

AM/FM STEREO RECEIVER
SX-1250

<ART-158-0>

Service Manual



 **PIONEER®**

MODEL SX-1250 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KCU	120V only	CSA (Canada) and UL (U.S.A) approved with de-emphasis selector switch (25 μ s/75 μ s)
HG	220V and 240V (Switchable)	SEMKO (Sweden), NEMKO (Norway), DEMKO (Denmark) and EI (Finland) approved
S	110V, 120V, 220V and 240V (Switchable)	General export model with de-emphasis selector switch (25 μ s/50 μ s/75 μ s)

When repairing S or HG type, please see the manual on page 101.

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1. SPECIFICATIONS

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Power Amplifier Section

Continuous Power Output from 20 Hertz to 20,000 Hertz
(Both channels driven) . . 160 watts per channel (8 ohms)
200 watts per channel (4 ohms)

Total Harmonic Distortion (20 Hertz to 20,000 Hertz, from
AUX)

Continuous Rated Power Output. . . No more than 0.1%
80 watts per channel power

output, 8 ohms No more than 0.05%

1 watt per channel power
output, 8 ohms No more than 0.07%

Intermodulation Distortion (50 Hertz : 7,000 Hertz = 4 : 1,
from AUX)

Continuous Rated Power Output. . . No more than 0.1%
80 watts per channel power

output, 8 ohms No more than 0.05%

1 watt per channel power
output, 8 ohms No more than 0.07%

Frequency Response 5Hz to 100,000Hz ± 1 dB

Input Sensitivity/Impedance

POWER AMP IN 1 V/50k ohms

Output

Speaker A, B, C, A+B, B+C, A+C

Headphone Low Impedance

Damping Factor

(20Hz to 20,000Hz, 8 ohms) 30

Hum and Noise (IHF, short-circuited, A Network) . . 100dB

Preamplifier Section

Input Sensitivity/Impedance

PHONO 1 2.5mV/50k ohms

PHONO 2 2.5mV/50k ohms

MIC 6.5mV/50k ohms

AUX 150mV/50k ohms

TAPE PLAY 1 150mV/50k ohms

TAPE PLAY 2 150mV/50k ohms

TAPE PLAY 2 (DIN connector) . . . 150mV/50k ohms

PHONO Overload Level (T.H.D. 0.1%)

PHONO 1 500mV (1kHz)

PHONO 2 500mV (1kHz)

Output Level/Impedance

TAPE REC 1 150mV

TAPE REC 2 150mV

TAPE REC 2 (DIN connector) 30mV/80k ohms

PRE OUT 1V/1k ohms

Total Harmonic Distortion

(20Hz to 20,000Hz, 1V output) . . No more than 0.02%

Frequency Response

PHONO (RIAA equalization). .30Hz to 15,000Hz ± 0.2 dB

AUX, TAPE PLAY 10Hz to 50,000Hz ± 1 dB

Tone Control

BASS MAIN ± 10 dB (100Hz)

SUB ± 5 dB (50Hz)

TREBLE MAIN ± 10 dB (10kHz)

SUB ± 5 dB (20kHz)

Filter

LOW 30Hz (12dB/oct.)

HIGH 8kHz (12dB/oct.)

Loudness Contour (Volume control set

at -40dB position) +6dB (100Hz), +3dB (10kHz)

Hum and Noise (IHF, short-circuited, A Network, rated
power)

PHONO 75dB

AUX, TAPE PLAY 90dB

Muting -20dB

FM Section

Usable Sensitivity. . . MONO . . . 8.7dBf (3.0 μ V/300 Ω)

STEREO . . 14.5dBf (5.8 μ V/300 Ω)

Usable Sensitivity (IHF '58) 1.5 μ V

50dB Quieting Sensitivity

MONO . . . 11.5dBf (4.1 μ V/300 Ω)

STEREO . . 36.0dBf (69 μ V/300 Ω)

Signal-to-Noise Ratio at 65dBf . . MONO 80dB

STEREO 74dB

Distortion at 65dBf 100Hz MONO 0.1%

STEREO 0.25%

1kHz MONO 0.1%

STEREO 0.2%

6kHz MONO 0.3%

STEREO 0.3%

Frequency Response 30Hz to 15,000Hz ± 0.3 dB

Capture Ratio 1.0dB

Alternate Channel Selectivity 83dB

Spurious Response Ratio 110dB

Image Response Ratio 110dB

IF Response Ratio 120dB

AM Suppression Ratio 60dB

Muting Threshold 13dBf (4.9 μ V/300 Ω)

Stereo Separation . . 50dB (1kHz), 35dB (30Hz ~15kHz)

Subcarrier Product Ratio 74dB

SCA Rejection Ratio 74dB

Antenna Input 300 ohms balanced

75 ohms unbalanced

AM Section

Sensitivity (IHF, Ferrite antenna) 300 μ V/m
 (IHF, Ext. antenna) 15 μ V
 Selectivity 40dB
 Signal-to-Noise Ratio 55dB
 Image Response Ratio 65dB
 IF Response Ratio 85dB
 Antenna Built-in Ferrite Loopstick Antenna

Miscellaneous

Power Requirements 120V 60Hz
 Power Consumption 650W (UL, CSA)
 1200W (max.)
 Dimensions 556(W) x 186.5(H) x 464.5(D) mm
 21-7/8(W) x 7-3/8(H) x 18-1/4(D) in
 Weight Without Package 29.2kg (64 lb 4 oz)
 With Package 33.2kg (73 lb 1 oz)

Furnished Parts

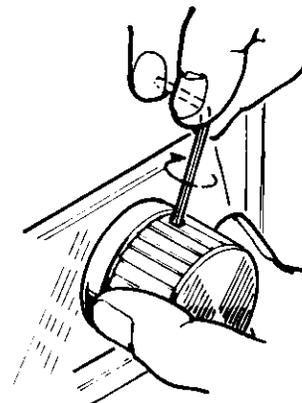
FM T-type Antenna 1
 Operating Instructions 1
 Hex. Wrench 1

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

HEX WRENCH

The accessory Hex. wrench is provided for removing the VOLUME and TUNING knobs, or for tightening its setscrew in the event it becomes loose.

If required, loosen the setscrew by inserting the wrench into the hole on the side of the knob and turning the wrench counterclockwise. Be particularly careful not to scratch the front panel when employing the wrench.



2. FRONT PANEL FACILITIES

FUNCTION SELECTOR BUTTONS

To select the program source, push each button as follows:

NOTE:

Only one **FUNCTION** button should be depressed at a time.

AM For AM broadcast reception.



PHONO 1 To operate a turntable connected to the PHONO 1 input jacks.

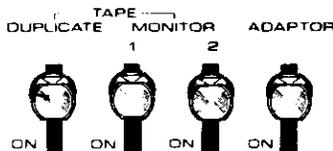
AUX For listening to audio component (cartridge tape player, TV sound tuner, etc.) connected to the AUX input jacks.

FM For FM stereo reception. Automatically receives monophonically during FM monophonic broadcasts. The **STEREO** indicator lights up when the broadcast is in stereo.

PHONO 2/MIC. As above for PHONO 2 jacks, or for reproduction through microphones connected to the MIC jack is on the front panel. Note, when the microphone is connected to the jack the turntable connected to the PHONO 2 jacks cannot be used.

TAPE DUPLICATE SWITCH

Set this switch in the **ON** (down) position to duplicate or edit a recorded tape using two tape decks.



TAPE MONITOR (1, 2) SWITCHES

Set these switch in the **ON** (down) position as follow:

- 1 With a tape deck connected to the TAPE 1 jacks (REC and PLAY), either playback or monitoring of a recording in progress are possible.
- 2 Same as in 1 above, with a tape deck connected to the TAPE 2 jacks (REC and PLAY).

For normal use, leave in the **OFF** (up) positions.

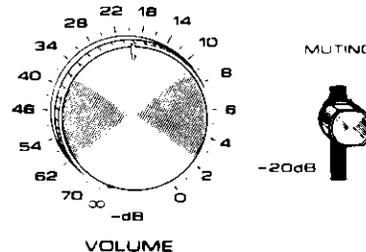
ADAPTOR SWITCH

When employing adaptor components, such as a graphic equalizer adaptor, RG processor, or Dolby NR adaptor, depress this **ADAPTOR** switch to **ON**.

VOLUME CONTROL AND AUDIO MUTING SWITCH

The extremely high power output of the SX-1250 can be finely controlled by combining the calibrated **VOLUME** control and the **AUDIO MUTING** switch.

The **AUDIO MUTING** switch can also be used to briefly lower the volume when changing records or tapes.



SPEAKER BUTTONS

Three sets of speaker terminals, A, B, and C, are provided on the rear panel, and the required speaker systems can be selected by depressing the SPEAKERS buttons as follows:

- A Speaker systems A operate
- B Speaker systems B operate
- C Speaker systems C operate

NOTES:

1. When any two buttons (A+B, B+C, C+A) are depressed simultaneously, the corresponding pairs of speaker systems will come into operation. However, it is not possible to operate all three speaker systems at the same time, even though all the buttons are depressed.
2. For private listening through headphones, return all the SPEAKERS buttons to the OFF (undepressed) position.

PHONES JACK

Accepts stereo headphones.

WARNING:

Do not plug a microphone into the PHONES jack as may damage the microphone.

POWER SWITCH

After turning this switch ON there is a delay of some 6 to 8 seconds, during which time the protection circuit operates to eliminate unpleasant noise.

TWIN BASS CONTROLS

Adjust low frequency tone.

- 100Hz: Adjusts frequency band below 400Hz. Control effectiveness at 100Hz is ± 10 dB.
- 50Hz: Provides additional control for the frequency band below 200Hz. Control effectiveness at 50Hz is ± 5 dB.

TONE SWITCH

In the OFF (up) position, this switch causes the amplifier section to operate with a flat frequency response regardless of the tone control setting.

FM TUNING METER

With the SIGNAL meter needle deflected to the right, make fine adjustment by centering the FM TUNING meter needle (indicating optimum reception).

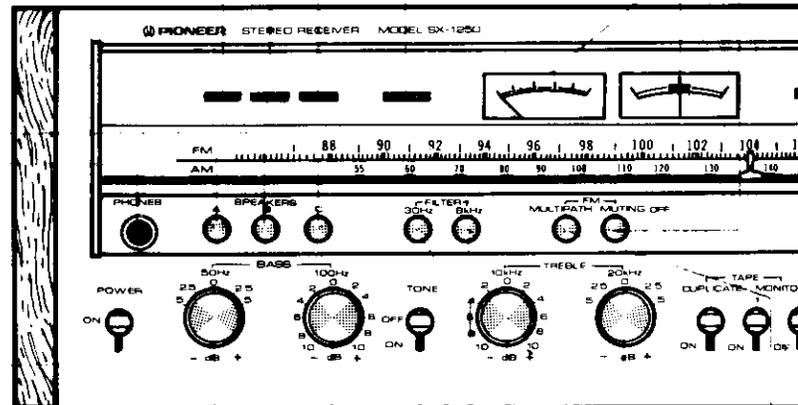
SIGNAL METER

For AM and FM station tunings.

- AM tuning: Tune for maximum deflection of the SIGNAL meter needle to the right.
- FM tuning: Both the SIGNAL and FM TUNING meters work together. The optimum point of the SIGNAL meter needle is the same as in AM tuning. Then use the FM TUNING meters.

SPEAKER SYSTEM INDICATOR

FM STEREO INDICATOR



LOW CUT (30Hz) FILTER BUTTON

When low-pitched rumble (from turntable motor or other source) is obtrusive depress this button to provide 12dB/octave, attenuation at frequencies below 30Hz. If no interference is experienced, release this button.

HIGH CUT (8kHz) FILTER BUTTON

When high frequency scratch noise (from worn records or other source) is unpleasant, depress this button to provide 12dB/octave attenuation at frequencies above 8kHz. If there is no interference, release this button.

TUNING KNOB

Select the station and tune for optimum reception by observing the SIGNAL meter for AM stations, and both SIGNAL and TUNING meters for FM stations.

FM MUTING BUTTON

Leave this button undepressed (in the ON position) to suppress unpleasant interstation noise while tuning between FM stations. Low-strength signals may also be suppressed by this function, so to pick up a weak station depress this button to the OFF position.

PROGRAM SOURCE INDICATOR

MIC JACKS (L and R)

For connect each channel jacks the left and right channel microphones.

NOTE:

Use the high impedance (above 20kΩ) with 6mm diam. phone plugs.

VOLUME CONTROL

Adjusts output level to speakers and headphones. Scale is graduated in dB, and when used in conjunction with the MUTING switch, finer and wider range attenuation can be performed. See additional description on page 6.

AUDIO MUTING SWITCH – 20dB

Depress this switch to attenuate the audio output by 20dB. This convenient feature saves having to disturb the VOLUME control, for example when answering the telephone.

LOUDNESS SWITCH

Depress this switch when listening at low volume. The frequency response of the human ear varies according to the listening volume, and the depressed position compensates for hearing response by emphasizing the bass and treble.

MODE SWITCH

For stereo playback, leave this switch undepressed (or depress to release, if already depressed). When depressed for MONO playback, left and right channel stereo signals will be mixed to produce monophonic sound from both speaker systems.

BALANCE CONTROL

Adjusts the balance between the sound volume from the left and right speaker systems or headphones.

FM MULTIPATH BUTTON

When selecting the best position for the FM antenna, depress this button so that multipath noise is heard from the speaker systems. To listen to FM broadcasts, release this button.

TWIN TREBLE CONTROLS

Adjusts high frequency tone.

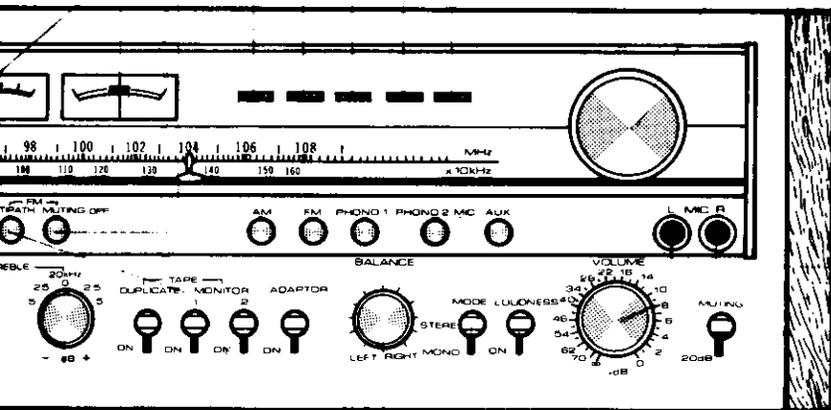
10kHz: Adjusts frequency band above 2.5kHz. Control effectiveness at 10kHz is ±10dB.

20kHz: Provides additional control for the frequency band above 5kHz. Control effectiveness at 20kHz is ±5dB.

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TUNING

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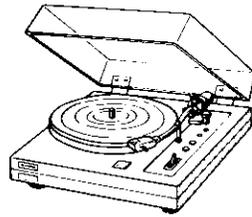


or other
provide
30kHz. If

records or
provide
8kHz. If

3. CONNECTION DIAGRAM

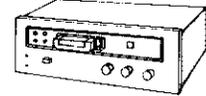
TURNTABLE



TURNTABLE



CARTRIDGE
TAPE PLAYER

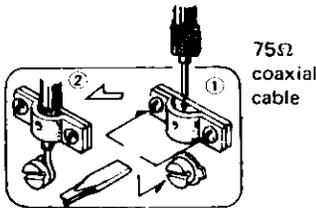
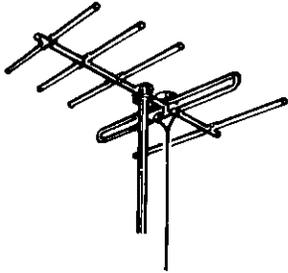


TAPE DECK
(open-reel)



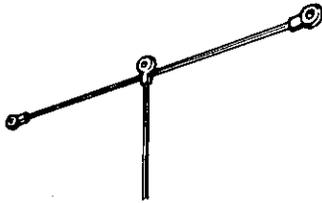
LINE
INPUT

OUTDOOR
FM ANTENNA

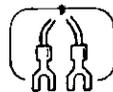


75Ω
coaxial
cable

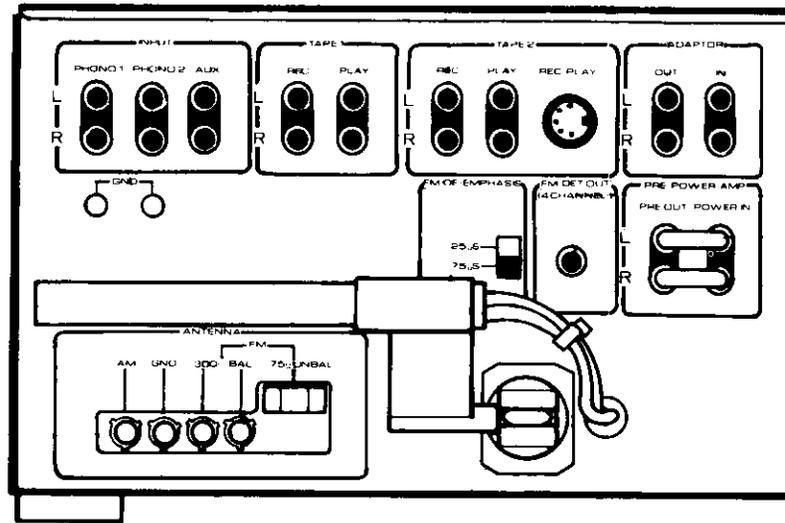
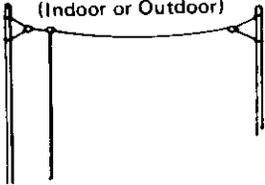
T-TYPE
FM ANTENNA



300Ω feeder



AM ANTENNA
(Indoor or Outdoor)

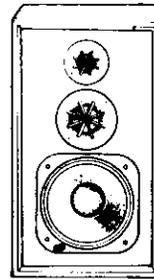


GND

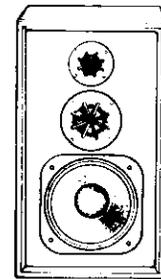
FM DE-EMPHASIS SWITCH

Normally, set this switch to "75μs". Be sure to set it to "25μs" only when listening to an FM broadcast (pre-emphasis; 25μsec.) with a Dolby* system NR adaptor connected between the ADAPTOR OUT and ADAPTOR IN terminals.

* The word "Dolby" is a trademark of Dolby Laboratories Inc.

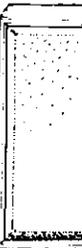


RIGHT



LEFT

SPEAKER SYSTEMS A



RIGHT

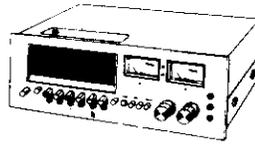
SPEAKER SYSTEMS B

TAPE DECK
(open-reel, cassette)



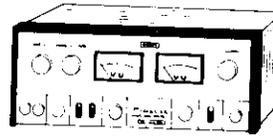
LINE INPUT LINE OUTPUT

TAPE DECK
(Open-reel, cassette)



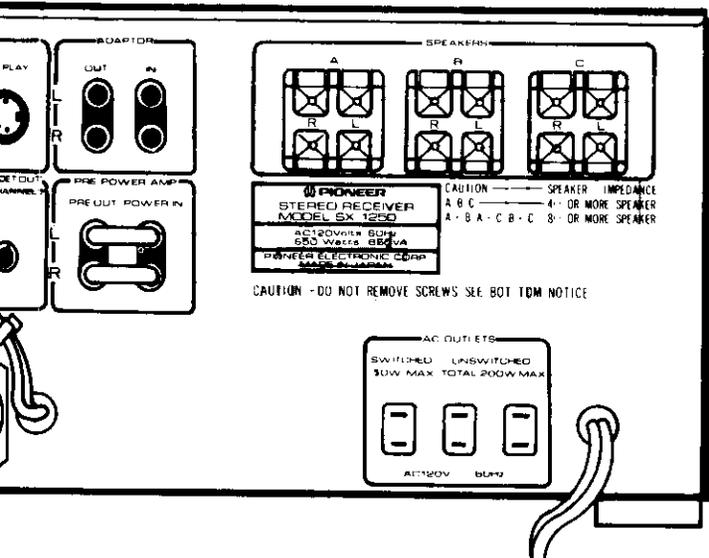
LINE INPUT LINE OUTPUT

DOLBY NR ADAPTOR



LINE INPUT LINE OUTPUT

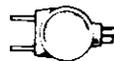
4 CHANNEL DISCRETE FM ADAPTOR



PRE/POWER AMP

The bridge connecting plugs between PRE OUT and POWER IN jacks should always be left in position in normal use. If they are disconnected or removed, no sound will come from the speakers. Always be sure to switch off the power supply before attempting to remove them.

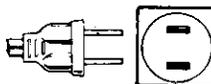
CONVENIENCE OUTLETS



Unswitched: Less frequently used components, which do not require coupled power, can be plugged into either of these outlets. (200W max.)



Switched: A frequently used component (turntable, tape deck, etc.) can be plugged into this outlet. (50W max.) By leaving the power switch of that component in the ON position, power supply to the component will be coupled with the SX-1250 switch operation.

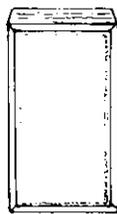


RIGHT



LEFT

SPEAKER SYSTEMS B



RIGHT



LEFT

SPEAKER SYSTEMS C

4. CIRCUIT DESCRIPTIONS

4.1 TUNER SECTION

FM Front End

The FM front end is composed of a tuning circuit employing a 5-gang variable capacitor, a 2-stage RF amplifier and mixer employing dual gate MOS FETs, and a local oscillator with buffer. An equivalent of a cascode amplifier is produced by AC grounding gate-2 of the dual gate MOS FET, allowing stable RF amplification at high gain.

The output signal of the RF amplifier is applied to gate-1 of the mixer stage MOS FET, while the local oscillator output signal is applied to gate-2. This technique minimizes input power from the local oscillator, resulting in low mutual interference even if the received signal input level is high.

A variation of a Clapp circuit forms the local oscillator. Inclusion of a buffer amplifier between local oscillator and mixer reduces local oscillator load, eliminating distortion of the oscillation waveform. Drawing effect of the local oscillator is also eliminated.

FM IF Section

Four integrated circuits (ICs) and four dual element ceramic filters compose this section. HA1201 (diagram on page 56) is a differential amplifier with a constant current source and functions as a current-limiting limiter. HA1137 (diagram on page 55) contains IF limiter amplifier, quadrature detector, meter drive and muting circuits. The detector circuit contained within this IC is not used in the SX-1250 however, and instead the IF signal is taken from the stage prior to the detector and applied to TA7061AP. This latter IC is a 3-stage differential amplifier (diagram on page 56) and its output goes to the ratio detector for FM detection.

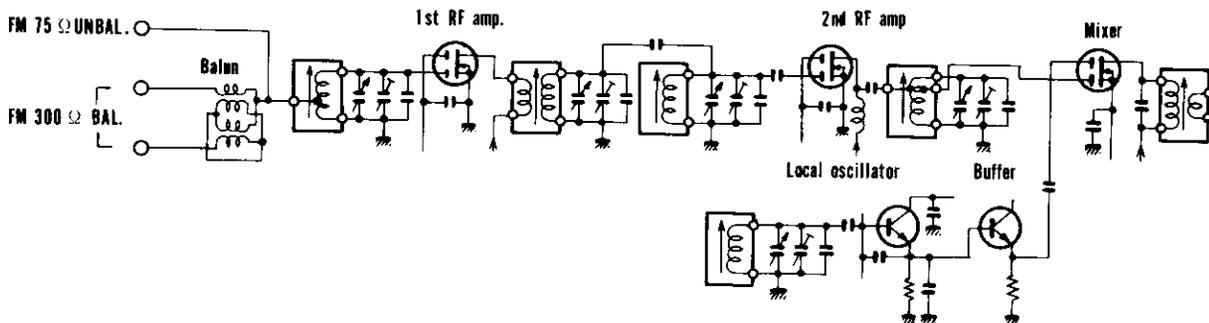


Fig. 1. Circuitry of FM front end

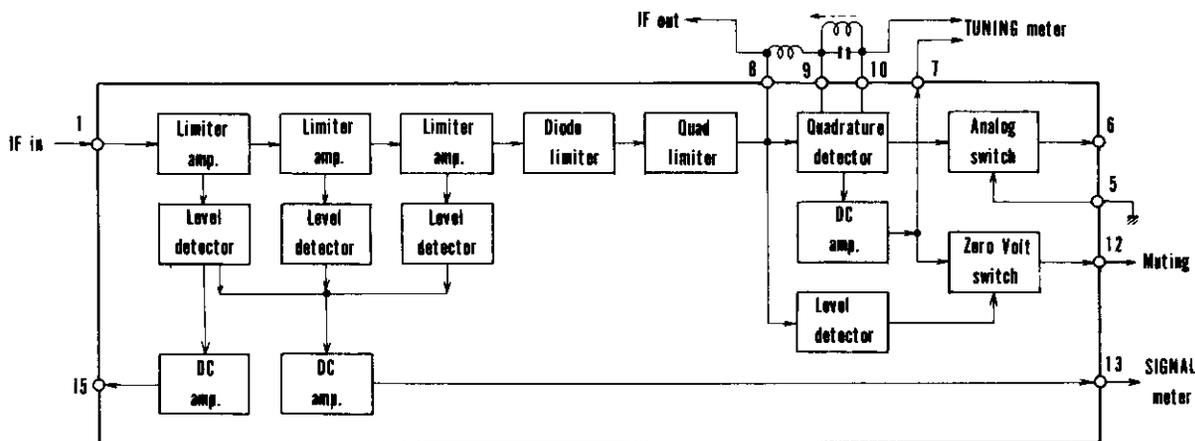


Fig. 2. Block diagram for HA1137

Multiplex Decoder

The multiplex decoder contains three sections and employs an IC (HA1196) with a block diagram as shown in Fig. 3 (see page 55 for circuit).

1. Switching Signal Generator

A PLL (phase locked loop) system is employed. 76kHz is generated by the VCO (voltage controlled oscillator: an oscillator in which frequency is controlled by a voltage) and converted into 38kHz by a frequency divider, then divided again to become 19kHz. This signal and the stereo pilot component (19kHz) of the detected signal are applied to a phase comparator where the difference between them is converted into a voltage. By feedback this voltage is applied to the VCO. And the oscillator signal is locked to the pilot signal. This loop is termed PLL and a 38kHz switching signal synchronized to the pilot signal is obtained and employed as a switching signal.

2. Automatic stereo detector

With the PLL locked to the pilot signal, the pilot signal and a 19kHz signal of the same phase are produced. A voltage is then obtained at the phase comparator that is proportional to the pilot signal amplitude. As it increases, the lamp lights and the switch becomes on. The switching signal is applied to the demodulator.

However, if the FM muting signal is also applied to pin 12, the detector circuit becomes disabled (grounded). Therefore a switching signal to the demodulator is not supplied and mono reproduction is obtained.

3. Demodulator

Two differential amplifiers are employed in a switching circuit (Fig. 4). The composite signal is applied to the base of Q3. Q1 and Q2 are alternately switched ON and OFF by the switching signal. The composite signal amplified at Q3 is demodulated by the switching of Q1 and Q2. Q6 and Q3 are loosely coupled at their emitters by R1, R2 and R3. Q6 is driven in opposite phase to Q3 and its low level composite signal output is demodulated by switching of Q4 and Q5. The demodulated signals in opposite phase are combined at the collectors of Q1 and Q2, cancelling crosstalk. Adequate current flow is required in Q3 and Q6 for low distortion. However, if the base bias voltage is raised, the voltage range available at the collector is reduced and clipping occurs (power supply voltage is limited by IC voltage requirement). For this reason, current from an external source is inserted at Q3 and Q6 collectors and become I1 and I2 in Fig. 4. The same amount of current is removed at the emitters of Q3 and Q6 to become I3 and I4 in Fig. 4. Q3 and Q6 therefore operate with adequate current and distortion in this stage is remarkably reduced. A feedback amplifier amplifies the demodulated signal to produce the IC outputs.

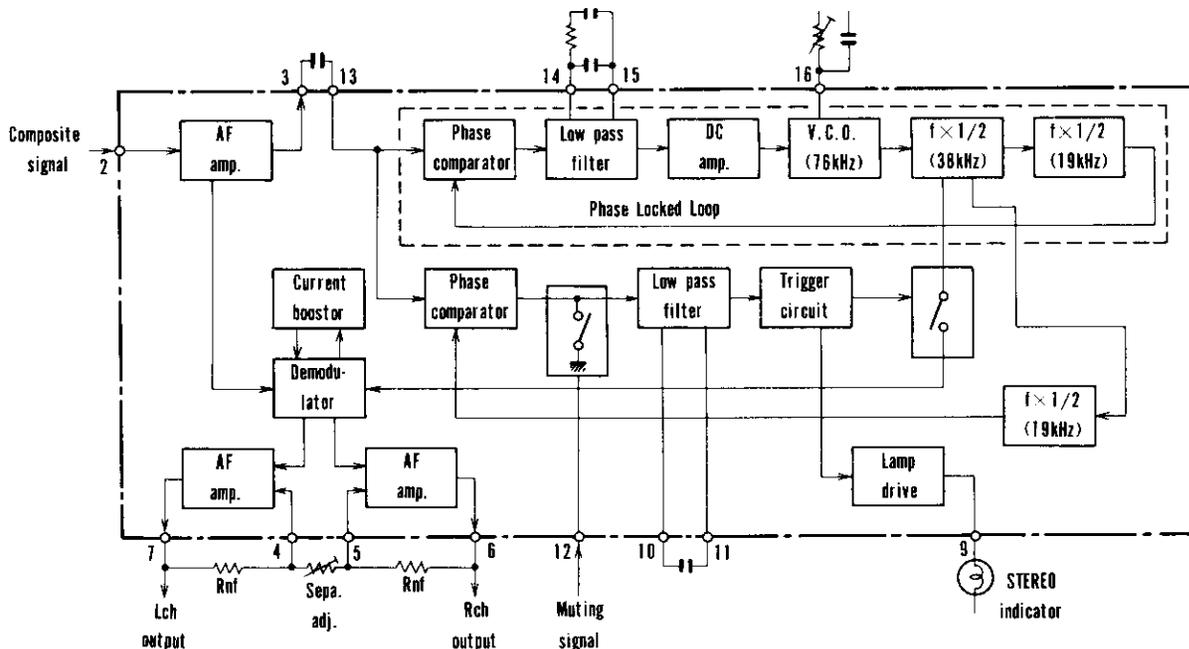


Fig. 3. Block diagram for HA1196

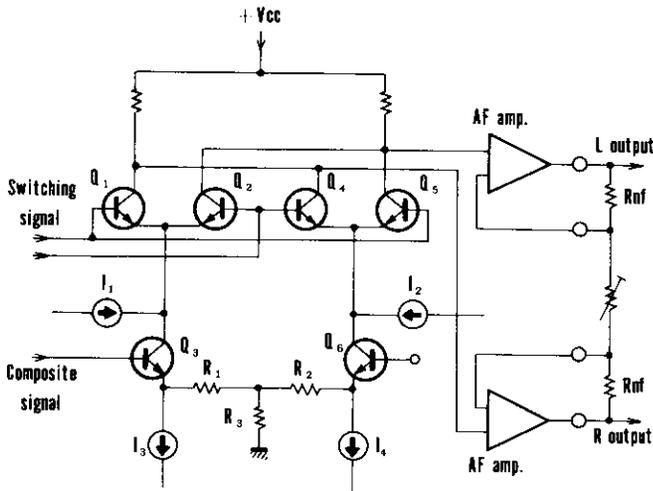


Fig. 4. Basic circuitry of demodulator

FM Muting Circuit (Fig. 5)

DC voltage emerges from pin 12 of IC (HA1137) in the event of more than $\pm 70\text{kHz}$ detuning or low input level (less than $4.9\mu\text{V}$ antenna input conversion). This is employed for shorting the AF output circuit to perform muting by the reed relay.

Multipath Monitor Circuit

When multipath reflections exist in the received signal, the signal is converted into AM and PM (amplitude modulation and phase modulation) forms. Since the amplitude of the actual FM signal is fixed, by converting this AM component into a sound and listening to it, the existence (and amount) of multipath reflection can be determined. Short term level variations (audio frequency) are taken as a signal from HA1137 SIGNAL meter drive terminal (pin 13). By setting the FM MULTIPATH switch to ON during FM reception, this signal becomes connected to the audio amplifier and can be heard as a sound which indicates conditions of multipath reflection.

AM Tuner

The AM tuner employs a 3-gang variable capacitor and an IC (HA1138) with 1-stage of RF and 2-stage of IF amplification. Fig. 6 shows the HA1138 block diagram (see page 55 for circuit).

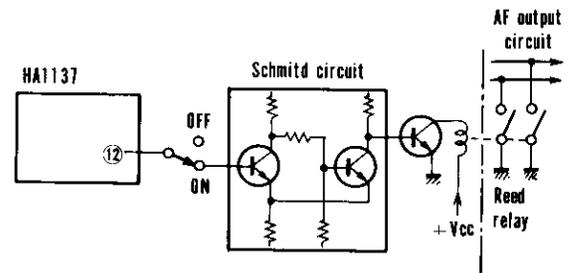


Fig. 5. Circuitry of FM muting

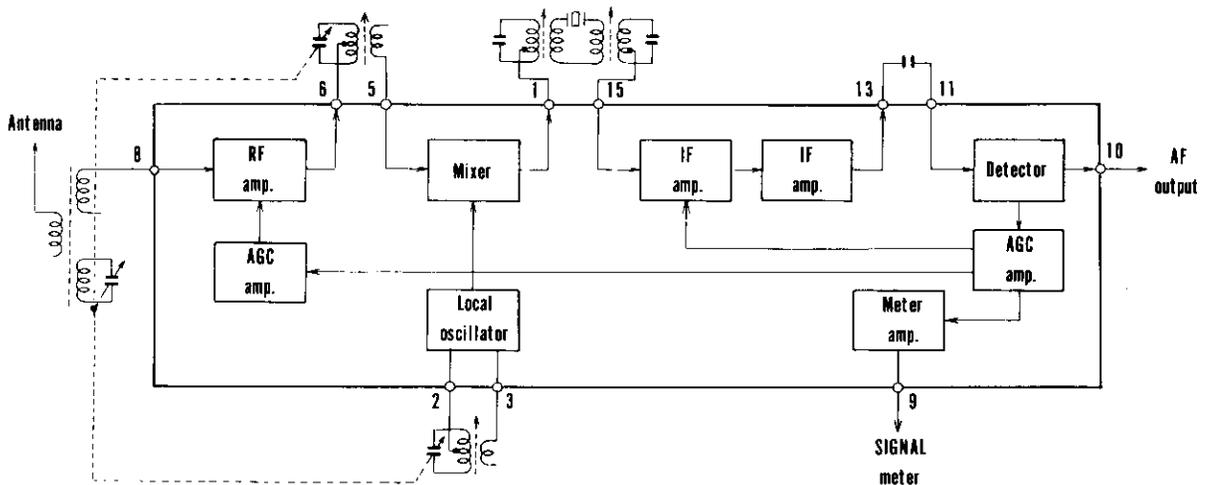


Fig. 6. Block diagram for HA1138

4.2 AUDIO SECTION

Equalizer Amplifier

The equalizer amplifier is shown in Fig. 7. The first stage (Q1 & Q2) is a PNP transistor unbalanced differential amplifier. High voltage gain is provided in the following stage (Q3) by a bootstrap circuit (C1 & R1). The output stage (Q4 & Q5) is a complementary symmetrical SEPP circuit. The high voltage utility factor of the SEPP circuit provides a high maximum output voltage. Dynamic range of the equalizer amplifier is therefore wide and overload input level at 0.1% distortion is 500mV (rms at 1kHz).

Equalizer elements (C2, C3, R2, R3) are polystyrene film capacitors with tolerances within $\pm 1\%$ and metal film resistors with tolerances better than $\pm 1\%$. These lead to a deviation with respect to the RIAA playback standard within $\pm 0.2\text{dB}$. Due to the balanced plus and minus power supply, the input and the output points become essentially 0V, reducing click noise during FUNCTION switch operation.

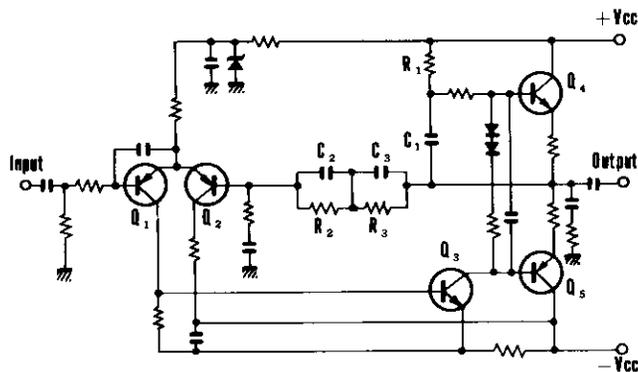


Fig. 7. Schematic diagram for Equalizer amplifier

Tape and Adaptor Circuits

With the DUPLICATE switch OFF, the program source selected by the function switches are obtained at the TAPE REC jacks (Fig. 8).

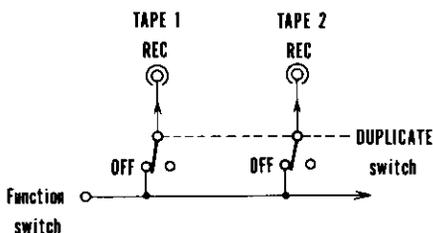


Fig. 8. TAPE REC jacks

The TAPE MONITOR 1 switch selects between the program source selected by the function switch and the input at the TAPE 1 PLAY jacks (Fig. 9). The TAPE MONITOR 2 switch selects between the signal selected by the TAPE MONITOR 1 switch and the input at the TAPE 2 PLAY jacks (Fig. 9).

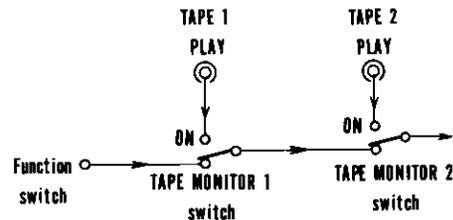


Fig. 9. Tape monitor circuit

When the DUPLICATE switch is set to ON, the TAPE 1 REC jacks are connected to the TAPE 2 PLAY jacks, and the TAPE 2 REC jacks to the TAPE 1 PLAY jacks (Fig. 10).

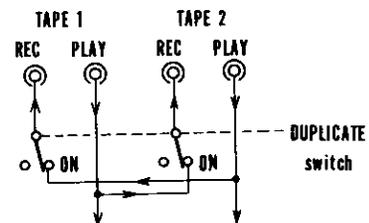


Fig. 10. Tape duplicate circuit

The signal selected by the TAPE MONITOR 2 switch appears at the ADAPTOR OUT jacks (Fig. 11). The ADAPTOR switch selects between the signal selected by the TAPE MONITOR 2 switch and the input at the ADAPTOR IN jacks (Fig. 11).

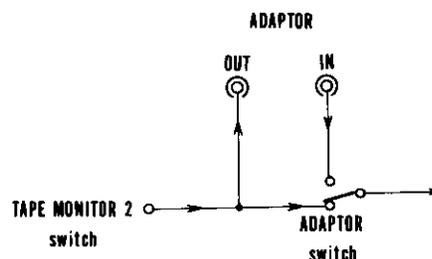


Fig. 11. ADAPTOR jacks

MODE Switch

When the MODE switch is set to the MONO position, the left and right channels are shorted in the stage following the tape and adaptor circuits.

BALANCE Control

A no-loss HB type variable resistor at center position is employed. An SEPP circuit is inserted as a buffer in the following stage.

Muting Circuit

When the MUTING switch is set to the -20dB position, the signal is attenuated by 20dB.

Loudness Circuit

This circuit is operated ON or OFF by the LOUDNESS switch and is intended to compensate for audibility characteristics of the human ear at low volumes. The VOLUME control variable resistor is tapped. Connecting a CR network at this point enhances low and high frequencies at low volumes.

Tone Controls

Twin tone controls are employed with the SX-1250. These consist of ultra-low and ultra-high (sub) controls in addition to the conventional BASS and TREBLE (main) controls.

The signal is amplified to required level by a 2-stage FET and transistor direct coupled amplifier, after which a 2-stage NFB type tone control circuit is provided. The sub controls form the first stage and the main controls form the second stage of this circuit. With NFB type tone controls, C-B feedback is applied to a single transistor amplifier. Frequency response becomes variable by providing selectivity in the feedback circuit. The basic circuit of this stage is shown in Fig. 12.

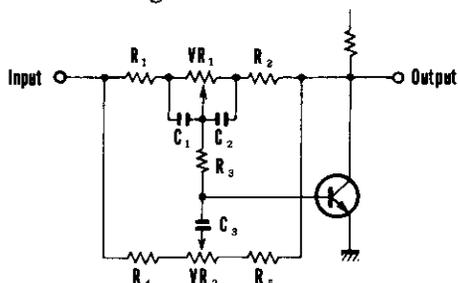


Fig. 12. Basic circuitry of NFB type tone control circuit

Midrange Operation

The C1 and C2 reactances are considerably smaller than VR1 at frequencies above midrange, effectively shorting VR1. At frequencies below midrange, C3 reactance becomes large and in effect, opens the circuit. Consequently, the circuit becomes equivalent to that shown in Fig. 13 with respect to the midrange. In this figure, the circuit parameters are not changed by any change in position of the VR1 and VR2 sliders. The NFB amount is therefore fixed and the circuit gain is also fixed without regard to VR1 and VR2 slider positions.

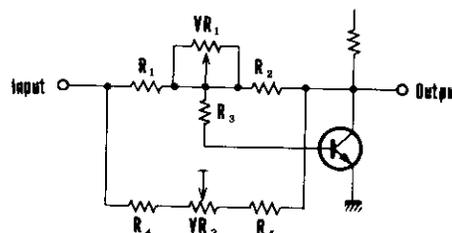


Fig. 13. Midrange operation of NFB type tone control circuit

Low Frequency Operation

The reactance of C1 and C2 increases at low frequency to form a circuit as shown in Fig. 14. This reactance increases in proportion to the frequency declines. Also, the NFB amount varies greatly according to VR1 slider position. The circuit gain at low frequencies can therefore be varied by VR1.

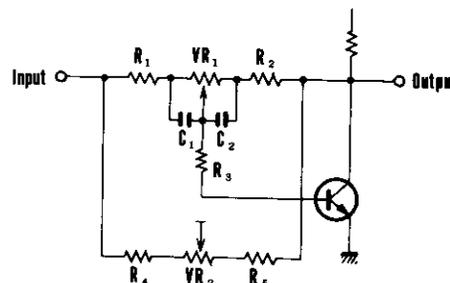


Fig. 14. Low frequency operation of NFB type tone control circuit

High Frequency Operation

The considerably smaller reactance of C1 and C2 at high frequency in comparison with VR1 effectively shorts VR1 to form an equivalent circuit such as that shown in Fig. 15. C3 reactance decreases in the same degree that the frequency increases and the NFB amount is now mainly controlled by the VR2 slider position. Consequently, the gain at high frequencies can be varied by VR2.

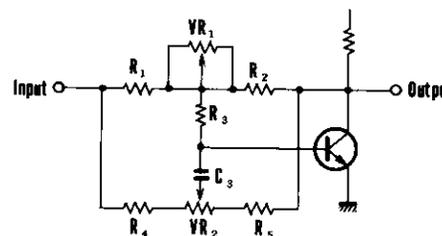


Fig. 15. High frequency operation of NFB type tone control circuit

Tone Defeat Circuit

By setting the TONE switch to OFF, the above described tone control circuit becomes bypassed.

Filter Circuits (Fig. 16)

These are NFB type active filters with -12dB/octave slopes. The circuit combines a 2-stage CR element and emitter follower. Normal function of the emitter follower is provided in the passband and by 100% NFB, gain becomes essentially "1". NFB is cancelled in the area of the cutoff frequency, composing a peak in the frequency response. This leads to improved and sharper CR filter response. In the actual circuit, CR elements for low and high filters both employ the same emitter follower and each can be selected ON-OFF.

Power Amplifier

Fig. 17 shows the power amplifier section. The input stage is composed of Q1 & Q2 differential amplifier, with the input signal applied to Q1. Q3 & Q4 differential amplifier comprise the second stage, with Q3 output composed at Q4 by Q5 & Q6 current mirror. Connecting collector and base of Q5 produces the equivalent of a diode. Q3 collector current produces a forward voltage between Q5 base and emitter, biasing Q6. R1 and R2 in this circuit are equal, while Q5 and Q6 are the same type transistors. Consequently, when voltages between bases and emitters of Q5 & Q6 are equal, current flows in these transistors also become equal. This results in equal current flows in Q3 and Q6. Mutually opposite phase signals drive Q3 and Q4, resulting in mutually opposite phase collector currents. Q4 and Q6 therefore operate as push-pull.

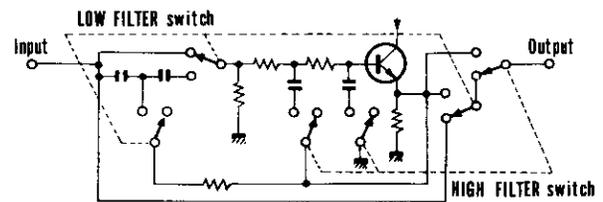
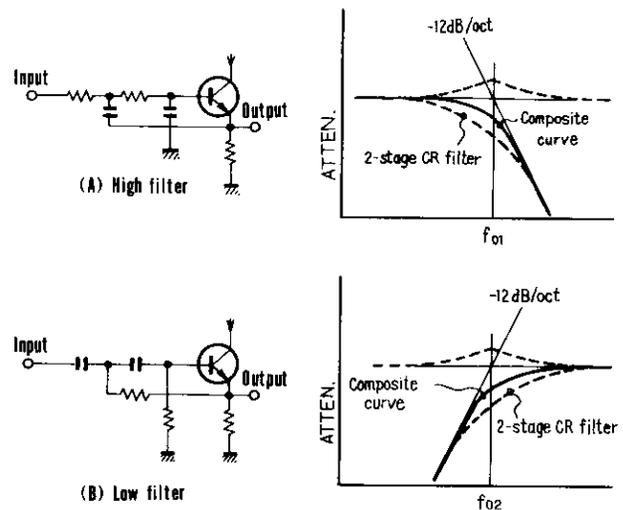


Fig. 16. Basic circuitry of filters

Power stage bias voltage is supplied by the voltage drop across D1, D2 and VR2. VR2 is a semi-fixed resistor for power stage bias adjustment, while D1 and D2 are Varistors for temperature compensation.

A 3-stage Darlington connection is employed in the power stage (Q7-Q14), with output transistors Q11-Q14 in a complementary symmetrical parallel

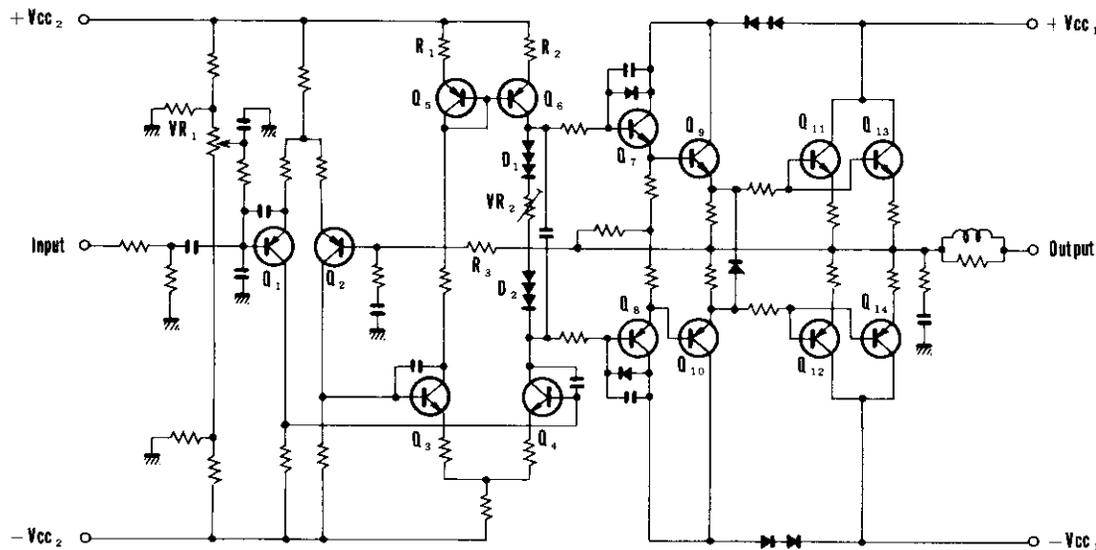


Fig. 17. Schematic diagram for power amplifier

connection. The output center point is at 0V from the balanced plus and minus power supply, while 100% DC NFB is applied to Q2 through R3. Because of this, circuit DC gain becomes 0dB and DC voltage of the output center point is determined by Q1 base voltage. VR1 is a semi-fixed resistor for fine adjustment of the center point voltage to compensate for irregularities in circuit elements.

SPEAKERS Switches

The SX-1250 is provided with 3 sets of speaker terminals (A, B, C). Since the power amplifier can become overloaded if all three sets are used simultaneously, when all 3 SPEAKERS switches are set to ON, the circuit functions as if all switches were OFF and the indicator lamps extinguish.

4.3 PROTECTION CIRCUIT

This circuit protects the power transistors in case of overload, the speakers in case of power amplifier malfunction, and also performs a muting function when the power supply is turned ON or OFF. The protection circuit is composed of three sections (Fig. 18).

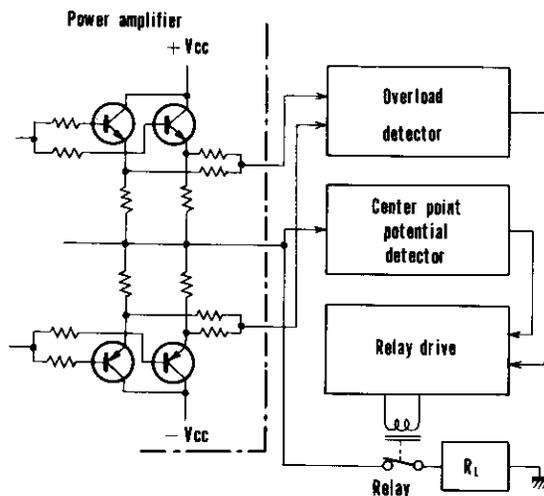


Fig. 18. Block diagram of protection circuit

1. Relay Driver Circuit (Fig. 19)

The relay which connects the output circuits is driven by this circuit. It also performs a muting function to prevent unpleasant noise during ON-OFF operation of the power supply as well as opening the output circuit on command from the detector circuits.

Muting Operation

When the power supply is turned ON, Q6 base is reverse biased through D6 and R19-R21, turning Q6 OFF. Q7 base potential rises as C4 charges through R22 & R23, and Q7 turns ON several seconds later. The collector current of Q7 then

flows through the relay coil, operating the relay to turn on the power amplifier output circuit. The reverse bias of Q6 base from D6 & R19-R21 disappears when the power supply is set from ON to OFF. Q6 remains ON however, due to the residual power supply voltage. C4 very rapidly discharges, Q7 base potential drops and Q7 turns OFF. The relay releases and the power amplifier output circuit turns OFF.

Note:

Q5 is normally OFF due to base bias and does not participate in the muting operation.

Operation by Detector Circuit Command

Command from the detector circuits pass through one of D3, D4 or D5 and are applied in the form of a current flow. Q5 is normally reverse biased through R14, but when a large current flows through on of these diodes, Q5 base potential declines according to the voltage drop at R14. Q5 then becomes ON, Q6 base potential rises and Q6 becomes ON. C4 rapidly discharges and Q7 base potential drops, turning Q7 OFF. The relay releases and the power amplifier output circuit becomes cut off.

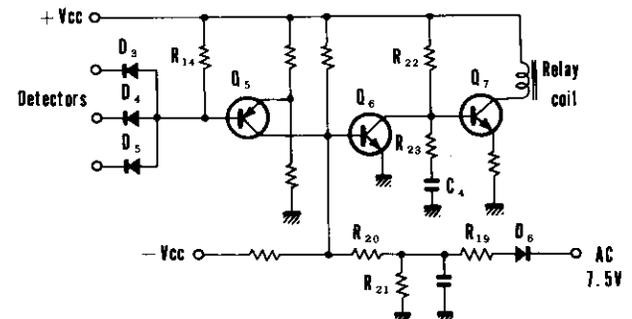


Fig. 19. Schematic diagram of relay driver circuit

2. Overload Detector Circuit

Shorting of the power amplifier load or a load impedance below the specified value causes a command to be sent to the relay drive circuit. This is illustrated in Fig. 20.

With the output stage in class B operation, when Qa is operating in the positive half cycle, Qb becomes cut off and the signal current flows as indicated by the solid arrows in Fig. 20. Point D potential at this time is the point A potential divided by R1 and R3. Also, point C potential is the point A potential divided by RE1 and RL (load). Point D is connected to Q1 base and point C to Q1 emitter through R2 and RE2. When RL is extremely small, the point C potential becomes considerably lower than point D. This potential difference forward biases Q1. Q1 turns ON and current flows in D3.

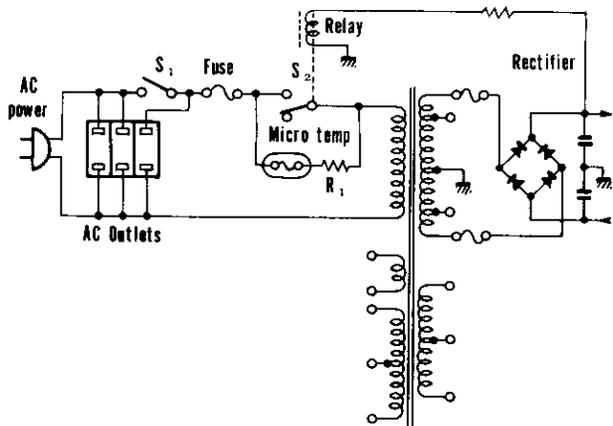
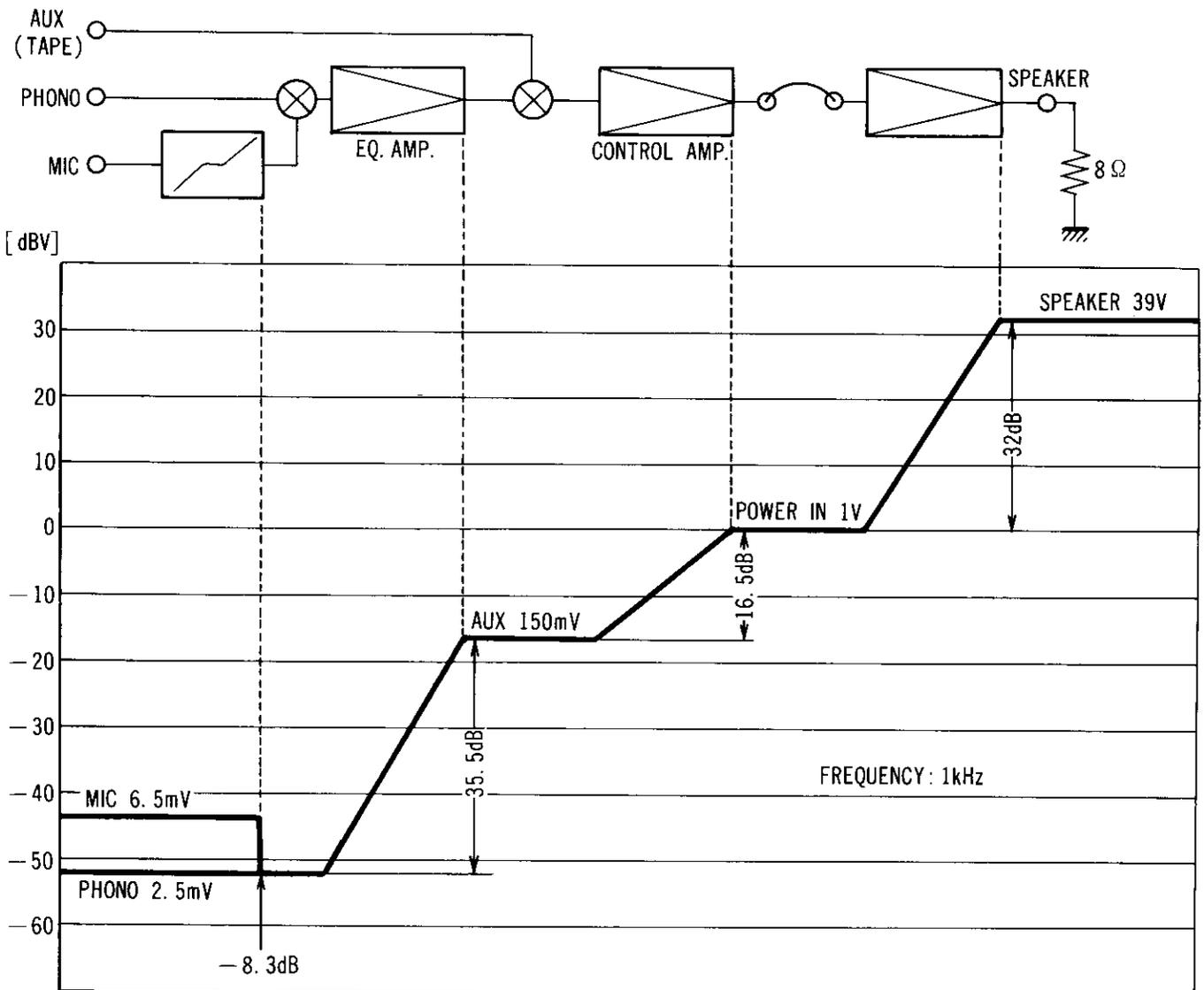
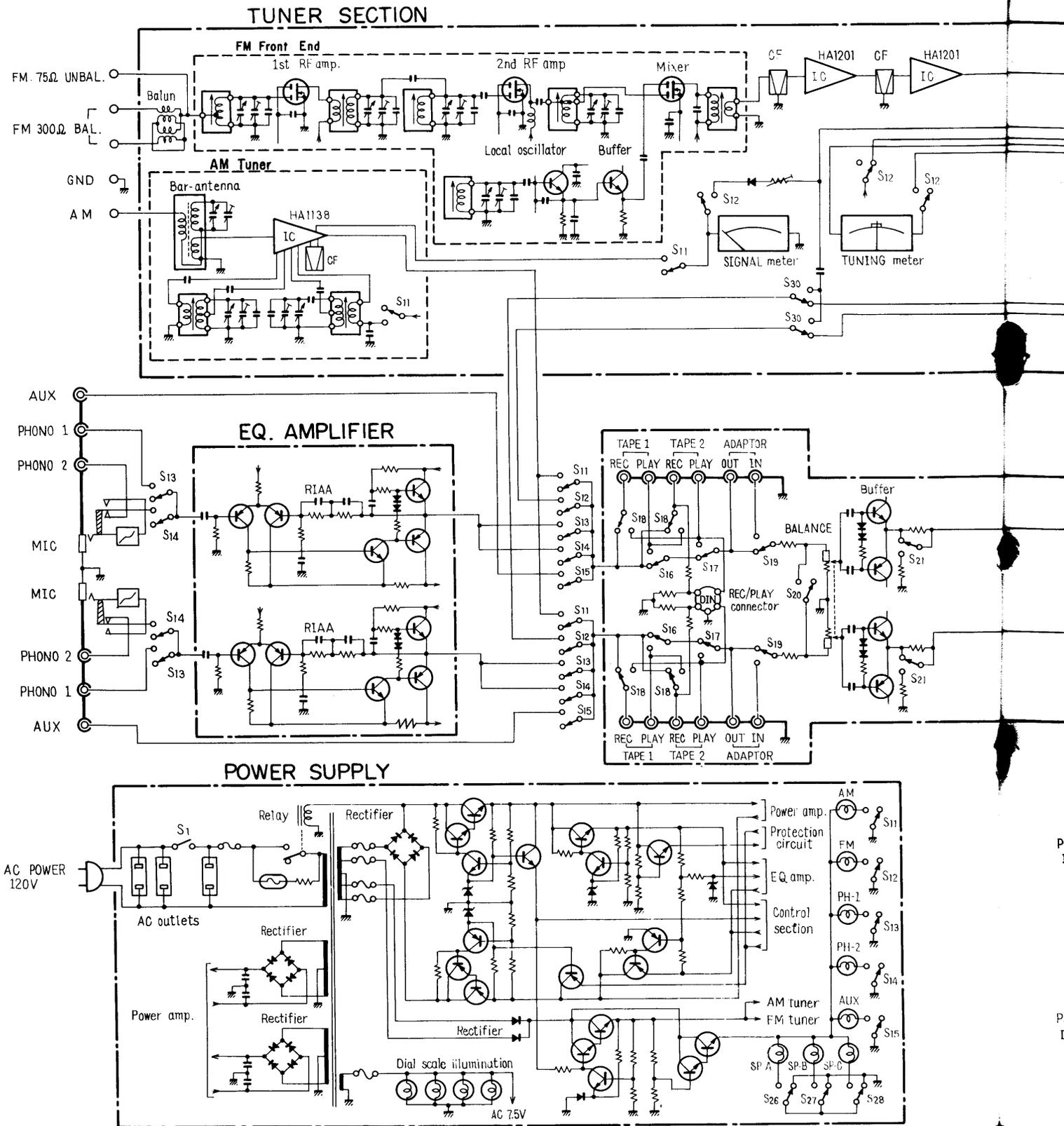


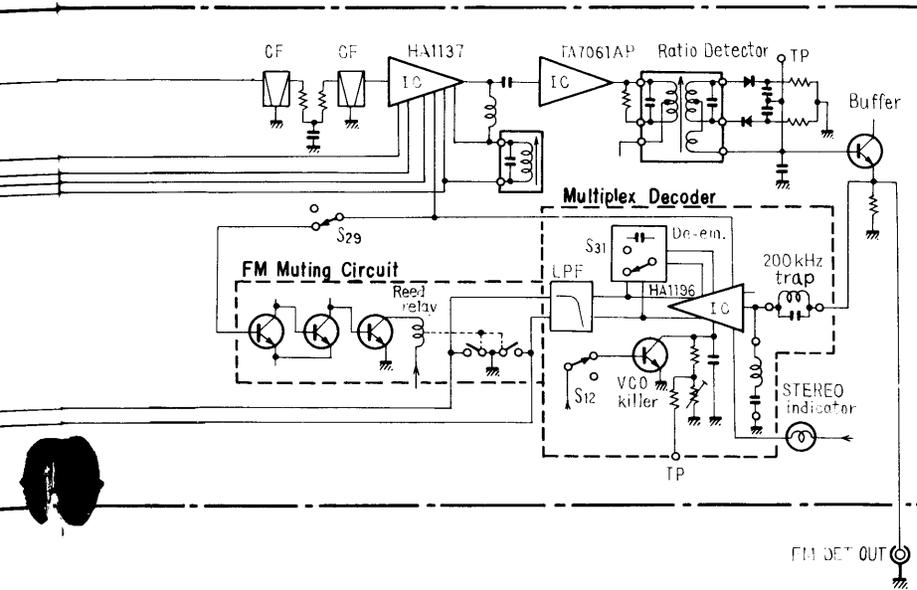
Fig. 22. Basic circuitry for inrush current suppressor

5. LEVEL DIAGRAM



6. BLOCK DIAGRAM

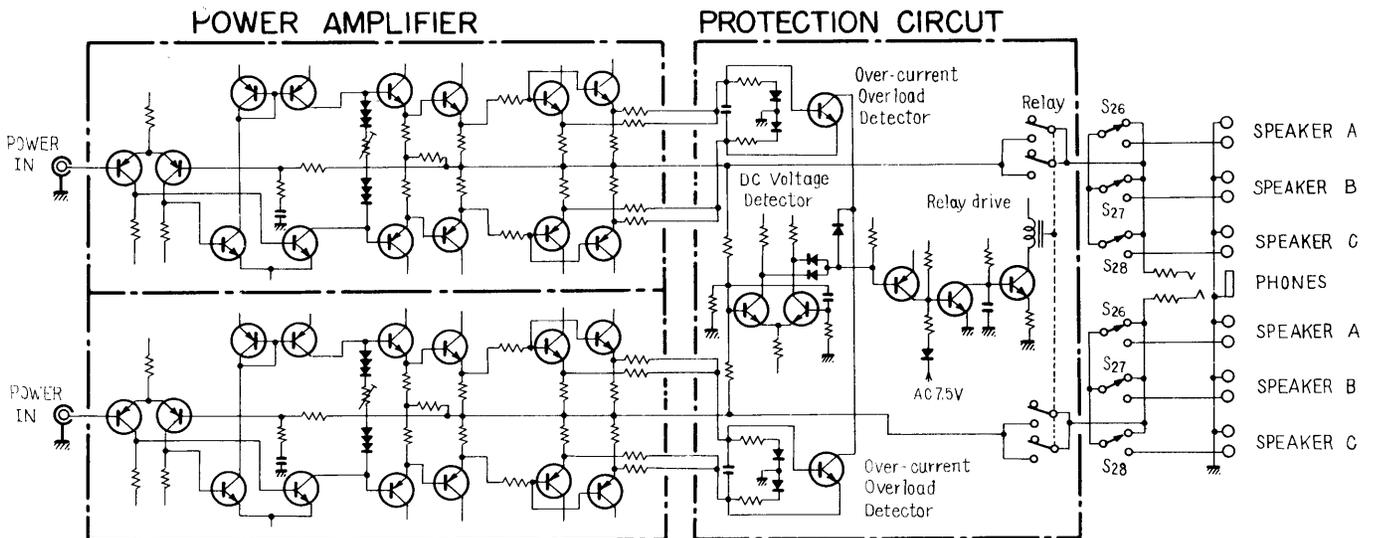
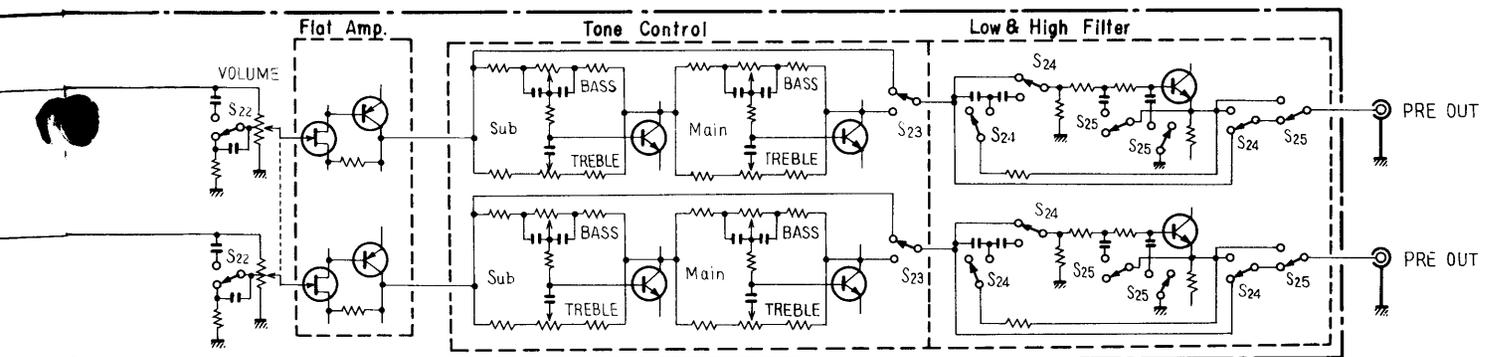




SWITCHES :

- | | | |
|--------------|----------------|----------------------|
| S1 : | POWER | (SPEAKERS) |
| (FUNCTION) | | S26 : SPEAKERS A |
| S11 : | AM | S27 : SPEAKERS B |
| S12 : | FM | S28 : SPEAKERS C |
| S13 : | PHONO 1 | |
| S14 : | PHONO 2 / MIC | S29 : FM MUTING |
| S15 : | AUX | S30 : FM MULTIPATH |
| | | S31 : FM DE-EMPHASIS |
| S16 : | TAPE MONITOR 1 | |
| S17 : | TAPE MONITOR 2 | |
| S18 : | TAPE DUPLICATE | |
| S19 : | ADAPTOR | |
| S20 : | MODE | |
| S21 : | MUTING | |
| S22 : | LOUDNESS | |
| S23 : | STONE | |
| S24 : | LOW FILTER | |
| S25 : | HIGH FILTER | |

CONTROL SECTION



7. DISASSEMBLY

Top Plate

Remove the six screws (A) to detach the top plate.

Wooden Cover

Remove the two screws (B) on each side of the wooden cover.

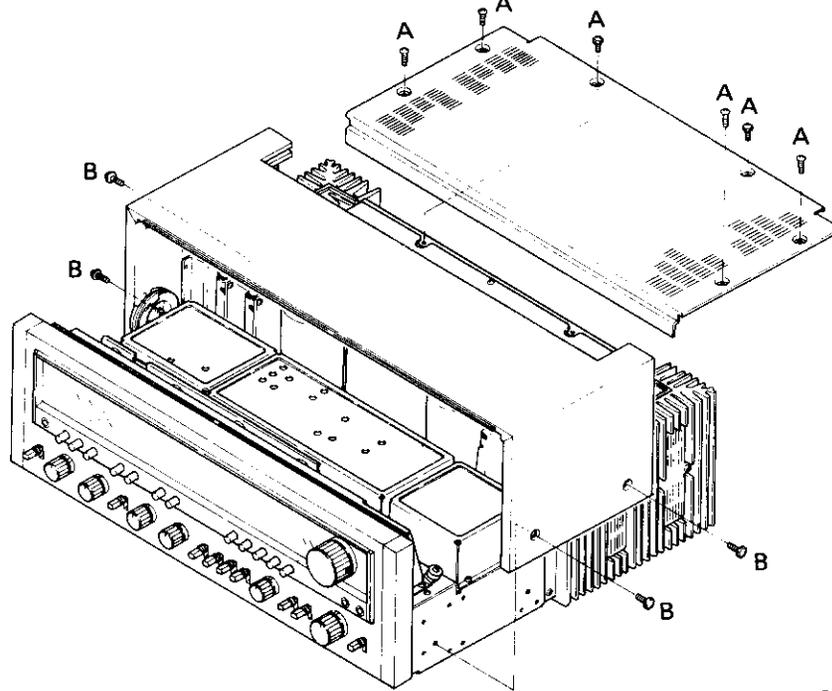


Fig. 25

Bottom Plate

Remove the fifteen screws to detach the bottom plate.

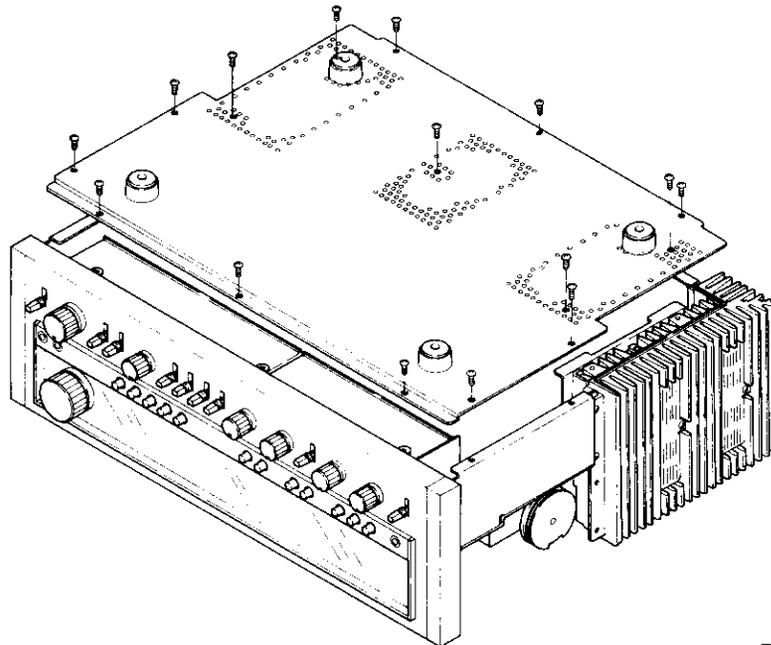


Fig. 26

Front Panel

Loosen the setscrews of TUNING and VOLUME knobs with a hexagonal wrench. Remove all the knobs by pulling. Remove the two screws from the top edge of the front panel. Remove the three nuts from the sub-tone and volume control shafts.

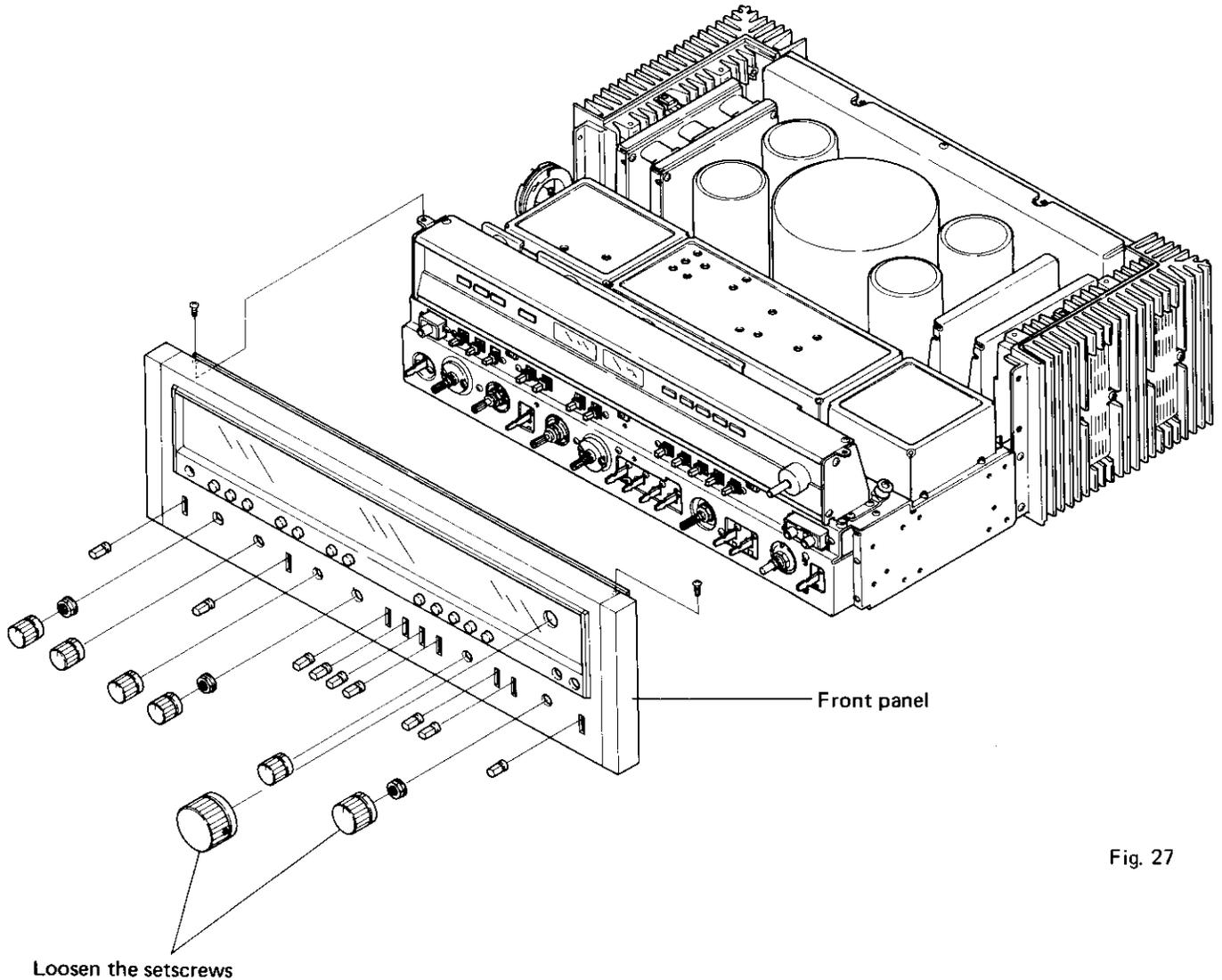


Fig. 27

Speakers Switch Assem
Remove the four screws

Filter Amplifi
Remove the t

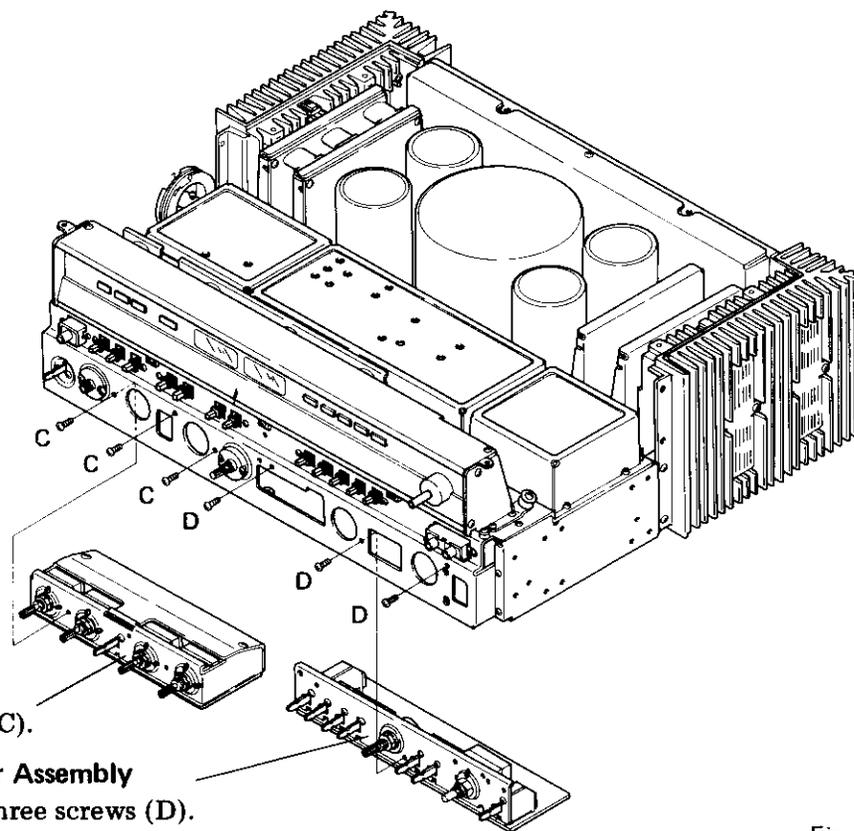


Fig. 28

27

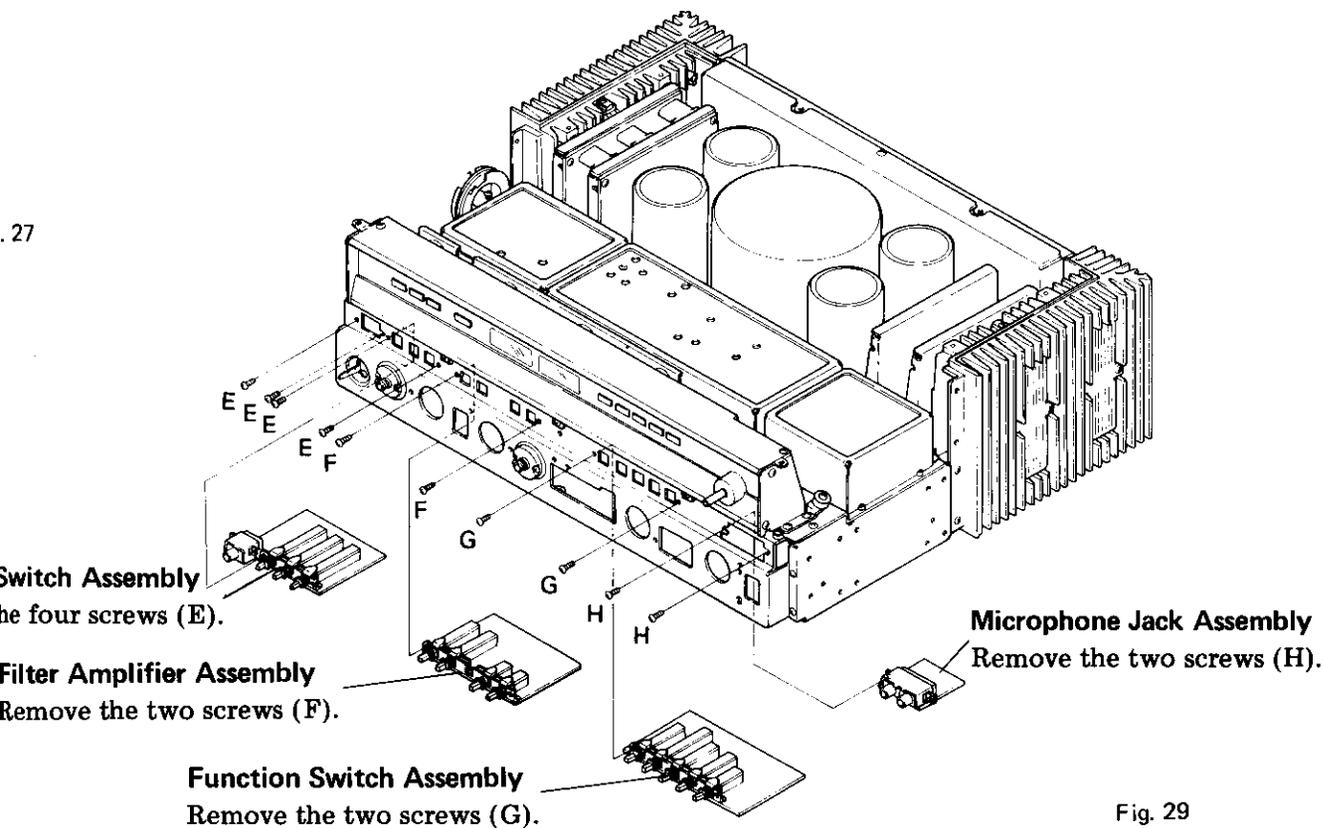


Fig. 29

8. PARTS LOCATION

8.1 FRONT PANEL VIEW

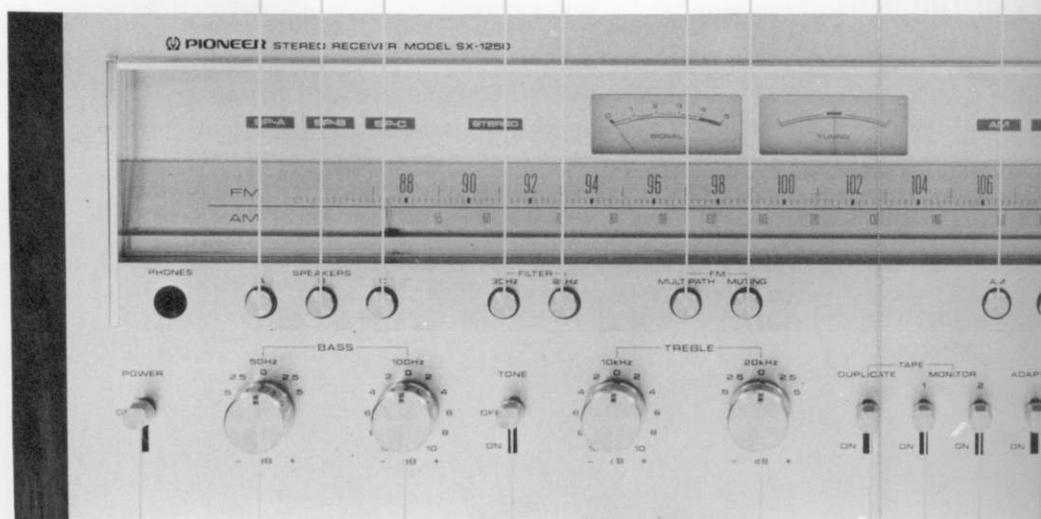
Knob (FILTER 30Hz)
AAD-114

Knob (SPEAKERS C)
AAD-114

Knob (SPEAKERS B)
AAD-114

Knob (SPEAKERS A)
AAD-114

Knob (FILTER 8kHz)
AAD-114



Knob (POWER)
AAD-113

Knob (BASS 50Hz)
AAB-100

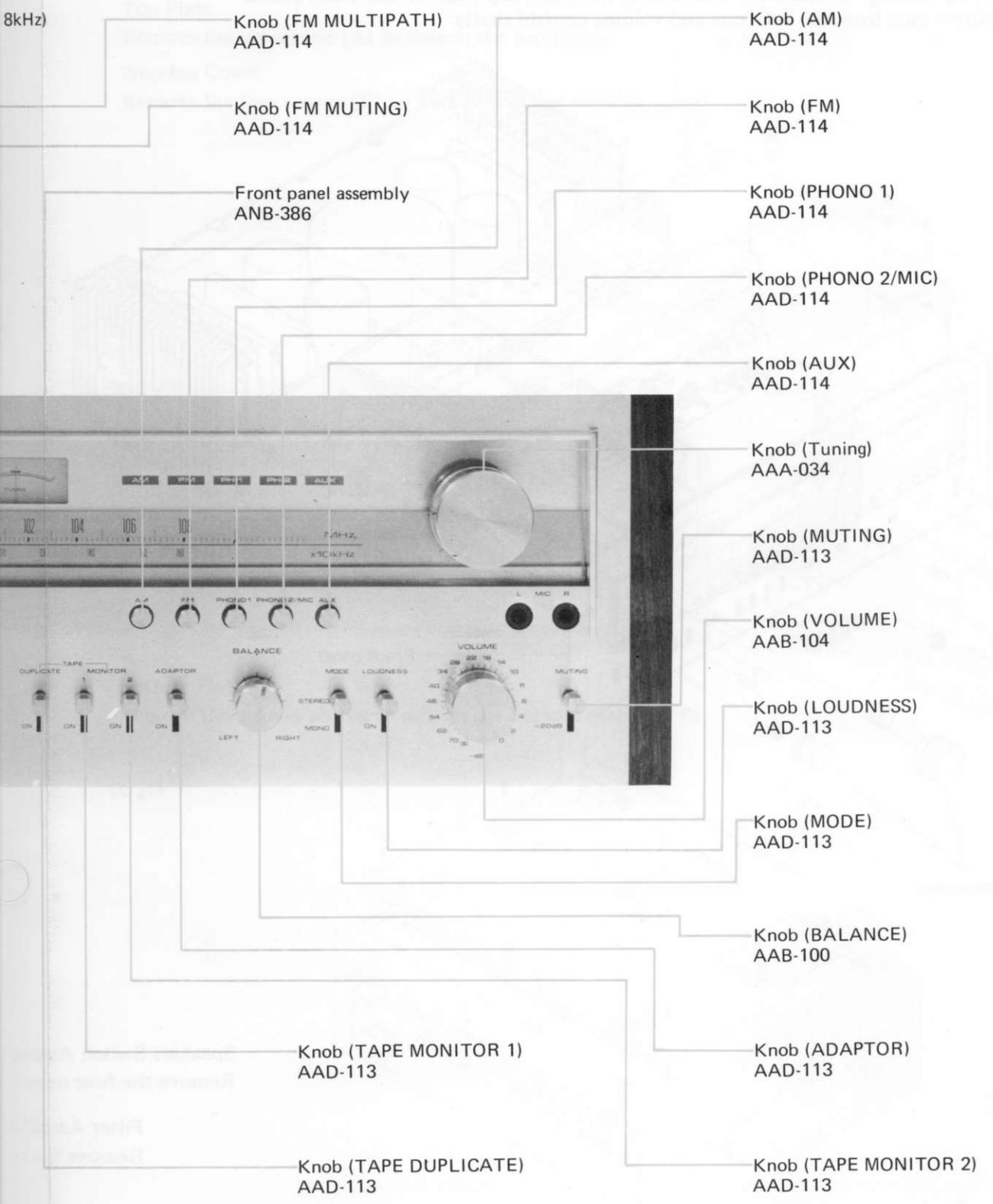
Knob (BASS 100Hz)
AAB-100

Knob (TONE)
AAD-113

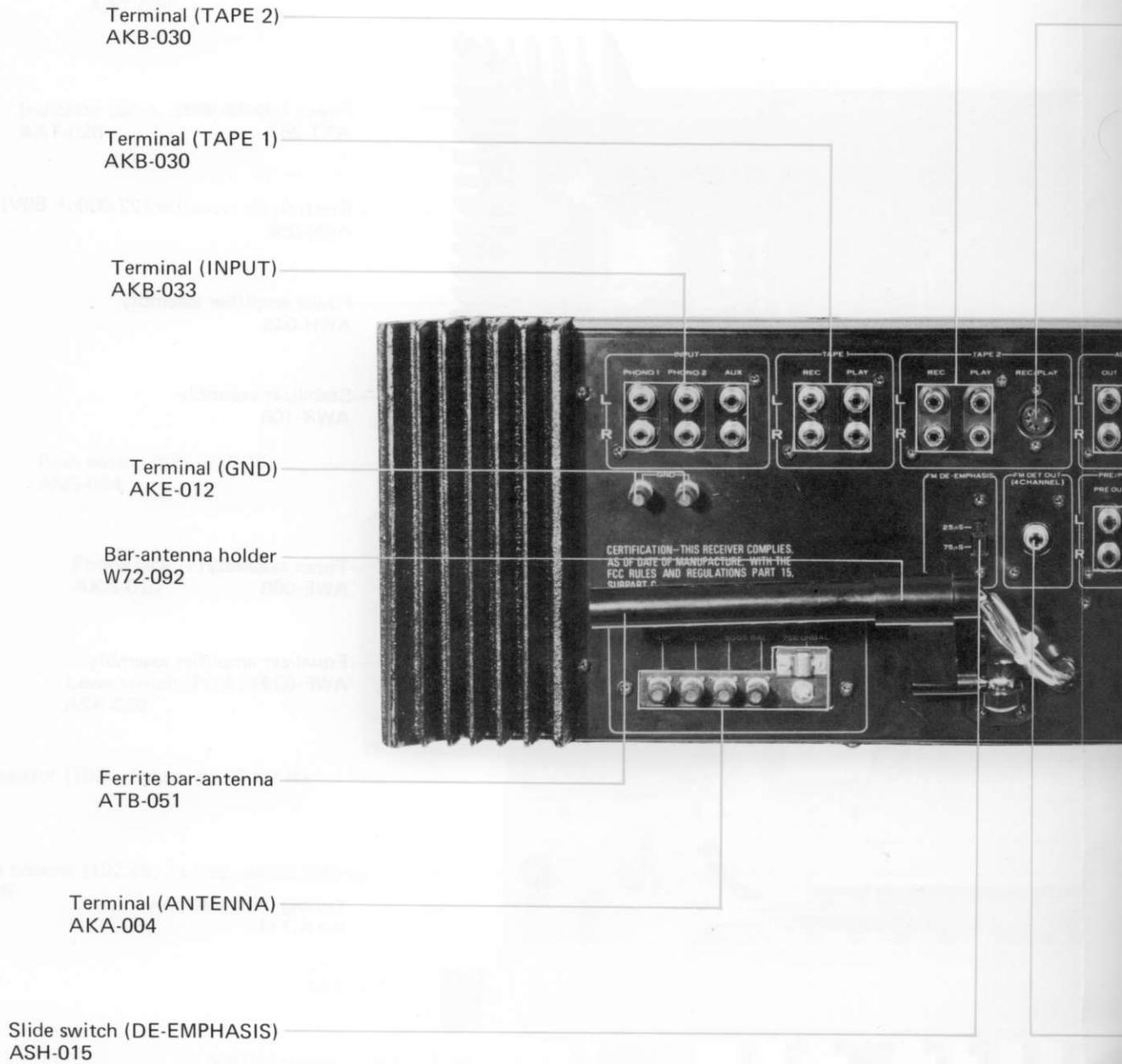
Knob (TREBLE 10kHz)
AAB-100

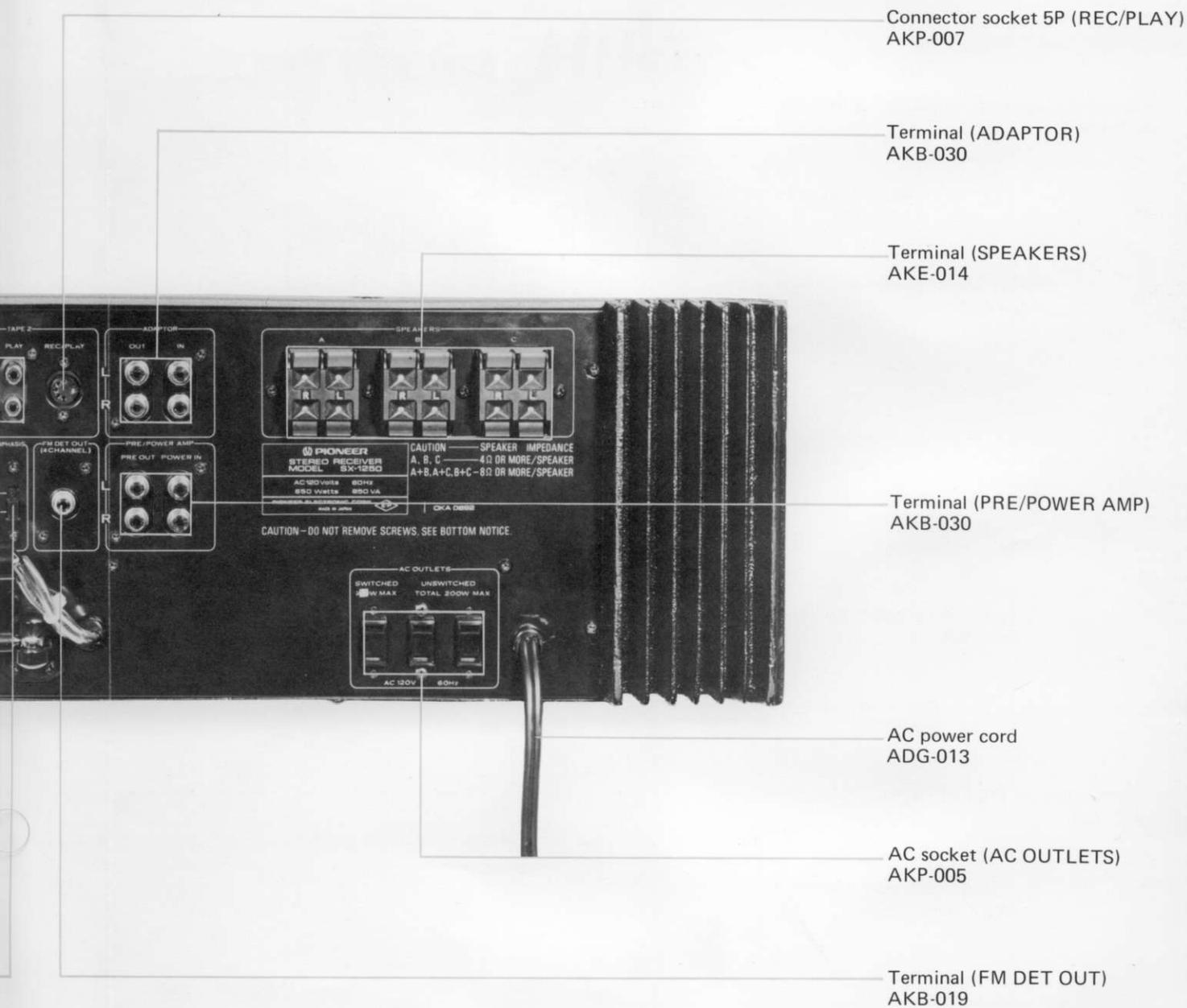
Knob (TREBLE 20kHz)
AAB-100

7. DISASSEMBLY



8.2 REAR PANEL VIEW





8.4 BOTTOM VIEW

Fuse 1A (FU1)
AEK-106

Fuse 1A (FU2)
AEK-106

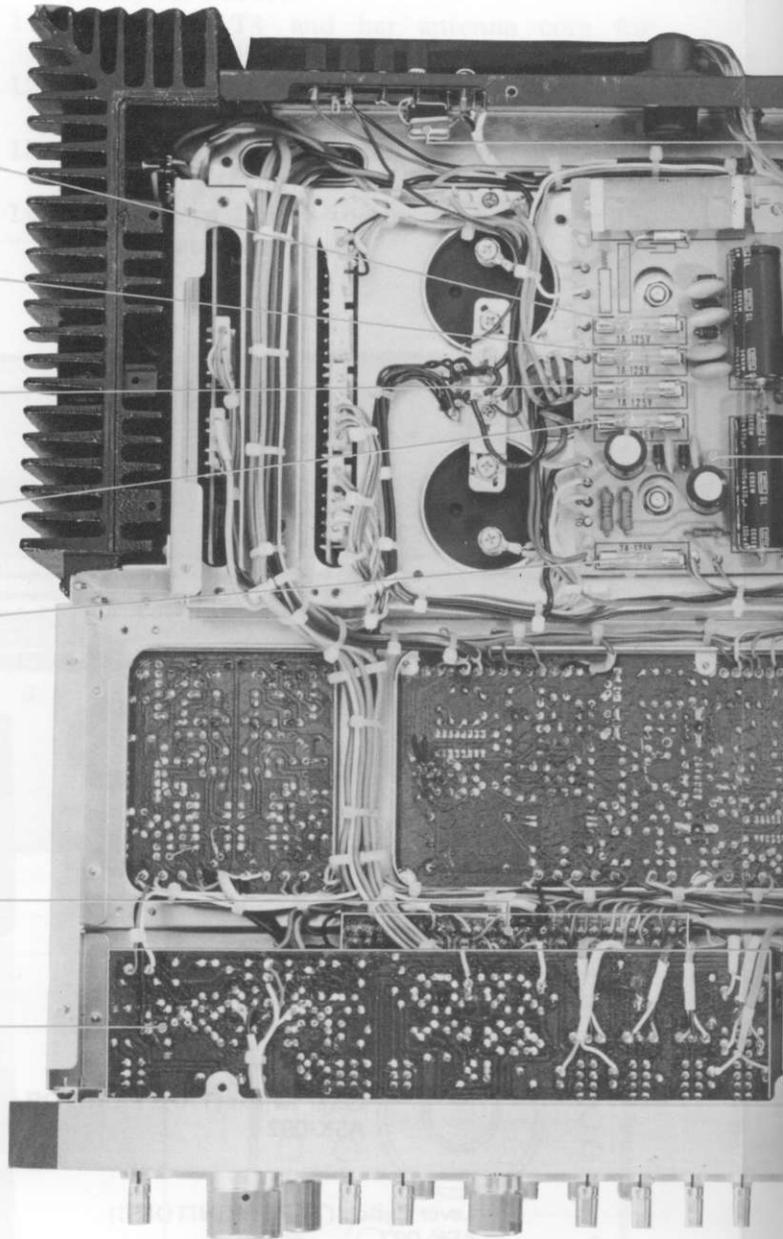
Fuse 1A (FU3)
AEK-106

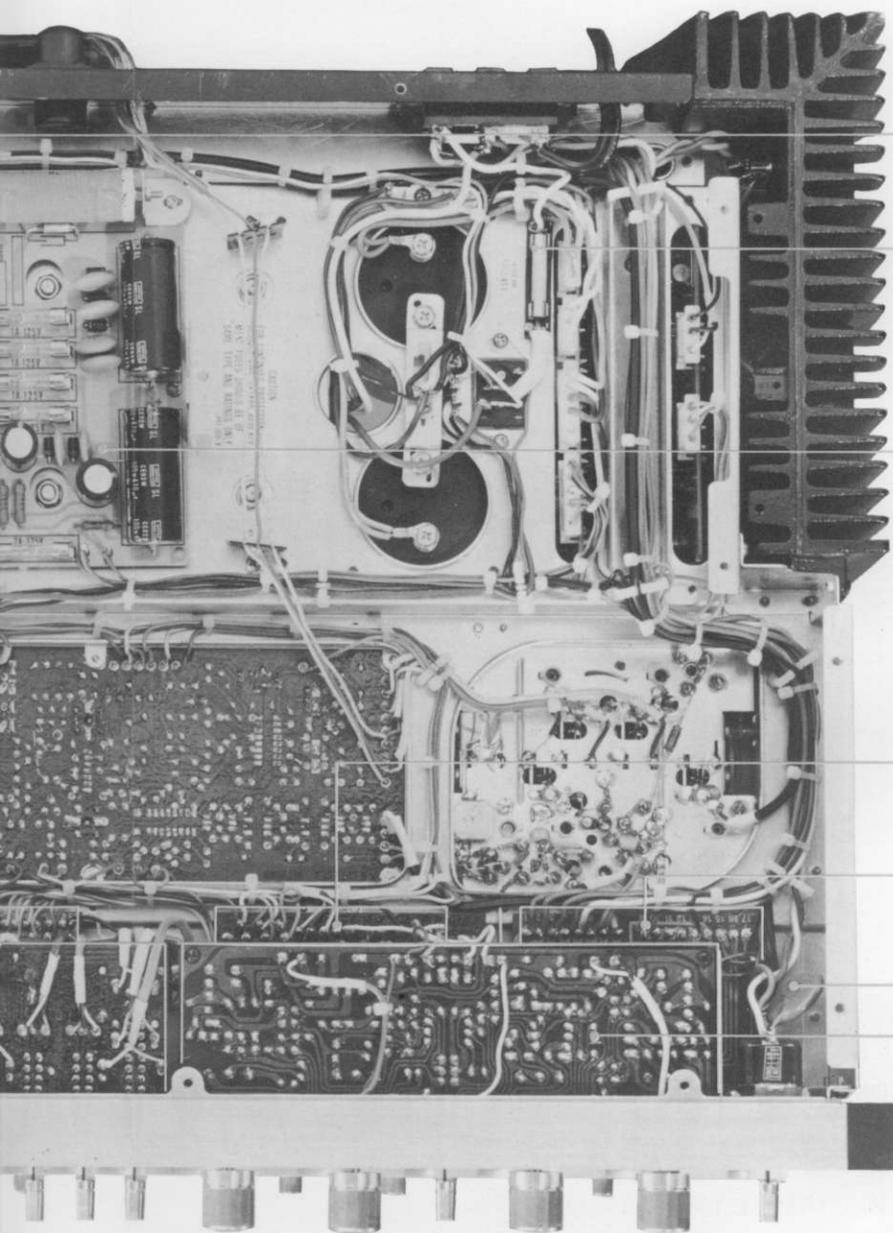
Fuse 1A (FU4)
AEK-106

Fuse 1.5A (FU5)
AEK-104

Function switch assembly
AWS-094

Flat amplifier assembly
AWG-042





Ferrite balun
T22-025

Fuse 12A (FU6, primary)
AEK-301

Power supply assembly
AWR-107

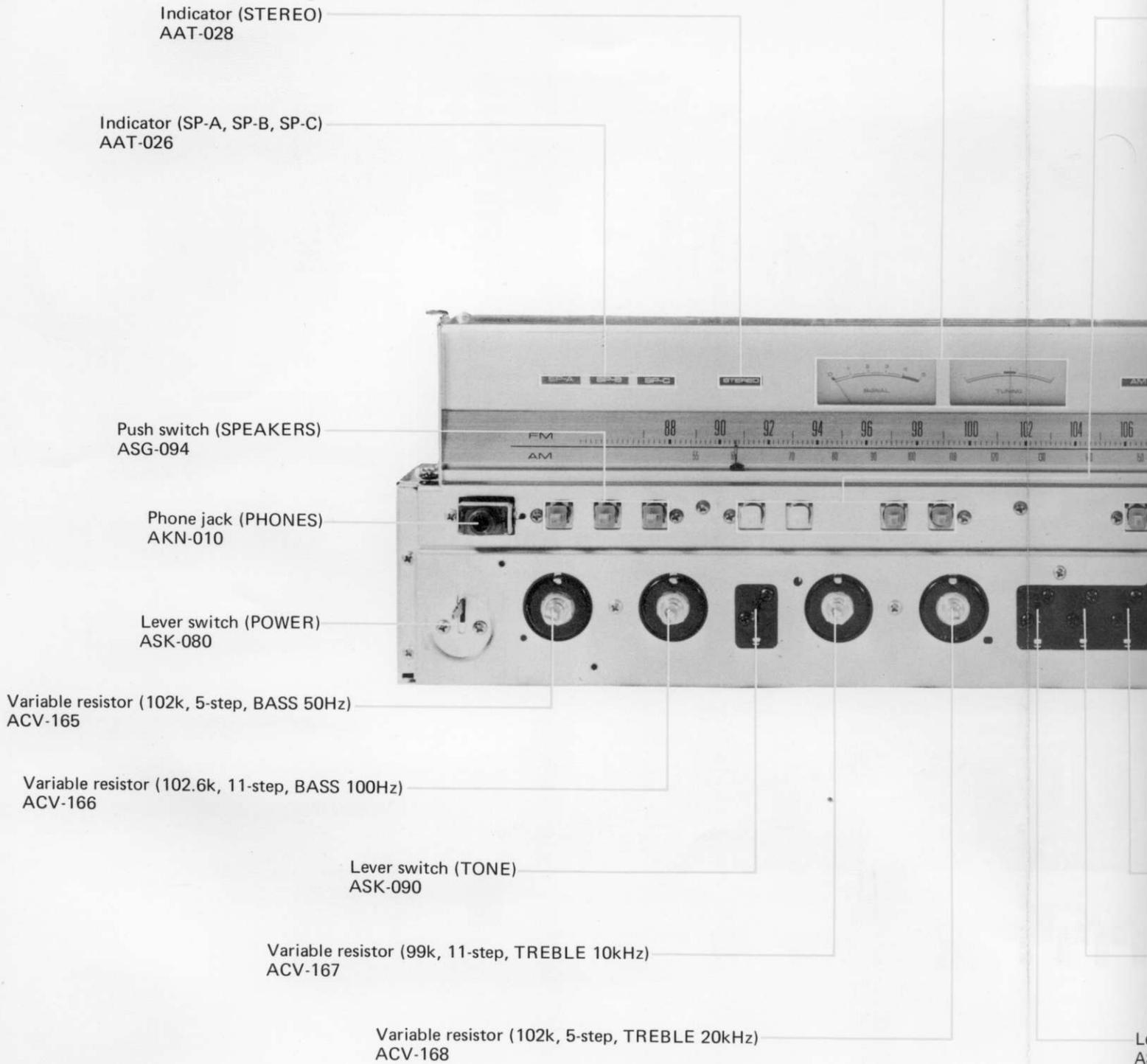
Filter amplifier assembly
AWM-089

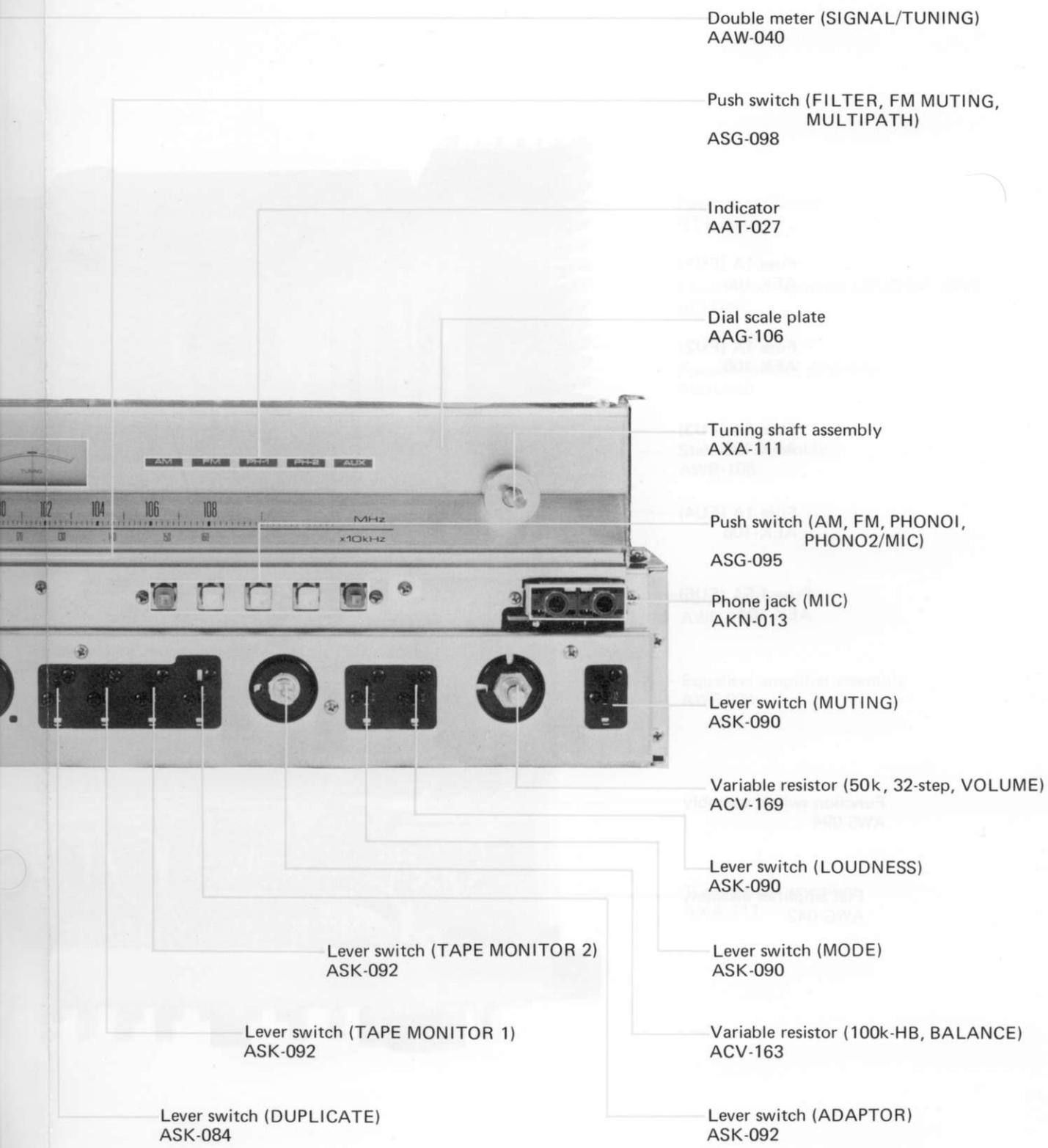
Speakers switch assembly
AWS-095

Ceramic capacitor (0.01 μ F 150V)
ACG-003

Control amplifier assembly
AWG-041

8.5 FRONT VIEW





Double meter (SIGNAL/TUNING)
AAW-040

Push switch (FILTER, FM MUTING,
MULTIPATH)
ASG-098

Indicator
AAT-027

Dial scale plate
AAG-106

Tuning shaft assembly
AXA-111

Push switch (AM, FM, PHONO1,
PHONO2/MIC)
ASG-095

Phone jack (MIC)
AKN-013

Lever switch (MUTING)
ASK-090

Variable resistor (50k, 32-step, VOLUME)
ACV-169

Lever switch (LOUDNESS)
ASK-090

Lever switch (MODE)
ASK-090

Variable resistor (100k-HB, BALANCE)
ACV-163

Lever switch (ADAPTOR)
ASK-092

Lever switch (TAPE MONITOR 2)
ASK-092

Lever switch (TAPE MONITOR 1)
ASK-092

Lever switch (DUPLICATE)
ASK-084

9. ADJUSTMENTS

9.1 AM TUNER

1. Set function switch to AM.
2. Connect AM signal generator through 1k-ohm resistor to AM antenna terminal.
3. Set DUPLICATE switch to OFF and connect an AC voltmeter to TAPE 1 REC jacks.
4. Set AM SG for 400Hz 30% modulation 100dB output.
5. Set SX-1250 dial indication and AM SG frequency for 600kHz.
6. Adjust T3 core for maximum reading on AC voltmeter.
7. Set SX-1250 dial indication and AM SG frequency for 1,400kHz.
8. Adjust TC1 for maximum reading on AC voltmeter.
9. Set AM SG for 30dB output.
10. Set SX-1250 dial indication and AM SG frequency for 600kHz.
11. Adjust T3, T4 and bar antenna core for maximum reading on AC voltmeter.
12. Set SX-1250 dial indication and AM SG frequency for 1,400kHz.
13. Adjust TC1, TC2 and TC3 for maximum reading on AC voltmeter.
14. Repeat steps 10~13 to eliminate variations in AC voltmeter readings.

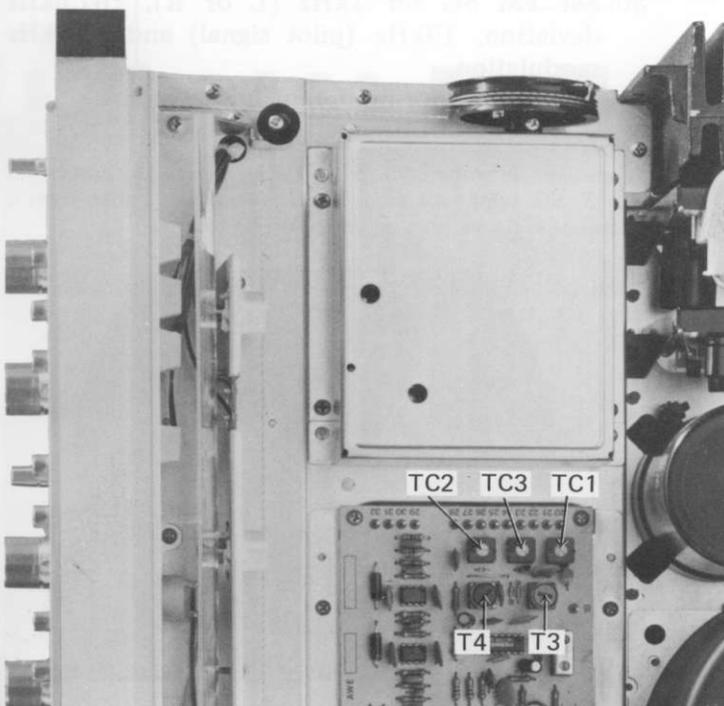
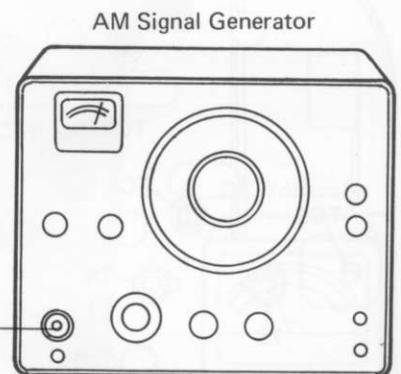
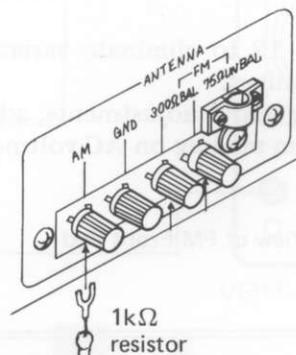
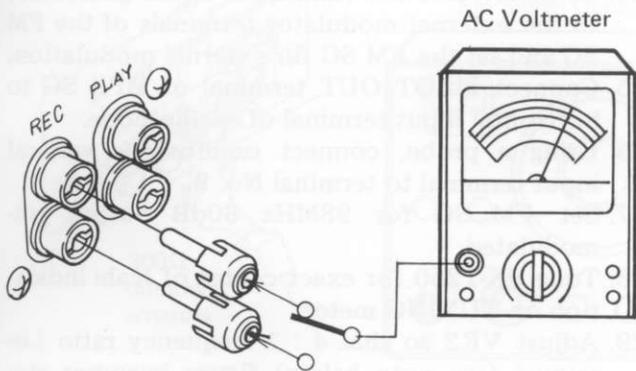


Fig. 30

9.2 FM TUNER

FM Front End

1. Set function switch to FM.
2. Set FM MUTING switch to OFF.
3. Connect FM signal generator through 300-ohm dummy load to 300 ohm FM antenna terminals.
4. Set DUPLICATE switch to OFF and connect AC voltmeter to TAPE 1 REC jacks.
5. Set FM SG for 100dB output at 400Hz and 100% modulation.
6. Set SX-1250 dial indication and FM SG frequency for 87.4MHz.
7. Adjust T5 core for maximum indication on SIGNAL meter.
8. Set FM SG for 8dB output and adjust cores of T1, T2, T3 and T4 for maximum reading on AC voltmeter.
9. Set FM SG for 100dB output.
10. Set SX-1250 dial indication and FM SG frequency for 106MHz.
11. Adjust TC5 for maximum indication on SIGNAL meter.
12. Set FM SG for 8dB output and adjust TC1, TC2, TC3 and TC4 for maximum reading on AC voltmeter.
13. Repeat steps 5 ~ 12 to eliminate variations in AC voltmeter readings.
14. After completing above adjustments, adjust T6 core for maximum reading on AC voltmeter.

Bottom View of FM Front End

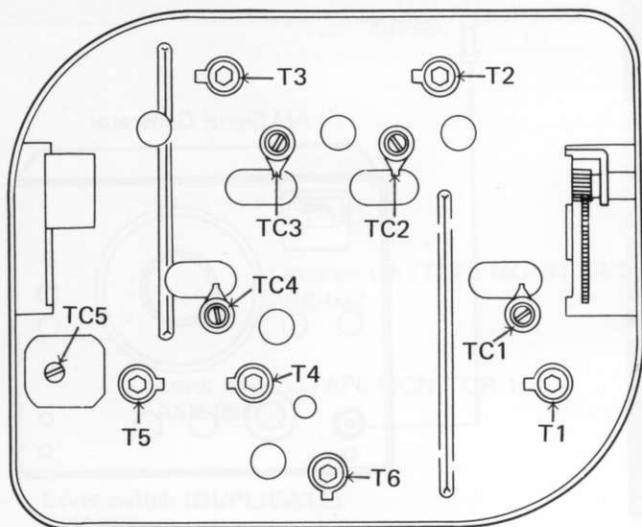


Fig. 31

Tuner Assembly

15. Connect DC voltmeter to terminal No. 43.
16. Turn VR1 and VR3 fully counter-clockwise.
17. Detune SX-1250 to where only noise is received and adjust T1 core for center of scale indication on TUNING meter.
18. Set FM SG for 98MHz 60dB output.
19. Tune SX-1250 for exact center of scale indication on TUNING meter.
20. Adjust T2 upper core for 0V ($\pm 10mV$) between terminal No. 43 and ground.
21. Adjust T2 lower core for minimum distortion.
22. Repeat steps 20 - 21 several times.
23. Set FM SG for 100dB output and adjust VR1 so that SIGNAL meter indicates 4.7 on the scale.

Multiplex Decoder

24. Connect MPX SG (multiplex signal generator) to the external modulator terminals of the FM SG and set the FM SG for external modulation.
25. Connect PILOT OUT terminal of MPX SG to horizontal input terminal of oscilloscope.
26. Using a probe, connect oscilloscope vertical input terminal to terminal No. 9.
27. Set FM SG for 98MHz 60dB output unmodulated.
28. Tune SX-1250 for exact center of scale indication on TUNING meter.
29. Adjust VR2 so that 4 : 1 frequency ratio Lissajous' (see note below) figure becomes stationary.
30. Set FM SG for 1kHz (L or R), $\pm 67.5kHz$ deviation, 19kHz (pilot signal) and $\pm 7.5kHz$ modulation.
31. Adjust VR3 for minimum L-R crosstalk.

Note:

Signal at terminal No. 9 is 76kHz sawtooth wave and MPX SG pilot out is a 19kHz sinewave. These form a Lissajous' figure such as shown in Fig. 32.

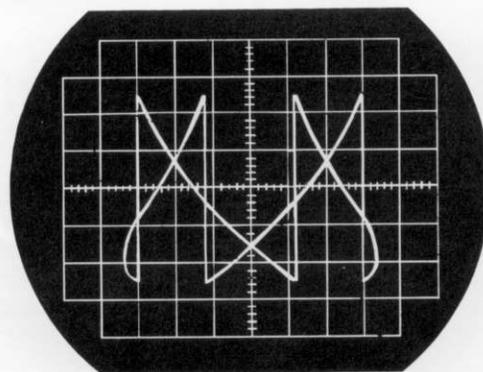


Fig. 32

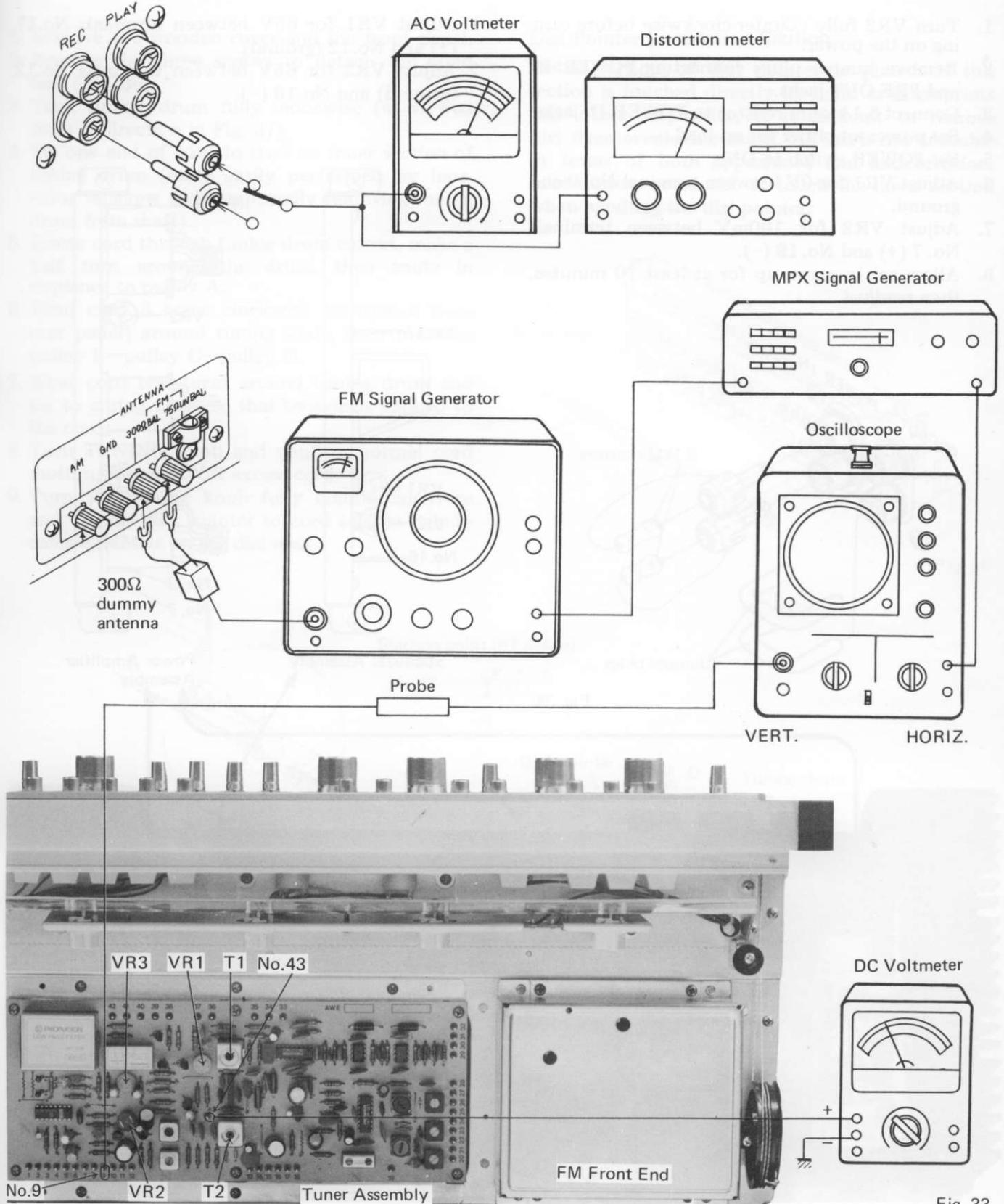


Fig. 33

9.3 POWER AMPLIFIER

1. Turn VR2 fully counter-clockwise before turning on the power.
2. Remove jumper plugs connecting POWER IN and PRE OUT jacks.
3. Connect 5.1 k-ohm resistor to POWER IN jacks.
4. Set power amplifier for no load.
5. Set POWER switch to ON.
6. Adjust VR1 for 0V between terminal No. 9 and ground.
7. Adjust VR2 for 100mV between terminals No. 7 (+) and No. 19 (-).
8. Allow set to warm up for at least 10 minutes, then readjust.

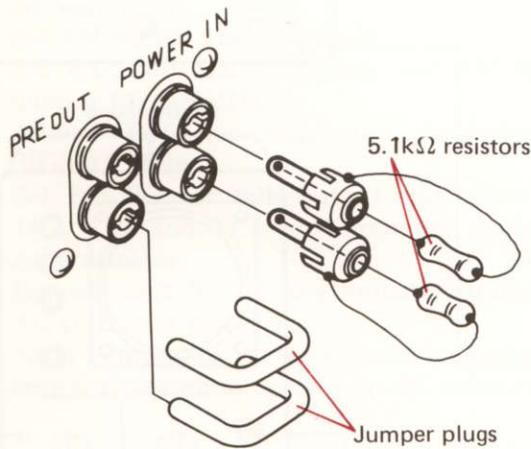


Fig. 34

9.4 STABILIZER

1. Adjust VR1 for 65V between terminals No.17 (+) and No.12 (ground).
2. Adjust VR2 for 65V between terminals No.12 (ground) and No.16 (-).

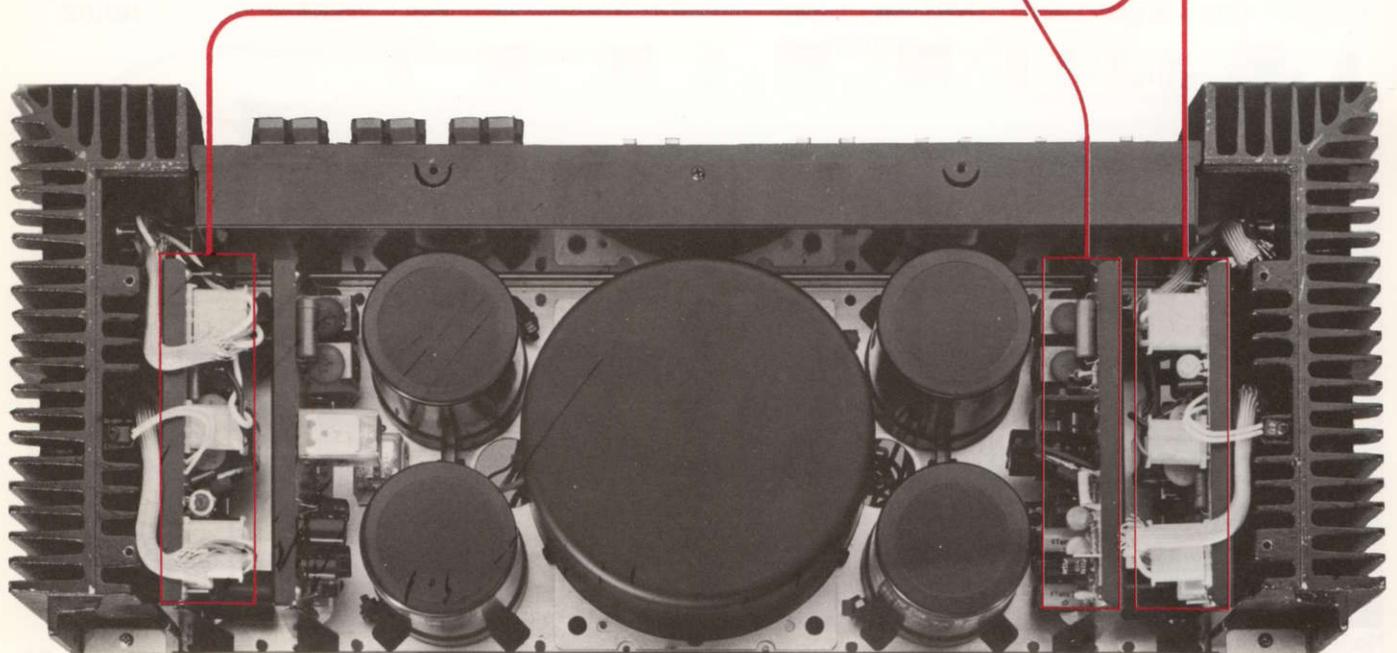
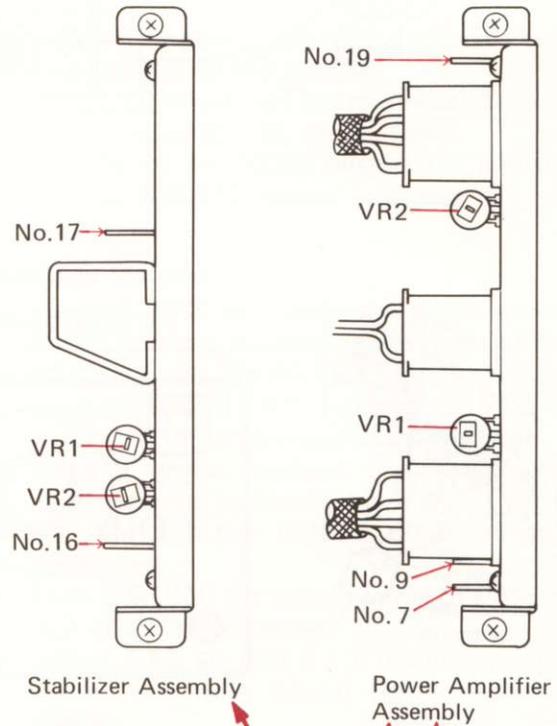


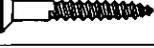
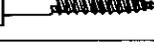
Fig. 35

11. EXPLODED VIEWS

NOMENCLATURE OF SCREWS, WASHERS AND NUTS

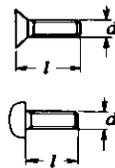
The following symbols stand for screws, washers and nuts as shown in exploded view.

Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
BT	Binding head tapping screw	
CT	Countersunk head tapping screw	
TT	Truss head tapping screw	
OCT	Oval countersunk head tapping screw	
PM	Pan head machine screw	
CM	Countersunk head machine screw	
OCM	Oval countersunk head machine screw	
TM	Truss head machine screw	
BM	Binding head machine screw	
PSA	Pan head screw with spring lock washer	
PSB	Pan head screw with spring lock washer and flat washer	
PSF	Pan head screw with flat washer	

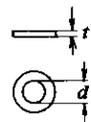
Symbol	Description	Shape
EW	E type washer	
FW	Flat washer	
SW	Spring lock washer	
N	Nut	
WN	Washer faced nut	
ITW	Internal toothed lock washer	
OTW	Outernal toothed lock washer	
SC	Slotted set screw (Cone point)	
SF	Slotted set screw (Flat point)	
HS	Hexagon socket headless set screw	
OCW	Oval countersunk head wood screw	
CW	Countersunk head wood screw	
RW	Round head wood screw	

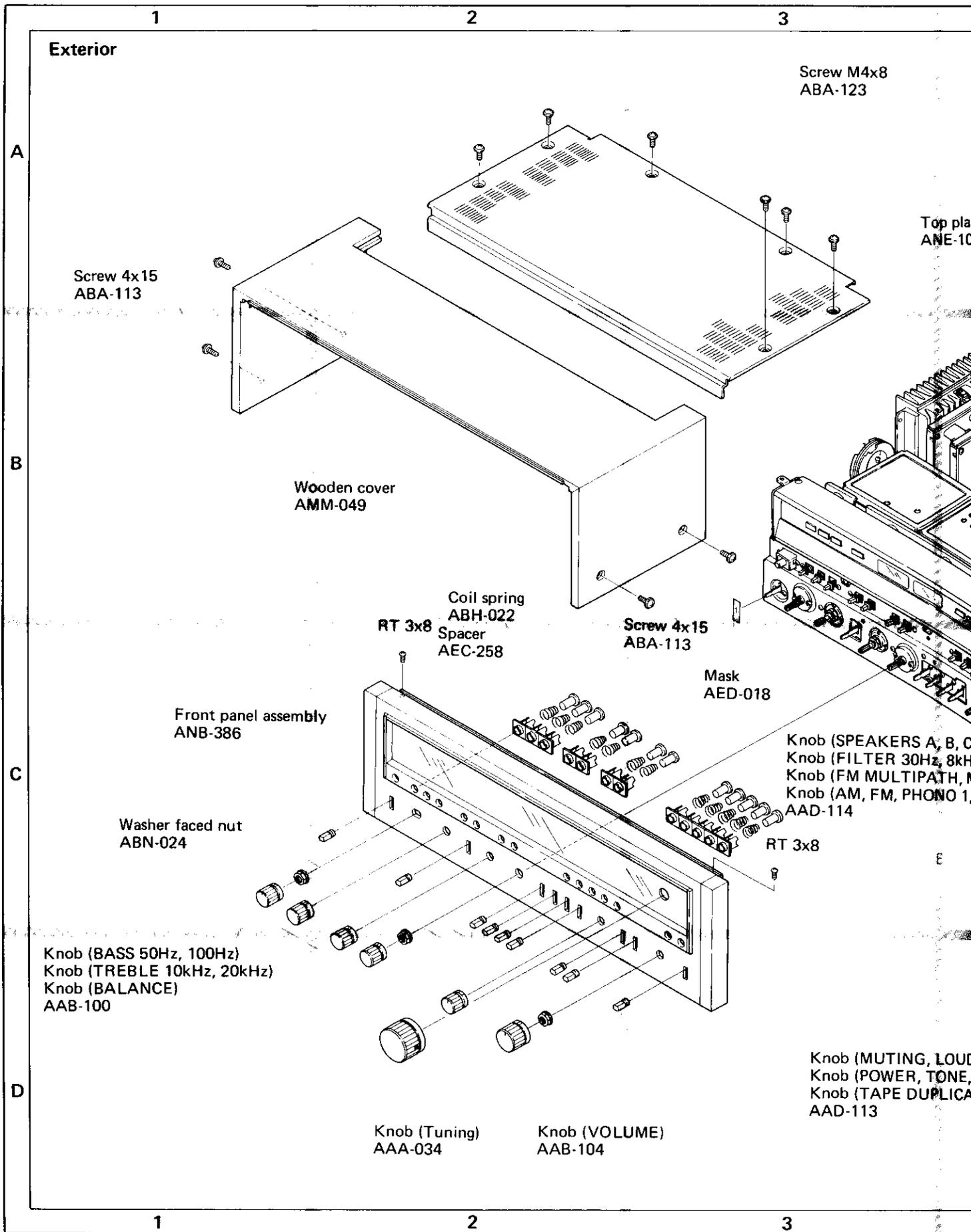
EXAMPLE

PM 3x8
 length in mm (l)
 diameter in mm (d)
 Symbol



FW 9 ϕ x1^t
 thickness in mm (t)
 diameter in mm (d)
 Symbol





4

5

6

M4x8
23

NOTE:

Parts indicated in green type cannot be supplied.

Top plate
ANE-105

See Page 48.

Screw 3x8
ABA-002

Screw 3x8
ABA-081

Screw 3x8
ABA-002

See Pages 43-47.

Screw 3x8
ABA-081

Screw 4x8
ABA-012

PEAKERS A, B, C)
FILTER 30Hz, 8kHz)
M MULTIPATH, MUTING)
M, FM, PHONO 1, PHONO 2/MIC, AUX)

Screw 4x8
ABA-012

Foot
AEC-178

Screw 4x8
ABA-012

Foot
AEC-178

Screw 4x8
ABA-012

Foot
AEC-178

Screw 4x8
ABA-012

RT 4x16

(MUTING, LOUDNESS, MODE)
(POWER, TONE, ADAPTOR)
(TAPE DUPLICATE, MONITOR)

113

RT 4x16

4

5

6

A

B

C

D

4

5

6

NOTE:

Parts indicated in green type cannot be supplied.

...p assembly (PL1-PL4, 8V 0.3A)
...056

...amp board assembly
...AWX-096

Pulley shaft
ABA-114

Pulley
AEC-101

Tuner assembly
AWE-068

Tuning drum assembly
AXA-070

RT 3x6

...x8
...L/TUNING)

...ds (8V, 50mA)
...H-1 (PL10)
...EL-074

...H-2 (PL11)
...EL-072

...UX (PL12)
...EL-073

PH-2, AUX)

Pulley shaft
ABA-114

Pulley (small)
AEC-256

Panel base
ABN-022

BT3x6

RT 3x6

RT 3x6

RT 3x6

Equalizer amplifier
assembly
AWF-021

RT 3x6

FM front end
AWB-023

Pulley shaft
ABA-114

Pulley (small)
AEC-256

4

5

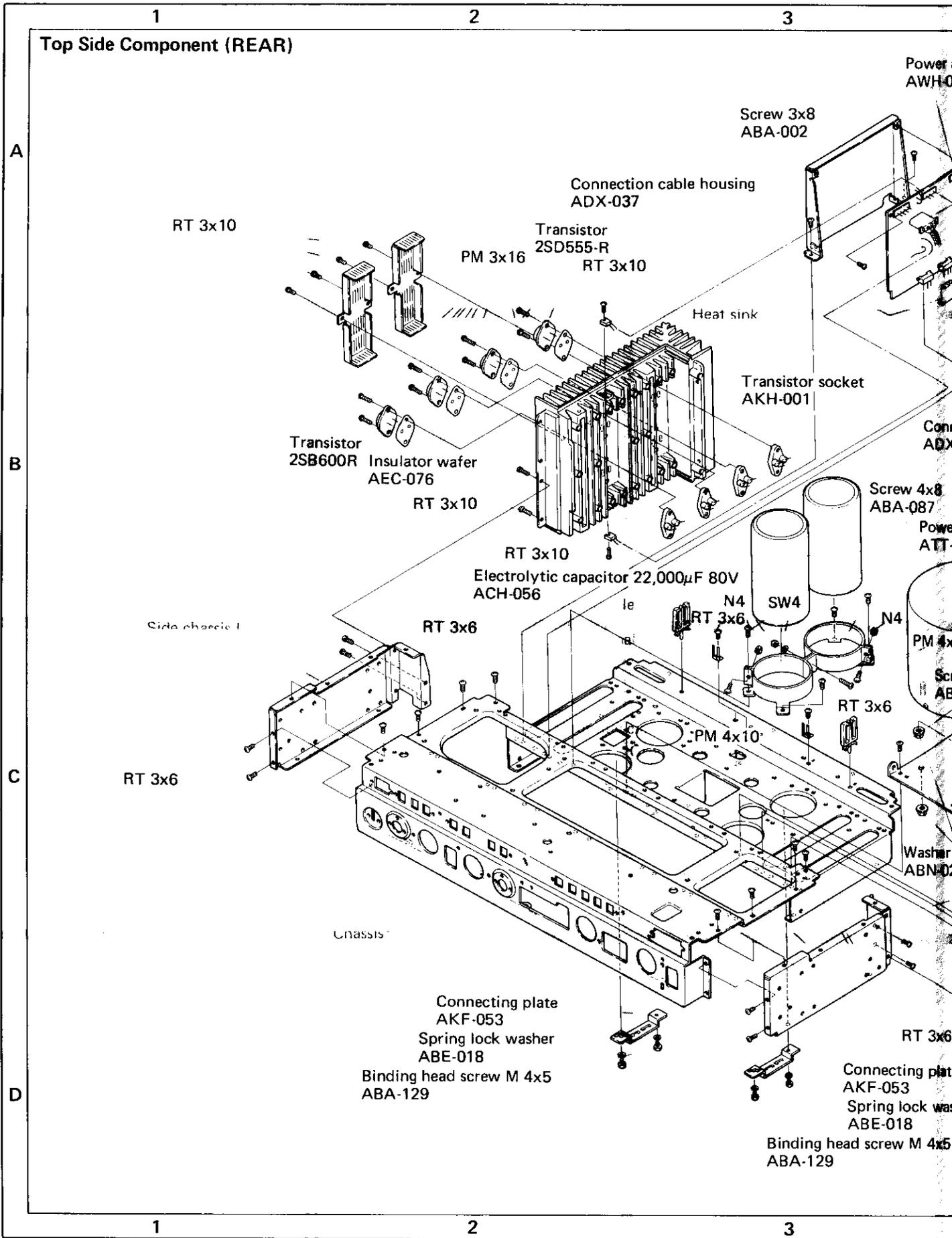
6

A

B

C

D



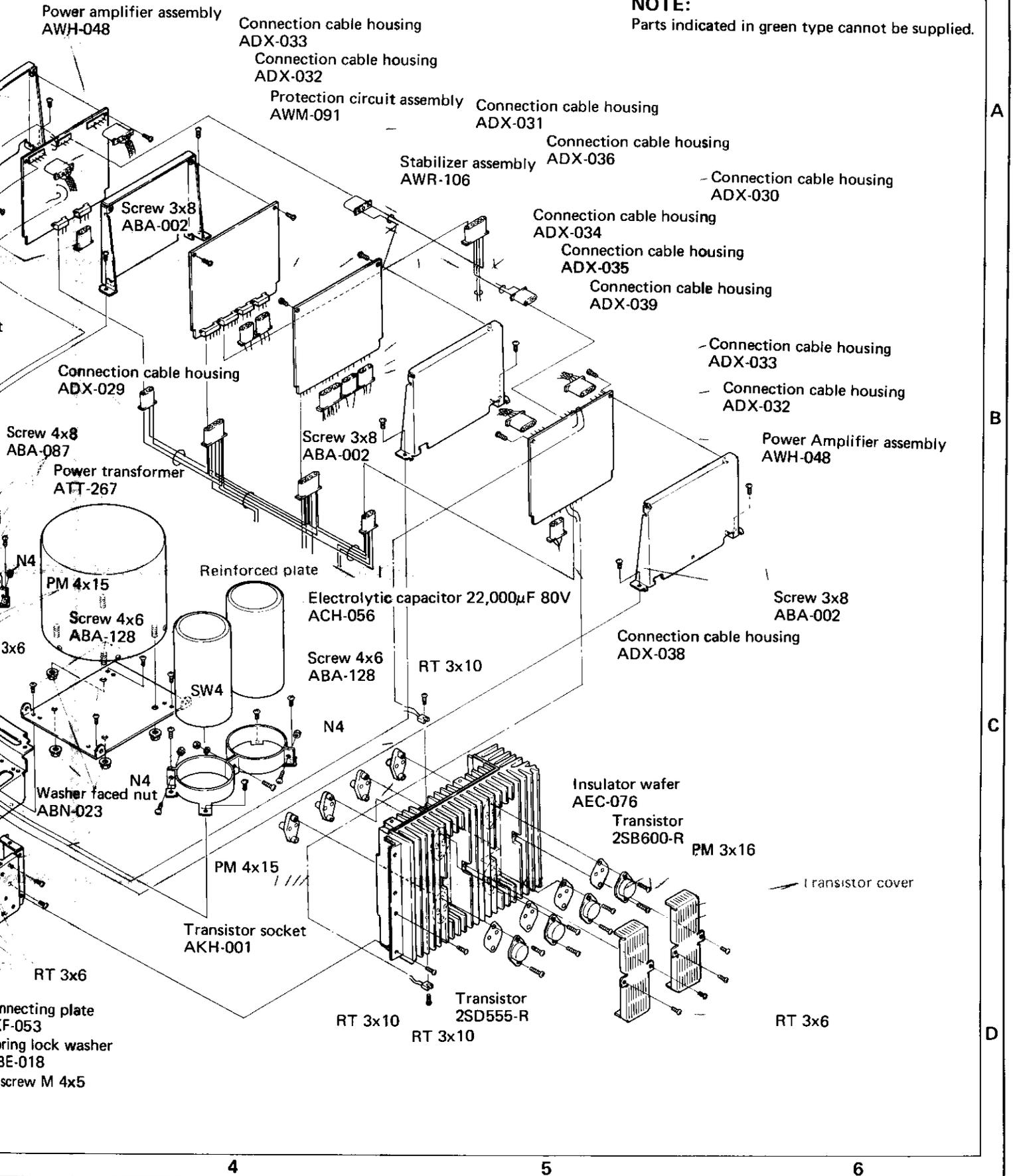
4

5

6

NOTE:

Parts indicated in green type cannot be supplied.



Flat Amplifier Assembly (AWG-042)

- Lever switch (DUPLICATE)
ASK-084
- Lever switch (MONITOR 1)
ASK-092

NOTE:
Parts indicated in green type cannot be supplied.

- Lever switch (MONITOR 2)
AKS-092
- ~~Lever switch (ADAPTOR)
ASK-092~~
- Variable resistor (100k-HB, BALANCE)
ACV-163
- Variable resistor
(50k, 32-step, VOLUME)
ACV-169

- Lever switch (MUTING)
ASK-090
- Lever switch (LOUDNESS)
ASK-090
- Lever switch (MODE)
ASK-090

Screw
ABA-116

Washer faced nut
ABN-024

Union nut
ABN-021

Control Amplifier Assembly (AWG-041)

- Variable resistor
(102.6k, 11-step, BASS 100Hz)
ACV-166
- Variable resistor
(102k, 5-step, BASS 50Hz)
ACV-165

- Lever switch (TONE)
ASK-090
- Variable resistor
(99k, 11-step, TREBLE 10kHz)
ACV-167
- Variable resistor
(102k, 5-step, TREBLE 20kHz)
ACV-168

Washer faced nut
ABN-024

Screw 3x6
ABA-116
Washer faced nut
ABN-024

RT 3x6

RT 3x6

RT 3x6

1

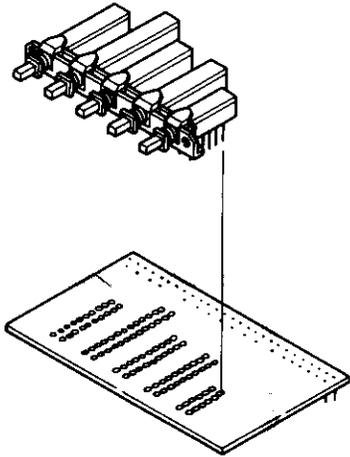
2

3

Switch Assembly (AWS-094)

Push switch (AM, FM, PHONO 1,
PHONO 2/MIC, AUX)

ASG-095

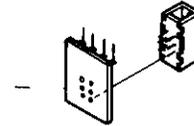


NOTE:

Parts indicated in green type cannot be supplied.

Switch Assembly (AWX-099)

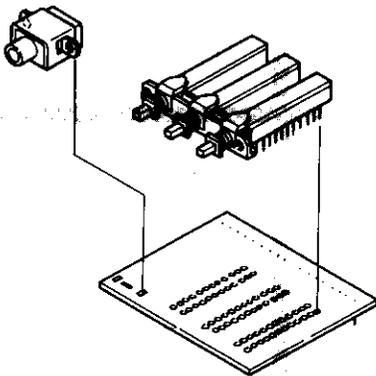
Slide switch (DE-EMPHASIS)
ASH-015



Switch Assembly (AWS-095)

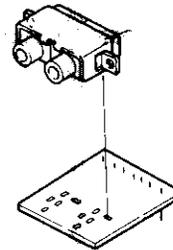
Push switch (SPEAKERS A, B, C)
ASG-094

Phone jack (PHONES)
AKN-010



Microphone Jack Assembly (AWX-097)

Phone jack (MIC)
AKN-013

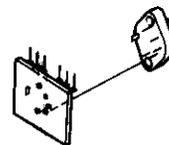
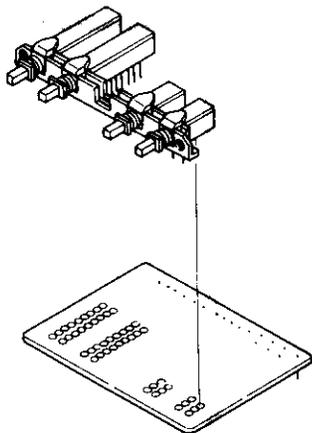


Filter Amplifier Assembly (AWM-089)

Push switch
(FILTER, FM MUTING,
MULTIPATH)
ASG-098

5P Connector Assembly (AWX-062)

5P connector socket (REC/PLAY)
AKP-007



A

A

B

B

C

C

D

D

1

2

3