropylene	2H : 500V	2A : 100V	J : $\pm 5\%$
ECG	: Ceramic	1 : 100V	1J : 63V	G : $\pm 2\%$
ECEA N	: Non Polar Electrolytic	KC : 400V AC		F : $\pm 1\%$
QCU	: Ceramic (Chip Type)	KC : 125V AC		C : $\pm 0.25pF$
ECUX	: Ceramic (Chip Type)	(UL)		D : $\pm 0.5pF$
ECF	: Semiconductor			
EECW	: Liquid electrolyte double layer capacitor			

Ref. No.	Part No.	Value.	Ref. No.	Part No.	Value.	Ref. No.	Part No.	Value.
RESISTORS(VALUE,WATTAGE)								
R1	ERDS2T J104	100K 1/4	R134	ERDS2T J682	6.8K 1/4	R207	ERDS2T J562	5.6K 1/4
R2	ERDS2T J273	27K 1/4	R135	ERDS2T J183	18K 1/4	R208	ERDS2T J104	100K 1/4
R3	ERDS2T J104	100K 1/4	R136	ERDS2T J684	680K 1/4	R209	ERDS2T J102	1K 1/4
R4	ERDS2T J104	100K 1/4	R137	ERDS2T J473	47K 1/4	R210	ERDS2T J822	8.2K 1/4
R5	ERDS2T J104	100K 1/4	R138	ERDS2T J472	4.7K 1/4	R211	ERDS2T J473	47K 1/4
R6	ERDS2T J823	82K 1/4	R139	ERDS2T J331	330 1/4	R212	ERDS2T J101	100 1/4
R7	ERDS2T J103	10K 1/4	R140	ERDS2T J222	2.2K 1/4	R213	ERDS2T J473	47K 1/4
R8	ERDS2T J100	10 1/4	R141	ERDS2T J102	1K 1/4	R251	ERDS2T J103	10K 1/4
R9	ERDS2T J104	100K 1/4	R142	ERDS2T J222	2.2K 1/4	R252	ERDS2T J182	1.8K 1/4
R10	ERDS2T J820	82 1/4	R143	ERDS2T J102	1K 1/4	R253	ERDS2T J223	22K 1/4
R11	ERDS2T J820	82 1/4	R144	ERDS2T J102	1K 1/4	R254	ERDS2T J182	1.8K 1/4
R12	ERDS2T J820	82 1/4	R145	ERDS2T J102	1K 1/4	R255	ERDS2T J473	47K 1/4
R101	ERDS2T J820	82 1/4	R146	ERDS2T J102	1K 1/4	R301	ERDS2T J104	100K 1/4
R102	ERDS2T J472	4.7K 1/4	R149	ERDS2T J104	100K 1/4	R302	ERDS2T J104	100K 1/4
R103	ERDS2T J331	330 1/4	R150	ERDS2T J104	100K 1/4	R304	ERDS2T J103	10K 1/4
R104	ERDS2T J562	5.6K 1/4	R151	ERDS2T J101	100 1/4	R305	ERDS2T J104	100K 1/4
R105	ERDS2T J331	330 1/4	R152	ERDS2T J472	4.7K 1/4	R306	ERDS2T J682	6.8K 1/4
R106	ERDS2T J331	330 1/4	R153	ERDS2T J182	1.8K 1/4	R307	ERDS2T J333	33K 1/4
R107	ERDS2T J561	560 1/4	R154	ERDS2T J122	1.2K 1/4	R308	ERDS2T J103	10K 1/4
R108	ERDS2T J123	12K 1/4	R155	ERDS2T J102	1K 1/4	R309	ERDS2T J123	12K 1/4
R109	ERDS2T J103	10K 1/4	R156	ERDS2T J273	27K 1/4	R310	ERDS2T J563	56K 1/4
R110	ERDS2T J472	4.7K 1/4	R157	ERDS2T J103	10K 1/4	R311	ERDS2T J472	4.7K 1/4
R111	ERDS2T J331	330 1/4	R163	ERDS2T J820	82 1/4	R312	ERDS2T J103	10K 1/4
R113	ERDS2T J151	150 1/4	R165	ERDS2T J224	220K 1/4	R314	ERDS2T J820	82 1/4
R115	ERDS2T J681	680 1/4	R166	ERDS2T J474	470K 1/4	R315	ERDS2T J473	47K 1/4
R116	ERDS2T J332	3.3K 1/4	R167	ERDS2T J223	22K 1/4	R316	ERDS2T J473	47K 1/4
R117	ERDS2T J332	3.3K 1/4	R168	ERDS2T J223	22K 1/4	R317	ERDS2T J153	15K 1/4
R118	ERDS2T J332	3.3K 1/4	R169	ERDS2T J683	68K 1/4	R318	ERDS2T J392	3.9K 1/4
R119	ERDS2T J331	330 1/4	R170	ERDS2T J473	47K 1/4	R319	ERDS2T J223	22K 1/4
R120	ERDS2T J102	1K 1/4	R171	ERDS2T J473	47K 1/4	R320	ERDS2T J103	10K 1/4
R121	ERDS2T J222	2.2K 1/4	R172	ERDS2T J103	10K 1/4	R321	ERDS2T J183	18K 1/4
R122	ERDS2T J331	330 1/4	R173	ERDS2T J223	22K 1/4	R322	ERDS2T J393	39K 1/4
R123	ERDS2T J272	2.7K 1/4	R174	ERDS2T J473	47K 1/4	R323	ERDS2T J153	15K 1/4
R124	ERDS2T J331	330 1/4	R175	ERDS2T J332	3.3K 1/4	R324	ERDS2T J153	15K 1/4
R125	ERDS2T J103	10K 1/4	R176	ERDS2T J332	3.3K 1/4	R325	ERDS2T J333	33K 1/4
R126	ERDS2T J472	4.7K 1/4	R177	ERDS2T J563	56K 1/4	R326	ERDS2T J333	33K 1/4
R129	ERDS2T J392	3.9K 1/4	R178	ERDS2T J473	47K 1/4	R327	ERDS2T J153	15K 1/4
R130	ERDS2T J221	220 1/4	R201	ERDS2T J473	47K 1/4	R328	ERDS2T J153	15K 1/4
R131	ERDS2T J101	100 1/4	R202	ERDS2T J222	2.2K 1/4	R329	ERDS2T J101	100 1/4
R132	ERDS2T J104	100K 1/4	R203	ERDS2T J563	56K 1/4	R330	ERDS2T J101	100 1/4
R133	ERDS2T J471	470 1/4	R204	ERDS2T J222	2.2K 1/4	R331	ERDS2T J102	1K 1/4
			R205	ERDS2T J101	100 1/4	R332	ERDS2T J102	1K 1/4
			R206	ERDS2T J473	47K 1/4	R333	ERDS2T J331	330 1/4

Ref. No.	Part No.	Value.	Ref. No.	Part No.	Value.	Ref. No.	Part No.	Value.
R334	ERDS2TJ331	330 1/4	C10	ECKD1H102MDL	0.001 50	C210	ECQP1471JZ	470P 125
R335	ERDS2TJ332	3.3K 1/4	C11	ECBT1H102KB5	0.001 50	C211	ECKD1H223PF	0.022 50
R336	ERDS2TJ332	3.3K 1/4	C12	ECBT1H102KB5	0.001 50	C212	ECKD1H103PF	0.01 50
R337	ERDS2TJ222	2.2K 1/4	C15	ECBT1H102KB5	0.001 50	C213	ECKD1H103PF	0.01 50
R338	ERDS2TJ222	2.2K 1/4	C16	ECQM1H223JZ	0.022 50	C251	ECQP1391JZ	390P 100
R341	ERDS2TJ562	5.6K 1/4	C17	ECKD1H103PF	0.01 50	C301	ECEA1HK010	1 50
R342	ERDS2TJ562	5.6K 1/4	C18	ECEA1VK100B	10 35	C303	ECQM1H472JZ	0.0047 50
R343	ERDS2TJ223	22K 1/4	C19	ECBT1H102KB5	0.001 50	C304	ECBT1H102KB5	0.001 50
R344	ERDS2TJ223	22K 1/4	C21	RCBS1H1R0MICY	1P 50	C305	ECBT1H821KB5	820P 50
R345	ERDS2TJ273	27K 1/4	C22	ECQM1H223JZ	0.022 50	C306	ECEA1CU221	220 16
R346	ERDS2TJ104	100K 1/4	C23	ECKD1H103PF	0.01 50	C307	ECEA0JU101	100 6.3
R347	ERDS2TJ683	68K 1/4	C101	ECKD1H103PF	0.01 50	C308	ECQM1H152JZ	0.0015 50
R348	ERDS2TJ183	18K 1/4	C102	ECKD1H103PF	0.01 50	C309	ECQM1H152JZ	0.0015 50
R349	ERDS2TJ333	33K 1/4	C103	ECBT1H102KB5	0.001 50	C310	ECEA1VK3R3	3.3 35
R350	ERDS2TJ333	33K 1/4	C104	ECEA1HKR22	0.22 50	C311	ECEA1VK100B	10 35
R351	ERDS2TJ561	56K 1/4	C105	ECKD1H103PF	0.01 50	C312	ECEA1CU221	220 16
R352	ERDS2TJ823	82K 1/4	C106	ECKD1H103PF	0.01 50	C313	ECEA1HKR47	0.47 50
R353	ERDS2TJ333	33K 1/4	C107	ECKD1H103PF	0.01 50	C314	ECEA25MAR7R	4.7 25
R354	ERDS2TJ332	3.3K 1/4	C108	ECKD1H103PF	0.01 50	C315	ECQP1391JZ	390P 100
R355	ERDS2TJ471	470 1/4	C109	ECKD1H103PF	0.01 50	C316	ECEA1HK010	1 50
R356	ERDS2TJ102	1K 1/4	C110	ECKD1H103PF	0.01 50	C317	ECFTD104KXL	0.1 25
R357	ERDS2TJ102	1K 1/4	C111	ECKD1H103PF	0.01 50	C318	ECKD1H103PF	0.01 50
R358	ERDS2TJ223	22K 1/4	C112	ECKD1H103PF	0.01 50	C319	ECEA1VK100B	10 35
R359	ERDS1FJ121	120 1/2	C113	ECKD1H103PF	0.01 50	C320	ECEA1VK100B	10 35
R360	ERDS2TJ104	100K 1/4	C114	ECBT1H102KB5	0.001 50	C323	ECQM1H472JZ	0.0027 50
R361	ERDS2TJ682	6.8K 1/4	C115	ECEA1HKR22	0.22 50	C324	ECQP1391JZ	390P 100
R362	ERDS1FJ121	120 1/2	C116	ECEA0JU101	100 6.3	C327	ECQM1H332JZ	0.0033 50
R363	ERDS2TJ123	12K 1/4	C117	ECEA1VK100B	10 35	C328	ECQM1H332JZ	0.0033 50
R704	ERDS2TJ101	100 1/4	C118	ECEA50V330V	330 50	C701	ECKD2H1022F	0.001 500
R707	ERDS2TJ222	2.2K 1/4	C119	ECQM1H223JZ	0.022 50	C702	ECKD1H103PF	0.01 50
R708	ERDS2TJ222	2.2K 1/4	C120	ECQM1H122JZ	0.0012 50	C703	ECKD2H1022F	0.001 500
R710	ERDS2TJ391	390 1/4	C121	RCBS1H180JCY	18P 50	C704	ECEA1CU222	2200 16
R711	ERDS2TJ472	4.7K 1/4	C122	ECQM1H122JZ	0.0012 50	C705	ECEA1CU222	2200 16
R713	ERDS2TJ101	100 1/4	C123	ECKD1H103PF	0.01 50	C707	ECEA1HKR47	0.47 50
R714	ERDS2TJ101	100 1/4	C124	ECKD1H103PF	0.01 50	C708	ECEA1CU221	220 16
R715	ERDS2TJ470	47 1/4	C125	RCBS1H6R8KCY	6.8P 50	C710	ECKD1H103PF	0.01 50
R716	ERDS2TJ470	47 1/4	C126	ECQM1H223JZ	0.022 50	C711	ECEA1VU470	47 35
R901	ERDS2TJ682	6.8K 1/4	C127	ECEA0JU101	100 6.3	C712	ECEA0JU101	100 6.3
R902	ERDS2TJ123	12K 1/4	C128	ECEA1HK010	1 50	C713	ECEA1VU101	100 35
R903	ERDS2TJ102	1K 1/4	C129	ECKD1H103PF	0.01 50	C714	ECKD2H1022F	0.001 500
R904	ERDS2TJ681	680 1/4	C130	ECQM1H223JZ	0.022 50	C715	ECEA1VU101	100 35
R906	ERDS2TJ472	4.7K 1/4	C131	ECKD1H103PF	0.01 50	C716	ECEA1VK100B	10 35
R908	ERDS2TJ123	12K 1/4	C132	ECKD1H103PF	0.01 50	C717	ECEA1VK3R3	3.3 35
R911	ERDS2TJ102	1K 1/4	C133	ECKD1H103PF	0.01 50	C718	ECEA1VU470	47 35
R912	ERDS2TJ102	1K 1/4	C134	ECKD1H103PF	0.01 50	C719	ECEA1VU470	47 35
R913	ERDS2TJ104	100K 1/4	C135	ECKD1H103PF	0.01 50	C720	ECKD2H1022F	0.001 500
R914	ERDS2TJ104	100K 1/4	C136	ECFTD104KXL	0.1 25	C721	ECKD2H1022F	0.001 500
R915	ERDS2TJ104	100K 1/4	C137	RCBS1H300JUY	30P 50	C722	ECEA0JU471	470 6.3
R916	ERDS2TJ104	100K 1/4	C138	ECQP1471JZ	470P 125	C902	ECKD1H103PF	0.01 50
R917	ERDS2TJ681	680 1/4	C139	RCBC1H470JLY	47P 50	C903	ECKD1H223PF	0.022 50
R918	ERDS2TJ103	10K 1/4	C140	RCBC1H470JLY	47P 50	C904	ECKD1H103PF	0.01 50
R919	ERDS2TJ103	10K 1/4	C141	RCBS1H6R8KCY	6.8P 50	C905	ECEA25MAR7R	4.7 25
R920	ERDS2TJ104	100K 1/4	C142	RCBC1H101KBY	100P 50	C911	RCBS1H180JCY	18P 50
R921	ERDS2TJ103	10K 1/4	C143	ECQM1H122JZ	0.0012 50	C912	RCBS1H150JCY	15P 50
R922	ERDS2TJ105	1M 1/4	C144	RCBS1H100JCY	10P 50	C913	RCBC1H101KBY	100P 50
R923	ERDS2TJ102	1K 1/4	C145	RCBC1H470JLY	47P 50	C914	ECEA0JU471	470 6.3
R924	ERDS2TJ102	1K 1/4	C146	ECQP1102JZ	0.001 100	C915	ECBT1H102KB5	0.001 50
R925	ERDS2TJ104	100K 1/4	C147	ECEA1CU221	220 16	C916	ECEA1VK100B	10 35
R926	ERDS2TJ104	100K 1/4	C148	ECKD1H103PF	0.01 50	C917	ECEA0JU101	100 6.3
R927	ERDS2TJ473	47K 1/4	C149	ECKD1H103PF	0.01 50	C918	ECEA0JS102	1000 6.3
R928	ERDS2TJ473	47K 1/4	C150	ECKD1H103PF	0.01 50	C919	ECKD1H103PF	0.01 50
R929	ERDS2TJ153	15K 1/4	C151	RCBS1H6R8KCY	6.8P 50	C921	ECEA0JU222	2200 6.3
R930	ERDS2TJ181	180 1/4	C152	ECFTD104KXL	0.1 25	C922	RCBC1H101KBY	100P 50
R931	ERDS2TJ471	470 1/4	C153	ECBT1H102KB5	0.001 50	C923	RCBC1H101KBY	100P 50
R932	ERDS2TJ181	180 1/4	C154	ECBT1H102KB5	0.001 50	C924	RCBC1H101KBY	100P 50
R933	ERDS2TJ221	220 1/4	C155	RCBS1H390JLY	39P 50	C925	RCBC1H101KBY	100P 50
R951	ERDS2TJ102	1K 1/4	C158	RCBC1H470JLY	47P 50	C926	RCBC1H101KBY	100P 50
R952	ERDS2TJ332	3.3K 1/4	C201	ECKD1H103PF	0.01 50	C927	RCBC1H101KBY	100P 50
R953	ERDS2TJ123	12K 1/4	C202	ECEA0JK330	33 6.3	C928	RCBC1H101KBY	100P 50
CAPACITORS(VALUE,VOLTAGE)			C203	ECKD1H103PF	0.01 50	C929	ECEA1VK3R3	3.3 35
C1	ECEA1VK3R3	3.3 35	C204	ECEA1HKR47	0.47 50	C930	ECKD1H103PF	0.01 50
C2	ECBT1H102KB5	0.001 50	C205	ECEA0JK330	33 6.3	C931	ECEA1HKR47	0.47 50
C3	ECBT1H102KB5	0.001 50	C206	ECKD1H223PF	0.022 50	C934	RCBC1H101KBY	100P 50
C4	RCBS1H390JLY	39P 50	C207	ECFTD104KXL	0.1 25	C935	RCBC1H101KBY	100P 50
C6	ECGN5R22K	0.22 500	C208	ECKD1H473ZF	0.047 50	C936	ECEA0JK330	33 6.3
C9	RCBS1H4R7KCY	4.7P 50	C209	RCBS1H150JCY	15P 50	C937	ECEA1VK100B	10 35
						C951	ECKD1H103PF	0.01 50
						C952	ECEA1HK010	1 50

# REPLACEMENT PARTS LIST

Notes : \* Important safety notice :

Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

\* Bracketed indications in Ref. No. columns specify the area. (Refer to the first page for area.)

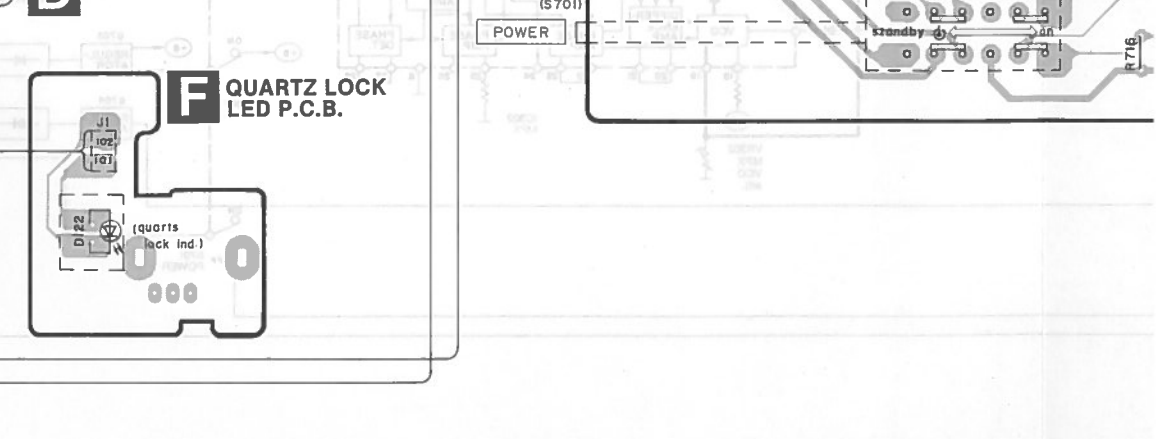
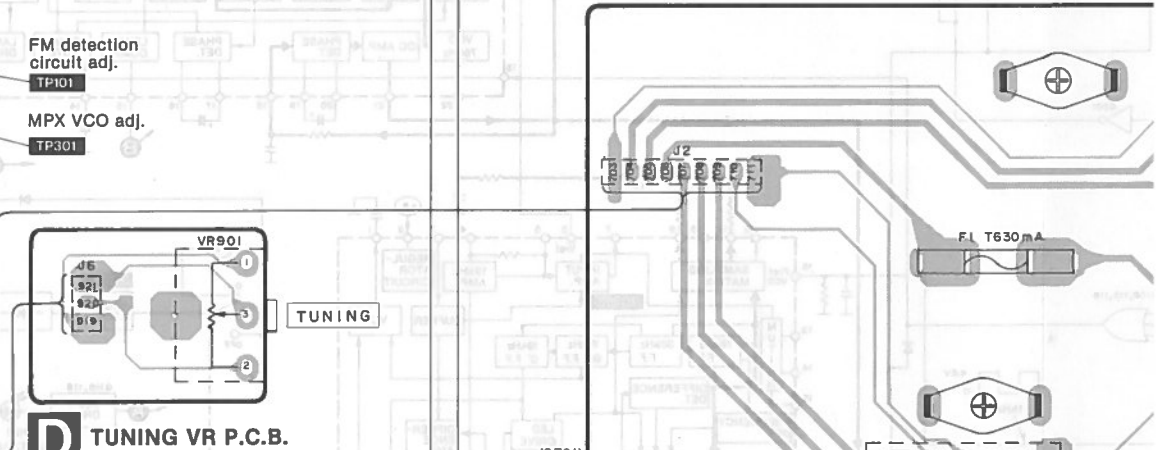
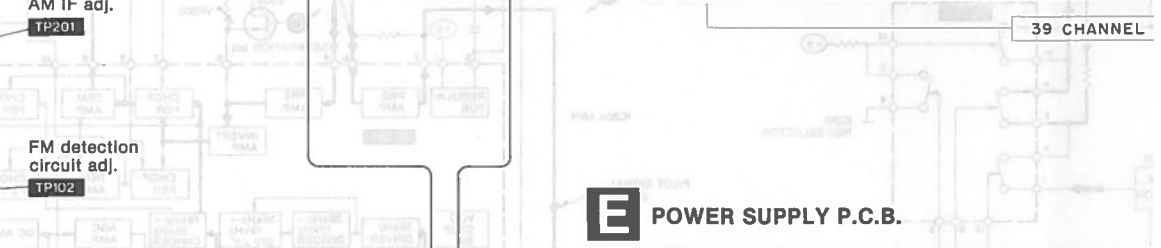
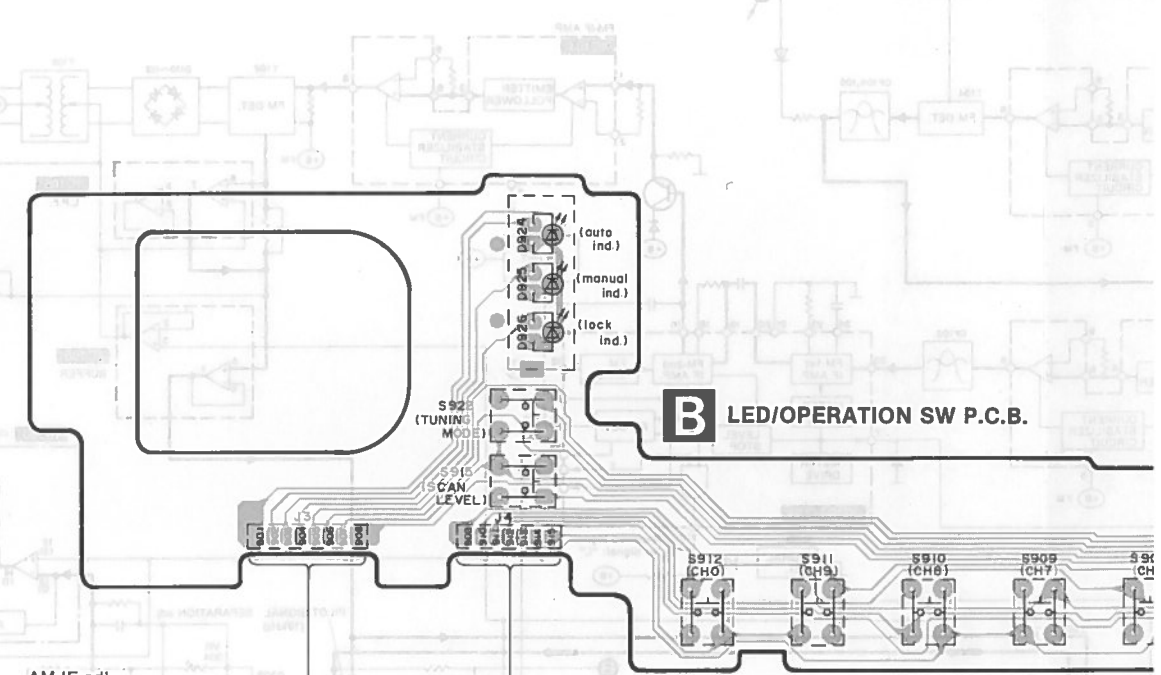
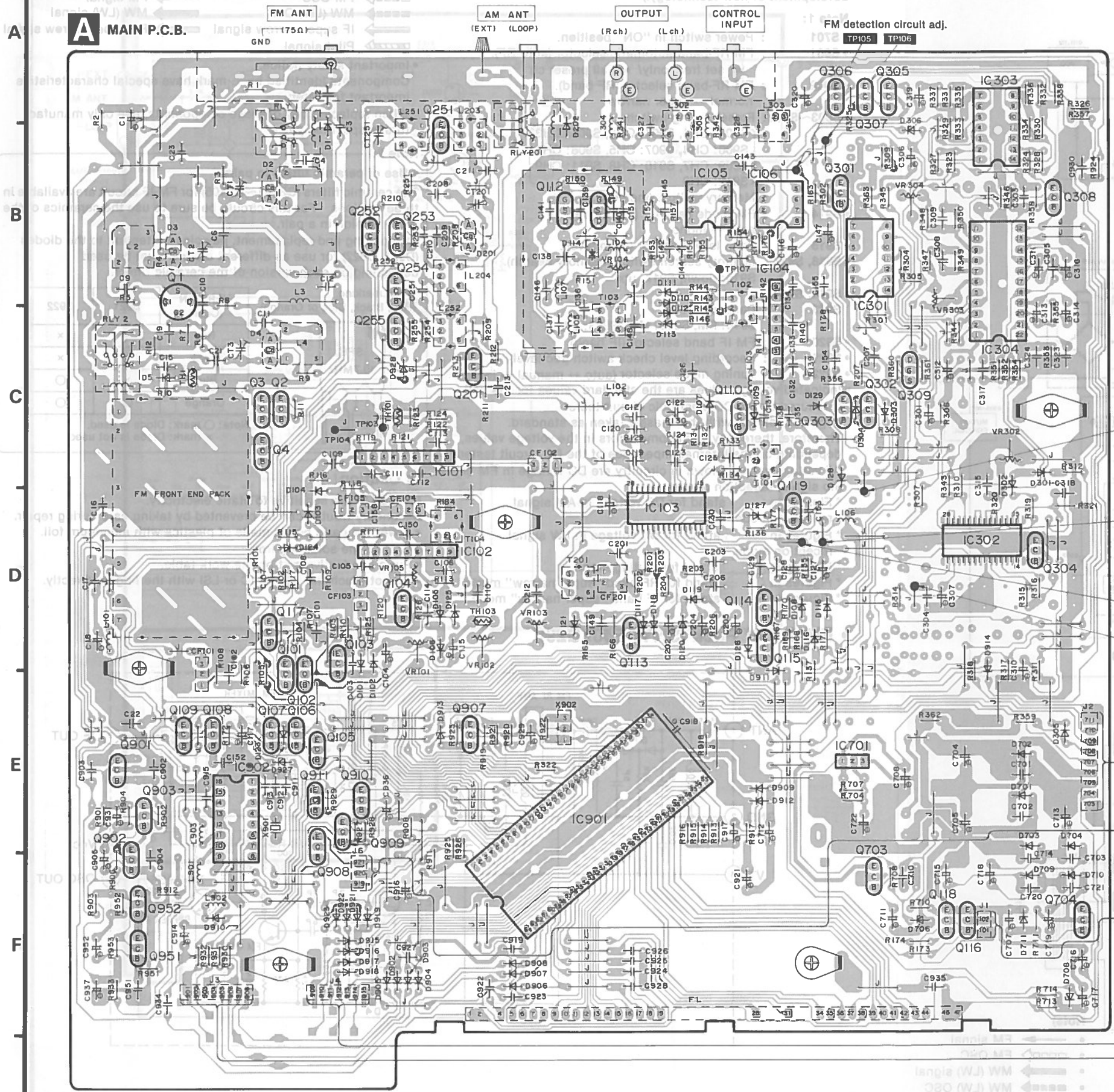
Parts without these indications can be used for all areas.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
<b>INTEGRATED CIRCUITS</b>					
IC101	AN278	I.C. IF AMP	D5	MA165	DIODE
IC102	AN278	I.C. IF AMP	D101	MA700AT	DIODE
IC103	AN727ANS	I.C. FM IF AMP & AM CONV	D102	MA700AT	DIODE
IC104	AN278	I.C. IF AMP	D103	MA165	DIODE
IC105	M5219P	I.C. L.P.F.	D104	MA165	DIODE
IC106	AN6552F	I.C. BUFFER AMP	D105	MA700AT	DIODE
IC301	MN4066B	I.C. ANALOG SW	D106	MA700AT	DIODE
IC302	AN7471S	I.C. MPX	D107	MA165	DIODE
IC303	AN6554F	I.C. OP AMP	D108	MA165	DIODE
IC304	UPC1223C	I.C. MPX	D109	MA165	DIODE
IC701	AN78M12	I.C. REGULATOR	D110	MA700AT	DIODE
IC901	M50941-421SP	I.C. MICRO COMPUTER	D111	MA700AT	DIODE
IC902	LM7001	I.C. PLL SYNTHESIZER	D112	MA700AT	DIODE
<b>TRANSISTORS</b>					
Q1	3SK74L1	TRANSISTOR	D113	MA700AT	DIODE
Q2	DTA114YSTP	TRANSISTOR	D114	SVC333A	DIODE
Q3	DTA114YSTP	TRANSISTOR	D115	MA165	DIODE
Q4	DTC144A	TRANSISTOR	D116	MA165	DIODE
Q101	2SC2786M	TRANSISTOR	D117	MA165	DIODE
Q102	2SC2786M	TRANSISTOR	D118	MA165	DIODE
Q103	2SC3311A-Q	TRANSISTOR	D119	MA165	DIODE
Q104	2SC3311A-Q	TRANSISTOR	D120	MA4043M	DIODE
Q105	DTC144A	TRANSISTOR	D121	MA165	DIODE
Q106	DTA114YSTP	TRANSISTOR	D122	LN014314P	DIODE
Q107	DTA114YSTP	TRANSISTOR	D123	MA165	DIODE
Q108	DTA114YSTP	TRANSISTOR	D124	MA165	DIODE
Q109	2SC3311A-Q	TRANSISTOR	D125	MA165	DIODE
Q110	2SC2786M	TRANSISTOR	D126	MA165	DIODE
Q111	2SK193L	TRANSISTOR	D127	MA165	DIODE
Q112	2SK193L	TRANSISTOR	D128	MA700AT	DIODE
Q113	DTC144A	TRANSISTOR	D129	MA700AT	DIODE
Q114	DTC144A	TRANSISTOR	D201	SVC342LMT	DIODE
Q115	2SC3311A-Q	TRANSISTOR	D202	MA165	DIODE
Q116	2SC3311A-Q	TRANSISTOR	D301	MA165	DIODE
Q117	2SA1309A-R	TRANSISTOR	D302	MA165	DIODE
Q118	2SC3311A-Q	TRANSISTOR	D303	MA165	DIODE
Q119	2SC3311A-Q	TRANSISTOR	D304	MA165	DIODE
Q201	2SA1309A-R	TRANSISTOR	D305	MA165	DIODE
Q251	2SA1309A-R	TRANSISTOR	D306	MA4082M	DIODE
Q252	2SC3311A-Q	TRANSISTOR	D701	$\Delta$ SVD1SR35200A	RECTIFIER
Q253	2SC3311A-Q	TRANSISTOR	D702	$\Delta$ SVD1SR35200A	RECTIFIER
Q254	2SC3311A-Q	TRANSISTOR	D703	MA167	DIODE
Q255	DTA114YSTP	TRANSISTOR	D704	MA167	DIODE
Q301	DTC144A	TRANSISTOR	D706	MA4062M	DIODE
Q302	DTA114YSTP	TRANSISTOR	D708	MA4056-M	DIODE
Q303	2SC3311A-Q	TRANSISTOR	D709	MA167	DIODE
Q304	2SC3311A-Q	TRANSISTOR	D710	MA167	DIODE
Q305	2SD1450TTA	TRANSISTOR	D711	MA4270	DIODE
Q306	2SD1450TTA	TRANSISTOR	D902	MA165	DIODE
Q307	2SA1309A-R	TRANSISTOR	D903	MA165	DIODE
Q308	DTC144A	TRANSISTOR	D904	MA165	DIODE
Q309	2SK301	TRANSISTOR	D905	MA165	DIODE
Q703	2SD592ANCQ	TRANSISTOR	D906	MA165	DIODE
Q704	2SA1309A-R	TRANSISTOR	D907	MA165	DIODE
Q901	2SA1309A-R	TRANSISTOR	D908	MA165	DIODE
Q902	2SC1310EFG	TRANSISTOR	D909	MA165	DIODE
Q903	2SC1310EFG	TRANSISTOR	D910	MA165	DIODE
Q907	DTC144A	TRANSISTOR	D911	MA165	DIODE
Q908	DTC114YSTP	TRANSISTOR	D912	MA165	DIODE
Q909	DTC114YSTP	TRANSISTOR	D913	MA4030M	DIODE
Q910	2SC3311A-Q	TRANSISTOR	D914	MA700AT	DIODE
Q911	DTC114YSTP	TRANSISTOR	D915	MA165	DIODE
Q951	2SC3311A-Q	TRANSISTOR	D916	MA165	DIODE
Q952	2SC3311A-Q	TRANSISTOR	D917	MA165	DIODE
<b>DIODES</b>					
D1	MA165	DIODE	D918	MA165	DIODE
D2	1SV103B2	DIODE	D919	MA165	DIODE
D3	1SV103B2	DIODE	D921	MA165	DIODE
D4	1SV103B2	DIODE	D922	MA165	DIODE
			D923	MA165	DIODE
			D924	LN031306P1	DIODE
			D925	LN031306P1	DIODE
			D926	LN031306P1	DIODE
			D927	MA4062M	DIODE

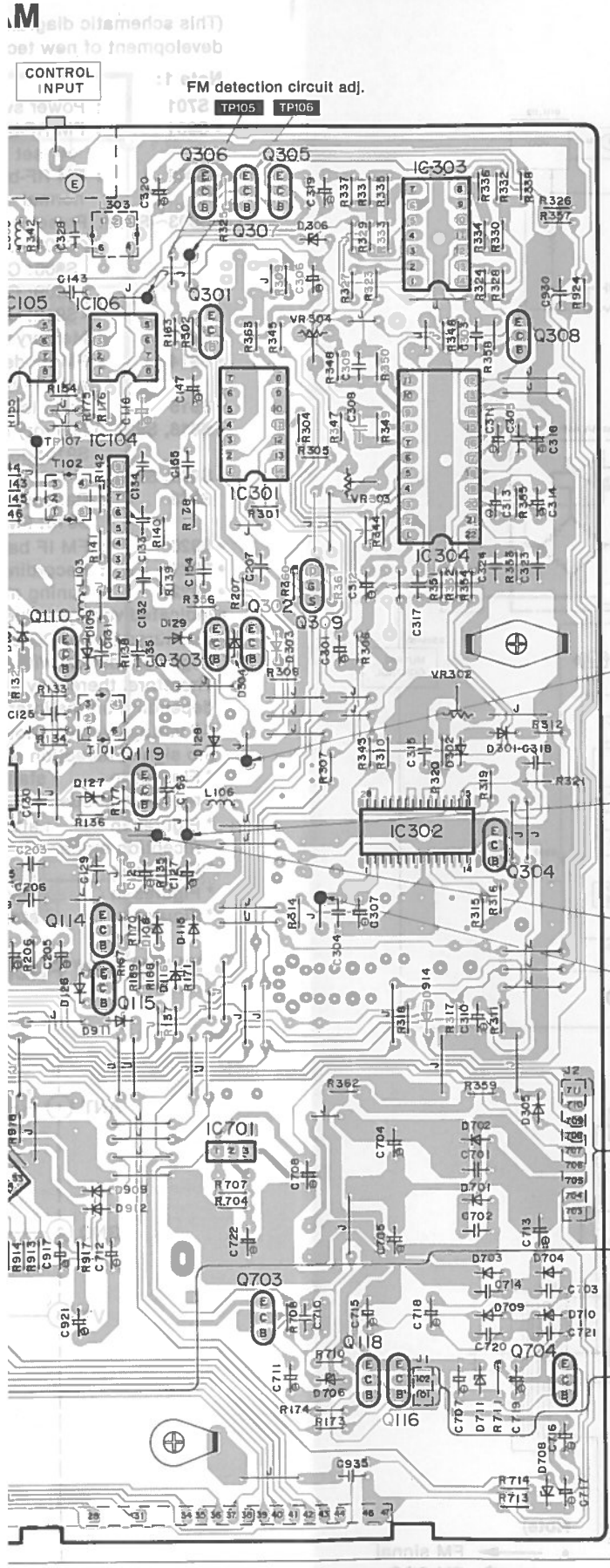
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
D928	MA4062M	DIODE	T701	Δ SLT5K248	POWER TRANSFORMER
VARIABLE RESISTORS			(EW, EF, EB)		
VR101	EVND4AA00B15	V.R. FM SIGNAL	T701	Δ SLT5K249	POWER TRANSFORMER
VR102	EVND4AA00B15	V.R. FM SIGNAL	(EK)		
VR103	EVND4AA00B15	V.R. FM DET.	FILTERS		
VR104	EVND4AA00B52	V.R. FM DET.	CF101	SVFE107MX2-L	CERAMIC FILTER
VR105	EVND4AA00B14	V.R. FM 1F NARROW	CF102	SVFE107MX2-L	CERAMIC FILTER
VR302	EVND4AA00B53	V.R. MPX VCO	CF103	SVFE107MX2-L	CERAMIC FILTER
VR303	EVND4AA00B15	V.R. SEPARATION	CF104	SVFE107M22-L	CERAMIC FILTER
VR304	EVND4AA00B15	V.R. SEPARATION	CF105	SVFE107M22-L	CERAMIC FILTER
VR901	EVQWX9S2512B	V.R. TUNING	CF201	SVF5FP450HT	CERAMIC FILTER
VARIABLE CAPACITORS			OSCILLATORS		
CT1	ECRHA007A41	TRIMMER	X901	SVQ49U722-S	CRYSTAL OSCILLATOR
CT2	ECRHA007A41	TRIMMER	X902	EF0FC4004A4	CERAMIC FILTER
CT3	ECRHA007A41	TRIMMER	DISPLAYS		
CT201	SVCTZ03T110F	TRIMMER	FL	SAD7MT83ZK	DISPLAY TUBE
CT251	SVCTZ03R200F	TRIMMER	FRONT PACKS		
THERMISTORS AND VARISTORS			FE	SNVFE407G29	FRONT END PACK
TH1	ERTD2ZHL333S	THERMISTOR	FUSES		
TH101	ERTD2ZHL332S	THERMISTOR	F1	Δ XBA2C06T80	FUSE 250V. T600mA
TH103	ERTD2ZHL333S	THERMISTOR	SWITCHES		
COILS AND TRANSFORMERS			S701	Δ SSH1234	POWER SW
L1	SLA4P81	FM ANT COIL	S901	SSG13	SW. AUTO RF
L2	SLD4P81	COIL	S902	SSG13	SW. RF BAND
L3	SLQAN40G1-P	CHOKE COIL	S903	SSG13	SW. CH1
L4	SLD4P81	COIL	S904	SSG13	SW. CH2
L101	RLQZP3R3KT-Y	COIL	S905	SSG13	SW. CH3
L102	ELEXT101KA9	COIL	S906	SSG13	SW. CH4
L103	ELEXT101KA9	COIL	S907	SSG13	SW. CH5
L104	ELEXT330KA9	COIL	S908	SSG13	SW. CH6
L105	ELEXT101KA9	COIL	S909	SSG13	SW. CH7
L106	ELEXT101KA9	COIL	S910	SSG13	SW. CH8
L107	ELEXT330KA9	COIL	S911	SSG13	SW. CH9
L203	SLA2B3-P	ANTENNA COIL	S912	SSG13	SW. CH0
L204	SLQ2B9R-P	OSCILLATOR COIL	S913	SSG13	SW. MEMORY
L251	SLA1B7R-P	ANTENNA COIL	S914	SSG13	SW. FM MODE
L252	SL01B5-P	OSCILLATOR COIL	S915	SSG13	SW. SCAN LEVEL
L302	SLM5B2-1P	MPX COIL	S916	SSG13	SW. DOWN
L303	SLM5B2-1P	MPX COIL	S917	SSG13	SW. UP
L304	RLQZPRA7KT-Y	CHOKE COIL	S918	SSG13	SW. FM
L305	RLQZPRA7KT-Y	CHOKE COIL	S919	SSG13	SW. MW
L901	RLQZP3R3KT-Y	COIL	S920	SSG13	SW. FM 1F BAND
L902	RLQZP3R3KT-Y	COIL	S921	SSG13	SW. REC LEVEL
L903	RLQZPR22KT-Y	COIL	S922	SSG13	SW. TUNING MODE
T101	SL14B515-Z	I.F. TRANSFORMER	S923	SSG13	SW. LW
T102	SL14B525-P	I.F. TRANSFORMER	RELAYS		
T103	SL14B525-P	I.F. TRANSFORMER	RL1	SFDYG5A237P	RELAY
T104	SL14B109-Z	I.F. TRANSFORMER	RL2	SFDYG5A237P	RELAY
T201	SL12B103-M	I.F. TRANSFORMER	RL201	SFDYG5A237P	RELAY



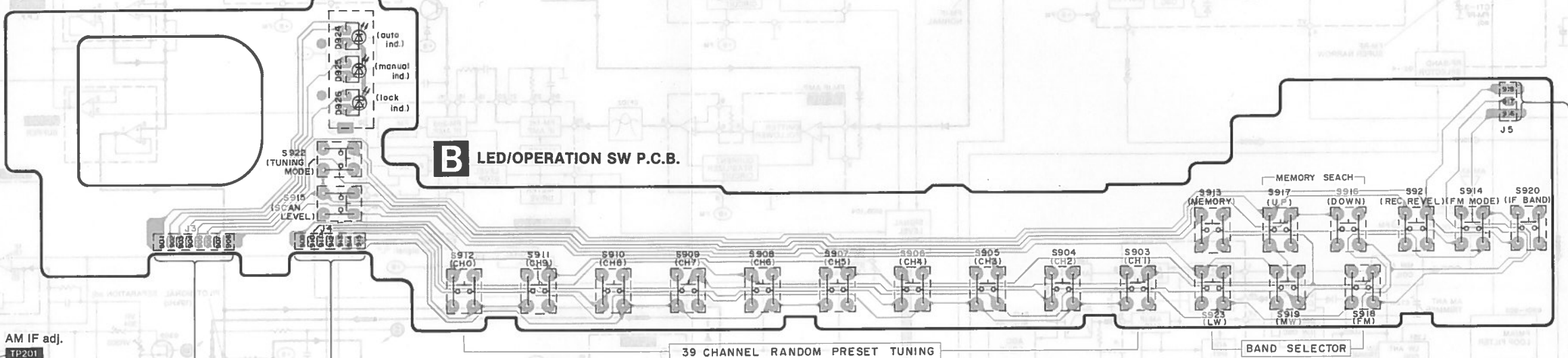
# CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM



5 6 7 8 9 10 11 12 13 14



CONTROL INPUT  
FM detection circuit adj.  
TP105 TP106

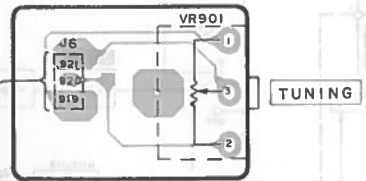


AM IF adj.  
TP201

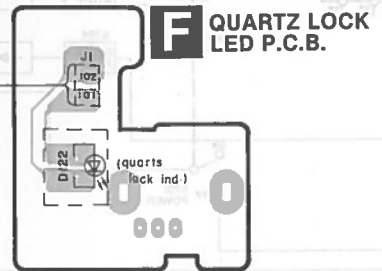
FM detection circuit adj.  
TP102

FM detection circuit adj.  
TP101

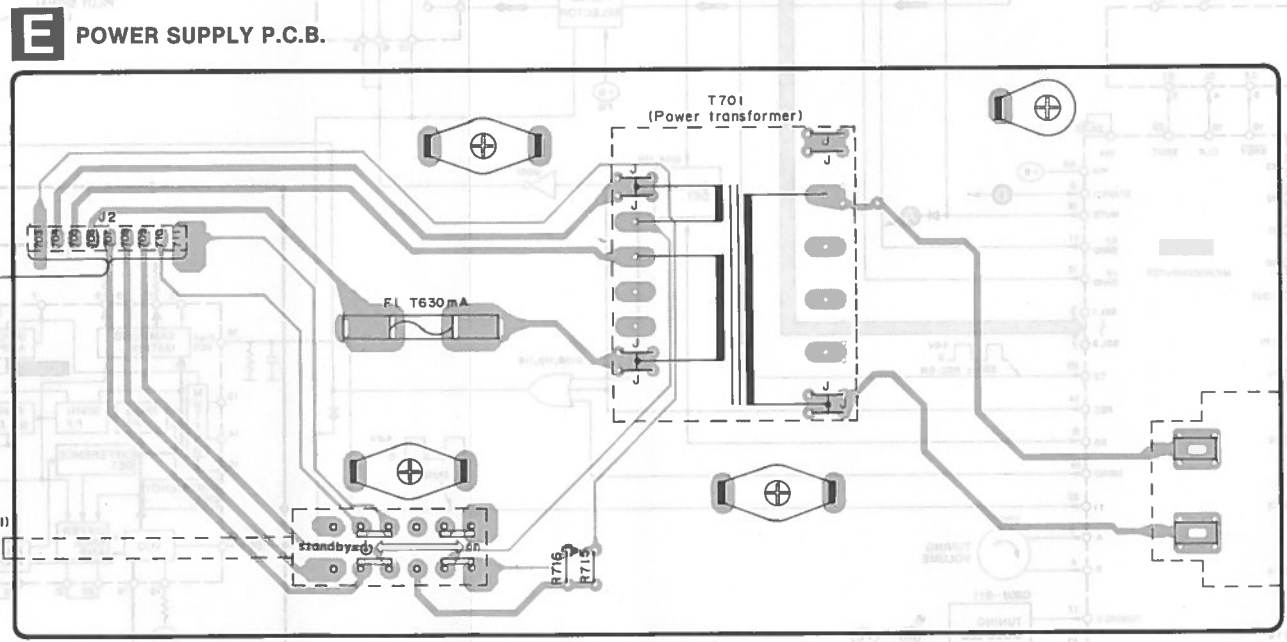
MPX VCO adj.  
TP301



TUNING VR P.C.B.

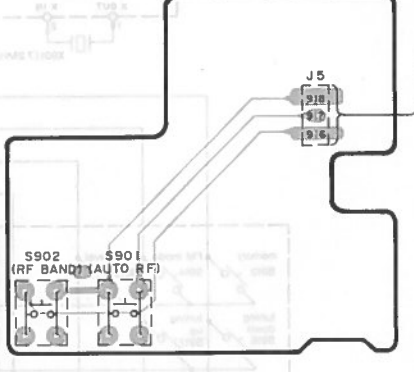


QUARTZ LOCK LED P.C.B.



POWER SUPPLY P.C.B.

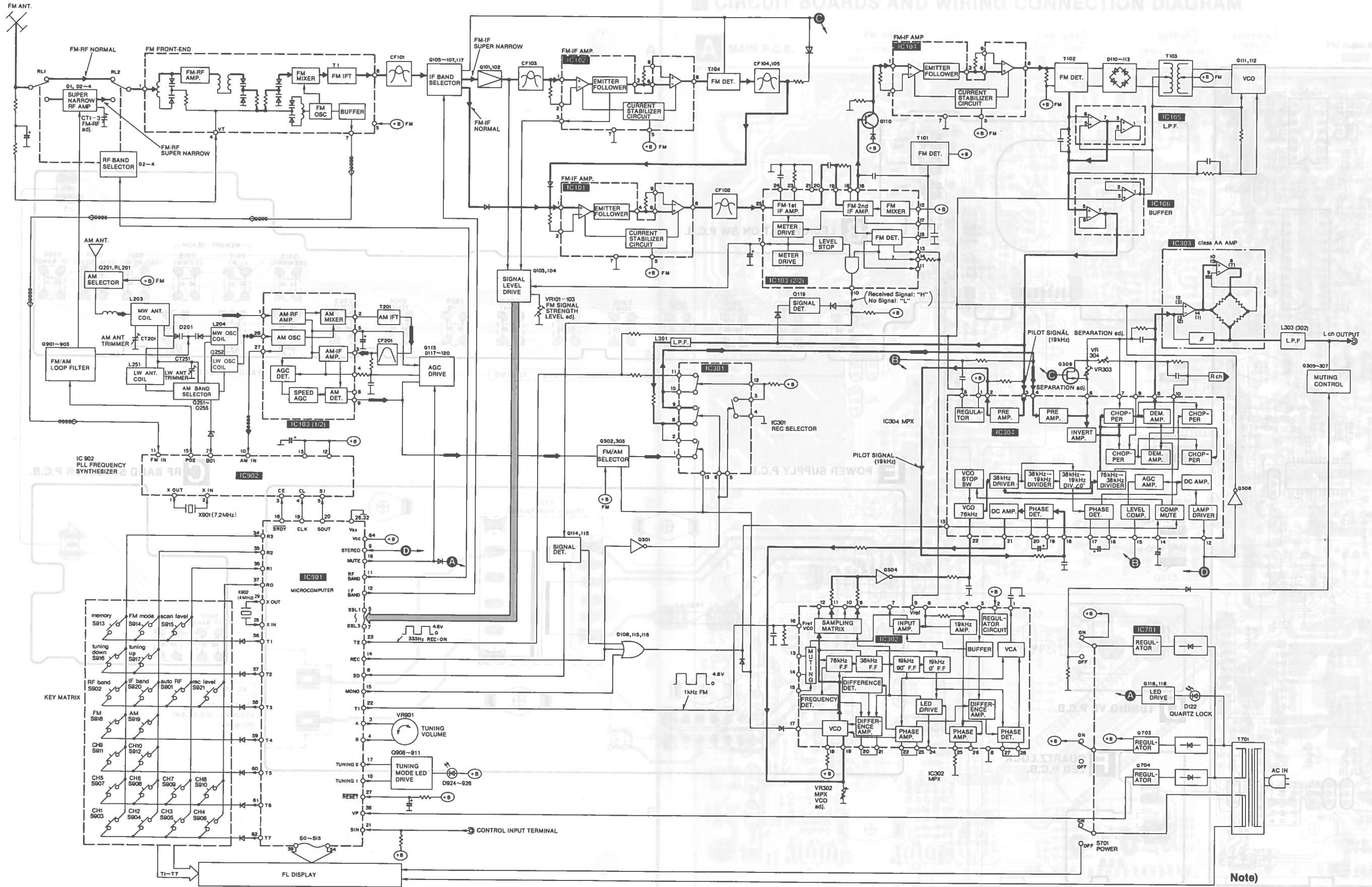
RF BAND SELECTOR P.C.B.



AC IN  
AC 240V----(E K)  
AC 220V----(E B, E F, E W)  
(50/60Hz)

# BLOCK DIAGRAM

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM



**Note**

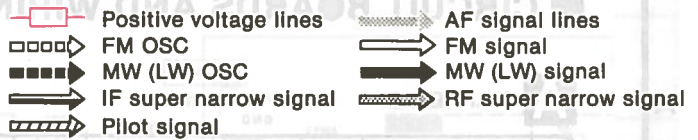
- → FM signal
- □□□□ FM OSC
- → MW (LW) signal
- ■■■■ MW (LW) OSC

# SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

**Note 1:**

- **S701** : Power switch in "ON" position.
  - **S901** : FM RF-band automatic-selector (auto RF).
    - ▬ set freq. only/ ▬ all preset ch
  - **S902** : FM RF-band selector (RF band).
    - normal ↔ super narrow
  - **S903~S912**: Preset tuning switch.
    - [ S903: CH1, S904: CH2, S905: CH3 ]
    - [ S906: CH4, S907: CH5, S908: CH6 ]
    - [ S909: CH7, S910: CH8, S911: CH9 ]
    - [ S912: CH0 ]
  - **S913** : Memory switch. (memory).
  - **S914** : FM mode selector (FM mode).
    - auto ↔ mono
  - **S915** : Scan level selector (scan level).
  - **S916, S917** : Memory search switch (memory search).
    - S916: down, S917: up
  - **S918, S919, S923** : Band selectors.
    - S918: FM, S919: MW, S923: LW
  - **S920** : FM IF band selector (IF band).
  - **S921** : Recording level check switch (rec level).
  - **S922** : Tuning mode selector (auto ↔ manual ↔ lock).
- Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester. All voltage values shown in circuitry are DC voltage in FM signal (no signal) reception modes.
- \* Figures in ( ) stand for DC voltage in AM signal reception mode.
  - \* Figures in [ ] stand for DC voltage in LW signal reception mode.
  - \* Figures in [ ] stand for muting mode.
  - \* Figures in < > stand for RF band "super narrow" mode.
  - \* Figures in < > stand for IF band "super narrow" mode.



• Important safety notice.  
Components identified by **△** mark have special characteristics important for safety.  
When replacing any of these components, use only manufacturer's specified parts.

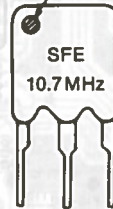
**Note 2:**

**Use of ceramic filters in pairs**

The ceramic filters (CF101~CF105) for FM-IF circuit are available in three versions. For this circuit, be sure to use the ceramics of the same version in a pair.

At repairing and replacement, pay close attention to the diodes (D921, D922) for use as different diodes must be used depending on each version of the ceramic filters.

Color marking (Red, Black, Blue or Orange)



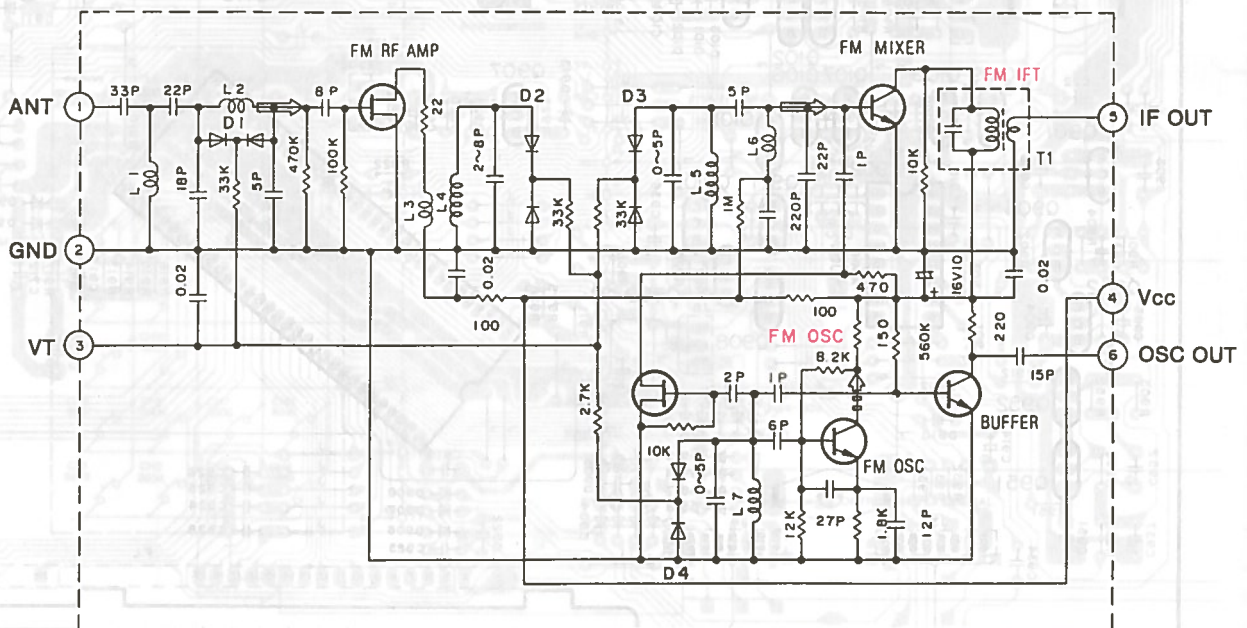
VERSION (Color)	D921	D922
Red	x	x
Black	○	x
Blue	x	○
Orange	○	○

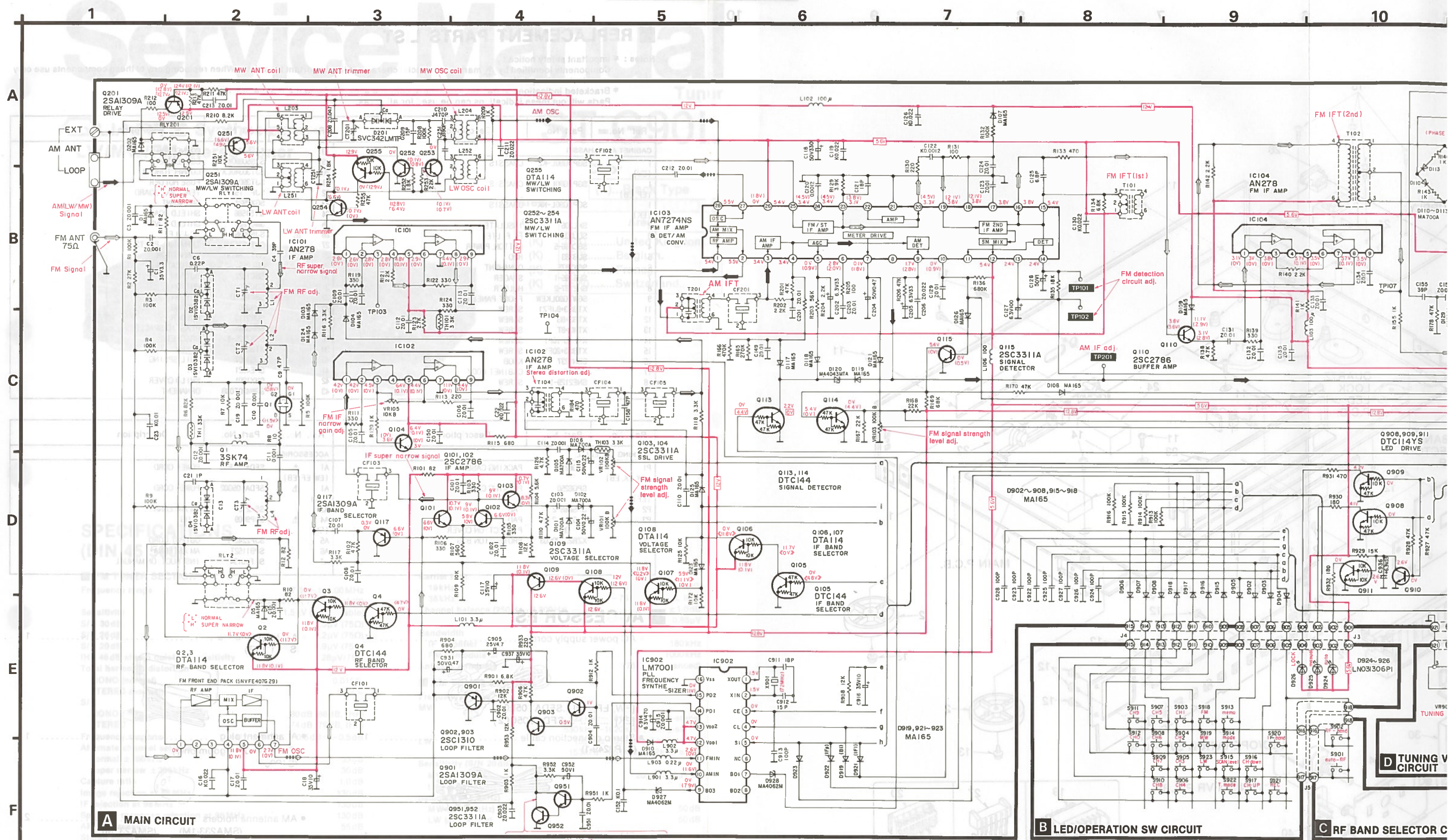
Note: ○ mark: Diode is used.  
x mark: Diode is not used.

**\* Caution!**

- IC and LSI are sensitive to static electricity. Secondary trouble can be prevented by taking care during repair.
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the legs of IC or LSI with the fingers directly.

**FM Tuner Pack (SNVFE407G29)**

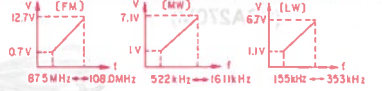




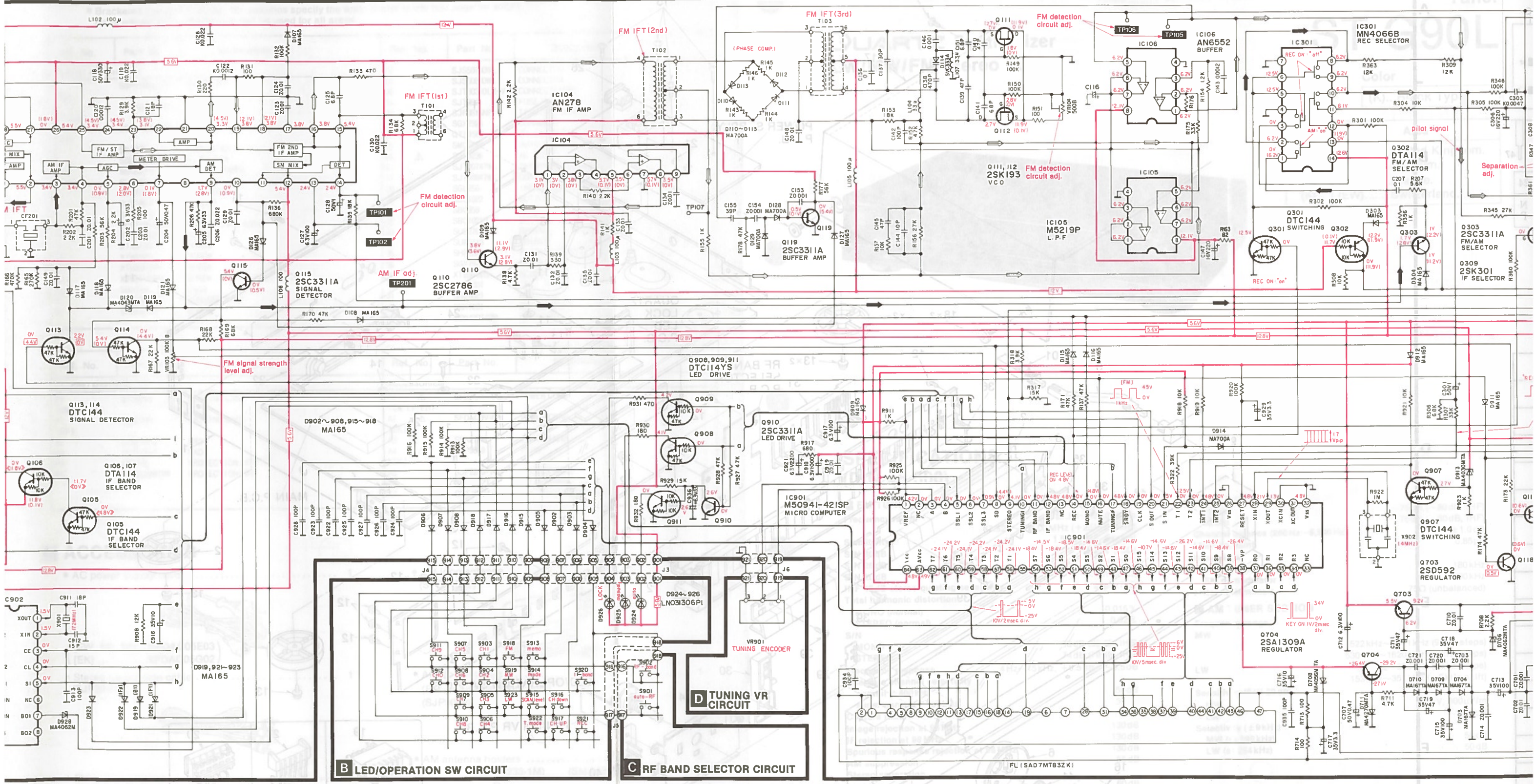
**A MAIN CIRCUIT**

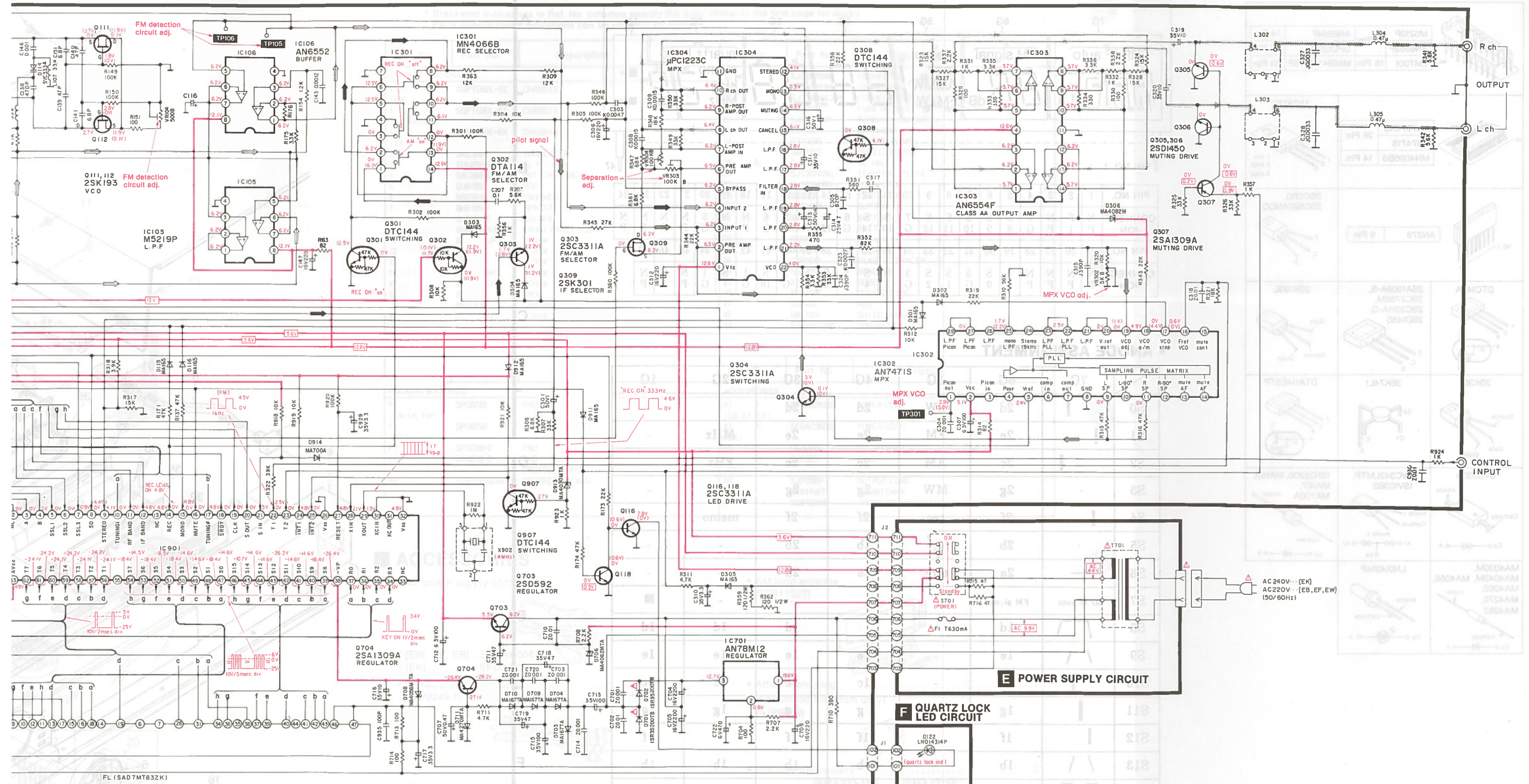
**B LED/OPERATION SW CIRCUIT**

**C RF BAND SELECTOR**



**D TUNING V CIRCUIT**





E POWER SUPPLY CIRCUIT

F QUARTZ LOCK LED CIRCUIT

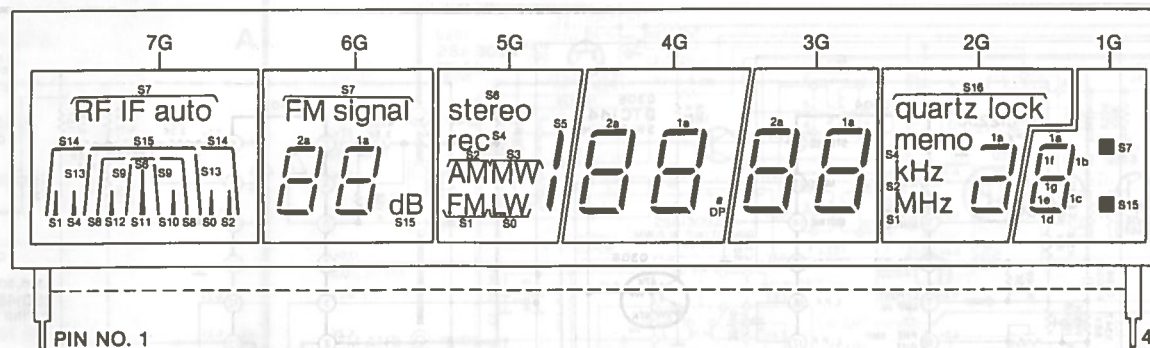
FL (SAD7MT83ZK)

**TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES**

	M5219P 8 Pin AN6552F 16 Pin LM7001 16 Pin	AN6554F 14 Pin UPC1223C 22 Pin M50941-421SP 64 Pin
	AN7274NS 28 Pin AN7471S 14 Pin MN4066BS 14 Pin	AN78M12 1. Vin 2. GND 3. Vout
	AN278 9 Pin	2SC1310, 2SD592ANCQ E C B
	DTC144A E C B	2SA1309A-S, 2SC2786M, 2SC3311A-Q, 2SD1450 E C B
	2SK193L Gate Source Drain	
	2SK301 Source Gate Drain	3SK74L1 G2 G1 S D
	DTA114ESTP E C B	
	SVC333A Cathode Anode Ca O A	SVC342LMTP, 1SV103B2 Anode 1 Cathode Anode 2 A1 O A2 O Ca
	1SR35200, MA165, MA167, MA700A Cathode Anode Ca O A	
	MA4030M, MA4043M, MA4056, MA4062, MA4270, MA4082 Cathode Anode Ca O A	LN014314P Anode Cathode Ca O A

**DESCRIPTION OF FL PANEL**

**• GRID ASSIGNMENT**

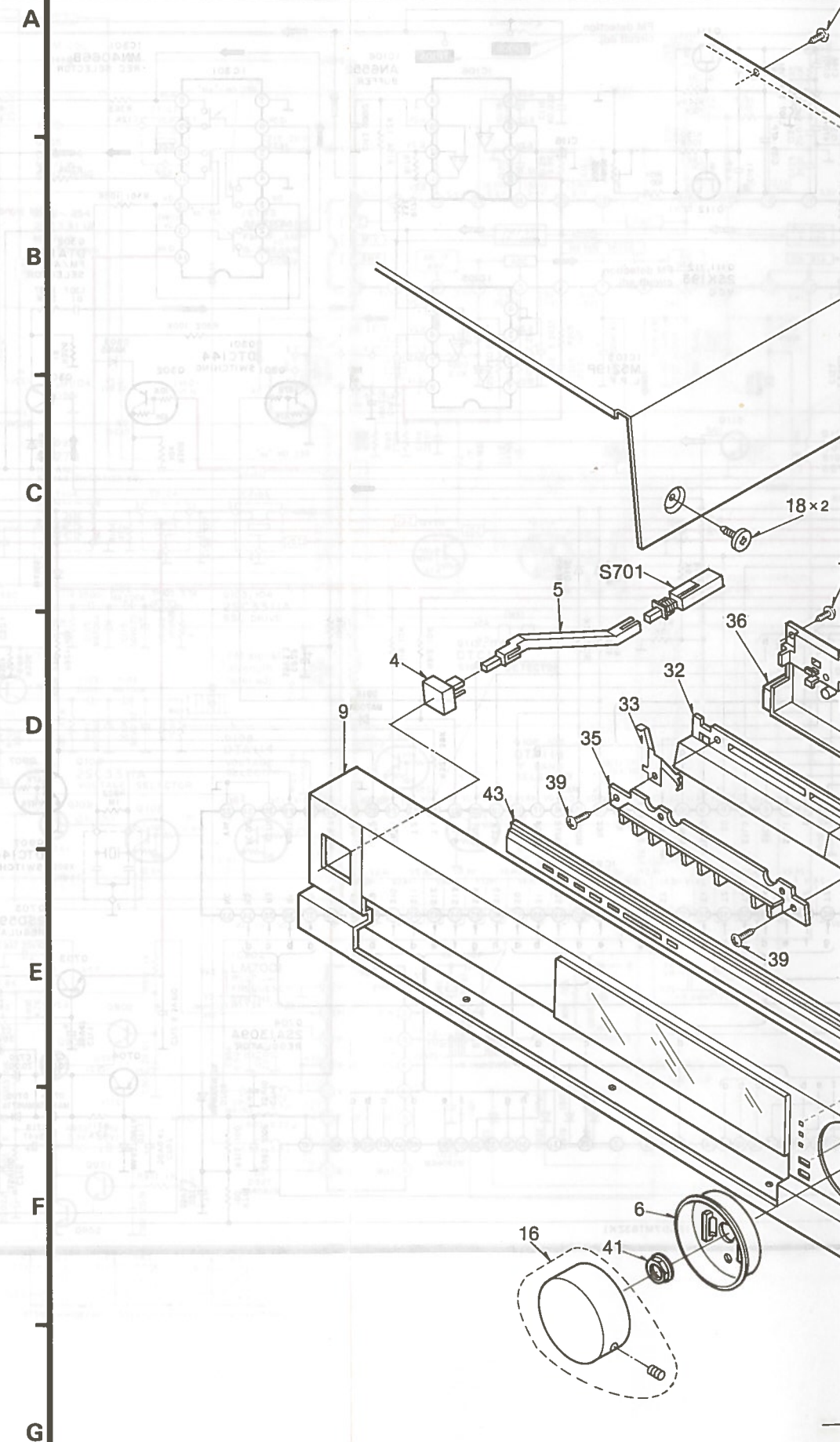


PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CONNECT -ION	N P	F 1	N P	7 G	S 8	S 9	S 10	S 11	S 12	7 G	S 13	S 14	6 G	S 15	N P	N P	6 G	N P	N P	5 G	N P	N P	N P	N P
PIN NO.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
CONNECT -ION	N P	N P	N P	N P	4 G	S 0	3 G	S 1	S 2	3 G	S 3	S 4	2 G	S 5	S 6	2 G	S 16	1 G	S 7	1 G	N P	F 2	N P	

**• ANODE ASSIGNMENT**

	7G	6G	5G	4G	3G	2G	1G
S0		2d	LW	2d	2d	-	-
S1		2e	FM	2e	2e	MHz	-
S2		2c	AM	2c	2c	kHz	-
S3	-	2g	MW	2g	2g	-	-
S4		2f	rec	2f	2f	memo	-
S5	-	2b	/	2b	2b	-	-
S6	-	2a	stereo	2a	2a	-	-
S7	RF IF auto	FM signal	-	-	-	-	■
S8	∩	1d	-	1d	1d	1d	1d
S9	/ \	1e	-	1e	1e	1e	1e
S10		1c	-	1c	1c	1c	1c
S11		1g	-	1g	1g	1g	1g
S12		1f	-	1f	1f	-	1f
S13	/ \	1b	-	1b	1b	1b	1b
S14	∩	1a	-	1a	1a	1a	1a
S15	—	dB	-	DP	-	-	■
S16	-	-	-	-	-	quartz lock	-

**EXPLODED VIEW**







**REPLACEMENT PARTS LIST**

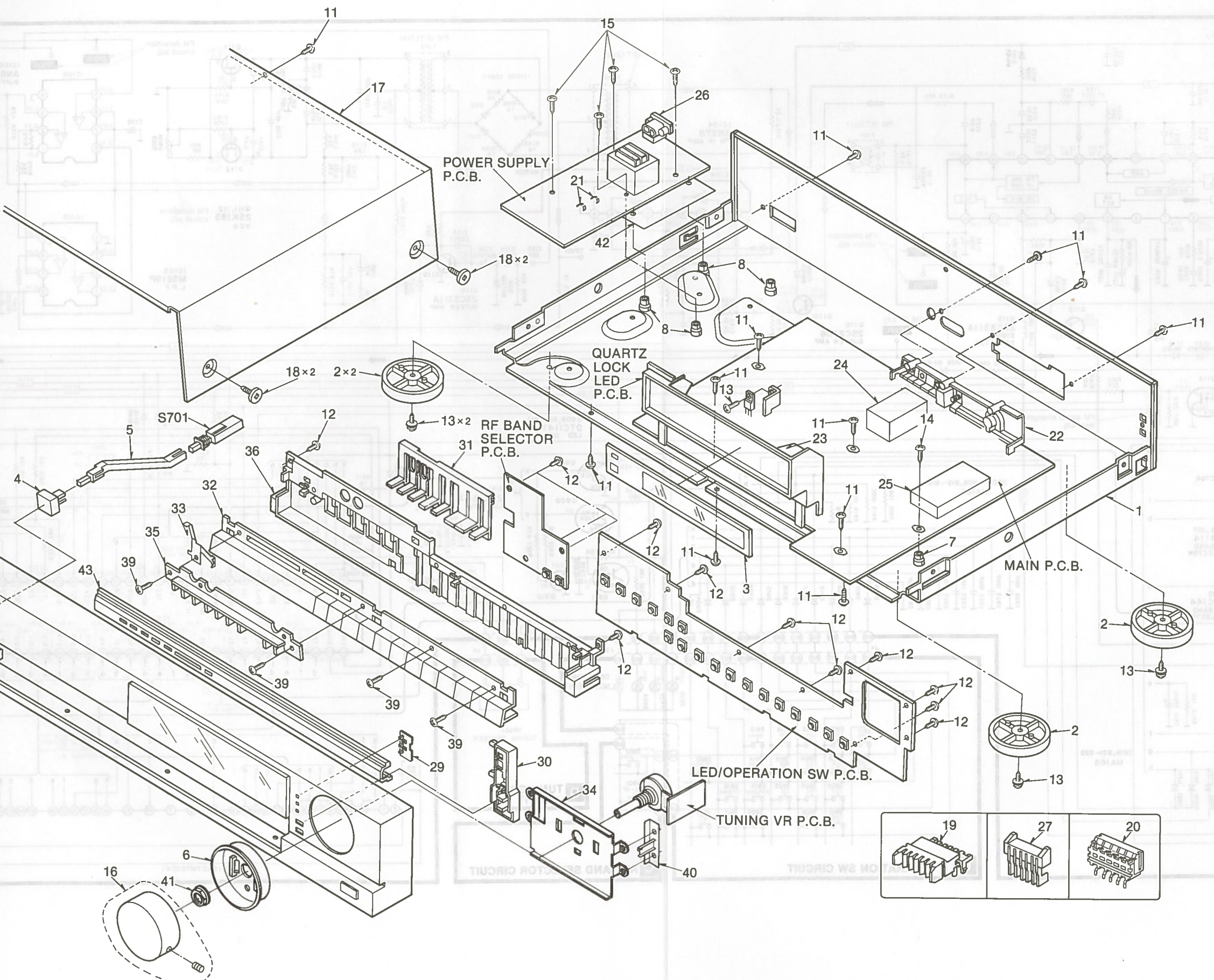
**Notes :** \* Important safety notice :  
 Components identified by  $\Delta$  mark have special manufacturer's specified parts.  
 \* Bracketed indications in Ref. No. columns specify parts without these indications can be used

Ref. No.	Part No.	Description
<b>CABINET AND CHASSIS</b>		
1	SGPTG90L-KE	CHASSIS
(EW)		
1	SGPTG90L-KF	CHASSIS
(EF, EB)		
1	SGPTG90L-KK	CHASSIS
(EK)		
2	SKL306	INSULATOR
3	SDU332-1B	FL. FILTER
4	SBC666-5	BUTTON, POWER
5	SUB183	ROD
6	SGX7975	ORNAMENT
7	SHE185-1	SPACER
8	SHE187-2	HOLDER
9	SGWTG90LKEW	FRONT PANEL ASS'Y
11	XTBS3+8JFZ1	SCREW
12	XTB3+8G	SCREW
13	XTW3+8T	SCREW
14	XTBS3+16F1	SCREW
15	XTBS3+20F1	SCREW
16	SBN1237	KNOB
17	SKCD511KE1	CABINET BODY
18	SNE2129-1	SCREW

Ref. No.	Part No.	Description
<b>PACKING MATERIAL</b>		
P1	SPG6249	PACKING CASE
(EW, EK, EB)		
P1	SPG6250	PACKING CASE
(EF)		
P2	SPSD69-2	PAD
P3	SPSD70-2	PAD
P4	SPP735	PROTECTION COVER
P5	XZB23X20C03	PROTECTION BAG

**ACCESSORIES**

- AC power supply cord .....
- ([EW, EF, EB]...SFDAC05E03  
 ([EK].....SFDAC05G02)
- Stereo connection cable .....
- (SJP2249-1)
- FM indoor antenna.....
- (SSA270M)



# REPLACEMENT PARTS LIST

Notes : \* Important safety notice :

Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

\* Bracketed indications in Ref. No. columns specify the area. (Refer to the first page for area.)

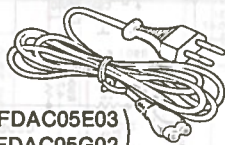
Parts without these indications can be used for all areas.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
<b>CABINET AND CHASSIS</b>			19	SJS50780WL	CONNECTOR
1	SGPTG90L-KE	CHASSIS	19	SJS50880WL	CONNECTOR
(EW)			20	SJT30340LX-V	CONNECTOR(3P)
1	SGPTG90L-KF	CHASSIS	21	SJT390	FUSE HOLDER
(EF, EB)			22	SJF8615NP	TERMINAL BOARD
1	SGPTG90L-KK	CHASSIS	23	SGX7924	ORNAMENT
(EK)			24	QTS1586	SHIELD BOARD
2	SKL306	INSULATOR	25	SMC1283	SHIELD COVER
3	SDU332-1B	FL FILTER	26	$\Delta$ SJS9236	AC INLET
4	SBC666-5	BUTTON, POWER	27	SJT30747WL	TERMINAL PLATE
5	SUB183	ROD	27	SJT30847WL	CONNECTOR
6	SGX7975	ORNAMENT	29	SGL256	INDICATOR
7	SHE185-1	SPACER	30	SBC1022	BUTTON
8	SHE187-2	HOLDER	31	SBC959	BUTTON
9	SGWTG90LKEW	FRONT PANEL ASS'Y	32	SBC1021B	BUTTON
11	XTBS3+8JFZ1	SCREW	33	SUS870	SPRING
12	XTB3+8G	SCREW	34	SUW3113	HOLDER
13	XTW3+8T	SCREW	35	SHR9844	PLASTIC SPACER
14	XTBS3+16F1	SCREW	36	SGX7925-1	BRACKET
15	XTBS3+20F1	SCREW	39	XTB3+10G	SCREW
16	SBN1237	KNOB	40	SUS1007	COIL SPRING
17	SKCD511KE1	CABINET BODY	41	SNE4021	NUT
18	SNE2129-1	SCREW	42	SMX1001	SHIELD COVER
			43	SGW420T03B	ORNAMENT

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
<b>PACKING MATERIAL</b>			<b>ACCESSORIES</b>		
P1	SPG6249	PACKING CASE	A1	$\Delta$ SFDAC05E03	POWER CORD
(EW, EK, EB)			(EW, EF, EB)		
P1	SPG6250	PACKING CASE	A1	$\Delta$ SFDAC05G02	POWER CORD
(EF)			(EK)		
P2	SPSD69-2	PAD	A3	SSA270M	FM ANTENNA
P3	SPSD70-2	PAD	A4	$\Delta$ SJP9009	PLUG
P4	SPP735	PROTECTION COVER	(EK)		
P5	XZB23X20C03	PROTECTION BAG	A5	SJP2249-1	OUTPUT CORD
			A6	SPB1152T	AM ANTENNA
			A7	SQB13194	INSTRUCTION MANUAL

## ACCESSORIES

- AC power supply cord ..... 1



(EW, EF, EB) ...SFDAC05E03  
(EK) .....SFDAC05G02

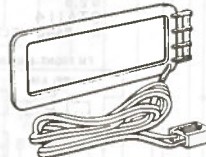
- Stereo connection cable ..... 1  
(SJP2249-1)



- FM indoor antenna ..... 1  
(SSA270M)



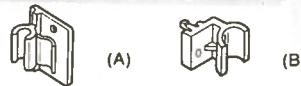
- AM loop antenna ..... 1  
(SPB1152T)



- Attachment plug ..... 1  
(For United Kingdom only)  
(SJP9009)



- AM antenna holders ..... 2  
(SMA233-1M) (SMA231M)



- Screws ..... 2  
(XTN3+10AFZ)

