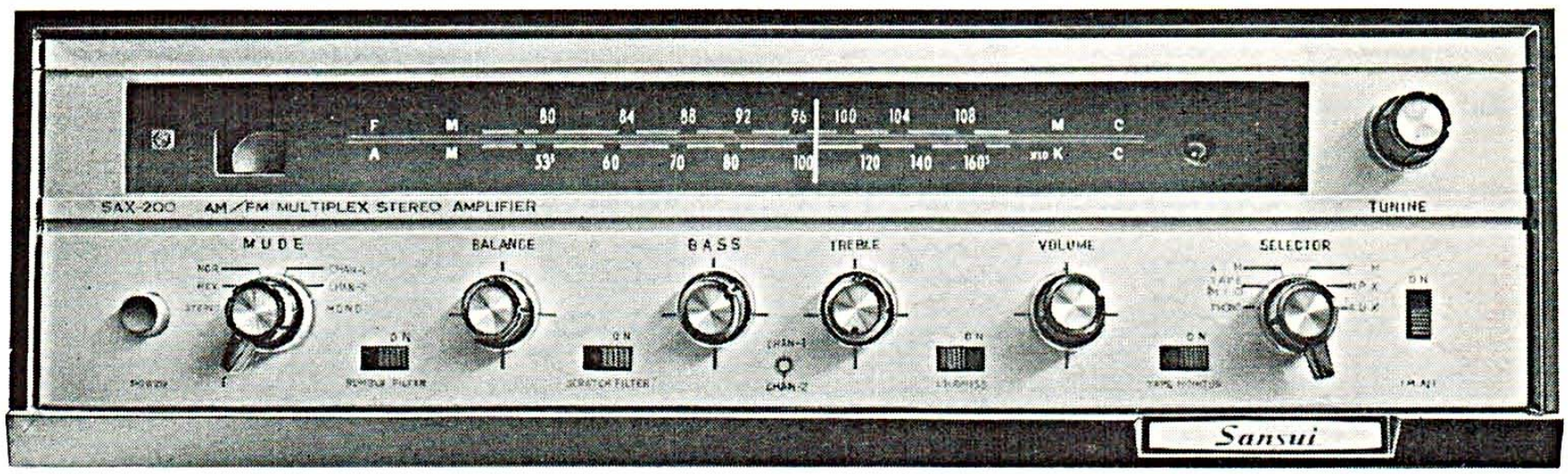
OPERATING INSTRUCTIONS
& SERVICE MANUAL

AM/FM MULTIPLEX STEREO TUNER AMPLIFIER

SANSUI MODEL SAX-200



Sansui

SANSUI ELECTRIC COMPANY LIMITED

SANSUI

AM/FM MULTIPLEX STEREO TUNER AMPLIFIER

MODEL

SAX-200

Congratulations, you are now the owner of a new SAX–200 FM multiplex stereo amplifier manufactured by SANSUI, the leading manufacturer of amplifiers, transformers and other stereo audio sets.

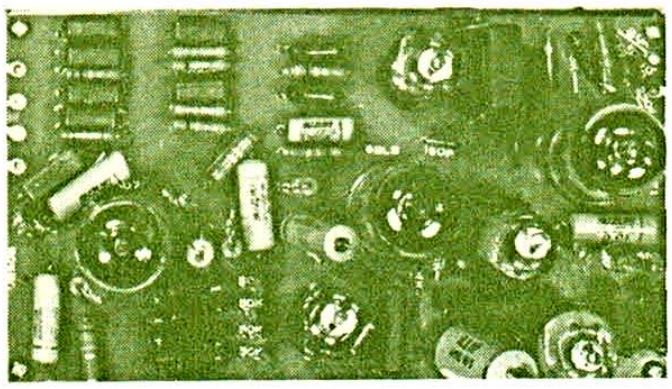
SANSUI's technical staff has always endeavored to produce amplifiers that give stereo fans every convenience and advantage possible. This booklet explains the steps necessary for operating and caring for your new SAX–200. Read it carefully and retain for future use.

CONTENTS

FEATURES

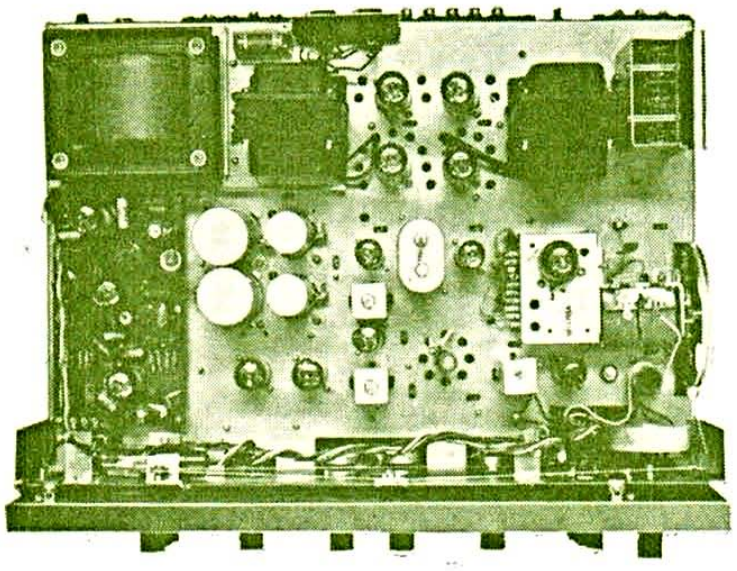
HIGH-STABILITY FM MULTIPLEX CIRCUIT

The SAX-200 employs the most advanced switching matrix circuit, featuring the outstanding performance characteristics. The channel separation is better than 35 db at 1000 cps! The distortion is less than 1%! For easier correct tuning, this new unit is provided with a stereo indicator.



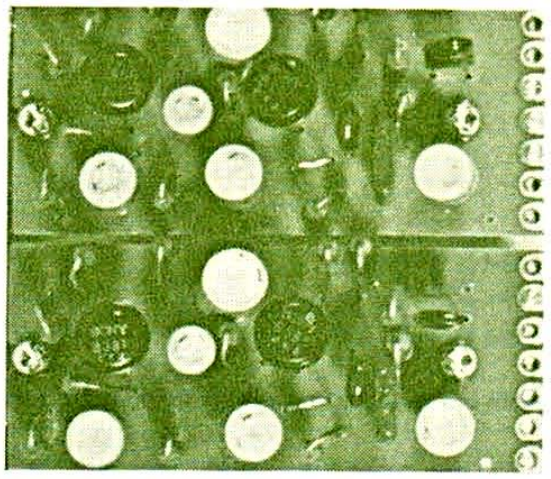
40-WATT POWER AMPLIFIER WITH EXCELLENT DAMPING FACTOR

The push-pull main amplifier with high-performance 6BM8 multiunit power tubes (triode-pentodes) allows to handle 40-watt power. Since voltage negative feedback of more than 16 db is applied to the power stage, the internal impedance is reduced to nearly one-sixth of its initial value and the damping factor of better than 2.5 is obtained. These assure of clear and crisp bass notes.



4-TRANSISTOR HEAD AMPLIFIER

Sansui's famous precision-made 4-transistor head amplifier is free from any hum. Even the low-output magnetic pickup, tape deck (direct tape head) and microphone can be used effectively and efficiently with the SAX-200.

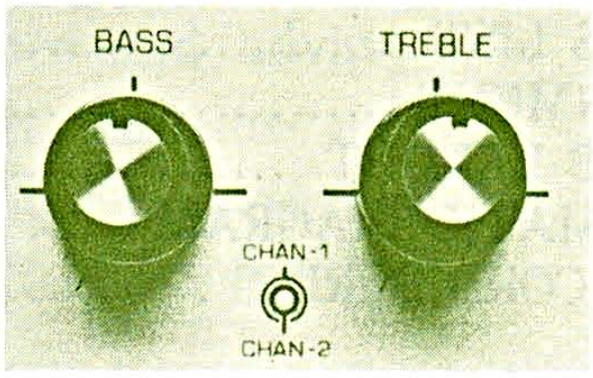


ALL HIGH-CLASS CIRCUITS AVAILABLE

The SAX-200 is equipped with all the high-class circuits such as rumble filter, scratch filter, loudness control, tape monitor, and tape recording-playback plug.

FRICTION DOUBLE-KNOB TONE CONTROLS

For easier adjustment of tones, both TREBLE and BASS controls have coaxial dual knobs.

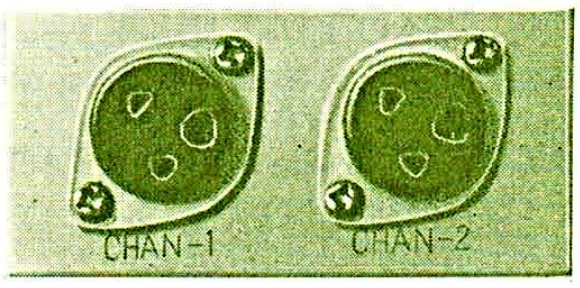


SPECIAL OUTLETS FOR CONDENSER TWEETER

The SAX-200 is provided with the two special outlets for the condenser (electrostatic) tweeter that has won a high reputation among the hi-fi stereo enthusiasts.

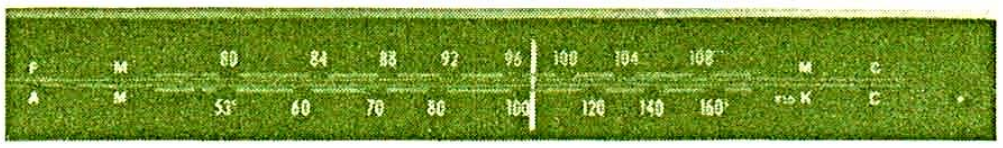
3-DIMENSIONAL DIAL SYSTEM

For easier selection of the desired station, the frequency calibration scales light up when the power switch is pushed on.



REFINED FUNCTIONAL DESIGN

The functional design of the SAX-200 is years ahead of its time. All the Sansui's technical advancements reflect even on a knob.



SPECIFICATIONS/CHARACTERISTICS

SPECIFICATIONS

POWER AMPLIFIER:

MAXIMUM OUTPUT	40 watts total, 20 watts pe channel
FREQUENCY RESPONSE	20 to 80,000 cps —2 dB
DISTORTION	Less than 1% at 13 watt
OUTPUT IMPEDANCE	8, 16 and 32 ohms, each chan nel

PREAMPLIFIER:

SENSITIVITY & GAIN:

PHONO MAG:	77 dB	12 watts at 2 mV Input
X-TAL:	49 dB	12 watts at 50 mV Input
TAPE(MIC):	82 dB	12 watts at 1.1 mV Input
AUX(TAPE MON-OUT):	46 dB	12 watts at 70 mV Input

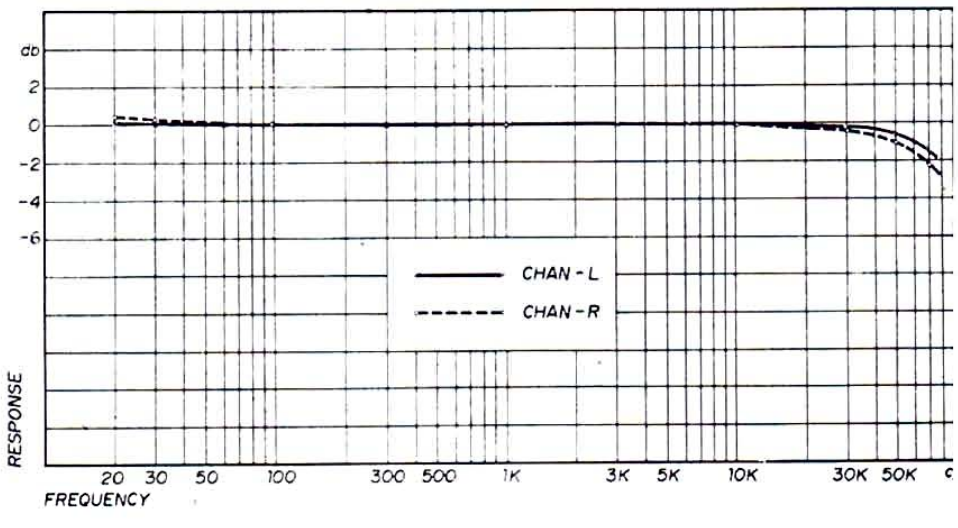
SIGNAL-TO-NOISE RATIO	better than 55 dB at TAP terminal
TONE CONTROL	CR type, +13~—15 dB (50cps +10~—14 dB (10 kc
EQUALIZER	NF type, PHONO : RIAA TAPE : BTS

FM TUNER:

FREQUENCY RANGE	80 to 108 MC

CHARACTERISTICS

FREQUENCY



BANDWIDTH	200 kc within −3 dB
FIDERITY	± 2 dB, 30 to 15,000 cps
SENSITIVITY	1.8 μV (S/N 30 dB 83 MC, 1 kc 100% MOD at 0.5 watts)
INTERMEDIATE FREQUENCY	10.7 MC

AM TUNER:

FREQUENCY RANGE	535 to 1605 kc
BANDWIDTH	6 kc within −3 dB
SENSITIVITY	better than 50 μV (S/N 20 dB 1 MC, 400 cps 30% MOD at 0.5 watts)
INTERMEDIATE FREQUENCY	455 kc

FM MULTIPLEX DEMODULATION CIRCUIT:

FREQUENCY RESPONSE	50 to 15,000 cps ±2 dB
CHANNEL SEPARATION	35 dB at 1 kc
DISTORTION	Less than 1% at 1 kc, 0.3 to 3 V input

OTHER MAIN CIRCUITS:

LOUDNESS CONTROL	on-off switch
50 cps	+8 dB
10 kc	+8 dB (1 kc : 0 dB)
SCRATCH FILTER	on-off switch
10 kc	−9 dB (1 kc : 0 dB)
RUMBLE FILTER	on-off switch
20 cps	−18 dB
100 cps	−4 dB
FM-AFC	on-off switch
TAPE MONITOR	on-off switch
FM STEREO INDICATOR	
CONDENSER SPEAKER OUTLETS	

TUBES, DIODES & TRANSISTORS:

6AQ8 × 3, 6BE6 × 1, 6BA6 × 3, 6BM8 × 4, 6BL8 × 1, 6DA5 × 1, 12AT7 × 1 & 12AU7 × 1;
OA-91 (germanium diode) × 9, SW-0.5B(silicon diode) × 2 & TC-0.2P(selenium diode) × 1;
2SB-381 (transistor) × 4, IS-352 (variable capacitor)

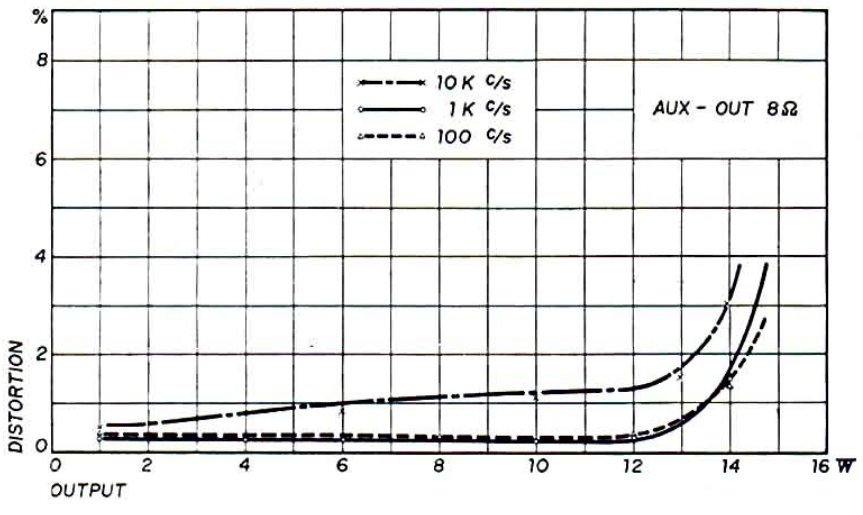
TUNING INDICATOR	magic eye (both AM & FM tuners)
POWER CONSUMPTION	120 VA
POWER SUPPLY	100V, 115V, 230V, AC 50, 60cps
DIMENSIONS	width $17^{3}/_{13}$" × depth $13^{9}/_{18}$" × height $5^{14}/_{18}$"
WEIGHT	29.3 lbs

STANDARD ACCESSORIES:

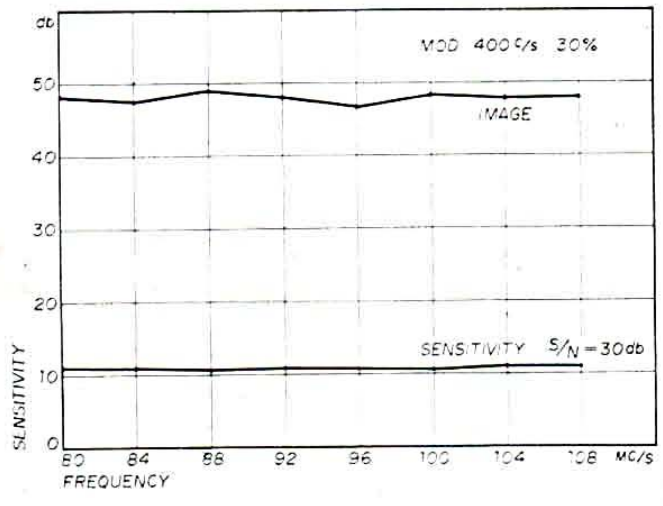
1. FM antenna	1 pc
2. AM antenna	1 pc
3. Pin jack	10 pcs
4. 3-pin jack	2 pcs

(Specifications subject to change without notice)

DISTORTION



FM SENSITIVITY



CONNECTIONS

NOTES :

In cases of 2–2 and 2–3 of the above subsections, a impedance-matching transformer should be used. The following are available at your Sansui dealer:
CT–50 : for 8–ohm speaker;
CT–60 : for 16–ohm speaker.

CONNECTION OF LOUDSPEAKERS

When a speaker is connected to your SAX-200, the impedance should match to obtain proper performance. Carefully read this section to obtain the best amplifying result.

1 IN CASE OF USING ORDINARY CONE OR HORN SPEAKERS

1–1 STEREO (Fig.1–2)

Connect the possitive terminal of the right speaker (channel-1) to one of the upper terminals marked 8, 16 and 32 ohms at the back of your SAX-200, depending on the impedance of the speaker used. Then connect the negative terminal to the upper C terminal.

Connect the positive terminal of the left speaker (channel-2) to one of the lower terminals marked 8, 16 and 32 ohms at the back of your SAX-200, depending on the impedance of the speaker used. Then connect the negative terminal to the lower C terminal.

1–2 MONO

If speaker systems are used as a monophonic system (theimpedance of the speaker is 16 ohms, for example), connect the positive terminals of the right and left speakers to the upper and lower terminals marked 32 ohms at the back of your SAX-200, and then the negative terminals to the upper and lower C terminals.

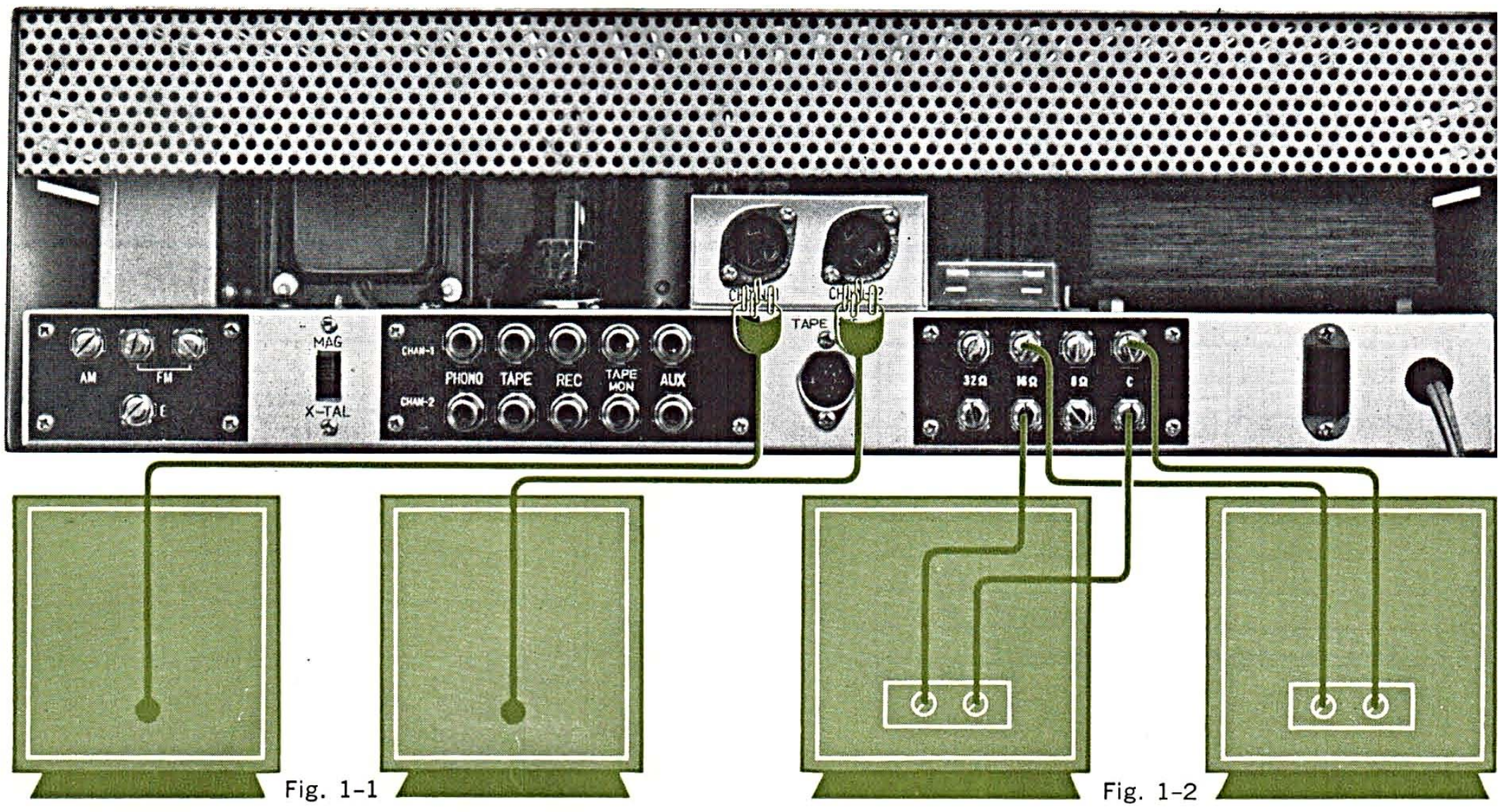
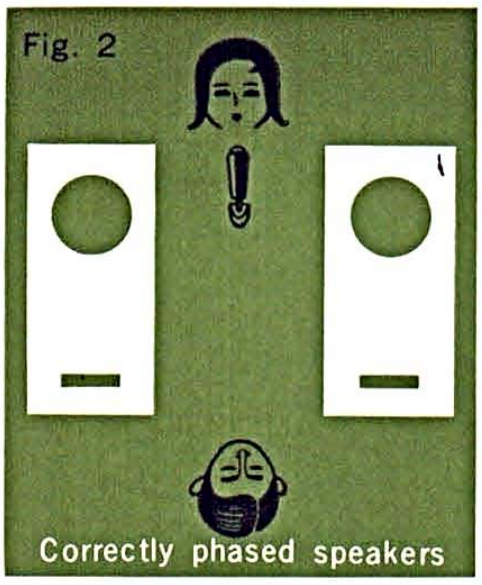
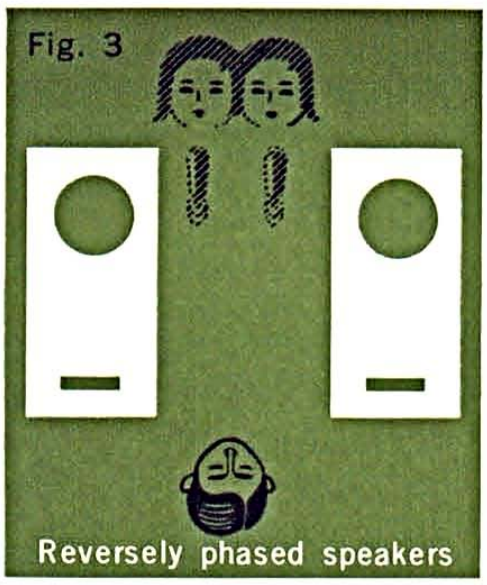
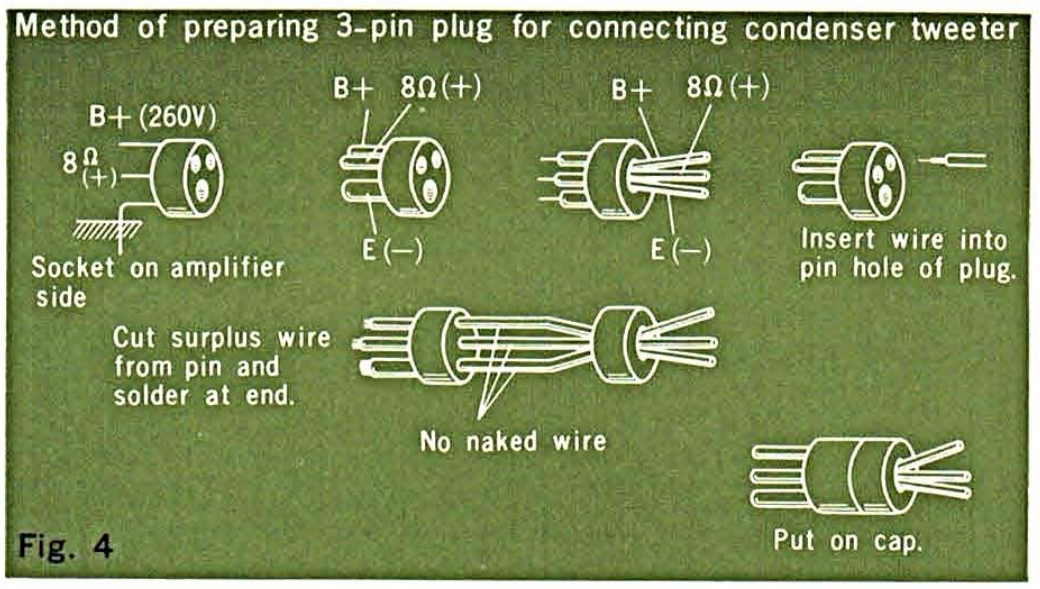


Fig. 1–1

Fig. 1–2







2 IN CASE OF USING CONDENSER (ELECTROSTATIC) TWEETER IN 2-WAY OR 3-WAY SPEAKER SYSTEM

2-1 In case of using condenser speakers with built-in polarized power supply (250/260V) or use of low-impedance speakers with buil-in network, connect them depending on their impedance as described in the preceding section (Fig. 1-2).

2-2 If a 8-ohm woofer/midrange is used together with the condenser tweeter, connect as shown in Fig. 5 and Fig. 1-1 by using a 3-pin plug* (Fig. 4).
* Included in the standard accessories of your SAX-200.

2-3 If a 16-ohm woofer/midrange is used together with the condenser tweeter, the latter should be, by using the 3-pin plug, connected as shown in Eig. 6. The woofer/midrange should be connected to the C and 16-ohm terminals in accordance with its impedance.

2-4 If a condenser tweeter with built-in high-impedance network is used, remove the network from the tweeter and then connect as described in subscription 2-2 or 2-3.

CAUTION: Be sure to use the 3-pin plug correctly as illustrated Fig. 8, or the amplifier and speaker may be damaged.

WARNING: Never attempt to touch the power supply built into the condenser speaker because of the high tension of 260V.

NOTES:

1. The two speakers or groups of speakers must be properly phased. The speakers for the two channels must push the sound waves out together. If one pushes while the other pulls, there is sound cancellation at some frequencies or in some listening locations. If so, reverse the phase (+ and −) of either group of speakers.
2. The proper connection of the speakers is vital to maintain long life and high performance of the amplifier. After connecting, make sure that one terminal is not in contact with another terminal.

Fig. 5

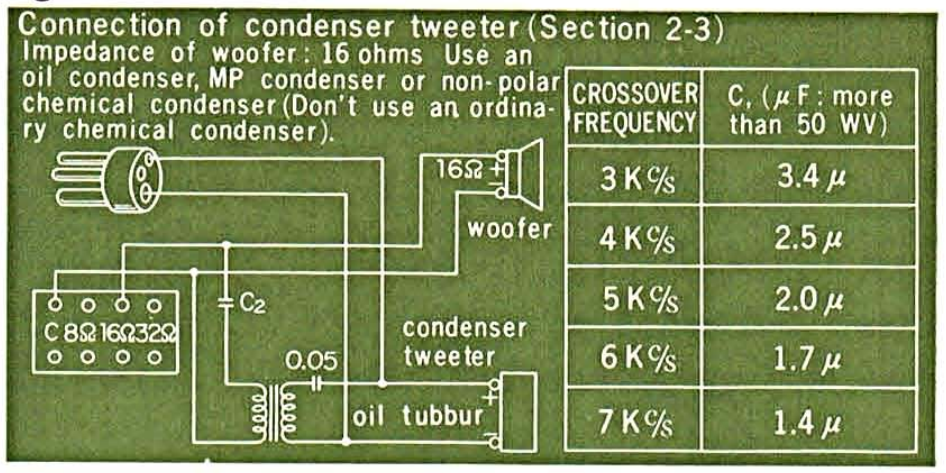


Fig. 6

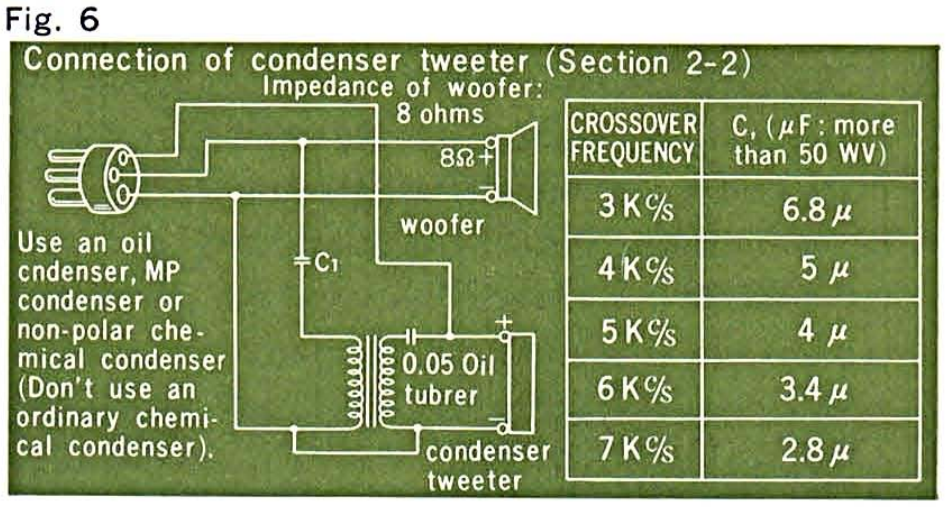


Fig. 7

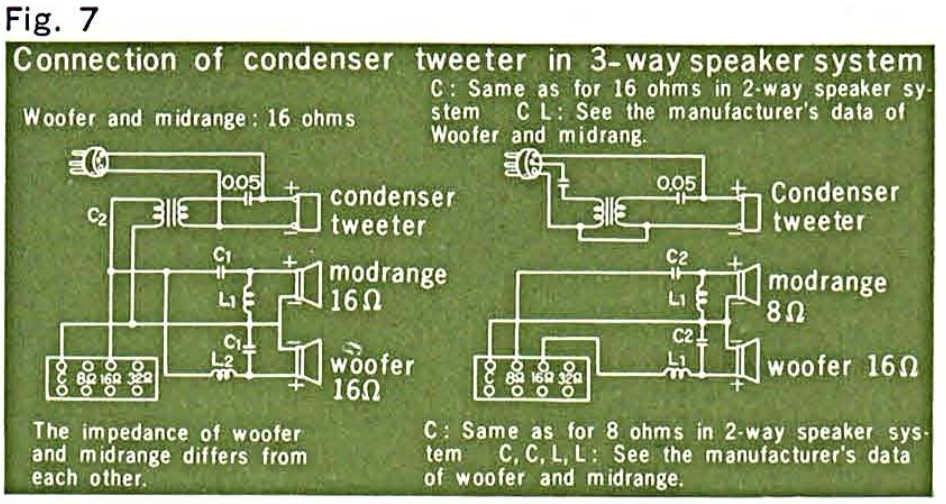
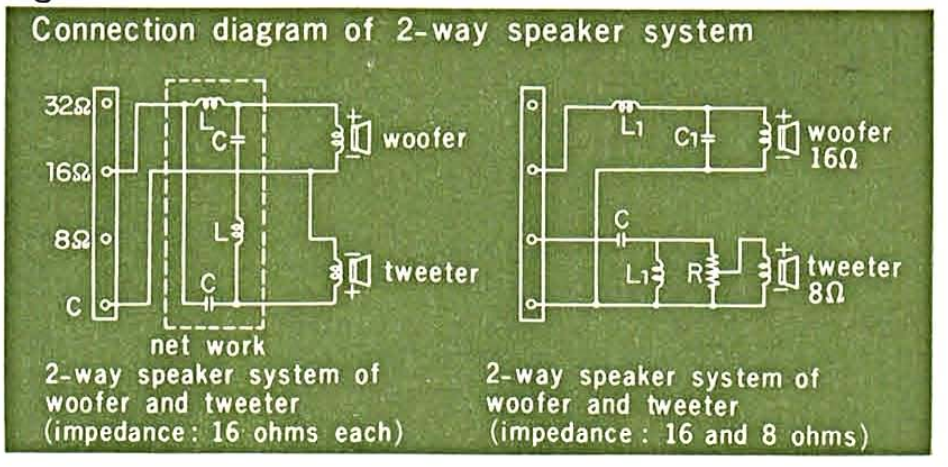


Fig. 8



CONNECTIONS

1. CONNECTION OF THE ANTENNA

The AM and FM antennas are included in the standard accessories of your SAX-200. Properly connect as follows :

1-1 AM ANTENNA

Connect the AM antenna (blue PVC wire) to the AM antenna terminal at the back of the amplifier.

NOTES :

1. STRONG SIGNAL STRENGTH

   If the station signal is strong enough (in some places near the broadcasting station), only 2 or 3-meter indoor antenna is adequate. If a noise or hum is still heard due to the insufficient sensitivity, it should be properly installed on the wall of the room.

2. WEAK SIGNAL STRENGTH

   If the station signal is weak (in some places far away from the broadcasting station or in some thick-wall building), the outdoor antenna should be installed as illustrated in Fig. 11.
   For stafety reason, install a lightning arrester to the outdoor antenna.

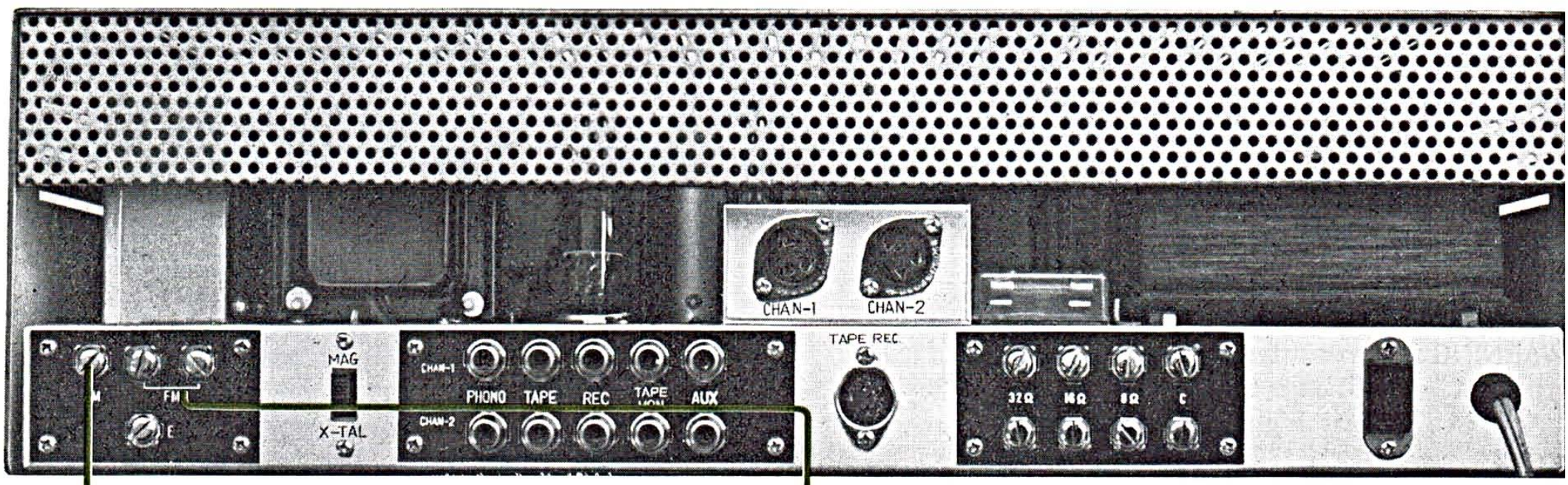
1-2 FM ANTENNA

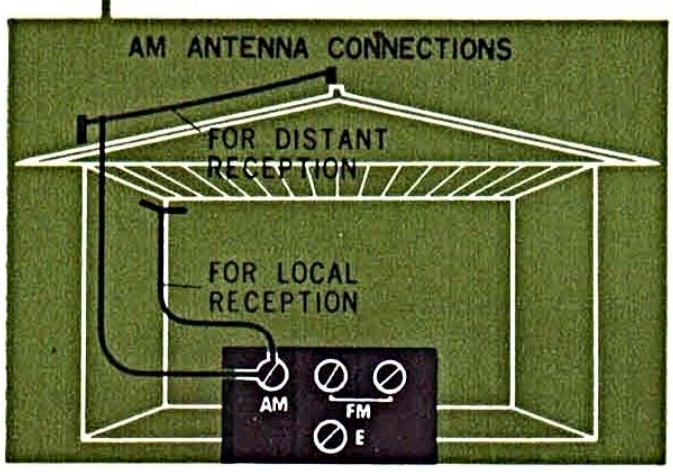
Connect the FM antenna (feeder wire) to both FM and E terminals at the back of the amplifier.

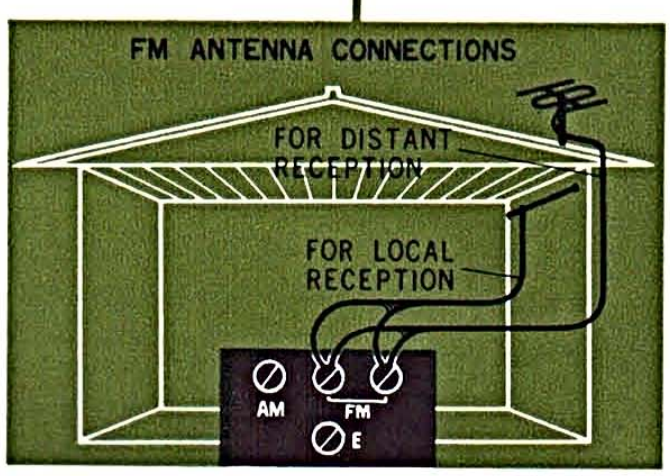
NOTES :

1. STRONG SIGNAL STRENGTH

   If the station signal is strong (in some places near the broadcasting station,) the indoor antenna should be installed in a "T" shape to







obtain the highest sensitivity.

2. WEAK SIGNAL STRENGTH

If the station signal is weak (in some places far away from the broadcasting station or in some thick-wall buildings), the outdoor TV antenna should be used.

3. For the best antenna effect, pay a special attention to its height and direction rather than its length. One person should listen while another installs it to the proper position.

RECORD PLAYER

a) Connect the right output of the record player to the PHONO CHAN-1 input at the back of the amplifier.

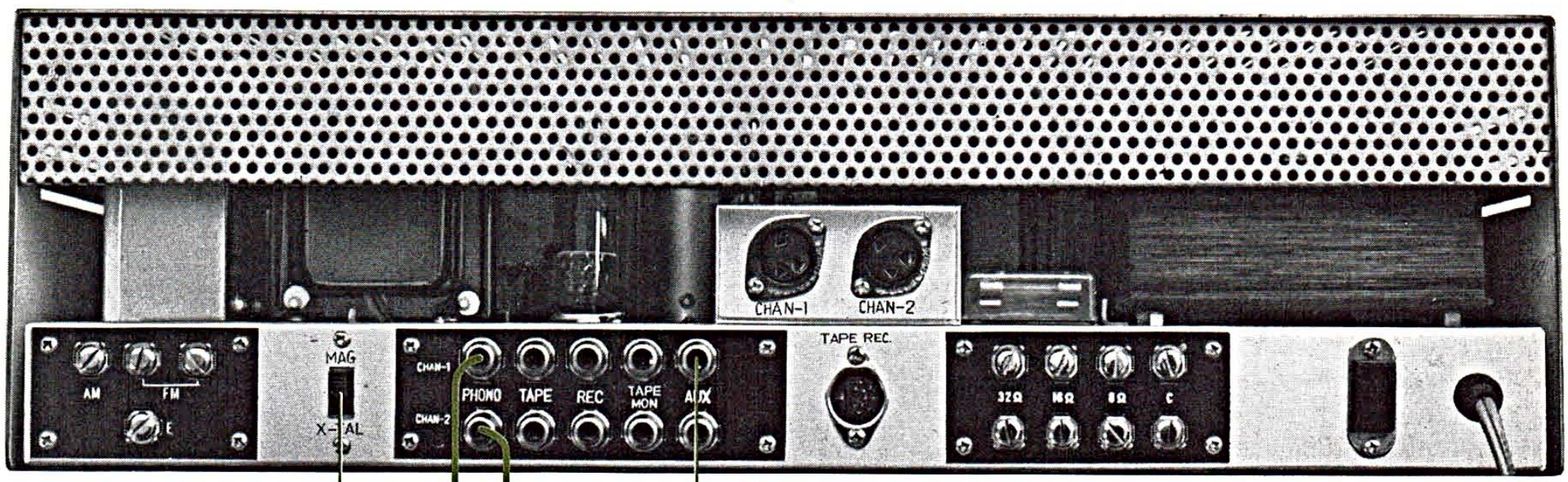
b) Connect the left output of the record player to the PHONO CHAN-2 input at the back of the amplifier.

c) Set the cartridge switch at the back of the amplifier to MAG or XTAL position, depending on the type of pickup cartridge used.

d) Insert the record player plug into the amplifier outlet.

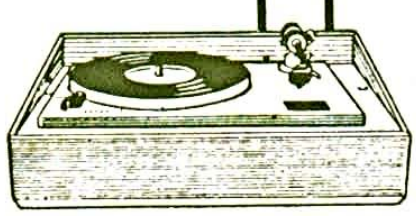
NOTES :

1. There are two categories of pickups, one using a crystal element and the other using a magnetic circuit. You can use either pickup with your SAX-200.
2. The record player connected is not switched on and off by the power switch of the SAX-200. It is, therefore, preferable to use a record player having its own power switch.



Record player with CRYSTAL or MAGNETIC cartridge

For sources Such as tuner etc.



Less than 2 mV output cartridge player

CONNECTIONS

CONNECTION OF A TAPE RECORDER

1 RECORDING

1-1 TAPE RECORDER WITH RECORDING/PLAY-BACK CONNECTOR (ONE CONNECTION : DIN STANDARD)

By using shieldedwire, insert the recording/ playback connector of the tape recorder into the REC outlets, or TAPE REC (DIN) socket of the amplifier.

1-2 TAPE RECORDER WITH PIN JACK

By using shielded wire, connect the recording input of the tape recorder to the amplifier CHAN-1 and CHAN-2 terminals marked REC for stereo recording or either terminal for monophonic recording.

2 PLAYBACK

2-1 TAPE RECORDER WITH RECORDING/PLA BACK CONNECTOR (ONE CONNECTION : D STANDARD)

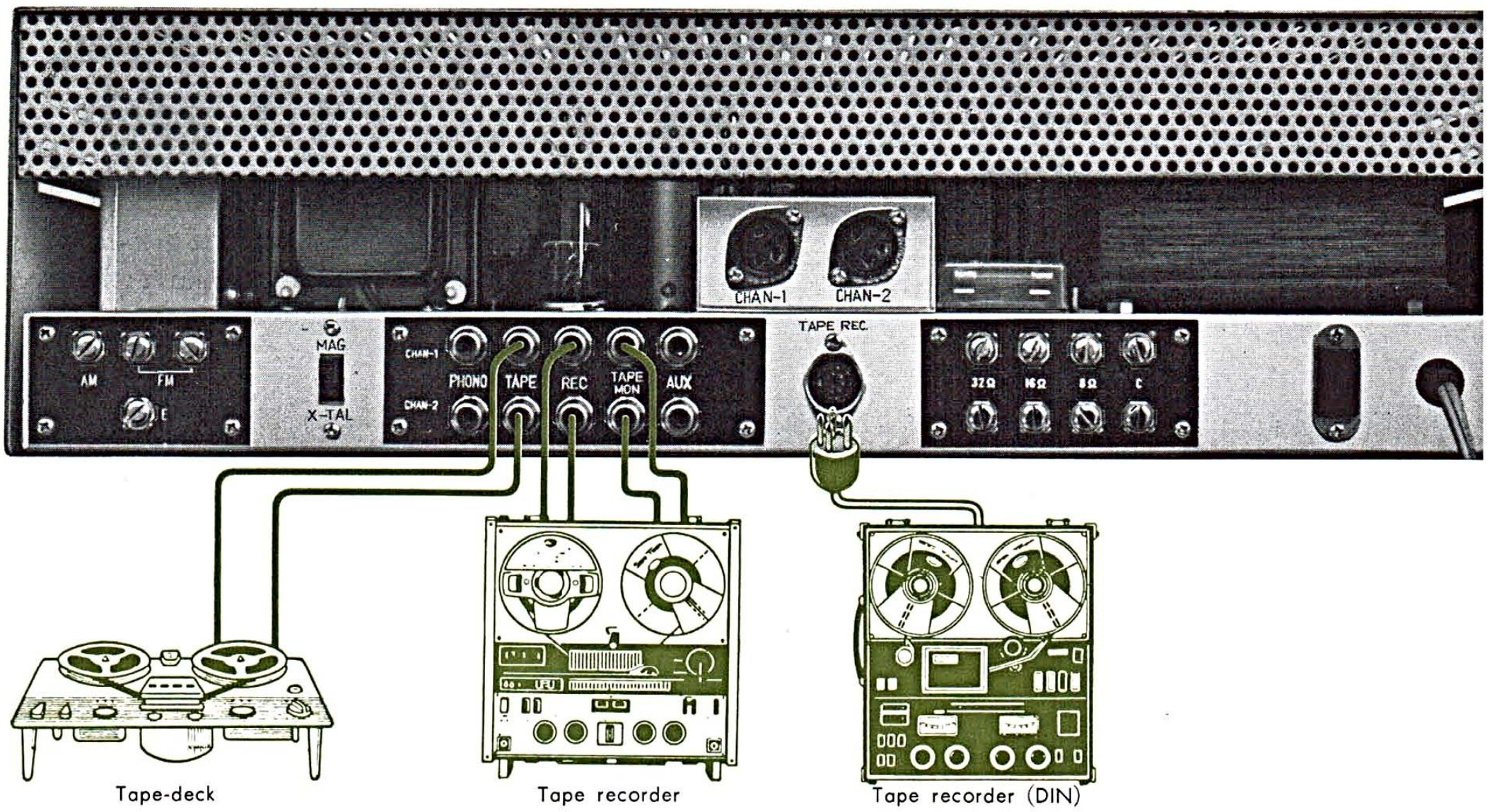
By using shielded wire, insert the recordin playback connector of the tape recorder in the TAPE MON outlets, TAPE REC (DI socket of the amplifier.

2-2 TAPE RECORDER WITH PIN JACK

Connect the tape recorder outputs to the amp fier CHAN-1 and CHAN-2 terminals mark TAPE MON for stereo or to either termin for monaural.

2-3 TAPE DECK(DIRECT TAPE HEAD)

Connect the tape deck outputs to the amplifi



Tape-deck

Tape recorder

Tape recorder (DIN)

CHAN–1 and CHAN–2 terminals marked TAPE for stereo or to either terminal for monaural.

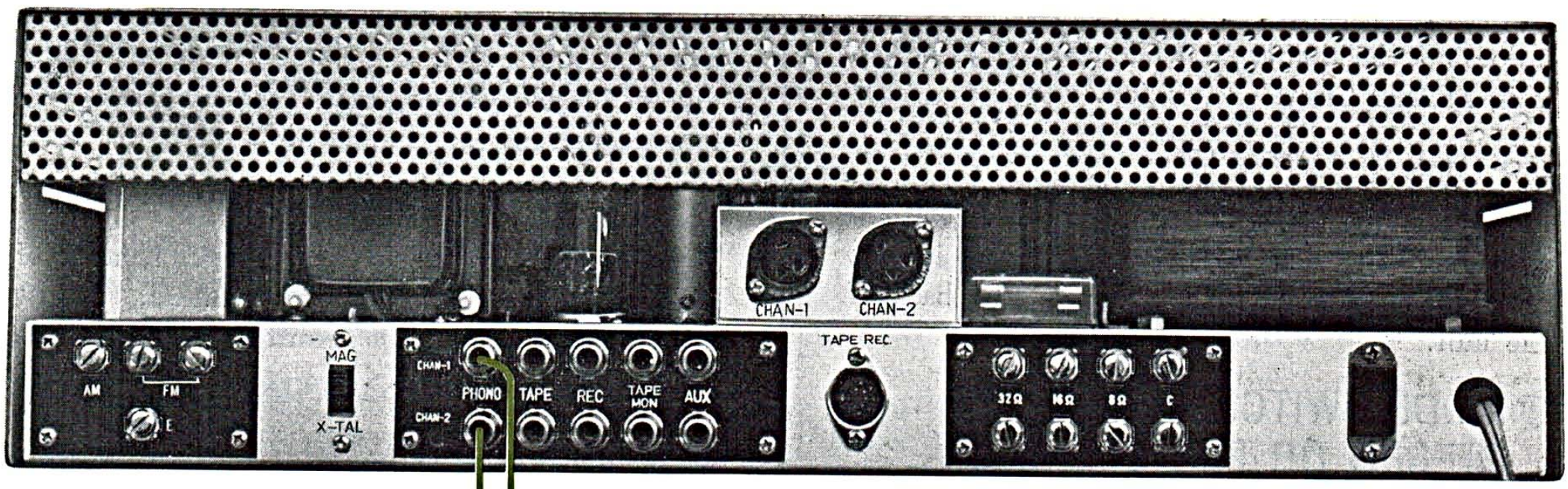
3 MONITORING

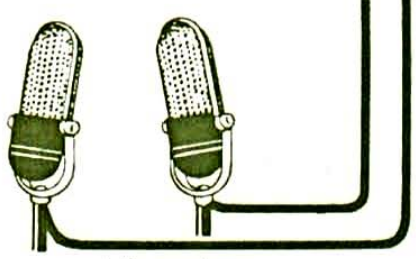
Your SAX-200 has a monitoring circuit for a 3-head tape recorder, making it possible to listen to the reproduced sound while recording. Connect it as in Section "RECORDING(1–1)" and "PLAY-BACK (2–1 and 2–2).

MICROPHONE

Use a high-impedance 50 kΩ crystal, dynamic or velocity microphone.

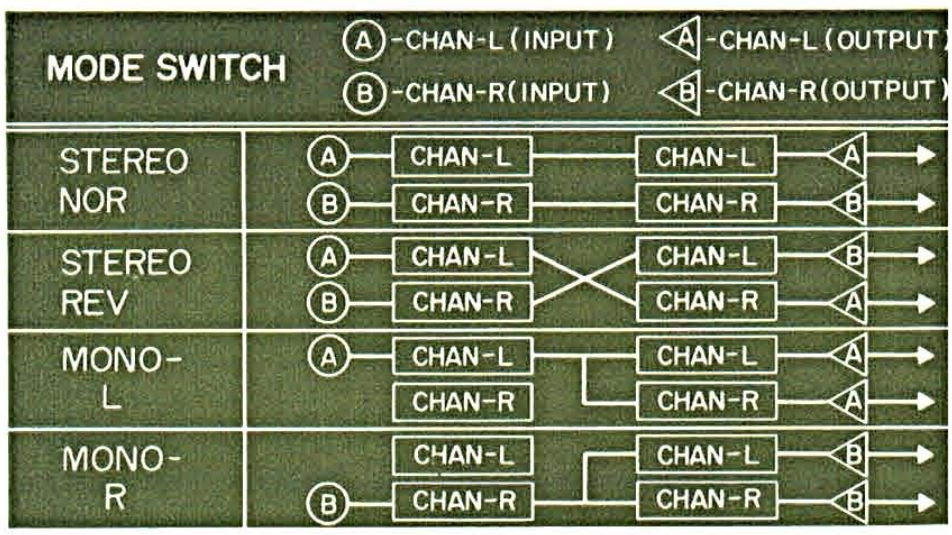
Connect the microphone to the amplifier CHAN–1 and CHAN–2 terminals marked TAPE for stereo or to either terminal for monaural.





Microphone

SWITCHES AND CONTROLS



①MAGIC EYE

This device gives a visual indication of correct FM and AM tuning. The closed fluorescent pattern means that the tuning is correct.

②MPX INDICATOR

This indicator is lit as soon as the signals of the desired stereo broadcast are correctly selected. It does not function for monaural FM broadcasting. Although it goes on when the power switch is turned on, it will go off in a short time.

③TUNING

This knob is used to select the signal of the desired FM or AM broadcast station. Note that it does not function at all while the MODE switch is in MONO CHAN-2 position.

④POWER SWITCH

Push the button and the unit goes on. Push it again and the unit goes off. Note that it does not switch on and off the outlets at the back of the unit.

⑤MODE SWITCH (SWITCH TO STEREO OR MONO)

STEREO NORMAL :

FM multiplex stereo broadcast, stereo record and stereo tape.

As illustrated below, the signal A of the channel 1 and the signal B of the channel 2 are driven from the speaker A and the speaker B respectively.

STEREO REVERSE : Same as above.

The signal A of the channel 1 and the signal B of the channel 2 are driven from the speak B and the speaker A respectively.

If the sound from the right and left speake is heard reverse, the MODE switch should set to this position.

MONO CHAN-1 :

FM broadcast, AM broadcast, monophor record and monophonic tape.

As illustrated below, the signal of the chanr 1 is driven from both A and B speakers.

MONO CHAN-2 : Same as above but rarely use

The signal B of the channel 2 is driven fr both A and B speakers.

⑥RUMBLE FILTER

Turn on this switch and the low-frequency vib tion of mechanical origin or noises at relative low frequencies are eliminated or reduced.

⑦BALANCE CONTROL

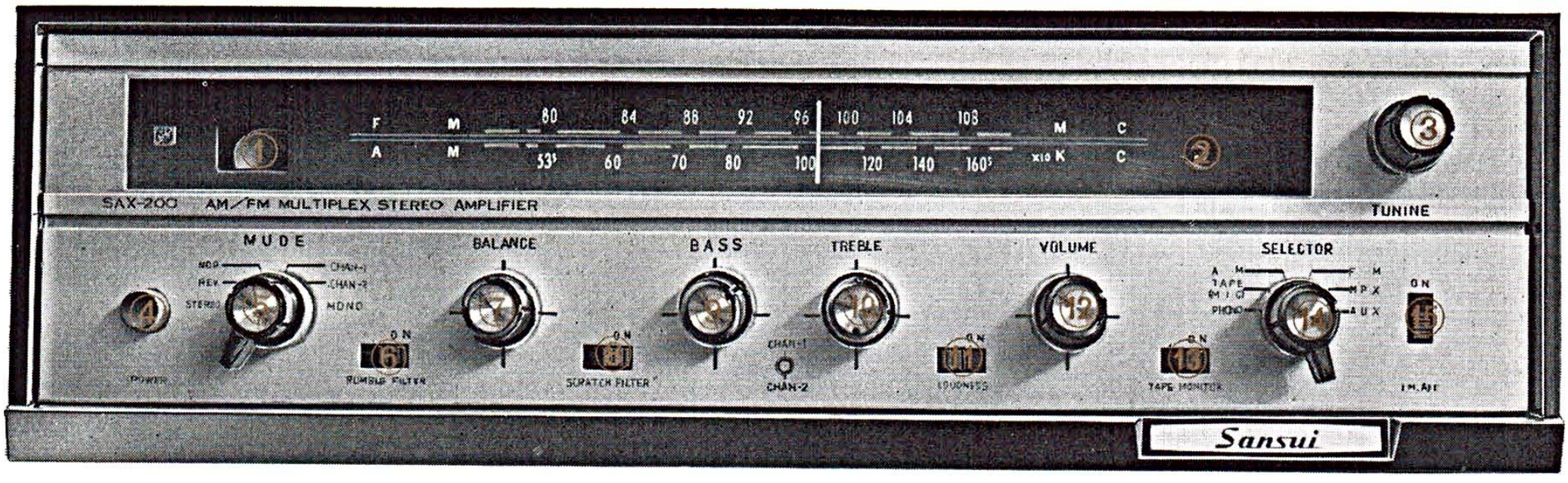
This control is used to keep proper balance sound volume between the two channels. Adj it so that the sound is heard equally from t right and left speakers.

⑧SCRATCH FILTER

Turn on this switch and a record scratching nois radio noise caused by a fluorescent lamp and oth noises at relatively high frequencies are eliminat or reduced.

⑨BASS CONTROL

As this control is turned from the center-s (FLAT) to right, the bass notes are more emp sized. As it is turned from the center-set to le



they are less emphasized.
The outer knob and the inner knob of the control are for the channel 1 and the channel 2 respectively.

⑩TREBLE CONTROL

As this control is turned from the center-set (FLAT) to right, the high notes are more emphasized. As it is turned from the center-set to left, they are less emphasized.

The outer knob and the inner knob of the control are for the channel 1 and the channel 2 respectively.

⑪LOUDNESS SWITCH

This switch is used to emphasize the high and low notes only when you enjoy a music with the volume largely reduced.

⑫VOLUME CONTROL

When this control is turned clockwise, the volume is increased ; when it is turned counter-clockwise, the volume is decreased.

⑬TAPE MONITOR SWITCH

When you tape recorder using of a 3-head tape recorder, turn on this switch. And the sound recorded is reproduced at the same time.
When playing the tape back, turn this switch on.
This switch must be always in OFF position except for the above uses.

⑭SELECTOR

This switch is used to select the desired sound program :

PHONO : Playing of records.

TAPE (MIC) : Tape deck (direct head) playback and microphone.

AM : AM broadcasting.

FM : FM broadcasting.

MPX : FM multiple stereo broadcasting.

AUX : Reproduction by connecting other tuners, MPX adaptor, X-tal cartridges, etc.

⑮FM-AFC

This prevents signals from FM station with drifting. This is likely to happen because of the very high frequencies used. If it occurs, the total quality deteriorates or you cannot hear the program at all. To avoid this, switch on the FM-AFC after tuning in the station of your choice. If you switch on the FM-AFC before tuning, you may not be able to tune the tuner as accurately. If the FM-AFC is kept on even when there are a number of stations nearly, you may suffer from their interference. In such a case, switch off the FM-AFC.

OPERATIONS

FOR RADIO RECEPTION

1. FM RECEPTION

a) Set the SELECTIOR switch to FM position.
b) Set the MODE switch to MONO CHAN-1 position.
c) Select the signal of the desired station by means of the TUNING knob and the magic eye.
d) Turn on the FM-AFC switch.
e) Adjust other controls and switches properly.

2. AM RECEPTION

a) Set the SELECTOR switch to AM position.
b) Set the MODE switch to MONO CHAN-1 position.
c) Select the signal of the desired station by means of the TUNING knob and the magic eye.
d) Adjust other controls and switches properly.

3. FM STEREO RECEPTION

a) Set the SELECTOR switch to MPX position.
b) Set the MODE switch to STEREO NOR position.
c) Select the signal of the desired station by means of the TUNING knob and the magic eye. When the FM stereo signals are correctly selected, the indicator lamp goes on.
d) Turn on the FM-AFC swich.
e) Set the BALANCE control to proper position.
f) Adjust other controls and switches properly.

NOTES :

1. FM-AFC SWITCH

Your SAX–200 has a FM-AFC circuit which provides continuous automatic adjustment to the tuning, eliminating any trouble caused by the FM. First, select the signals of the desired statior and then turn on the FM-AFC switch, or may be hard to tune in.

2. FM MULTIPLEX STEREO

There are two systems in the FM multiple broadcasting: FCC system (GE-ZEMITI system) and CROSBY system (FM-FM system Your SAX–200 can receive the signals of th FCC stereo system.

In the FCC system, also cllaed "Single Wav AM-FM System", a signal which contains th sum of the left and right stereo channels (L+F is frequency-modulated in the main chann and a signal which is the difference betwee the left and right channels (L-R) is amplitud modulated in the subchannel. For easie demodulation, the SAX–200 employs the con patible system of the complex singnals to whic the 19 kc pilot carrier and the 67 kc subsign of the SCA channel signal are added. Wit this system, you can enjoy clear and noisele stereo music.

FOR PLAYING OF RECORDS

a) Set the SELECTOR switch to PHON position.
b) Set the MODE switch to STEREO NO position.
c) Switch on the record player at proper spee (rpm).
d) Place a pickup on the record.
e) Adjust the balance of sound levels betwee the right and left speakers by means of th BALANCE control.
f) Adjust the VOLUME control properly.
g) Adjust other controls and switches properl

USE OF A STEREO RECORD PLAYER

Follow the same procedure as for playing of stereo records for better result.

1. When the sound in the right channel is heard from the left speaker, and vice versa, the MODE switch should be set to STEREO REV position.
2. To obtain the best balance of sound levels between both channels, play a monophonic record just like a stereo and adjust the BALANCE control so that the sounds are heard from the middle between the right and left speakers.

FOR RECORDING AND PLAYBACK OF TAPE

1. TAPE RECORDING

a) Set the SELECTOR switch to the program source which is going to be recorded.
b) Set the MODE switch to STEREO NOR position for stereo recording or to either of MONO CHAN-1 and CHAN-2 positions for monophonic recording.
c) Operate the tape recorder correctly.

NOTE:

The sound to be recorded on the tape is not controlled by the amplifier.

2. PLAYBACK

a) In case of tape recorder (in Section 1-2-1 and 1-2-2), set on the TAPE MONITOR switch, In case of tape deck (in Section 1-2-3), set the SELECTOR switch to TAPE(MIC) position.
b) Set the MODE switch to STEREO NOR position for stereo or to either of MONO CHAN-1 and CHAN-2 positions for monaural.
c) Operate the tape recorder properly.
d) Properly adjust the controls and switches of the amplifier.

3. MONITORING

Operate as in the preceding section "PLAY-BACK".

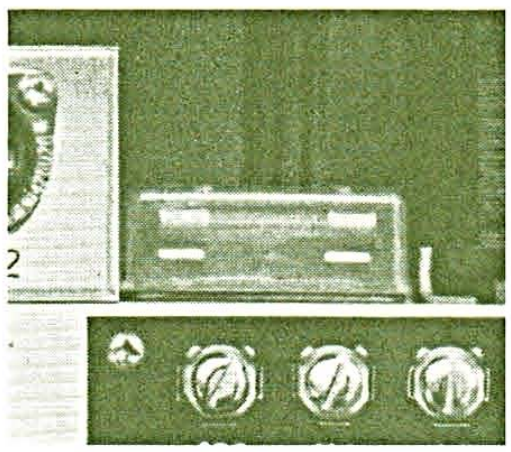
NOTES:

1. The sound level recorded is not related to that from the speakers.
2. Record playing and radio programs should be recorded on the tape by the use of the amplifier. Don't use a microphone placed in front of the speaker.
3. Before recording, be sure to look up the manufacturer's instructions to connect and operate the tape recorder correctly.
4. In case of record-to-tape recording, the MODE switch always functions as STEREO NOR even if it is set to any other position.
4. The TAPE MONITOR switch must be always in OFF position except for monitoring and playback.

FOR MICROPHONE

a) Set the SELECTOR switch to TAPE(MIC) position.
b) Set the MODE switch to STEREO NOR (or REV) position for the use of the two microphones or to CHAN-1 (or CHAN-2) position for the use of single microphone.
c) Turn the BASS control fully in a counter-clockwise direction.
d) Adjust the TREBLE control clockwise to the right horizontal line through the center-set (FLAT).
e) Adjust other controls and switches properly.

HOW TO KEEP YOUR SAX-200 IN TOP CONDITION



HOW TO ELIMINATE UNPLEASANT RADIO NOISE

1. AM BROADCASTING

1-1 An AM radio noise is often eliminated simply by replacing the antenna.

1-2 Too weak station signal may cause a noise to the amplifier. To eliminate it, install the indoor antenna properly on the wall of the listening room. If the noise is still heard or the sensitivity of the amplifier is still excessively low, the outdoor antenna should be installed.

1-3 To eliminate a modulation hum, connect amplifier to the ground or turn the power plug upside down.

2. FM BROADCASTING

2-1 There are two trouble-sources in the FM radio noises: one is caused by the insufficient antenna input and another is caused by other electrical appliances placed near the amplifier. To eliminate the former noise, check the antenna for improper installation and, if necessary, install an outdoor TV antenna or special FM antenna. When the FM antenna is used together with the TV antenna, it must be installed so that it does not affect the latter at all. A special divider is recommended for this use. To eliminate the latter noise, install noise limiters to them or the amplifier itself.

2-2 Note that an excessively long antenna may cause a noise.

2-3 The sensitivity of the amplifier varies, depending on the transmitting conditions of the station and the performance of the antenna Therefore, it is not an amplifier trouble tha the signal of the station A is well receive but that of the station B is badly received.

3. FM AND AM BROADCASTINGS

To eliminate a noise caused by other electrica appliances, install noise limiters to them o the amplifier itself.

4. FM MULTIPLEX STEREO BROADCASTING

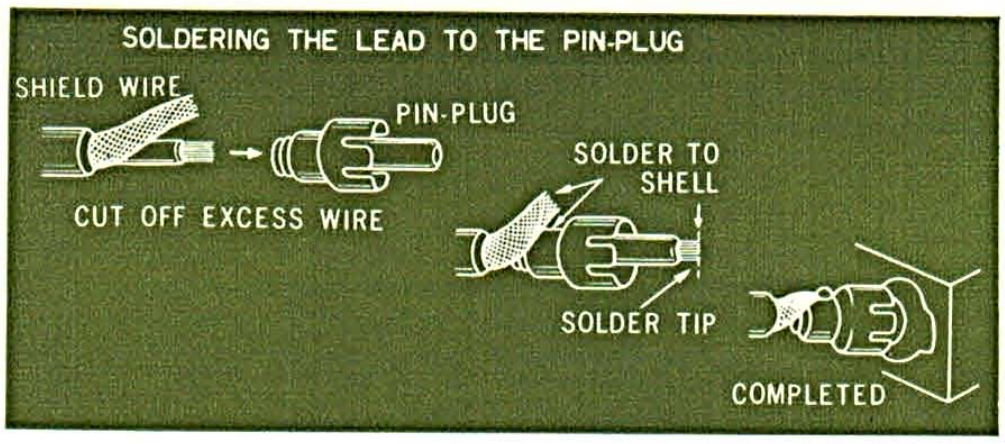
To eliminate a noise in the FM multiple stereo, switch on the scratch filter and adjus the TREBLE control to FLAT (or give a little turn counterclockwise from the middle) Another way to eliminate is to listen to th FM multiplex stereo with the amplifie operated for monophonic FM.

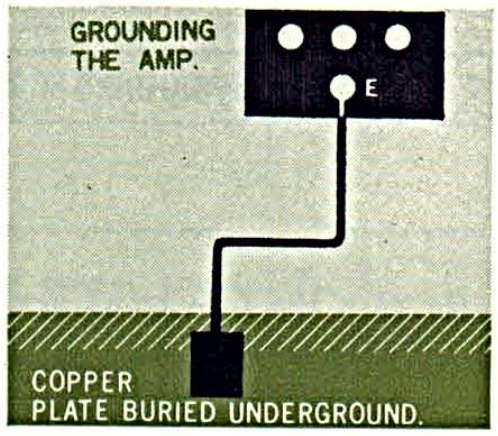
WRONG PHASED SPEAKERS

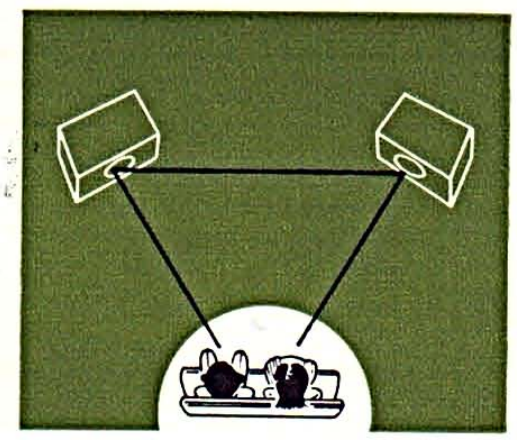
Incorrect phasing is evidenced by loss of bas when you are listening to a monophonic recor at a point midway between the two speake systems. To phase them correctly, reverse th positive and negative terminals of either speake system.

BLOWN FUSE

If the unit does not function at all due to th blown fuse, remove its line cord from the outle and then replace the fuse. Use a 2-amper cartridge fuse. Never attempt to use a wire o a fuse with improper capacity. Before replacing be sure to trace the trouble source and repair.







HOT AMPLIFIER

Don't worry about heat radiated from the amplifier. Air vents in the top and back plates assure of a long continuous use. Some precautions, however, should be observed: first, place nothing on the amplifier; second, don't install it into an air-tight box; and lastly, don't use it standing upright.

CONNECTION TO THE AMPLIFIER

Be sure to use a shielded wire for the connection of a tape recorder, record player etc. The use of an ordinary cord or PVC wire may cause buzz to the amplifier.

DEEP HOWLING

Deep howling or buzzing on record playing is caused not by the amplifier, but by the record player which is placed on or near the enclosure. To eliminate it, keep a proper distance between them or place the record player on a thick cushion.

Be sure to use a shielded wire for the connection of the record player and the tape recorder, or a noise or buzz may be made.

If the noise is still heard, check all the connections for wrong or bad grounding.

CONNECTING TO THE GROUND

Connect one end of a PVC wire or enamel wire to the E terminal of the amplifier and another end to the ground, as shown in Fig. 15. This eliminates or reduces a noise on radio reception and a howl on record playing.

RECORD NOISE

To eliminate a record noise, switch on the scratch filter. If the noise is still heard, check the needle for wear and the record for defect.

FOR THE BEST STEREO EFFECT

The spacing between speakers, the location of the listener, and room acoustics, all effect the performance of the stereo system.

Positioning of speakers is just as phasing in the stereo system. If the speakers are separated too much, or if the listener gets too close to the speakers, there may be a sound hole in the middle. Arrange them as illustrated in Fig. 16. The amplifier and the record player should be kept away from the speakers not only for convenience but for eliminating any troubles caused by the vibration of the reproduced sound.

WHERE TO BE PLACED

The amplifier should be installed to the place as given below:

1. Easy to ground;
2. Floor not vibrated;
3. Not wet and dusty;
4. Not exposed to the sun;
5. Well ventilated.

SERVICE NOTE

When the power switch is pushed, electric supply will not be on.

Symptoms (1)	Symptoms (2)	Likely defective places
A. Poor power switch.		Replace it.
B. Poor power cord.		Replace it.
C. Poor plug contact.		Replace the plug or make the plug contact better.
D. Blown fuse.	(In case the fuse blows again upon fitting a new one)	Replace it. Short-circuit rearing in the power transformer (T_6) or short-circuit of path condenser (C_{39}).

When the power switch is pushed, electric supply will be on.

Symptoms (1)	Symptoms (2)	Likely defective places
A. The amplifier does not work at all.	1. Broken wires of vacuum tube heaters.	$V_1 \sim V_{14}$ and silicon diodes.
	2. In case there is something wrong in the vacuum tube and voltage in resp. places.	Check the places where there is something wrong in voltage.
	3. In case there is nothing wrong in the vacuum tube and voltage in resp. places.	Check the input circuit after AUX.
B. Only the FM tuner does not work at all.	1. Broken wires of vacuum tube heaters in the FM system.	$V_1 \sim V_4$
	2. In case there is something wrong in the vacuum tube and voltage in resp. places in the FM system.	Check the places where there is something wrong in voltage.
	3. In case there is nothing wrong in resp. places in the FM system.	Insufficient capacity of C_{90}, C_{91}, poor IFT ($T_1 \sim T_4$) Short-circuit of C_{20}, C_{21}, C_{27}, C_{44} Trouble in the local oscillating circuit of V_1 (6AQ8)
C. Only the FM-MPX system does not work.	1. Broken wires of vacuum tube heaters in the multiplex system.	If the FM tuner works normally, check $V_6 \sim V_8$
	2. In case there is something wrong in the vacuum tube and voltage in resp. places in the multiplex system.	Check the places where there is something wrong in voltage.
	3. In case there is nothing wrong in the vacuum tube and voltage in the multiplex system.	If the FM tuner works normally, it is caused by insufficient capacity of C_{47}, C_{60} C_{61}, C_{62}, C_{63}, and poor L_6, L_8, L_9
D. Only the AM tuner does not work	1. Broken wires of vacuum tube heaters in the AM tuner system.	V_5, V_2 Check the places where there is something wrong in voltage.
	2. In case there is something wrong in the vacuum tube and voltage in resp. places in the AM tuner system.	Poor IFT (T_5, T_2) and poor diode (OA-91).
	3. In case there is nothing wrong in the vacuum tube and voltage in resp. places in the AM tuner system.	Short-circuit of C_{13} and C_{14}
E. The phono, tape head systems and mike do not work.	1. In case of poor the TR head amplifier.	Replace the TR head amplifier unit.
	2. In case of the poor contact of the selector switch.	Replace it or repair the contact.
	3. In case there is something wrong in the input circuit.	Poor contact and short-circuit of the input terminal and pin jack.
	4. Poor condition of the attached appliances connected.	——
	5. Poor coupling condenser.	C_{72}, C_{73}, C_{78}, C_{79}

Symptoms (1)	Symptoms (2)	Likely defective places
A. In case of small sounds of resp. AUX, FM (MPX), AM tuners, phono, tape recorder, mike etc.	In case there is something wrong in voltage in power circuit and resp. places.	Check the places where there is something wrong in voltage.
A. In case of small sounds of AUX with nothing wrong in voltage in resp. places.	1. Short-circuit rearing in the output transformer.	T_8, T_9
	2. Drop in condenser capacity and short-circuit.	Infufficient capacity of C_{96}, C_{97}, C_{100}, C_{101}, C_{114}, C_{115}, C_{122}, C_{123}, C_{124}, C_{125}, and tubular electrolytic condensers C_{98}, C_{99}, C_{112}, C_{113}
	3. Deterioration of vacuum tubes.	$V_9 \sim V_{14}$
B. In case of small FM broadcasting sounds with nothing wrong in voltage in resp. places.	1. Divergence in tracking regulation.	Refer to the regulation method of the FM tuner.
	2. Divergence in IFT regulation.	Refer to the regulation method of the FM tuner.
	3. Poor diode.	Germanium diode (OA-91)
	4. Drop in Q of coils etc.	L_1, L_2
	5. Poor condensers.	Insufficient capacity of C_{11}, C_{21}
	6. Poor contact of the rotary switch.	S_{e5}, S_{e6}
C. In case of small sounds of the FM multiplex stereo system with nothing wrong in voltage in resp. places.	1. Insufficient capacity of the coupling condensers.	C_{47}, C_{48}, C_{55}, C_{60}, C_{61}, C_{62}, C_{63}
	2. Divergence in regulation of coils etc.	L_6, L_8, L_9
	3. Change in capacity of the condensers in the tank circuit.	C_{50}, C_{51}, C_{57}
	4. Deterioration of diode.	Germanium diode OA-91
	5. Poor contact of the rotary switch.	S_{2b} S_{e5}, S_{e6}
D. In case of small AM broadcasting sounds with nothing wrong in voltage in resp. places.	1. Divergence in tracking regulation.	Refer to the regulation method of the AM tuner.
	2. Divergence in IFT regulation.	Refer to the regulation method of the AM tuner.
	3. Poor diode.	OA-91
	4. Drop in Q of coils etc.	L_3, L_4
	5. Poor condensers.	Insufficient capacity of C_{26}
		R_8, R_9
	6. Poor contact of the rotary switch.	S_{e5}, S_{e6}
E. In case of small sounds of the phono, tape recording systems and mike with nothing wrong in voltage in resp. places.	1. In case of the poor contacts of the selector switch.	$S_{e1} \sim S_{e6}$
	2. In case there is something wrong in the input circuit.	Poor contact of the pin jack or poor shielding wires.
	3. Poor condition of the attached appliances connected.	——
	4. Poor coupling condensers.	$C_{74} \sim C_{79}$
	5. Insufficient capacity of emitter bypass condensers.	C_{80}, C_{81}, C_{93}, C_{94}
A. In case the sounds from the AUX terminal are distorted much.	1. Deterioration of vacuum tubes.	$V_9 \sim V_{14}$
	2. Partial short-circuit rearing in the output transformer.	T_7, T_8
	3. Poor speaker.	——
	4. Distortion resulted from the attached appliances connected.	——

SERVICE NOTE

Symptoms (1)	Symptoms (2)	Likely defective places
B. In case the FM broadcasting sounds are distorted much.	1. Poor condition and small input of the antenna.	Refer to the Item, "How to install the antenna" in this manual.
	2. Divergence in tracking regulation.	Refer to the regulation method of FM.
	3. Divergence in regulation of IFT.	Refer to the regulation method of FM.
	4. Poor germanium diode.	OA-91
	5. Insufficient capacity of the condensers in the FM tuner part.	C_{12}, C_{15}, C_{18}
C. In case the sounds of the FM multiplex stereo system are distorted much.	1. Sounds distorted at FM tuner.	Refer to the Item B in Symptoms 1.
	2. Poor regulation of the multiplex coil.	Refer to the regulation method of the multiplex adaptor.
	3. Poor germanium diode.	(OA-91)
	4. Poor condensers.	Poor insulation of C_{60}, C_{61}
	5. Poor fixed resistors.	Broken wires of R_{37}, R_{43}, R_{50}, R_{55}
D. In case the AM broadcasting sounds are distorted much.	1. Divergence in tracking regulation.	Refer to the regulation method of AM.
	2. Divergence in regulation of IFT.	Refer to the regulation method of AM.
	3. Poor germanium diode.	OA-91
	4. Insufficient capacity of condenser and short circuit.	Insufficient capacity of C_{27} or puncture of C_{30}
E. In case the sounds of the phono, tape recording systems and mike are distorted much.	1. In case of much distortion in the attached appliances connected.	——
	2. Poor tubular electrolytic condensers.	Puncture of C_{74} and C_{75}
A. In case of big humming from the AUX terminal	1. Insufficient capacity of the electrolytic condensers.	C_{44}, C_{127}, C_{129}, C_{126}
	2. Inner touch of vacuum tubes.	$V_9 \sim V_{14}$
	3. Big humming in the attached appliances connected.	——
	4. Poor regulation of the hum balancer.	VR-1, VR-2
	5. Broken wires of the NF resistances.	R_{136}, R_{135}
B. In case of big humming in FM broadcasting.	1. Hums generated when tuned to a channel.	Reverse connection of the power plug or poor earthing condition of the chassis.
	2. Inner touch of vacuum tubes.	$V_1 \sim V_4$
C. In case of big humming in the FM multiplex circuit system.	1. Hums generated from the above-mentioned causes.	Reverse connection of the power plug or poor earthing condition of the chassis.
	2. Inner touch of vacuum tubes.	$V_1 \sim V_4$, $V_6 \sim V_8$
D. In case of big humming in AM broadcasting.	1. Hums generated when tuned to a channel.	Reverse connection of the power plug or poor earthing condition of the chassis.
	2. Inner touch of vacuum tubes.	V_5, V_2
E. In case of big humming in the phono, tape recording systems and mike.	1. Poor condition of shielding wires of sound appliances and their connection.	Refer to the Item PRECAUTIONS in the this manual.
	2. Sound appliances and the shielding wires are subjected to external induction.	Install them as far away as possible from the induction machines.
	3. Residual hums of sound appliances.	——

Symptoms (1)	Symptoms (2)	Likely defective places
A. In case of loud noises from the AUX terminal.	1. Break rearing in the fixed resistor wires and touch of parts.	R_{103}, R_{104}, R_{113}, R_{114}, R_{123}, R_{124}, R_{127}, R_{128}, R_{129}, R_{130}
	2. Short-circuit rearing at the condensers and touch of parts.	C_{106}, C_{109}, C_{141}, C_{142}
	3. Break rearing in the primary side of the output transformers.	T_7, T_8
	4. Inner touch of vacuum tubes.	V_9, V_{14}
B. In case of a great many noise in FM broadcasting.	1. Small input voltage and poor condition of the antenna.	Refer to the Item "Antenna" in this manual.
	2. Poor vacuum tubes (high howling)	V_1
	3. Break rearing in the fixed resistance wires and touching of parts.	R_3, R_6, R_{11}, R_{15}
	4. Short-circuit of condensers and touch of parts.	C_3, C_5, C_{12}, C_{15}, C_{17}
C. In case of a great many noises in FM multiplex stereo system.	1. Noises made by the above-mentioned causes.	Refer to symptoms (1).
	2. Break rearing in the multiplex coil wires.	$L_6 \sim L_9$
	3. Break rearing at the fixed resistances.	R_{40}, R_{45}, R_{65}, R_{64}, R_{66}, R_{68}
	4. Short-circuit rearing at condensers.	C_{47}, C_{48}, C_{55}, C_{60}, C_{61}, C_{62}, C_{63}, C_{67}
	5. Poor vacuum tubes.	$V_6 \sim V_8$
D. In case of a great many noises in the phono, tape recording system and mike.	1. Poor condition of fixed resistances and break rearing at the resistance wires.	$R_{67} \sim R_{92}$
	2. Poor condensers.	$C_{72} \sim C_{89}$
	3. Inner noises and poor connection of the attached appliances connected.	——
A. While the FM tuner is working normally.	1. The Magic eye does not work at all.	Deterioration of Magic eye.
	2. The Magic eye works slightly.	• It is caused by poor condition of the FM antenna.
B. While the AM tuner is working normally.	1. The Magic eye does not work at all.	Deturiotion of Magic eye.
	2. The Magic eye works slightly.	• It is caused by poor condition of the FM antenna.
C. The stereo indicator is not lighted at the time of FM stereo reception.	1. In case the multiplex adaptor does not work normally.	Refer to the Item "Symptoms" of respective multiplex.
	2. In case only the indicator does not work with the multiplex adaptor working normally.	Poor NL, broken wire of R_{33} and poor V_c
	3. The indicator is kept lighting while the multiplex adaptor is working normally.	Poor OA-91 and poor regulation of VR-4.
D. Poor separation at the time of FM stereo reception.	1. In case the multiplex adaptor works normally.	Poor regulation of VR-5 (Refer to the regulation method of multiplex).

PARTS LIST

Part No.	Nomenclature
R1	1 MΩ ¼Watt ±10% Corbon Fixed Resistor
R2	150 KΩ ¼Watt ±10% Carbon Fixed Resistor
R3	10 KΩ ¼Watt ±10% Carbon Fixed Resistor
R4	4.7 MΩ ¼Watt ±10% Carbon Fixed Resistor
R5	68 Ω ¼Watt ±10% Carbon Fixed Resistor
R6	4 KΩ 2 Watt ±10% Carbon Fixed Resistor
R7	2 MΩ ¼Watt ±10% Carbon Fixed Resistor
R8	30 KΩ ¼Watt ±10% Carbon Fixed Resistor
R9	120 KΩ ¼Watt ±10% Carbon Fixed Resistor
R10	68 Ω ¼Watt ±10% Carbon Fixed Resistor
R11	4 KΩ 2 Watt ±10% Carbon Fixed Resistor
R12	50 KΩ ¼Watt ±10% Carbon Fixed Resistor
R13	2 MΩ ¼Watt ±10% Carbon Fixed Resistor
R14	15 KΩ ½Watt ±10% Carbon Fixed Resistor
R15	15 KΩ 1 Watt ±10% Carbon Fixed Resistor
R16	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R17	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R18	2 MΩ ¼Watt ±10% Carbon Fixed Resistor
R19	150 KΩ ¼Watt ±10% Carbon Fixed Resistor
R20	300 KΩ ¼Watt ±10% Carbon Fixed Resistor
R21	150 KΩ ¼Watt ±10% Carbon Fixed Resistor
R22	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R23	5 KΩ 2 Watt ±10% Carbon Fixed Resistor
R24	20 KΩ ¼Watt ±10% Carbon Fixed Resistor
R25	50 Ω ¼Watt ±10% Carbon Fixed Resistor
R26	8 KΩ 1 Watt ±10% Carbon Fixed Resistor
R27	100 KΩ 1 Watt ±10% Carbon Fixed Resistor
R28	10 KΩ ½Watt ±10% Carbon Fixed Resistor
R29	6 KΩ ¼Watt ±10% Carbon Fixed Resistor
R30	4 KΩ ¼Watt ±10% Carbon Fixed Resistor
R31	10 KΩ ¼Watt ±10% Carbon Fixed Resistor
R32	1 Ω 1 Watt ±10% Carbon Fixed Resistor
R33	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R34	250 KΩ ½Watt ±10% Carbon Fixed Resistor
R35	3 KΩ ¼Watt ±10% Carbon Fixed Resistor
R36	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R37	2 MΩ ¼Watt ±10% Carbon Fixed Resistor
R38	5 KΩ ¼Watt ±10% Carbon Fixed Resistor
R39	3 KΩ ¼Watt ±10% Carbon Fixed Resistor
R40	15 KΩ ½Watt ±10% Carbon Fixed Resistor
R41	1 KΩ ¼Watt ±10% Carbon Fixed Resistor
R42	40 KΩ ¼Watt ±10% Carbon Fixed Resistor
R43	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R44	1 KΩ ¼Watt ±10% Carbon Fixed Resistor
R45	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R46	50 KΩ ¼Watt ±10% Carbon Fixed Resistor

Part No.	Nomenclature
R47	50 KΩ ¼Watt ±10% Carbon Fixed Resisto
R48	50 KΩ ¼Watt ±10% Carbon Fixed Resisto
R49	50 KΩ ¼Watt ±10% Carbon Fixed Resisto
R50	20 MΩ ½Watt ±10% Carbon Fixed Resisto
R51	15 KΩ ½Watt ±10% Carbon Fixed Resisto
R52	15 KΩ ¼Watt ±10% Carbon Fixed Resisto
R53	20 KΩ ½Watt ±10% Carbon Fixed Resisto
R54	20 KΩ ½Watt ±10% Carbon Fixed Resisto
R55	20 MΩ ½Watt ±10% Carbon Fixed Resisto
R56	50 KΩ ¼Watt ±10% Carbon Fixed Resisto
R57	50 KΩ ¼Watt ±10% Carbon Fixed Resisto
R58	10 KΩ ¼Watt ±10% Carbon Fixed Resisto
R59	10 KΩ ¼Watt ±10% Carbon Fixed Resisto
R60	8 KΩ ¼Watt ±10% Carbon Fixed Resisto
R61	8 KΩ ¼Watt ±10% Carbon Fixed Resisto
R62	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R63	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R64	400 KΩ ¼Watt ±10% Carbon Fixed Resisto
R65	400 KΩ ¼Watt ±10% Carbon Fixed Resisto
R66	4 KΩ 10Watt Wire Wound Resista
R67	5 KΩ ¼Watt ±10% Carbon Fixed Resisto
R68	5 KΩ ¼Watt ±10% Carbon Fixed Resisto
R69	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R70	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R71	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R72	100 KΩ ¼Watt ±10% Carbon Fixed Resisto
R73	170 KΩ ¼Watt ±10% Carbon Fixed Resisto
R74	170 KΩ ¼Watt ±10% Carbon Fixed Resisto
R75	15 KΩ ¼Watt ±10% Carbon Fixed Resisto
R76	15 KΩ ¼Watt ±10% Carbon Fixed Resisto
R77	300 Ω ¼Watt ±10% Carbon Fixed Resisto
R78	300 Ω ⅛Watt ±10% Carbon Fixed Resisto
R79	15 KΩS ¼Watt ±10% Carbon Fixed Resisto
R80	15 KΩS ¼Watt ±10% Carbon Fixed Resisto
R81	12 KΩ ¼Watt ±10% Carbon Fixed Resisto
R82	12 KΩ ¼Watt ±10% Carbon Fixed Resisto
R83	5 KΩ ¼Watt ±10% Carbon Fixed Resisto
R84	5 KΩ ¼Watt ±10% Carbon Fixed Resisto
R85	70 KΩS ¼Watt ±10% Carbon Fixed Resisto
R86	70 KΩS ¼Watt ±10% Carbon Fixed Resisto
R87	15 KΩS ¼Watt ±10% Carbon Fixed Resisto
R88	15 KΩS ¼Watt ±10% Carbon Fixed Resisto
R89	12 KΩS ¼Watt ±10% Carbon Fixed Resisto
R90	12 KΩS ¼Watt ±10% Carbon Fixed Resisto
R91	10 Ω ¼Watt ±10% Carbon Fixed Resisto
R92	10 Ω ¼Watt ±10% Carbon Fixed Resisto

Part No.	Nomenclature
R93	3 KΩS ¼Watt ±10% Carbon Fixed Resistor
R94	3 KΩS ¼Watt ±10% Carbon Fixed Resistor
R95	50 KΩ ¼Watt ±10% Carbon Fixed Resistor
R96	50 KΩ ¼Watt ±10% Carbon Fixed Resistor
R97	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R98	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R99	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R100	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R101	2 KΩ ¼Watt ±10% Carbon Fixed Resistor
R102	2 KΩ ¼Watt ±10% Carbon Fixed Resistor
R103	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R104	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R105	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R106	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R107	15 KΩ ¼Watt ±10% Carbon Fixed Resistor
R108	15 KΩ ¼Watt ±10% Carbon Fixed Resistor
R109	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R110	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R111	3 KΩ ¼Watt ±10% Carbon Fixed Resistor
R112	3 KΩ ¼Watt ±10% Carbon Fixed Resistor
R113	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R114	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R115	250 KΩ ¼Watt ±10% Carbon Fixed Resistor
R116	250 KΩ ¼Watt ±10% Carbon Fixed Resistor
R117	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R118	100 KΩ ¼Watt ±10% Carbon Fixed Resistor
R119	2 KΩ ¼Watt ±10% Carbon Fixed Resistor
R120	2 KΩ ¼Watt ±10% Carbon Fixed Resistor
R121	2.7 KΩ ¼Watt ±10% Carbon Fixed Resistor
R122	2.7 KΩ ¼Watt ±10% Cabron Fixed Resistor
R123	470 KΩ 1 Watt ±10% Carbon Fixed Resistor
R124	470 KΩ 1 Watt ±10% Carbon Fixed Resistor
R125	10 KΩ ¼Watt ±10% Carbon Fixed Resistor
R126	10 KΩ ¼Watt ±10% Carbon Fixed Resistor
R127	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R128	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R129	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R130	150 KΩ ½Watt ±10% Carbon Fixed Resistor
R131	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R132	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R133	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R134	500 KΩ ¼Watt ±10% Carbon Fixed Resistor
R135	15 KΩ ¼Watt ±10% Carbon Fixed Resistor
R136	15 KΩ ¼Watt ±10% Carbon Fixed Resistor
R137	10 KΩ ½Watt ±10% Carbon Fixed Resistor
R138	10 KΩ ½Watt ±10% Carbon Fixed Resistor

Part No.	Nomenclature
R139	1 MΩ ½Watt ±10% Carbon Fixed Resistor
R140	1 MΩ ½Watt ±10% Carbon Fixed Resistor
R141	700Ω + 500Ω 10Watt Wire Wound Resistor
C1	10 pF 250 WV ±10% Ceramic tubular
C2	10 pF 250 WV ±10% Ceramic utublar
C3	0.02 μF 250 WV $^{+100}_{-0}$ % Ceramic tubulcr
C4	13.5 pF 250 WV ±10% Ceramic tubular
C5	10 pF 250 WV ±10% Ceramic tubular
C6	12 pF 250 WV ±10% Ceramic tubular
C7	7 pF 250 WV ±10% Ceramic tubular
C8	18 pF 250 WV ±10% Ceramic tubular
C9	0.002 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C10	10 pF 250 WV ±10% Ceramic tubular
C11	0.01 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C12	0.01 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C13	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C14	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C15	0.002 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C16	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C17	0.01 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C18	0.01 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C19	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C20	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C21	350 pF 500 WV ±10% Mica tubular
C22	40 μF 150 WV $^{+100}_{-0}$ % Electrolytic tubular
C23	0.01 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C24	15 pF 250 WV ±10% Ceramic tubular
C25	300 pF 500 WV ±10% Mica tubular
C26	50 pF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C27	0.05 μF 400 WV ±10% Oil tubular
C28	0.05 μF 400 WV ±10% Oil tubular
C29	0.001 μF 250 WV $^{+100}_{-0}$ % Ceramic tubular
C30	0.05 μF 400 WV ±10% Oil tubular
C31	0.01 μF 250 WV $^{+100}_{-1}$ % Ceramic tubular
C32	25 μF 50 WV $^{+100}_{-0}$ % electrolytic tubular
C33	200 μF 25 WV $^{+100}_{-0}$ % electrolytic tubular
C34	200 μF 25 WV $^{+100}_{-0}$ % electrolytic tubular
C35	25 μF 50 WV $^{+100}_{-0}$ % electrolytic tubular
C36	25 μF 25 WV $^{+100}_{-0}$ % electrolytic tubular

PARTS LIST

Part No.	Nomenclature				
C37	0.01 μF	250 WV	± 100 0 %	Ceramic	tubular
C38	0.01 μF	250 WV	± 100 0 %	Ceramic	tubular
C39	0.005 μF	600 WV	±10%	Oil	tubular
C40	0.005 μF	600 WV	±10%	Oil	tubular
C41	0.005 μF	600 WV	±10%	Oil	tubular
C42	200 μF	180 WV	± 100 0 %	electrolytic	lug terminal
C43	200 μF	180 WV	± 100 0 %	electrolytic	lug terminal
C44	20 μF	350 WV	± 100 0 %	electrolytic	lug terminal
C45	3000 pF	250 WV	± 100 0 %	Ceramic	tubular
C46	0.01 μF	400 WV	±10%	Oil	tubular
C47	0.01 μF	400 WV	±10%	Oil	tubular
C48	150 pF	250 WV	± 100 0 %	Ceramic	tubular
C49	150 pF	250 WV	± 100 0 %	Ceramic	tubular
C50	1500 pF	250 WV	± 5 %	mica	tubular
C51	0.01 μF	250 WV	± 5 %	mica	tubular
C52	200 pF	250 WV	± 5 %	mica	tubular
C53	300 pF	250 WV	± 5 %	mica	tubular
C54	0.1 μF	400 WV	±10%	Oil	tubular
C55	1000 pF	250 WV	± 100 0 %	Ceramic	tubular
C56	1 μF	150 WV	± 100 0 %	electrolytic	tubular
C57	3000 pF	250 WV	± 5 %	mica	tubular
C58	100 pF	250 WV	± 100 0 %	Ceramic	tubular
C59	100 pF	250 WV	± 100 0 %	Ceramic	tubular
C60	0.001 μF	400 WV	±10%	Oil	tubular
C61	0.001 μF	400 WV	±10%	Oil	tubular
C62	0.003 μF	400 WV	±10%	Oil	tubular
C63	0.003 μF	400 WV	±10%	Oil	tubular
C64	300 pF	50 WV	±10%	Stycon	tubular
C65	80 pF	250 WV	± 5 %	Stycon	tubular
C66	80 pF	250 WV	± 5 %	Stycon	tubular
C67	430 pF	250 WV	± 5 %	Stycon	tubular
C68	430 pF	250 WV	± 5 %	Stycon	tubular
C69	500 pF	250 WV	± 5 %	Stycon	tubular
C70	500 pF	250 WV	± 5 %	Stycon	tubular
C71	40 μF	300 WV	± 100 0 %	electrolytic	lug terminal
C72	0.1 μF	50 WV	±10%	mylar	tubular
C73	0.1 μF	50 WV	±10%	mylar	tubular
C74	30 μF	10 WV	± 100 0 %	electrolytic	tubular
C75	30 μF	10 WV	± 100 0 %	electrolytic	tubular

Part No.	Nomenclature				
C76	30 μF	12 WV	± 100 0 %	electrolytic	tubular
C77	30 μF	12 WV	± 100 0 %	electrolytic	tubular
C78	10 μF	12 WV	± 100 0 %	electrolytic	tubular
C79	10 μF	12 WV	± 100 0 %	electrolytic	tubular
C80	30 μF	10 WV	± 100 0 %	electrolytic	tubular
C81	30 μF	10 WV	± 100 0 %	electrolytic	tubular
C82	30 μF	10 WV	± 100 0 %	electrolytic	tubular
C83	30 μF	10 WV	± 100 0 %	electrolytic	tubular
C84	0.006 μF	50 WV	±10%	mylar	tubular
C85	0.006 μF	50 WV	±10%	mylar	tubular
C86	0.025 μF	50 WV	±10%	mylar	tubular
C87	0.025 μF	50 WV	±10%	mylar	tubular
C88	0.01 μF	50 WV	±10%	mylar	tubular
C89	0.01 μF	50 WV	±10%	mylar	tubular
C90	0.03 μF	400 WV	±10%	Oil	tubular
C91	0.03 μF	400 WV	±10%	Oil	tubular
C92	100 pF	500 WV	±10%	mica	tubular
C93	100 pF	500 WV	±10%	mica	tubular
C94	0.01 μF	50 WV	±10%	mylar	tubular
C95	0.01 μF	50 WV	±10%	mylar	tubular
C96	0.1 μF	50 WV	±10%	mylar	tubular
C97	0.1 μF	50 WV	±10%	mylar	tubular
C98	30 μF	6 WV	± 100 0 %	electrolytic	tubblar
C99	30 μF	6 WV	± 100 0 %	electrolytic	tubblar
C100	0.03 μF	400 WV	±10%	Oil	tubular
C101	0.03 μF	400 WV	±10%	Oil	tubular
C102	0.003 μF	400 WV	±10%	Oil	tubular
C103	0.003 μF	400 WV	±10%	Oil	tubular
C104	0.001 μF	400 WV	±10%	Oil	tubular
C105	0.001 μF	400 WV	±10%	Oil	tubular
C106	150 pF	500 WV	±10%	mica	tubular
C107	150 pF	500 WV	±10%	mica	tubular
C108	0.02 μF	50 WV	±10%	mylar	tubular
C109	0.02 μF	50 WV	±10%	mylar	tubular
C110	500 pF	500 WV	±10%	mica	tubular
C111	500 pF	500 WV	±10%	mica	tubular
C112	0.01 μF	400 WV	±10%	Oil	tubular
C113	0.01 μF	400 WV	±10%	Oil	tubular
C114	0.02 μF	400 WV	±10%	Oil	tubular
C115	0.02 μF	400 WV	±10%	Oil	tubular
C116	0.005 μF	400 WV	±10%	Oil	tubular
C117	0.005 μF	400 WV	±10%	Oil	tubular
C118	50 μF	6 WV	± 100 0 %	electrolytic	tubular

Part No.			Nomenclature		
C119	50 μF	6 WV	$\pm^{100}_{0}$ %	electrolytic	tubular
C120	80 pF	500 WV	±10%	mica	tubular
C121	80 pF	500 WV	±10%	mica	tubular
C122	0.01 μF	400 WV	±10%	Oil	tubular
C123	0.01 μF	400 WV	±10%	Oil	tubular
C124	0.01 μF	400 WV	±10%	Oil	tubular
C125	0.10 μF	400 WV	±10%	Oil	tubular
C126	20 μF	350 WV	$\pm^{100}_{0}$ %	electrolytic	lug terminal
C127	20 μF	350 WV	$\pm^{100}_{0}$ %	electrolytic	lug tubular
C128	20 μF	350 WV	$\pm^{100}_{0}$ %	electrolytic	lug terminal
C129	20 μF	350 WV	$\pm^{100}_{1}$ %	electrolytic	lng terminal

VR-1	100 Ω	(B)	HUM	Balance
VR-2	100 Ω	(B)	HUM	Balance
VR-3	5 KΩ	(B)	Variable Resistor	Driver type
VR-4	100 KΩ	(B)	Variable Resistor	Driver typa
VR-5	50 KΩ	(A)	Variable Resistor	Driver type
VR-6	500 KΩ	(A)	Variable Resistor	24φ type
VR-7	1 MΩ	(N)	Variable Resistor	24φ friction type
VR-8	1 MΩ	(N)	Variable Resistor	24φ friction type
VR-10	500 KΩ	(B)	Variable Resistor	24φ type

VC-1	6～18 pF	Variable Capacitor (FM, RF Luner)
VC-2	6～18 pF	Variable Capacitor (FM Oscillator)
VC-3	8.8～32.8 pF	Variable Capacitor (AM RF Luner)
VC-4	8.8～32.8 pF	Variable Capacitor (AM Oscillator)

TC-1	15 pF	Trimer condenser
TC-2	15 pF	Trimer condenser
TC-3	15 pF	Trimer condenser
TC-4	15 pF	Trimer condenser
TC-5	15 pF	Padding condenser

V1	6AQ8	FM RF & mixer
V2	6BA6	FM IF amp
V3	6BA6	FM IF & AM IF amp
V4	6BA6	Limiter
V5	6BE6	AM converter
V6	12AT7	MPX amp & Indicater amp
V7	6BL8	19 Kc/s Synchro & doubler
V8	12AU7	Dual out & deemphasis
V9	6AQ8	Pre amp

Part No.		Nomenclature
V10	6BM8	Audio & power amp
V11	6BM8	Audio & power amp
V12	6AQ8	Pre amp
V13	6BM8	Audio & power amp
V14	6BM8	Audio & power amp
V15	6AD5	Magic eye
TR1～4	2SB-381	Transister

L1	FM antenna coil
L2	FM RF & oscillater coil
L3	AM antenna coil
L4	AM oscillater coil
L5	Heater coil 1 μH
L6	MPX coil
L7	MPX coil
L8	MPX coil
L9	MPX coil
L10	FMRF coil

T1	1st FM I.F.T 10.7Mc/s
T2	2nd FM I.F.T 10.7Mc/s & 2nd AM I.FT 455Ks/c
T3	3rd FM I.F.T 10.7Mc/s
T4	4th FM Discriminater transformer
T5	1st AM IFT 455Kc/s
T6	Power tronsfomer
T7	Outpat transfomer
T8	Outpat transfomer

SE-0.56	Silicon Diode AC (RMS) 180V I_D 150mA −65°C～100°C
OA-91	Germanium Diode VD=90V I_D =50mA −55°C～75°C
1S351	Variable capacitor (FMAFC)
TC-0.2P	Selenium diode AC45V I_D 25mA
NL	PL-2LA Neon Lamp
F	Fuse 4A

Se	(1～8)	Input Selector
Sm	(1～2)	MODE Selector
SS1	(a～b)	MAG, X-tal
SS2	(a～b)	REC, TAPE MON
SS3	(a～b)	(Pumble) OFF ON
SS4	(a～b)	(LPF) OFF ON
SS5	(a～b)	(Loudness) OFF ON
SS6		(AFC) OFF ON
SW		Power Switch

ALIGNMENT

FM ALIGNMENT PROCEDURE

1. AFC-OFF 2. Turn tuning gang fully. 3. Center carrier wave. 4. Set pointer at reference mark.

STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	DIAL SETTING	ADJUST	ADJUST FOR
1.	IF Transformer	10.7 MC ±400 KC	V_3 Pin 1 6BA6	oscilloscope at ①		3rd IFT (T_3) Primary & secondary	Best IFT Wave from
		10.7 MC ±400 KC	V_2 Pin 1 6BA6	oscilloscope at ①		2nd IFT (T_2) Primary & secondary	Best IFT Wave from
		10.7 MC ±400 KC	Couple Sweep Signal by a round tube V_1 6AQ8	oscilloscope at ①		1st IFT (T_1) Primary & secondary	Best IFT Wave from
2.	Discriminator	10.7 MC ±400 KC	Couple Sweep Signal by a round tube V_1 6AQ8	oscilloscope at ②		5th IFT (T_5) Discriminator Transformer	S Curve
3.	OSC.	88 MC 400 c/s 100% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at oscillo load	80 MC	OSC. coil L_2	Maximum
4.	OSC.	108 MC 400 c/s 100% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at oscillo load	108 MC	OSC. Trimmer TC_2	Maximum
5.		Reiterate 3, 4					
6.	RF Amp.	88 MC 400 c/s 100% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at oscillo Load	80 MC	RF Amp. coil L_{10}	Maximum
7.	Antenna circuit	104 MC 400 c/s 100% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at oscillo Load	104 MC	Antenna circuit Trimmer TC_1	Maximum
8.		Reiterate 6, 7					

FM M.P.X ALIGNMENT PROCEDURE

1. Do not attempt to align the Multiplex Circuit unless the following equipment is available :

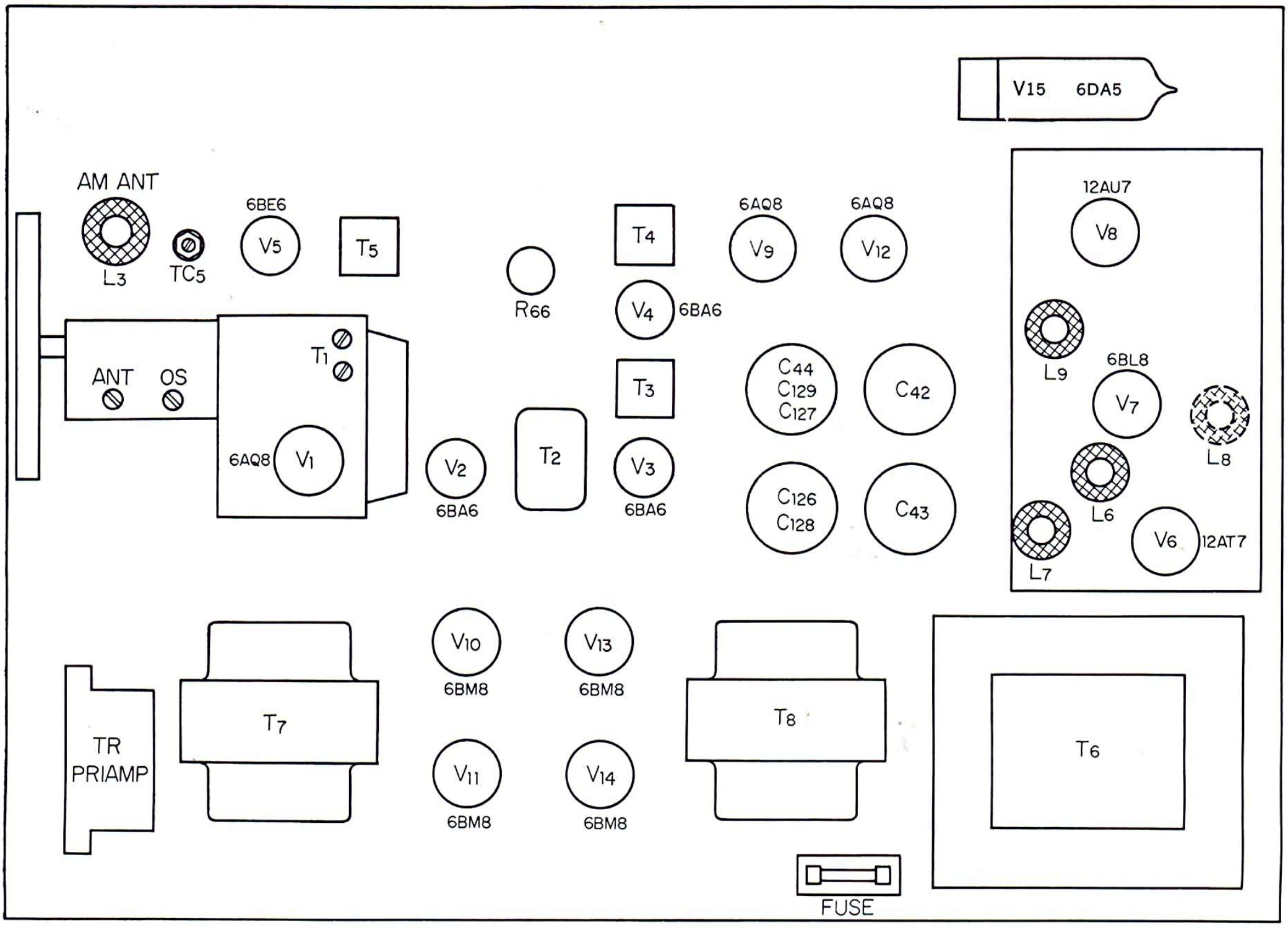
a. Multiplex Stereo Generator b. FM Signal Generator c. Oscilloscope d. Sweep Generator e. AC V.T.V.M.
f. Audio oscillator

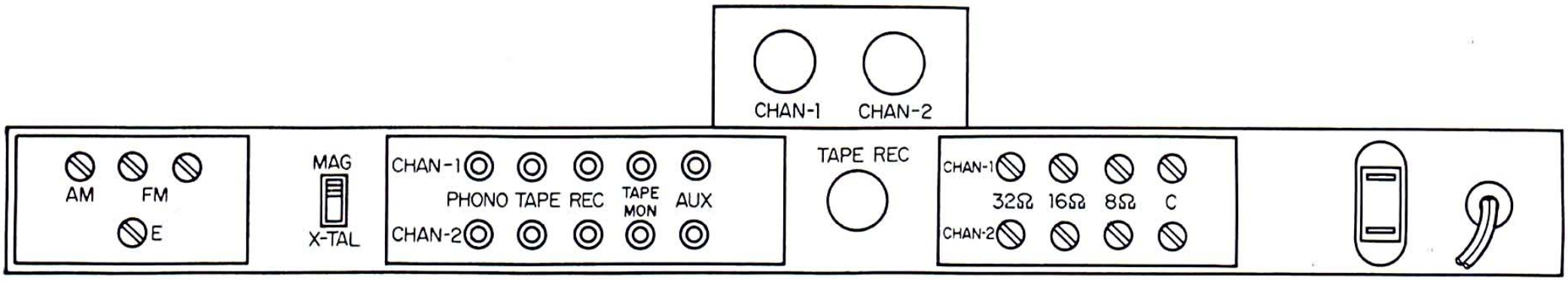
STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	ADJUST	ADJUST FOR
1.	67 KC Trap	67 KC Audio Signal	Connect to T.P ④	V.T.V.M. at P.T ⑤	L_7	Minimum
2.	19 KC coil Transformer	FM Signal Gen. Modulated 30% by Stereo Gen. sub-Channel	Antenna Terminals Tune to signal	V.T.V.M. & Oscilloscope at output load	L_6	Maximum
3.	19 KC coil	Same	Same	Same	L_8	Maximum
4.	38 KC Doubler	Same	Same	Same	L_9	Maximum
5.	Separation VR	FM Signal Gen. Modulated 30% by Stereo Signal Gen. Channel-L	Same	V.T.V.M. & Oscilloscope at output load Channel-R	Separation VR_5	Channel-R Minimum

AM ALIGNMENT PROCEDURE

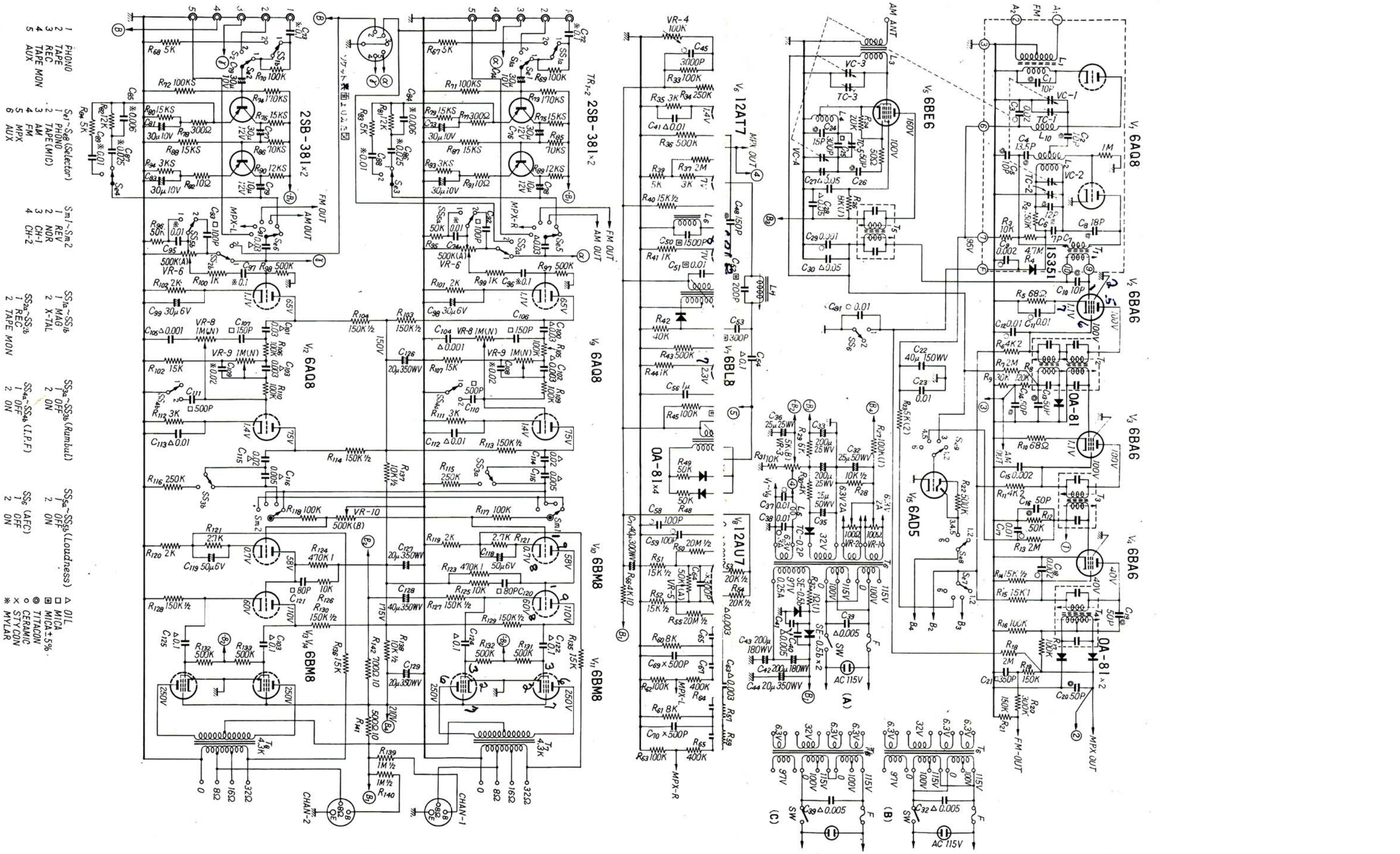
STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	DIAL SETTING	ADJUST	ADJUST FOR
1.	IF Transformer	455 KC ±30 KC sweep-generator	Pin 7 6BE6	Sweep input at ③		1st I.F.T- - (T_5) Primary & secondary 2nd I.F.T- - (T_2) Primary & secondary	Best I.F.T Wave form
2.	OSC.	AM-OSCILATOR 535 KC 400 c/s 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at output load	535 KC	OSC. coil TC-5	Maximum
3.	OSC.	1605 KC 400 c/s 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at output load	1605 KC	OSC. Trimmer TC-4	Maximum
4.		Reiterate 2, 3					
5.	Antenna circuit	600 KC 400 c/s 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. at output load	600 KC	Ferrite Loop Antenna at coil L_3	Maximum
6.	Antenna	1400 KC 400 c/s 30% Modulation		oscilloscope & V.T.V.M. at output load	1400 KC	Antenna circuit at Trimmer TC-3	Maximum
7.		Reiterate 5, 6					

PARTS LAYOUT





SCHEMATIC DIAGRAM



(specifications are subject to change without notice)

DIAL CORD STRING