

# Service Manual

# AM/FM STEREO TUNER -6800 TX-608

**MPIONEER** 

Both Model TX-6800 and TX-608 have the same basic performance. The major difference is in appearance, Model TX-6800 being fitted with wooden side and top panels, while Model TX-608 employs metal.

# MODEL TX-6800 COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS.

Туре	Voltage	Remarks	
κυ	120V only	U.S.A. model	
кс	120V only	Canada model	

# MODEL TX-608 COMES IN SIX VERSIONS DISTINGUISHED AS FOLLOWS:

Туре	Voltage	Remarks
κυ	120V only	U.S.A. model
HE	220V and 240V (Switchable)	Europe model
нв	220V and 240V (Switchable)	United Kingdom model
НР	220V and 240V (Switchable)	Oceania model
S	110V, 120V, 220V and 240V (Switchable)	General export model
S/G	110V, 120V, 220V and 240V (Switchable)	U.S. military model

This service manual is applicable to the TX-6800/KU. When repairing the TX-608/KU, please see page 23, and for the other types, please refer to the additional service manuals.

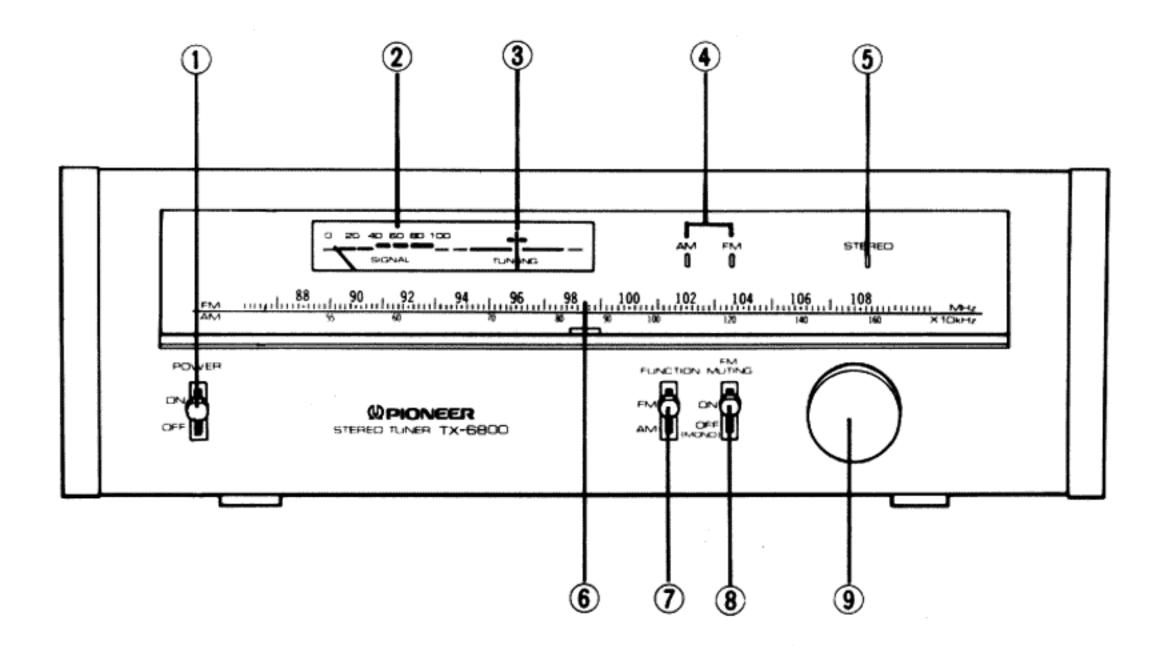
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# 1. SPECIFICATIONS

Semiconductors	AM Section
ICs	Sensitivity
FET 1	IHF, ferrite antenna 300µV/m
Transistors 8	IHF, external antenna 15μV
Diodes 15	Selectivity 35dB
FM Section	Signal-to-Noise Ratio 50dB
Usable Sensitivity MONO: $10.8 dBf (1.9 \mu V)$	Image Response Ratio 40dB
50dB Quieting Sensitivity MONO: 15dBf	IF Response Ratio 70dB
STEREO: 38dBf	Antenna Built-in Ferrite Antenna
Signal-to-Noise Ratio	Audio Section
at 65dBf MONO: 80dB	Output Level 650mV/4.3kΩ
STEREO: 74dB	(FM 100% MOD.)
Distortion at 65dBf MONO: 100Hz 0.1% 1kHz 0.1%	Miscellaneous
6kHz 0.15%	Power Requirements 120V 60Hz
STEREO: 100Hz 0.2%	Power Consumption 14W
1kHz 0.2%	Dimensions 451(W) x 151(H) x 284(D) mm
6kHz 0.25%	17-3/4(W) x 5-15/16(H)
Capture Ratio 1.0dB	x11-3/16(D) in
Alternate Channel Selectivity 60dB	Weight (Without Package) 5.3 kg (11lb 11oz)
Stereo Separation 1kHz: 40dB 30Hz to 15kHz: 35dB	Furnished Parts
Frequency Response 20Hz to 15kHz +0.5 dB	FM T-type Antenna 1
Spurious Response Ratio 70dB	Connection Cord with Pin Plugs 1
Image Response Ratio 60dB	Operating Instructions
IF Response Ratio 80dB	
AM Suppression Ratio 55dB	NOTE:
Subcarrier Product Ratio 50dB	Specifications and the design subject to possible modifica- tion without notice due to improvements.
Muting Threshold 17.2dBf $(4.0\mu V)$	tion without notice due to improvements.
De-Emphasis Switch	
(Switchable) 25μs - 75μs	
Antenna Input 300ohms balanced	
75ohms unbalanced	

# 2. FRONT PANEL FACILITIES



# 1 POWER SWITCH

Set this switch to ON to supply power to the tuner.

### **②** SIGNAL METER

This meter indicates the antenna input level of the AM and FM broadcasting waves. The higher the input level, the more the meter deflects toward right. When selecting the desired station, find the position of the tuning knob which effects the maximum deflection of the meter pointer. When selecting an FM station, also observe the tuning meter to determine the optimum tuning point.

# 3 TUNING METER

This meter indicates the optimum tuning point irrespective of the field strength when selecting an FM station. With no signal, the pointer remains at the center; as a signal is tuned in, it deflects to the right or left; when the signal is tuned in accurately, the pointer will correctly move to the center of the scale. If the tuning knob is adjusted further, the pointer deflects to the right or left; as the signal moves off completely, the pointer returns to the center position again.

# **4** FUNCTION INDICATORS

These indicators light up during an FM or AM reception, respectively.

# (5) FM STEREO INDICATOR

This indicator lights up when the tuner is receiving a stereo program if the FM muting/mode switch is set to ON.

### 6 DIAL POINTER

This pointer indicates the broadcasting stations.

# **TUNCTION SWITCH**THE STATE OF THE STAT

This switch is used to select the type of broadcasting waves.

FM ..... For reception of FM broadcasting AM ..... For reception of AM broadcasting

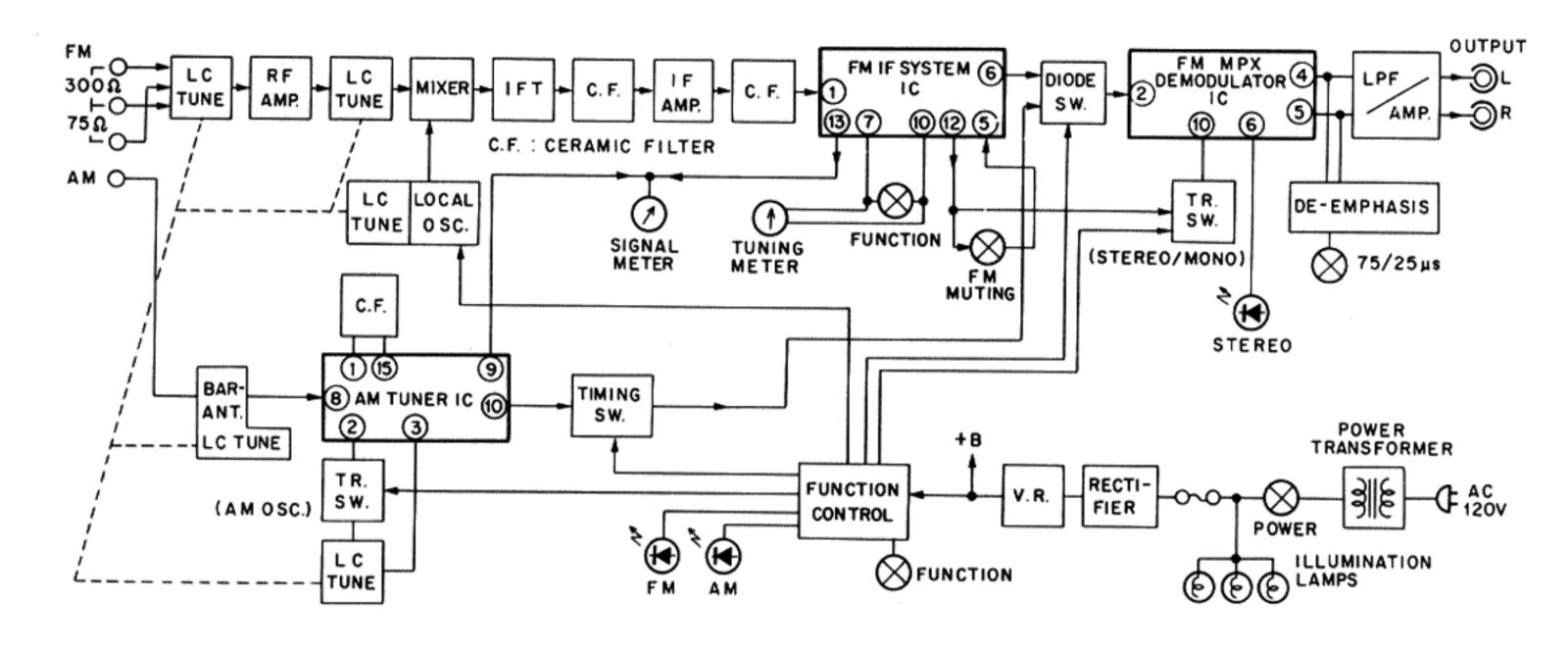
# **®** FM MUTING/MODE SWITCH

When this switch is set to ON, unpleasant interstation noise is eliminated, which makes selection of stations easier. However, if the muting switch is set to ON in areas where the field strength is extremely weak, the station being received may also disappear. In such areas, therefore, the muting switch should be turned OFF (MONO). When this switch is set to OFF (MONO), monaural reception will be obtained even though the station is broadcasting a stereo program.

### TUNING KNOB

This knob is used for selecting station. When selecting an AM station, observe the signal meter, and when selecting an FM station, observe both the signal meter and the tuning meter.

# 3. BLOCK DIAGRAM



# 4. CIRCUIT DESCRIPTIONS

### 4.1 AM TUNER

The AM tuner employs a 2-ganged tuning capacitor, a single-element ceramic filter, and an IC (HA1138) consisting of an RF amplifier, mixer, 2-stage IF amplifier, detector and AGC amplifier. See Fig. 4-1 for the block diagram.

When the FUNCTION switch (S<sub>3</sub>) is in the FM position, +B is applied to the emitter of Q<sub>11</sub> via R<sub>52</sub>, R<sub>62</sub> and R<sub>65</sub>. Q<sub>11</sub> will turn off, and the local oscillator circuit will be opened.

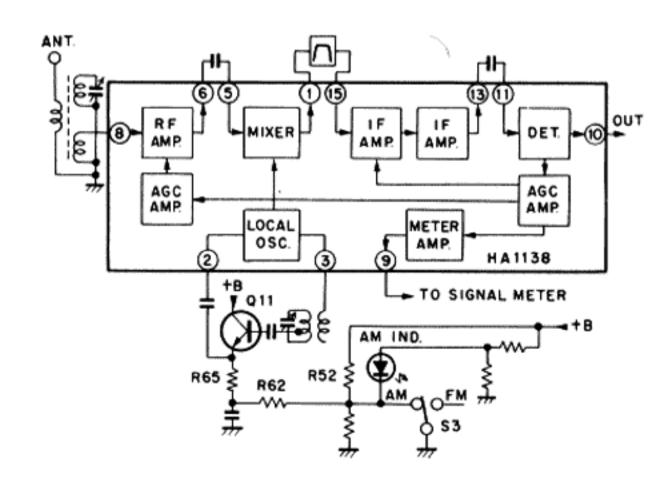


Fig. 4-1 AM tuner

### 4.2 FM TUNER

### Front-End

A frequency linear 3-gang variable capacitor is used with a single stage FET RF amplifier.

The FET possesses high input impedance compared with a transistor, and allows simple coupling with the input tuning circuit, plus a significant advantage in terms of noise.

The local oscillator, Q<sub>3</sub> employs a modified Clapp circuit, thereby reducing the amount of drift caused by changes in time, ambient temperature, and power supply voltage. Also since the oscillator signal is obtained from the tuning circuit, there are far fewer higher harmonics, resulting in a much cleaner waveform with less spurious interference.

The oscillator signal is applied to the base of the mixer transistor Q<sub>2</sub> via low capacity capacitor.

When the FUNCTION switch (S<sub>3</sub>) is in the AM position, +B is applied to the cathode of D<sub>1</sub> via R<sub>34</sub>. D<sub>1</sub> will be cut-off and Q<sub>3</sub> will turn off.

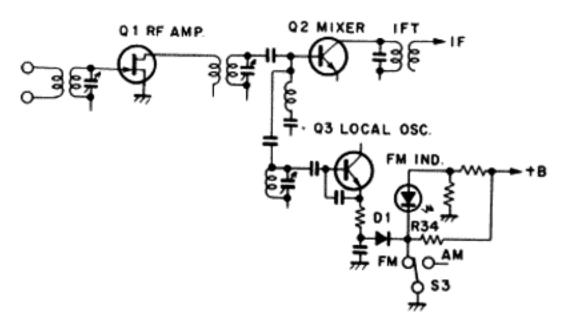


Fig. 4-2 FM front end

### IF Amplifier and Detector

This stage includes 2 dual-element ceramic filters, a transistor and an IC (PA3001-A) with a high SN ratio and very little distortion. The transistor inserted between the two ceramic filters is employed for impedance matching purposes as well as to increase the gain.

PA3001-A includes the IF limiter amplifier, FM detector (quadrature detector), AF amplifier, muting circuit and the meter drive circuit.

The muting circuit is turned on when pins 5 and 12 are connected by means of the FM MUTING switch. If the dial pointer is moved approx.  $\pm 70 \text{kHz}$  away from a station, and the input level is very low (equivalent antenna input less than  $4\mu\text{V}$ ), a 5V DC signal is generated at pin 12, and applied to pin 5, thereby activating the muting circuit within the IC.

### FM MPX Stereo Demodulator

The IC (PA1001-A) employed in the FM multiplex stereo demodulator stage also features a high SN· ratio and reduced distortion. Due to the incorporation of a pilot auto-canceller circuit, very good frequency characteristics are obtained. Unlike the more conventional pilot signal (19kHz) canceller circuits, which fail to completely remove the pilot signal if it is not at standard level, PA1001-A pilot auto-canceller circuit also includes a pilot signal level detector circuit. Changes in pilot signal level are consequently responded to immediately, resulting in very effective suppression of the pilot signal leak level.

### **Filter Circuit**

Besides eliminating the sub-carrier signals (more than 23kHz), this PNP transistor 18dB/oct. active filter also serves as an amplifier for the low-pass region, and as a crosstalk canceller.

# 5. DISASSEMBLY

# Side Panels and Top Panel

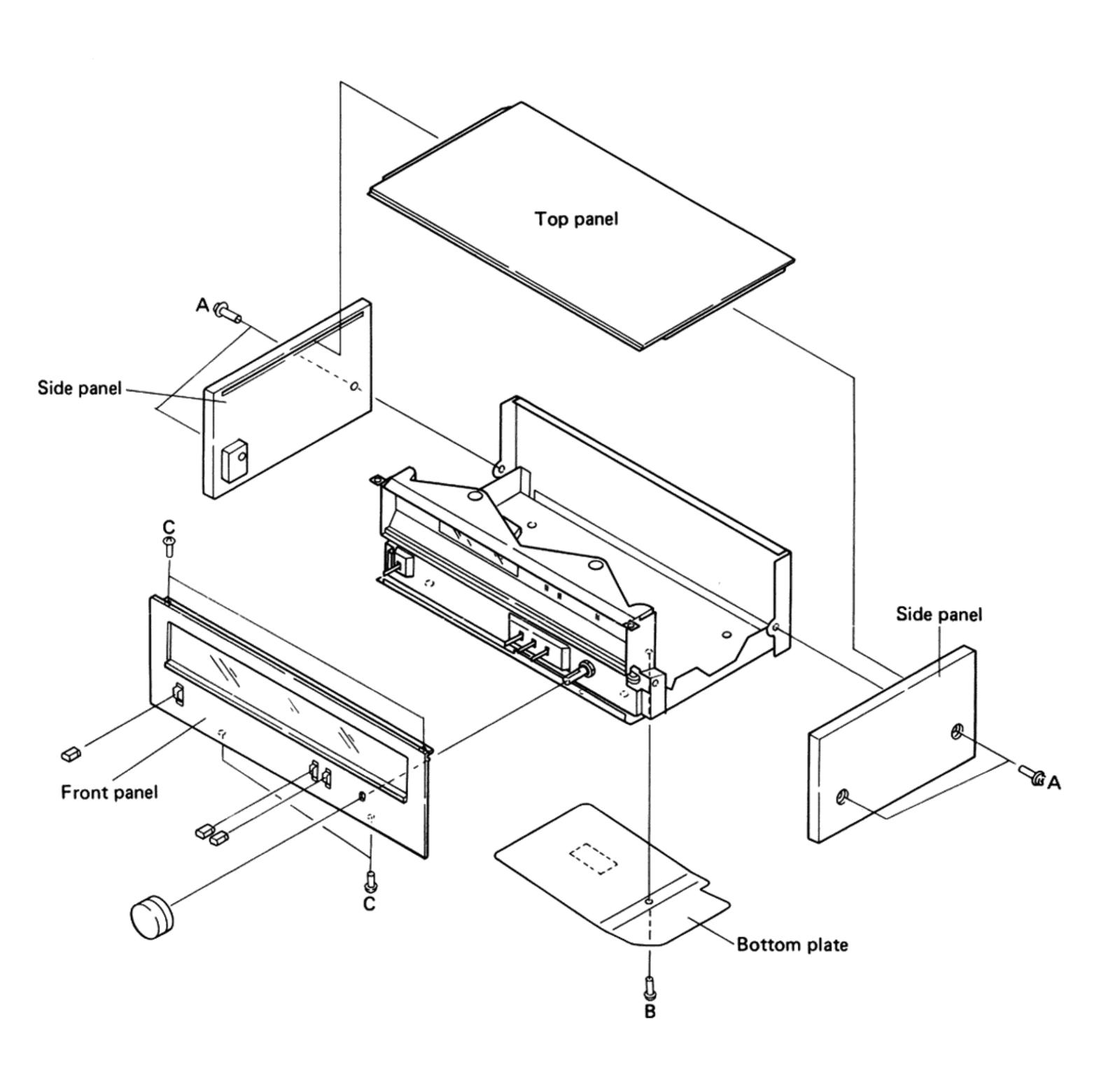
Remove the four screws (A), and remove the side panels.

# **Bottom Plate**

Remove the screw (B).

# **Front Panel**

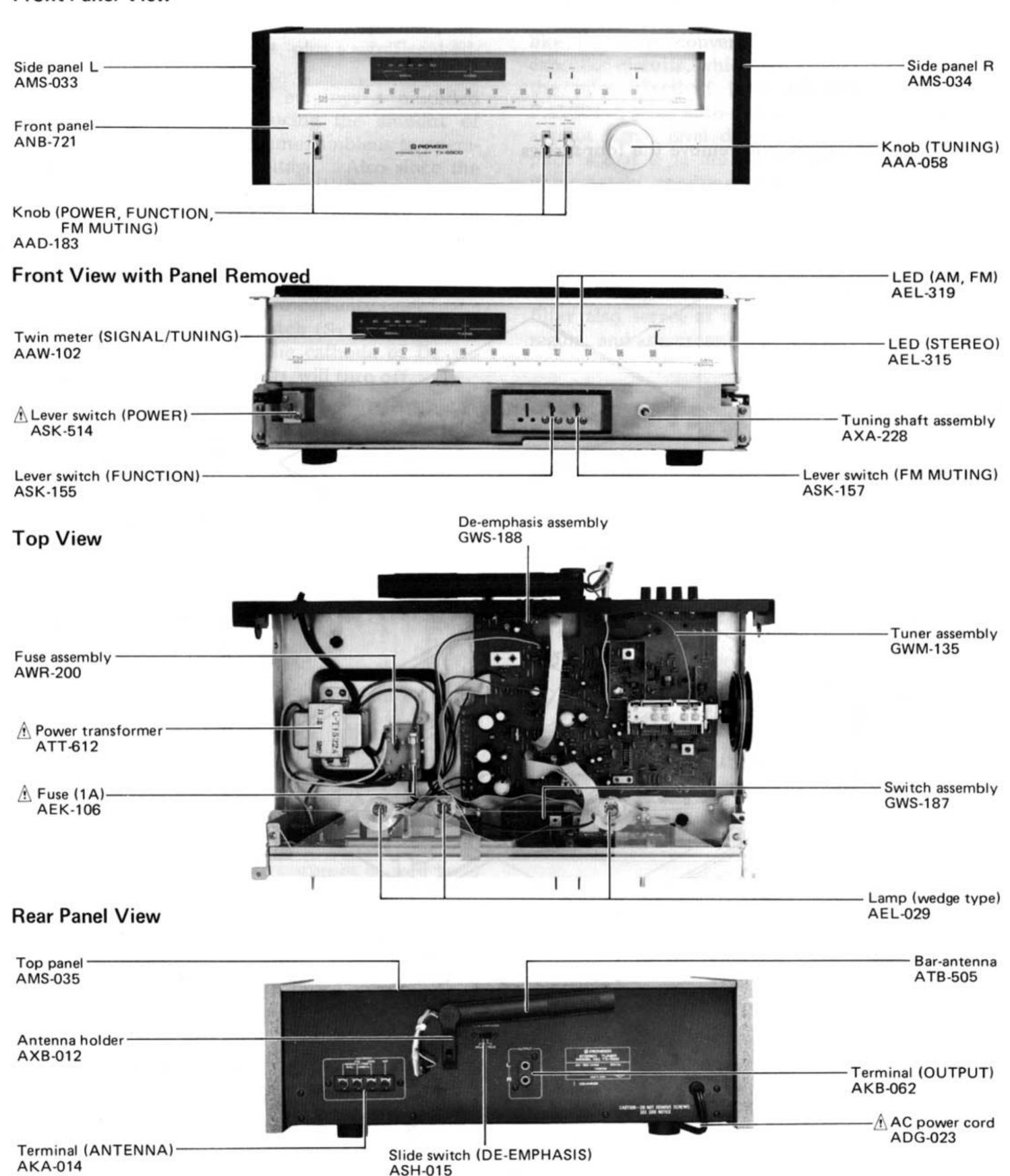
Pull off all the knobs, and remove the four screws (C).



# 6. PARTS LOCATION

The 
 \( \bullet \) mark found on some component parts indicates
the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical
designation.

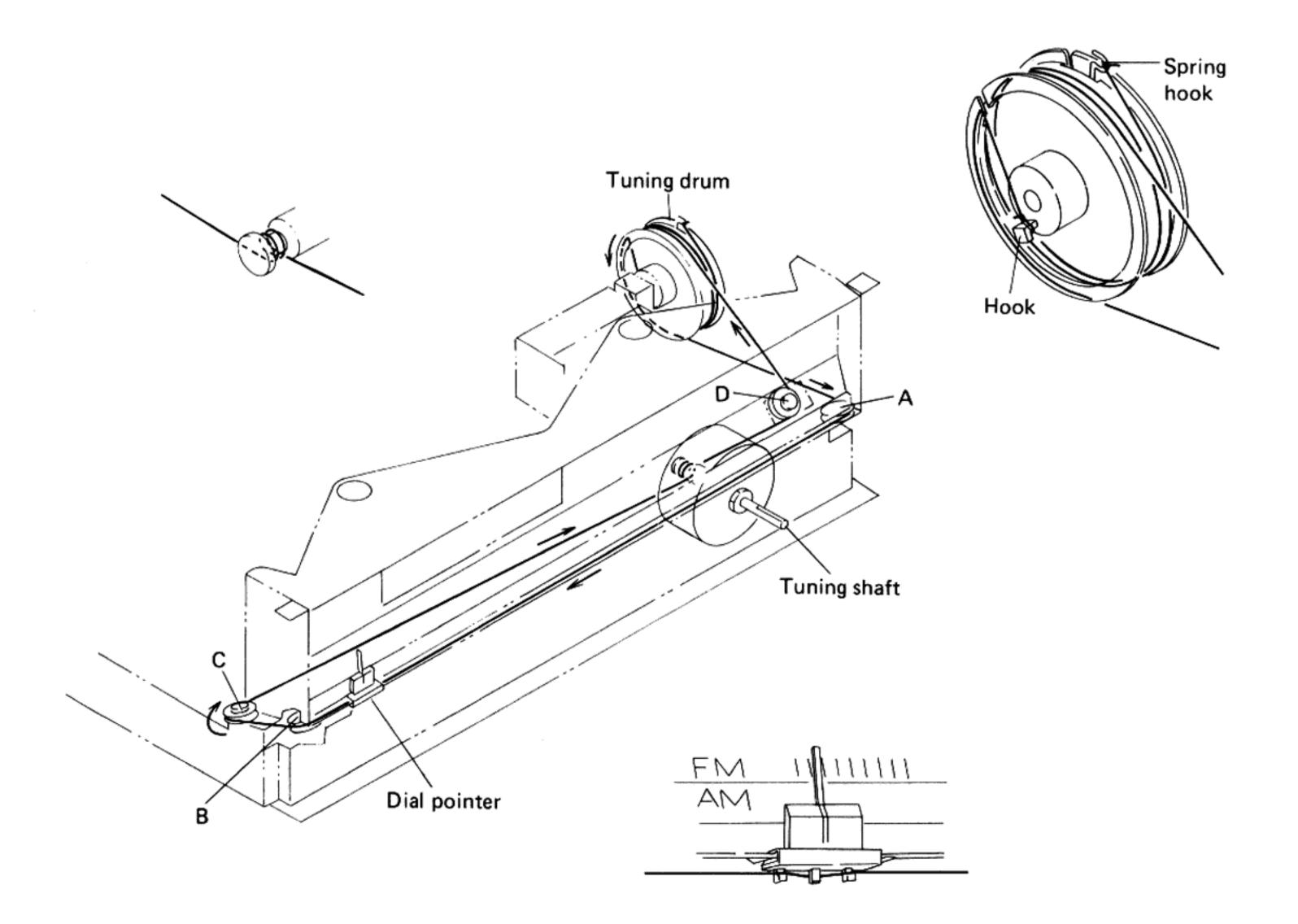
### Front Panel View



# 7. DIAL CORD STRINGING

- Remove the wooden case and front panel as described in the "Disassembly" section on page 7.
- 2. Turn the tuning capacitor shaft fully clockwise.
- 3. Fix the tuning drum to the tuning capacitor shaft so that the set-screw is uppermost.
- Tie on end of the dial cord to the hook on the tuning drum.
- Pass the cord through the cut-out section in the tuning drum, and then take it over pulleys A, B and C in that sequence.
- 6. Wind the cord around the tuning shaft 2 times.
- 7. Pass it over pulley D, wind it around the tuning drum 2 times, and finally tie it to the spring hook so that it is tensioned.

- 8. Turn the tuning shaft, and check that the cord moves smoothly.
- 9. Cut off any excess cord.
- 10. Turn the tuning shaft counter-clockwise as far as it will go.
- 11. Align the dial pointer with the starting point of the dial scale (second division from the left), and then pass the cord over it.
- 12. Check that the dial pointer is in line with the starting point of the dial scale.
- 13. Finally apply the locking paint to the cord securing positions (tuning drum hook and spring hook) and the dial pointer connection.



# 8. ADJUSTMENTS

### 8.1 FM TUNER

- Connect the FM SG (FM signal generator) to the FM ANTENNA  $300\Omega$  terminals via a  $300\Omega$  dummy antenna.
- Switch the FUNCTION selector to the FM position, the FM MUTING switch to the OFF position.
- The tuning coils in the FM front end dose not have an adjusting core. Consequently, tracking adjustments at 90MHz are performed by regulating the gap between rotor and stator of the tuning capacitors (VC<sub>1</sub>, VC<sub>3</sub> and VC<sub>5</sub>). The expression "adjust VC (VC<sub>1</sub>, VC<sub>3</sub>, VC<sub>5</sub>) found in the text means that the two outer rotor blades of each of these tuning capacitors are to be extended outwards with spatula (Part No. GGK-066) as shown in Fig. 8-1.

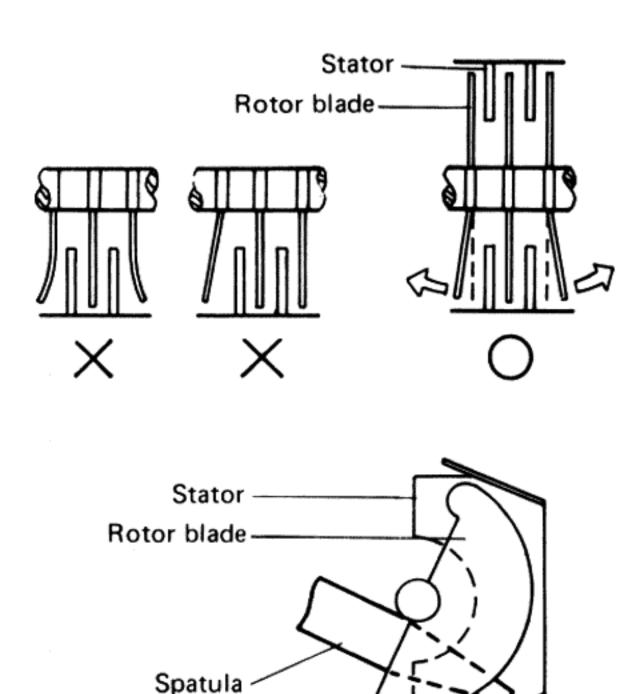


Fig. 8-1 Adjustment of tuning capacitor

(GGK-066)

- 1. Set the TX-6800 dial point to a frequency in the 106MHz region so that there will be no input signal.
- 2. Rotate the N core of T<sub>2</sub> to bring the TUNING meter indicator to dead center.
- Next tune more accurately to 106MHz, and set the FM SG output to 106MHz, 60 to 80dB (modulation-400Hz, ±75kHz deviation).
- Adjust TC<sub>5</sub> to obtain maximum deflection of the SIGNAL meter indicator, and a dead center reading in the TUNING meter.

- 5. Then tune the dial pointer to 90MHz, and set the FM SG output frequency to 90MHz.
- 6. Adjust the VC<sub>5</sub> to obtain maximum deflection in the SIGNAL meter, and a dead center reading in the TUNING meter.
- 7. Repeat steps 3 to 6 above.
- 8. Reset the FM SG output level to 20-30dB, and adjust TC<sub>1</sub> and TC<sub>3</sub> at 106MHz, and VC<sub>1</sub> and VC<sub>3</sub> at 90MHz in the same manner as described above in steps 3 to 7. These adjustments will ensure optimum sensitivity in the 90 to 106MHz range, and minimum difference in sensitivity between the two extreme frequencies.
- 9. Return to a position with no input signal.
- 10. Rotate the N core of T<sub>2</sub> again to set the TUNING meter indicator to dead center.
- 11. Set the FM SG output to 98MHz and 66dB (modulation-400Hz, ±75kHz deviation), and tune the TX-6800 to this position.
- 12. Then rotate the D core of T<sub>2</sub> to reduce distortion in the demodulator output (OUTPUT terminal) to a minimum.
- 13. Repeat steps 9 to 12 above until both specifications (center TUNING meter reading in the absence of input signal, and minimum distortion in demodulator output) are satisfactorily met.

### Multiplex Decoder

- Connect the MPX SG (FM multiplex generator) to the FM SG external modulator terminal.
- Set the FM MUTING switch to the ON position.
- 14. Set the FM SG output to 98MHz and 66dB (unmodulated), and tune the TX-6800 to this position.
- 15. Adjust VR<sub>1</sub> to obtain a 76kHz signal at TP terminal.
- 16. Then set the FM SG output level to 86dB, and the modulation mode to external. Then with the MPX SG, set Main to 1kHz, L+R to ±67.5kHz deviation, and pilot signal to ±7.5kHz deviation.
- 17. Rotate the T<sub>1</sub> core around by up to 90° in either direction to reduce the demodulator output (OUTPUT terminal) distortion to a minimum.

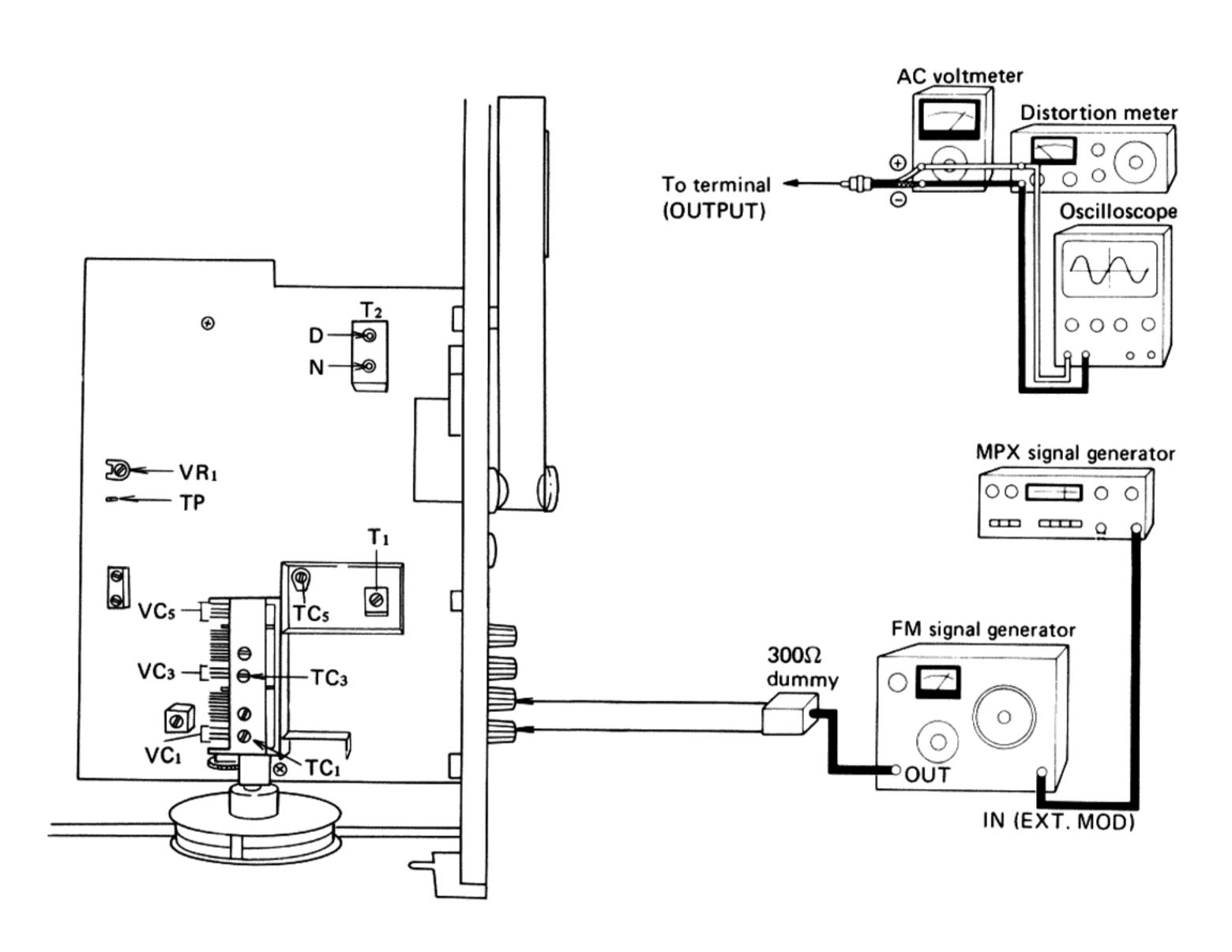


Fig. 8-2 FM tuner adjustments

### 8.2 AM TUNER

- Connect the AM SG (AM signal generator) to the AM ANTENNA terminal via a  $1k\Omega$  resistor.
- Switch the FUNCTION selector to the AM position.
- 1. Tune the TX-6800's dial pointer to 600kHz, and the AM SG output to 600kHz, 100dB (modulation 400Hz, 30%).
- 2. Adjust the core of T<sub>3</sub> to obtain maximum deflection of the SIGNAL meter indicator.
- 3. Then tune to 1400kHz, and set the AM SG output frequency to 1400kHz also.

- 4. This time adjust TC<sub>4</sub> to obtain maximum SIGNAL meter deflection.
- 5. Repeat steps 1 to 4 above.
- 6. Set the AM SG output level to 30dB, adjust the core of the bar-antenna and T<sub>3</sub> at 600kHz, and TC<sub>4</sub> and TC<sub>2</sub> at 1400kHz, in the same manner as described in the above steps. This is the adjustment for optimum sensitivity across the frequency band, and minimum difference in sensitivity at different frequencies.

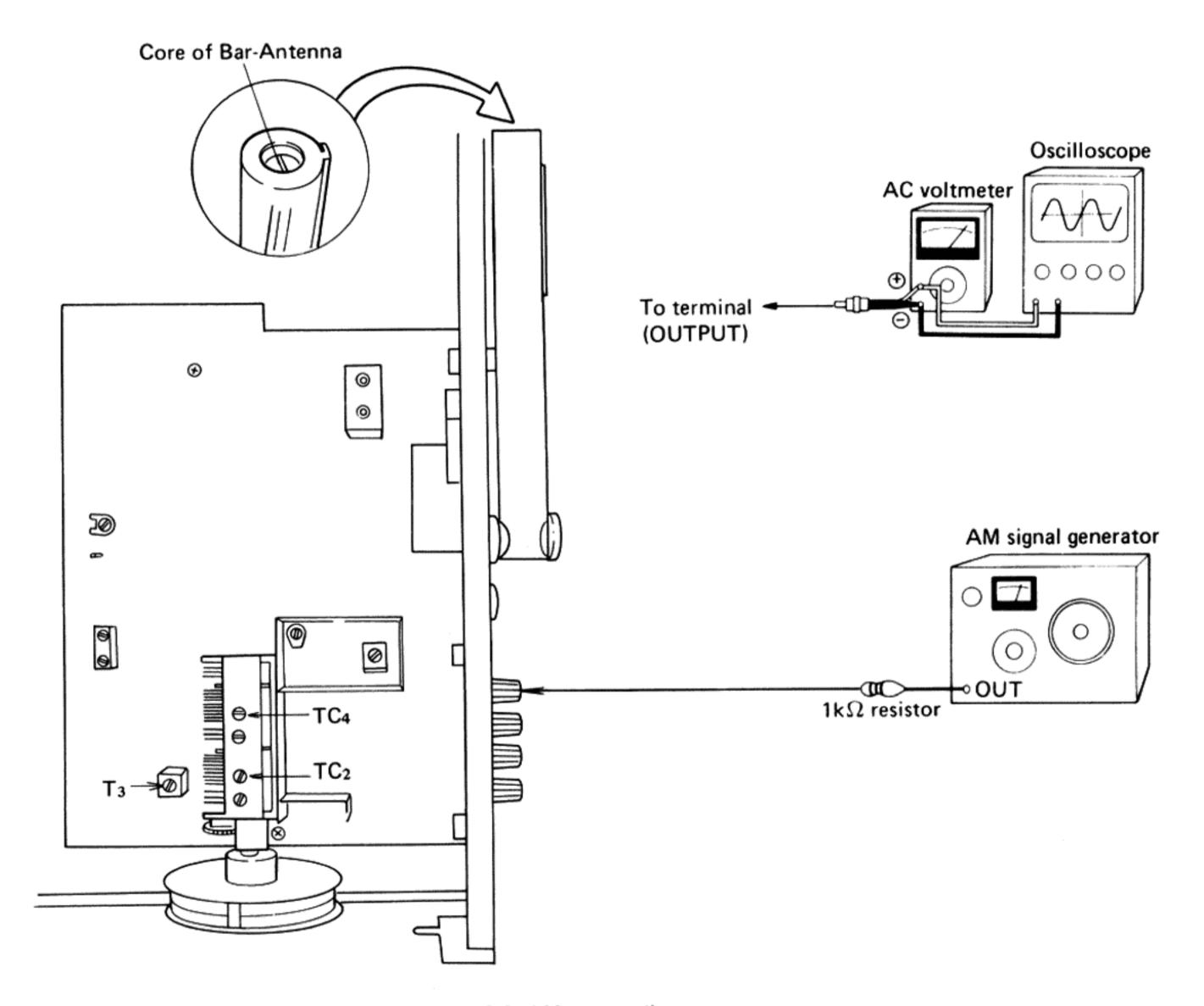
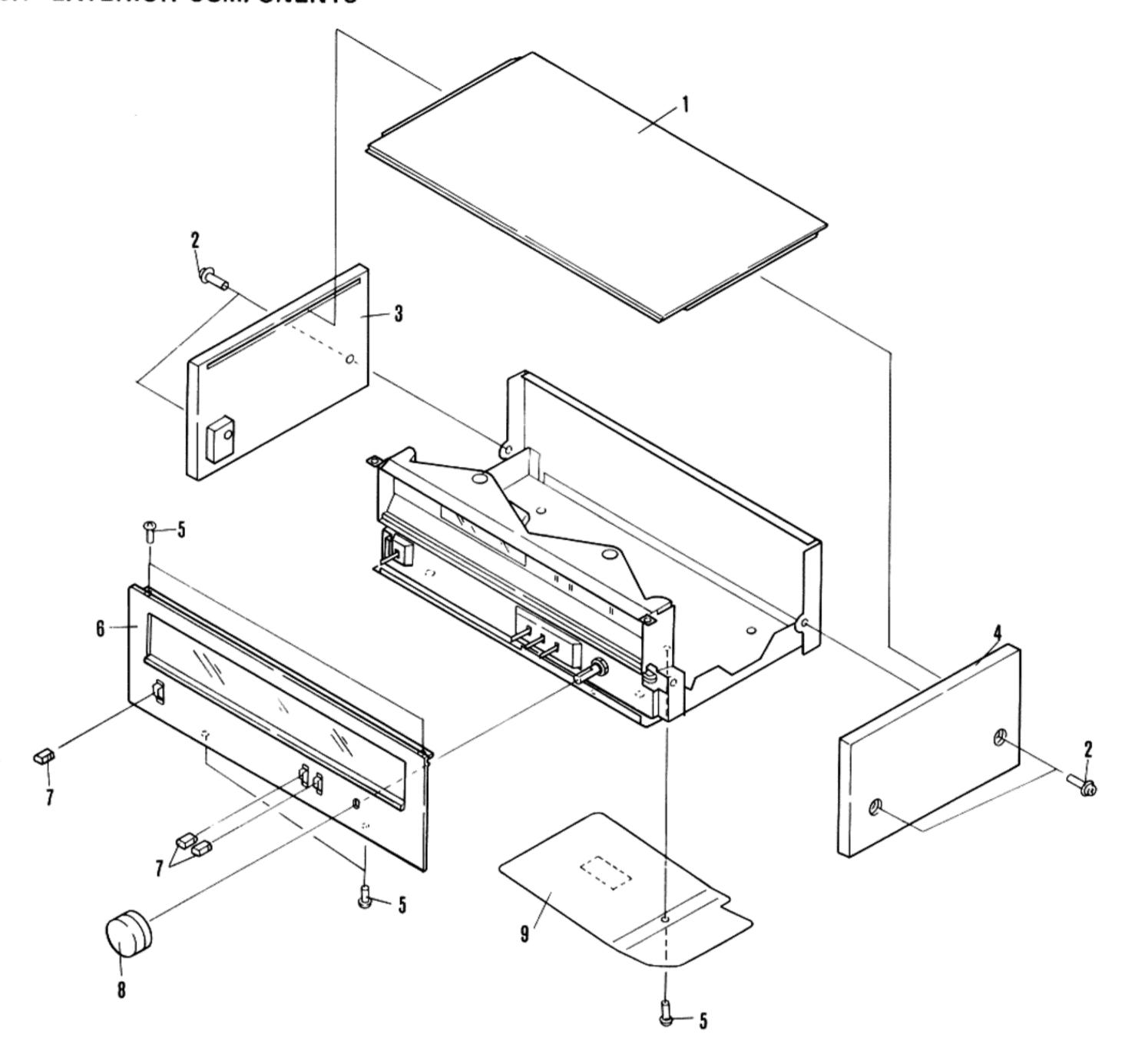


Fig. 8-3 AM tuner adjustments

# 9. EXPLODED VIEW

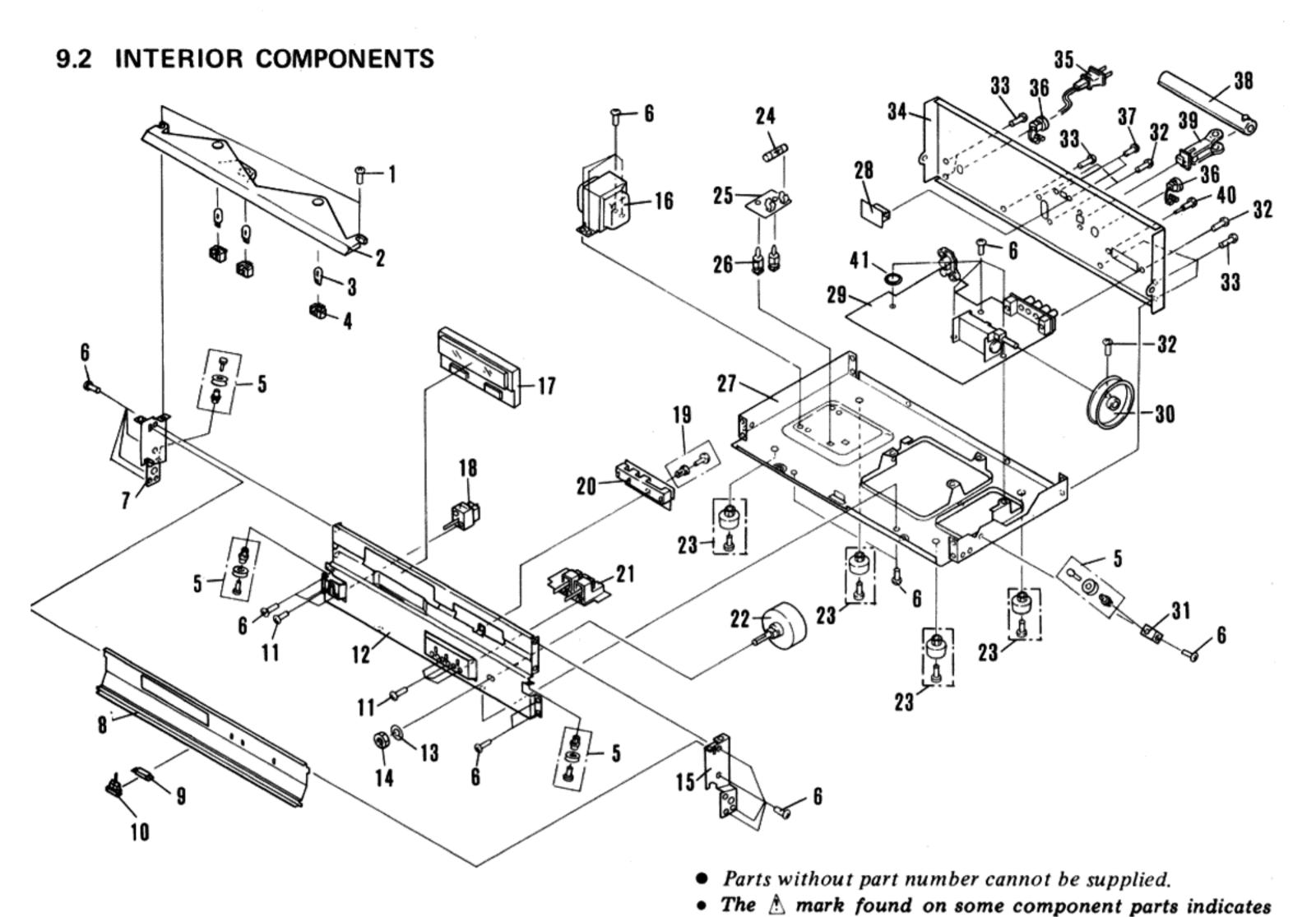
# 9.1 EXTERIOR COMPONENTS



Parts List

• Parts without part number cannot be supplied.

Key No.	Part No.	Description
1.	AMS-035	Top panel
2.	ABA-206	Washerfaced screw 4x25
3.	AMS-033	Side panel L
4.	AMS-034	Side panel R
5.	ABA-048	Screw 3x6
6.	ANB-721	Front panel
7.	AAD-183	Knob (POWER, FUNCTION, MUTING)
8.	AAA-058	Knob (TUNING)
9.		Bottom plate



Parts List

Part No. Key No. Description Key No. Part No. Description **ABA-049** Screw 3x8 1. 21. GWS-187 Switch assembly 2. Acrylic board 22. AXA-228 Tuning shaft assembly 3. **AEL-029** Lamp (wedge type) 23. **AEC-546** Foot assembly 4. **AKK-005** Lamp socket (wedge type) **∆**24. **AEK-106** Fuse (1A) 5 Pulley assembly 25. AWR-200 Fuse assembly 6. **ABA-048** Screw 3x6 26. AEC-554 P.C. board holder 7. Side plate L 27. Chassis 8. Dial scale board 28. GWS-188 De-emphasis assembly 9. Smoother 29. Tuner assembly GWM-135 10. Dial pointer 30. Tuning drum 11. **ABA-025** Pan head screw 3x4 31. Angle 12. Sub-panel Screw 3x10 32. ABA-082 13. B22-018 Flat washer 33. ABA-228 Screw 3x6 14. B71-010 Nut 7 ø 34. Rear panel 15. Side plate R **₫35**. ADG-023 AC power cord **∆**16. ATT-612 Power transformer AEC-327 36. Strain relief 17. AAW-102 Twin meter 37. **ABA-034** Pan head screw 3x4 **∆**18. ASK-514 Lever switch (POWER) 38. ATB-505 Bar-antenna 19. AEC-352 Nylon rivet 39. AXB-012 Antenna holder GWX-308 LED assembly 20. **ABA-115** 40. Special screw **ABE-035** 41. Washer

designation.

the importance of the safety factor of the part. There-

fore, when replacing, be sure to use parts of identical

# 10. SCHEMATIC DIAGRAM, P.C.BOARD PATTERNS AND PARTS LIST

### 10.1 MISCELLANEA

### NOTE:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.
- Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

 $560\Omega$ — $56 \times 10^1$ — $561 \dots RD4PS$  561 J $47k\Omega$  —  $47 \times 10^3$  —  $473 \dots RD4PS$  473 J

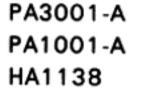
Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

 $5.62k\Omega$   $562 \times 10^{\circ}$  5621....RN4SR [5] [6] [2] [1] F

• The A mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

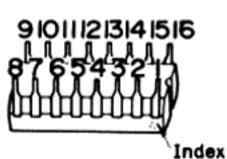
# External Appearance of Transistors and ICs

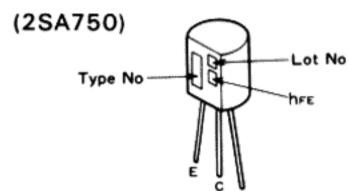
### Miscellaneous Parts

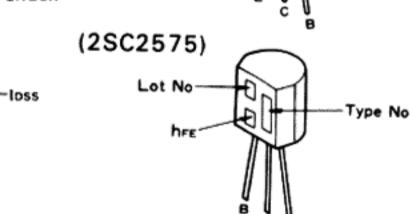


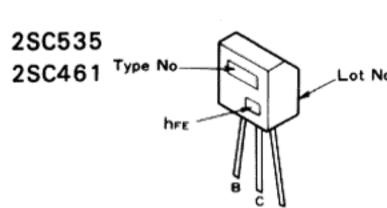
2SK168 Type No.

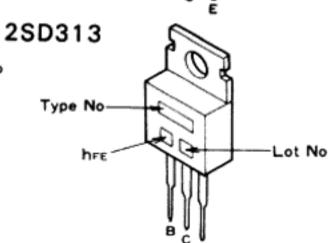
Lot No

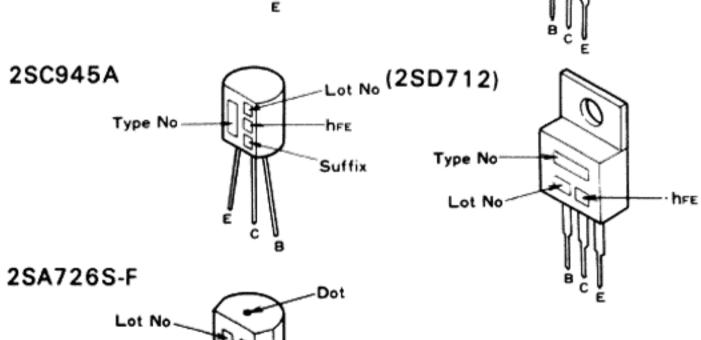












# LAMPS AND FUSE

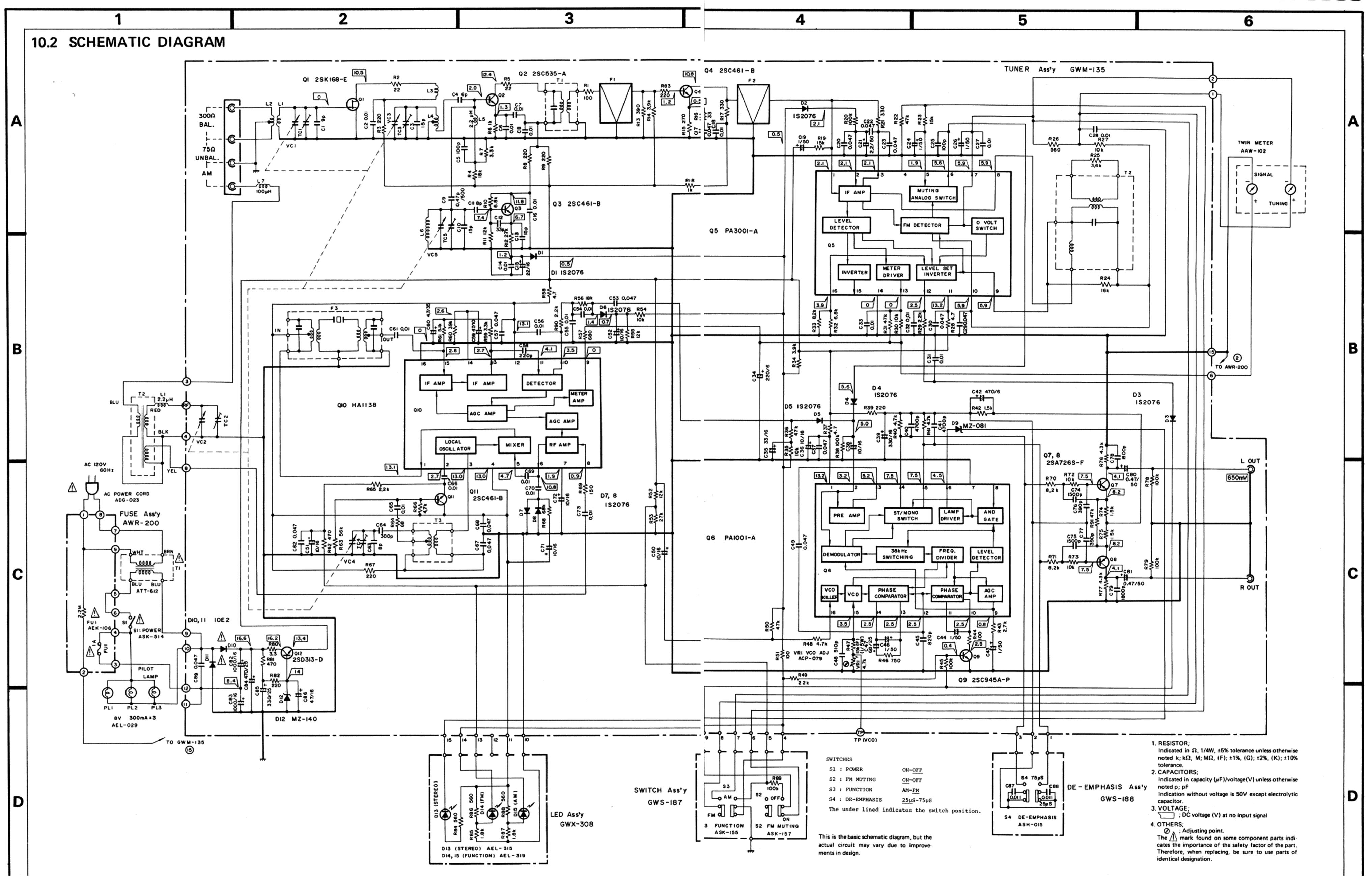
Part No.	Symbol & Description		
AEL-029 <b>AEK-106</b>	PL1-PL3 FU1	Lamp (wedge type) Fuse (1A)	

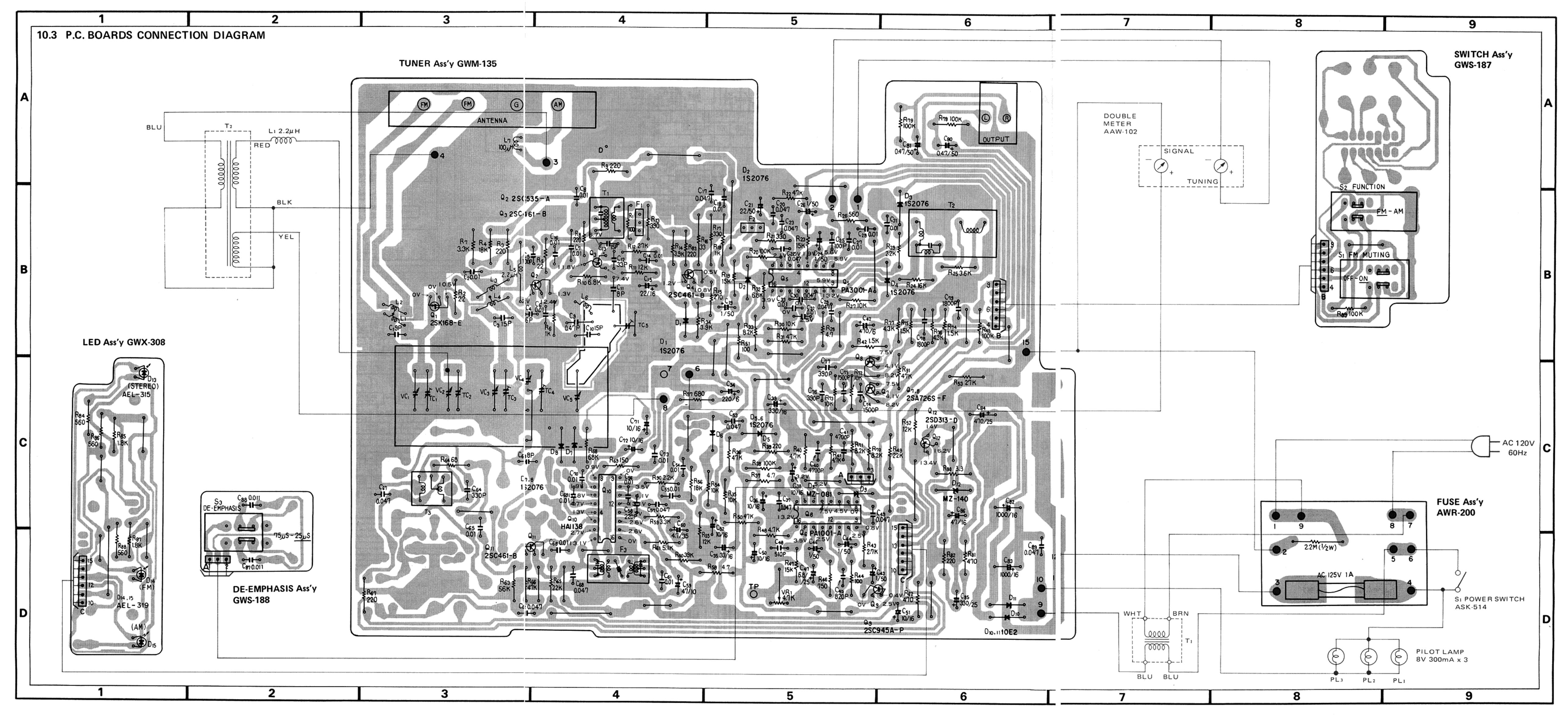
### P.C. BOARD ASSEMBLIES

Part No.	Description	
GWM-135	Tuner assembly	
GWS-187	Switch assembly	
GWS-188	De-emphasis assembly	
GWX-308	LED assembly	
AWR-200	Fuse assembly	

### **OTHERS**

Part No.	Symbol & Description		
<b>À</b> ATT-612	Т1	Power transformer	
ATB-505	T2	Bar-antenna	
<b>ASK-514 ASK-514</b>	S1	Lever switch (POWER)	
AAW-102		Twin meter (SIGNAL/TUNING)	
AKK-005		Lamp socket (wedge type)	
<b>⚠</b> ADG-023		AC power cord	





# 10.4 PARTS LIST OF P.C. BOARD ASSEMBLIES

<b>Tuner Assembly</b>	(GWM-135)
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### **COILS AND TRANSFORMERS**

Part No.	Symbol & Description		
ATE-008	T1	FM IFT	
ATE-043	T2	FM det. transformer	
ATB-063	Т3	AM OSC coil	
T24-028	L5	RF choke coil	
ATF-049	F1, F2	FM ceramic filter	
ATF-074	F3	AM ceramic filter (450kHz)	

### **CAPACITORS**

CAPACITORS		
Part No.	Symbol & De	scription
ACK-012	vc	Tuning capacitor
ACM-006	TC5	Trimmer
CCDUJ 090D 50	,C1	
CGB R47K 500	C9	
CCDXL 080F 50	C63	
CCDCH 080F 50	C11	
CCDUJ 150K 50	C3	
CCDRH 150K 50	C10	
CCDCH 150K 50	C13	
CCDCH 330K 50	C12	
CCDSL 060D 50	C4	
CCDSL 101K 50	C5, C25	
CCDSL 221K 50	C58	
CKDYB 391K 50	C76, C7	7
CKDYB 152K 50	C74, C7	5
CKDYB 182K 50	C78, C7	9
CKDYB 472K 50	C40, C4	1
CKDYB 821K 50	C45	
CKDYF 103Z 50	,	C7, C8, C14, C16, C18, C27,
		31, C32, C33, C54, C55, C56,
OKDVE 4727 FO		6, C69, C70, C73, C61
CKDYF 473Z 50	•	20, C22, C23, C29, C30, C37,
CQSH 331K 50	C49, C5	3, C57, C62, C67, C68, C89
CQSH 511J 50	C48	
CQ3H 3113 50	040	
CEANL R47M 50	C80, C8	1
CEANL 010M 50	C44, C4	6
CEANL 6R8M 25	C47	
CEA 010P 50		4, C26, C43
CEA 100P 16	C36, C3	8, C50, C51, C52, C71, C72
CEA 102P 16	C82, C8	3
CEA 2R2P 50	C21	
CEA 220P 16	C15	
CEA 221P 6	C34	
CEA 331P 25	C85	
CEA 331P 16	C39	
CEA 330P 16	C35	

Part No.	Symbol & Description	
CEA 4R7P 35	C60	
CEA 470P 10	C59	
CEA 470P 16	C86	
CEA 471P 6	C42	
CEA 471P 25	C84	

### **SEMICONDUCTORS**

Part No.	Symbol & Description
2SK168	Q1
2SC535	Q2
2SC461	Q3, Q4, Q11
2SA726S-F	Q7, Q8
(2SA750)	
2SC945A	Q9
(2SC2575)	
2SD313	Q12
(2SD712)	
PA3001-A	Q5
PA1001-A	Q6
HA1138	Q10
1S2076	D1-D8
(1S1555)	
(1S2473)	
<u></u> 10E2	D10, D11
<u> </u>	
MZ-140	D12
(WZ-140)	
MZ-081	D9
(WZ-081)	
	Note: When ordering resistors convert the

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Part No.	Symbol & Description			
ACP-079	VR1 Sem	i-fixed 4.7k-B		
RD¼PM □□□J RN¼PQ □□□□F		–R83, R90, R91		

# LED Assembly (GWX-308)

Symbol & Description		
D13 D14, D15	LED (STEREO) LED (AM, FM)	
R84, R86, F R85, R87	R88	
	Screw 3 x 10	
	D14, D15 R84, R86, F	D14, D15 LED (AM, FM)  R84, R86, R88  R85, R87

# Switch Assembly (GWS-187)

# Fuse Assembly (AWR-200)

Part No.	Symbol & Description		Part No.	Symbol &	Symbol & Description	
ASK-157	S1	Lever switch (FM MUTING)	<b>ACN-029</b>	R1	Carbon composition resistor	
ASK-155	\$2	Lever switch (FUNCTION)			our composition resistor	
RD%PM 104J	R89					

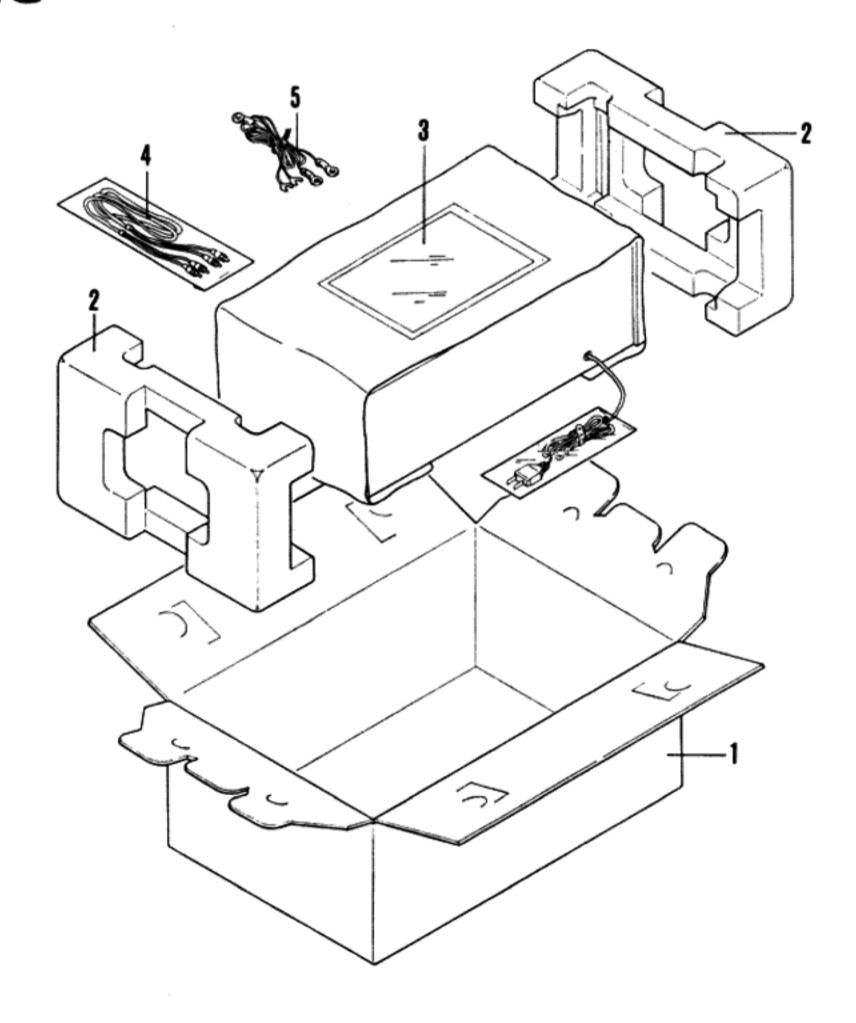
# De-Emphasis Assembly (GWS-188)

Symbol & Description

CQMA 113J 50	C87, C88	
ASH-015	<b>S</b> 3	Slide switch (DE-EMPHASIS)

# 11. PACKING

Part No.



# Parts List

Key No.	Part No.	Description		
1.	AHD-694	Packing case		
2.	AHA-188	Side pad		
3.	ARB-319	Operating instructions		
4.	ADE-005	Connection cord		
5.	ADH-002	T-type FM antenna		

# 12. SUPPLEMENTS FOR MODEL TX-608/KU

Model TX-608/KU is the same as Model TX-6800/KU with exception of descriptions in this supplements.

# **Contrast of Miscellaneous Parts**

Symbol	Description	Par		
		TX-6800/KU	TX-608/KU	Remarks
	Front panel	ANB-721	ANB-737	
	Side panel L	AMS-033		
	Side panel R	AMS-034		
	Top panel	AMS-035		
	Bonnet case		ANE-249	
	Screw 4 x 25	ABA-206		for side panels
	Screw 4 x 6		ABA-180	for bonnet case
	Operating instructions	ARB-319	ARB-335	
	Packing case	AHD-694	AHD-705	
	Side pad	AHA-188	AHA-189	

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