



Service Manual

AM/FM STEREO TUNER

TX-3000

 **PIONEER**

MODEL TX-3000 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
HE	220V and 240V (Switchable)	Europe or Oceania model
HB	220V and 240V (Switchable)	United Kingdom model
KU	120V only	U.S.A. model
S	110V, 120V, 220V and 240V (Switchable)	General export model
S/G	100V, 120V, 220V and 240V (Switchable)	U.S. Military model

- This service manual is applicable to the HE and HB types. When repairing the KU, S and S/G types, please see the additional service manual (ART-379-0).

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1. SPECIFICATIONS

Semiconductors

FET	1
IC(s)	4
Transistors	12
Diodes	12

FM Tuner Section

Usable Sensitivity	Mono; 10.3dBf (1.8 μ V)
50dB Quieting Sensitivity	Mono; 16.2dBf (3.5 μ V)
	Stereo; 36.7dBf (39 μ V)
Sensitivity (DIN)	Mono; 1.3 μ V
	Stereo; 40 μ V
Signal-to-Noise Ratio (at 65dBf)	Mono; 82dB
	Stereo; 77dB
Signal-to-Noise Ratio (DIN)	Mono; unweighted/weighted; 76dB/73dB
	Stereo; unweighted/weighted; 64dB/59dB
Distortion (at 65dBf)	
100Hz	Mono/Stereo; 0.1%/0.2%
1kHz	Mono/Stereo; 0.08%/0.15%
6kHz	Mono/Stereo; 0.1%/0.3%
Stereo Separation	
1kHz	45dB
30Hz to 15kHz	35dB
Frequency Response	20Hz to 15kHz ^{+0.2} _{-1.0} dB
Capture Ratio	1.0dB
Alternate Channel Selectivity	
400kHz	60dB
Spurious Response Ratio	70dB
Image Response Ratio	60dB
IF Response Ratio	100dB
AM Suppression Ratio	60dB
Subcarrier Product Ratio	55dB
SCA Rejection Ratio	50dB
Muting Threshold	19.2dBf (5 μ V)
Antenna Input	300 ohms balanced 75 ohms unbalanced

AM Tuner Section

Sensitivity	300 μ V/m (IHF, ferrite bar antenna)
	15 μ V (IHF, Ext. antenna)
Selectivity	30dB
Signal-to-Noise Ratio	50dB
Image Response Ratio	40dB
IF Response Ratio	45dB
Antenna	Ferrite Loopstic Antenna

Audio Section

Output Level/Impedance:	
FM	650mV/4.3k Ω (100% MOD)
AM	200mV/4.3k Ω (30% MOD)

Miscellaneous

Power Requirements	220/240V (Switchable), 50/60Hz
Power Consumption	6W
Dimensions	380(W) x 83(H) x 335(D) mm x 13-3/16(D) in.
Weight	Without package; 4kg (8 lb 13oz)

Furnished Parts

FM T-type Antenna	1
Connecting cord with pin plugs	1
Operating instructions	1

NOTE:

Specifications and the design subject to possible modification without notice due to improvements.

2. FRONT PANEL FACILITIES

POWER SWITCH

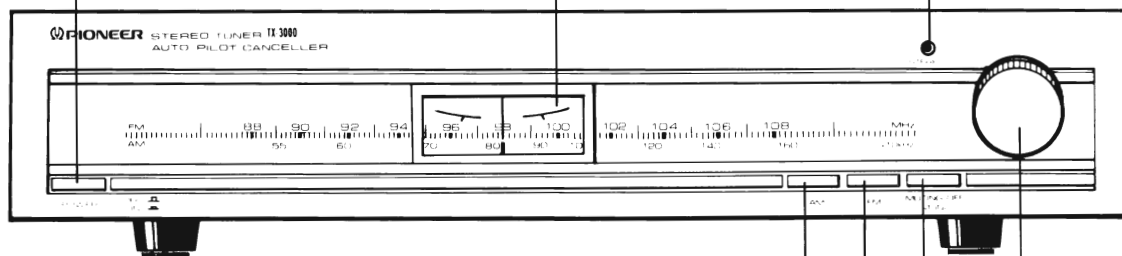
This switch is used to turn the power on and off. When it is set to the depressed position (ON), the power is supplied to the tuner and the tuning meter lights up.

TUNING METER

This tuning meter also serves as the dial pointer when tuning in an AM or FM broadcasting station. It indicates the optimum tuning point regardless of the strength of the signals. When the tuner is not receiving a program, the pointer will be positioned in the center. When tuning in a station, however, it will deflect to the left or right in accordance with the position of the station. The optimum tuning point is then indicated when this pointer is positioned in the center.

STEREO INDICATOR

This indicator comes on when an FM stereo broadcast is being received.



AM SWITCH

Depress this switch when receiving an AM broadcast.

FM SWITCH

Depress this switch when receiving an FM broadcast. The tuner will automatically be set to the stereo mode if the station is broadcasting in stereo.

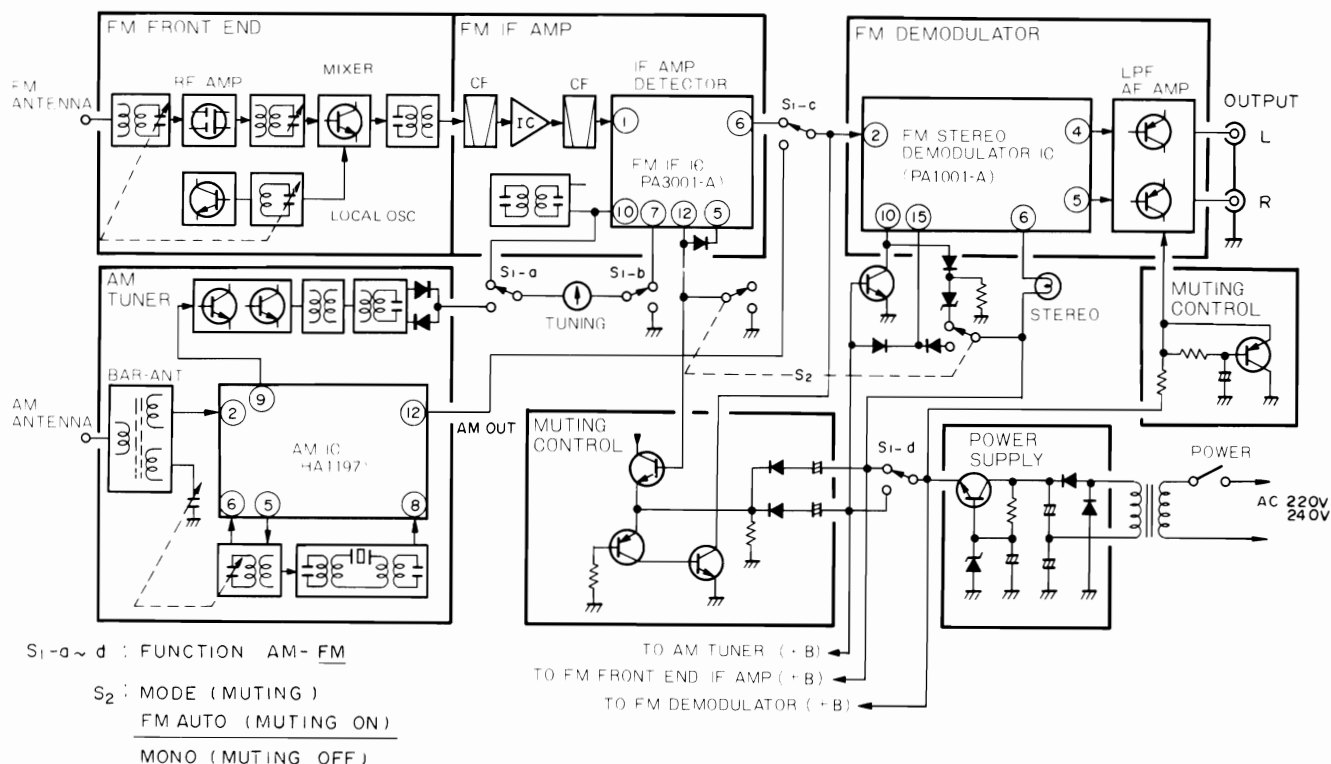
MUTING OFF SWITCH

Depress this switch to stop the muting operation (OFF position). Muting is a function that refers to the suppression of irritating interstation noise heard during tuning. When the switch is released, this function is actuated. Set it to the depressed position especially in fringe areas where the broadcasting signals are weak. When the muting function is set to OFF, it is possible to receive weak-signal stations or distant stations in mono even though the stations may be broadcasting in stereo.

TUNING KNOB

This knob is used to tune in the AM and FM stations. Observe the tuning meter which also serves as the dial pointer, rotate the knob and tune in the station.

3. BLOCK DIAGRAM



4. CIRCUIT DESCRIPTIONS

FM Tuner

The front end of the TX-3000 FM tuner section employs a frequency-linear 3-ganged tuning capacitor, a dual gate MOS FET (3SK73) RF amplifier (single stage) with M-coupled single tuning circuit, an NPN transistor mixer, and an NPN transistor modified Clapp type local oscillator circuit. By using this 3SK73 in the RF amplifier, the gain has been improved by 2 to 3dB in comparison to more conventional 3-ganged tuning capacitor FM front end stages, resulting in an IHF sensitivity rating of $1.8\mu\text{V}$.

The IF amplifier stage features 2 phase-linear ceramic filters equipped with 4 selector elements of very good group delay characteristics. The amplification elements consist of an IC (HA1201) equipped with a current-controlled differential amplifier, and an FM IF system IC (PA3001-A). Besides compensating for filter loss, HA1201 also serves as a limiter. PA3001-A is involved in IF amplification, serves as the limiter and detector (quadrature detector), and also controls tuning meter drive and the muting of weak input signals and interstation noise.

The FM stereo demodulator circuit employs in the FM stereo demodulator IC (PA1001-A). Besides the NFB type demodulator, this IC also contains an automatic pilot signal canceller and a stereo/mono automatic switch circuit for low distortion and high S/N ratio. The sub-carrier signal (23kHz ~ 53kHz) is removed by a PNP transistor equipped 18dB/oct active filter. This filter also serves as an amplifier in the passband region, and also as a crosstalk canceller.

AM Tuner

The AM tuner stage employs a 2-ganged tuning capacitor, an AM IC (HA1197), and ceramic filters. The detector output amplifier stage is common with the FM stereo demodulator stage.

Tuning indication employs the same center tuning meter as in FM. Consequently, independent meter drive IF amplifier and detector (ratio detector) are required in the AM tuner section for amplification and FM detection of the HA1197 pin no.9 output signal (IF OUT: 455kHz). The detector output describes an S shapes curved within a $\pm 15\text{kHz}$ range centered at 455kHz when tuning to and away from AM broadcasting stations.

Muting Control

The muting circuits in the TX-3000 mute the switching noise when the POWER switch is turned on and when the position of the FUNCTION selector is changed. Weak FM input signals and interstation noise in the FM band are also muted.

When the POWER switch is turned on, muting is effected by delaying the power supply voltage applied to the AF amplifier stage (see Fig. 4-1). During the 1 to 2 seconds after the POWER switch is turned on, Q_{10} is turned on according to the R_{324}/C_{320} time constant, resulting in a delay in the voltage rise of the power applied to the AM amplifier.

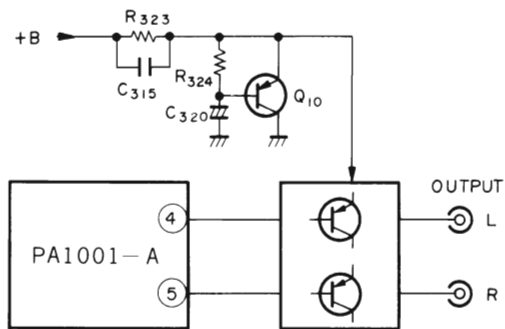


Fig. 4-1

When the position of the FUNCTION switch is changed, the signal path is shorted to ground by a transistor switch (see Fig. 4-2). +B is applied to the emitter of Q_6 via C_{115} and D_2 (or C_{113} and D_3) to turn Q_6 and Q_7 on. The signal path is thereby shorted to ground to mute any switching noise.

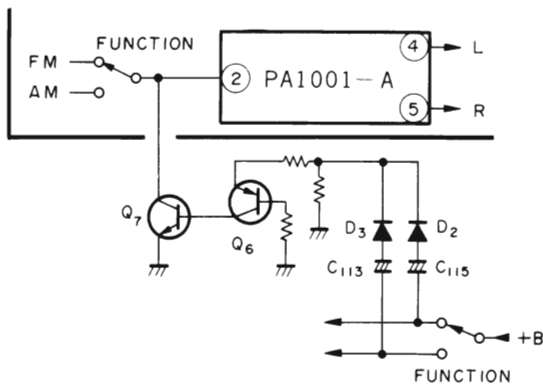


Fig. 4-2

The muting of weak FM stations and interstation noise in the FM band employs a transistor switch which shorts the signal path to ground, and the muting gate incorporated in the FM IF system IC (PA3001-A) (see Fig. 4-3). After a station has been tuned away from by more than 70kHz, and when a weak signal (below $5\mu\text{V}$ equivalent antenna input level) is received, a 1.4V DC voltage appears at pin no.12 of PA3001-A. This voltage is applied to pin no.5 and to the base of Q_5 , resulting in the activation of the PA3001-A muting gate and the shorting of the signal path due to $Q_5 \sim Q_7$ turning on.

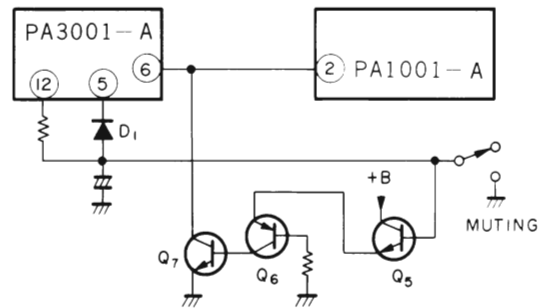


Fig. 4-3

5. DISASSEMBLY

Front Panel

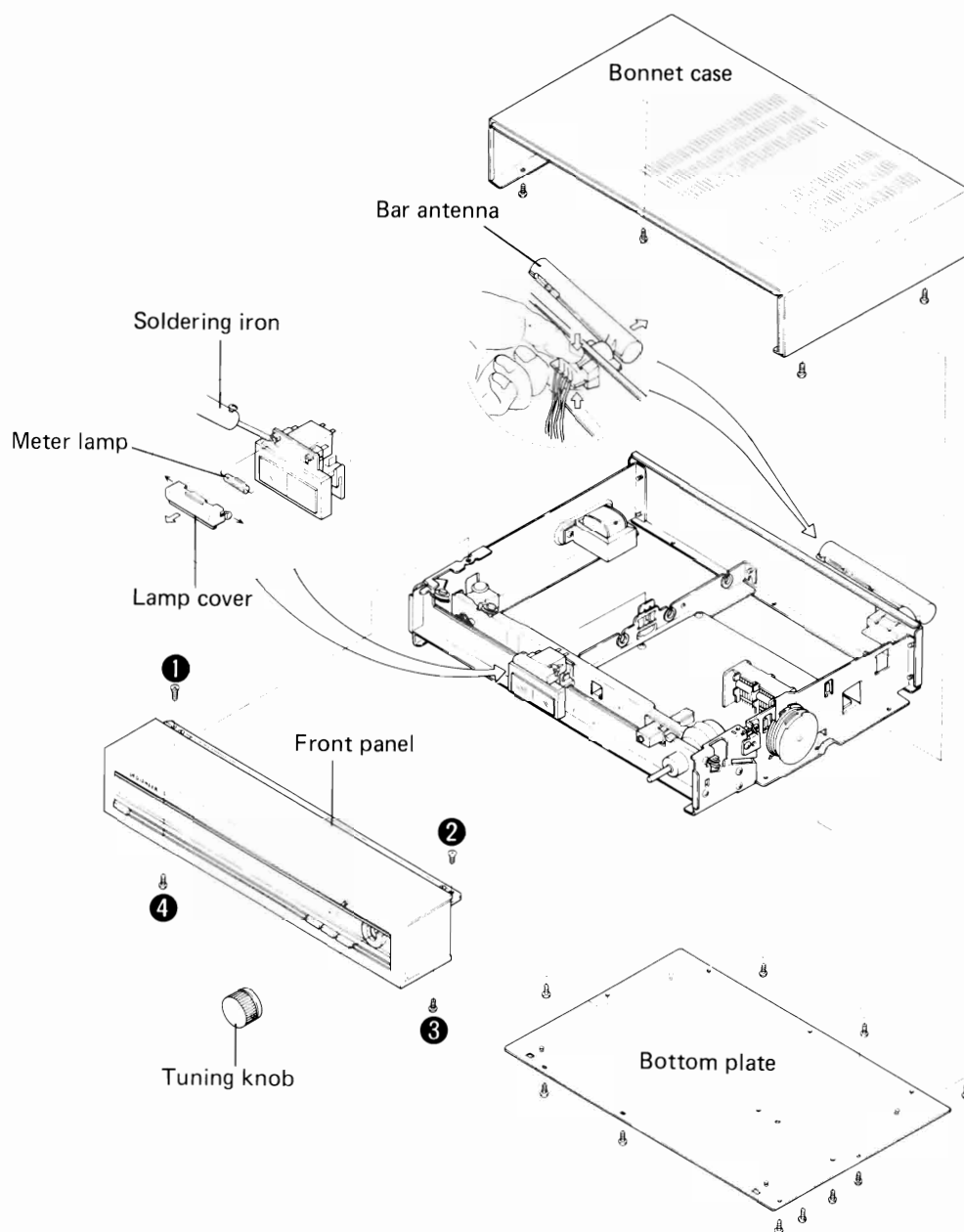
1. First loosen the tuning knob securing screw (hexagonal) to remove the knob.
2. Remove the bonnet case, undo screws ① to ④, and then pull the front panel.

Meter Lamps


1. First remove the bonnet case and front panel.
2. Then remove the lamp cover.
3. To remove the meter lamps, carefully apply a soldering iron to remove the solder.

Bar Antenna

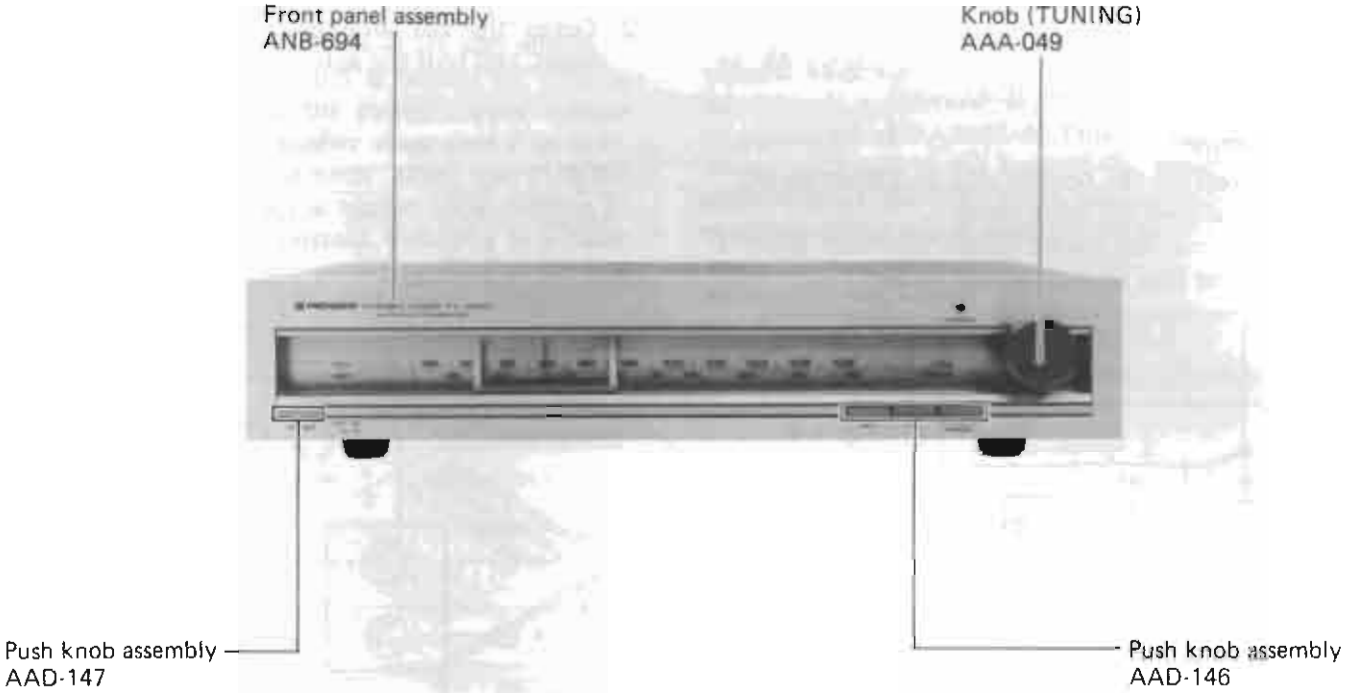
1. Remove the bonnet case.
2. Grasp the bar antenna holder firmly in one hand, and pull the antenna out with the other.



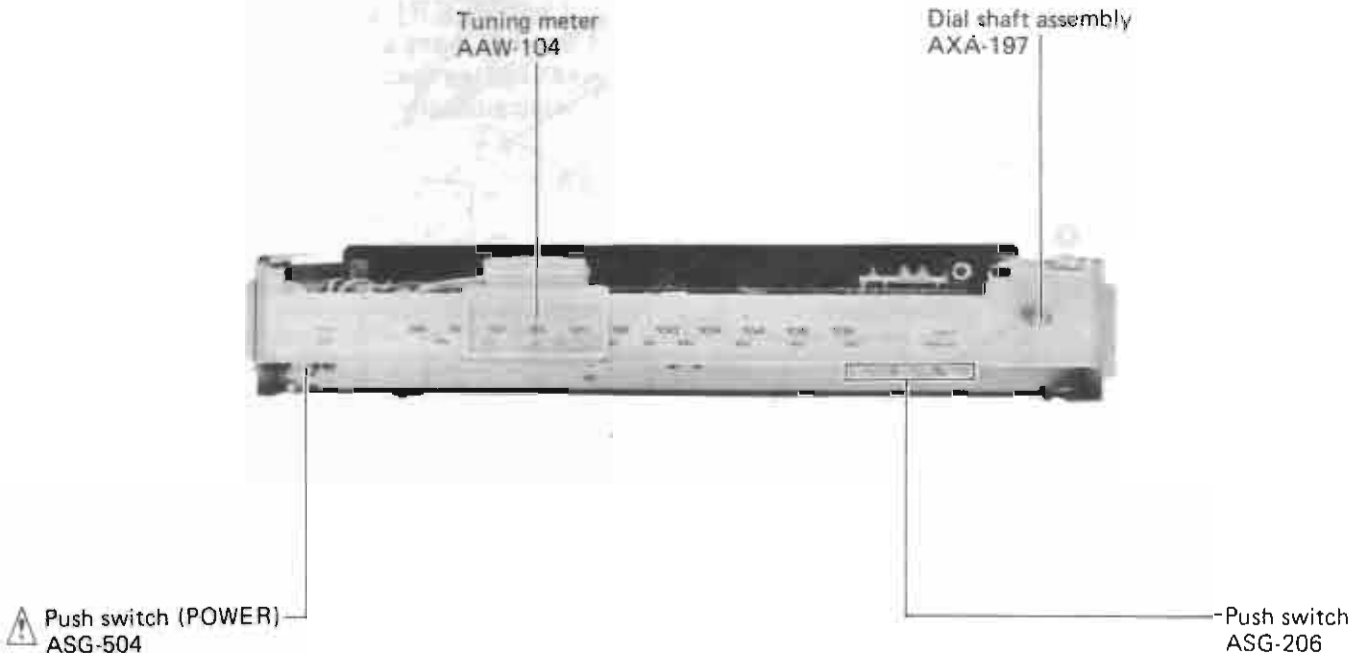
6. PARTS LOCATION

- The  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.

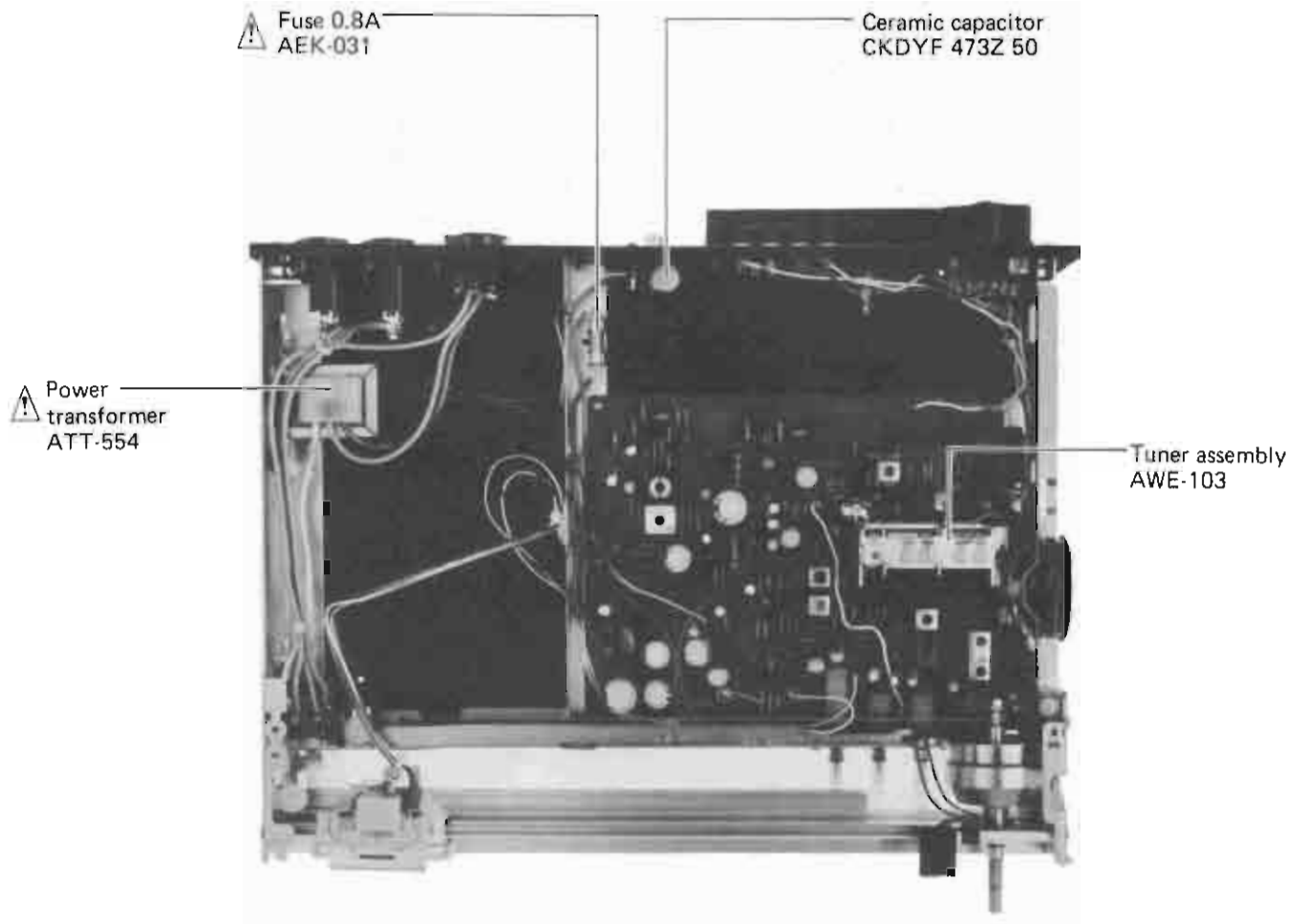
Front Panel View



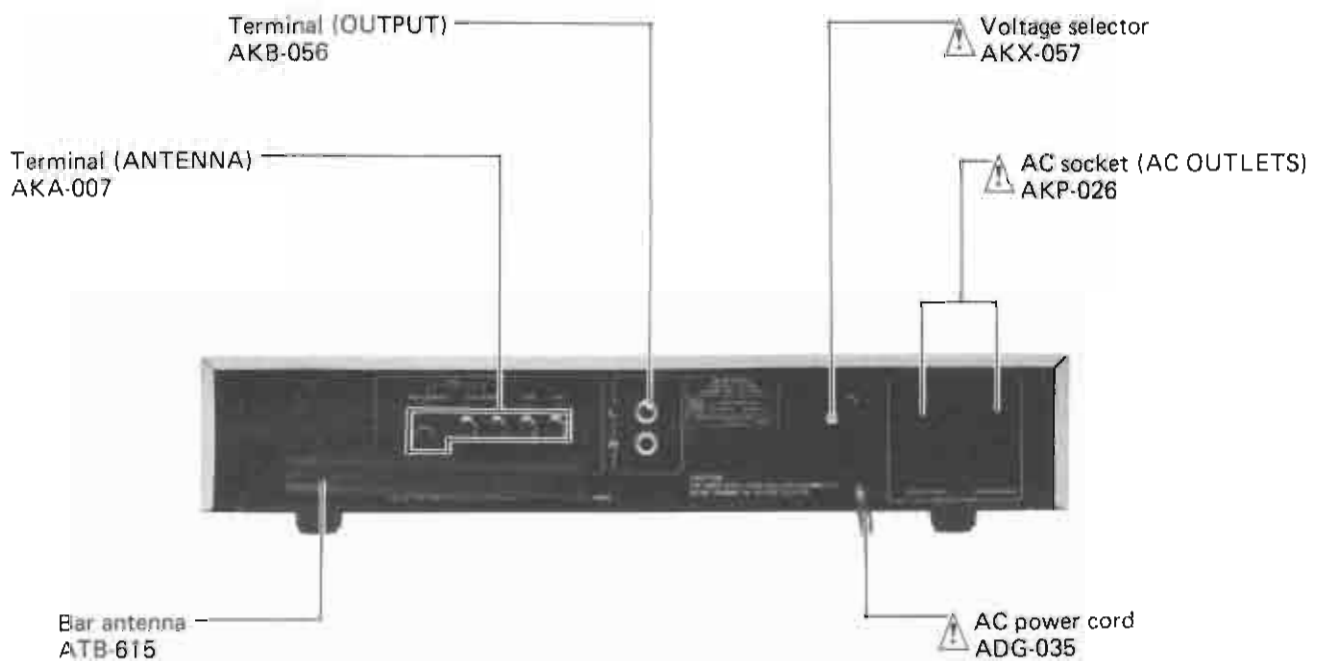
Front View with Front Panel Removed



Top View with Top Cover Removed



Rear Panel View



7. DIAL CORD STRINGING

1. Remove the top cover and front panel.
2. Remove the tuning drum from the shaft of the tuning capacitor.
3. Tie one end of the cord to the hook located inside the tuning drum.
4. Rotate the tuning capacitor right around until the rotor blades are fully intermeshed.
5. Secure the tuning drum back onto the tuning capacitor shaft, making sure that the securing screw faces directly upward.
6. Pass the cord out through the small opening in the circumference of the tuning drum (see diagram), make half a turn around the tuning drum, and then pass the cord around pulleys A, B, and C in that order. Next make 3 turns around the dial shaft, then pass around pulley D, make 2 more turns around the tuning drum (along the tuning drum groove), and finally tie the cord to the spring, checking that there is a certain amount of tension in the cord.
7. Rotate the tuning drum to check that the cord moves freely and smoothly. Then cut off any excess cord.
8. Next rotate the dial shaft in the counter clockwise direction (i.e. tuning capacitor rotor blades fully intermeshed). Align the dial pointer with the tuning dial "start point" (see Fig. 7-1), and then attach it to the cord.
9. Finally apply "paint lock" to the spots where the dial pointer is attached to the cord in order to secure the connection.

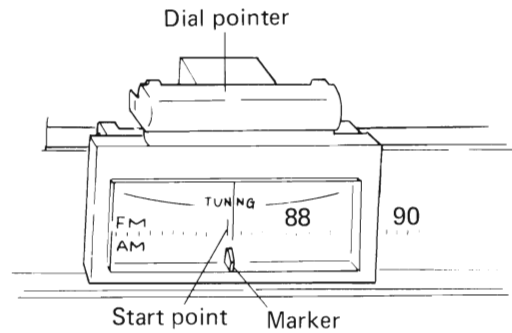


Fig. 7-1 Start point

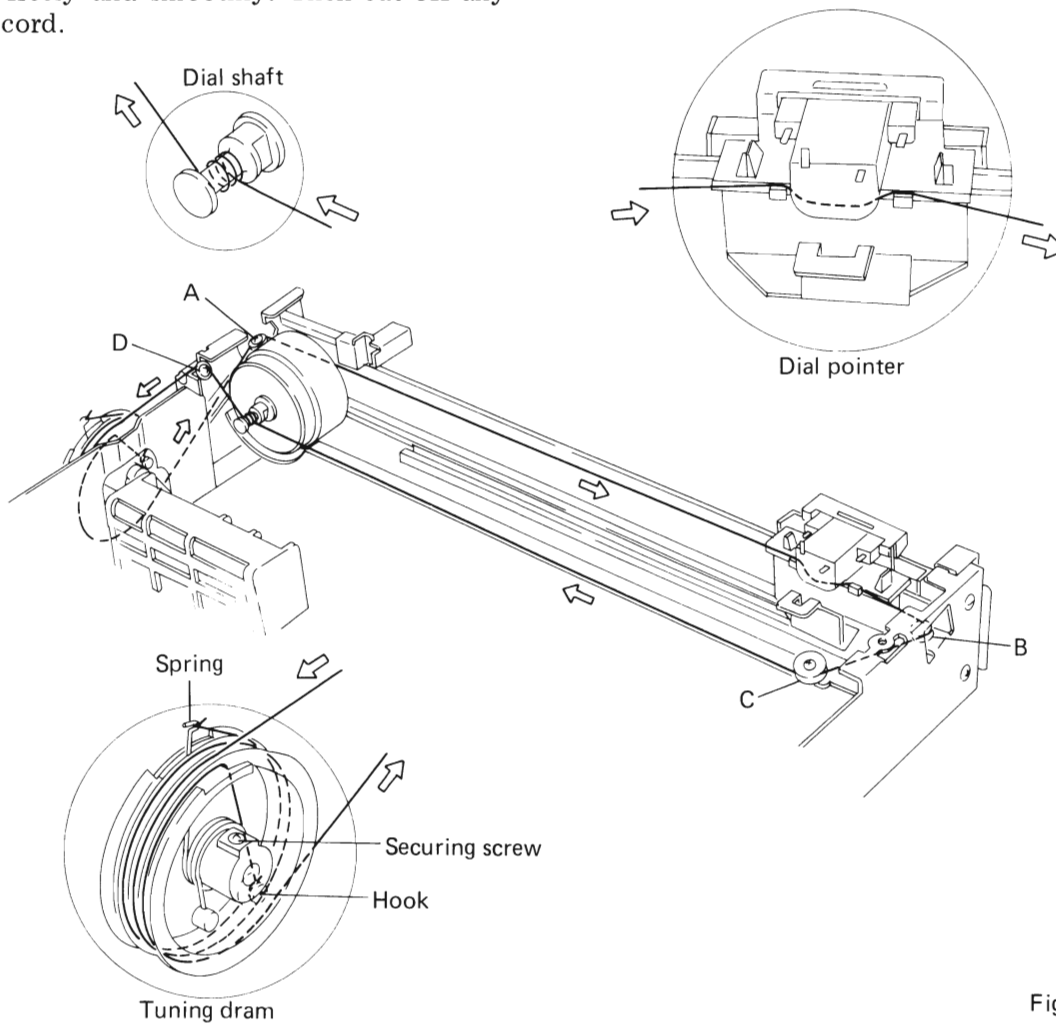


Fig. 7-2

8. ADJUSTMENTS

8.1 AM TUNER

1. Set up the test equipment as shown in Fig. 8-1.
2. Turn the AM function switch ON.
3. Set the AM signal generator (AM SG) to a modulation frequency of 400Hz, 30% modulated and output level of 30dB to 100dB.
4. Set the AM SG output frequency and dial frequency of the TX-3000 to 600kHz.
5. Adjust the core of T₃, F₄ and coil of bar antenna to obtain a maximum reading on the AC voltmeter (OUTPUT).
6. Set the AM SG output frequency and dial frequency of the TX-3000 to 1400kHz.
7. Adjust the TC₅ and TC₄ to obtain a maximum reading on the AC voltmeter (OUTPUT).
8. Repeat steps 4 to 7 above until no further changes occur in the AC voltmeter readings at the 600kHz and 1400kHz position.
9. Set output level of the AM SG to 80dB.
10. Set the AM SG output frequency and dial frequency of the TX-3000 to 1400kHz.
11. Adjust the core of T₅ so that the TUNING meter reads dead center.

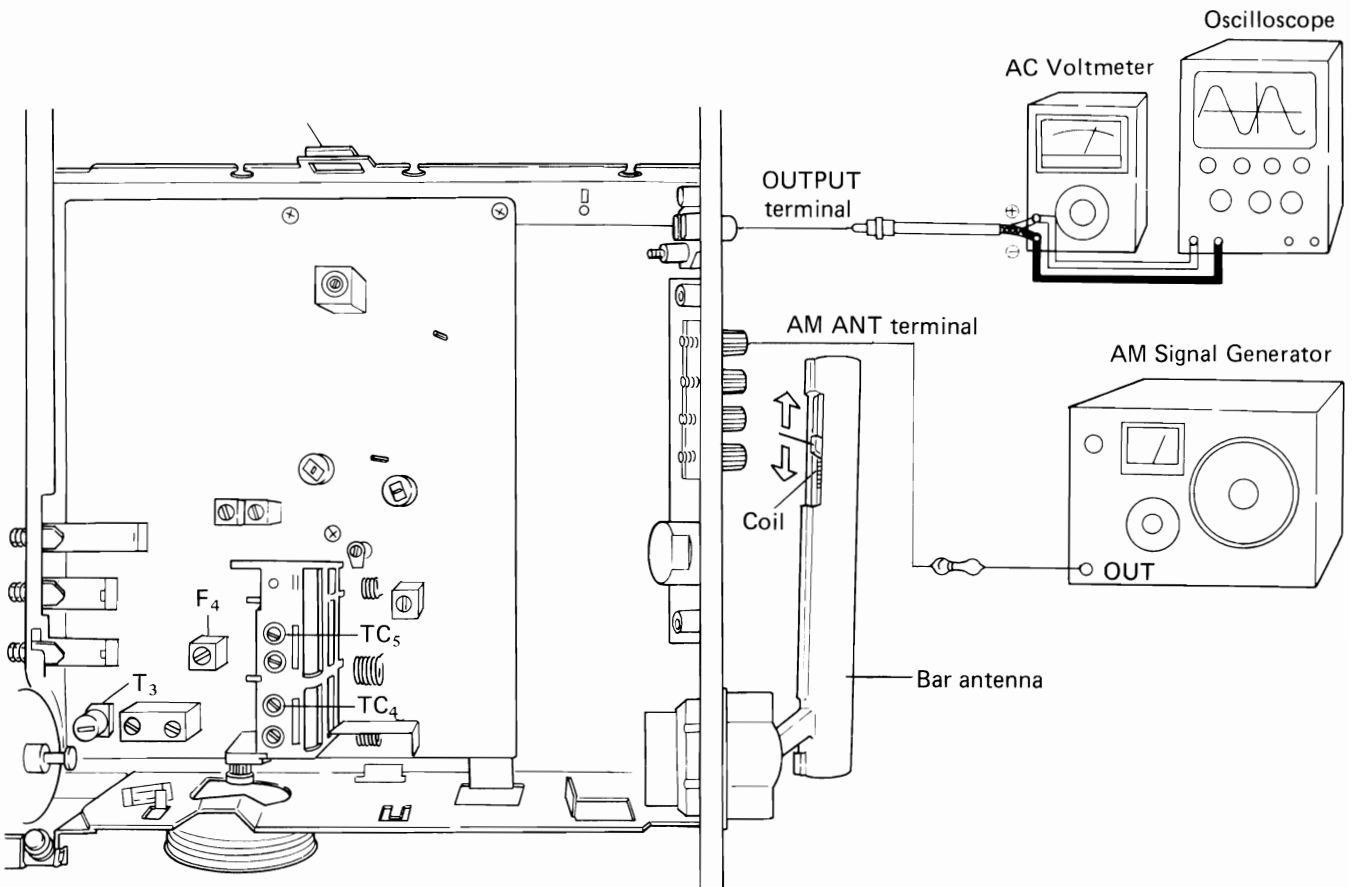


Fig. 8-1

8.2 FM TUNER

FM Tracking

1. Set up the test equipment as shown in Fig. 8-3.
2. Turn the FM function switch to the ON position, and MUTING switch to the OFF position.
3. Turn the dial frequency of the TX-3000 to 98MHz without any input signal.
4. Adjust the primary core (lower) of T2 so that the TUNING meter reads dead center.
5. Set the FM signal generator (FM SG) to a modulation frequency of 400Hz, FM deviation of $\pm 75\text{kHz}$, and output level of 30dB to 80dB.
6. Set the FM SG output frequency and dial frequency of the TX-3000 to 90MHz.
7. Adjust the gap (between rotor and stator) of VC3* (OSC), VC1 and VC2 to obtain a maximum reading on the DC voltmeter (between terminal 19 and ground).
8. Set the FM SG output frequency and dial frequency of the TX-3000 to 106MHz.
9. Adjust the TC3 (OSC), TC1 and TC2 to obtain a maximum reading on the DC voltmeter.
10. Adjust by repeating steps 6 to 9.
11. Set the FM SG output frequency and dial frequency of the TX-3000 to 98MHz.
12. Set output level of the FM SG to 30dB.
13. Adjust the core of T1 to obtain a maximum reading on the DC voltmeter.
14. Set output level of the FM SG to 60dB.
15. Adjust the secondary core (upper) of T2 to reduce distortion in the output to a minimum.
16. Set output level of the FM SG to zero.
17. Adjust the primary core (lower) of T2 so that the TUNING meter reads dead center.
18. Repeat steps 14 to 17 above so that the TUNING meter reads dead center with a minimum of distortion.

Multiplex Decoder

19. Connect the multiplex signal generator (MPX SG) to the external modulator terminals of FM SG, thereby using FM SG as external modulation.
20. Connect the frequency counter between terminal 17 and ground.
21. Turn the MUTING switch to the ON position.
22. Set the FM SG output frequency to 98MHz, and output level to 60dB, unmodulated.
23. Tune the TX-3000 to check that the DC voltmeter (between terminal 19 and ground) gives maximum deflection, and the TUNING meter reads dead center.
24. Adjust the VR1 to obtain a reading of 76kHz on the frequency counter.
25. Disconnect the frequency counter.

26. Set the MPX SG modulation output to pilot signal (19kHz) only, and set the FM deviation to $\pm 7.5\text{kHz}$.
27. Adjust VR2 so that the AC voltmeter (OUTPUT) shows minimum reading (19kHz leak).
28. Set the MPX SG to 1kHz (L or R) $\pm 33.7\text{kHz}$ deviation and 19kHz (pilot signal) $\pm 7.5\text{kHz}$ deviation.
29. Adjust the core of T1 (less than $\pm 90^\circ$) for minimum distortion at the L or R output.

NOTE:

The tuning coil in the FM front end does not have an adjusting core. Consequently, tracking adjustments at 90MHz are performed by regulating the gap between rotor and stator of the tuning capacitors (VC1, VC2 and VC3).

The expression "adjust VC (VC1, VC2 and VC3)" 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. 8-2.

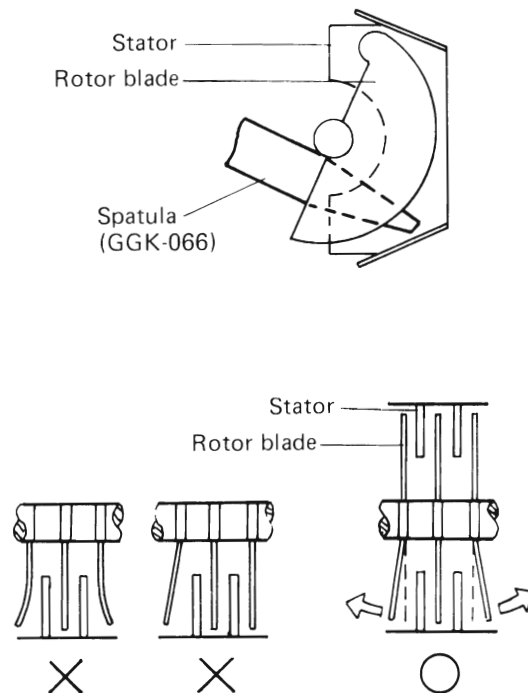


Fig. 8-2 Adjustment of tuning capacitor

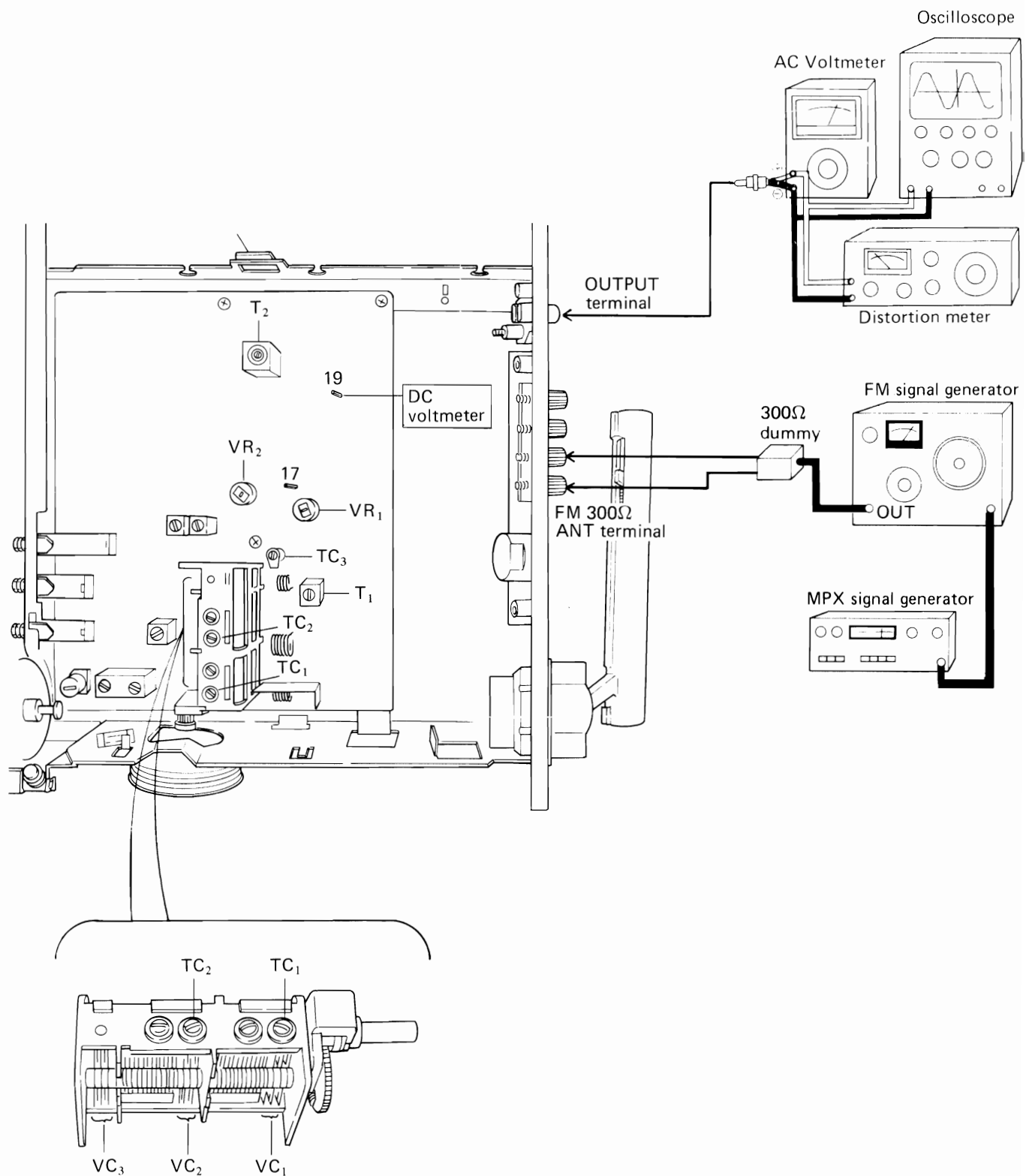









Fig. 8-3

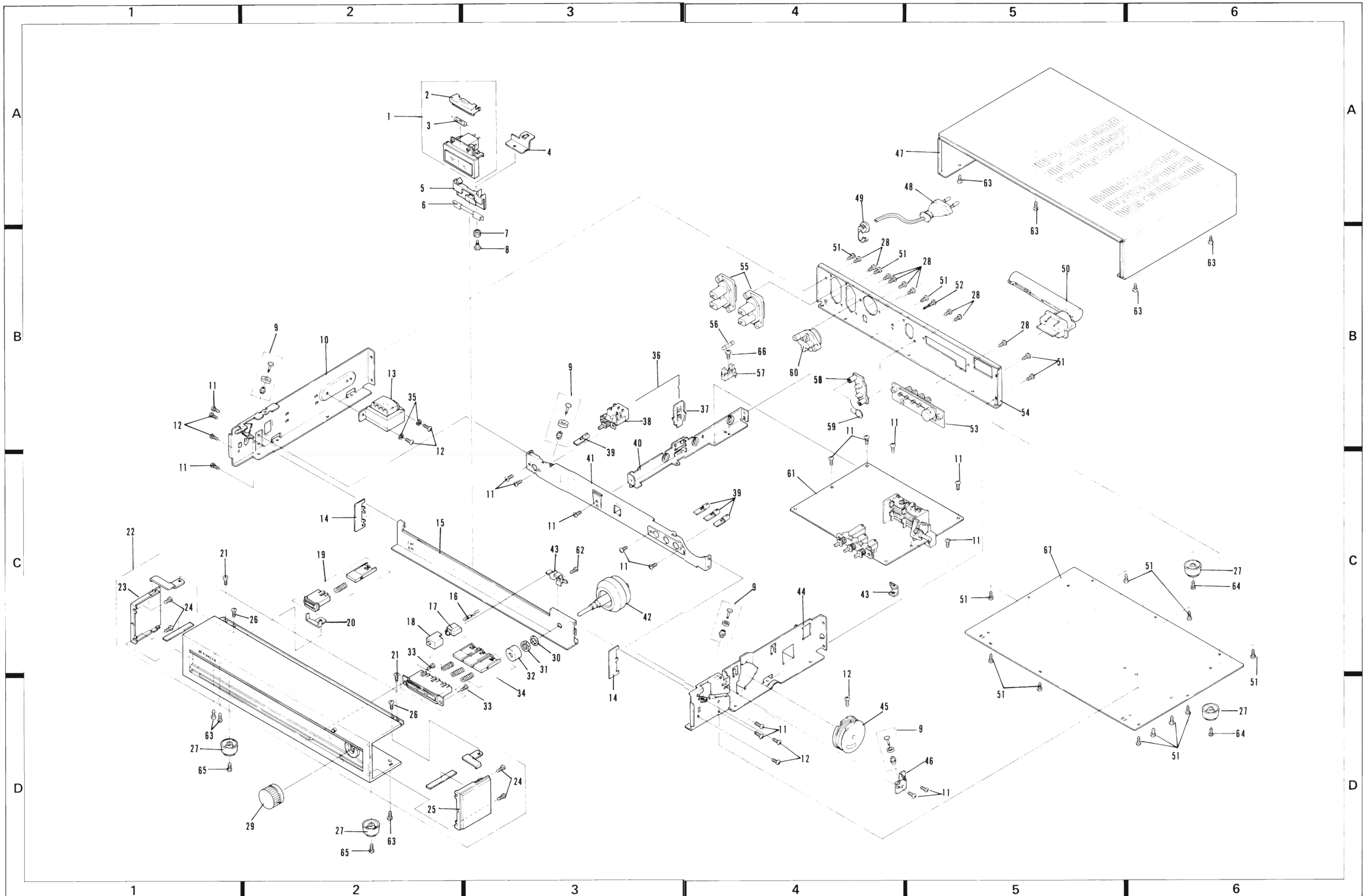
9. EXPLODED VIEW

Parts List

NOTES:

- Parts without part number cannot be supplied.
- The  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.

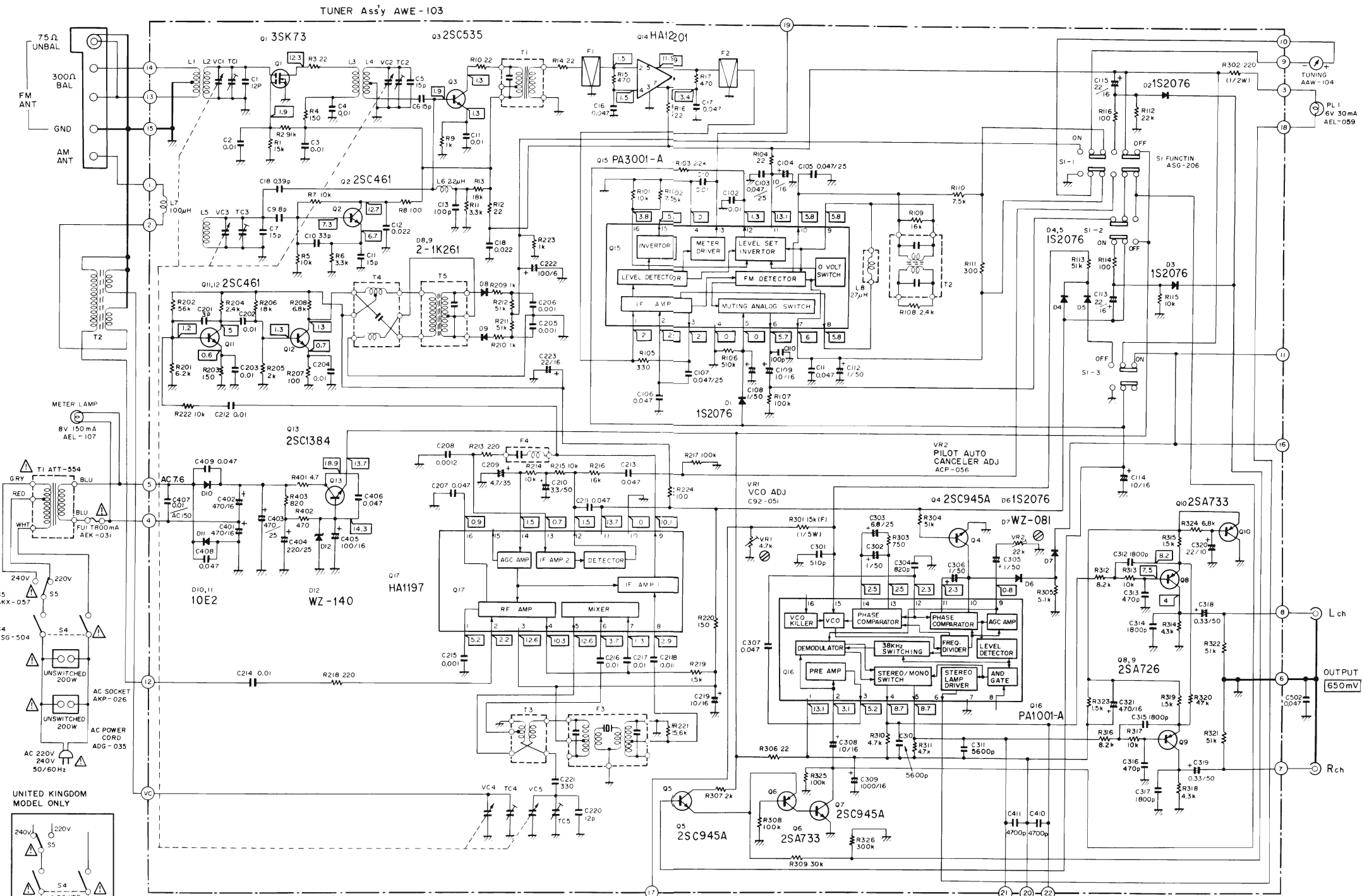
Key No.	Part No.	Description	Key No.	Part No.	Description
1.	AAW-104	Tuning meter	46.		Angle
2.		Lamp cover	47.	ANE-194	Top cover
3.	AEL-107	Meter lamp	 48.	ADG-035	AC power cord
4.		Angle	49.	AEC-327	Strain relief
5.		Slider	50.	ATB-615	Bar antenna
6.		Smoother	51.	ABA-002	Screw 3x8
7.		Pulley	52.	ABA-115	Screw 3x10
8.	ANL-005	Pulley shaft	53.	AKA-007	Terminal (ANTENNA)
9.		Pulley assembly	54.		Rear panel
10.		Frame	 55.	AKP-026	AC socket (OUTLETS)
11.	ABA-048	Screw 3x6	 56.	AEK-031	Fuse 0.8A
12.	ABA-066	Screw 3x8	57.		Fuse holder
 13.	ATT-554	Power transformer	58.	AKB-056	Terminal (OUTPUT)
14.		Plate	59.	CKDYF 473Z 50	Ceramic capacitor
15.		Dial scale	 60.	AKX-057	Voltage selector
16.	AEL-059	Lamp with wire	61.	AWE-103	Tuner assembly
17.		Lamp holder	62.	ABA-049	Screw 3x8
18.		Cover	63.	ABA-056	Screw 3x6
19.	AAD-147	Push knob assembly	64.	ABA-059	Screw 3x15
20.		Angle	65.	ABA-181	Screw 3x10
21.	ABA-203	Screw 3x6	66.	ABA-047	Screw 2.6x8
22.	ANB-694	Front panel assembly	67.		Bottom plate
23.	AEC-451	Side panel (L)			
24.	ABA-202	Screw 2.6x6			
25.	AEC-452	Side panel (R)			
26.	ABA-042	Screw 3x6			
27.	AEC-351	Foot assembly			
28.	ABA-082	Screw 3x10			
29.	AAA-049	Knob (TUNING)			
30.	M45-086	Washer M9			
31.	B71-004	Nut M9			
32.		Shaft cover			
33.	ABA-202	Screw 2.6x6			
34.	AAD-146	Push knob assembly			
35.	ABE-045	Spring washer			
36.		Hanger			
37.		Holder			
 38.	ASG-504	Push switch (POWER)			
39.		Joint			
40.		Frame			
41.		Frame			
42.	AXA-197	Dial shaft assembly			
43.		Angle			
44.		Frame			
45.		Tuning drum assembly			



10. SCHEMATIC DIAGRAM, P.C. BOARD CONNECTION DIAGRAM AND PARTS LIST

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

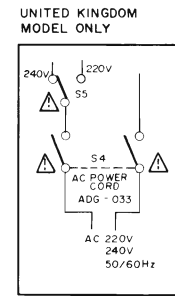
10.1 SCHEMATIC DIAGRAM



- SWITCHES**
- S1 FUNCTION ON - OFF
 - S1-1 AM ON - OFF
 - S1-2 FM ON - OFF
 - S1-3 FM MUTING ON - OFF/MONO
 - S4 POWER ON - OFF
 - S5 LINE VOLTAGE SELECTOR 220V - 240V
- The underlined indicates the switch position

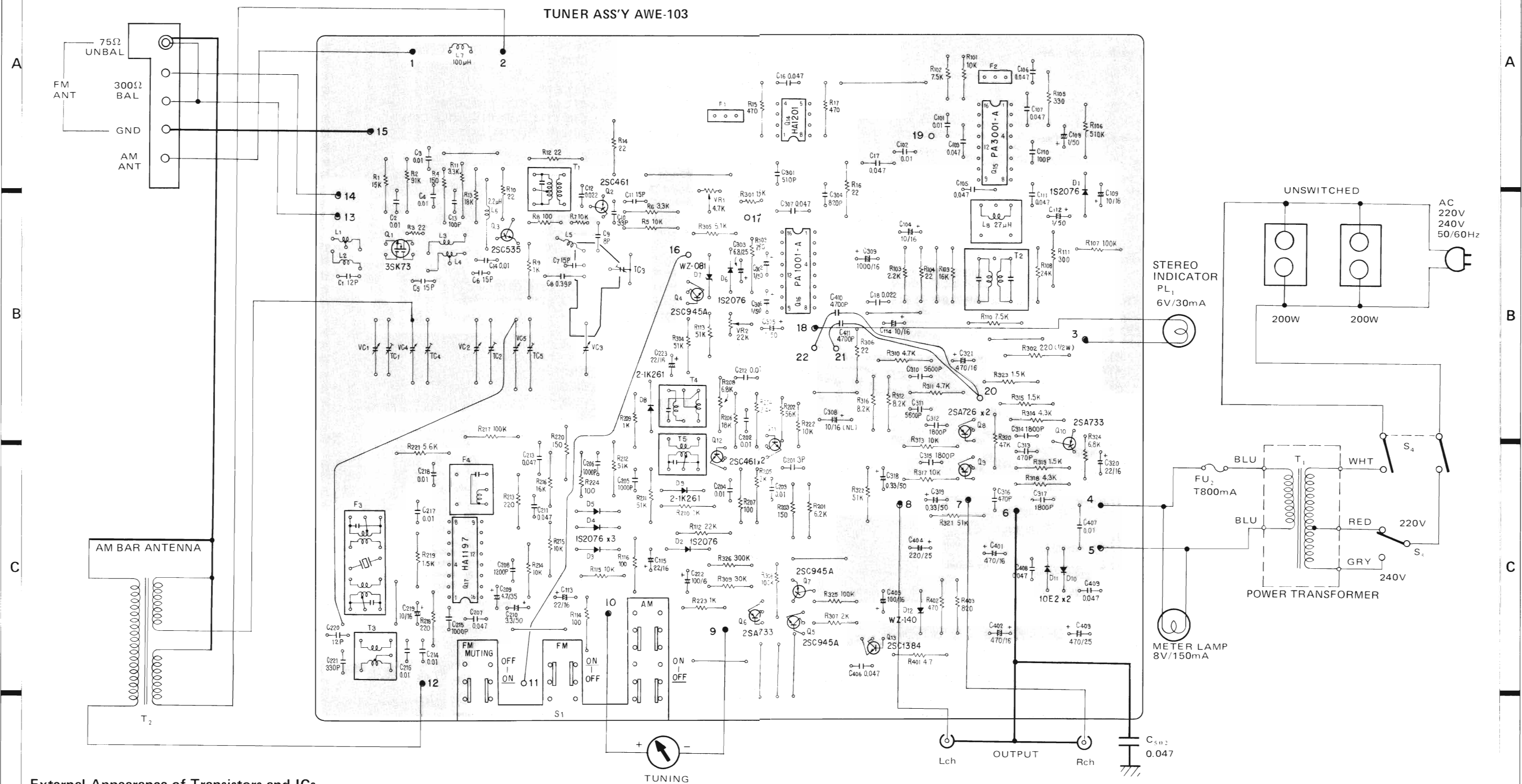
- 1 RESISTORS;**
Indicated in Ω , 1/4W, $\pm 5\%$ tolerance unless otherwise noted
k; k Ω ; M; M Ω (F); 1%; (G); 2%; (K); $\pm 10\%$ tolerance
- 2 CAPACITORS;**
Indicated in capacity (μ F) voltage (V) unless otherwise noted p,pF
Indication without voltage is 50V, except electrolytic capacitor.
- 3 VOLTAGE**
DC Voltage (V) at no input signal
mv Signal voltage at FM 400Hz 75kHz DEV

- 4 OTHERS;**
⊗ adjusting point.
The Δ 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.
- This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

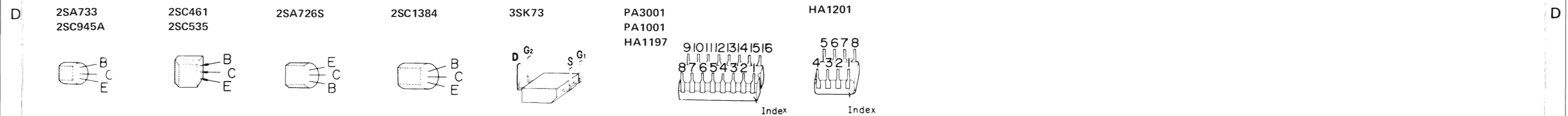


10.2 P.C. BOARD CONNECTION DIAGRAM

TUNER ASS'Y AWE-103



External Appearance of Transistors and ICs



10.3 PARTS LIST

NOTE:

- When ordering resistors, first convert resistance values into code forms 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%).

560Ω 56 × 10¹ 561 RD¼PS 561 J
 47kΩ 47 × 10³ 473 RD¼PS 473 J
 0.5Ω 0R5 RN2H 0R5 K
 1Ω 010 RSIP 010 K

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

5.62kΩ 562 × 10¹ 5621 RN¼SR 5621 F

- The Δ 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.

Miscellaneous Parts

Part No.	Symbol & Description
Δ ATT-554	T1 Power transformer
ATB-615	T2 Bar antenna
AEL-059	PL1 Lamp with wire
Δ AEK-031	FU1 Fuse 0.8A
Δ ASG-504	S4 Push switch (POWER)
Δ AKX-057	S5 Voltage selector
CKDYF 473Z 50	C502
AWE-103	Tuner assembly
AKA-007	Terminal (ANTENNA)
AKB-056	Terminal (OUTPUT)
Δ AKP-026	AC socket
Δ ADG-035	AC power cord

Tuner Assembly (AWE-103)

TRANSFORMERS, COILS AND FILTERS

Part No.	Symbol & Description
ATE-039	T1 FM IF transformer
ATE-040	T2 FM detector transformer
ATB-063	T3 AM OSC transformer
ATB-061	T4 AM detector transformer
ATB-062	T5 AM detector transformer
T24-028	L6 RF choke coil
ATH-022	L8 Choke coil
ATF-053	F1, F2 FM ceramic filter
ATF-061	F3 AM ceramic filter
ATF-038	F4 AM 455kHz filter

OTHERS

Part No.	Description
ABA-048	Screw 3x6
ABA-025	Screw 3x4

CAPACITORS

Part No.	Symbol & Description
ACK-027	VC Tuning
ACM-006	TC Trimmer
CCDUJ 120J 50	C1
CKDYF 103Z 50	C2-C4, C14, C101, C102, C202-C204, C212, C214, C216-C218
CCDUJ 150J 50	C5
CCDLH 150J 50	C7
CCDCH 150J 50	C11
CCDCH 330J 50	C10
CCDSL 101J 50	C13, C110
CKDYB 471K 50	C313, C316
CKDYB 821K 50	C304
CKDYB 102K 50	C205, C206, C215

Part No.	Symbol & Description
CKDYB 122K 50	C208
CCDSL 150J 50	C6
CCDSL 030C 50	C201
CCDTH 080D 50	C9
CCDXL 120J 50	C220
CKDYF 223Z 50	C12, C18
CKDBC 473Z 25	C17, C103, C105, C106, C107
CKDBC 473Z 50	C16, C111, C207, C211, C408, C409
CQMA 182K 50	C312, C315, C314, C317
CQMA 562J 50	C310, C311
CQMA 473K 50	C213, C307, C406
CQSH 331J 50	C221
CQSH 511J 50	C301
CEA 010P 50	C108, C112, C305
CEA 3R3P 50	C210
CEA 4R7P 35	C209
CEA 100P 16	C104, C114, C219
CEA 220P 16	C113, C115, C223, C320
CEA 101P 16	C405
CEA 221P 25	C404
CEA 471P 16	C321, C401, C402
CEA 471P 25	C403
CEA 102P 16	C309
CEA 101P 6	C222
CQMA 472J 50	C410, C411
CEANL R33M 50	C318, C319
CEANL 100M 16	C109, C308
CEANL 010M 50	C302, C306
CEANL 6R8M 25	C303
CGB R39K 500	C8
ACG-004	C407

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

RESISTORS

Part No.	Symbol & Description
C92-051	VR1 Semifixed
ACP-056	VR2 Semifixed
RD $\frac{1}{4}$ PS □□□ J	R1, R2, R4-R6, R9-R17, R103-R106,
RD $\frac{1}{4}$ PS □□□ J	R108-R112, R114, R201
RD $\frac{1}{4}$ PS □□□ J	R203-R221, R303, R306, R308,
RD $\frac{1}{4}$ PS □□□ J	R310-R323, R401-R403
RD $\frac{1}{4}$ VS □□□ J	R3, R7, R8
RD $\frac{1}{4}$ PM □□□ J	R101, R102, R107, R113, R115, R202,
RD $\frac{1}{4}$ PM □□□ J	R222-R224, R305
RD $\frac{1}{4}$ PM □□□ J	R307, R309, R324-R326
RN $\frac{1}{5}$ SQ □□□□ F	R301
RD $\frac{1}{2}$ PS □□□ J	R302

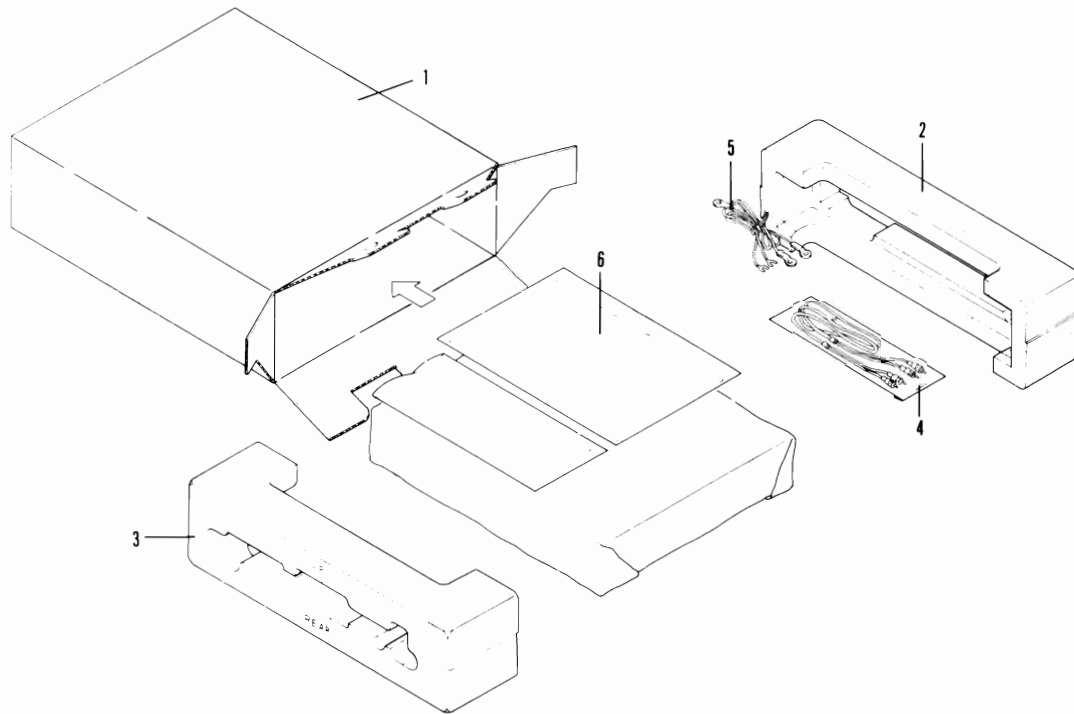
SEMICONDUCTORS

Part No.	Symbol & Description
3SK73	Q1
2SC461	Q2, Q11, Q12
2SC535	Q3
2SC945A (2SC1914A)	Q4, Q5, Q7
2SA733 (2SA904)	Q6, Q10
2SC1384	Q13
HA1201	Q14
PA3001-A	Q15
2SA726S	Q8, Q9
PA1001-A	Q16
HA1197	Q17
1S2076 (1S2473) (1S1555)	D1-D6
WZ-081 (MZ-081)	D7
2-1K261 10E2 (SIB01-02)	D8, D9 D10, D11
WZ-140 (MZ-140)	D12

SWITCH

Part No.	Symbol & Description
ASG-206	S1 Push

11. PACKING



Key No.	Part No.	Description
1.	AHD-670	Packing case
2.	AHA-223	Front pad
3.	AHA-224	Rear pad
4.	ADE-005	Connection cord
5.	ADH-002	FM antenna
6.	ARB-304	Operating instructions (English)
	ARD-129	Operating instructions (German/French)

12. SUPPLEMENTS FOR HB TYPE

Model TX-3000 HB is the same as TX-3000/HE with exception of description in this supplements.

Contrast of Miscellaneous Parts

Symbol	Description	Part No.		Remarks
		HE type	HB type	
	AC socket (AC OUTLETS)	AKP-026	
	AC power cord	ADG-035	ADG-033	
	Operating instructions (German/French)	ARD-129	

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