Service Manual

AM/FM STEREO TUNER

TX-9800

PIONEER®

MODEL TX-9800 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	120V	U.S.A. model
S	110V, 120V, 220V and 240V (Switchable)	General export model
S/G	110V, 120V, 220V and 240V (Switchable)	U.S. Military model
HG	220V and 240V (Switchable)	Europe or Oceania model

- **Although the basic features of KU, S, S/G and HG types are the same. The major difference is in appearance, KU, and S/G types being fitted with wooden case, while S and HG types employ metal cover.**
- **This service manual is applicable to the KU type. When repairing the S and S/G types, please see the additional in this service manual (p37 – p43). When repairing the HG type, please see the additional service manual (ART-347-0).**

CONTENTS

1. SPECIFICATIONS

Semiconductors

ICs 11
FETs 11
Transistors 30
Diodes 50

FM Section

Usable Sensitivity	MONO:	8.8dBf (1.5μV)	
50dB Quieting Sensitivity . . .	MONO:	13.2dBf (2.5μV)	
	STEREO:	36.1dBf (35μV)	
Signal-to-Noise Ratio			
at 85dBf	MONO:	83dB	
	STEREO:	80dB	
Distortion at 85dBf	MONO:	100Hz	0.05%
		1kHz	0.04%
		10kHz	0.06%
	STEREO:	100Hz	0.1%
		1kHz	0.07%
		10kHz	0.2%
		WIDE	NARROW
Capture Ratio		0.8dB	2.0dB
Alternate Channel Selectivity		30dB	85dB
Stereo Separation	1kHz:	55dB	
	20Hz to 10kHz:	40dB	
Frequency Response	20Hz to 10kHz ±0.2dB		
	20Hz to 15kHz $^{+0.2}_{-0.5}$ dB		
Spurious Response Ratio . .	110dB		
Image Response Ratio	120dB		
IF Response Ratio	110dB		
AM Suppression Ratio	65dB		
Subcarrier Product Ratio . .	70dB		
Muting Threshold	19.2dBf(5μV)		
De-Emphasis Switch			
(Switchable)	25μs~75μs		
Antenna Input	300ohms balanced		
	75ohms unbalanced		

AM Section

Sensitivity	
IHF, ferrite antenna. . . .	300μV/m
IHF, external antenna . .	15μV
Selectivity	WIDE; 20dB
	NARROW; 50dB
Signal-to-Noise Ratio	55dB
Image Response Ratio	70dB
IF Response Ratio	65dB
Antenna	Ferrite Loopstick Antenna

Audio Section

Output (Level/Impedance)	
FM (100% MOD.)	FIXED: 650mV/4.2kΩ
	VARIABLE: 50mV to 1.3V/3.6kΩ
AM (30% MOD.)	FIXED· 200mV/4.2kΩ
	VARIABLE: 15mV to 400mV/3.6kΩ
Multipath	
V (Vertical)	300mV/10kΩ (AM 1kHz 30% MOD)
H (Horizontal)	400mV/7kΩ (FM 1kHz 100% MOD)

Miscellaneous

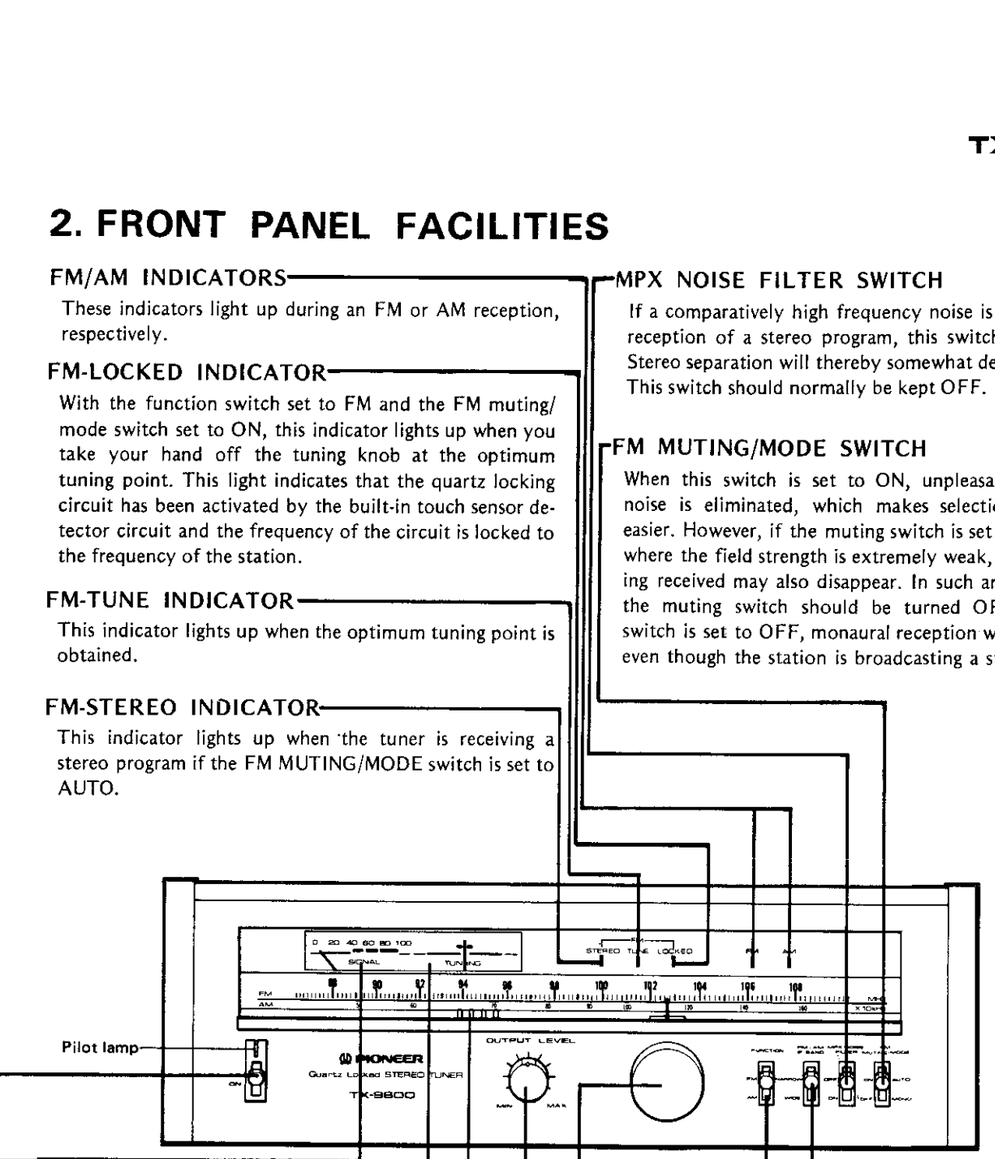
Power Requirements	120V 60Hz only.
Power Consumption	28W
Dimensions	453(W) x 155(H) x 390(D) mm
	17-11/16 x 6-1/8 x 15-3/8in
Weight	Without Package: 9.3kg (20lb 8oz)
	With Package: 10.7kg (23lb 9oz)

Furnished Parts

FM T-type antenna 1
Connection 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



FM/AM INDICATORS

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

FM-LOCKED INDICATOR

With the function switch set to FM and the FM muting/mode switch set to ON, this indicator lights up when you take your hand off the tuning knob at the optimum tuning point. This light indicates that the quartz locking circuit has been activated by the built-in touch sensor detector circuit and the frequency of the circuit is locked to the frequency of the station.

FM-TUNE INDICATOR

This indicator lights up when the optimum tuning point is obtained.

FM-STEREO INDICATOR

This indicator lights up when the tuner is receiving a stereo program if the FM MUTING/MODE switch is set to AUTO.

MPX NOISE FILTER SWITCH

If a comparatively high frequency noise is noticed during reception of a stereo program, this switch is set to ON. Stereo separation will thereby somewhat deteriorate. This switch should normally be kept OFF.

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. When this switch is set to OFF, monaural reception will be obtained even though the station is broadcasting a stereo program.

POWER SWITCH

Set to ON position to turn on power. Pilot lamp will light up.

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.

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.

MEMORY MARKERS

Convenient for designating most often tuned in stations. Slide markers with fingertip to desired positions.

OUTPUT LEVEL KNOB

This knob is used to adjust the output level of the variable output jacks. When it is rotated in the direction of MAX, the output level is increased.

TUNING KNOB

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

FUNCTION SWITCH

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

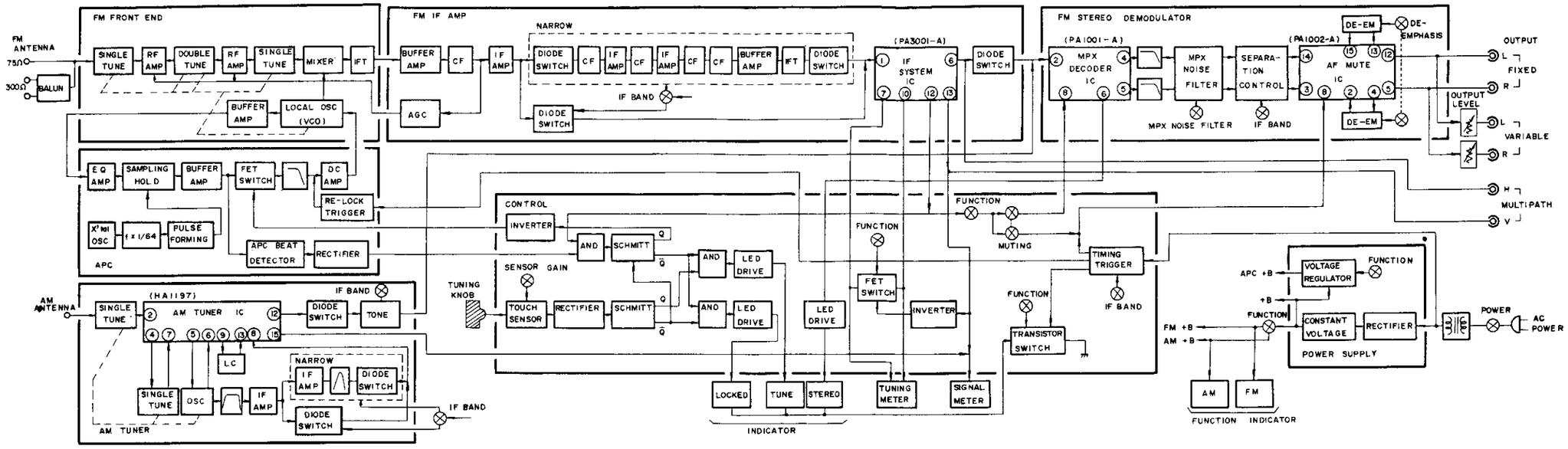
FM . . . . For reception of FM broadcasting
AM . . . . For reception of AM broadcasting

FM-AM IF BAND SWITCH

FM and AM IF (intermediate frequency) passband can be set to for wide or narrow.
This switch is used to select between NARROW (narrow band) and WIDE (wide band). In this way, it is possible to change over the pass bandwidth of the intermediate frequency signals.

NARROW . . . When tuning in the desired station, and if adjacent station interference is a problem at the WIDE setting, set switch to this position.
WIDE . . . . . Set the switch to this position after the desired station was received without adjacent station interference.

3. BLOCK DIAGRAM



4. CIRCUIT DESCRIPTIONS

4.1 SIGNAL CIRCUIT

FM Front-end

The FM front-end of this set uses a precision frequency-linear type 5-ganged tuning capacitor. The circuit is shown in Fig. 4-1. The antenna input is made an unbalanced (75Ω) by an M-coupled single-tuned circuit. The RF stage uses two dual-gate MOS FETs (Q_1, Q_2) having superior high-frequency characteristics. The interstage tuning circuits are C-coupled double-tuned for improved reception. The phase characteristic, spurious interference ratio, and IF interference ratio are especially good. A dual-gate MOS FET (Q_3) is also used at the mixer stage. The received signal is applied to gate 1 and the local oscillator signal is input at gate 2. The converted output (10.7MHz) is taken from the drain and applied to the IF amplifier thru an IFT. The local oscillator (Q_4) is modified Clapp circuit. Its output is fed to the mixer.

D_1 of the local oscillator is a vari-cap diode that forms part of the tuning capacitance. A vari-cap diode is an element whose capacitance can be controlled by means of the impressed voltage, and is designed to control the voltage relative to local oscillator frequency deviation to within ±100kHz. This control voltage is obtained from an APC (Automatic Phase Control) circuit. (See the description of the APC circuit on page 7.)

IF Amplifier

This tuner employs a dual IF amplifier consisting of a wide band IF amplifier designed for high separation, low distortion reproduction, and a narrow band IF amplifier used for rejection of interference signals (Fig. 4-2).

The wide band IF amplifier has been designed with the minimum number of frequency selective elements, with emphasis being placed on linear phase characteristics. The narrow band IF amplifier on the other band, has been designed with emphasis on selectivity. When the selector switch is in the wide position, the signal path is FM front-end → Q_8 → F_1 → Q_9 → T_2 → D_5, D_6 → PA3001-A, while in the narrow position it is FM front-end → Q_8 → F_1 → Q_9 → T_2 → D_4 → narrow IF amp. D_7 → PA3001-A. The changeover between wide and narrow is performed of diode switches (D_4 to D_7). When the selector switch is in the wide position, D_5 and D_6 are biased in the forward direction and D_4 and D_7 are biased in the reverse direction, thus bypassing the narrow IF amplifier. When the selector switch is in the narrow position, D_4 and D_7 are forward biased and D_5 and D_6 are reverse biased.

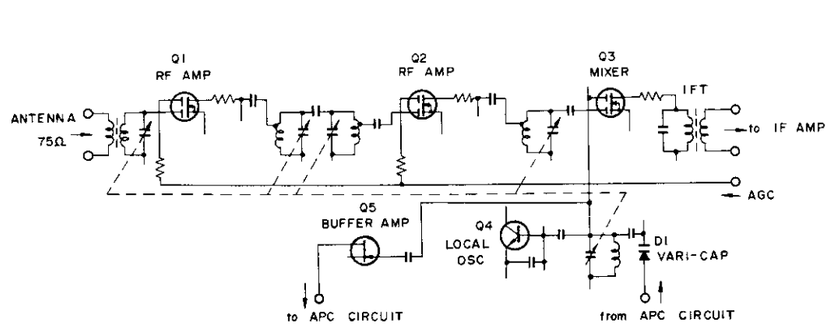


Fig. 4-1 FM front-end

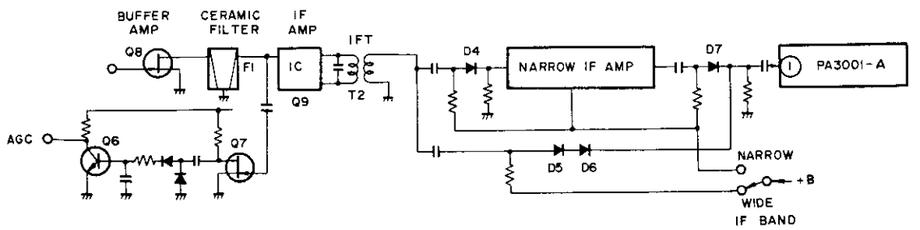


Fig. 4-2 FM IF amplifier

Multiplex Decoder

An IC (PA1001-A) developed by Pioneer is used in the stereo demodulation circuit. PA1001-A contains a PLL system VCO (Voltage Controlled Oscillator), NFB demodulator, automatic pilot conceller, and stereo/mono automatic switch. The NFB demodulator and automatic pilot canceller are special features of this IC. The NFB demodulator suppresses distortion caused by the non-linearity of the demodulation circuit. The automatic pilot canceller cancels the pilot signal (19kHz) in the stereo demodulation signal. This circuit cancels the pilot signal (19kHz) in the stereo demodulated signal by applying the 19kHz from the VCO synchronized with the pilot signal (19kHz) in the composite signal to the stereo demodulated signal thru an AGC amp. Moreover, since the cancel signal level tracks the input pilot signal level by means of the AGC amp., the rejection ratio remains the same even with changes in input pilot signal level.

Output Amplifier

An AF MUTE IC (PA1002-A) is employed in the final stage of the tuner. This IC contains two AF amplifiers for L and R channels, together with a muting gate circuit. These AF amplifiers employ time constant NFB to provide de-emphasis characteristics. The muting gate circuit is electrically connected to the signal circuit when a DC voltage is applied to pin no.8 of the PA1002-A (Refer to muting control in page 10).

4.2 APC CIRCUIT

The APC circuit stablizes the receiving state by suppressing changes in the FM front-end local oscillator frequency.

This circuit is a PLL circuit that controls the frequency of the local oscillator (VCO; Voltage Controlled Oscillator) by comparing the phase of a reference frequency produced by a crystal oscillator and the phase of the local oscillator frequency, and then using the DC voltage corresponding to their phase difference to control the local oscillator. The capture range (range over which circuit is locked) of this APC is approximately ±12kHz, and its lock range (range which can be controlled by APC) is ±75kHz. Fig. 4-3 is the block diagram of this circuit.

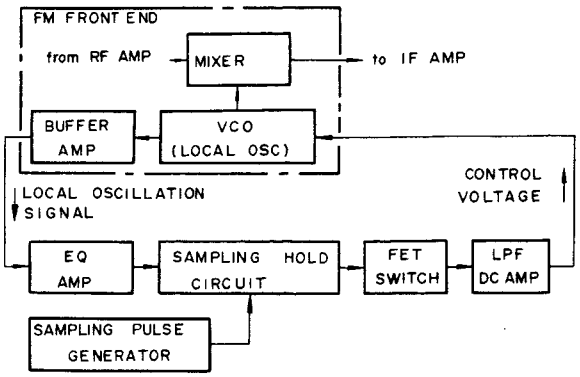


Fig. 4-3 Block diagram of APC circuit

Sampling Pulse Generator

This circuit uses 3 digital ICs and one crystal (Fig. 4-4). The crystal and two NAND gates on M5S003P from an oscillator circuit that oscillates at the reference frequency (6.4MHz).

This reference frequency is converted to a 100kHz square wave by dividing it by four with M53273P and then dividing it by sixteen with M53293P. This 100kHz square wave is applied to two NAND gates on M5S003P and shaped to a 100kHz sampling pulse (Fig. 4-5). This sampling pulse is then applied to the sampling hold circuit.

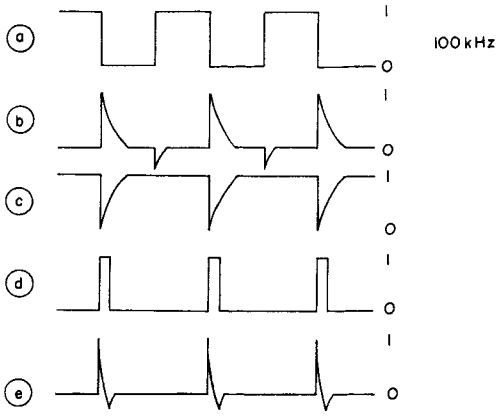


Fig. 4-4

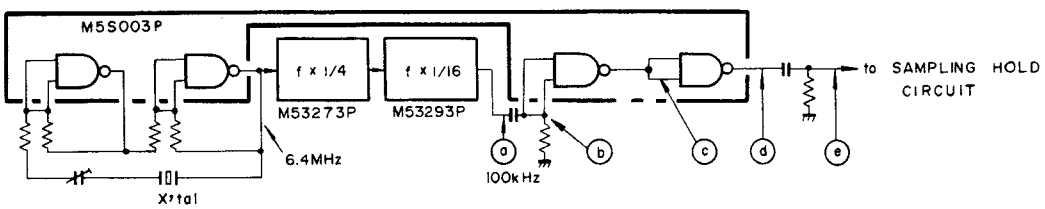


Fig. 4-5 Sampling pulse generator

Sampling Hold Circuit

The sampling hold circuit compares the phases of the local oscillation frequency and sampling pulse, and generates a voltage corresponding to their phase difference (Fig. 4-6). When the sampling pulse is applied to the base of Q_3, Q_3 is turned on, and current flows thru Q_2. When the pulse is removed, Q_3 is turned off, and a flyback pulse is generated at the base of Q_2 at this instant by the inductance component of the circuit. C_5 is charged by this flyback pulse and Q_2 is then turned off. When the next sampling pulse is applied, the charge across C_5 is discharged thru Q_3 and C_5 is recharged by the flyback pulse generated at the base of Q_3 at this time. The voltage waveforms of each part are shown in Fig. 4-7. This becomes as shown in Fig. 4-8 when the local oscillation frequency is applied to the base of Q_2.

Fig. 4-8a is the waveform when the sampling pulse and local oscillation frequency are in phase, and Fig. 4-8b is the composite waveform when there is a phase difference. Therefore, a voltage corresponding to the phase difference between the sampling pulse and local oscillation frequency is hold. The C_5 hold voltage waveform is shown in Fig. 4-9.

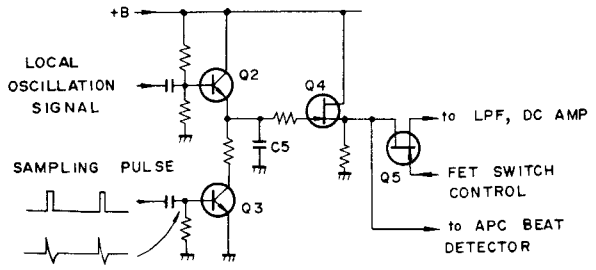


Fig. 4-6 Sampling hold circuit

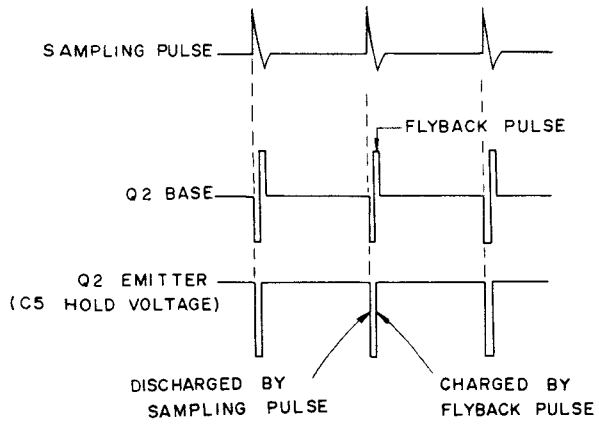


Fig. 4-7 Voltage waveforms

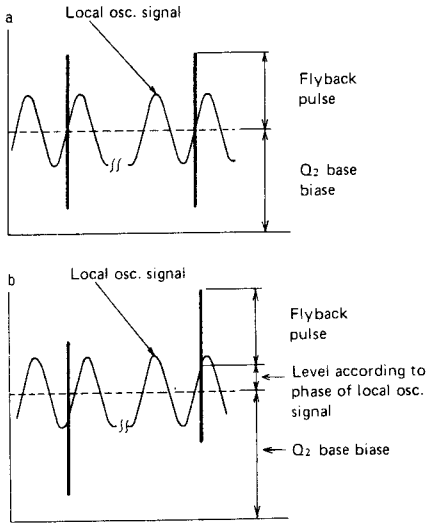


Fig. 4-8 Q_2 base waveforms

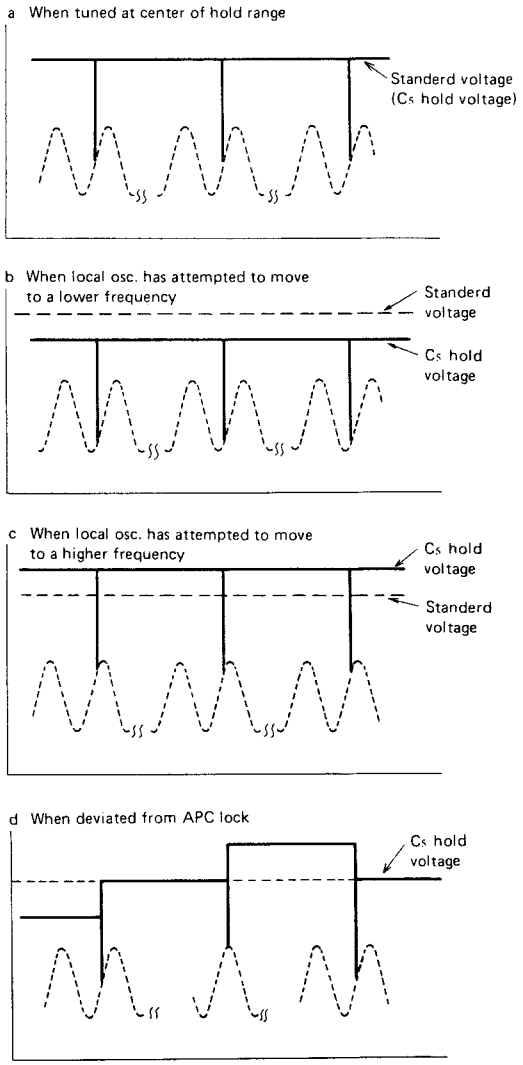


Fig. 4-9 C_5 hold voltage waveforms

4.2 CONTROL CIRCUIT

NOTE:
The control circuit is operated digitally. Consequently, voltage changes are represented by "H" (high level voltage) and "L" (low level voltage) in the description.

APC Operation Control

The FET switch (Q_5) in the APC circuit is turned off when the tuning knob is touched. During this time, a reference voltage (+8V) is applied to the variable capacitance diode in the FM front-end local oscillator to permit station tuning operations with the APC turned off.

When an input signal whose antenna input level is at least 20dBf (5.5μV) is tuned, the TUNE indicator LED is turned on. And when the tuning knob is then released, the FET switch (Q_5) is turned on, thereby completing the APC circuit loop to "lock" the local oscillator frequency. The TUNE indicator LED subsequently turns off, and the LOCKED indicator LED turns on instead. These operations are all controlled by the touch sensor, APC beat detector, and the output from pin no.12 of the IF system IC (PA3001-A). (See Fig. 4-10).

When the tuning knob is touched by hand, noise voltage induced by the human body is detected and amplified by the touch sensor. The sensor output is then rectified and employed as the Schmitt A control voltage. When an APC beat signal of at least 7kHz appears at the output of the sampling hold circuit, it is detected, and then amplified by the APC beat detector. (APC beat signals are generated at the sampling hold circuit output if the FM front-end local oscillator fails to remain at an integer multiple of 100kHz. The frequency of this beat signal lies within the DC~50kHz range, and is determined by the phase difference between the sampling pulse and the oscillator frequency). The output of the APC beat detector is rectified, and employed as the Schmitt B control voltage. When a station is tuned away by more than ±65kHz, or if the antenna input level is below 20dBf, a DC voltage appears at pin no.12 of the IF system IC (PA3001-A), this also being used to control Schmitt B.

Consequently, when the antenna input level of the tuned signal exceeds 20dBf, the collector voltage of Q_{32} in Schmitt A will be set to "L", and the collector voltage of Q_{33} set to "H". And with the collector voltage of Q_{38} in Schmitt B at "H", the collector voltage of Q_{37} is also set to "H" (by the Q_{32} collector voltage). The base voltage of Q_{35} is thereby increased, resulting in this transistor being turned on to light up the TUNE indicator. Since Q_{34} remains off because of a low base voltage, the LOCKED indicator does not light up at this time. And since Q_{36} has already been turned on by the collector voltage of Q_{37}, the gate voltage of the APC circuit FET switch (Q_5) will be low, which means this switch will also remain off.

When the tuning knob is then released, the collector voltages of Schmitt A Q_{32} and Q_{33}, and Schmitt B Q_{37} will all be inverted, resulting in Q_{35} (TUNE indicator LED) being turned off, and Q_{34} (LOCKED indicator LED) being turned on. Q_{36} is also turned off to turn the FET switch (Q_5) on.

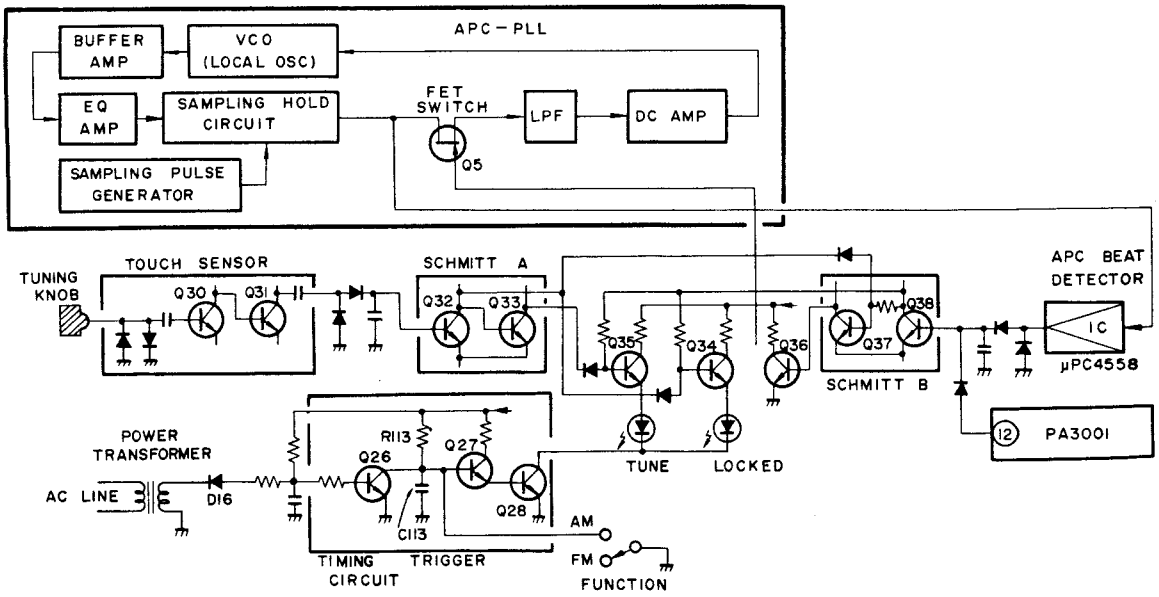


Fig. 4-10 APC operation control circuit

Timing Trigger Circuit

This circuit is designed to delay the lighting up of the indicator LEDs (TUNE, LOCKED, STEREO) when the power is switched on, and to turn them off immediately when the power is switched off again. (See Fig. 4-10).

When the power is switched on, Q_{26} is turned off immediately by a negative voltage applied via D_{16}. The base voltage of Q_{27} is thereby increased gradually, the increase being controlled by the R_{113}/C_{113} time constant. Once the voltage reaches +1.2V (approx.), Q_{27} and Q_{28} are both turned on, thereby turning on all relevant indicator LEDs.

When the power is switched off again, the negative voltage applied via D_{16} is cut immediately, resulting in Q_{26} being turned on. C_{113} therefore discharges directly via Q_{26} to turn Q_{27} and Q_{28} off. All indicator LEDs will consequently turn off immediately. This same result is also achieved when the FUNCTION selector is in the AM position. This is due to the fact that the base of Q_{27} is connected to ground by the FUNCTION selector, thereby turning Q_{27} and Q_{28} off.

Re-lock Trigger Circuit

When the power is switched on, this re-lock trigger circuit activates a sweep of the local oscillator frequency, covering a range of up to 100kHz both sides of the frequency indicated by the dial pointer at the time. If a signal of antenna input level in excess of 20dBf is detected in this range, the frequency is automatically re-locked by the APC circuit. (See Fig. 4-11).

In this case, when the power is switched on Q_{23} is turned off immediately by the negative voltage applied via D_{16}, resulting in the voltage changes at different places describing different curves as shown in Fig. 4-12. The voltage applied to the variable capacitance diode in the local oscillator is represented by curve (e), thereby causing the local oscillator frequency to change, or "sweep" within a limited range. If an input signal whose antenna input level exceeds 20dBf is detected during this sweep, the APC circuit FET switch is turned on,

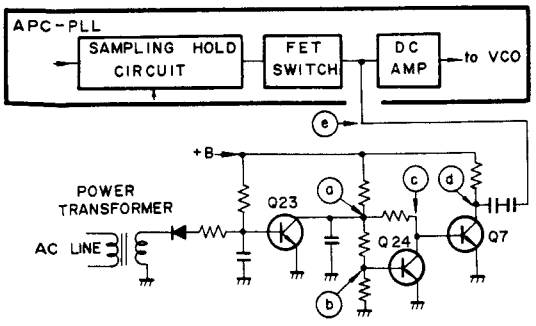


Fig. 4-11 Re-lock trigger circuit

resulting in the frequency of that input signal being locked by the APC circuit.

Muting Control Circuits

This tuner features 3 major muting actions.

(1) Inter-station muting in the FM band and muting of weak FM stations.
(2) Muting of switching noises when FUNCTION selector and IF BAND switch are operated.
(3) Muting when POWER switch is turned on and off.

All muting action is controlled by the muting gate included in the AF MUTE IC (PA1002-A). (See Fig. 4-13).

(1) Inter-station Muting in FM Band

When any FM input signal whose antenna input level is below 20dBf (5.5μV) is received (which also covers the case when no input signal is received), a DC voltage appears at pin no.12 of the IF system IC (PA3001-A). If the MUTING switch has been turned on, this DC voltage is applied to pin no.8 of the AF MUTE IC (PA1002-A) to activate the muting circuit.

(2) Muting of Switching Noises (FUNCTION Selector and IF BAND Switch)

When either the FUNCTION selector or the IF BAND switch is switched to another position, the Q_{29} base potential is dropped momentarily, resulting in Q_{29} being turned on during the same brief moment. During this interval, C_{114} is charged up, the charge then being applied to pin no.8 of PA1002-A. The muting time is thus determined by the C_{114}/R_{115} time constant.

(3) Power Switch Muting

The muting trigger employed when the POWER

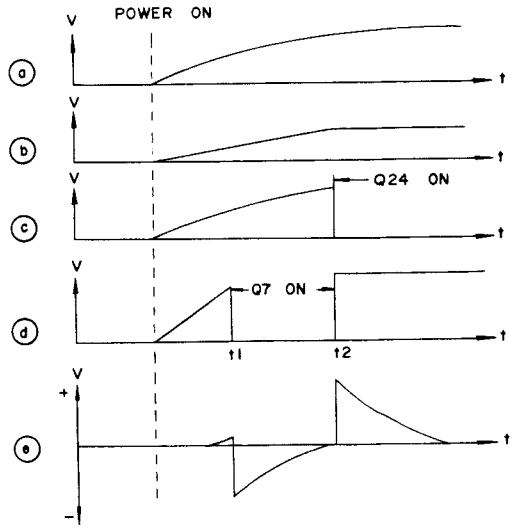


Fig. 4-12 Voltage waveforms

switch is turned on and off is formed by Q_{23} and Q_{25}. When the POWER switch is turned on, Q_{23} is turned off by the negative voltage applied via D_{16}. The consequent voltage changes at points (a) and (b) are shown in Fig. 4-14. The point (b) voltage is applied to pin no.8 of PA1002-A. When the POWER switch is turned off, Q_{23} is turned on due to the immediate cut off of the negative voltage applied via D_{16}. Q_{25} is then turned off as a result of the voltage at point (a) dropping to 0V, thereby generating a muting trigger action at point (b).

4.4 AM TUNER

The AM tuner stage is equipped with a 3-ganged tuning capacitor and an IC (HA1197). The IF amplifier stage includes a "wide IF amplifier" stage (for improved quality of sound) and a "narrow IF amplifier" stage (for better selectivity). (See Fig. 4-15).

The WIDE and NARROW positions are switched by switching the bias of D_{14} and D_{15}, thereby altering the signal path. In the NARROW position, D_{15} is turned on, resulting in the inverse biasing of D_{14}, and the IF signal being passed via F_9 (narrow band-pass filter). In the WIDE position, the D_{15} bias is removed, resulting in D_{14} being biased in the forward direction, and the IF signal being bypassed via D_{14}.

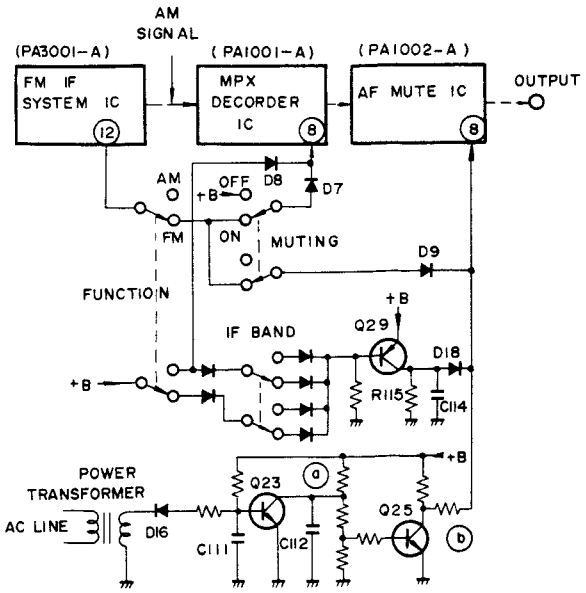


Fig. 4-13 Muting control circuit

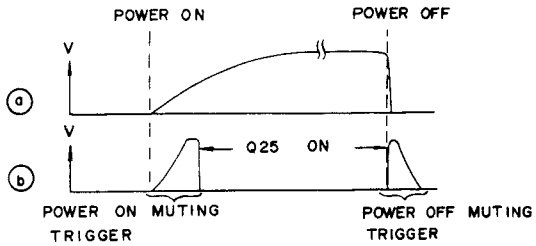


Fig. 4-14 Voltage waveforms

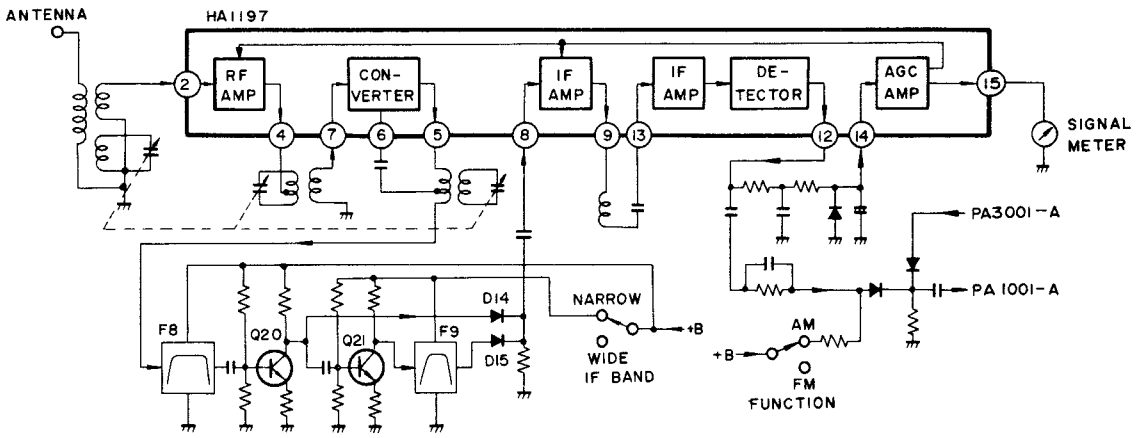


Fig. 4-15 AM tuner

5. DISASSEMBLY

Wooden Case

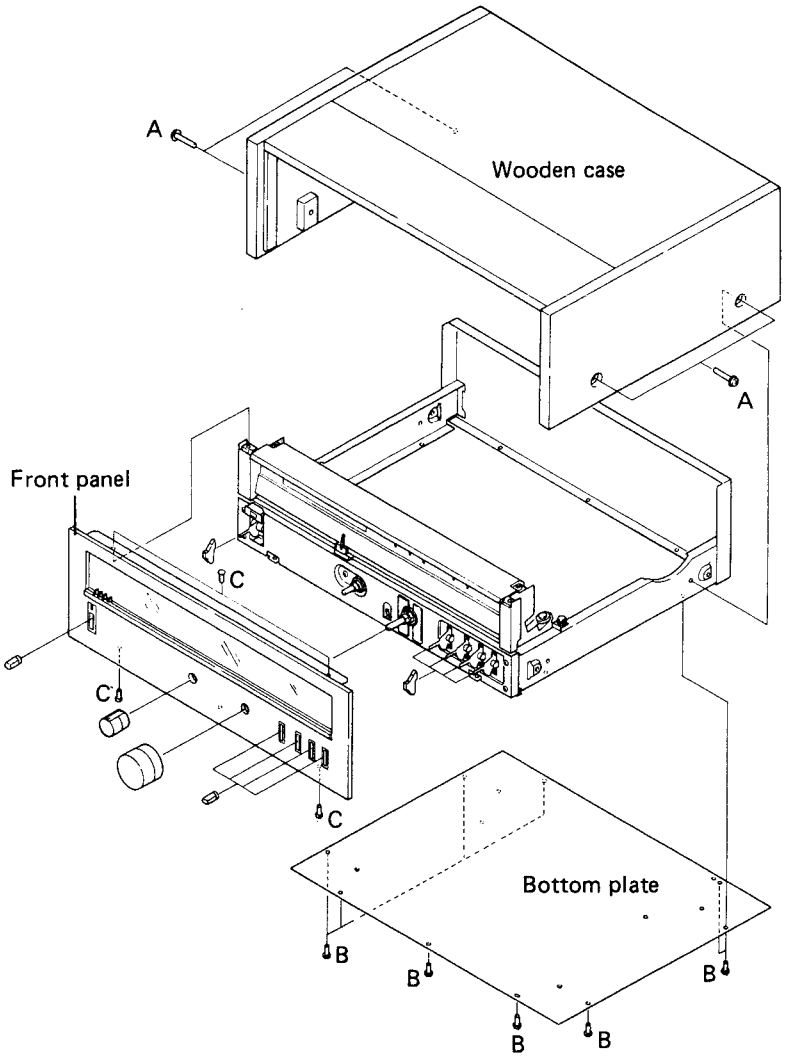
Remove the two screws (A) on each side of the wooden case.

Bottom Plate

Remove the eight screws (B) to detach the bottom plate.

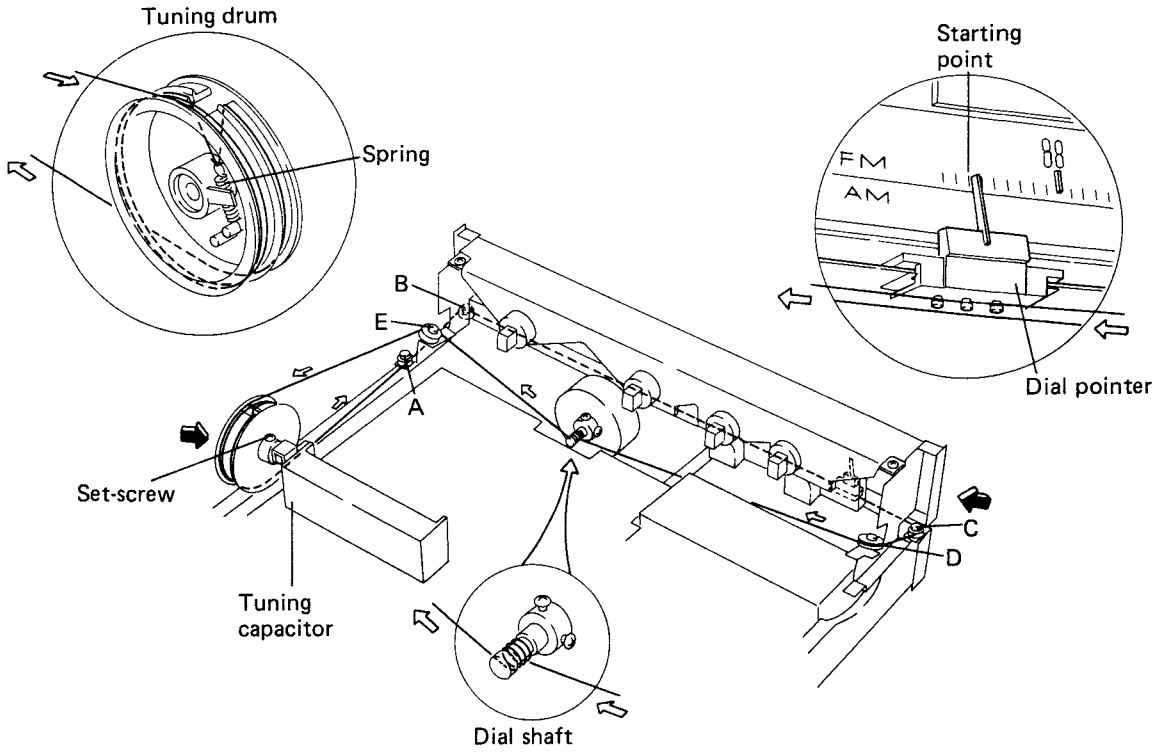
Front Panel

Remove the all control knobs. Remove the five screws (C) from the front panel.



6. DIAL CORD STRINGING

1. Remove the wooden case and front panel as described in the "Disassembly" section on page 12.
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.
4. Tie on end of the dial cord to the spring.
5. Pass the cord through the cutout section in the tuning drum. Wind it half around the tuning drum, and then take it over pulleys A, B, C and D in that sequence.
6. Wind the cord around the dial shaft 3 times. Pass it over puelly E, wind it around the tuning drum 2 times, and finally tie it to the spring so that it is tensioned.
7. Turn the dial shaft and check that the cord moves smoothly. Cut off any excess cord.
8. Turn the dial shaft counter clockwise as far as it will go.
9. Align the dial pointer with the starting point of the dial scale (third division from the left), and then pass the cord over it.
10. Check that the dial pointer is in line with the starting point of the dial scale.
11. Finally apply the locking paint to the cord securing positions (tuning drum projection and spring) and the dial pointer connection.



7. ADJUSTMENTS

7.1 AM TUNER

1. Turn the FUNCTION switch to the AM position and IF BAND switch to the NARROW position.
2. Set up the test equipment as shown in Fig. 7-1.
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 the dial frequency of the TX-9800 to 600kHz.
5. Adjust the core of T_6 (OSC), T_5, F_{10} and Bar antenna to obtain a maximum reading on the SIGNAL meter.
6. Set the AM SG output frequency and the dial frequency of the TX-9800 to 1400kHz.
7. Adjust the TC_8 (OSC), TC_6, TC_7 to obtain a maximum reading on the SIGNAL meter.
8. Repeat steps 4 to 7 above until no further changes occur in the SIGNAL meter readings at the 600kHz and 1400kHz position.
9. Set the AM SG output frequency and the dial frequency of the TX-9800 to 1000kHz.
10. Turn the IF BAND switch to the WIDE position.
11. Adjust the AM SG output level to obtain half scale reading on the SIGNAL meter.
12. Turn the IF BAND switch to the NARROW position.
13. Adjust the VR_8 to obtain half scale reading on the SIGNAL meter.

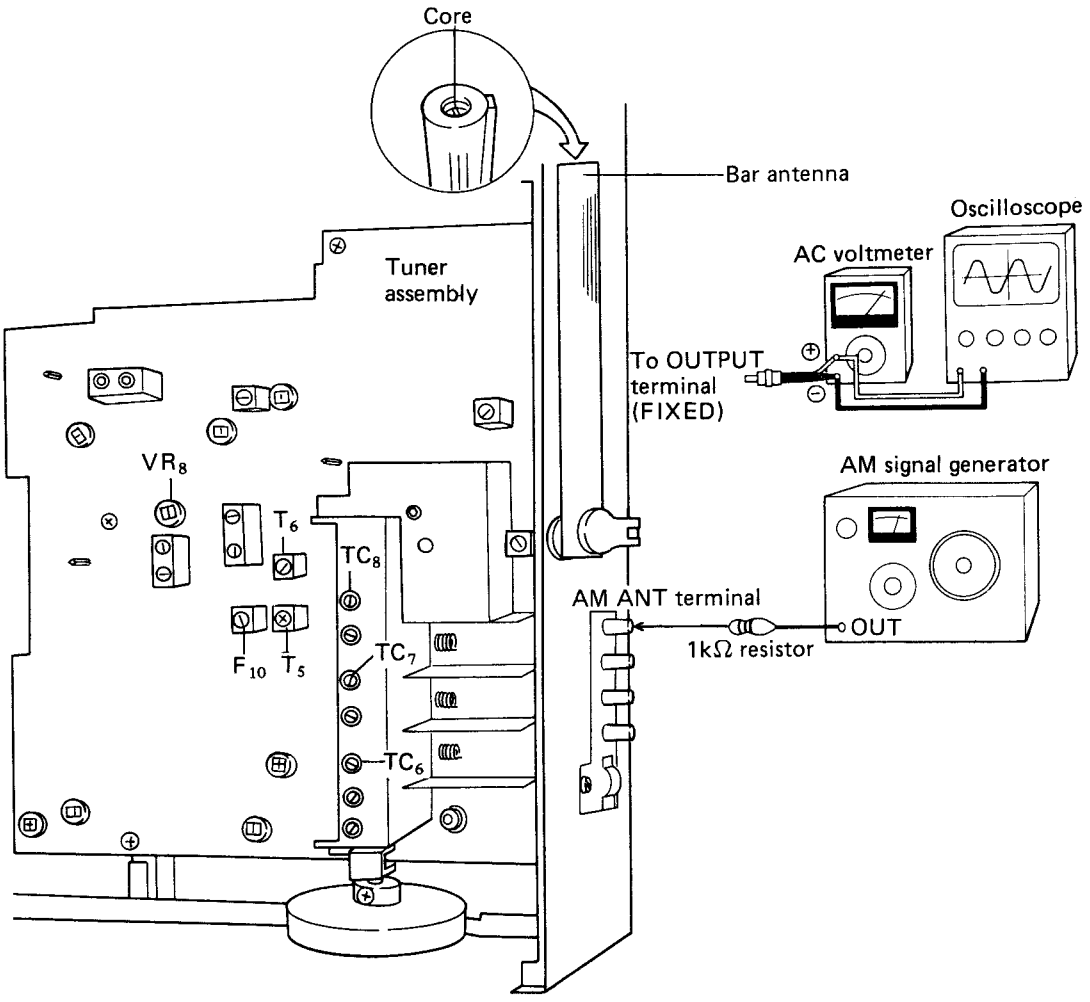


Fig. 7-1

7.2 FM TUNER

APC Circuit

1. Turn the FUNCTION switch to the FM position.
2. Connect the frequency counter between terminal 4 and 7 (ground).
3. Adjust the TC_1 to obtain a reading of 100.000kHz (±2Hz) on the frequency counter.
4. Disconnect the frequency counter.
5. Connect the wire between terminal 2 and 7.
6. Connect the DC voltmeter between terminal 1(+) and 7(−).
7. Adjust the VR_3 to obtain a reading of +8.5V (±20mV) on the DC voltmeter. Disconnect the DC voltmeter.
8. Set the dial frequency of the TX-9800 to 88MHz.
9. Connect the oscilloscope between terminal 11 and 7 (Ground).
10. Adjust the VR_1 to obtain a reading of 1.2V (peak to peak) on the oscilloscope.
11. Connect the DC voltmeter between terminal 11(+) and 1(−).
12. Adjust the VR_2 to obtain a reading of +10mV (±10mV) on the DC voltmeter. Disconnect the DC voltmeter.

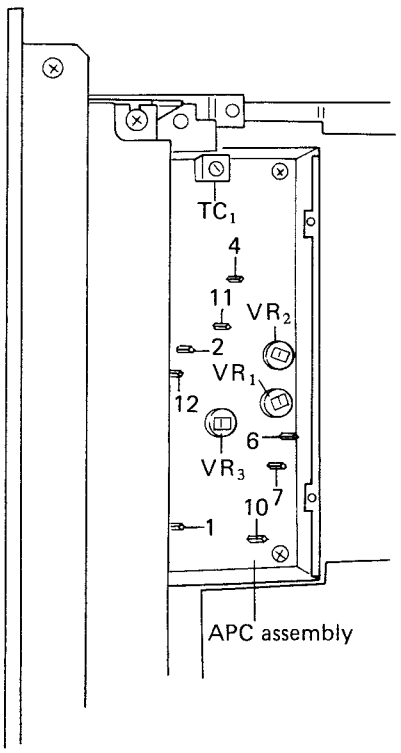


Fig. 7-2

FM Tracking

1. Turn the MUTING and MPX FILTER switches to the OFF position, turn the IF BAND switch to the NARROW position, and the FUNCTION switch to the FM position.
2. Set up the test equipment as Fig. 7-4.
3. Connect the wire between Tuner ass'y terminal 26 and ground.
4. Connect a DC voltmeter between Tuner ass'y terminal 43(+) and ground(−).
5. Adjust the VR_3 of the APC ass'y to obtain a reading of +8V on the DC voltmeter (refer to Fig. 7-2).
6. Disconnect the DC voltmeter from the Tuner ass'y.
7. Set the FM signal generator (FM SG) to a modulation frequency of 400Hz, FM deviation of 75kHz, and output level of 60dB to 80dB.
8. Set the FM SG output frequency and the dial frequency of the TX-9800 to 90MHz.
9. Adjust the core of L_{10} to obtain a maximum reading on the SIGNAL meter.
10. Set the FM SG output frequency and dial frequency of the TX-9800 to 106MHz.
11. Adjust the TC_5 to obtain a maximum reading on the SIGNAL meter.
12. Adjust by repeating steps 8 to 11.
13. Set output level of the FM SG from 20dB to 30dB.
14. Set the FM SG output frequency and dial frequency of the TX-9800 to 90MHz.
15. Adjust the gap of coils (L_3 to L_5)* and core of L_2 and T_1 to T_3 to obtain a maximum reading on the signal meter.
16. Set the FM SG output frequency and dial frequency of the TX-9800 to 106MHz.
17. Adjust TC_1 to TC_4 to obtain a maximum reading on the SIGNAL meter.
18. Adjust by repeating steps 14 to 17.
19. Connect the wire between Tuner ass'y terminal 37 and ground.
20. Turn the dial frequency of the TX-9800 to 98MHz without any input signal.
21. Adjust the core of T_4-a so that the TUNING meter reads dead center.
22. Turn the IF BAND switch to the WIDE position.
23. Set the FM SG output frequency and dial frequency of the TX-9800 to 98MHz. Then TUNING meter reads dead center.
24. Set output level of the FM SG to 60dB.
25. Adjust the core of T_4-b to reduce distortion in the output to a minimum.
26. Repeat steps 20 to 25 above so that the TUNING meter reads dead center with a minimum of distortion.
27. Disconnect wire between Tuner ass'y terminal 26 and ground.
28. Adjust the TC_1 of the APC ass'y so that the TUNING meter reads dead center.
29. Disconnect the wire between Tuner ass'y terminal 37 and ground.
30. Set the FM SG output frequency and dial frequency of the TX-9800 to 98MHz.
31. Set the FM SG output level to 100dB, and then adjust VR_3 so that the SIGNAL meter reads 4.8 on the scale.
32. Set the FM SG output level to 35dB, and record the deflection level of the SIGNAL meter.
33. Turn the IF BAND switch to the NARROW position.
34. Adjust VR_1 to obtain the same deflection level of the SIGNAL meter as the deflection level recorded in step 32.
35. Turn the IF BAND switch to the WIDE position.
36. Turn the MUTING switch to the ON position.
37. Set the FM SG output level to 20dB, and then adjust VR_2 to the point where the muting operated.

Multiplex Decoder

38. Connect the multiplex signal generator (MPX SG) to the external modulator terminals of FM SG, thereby using FM SG as external modulation.
39. Connect the frequency counter between terminal 17 of the Tuner ass'y and ground.
40. Turn the MUTING switch to the ON position and IF BAND switch to the WIDE position.
41. Set the FM SG output frequency to 98MHz, and output level to 60dB, unmodulated.
42. Tune the TX-9800 to check that the SIGNAL meter gives maximum deflection, and the TUNING meter reads dead center.
43. Adjust VR_5 to obtain a reading of 76kHz on the frequency counter.
44. Disconnect the frequency counter.
45. Set the MPX SG modulation output to pilot signal (19kHz) only, and set the FM deviation to 7.5kHz.
46. Adjust VR_4 so that the AC voltmeter (OUTPUT) shows minimum reading (19kHz leak).
47. Set the MPX SG to 1kHz (L or R) 33.75kHz deviation and 19kHz (pilot signal) 7.5kHz deviation.
48. Adjust the core of T_2 (less than $\pm 90°$) for minimum distortion at the L or R output.
49. Turn the IF BAND switch to the NARROW position.

50. Adjust the core of T_3 (less than ±90°) for minimum distortion at the L or R output.
51. Turn the IF BAND switch to the WIDE position.
52. Adjust the VR_6 to reduce crosstalk between L and R to a minimum.
53. Turn the IF BAND switch to the NARROW position.
54. Adjust the VR_7 to reduce crosstalk between L and R to a minimum.

NOTE:
L3, L4 and L5 are coreless coils which may be adjusted by extending one turn of coil out towards the tuning capacitor (See Fig. 7-3).

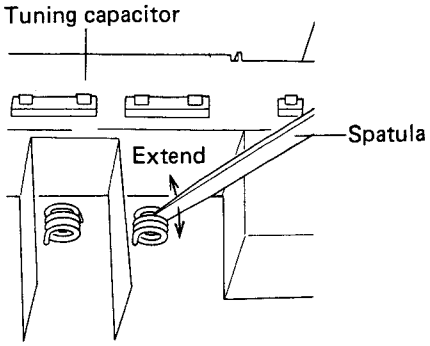


Fig. 7-3 Adjustment of tuning coil

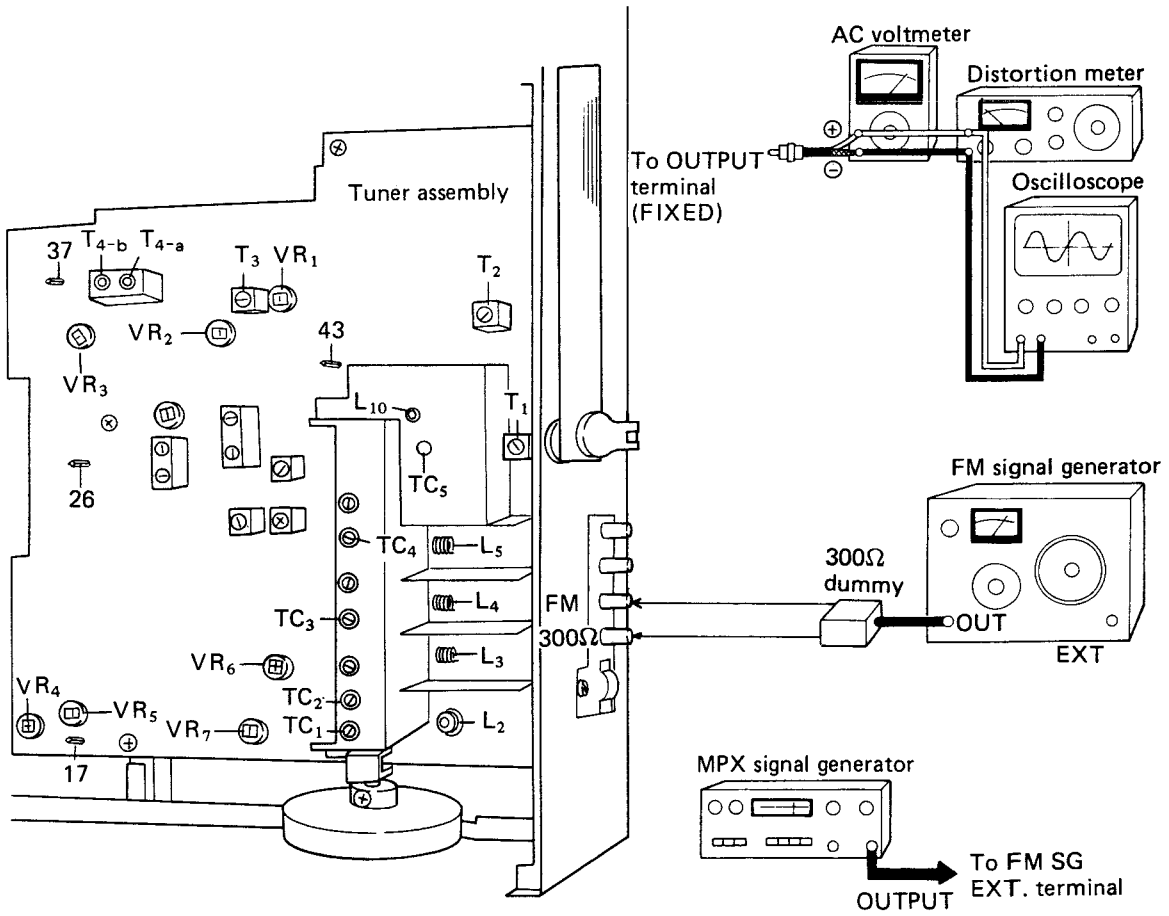
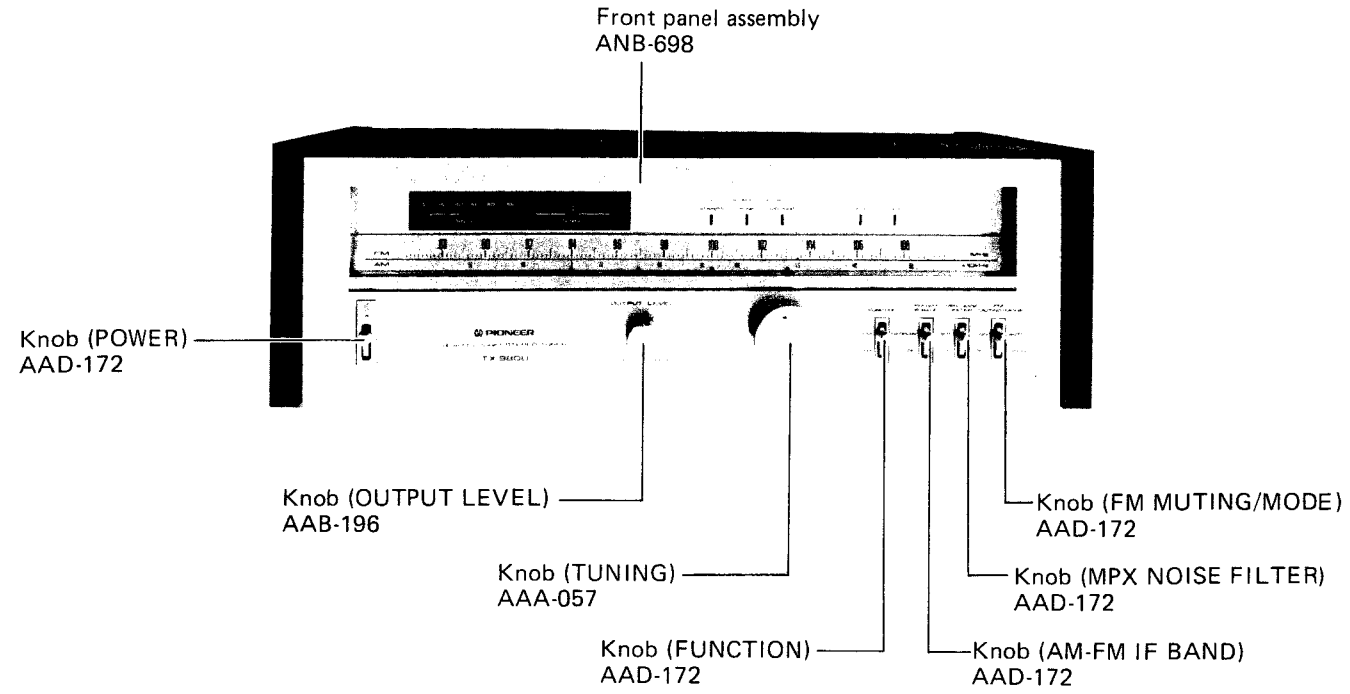


Fig. 7-4

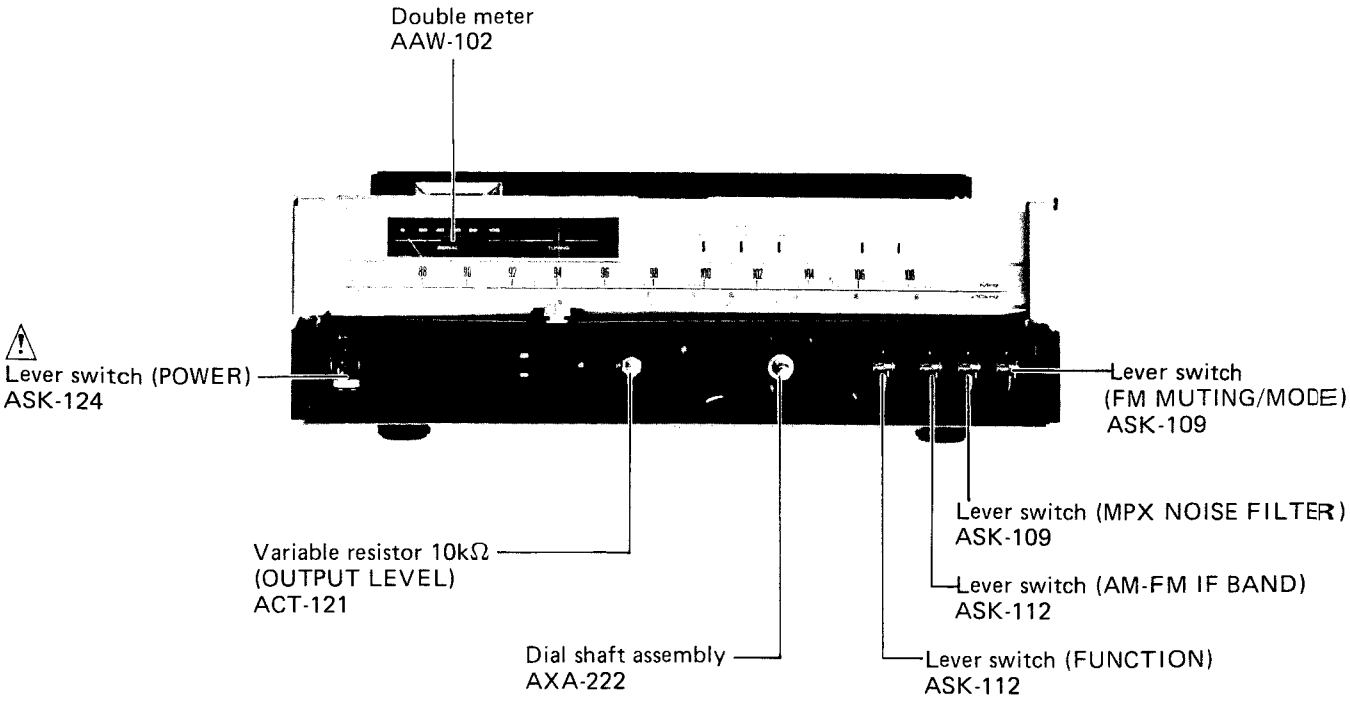
8. PARTS LOCATION

- *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.*

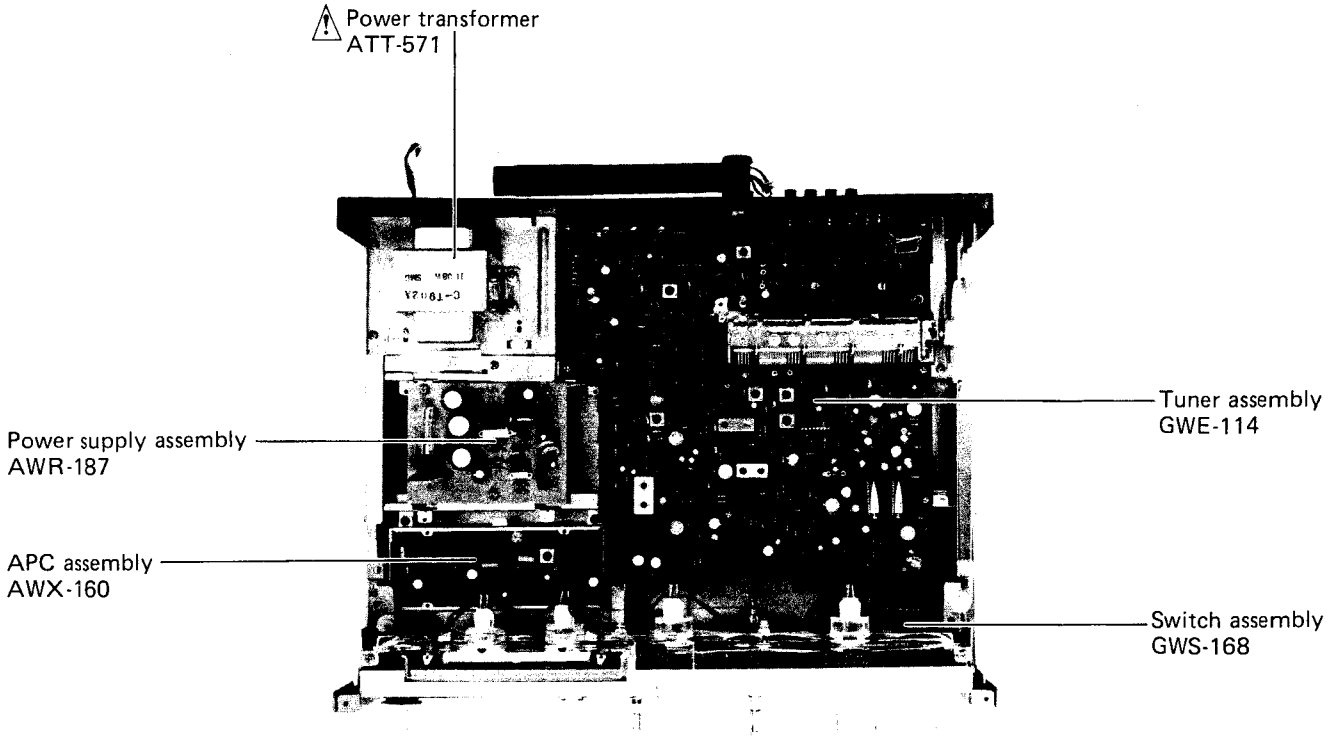
Front Panel View



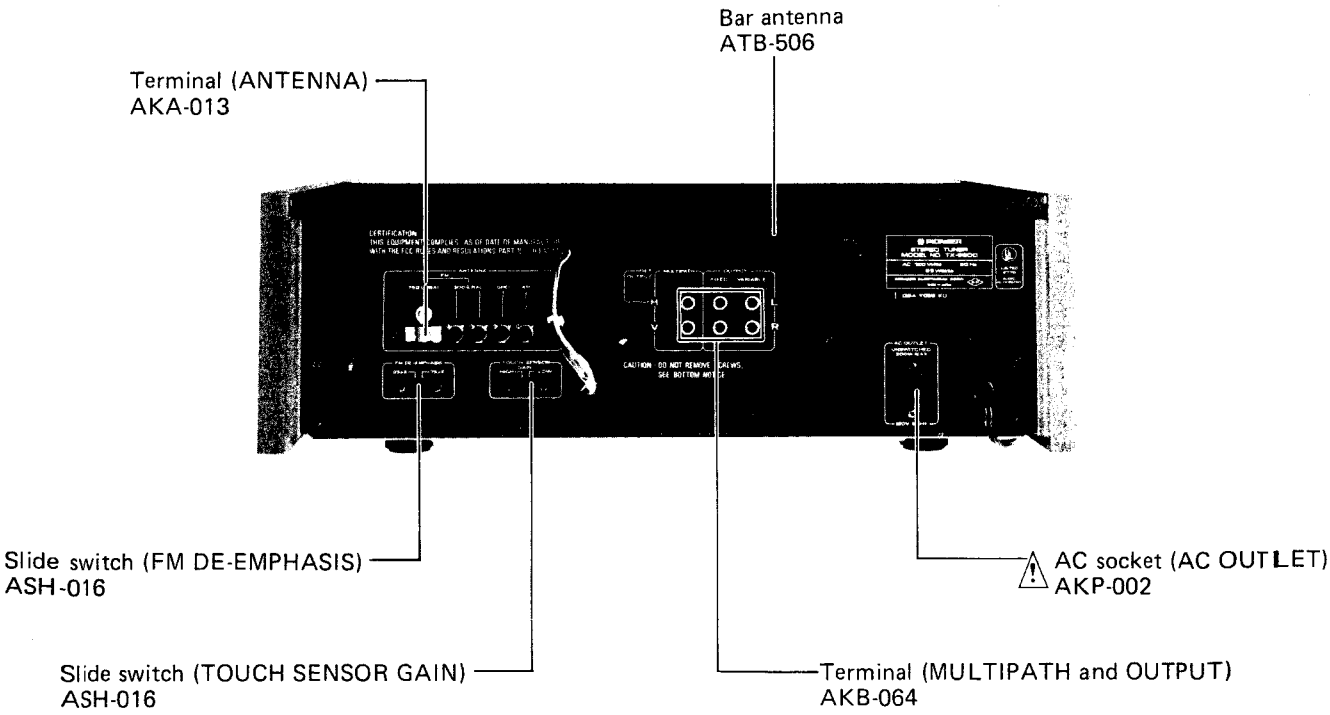
Front View with Panel Removed



Top View



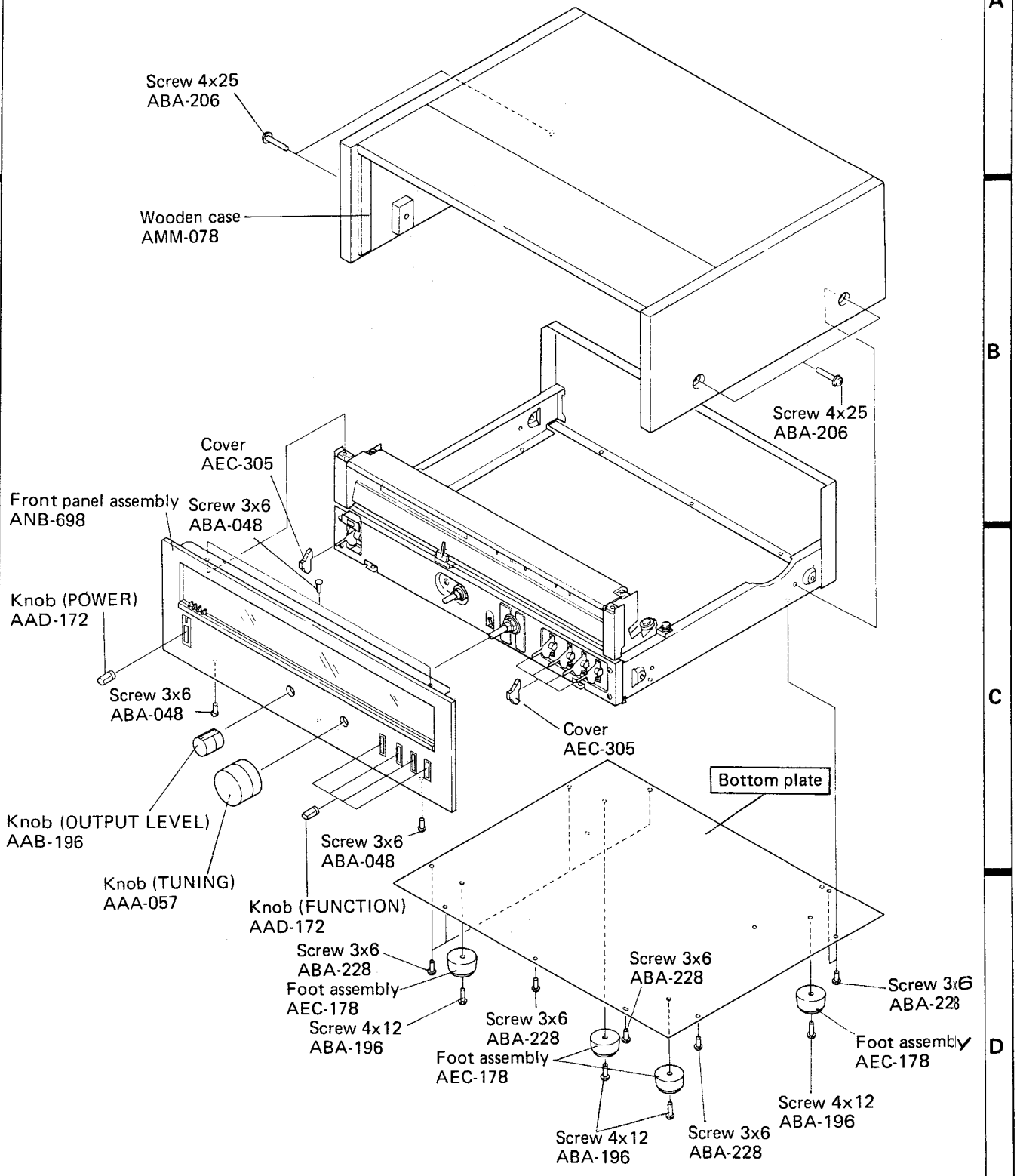
Rear Panel View



9. EXPLODED VIEW

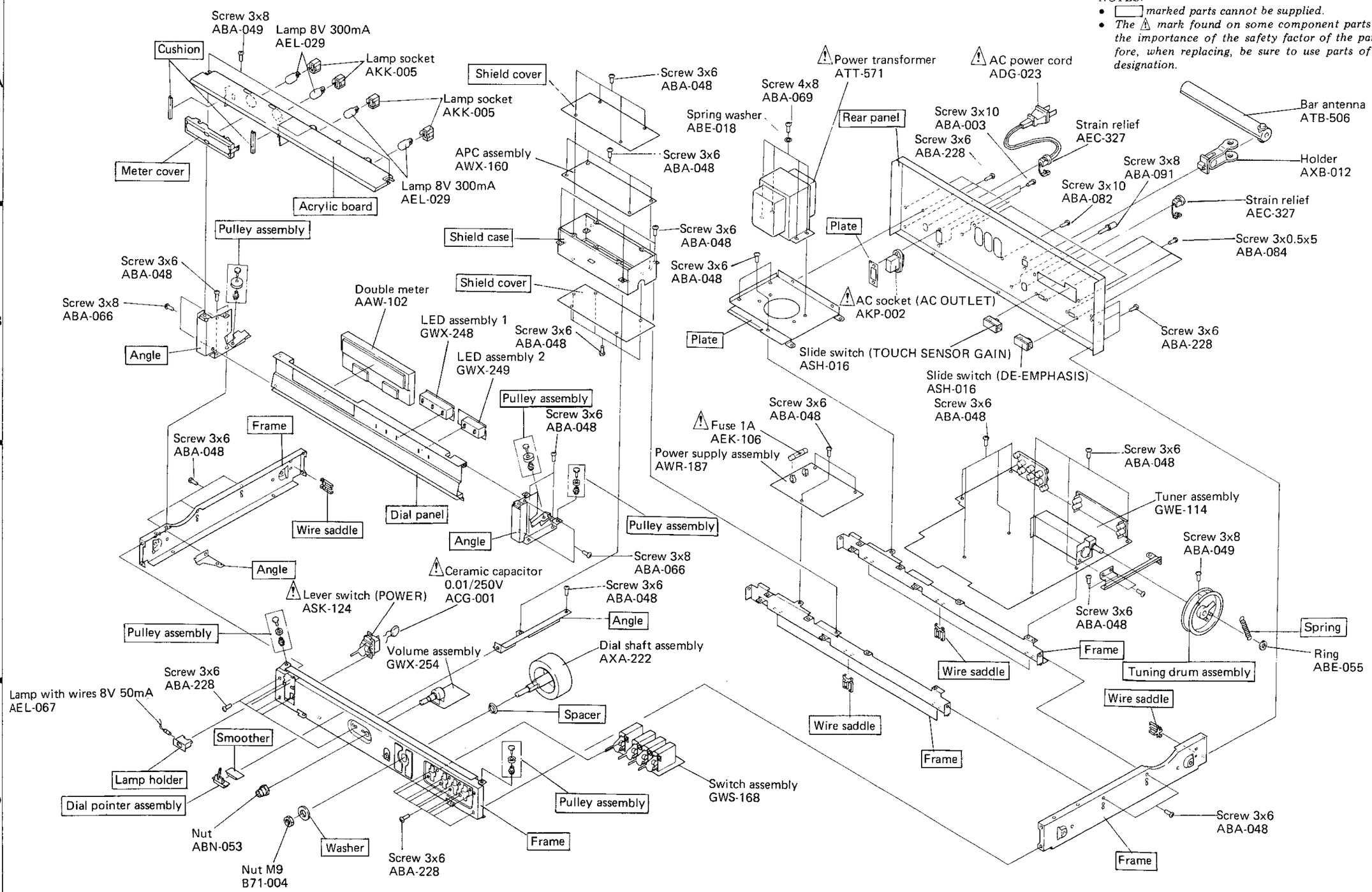
NOTES:

- ▭ *marked parts 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.*



NOTES:

- ▭ *marked parts 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.*



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

NOTES:

- *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%).

560Ω	*56 x 10¹*	*561*	*RD¼PS 5 6 1 J*
47kΩ	*47 x 10³*	*473*	*RD¼PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RSIP 0 1 0 K*

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

5.62kΩ	*562 x 10¹*	*5621*	*RN¼SR 5 6 2 1 F*

- *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.*

10.1 MISCELLANEA

Miscellaneous Parts

CAPACITOR

Part No.	Symbol & Description		
⚠ ACG-001	C1	Ceramic	0.01/250V
CKDBC 473Z 25	C2		

TRANSFORMERS

Part No.	Symbol & Description	
⚠ ATT-571	T1	Power transformer
ATB-506	L1	Bar antenna

LAMPS AND FUSE

Part No.	Symbol & Description	
AEL-067	PL1	Lamp with wires 8V 50mA
AEL-029	PL–PL5	Lamp 8V 300mA
⚠ AEK-106	FU1	Fuse 1A

SWITCHES

Part No.	Symbol & Description	
⚠ ASK-124	S1	Lever (POWER)
ASH-016	S2	Slide (DE-EMPHASIS)
ASH-016	S3	Slide (TOUCH SENSOR GAIN)

OTHERS

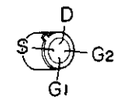
Part No.	Description
AKK-005	Lamp socket
⚠ AKP-002	AC socket (AC OUTLET)
⚠ ADG-023	AC power cord

P.C. BOARD ASSEMBLIES

Part No.	Description
GWE-114	Tuner assembly
GWX-248	LED assembly 1
GWX-249	LED assembly 2
AWR-187	Power supply assembly
AWX-160	APC assembly
GWS-168	Switch assembly
GWX-254	Volume assembly

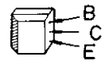
External Appearance of Transistors and ICs

3SK45



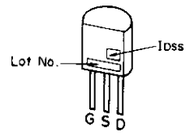
2SA733
2SC1906
2SC945A

2SC461

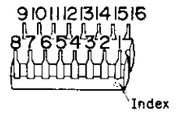


2SK34

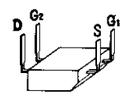
2SK168



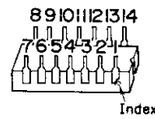
PA3001
PA1001
PA1002
HA1197



2SK73



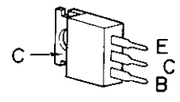
M5S003P
M53273P
M53293P



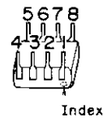
2SC763
2SC1914A

2SK19W

2SC1626

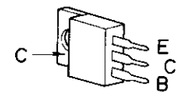


HA1201
μPC4558C

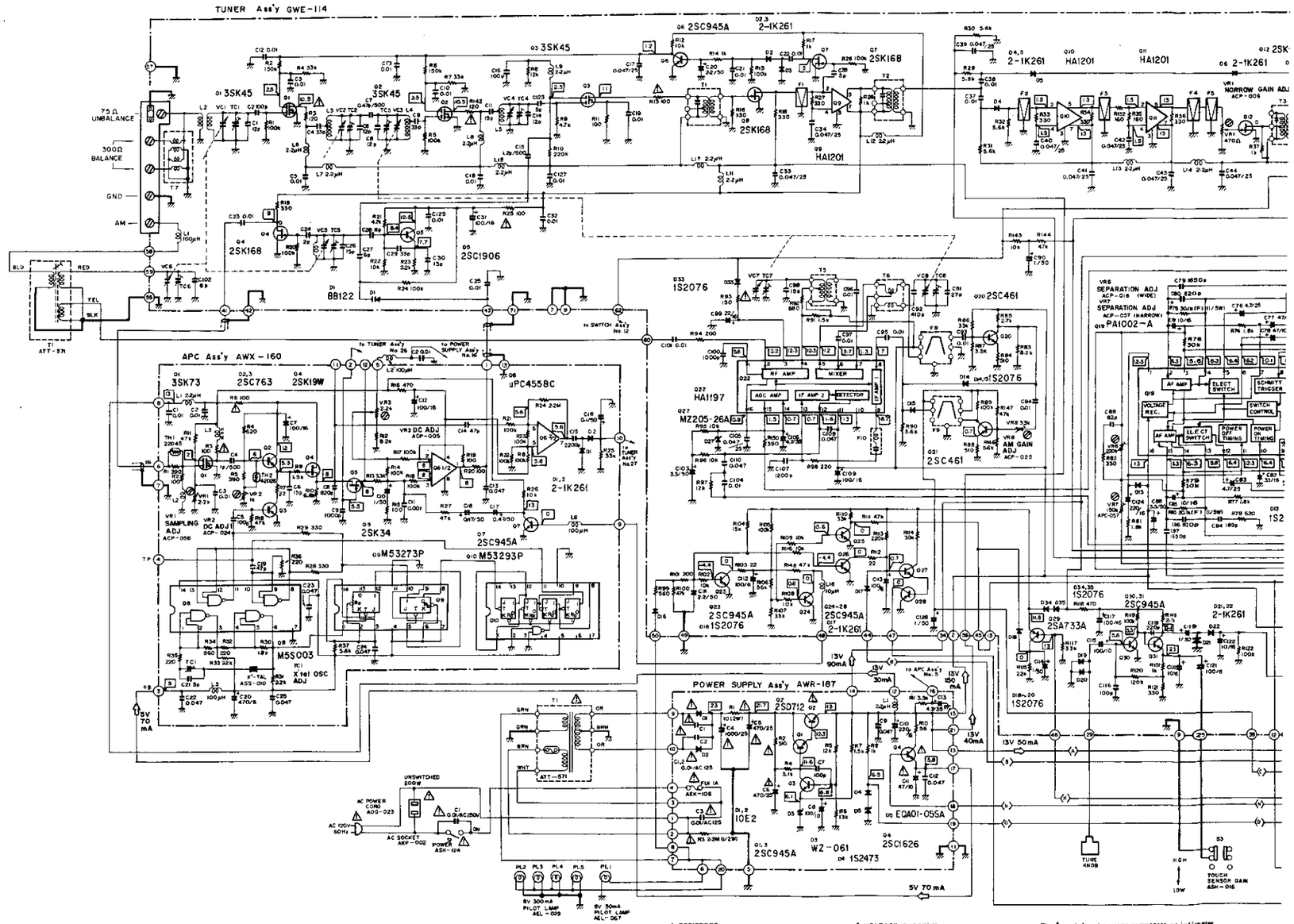


2SK117

2SD313
2SD712



10.2 SCHEMATIC DIAGRAM

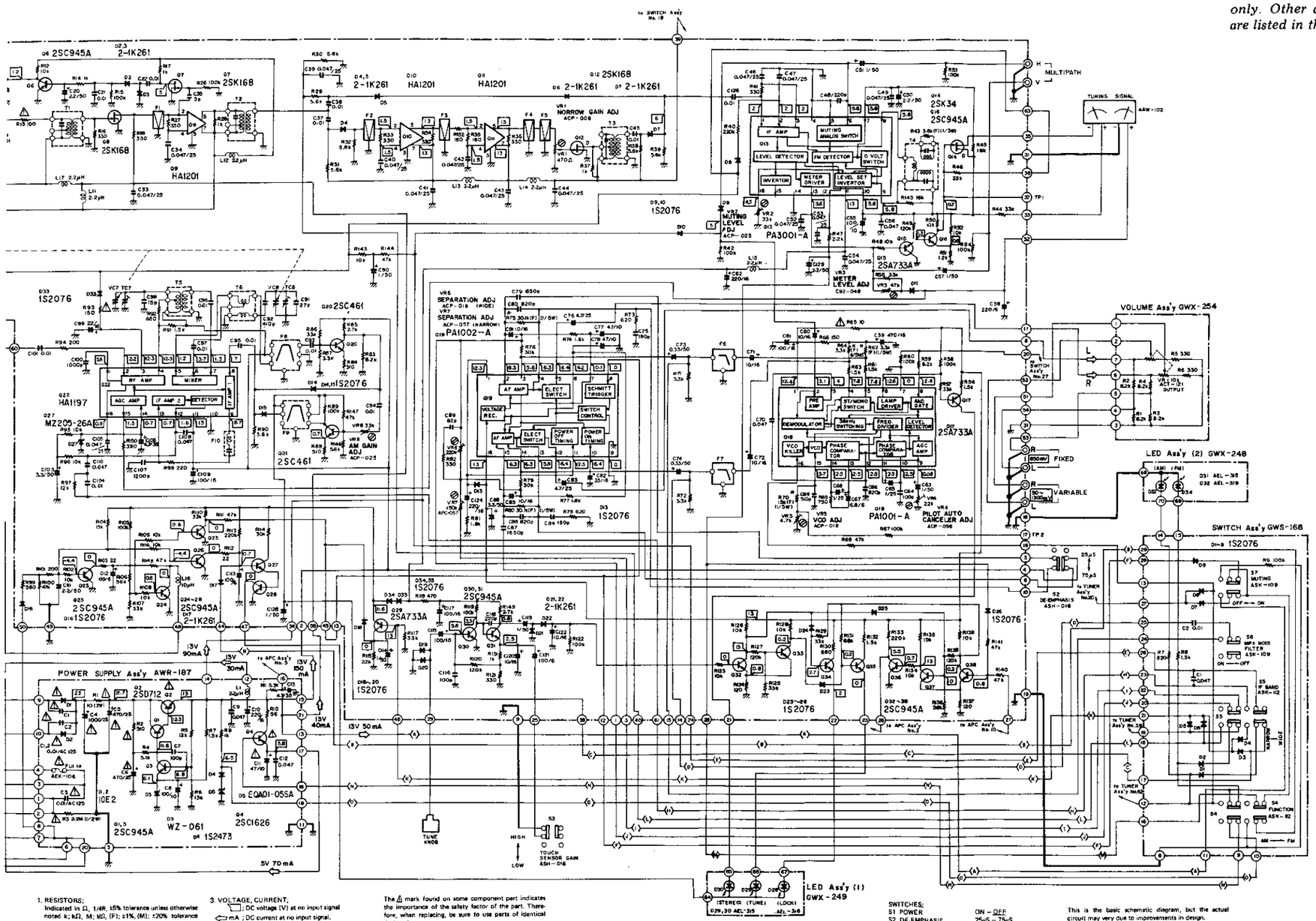


1. RESISTORS;
Indicated in Ω, 1/4W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F): ±1%, (M): ±20% tolerance
2. CAPACITORS;
Indicated in capacity (μF)/voltage[V] unless otherwise noted p: pF
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT;
: DC voltage (V) at no input signal
⇦mA : DC current at no input signal.
[mV]: Signal voltage at FM 400Hz, 75kHz DEV.
4. OTHERS;
➡ : Signal route.
⊘ : Adjusting point

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

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



1. RESISTORS;
   Indicated in Ω, 1/4W, ±5% tolerance unless otherwise noted. k; kΩ; M; MΩ; (F); ±1%, (M); ±20% tolerance
2. CAPACITORS;
   Indicated in capacity (pF)/voltage(V) unless otherwise noted. p; pF
   Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT;
   ▭ ; DC voltage (V) at no input signal
   ⇦mA ; DC current at no input signal.
   (MV); Signal voltage at FM 400Hz, 75kHz DEV.
4. OTHERS;
   ➡ ; Signal route.
   ⊘ ; Adjusting point

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

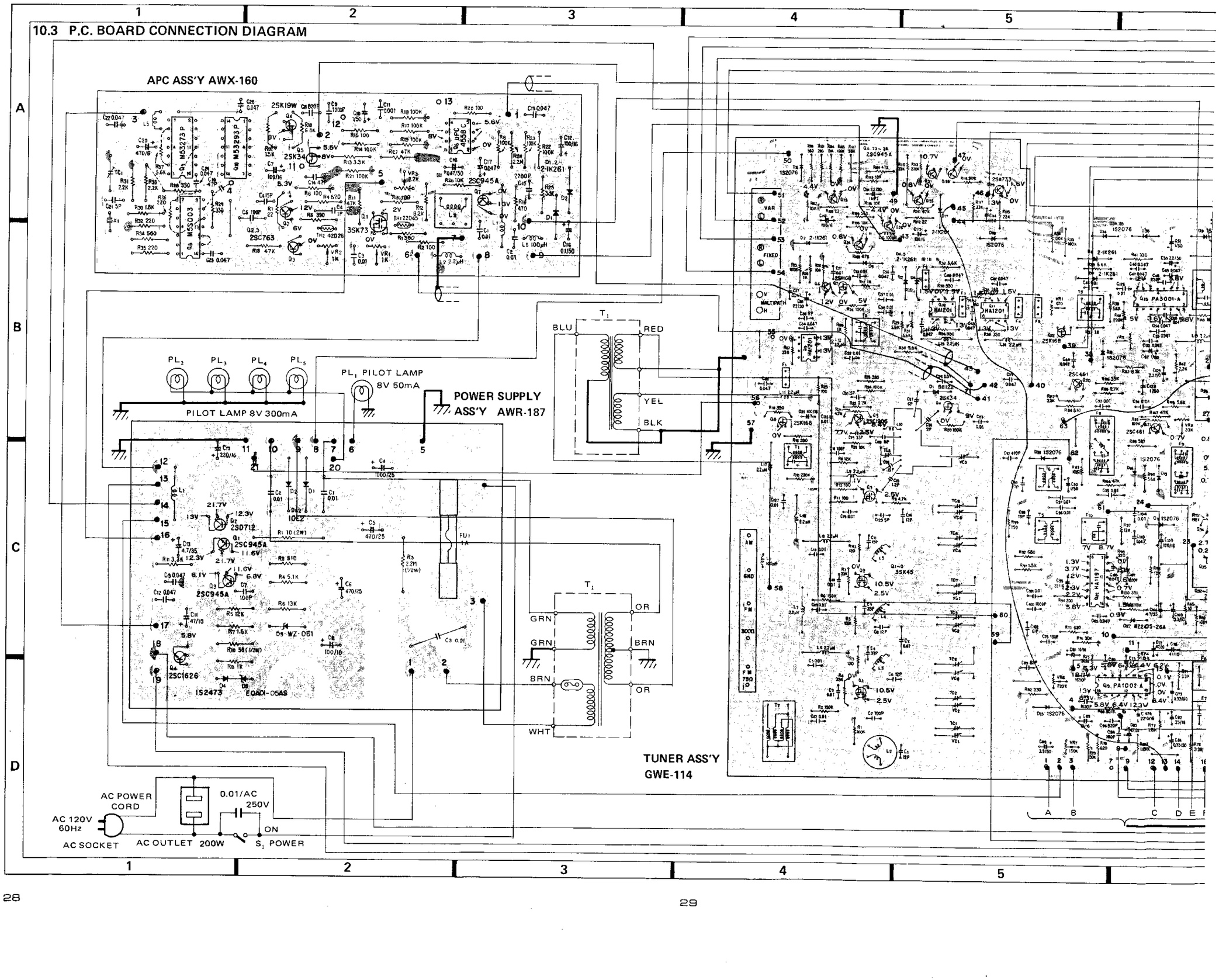
SWITCHES;

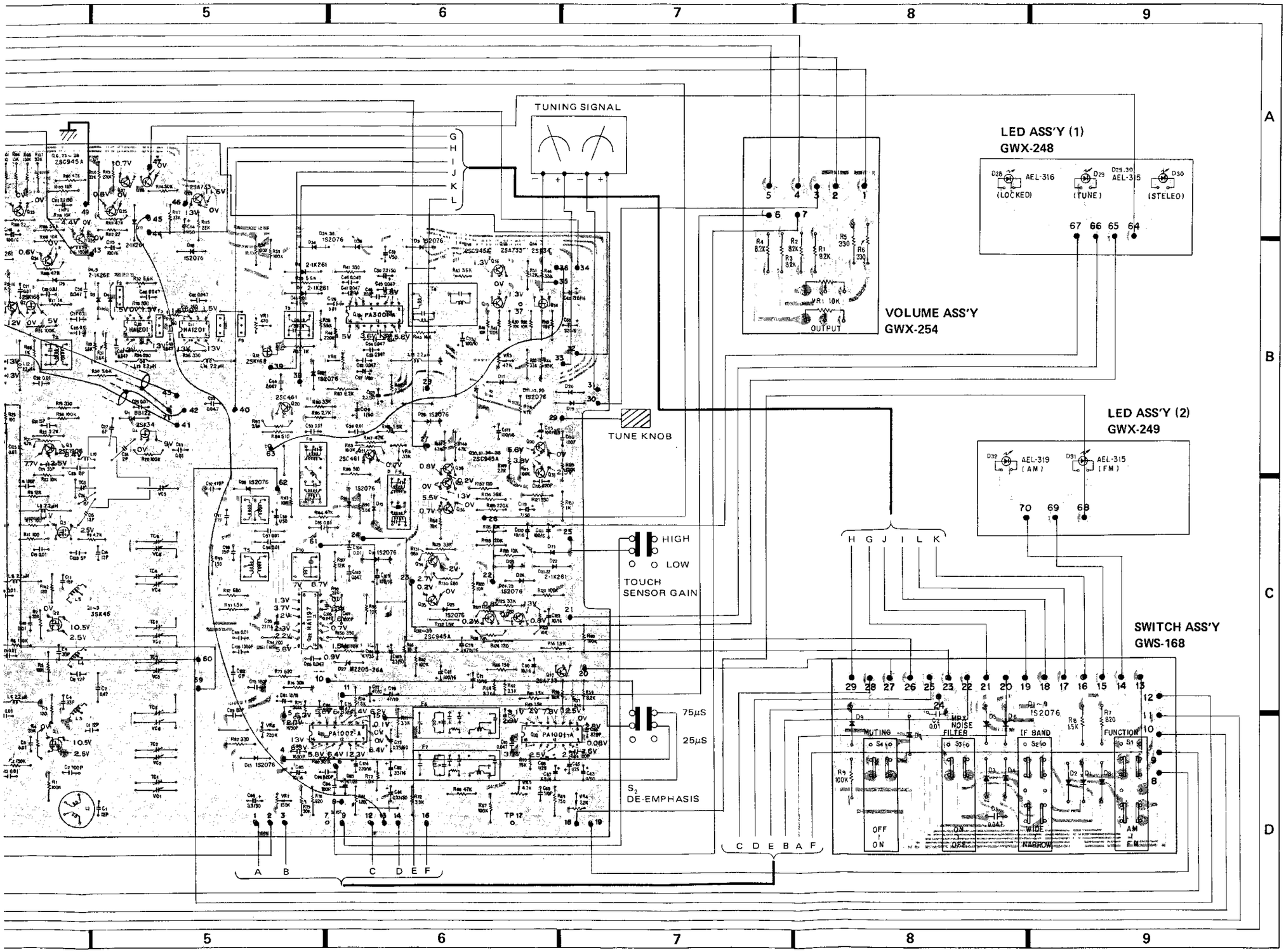
S1 POWER	ON – OFF
S2 DE-EMPHASIS	25μS – 75μS
S3 TOUCH SENSOR GAIN	HIGH – LOW
S4 FUNCTION	FM – AM
S5 IF BAND	NARROW – WIDE
S6 MPX NOISE FILTER	OFF – ON
S7 MUTING	ON – OFF

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may very due to improvements in design.

10.3 P.C. BOARD CONNECTION DIAGRAM




5
6
7
8
9
A
B
C
D
TUNING SIGNAL
G
H
I
J
K
L
TUNE KNOB
HIGH
LOW
TOUCH
SENSOR GAIN
75μS
25μS
S2
DE-EMPHASIS
VOLUME ASS'Y
GWX-254
OUTPUT
LED ASS'Y (1)
GWX-248
D28 AEL-316 (LOCKED)
D29 (TUNE)
D26,30 AEL-315
D30 (STELEO)
LED ASS'Y (2)
GWX-249
D32 AEL-319 (AM)
D31 AEL-315 (FM)
SWITCH ASS'Y
GWS-168
MUTING
MPX NOISE FILTER
IF BAND
FUNCTION
OFF
ON
WIDE
NARROW
AM
FM
A B C D E F
H G J I L K
C D E B A F

10.4 PARTS LIST OF P.C. BOARD ASSEMBLIES

Tuner Assembly (GWE-114)

COILS AND TRANSFORMERS

Part No.	Symbol & Description	
ATC-097	L2	FM ANT coil
ATC-099	L3–L5	FM RF coil
T24-028	L6–L9, L11–L15, L17, L18	RF choke coil
ATC-072	L10	FM OSC coil
ATE-008	T1	FM IFT
ATE-024	T2, T3	FM IFT
ATE-043	T4	FM det. transformer
ATB-065	T5	AM RF coil
ATB-064	T6	AM OSC coil
ATF-048	F1–F5	FM ceramic filter
ATF-068	F6, F7	Low pass filter
ATF-063	F8	AM filter
ATF-062	F9	AM ceramic filter
ATF-038	F10	455kHz filter

OTHERS

Part No.	Symbol & Description
AKA-013	Terminal (ANTENNA)
AKB-064	Terminal (OUTPUT)
ABA-025	Screw 3x4
ABA-048	Screw 3x6

CAPACITORS

Part No.	Symbol & Description	
ACK-029		Tuning capacitor
ACM-006	TC5	Trimmer
CCDCH 120 K 50	C1, C6, C8, C14	
CCDCH 101K 50	C2	
CKDYF 103Z 50	C3, C5, C10, C12, C13, C18, C19, C21–C23, C32, C37, C38, C45	
CKDYF 103Z 50	C93–C97, C101, C127	
CCDCH 330K 50	C4, C9, C29	
CGB R47K 50	C7	
CCDCH 150K 50	C11, C30, C98	
CGB 1R2J 500	C15	
CCDSL 101K 50	C16, C64, C116	
CKDBC 473Z 25	C33, C34, C36, C39, C44, C46, C47, C49, C52–C54, C108	
CCDBC 473Z 25	C56, C105	
CEA 2R2P 50	C20, C50, C129	
CCDCH 020C 50	C24	
CKDYB 103K 50	C25, C125	
CCDCH 060F 50	C27, C102	
CCDPH 080F 50	C28	
CEA 101P 16	C31, C61, C109, C117	
CCDCH 050D 50	C35, C123	
CCDSL 221K 50	C48, C118	
CEA 010P 50	C51, C57, C63, C90, C119, C128	
CEA 101P 10	C55, C115	
CEA 221P 6	C58	
CEA 471P 16	C59	
CEA NL 100M 16	C60, C71, C72	
CEA 221P 16	C62, C124	
CCDRH 150K 50	C26	
CSZA 010M 25	C65, C68	
CKDYB 821K 50	C66	
CSZA 6R8M 6	C67	
CQSH 511J 50	C69	
CQMA 473K 50	C70, C110	
CEANL R33M 50	C73, C74	
CCDSL 181K 50	C75, C84	
CEANL 4R7M 25	C76, C83	
CEA 470P 10	C77, C78	
ACE-012	C79, C87	Polystyrene 1650p
CQSH 821G 50	C80, C86	
CEA 100P 16	C81, C85, C120, C122	
CEA 330P 16	C82	
CEA 3R3P 50	C88, C103	
CCDSL 820K 50	C89	
CCDUJ 270K 50	C91	
ACE-048	C92	Polystyrene 410p
CEA 221P 16	C99	
CKDYB 102K 50	C100	
CQMA 103K 50	C104	
CEA 4R7P 35	C106	
CKDYB 122K 50	C107	
ACH-323	C111	Electrolytic 2.2/50V
CEANL 101M 6	C112, C113	
CEA 010P 50	C114	
CEA 101P 6	C121	

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

RESISTORS

Part No.	Symbol & Description		
ACP-006	VR1	Semi-fixed	470
ACP-025	VR2, VR8	Semi-fixed	33k
C92-048	VR3	Semi-fixed	47k
ACP-056	VR4	Semi-fixed	22k
C92-051	VR5	Semi-fixed	4.7k
ACP-016	VR6	Semi-fixed	220k
ACP-057	VR7	Semi-fixed	150k

Part No.	Symbol & Description
RD¼PM □□□J	R1, R2, R4–R12, R14–R24, R26–R42, R44–R61, R63, R66–R69, R71–R74,
RD¼PM □□□J	R76–R79, R81–R92, R94–R141, R152
RN⅛SQ □□□□F	R143–R151, R43, R62, R64, R70, R75,
⚠ RD¼PM □□□J	R80, R3, R13, R25, R65, R93, R142

SEMICONDUCTORS

Part No.	Symbol & Description
3SK45-B	Q1–Q3
2SK168-F	Q4, Q7, Q8, Q12
2SC1906	Q5
2SC945A	Q6, Q16, Q23–Q28, Q30–Q38
HA1201	Q9–Q11
2SA733-A	Q15, Q17, Q29
PA3001-A	Q13
PA1001-A	Q18
PA1002-A	Q19
2SC461-B	Q20, Q21
HA1197	Q22
2SK34-C	Q14
BB122	D1
2-1K261	D2–D7, D17, D21, D22
1S2076	D8–D11, D13–D16, D18–D20, D23–D26,
(1S2473)	D33–D35
(1S1555)	
MZ205-26A	D27

Switch Assembly (GWS-168)

CAPACITORS

Part No.	Symbol & Description
CQMA 473J 50	C1
CQMA 103J 50	C2

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

RESISTORS

Part No.	Symbol & Description
RD¼PM □□□J	R7–R9

SEMICONDUCTORS

Part No.	Symbol & Description
1S2076	D1–D9
(1S1555)	
(1S2473)	

SWITCHES

Part No.	Symbol & Description	
ASK-112	S1	Lever (FUNCTION)
ASK-112	S2	Lever (IF BAND)
ASK-109	S3	Lever (MPX FILTER)
ASK-109	S4	Lever (MUTING)

APC Assembly (AWX-160)

COILS

Part No.	Symbol & Description	
T24-028	L1	RF choke coil
ATC-100	L2	Tune coil
ATC-056	L3	Tune coil

OTHERS

Part No.	Symbol & Description	
ASS-010	X1	Crystal resonater
22D45	TH1	
42D26	TH2	

CAPACITORS

Part No.	Symbol & Description	
CKDYF 103Z 50	C1–C3	
CGB 010K 500	C4	
CCDCH 470K 50	C14, C19	
CCDCH 150K 50	C6	
CEA 101P 16	C7, C12	
CCDCH 101K 50	C5	
CKDYB 821K 50	C8	
CKDYB 222K 50	C15	
CEANL 010M 50	C10	
CKDYF 473Z 50	C13, C22	
CSZA R10M 35	C16	
CKDYB 102K 50	C9	
CEANL R47M 50	C17, C18	
CCDCH 200K 50	C19	
CEA 471P 6	C20	
CCDCH 050D 50	C21	
CCDSL 101K 50	C23	
CQMA 103K 50	C11	
CKDBC 473Z 25	C23–C25	
ACM-010	TC1	Trimmer

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

RESISTORS

Part No.	Symbol & Description		
RD¼PM □□□J	R1, R3–R5, R7–R14, R16–R19, R21–		
⚠ RD¼PM □□□J	R36, R2, R6, R15, R20		
ACP-056	VR1	Semi-fixed	22k
ACP-024	VR2	Semi-fixed	1k
ACP-005	VR3	Semi-fixed	2.2k

SEMICONDUCTORS

Part No.	Symbol & Description
3SK73	Q1
2SC763-C	Q2, Q3
2SK19-W	Q4
2SK34 (2SK117)	Q5
μPC4558C	Q6
2SC945A (2SC1914A)	Q7
M5S003P	Q8
M53273P	Q9
M53293P	Q10
2-1K261	D1, D2

Volume Assembly (GWX-254)

Part No.	Symbol & Description	
RD¼PM □□□ J	R1–R6	
ACT-121	VR1	Variable (OUTPUT)

LED Assembly 1 (GWX-248)

Part No.	Symbol & Description	
AEL-316	D28	LED (green)
AEL-315	D29, D30	LED (red)
ABA-065		Screw 3x6

LED Assembly 2 (GWX-249)

Part No.	Symbol & Description	
AEL-315	D31	LED (red)
AEL-319	D32	LED (orange)
ABA-065		Screw 3x6

Power Supply Assembly (AWR-187)

OTHERS

Part No.	Symbol & Description	
T24-028	L1	RF choke coil
ABA-026		Screw 3x6

CAPACITORS

Part No.	Symbol & Description		
⚠ ACG-004	C1, C2	Ceramic	0.01/150V
⚠ ACG-003	C3	Ceramic	0.01/125V
⚠ CEA 102P 25	C4		
⚠ CEA 471P 25	C5, C6		
CCDSL 101K 50	C7		
CEA 101P 10	C8		
CKDYF 473Z 50	C9, C12		
CEA 221P 16	C10		
CEA 470P 10	C11		
CEA 4R7P 35	C13		

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

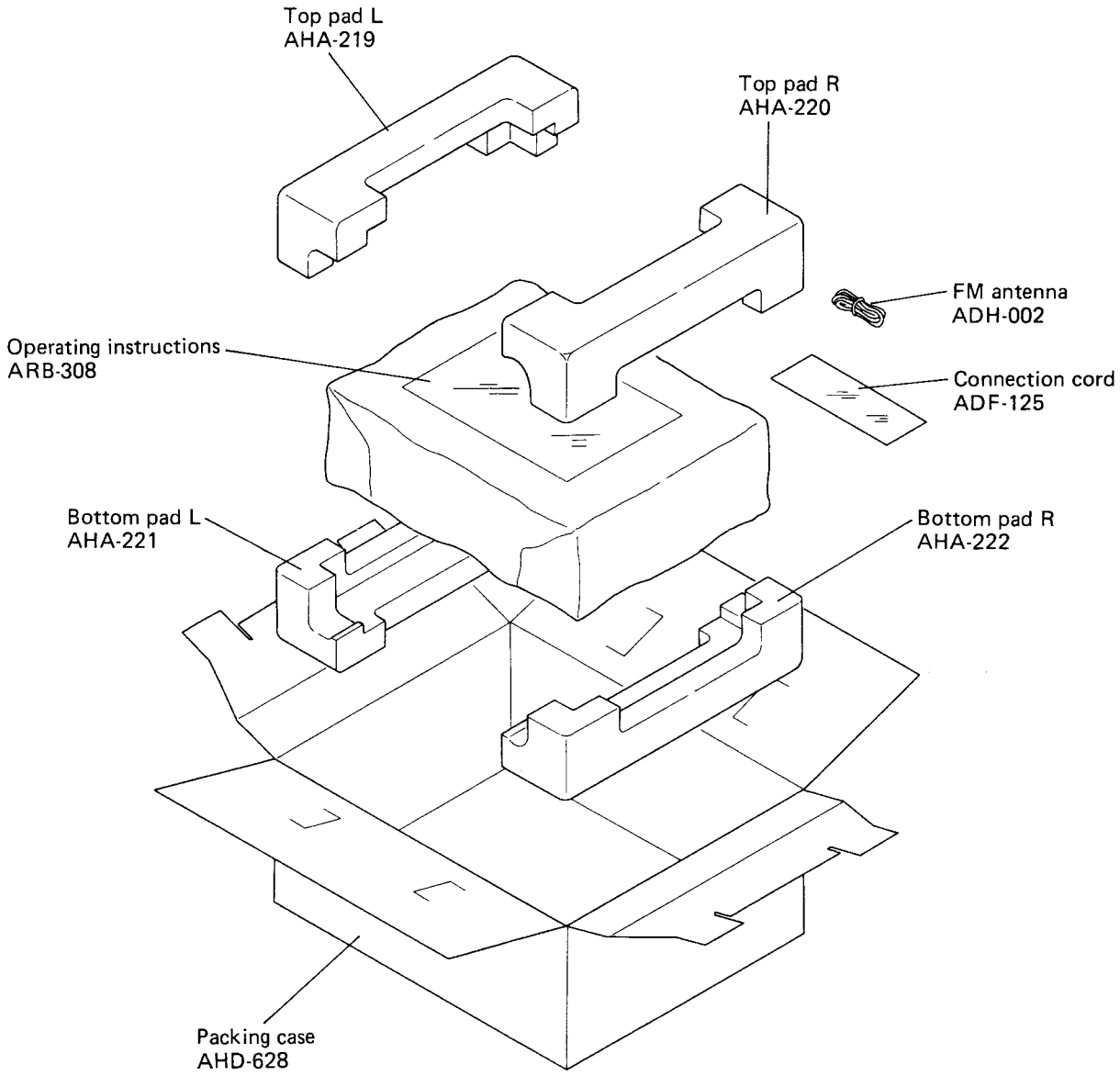
RESISTORS

Part No.	Symbol & Description
⚠ RS2P □□□ J	R1
RD¼PM □□□ J	R4–R8, R11
⚠ RD¼PM □□□ J	R2,
ACN-029	R3
RD½PM □□□ J	R10

SEMICONDUCTORS

Part No.	Symbol & Description
2SC945A	Q1, Q3
⚠ 2SD712 (2SD313)	Q2
⚠ 2SC1626-0	Q4
⚠ 10E2	D1, D2
WZ-061 (MZ-061)	D3
1S2473	D4
EQA01-05SA	D5

11. PACKING


Top pad L
AHA-219
Top pad R
AHA-220
FM antenna
ADH-002
Operating instructions
ARB-308
Connection cord
ADF-125
Bottom pad L
AHA-221
Bottom pad R
AHA-222
Packing case
AHD-628

ADDITIONAL

Service Manual

PIONEER

AM/FM STEREO TUNER

TX-9800 S S/G

NOTE:

- **For detailed instructions on adjustments, circuit descriptions, exploded view, etc., please refer to KU type.**

1. SPECIFICATIONS

The specifications for S and S/G types are the same as the KU type except for following sections;

FM Section

De-Emphasis . . . . . 25μs, 50μs, 75μs (switchable)

Miscellaneous

Power requirements . . . . . AC 110V, 120V, 220V, and 240V (switchable) 50/60Hz

Power consumption 23W

Dimensions

S type . . . . . 420(W)x150(H)x390(D)mm
16-9/16x5-7/8x15-3/8in

S/G type . . . . . 453(W)x150(H)x390(D)mm
17-11/16x6-1/8x15-3/8in

Weight

S type . . . . . 8.5kg (18 lb 12oz)

S/G type . . . . . 9.3kg (20 lb 8oz)

Furnished Parts

Fuse (1A or 500mA) 1

2. CONTRAST OF MISCELLANEOUS PARTS

- *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.*

P.C. BOARD ASSEMBLIES

Symbol	Description	Part No.			Remarks
		KU type	S type	S/G type	
	Tuner assembly	GWE-114	GWE-116	GWE-116	
	LED assembly 1	GWX-248	GWX-252	GWX-252	
	LED assembly 2	GWX-249	GWX-253	GWX-253	
	Power supply assembly	AWR-187	AWR-190	AWR-190	
	APC assembly	AWX-160	AWX-160	AWX-160	
	Switch assembly	GWS-168	GWS-168	GWS-168	
	Volume assembly	GWX-254	GWX-254	GWX-254	
	Switch assembly	.....	AWX-113	AWX-113	

SWITCHES

Symbol	Description	Part No.			Remarks
		KU type	S type	S/G type	
⚠S1	Lever switch (POWER)	ASK-124	ASK-128	ASK-128	
S2	Slide switch (DE-EMPHASIS)	ASH-016	ASH-017	ASH-017	

FUSE

Symbol	Description	Part No.			Remarks
		KU type	S type	S/G type	
⚠FU1	Fuse 1A	AEK-106	.....	AEK-106	
	Fuse 0.5A	.....	AEK-107	.....	

OTHERS

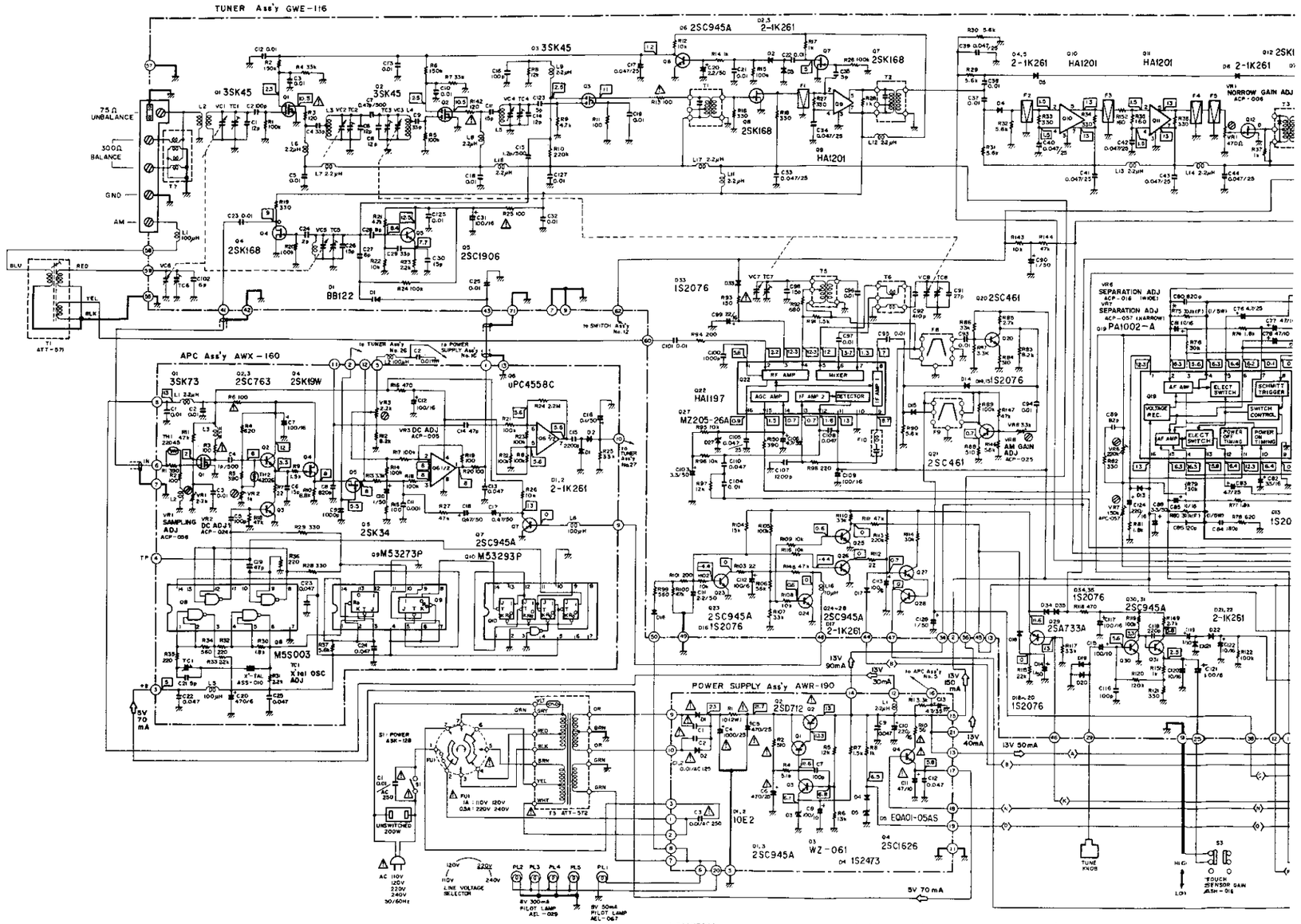
Symbol	Description	Part No.			Remarks
		KU type	S type	S/G type	
⚠T1	Power transformer	ATT-571	ATT-572	ATT-572	
⚠	AC power cord	ADG-023	ADG-016	ADG-016	
⚠	AC socket (AC OUTLET)	AKP-002	AKP-018	AKP-018	
⚠	Voltage selector	.....	AKR-031	AKR-031	
	Wooden case	AMM-078	.....	AMM-078	
	Metal case	.....	ANE-223	.....	

PACKING AND FURNISHED PARTS

Symbol	Description	Part No.			Remarks
		KU type	S type	S/G type	
	Operating instructions	ARB-308	ARB-310	ARB-310	
	Fuse 1A	.....	AEK-106	AEK-106	
	Fuse 0.5A	.....	AEK-107	AEK-107	
	Packing case	AHD-628	AHD-631	AHD-630	
	Top pad L	AHA-219	.....	AHA-219	
	Top pad R	AHA-220	.....	AHA-220	
	Bottom pad L	AHA-221	.....	AHA-221	
	Bottom pad R	AHA-222	.....	AHA-222	
	Side pad	.....	AHA-131	.....	

3. SUPPLEMENTS FOR S AND S/G TYPES

3.1 SCHEMATIC DIAGRAM

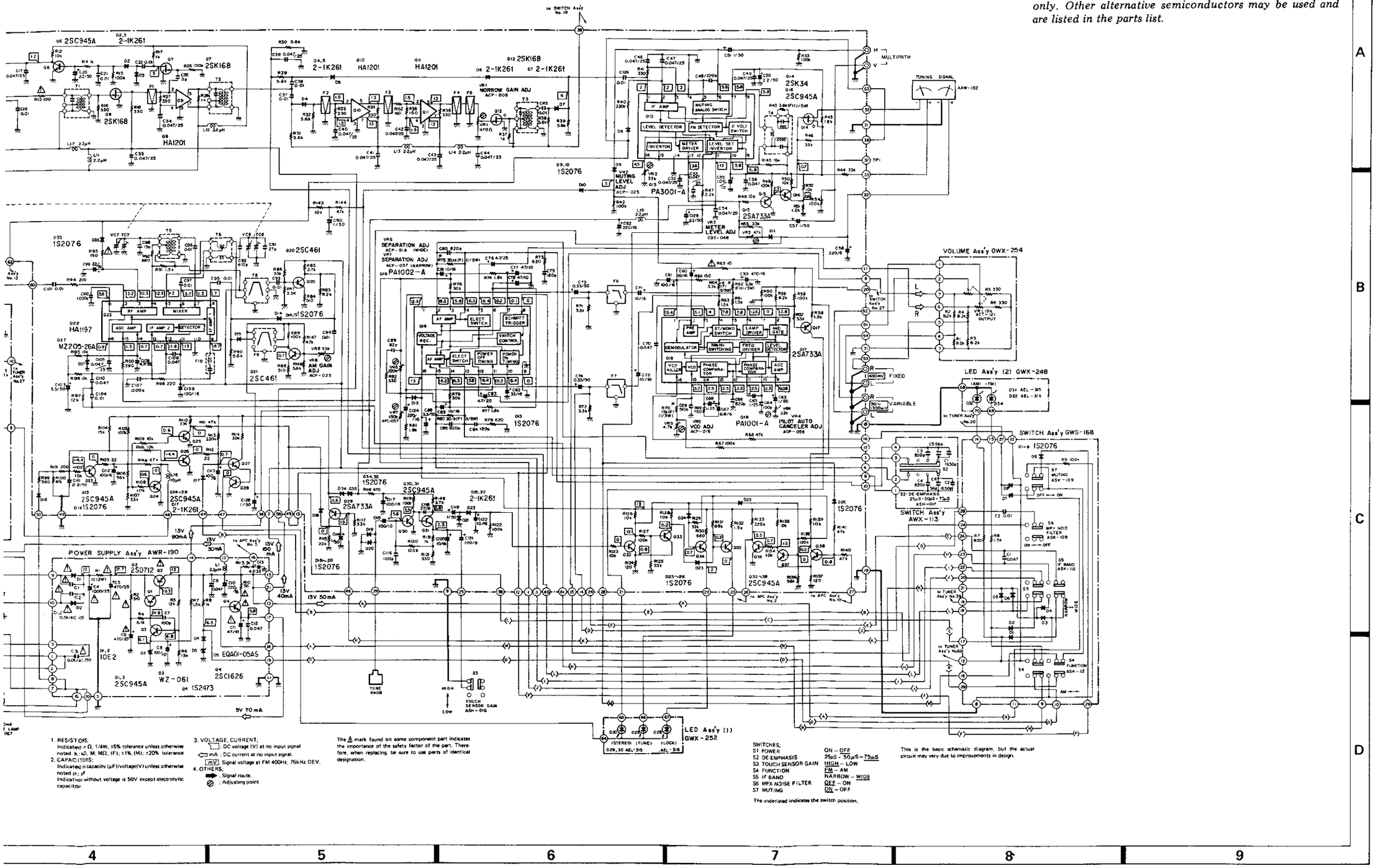


1. RESISTORS;
Indicated in Ω, 1/4W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F), ±1%, (M): ±20% tolerance
2. CAPACITORS;
Indicated in capacity (μF)/voltage(V) unless otherwise noted p: pF
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT;
□ : DC voltage (V) at no input signal
⇦ mA : DC current at no input signal.
mV : Signal voltage at FM 400Hz, 75kHz DEV.
4. OTHERS;
➡ : Signal route.
⊘ : Adjusting point

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

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



1. RESISTORS;
Indicated n Ω, 1/4W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F): ±1%, (M): ±20% tolerance
2. CAPACITORS;
Indicated is capacity (μF)/voltage(V) unless otherwise noted p: pf
Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT;
: DC voltage (V) at no input signal
: mA : DC current at no input signal.
[mV]: Signal voltage at FM 400Hz, 75kHz DEV.
4. OTHERS;
: Signal route.
: Adjusting point

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

SWITCHES;

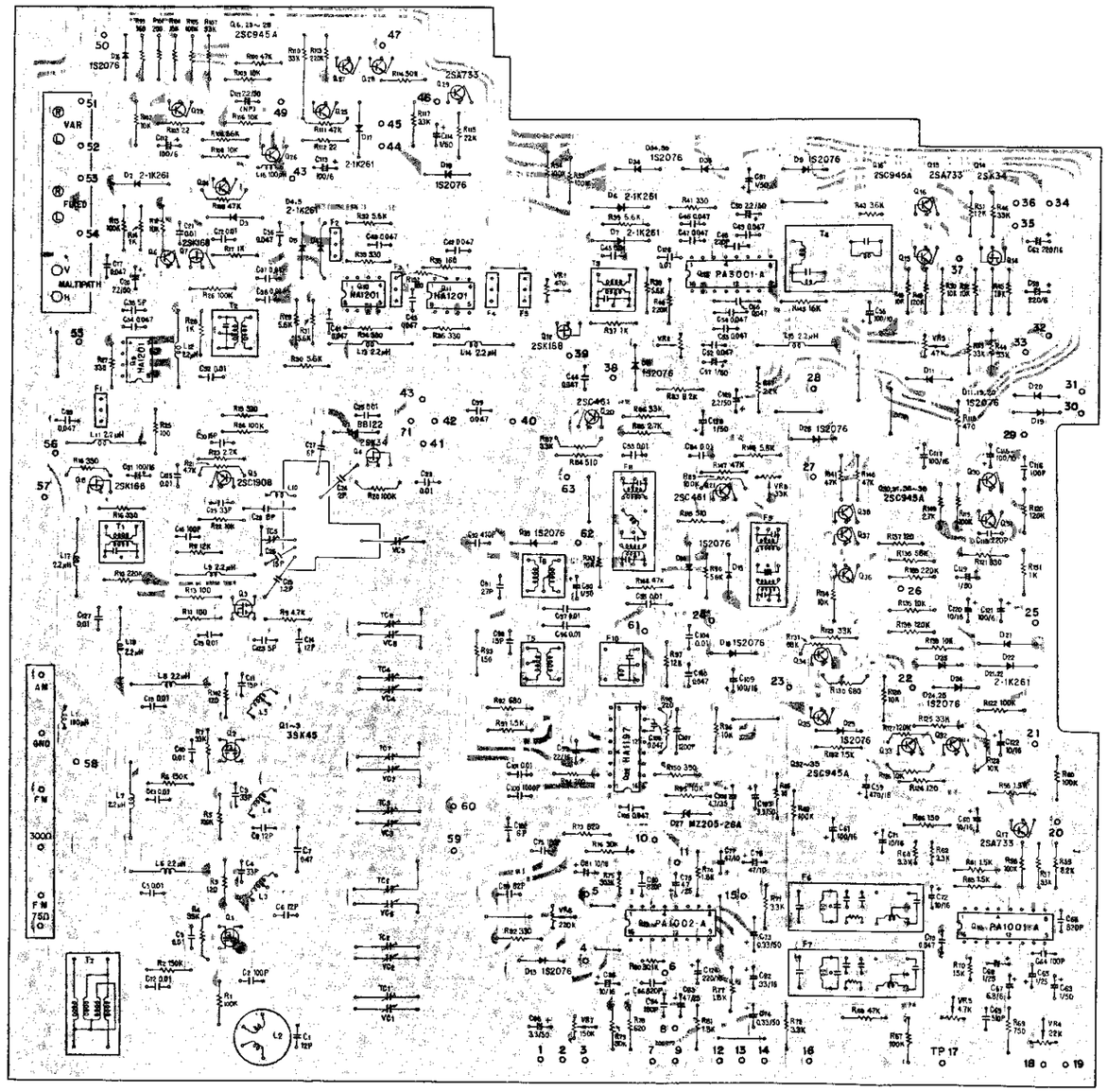
S1 POWER		ON – OFF
S2 DE-EMPHASIS		25μS - 50μS – 75μS
S3 TOUCH SENSOR GAIN		HIGH – LOW
S4 FUNCTION		FM – AM
S5 IF BAND		NARROW – WIDE
S6 MPX NOISE FILTER		OFF – ON
S7 MUTING		ON – OFF

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may very due to improvements in design.

3.2 TUNER ASSEMBLY (GWE-116)

The parts of the GWE-116 is the same as the GWE-114 (for KU type), with the exception of C79 and C87 (AEC-012: 1650p) which are left out.



3.3 LED ASSEMBLY 1 (GWX-252)

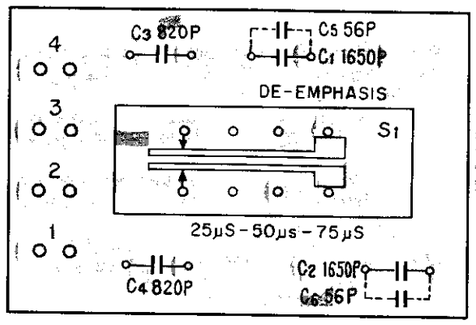
The circuitry of the LED assembly 1 GWX-252 is the same as the GWX-248 (for KU type).

3.4 LED ASSEMBLY 2 (GWX-253)

The circuitry of the LED assembly 2 GWX-253 is the same as the GWX-249 (for KU type).

3.5 SWITCH ASSEMBLY (AWX-113)

Part No.	Symbol & Description		
ASH-017	S1	Slide switch (DE-EMPHASIS)	
ACE-012 CQSA 821G 50 CCDSL 560K 50	C1, C2 C3, C4 C5, C6	Styrol	1650p



3.6 POWER SUPPLY ASSEMBLY (AWR-190)

The parts of the AWR-190 is the same as the AWR-187 (for KU type), with the exception of C3 and R3.

Symbol	Part No. (for AWR-190)	Part No. (for AWR-187)
C3	ACG-001	ACG-003
R3	.....	ACN-019