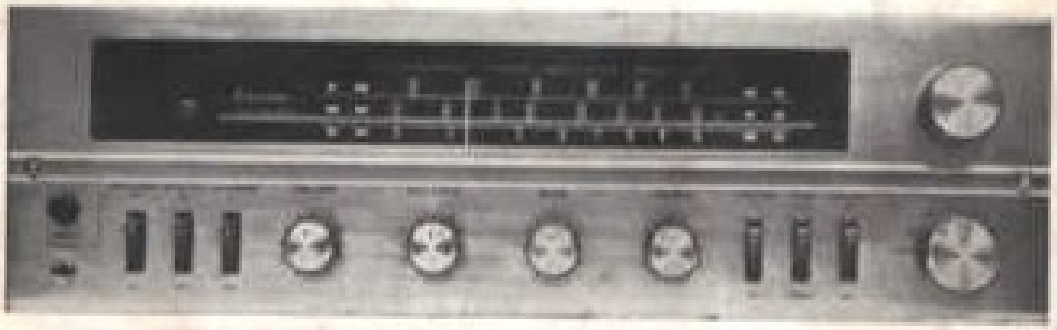
OPERATING INSTRUCTIONS & SERVICE MANUAL

AM/FM STEREO TUNER AMPLIFIER

SANSUI 220



Sansui

SANSUI ELECTRIC COMPANY LIMITED

Stereo sets needn't be as expensive as they're made out to be. This particular model, for instance, is priced low enough so that anyone with a taste for music can well afford it.

Still, not a bit of quality is missing. There are 22 watts to give you truly "live" sound, lots of switches for delicate tuning, and special silicon transistors in the head amplifier that completely eliminate hums and noises.

In short, this is a set you should really consider if want to economize—especially if huge price tags in the past have kept you from enjoying the music you'd like to hear. The way the 220 looks is worth the price alone! This booklet explains the steps necessary for operating and caring for your new the 220. Read this carefully and retain for future use.

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SANSUI

AM/FM
STEREO TUNER
AMPLIFIER

220

FEATURES—— SPECIFICATIONS— CHARACTERISTICS

FEATURES

HIGH PERFORMANCE OF OUTSTANDING CHARACTERISTICS

For better performance, the 220 employs the latest push-pull connection of a super wide-band output transformer to high-performance nuvistor tubes 6BM8, providing moderate music power of 22 watts. The newly designed excellent tone control helps reproduce "live" sound over the entire 20 to 15,000Hz range.

NEW TYPE SILICON-TRANSISTOR HEAD AMPLIFIER

New type silicon transistors are used as a head amplifier to eliminate hums and noises, and to obtain better signal-to-noise ratio.

SILICON DIODE IN POWER SECTION

The rectifying circuit has a supersafety silicon diode in place of the conventional vacuum tube to give more stability and regulation, to minimize the power loss, to solve the heat problem and lastly to assure its longer life.

ALL HI-FI IN RADIO RECEPTION, RECORD PLAYING & TAPE RECORDING

Hi-Fi FM and AM reception, hi-fi record playing by using either crystal or magnetic cartridge, and hi-fi tape recording and playback are all yours with the 220. It is provided with a direct tape recording terminal plus a tape monitor circuit.

CENTER CHANNEL OUTPUT TERMINAL

The 220 has an output terminal for the center channel amplifier. To obtain the 3-dimensional reproduction effect, just connect it to an additional monaural amplifier.

FM MULTIPLEX STEREO ADAPTER TERMINAL

For FM stereo reception, the 220 is provided with a terminal for a multiplex adapter.

ALL NECESSARY CIRCUITS FOR HI-FI REPRODUCTION

Headphone jack for private listening. Loudness compensator at low level listening. Tape monitor circuit that makes it possible to record and reproduce simultaneously. Built-in high-sensitivity ferrite AM antenna. Noise filter designed to eliminate noises in higher frequency range.

FUNCTIONAL FRONT PANEL LAYOUT

For easier operation and tuning, every control knob is specially designed in both size and position.

SPECIFICATIONS

Audio Section

* Power output
- a. Music power (IHFM) 22 watts total
- b. RMS Power (Left/Right) 10 / 10 watts
- c. RMS Stereo power (Both) 8 watts + 8

Harmonic Distortion 1.5%

Power Band width (IHFM) 35 - 15,000 Hz

Frequency Response 30 - 30,000 Hz ±2 dB

Channel Separation
- a. Phono 40 dB at 1,000 Hz
- b. AUX 1, 2 50 dB at 1,000 Hz

* Hum and Noise (IHFM)
- a. Phono 65 dB below rated output
- b. AUX 1, 2 70 dB below rated output

Output Impedance 8 and 16Ω

* Input Sensitivity (for rated output)
- a. Phono 3 mV
- b. AUX 1, 2 130 mV
- c. Tape Monitor 860 mV

Recording output, Center channel output

Equalizer characteristic phono (RIAA)

* Controls and switches

Bass control 50 Hz +10 dB to −10 dB

Treble control 10,000 Hz +12 dB to −10 dB

Loudness control 50 Hz +8 dB, 10,000 Hz +8 dB (Volume control at −30 dB)

Noise filter 10,000 Hz −10 dB

Mode switch 1 stereo 2 mono

Selector switch | 1. phono 2. SW
3. M.W. 4. FM
5. AUX-1 6. AUX-2

* Other Special Features
  Head Phone Jack
  Center channel output for connection to third amplifier
  Head phone switch
  Recording output for tape
  Direct tape monitor

FM SECTION

Frequency Range	88 – 108 MHz
* Sensitivity	4.0 μV (IHFM)
	2.5 μV (S/N 20 db)
FM Harmonic Distortion	1.3%
FM Frequency Response	40 – 20,000 Hz ± 2 db
IF Selectivity	200 KHz –3 db

FM Multiplex signal output for connection to multiplex adapter

AM SECTION

* MW Frequency Range	535 – 1605 KHz
Sensitivity (IHFM)	20 μV
IF Selectivity	8 KHz
IF Frequency	455 KHz
* SW Frequency Range	3.9 – 12 MHz
Sensitivity (IHFM)	40 μV

* Other Special features
  Eye tube tuning, AFC Switch
  AM ferrite antenna, fly wheel tuning
* Well below SABS Specification
* Tubes, Transistors and Diodes

Tubes	6BM8 – 4, 6AQ8 – 2, 6BE6 – 1
	6BA6 – 3, 12AX7 – 1, 6E5 – 1
Silicon transistors	2SC 402 – 2
Silicon diodes	SE-0.5h – 2
	SE-05-02 – 1
Germanium diodes	OA-91 – 3

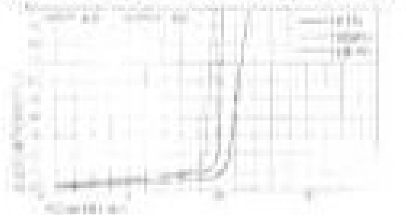
* Power Requirements

Power Voltage	100 117 220 240 Volts 50 60 Hz
Power consumption	106 VA

* Dimensions
  Wide 17 $\frac{3}{8}$"
  High 5 $\frac{9}{16}$" (Including rubber stand)
  Deep 12 $\frac{13}{16}$" (Including knobs)
* Weight 29 lbs.

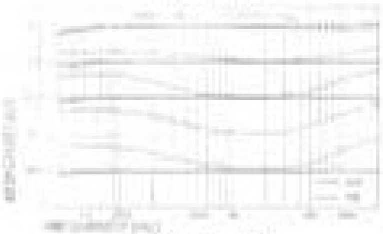
CHARACTERISTICS

POWER OUTPUT HARMONIC DISTORTION

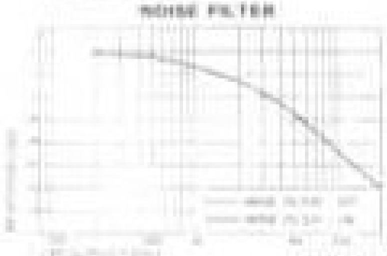


POWER BAND WIDTH

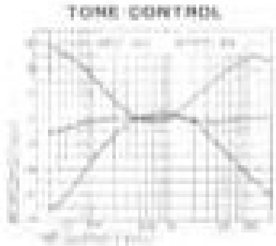
LOUDNESS



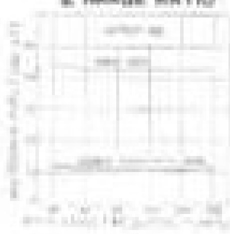
NOISE FILTER



TONE CONTROL



FM SENSITIVITY
IHFM STANDARD
& IMAGE RATIO



CONNECTIONS

ANTENNAS

MW ANTENNA

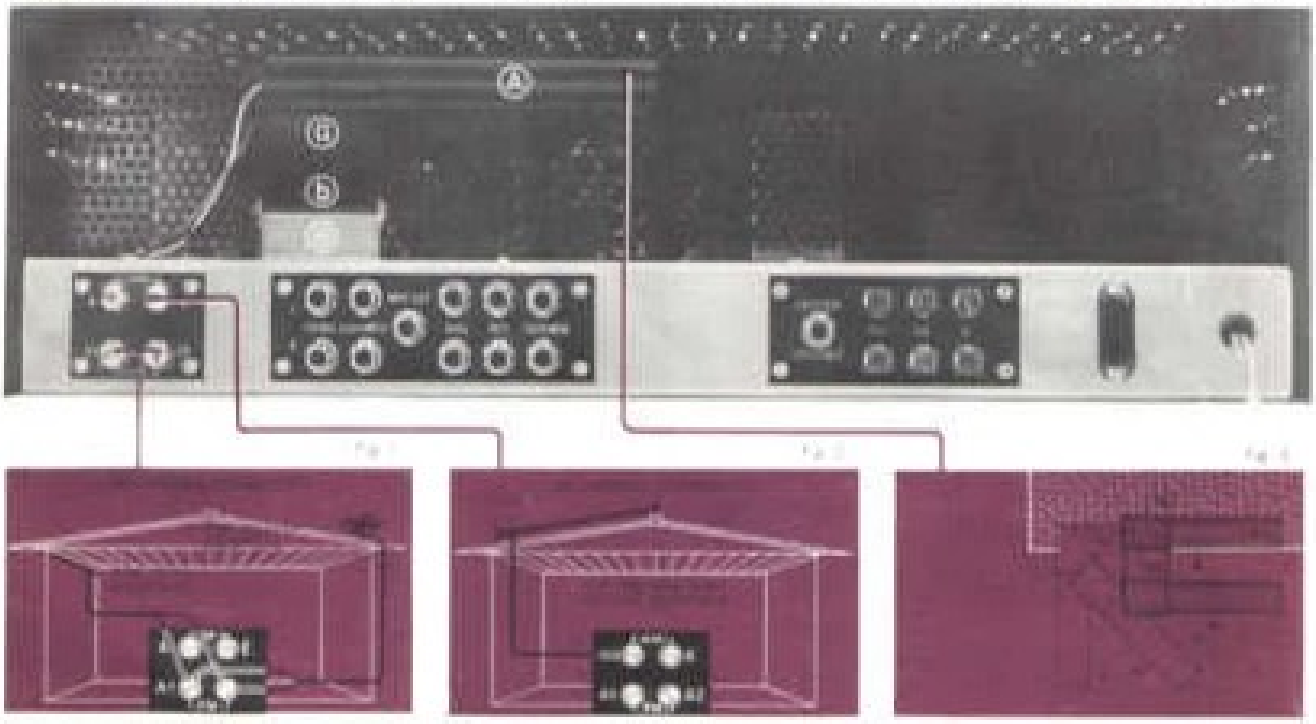
As illustrated below, turn the ferrite bar antenna "A" on the axis "b" toward you and then, prolong for a signal, orient "A" till you find the best position for it. This ferrite antenna is good enough for all "MW" receptions, except when the station signal is extremely weak due to excessively long distance from your desired station, skyscrapers, buildings etc. (Fig. 1)

AM ANTENNA

For the ferrite antenna inadequate to the weak MW signal and for SW radio reception, connect the AM antenna (PVC wire) to the terminal AM-A and a ground wire to AM-E. To install, support it horizontally and apart from your building as shown in Fig. 2 and set it for the finest reception. Note that the antenna sensitivity depends largely on the position to which the antenna is installed. For safety reason, be sure to install a lightning arrester with the outdoor antenna.

FM ANTENNA

Connect the FM antenna (feeder wire) to the terminals FM-A1 and -A2. If you live near the station or the signal is strong, put it up like "T" as your room. If you live in a thick-wall building or far away from your desired station and if the signal is too weak to receive with the indoor antenna, install the outdoor antenna like a TV receiver as shown in Fig. 1. Remember that the proper height and direction (not length) of the antenna are vital to the best reception.



RECORD PLAYER

1. Connect the left output of the record player to the input terminal PHONO CHAN-L of the amplifier.
2. Connect the right output of the record player to the input terminal PHONO CHAN-R of the amplifier.
3. Insert the power plug of the record player into the power socket of the amplifier.

NOTE:

There are two categories of pickups, those using a crystal element and those using a magnetic circuit. Be sure to use the magnetic cartridge with 3 to 10 mV output voltage. If you'll use the crystal cartridge, connect the output of the record player to the input terminal AUX of the amplifier.

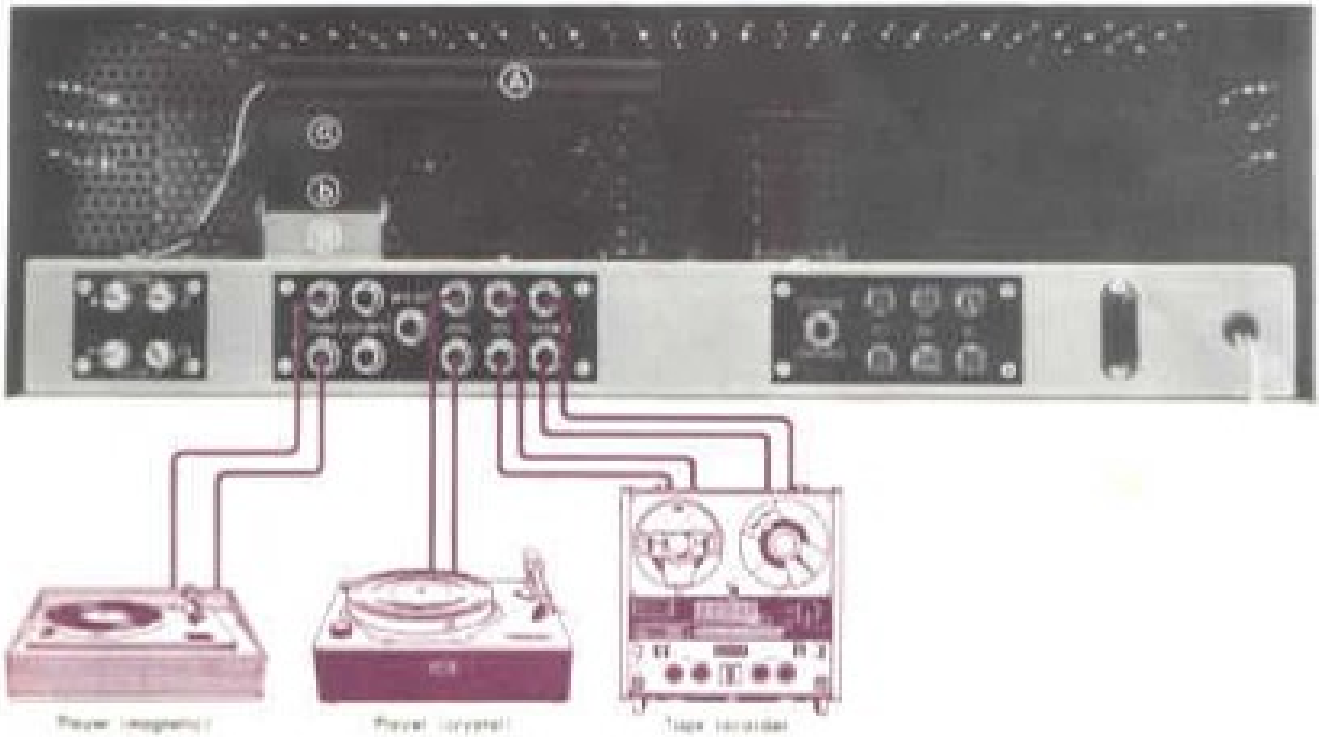
In case of use of a monophonic record player, connect the output of the record player to either of the PHONO terminals of the amplifier.

TAPE RECORDER

You can enjoy tape recording and playback by connecting a tape recorder to the 220. Besides, you can enjoy tape monitoring by the use of a 3-head tape recorder.

1. TAPE RECORDING

By using shielded wire, connect the recording inputs of the tape recorder to the REC CHAN-L and -R terminals of the amplifier. For a monaural tape recorder, connect its recording input to either of the REC terminals of the amplifier.



CONNECTIONS

2. PLAYBACK

By using shielded wire, connect the outputs of the tape recorder to the TAPE MON CHAN-L and R terminals of the amplifier. For a monaural tape recorder, connect its output to either of the TAPE MON terminals of the amplifier.

3. MONITORING

To monitor the tape by the use of a 3-head tape recorder, follow the above procedures.

FM MPX ADAPTER (FCC SYSTEM)

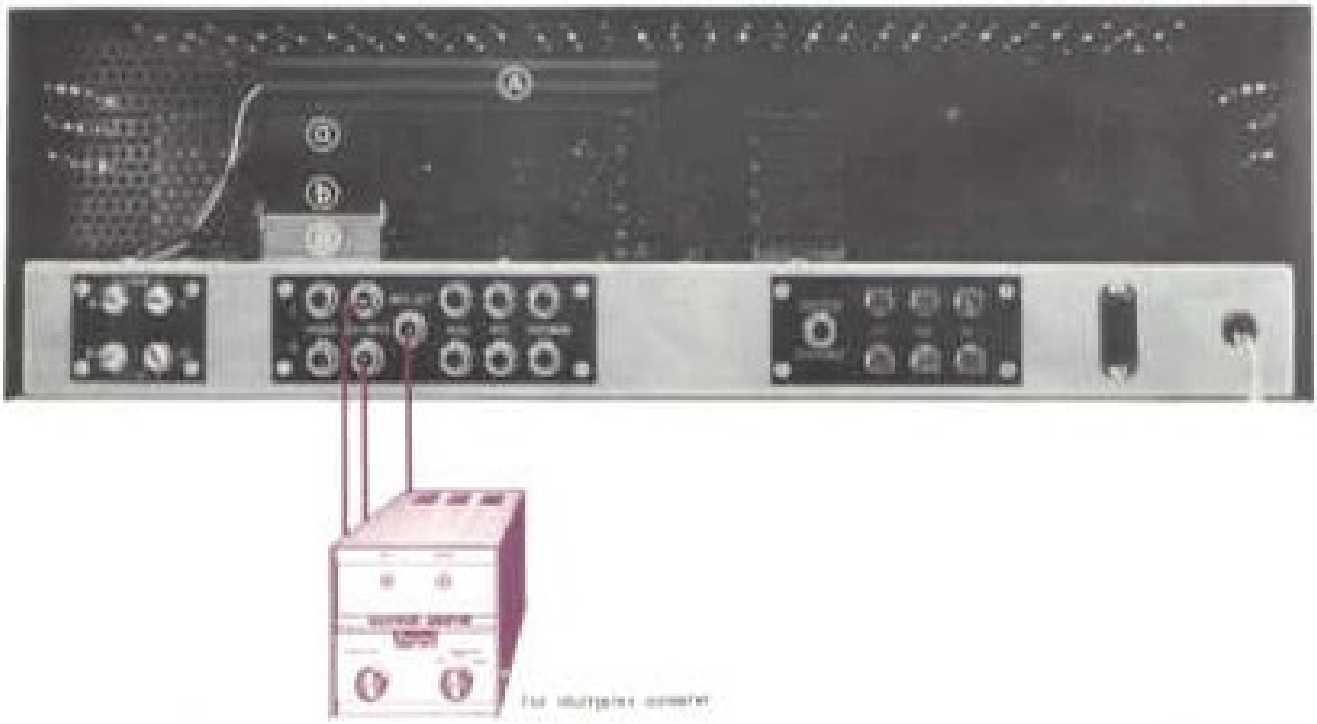
You can enjoy FM stereo broadcasts by connecting a FM MPX adapter to this amplifier.

1. Connect the input of the adapter to the terminal MPX-OUT of the amplifier.
2. Connect the output CHANNEL-L of the adapter to the terminal AUX-1 "L" of the amplifier.
3. Connect the output CHANNEL-R of the adapter to the terminal AUX-1 "R" of the amplifier.

LOUD SPEAKERS

STEREO

1. Connect (+) of the left speaker to the upper speaker terminal CHAN-L 8 or 16Ω of the amplifier.
2. Connect (−) of the left speaker to the upper speaker terminal C of the amplifier.
3. Connect (+) of the right speaker to the lower



For stereo owners

speaker terminal CHAN-R # or 1942 of the amplifier.

4. Connect (−) of the right speaker to the lower speaker terminal C of the amplifier.

MONAURAL

If a 2-speaker system is used as a mono and the speaker impedance is 8 ohms, for example, connect the upper and lower 16-ohm terminals (L and R) and then of the speaker to them, connect the upper and lower C terminals (L and R) and then of the speaker to them.

IMPORTANT: 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.

3-D STEREO SYSTEM

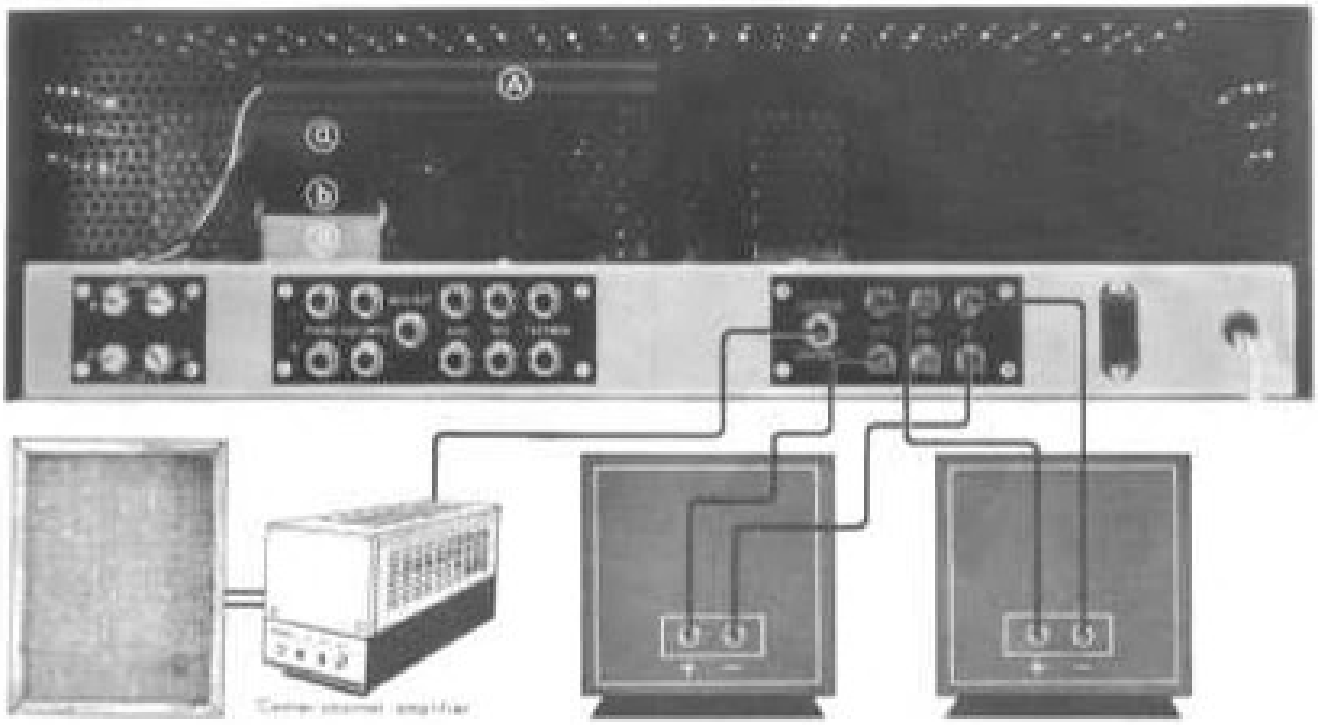
Since this amplifier is provided with an output terminal for a center channel amplifier, you can enjoy easily the 3-D stereo. By using shielded wire, connect the input of the bass amplifier * to the pin jack of the output terminal ** for center channel of this amplifier, and then connect a woofer to the bass amplifier. Exclusive features and advantages of this system are the effective reproduction of the lowest tones, use of only one woofer and economy.

*) Bass amplifier is built by using a filter circuit on the input side of the main amplifier (SANSUI Q-55 main amplifier is recommended for use).

**) Located on the left side of the speaker terminal plate.

See diagram in the page 11

Without the filter, mixed sounds of the right and left channels are heard from this circuit and the effect similar to the 3-D stereo system is obtained.



SWITCHES AND CONTROLS

①TUNING INDICATOR (MAGIC EYE)

This indicator gives a visual indication of correct tuning. The closed fluorescent pattern means that your desired station is properly tuned in.

②DIAL SCALES

The upper scale indicates FM, the middle the medium-wave range and the lower the short-wave range. Turn the tuning knob to select your desired station.

③TUNING KNOB

This knob is used to select your desired FM, MW or SW station.

④POWER SWITCH

To switch the power on, push the button. To switch it off, push the button again. Note that this switch does not turn on and off the outlet on the back panel.

⑤HEADPHONE JACK

You can enjoy stereo any time without any disturbance by just plugging in headphones. Tape monitoring is another use of the headphones. We recommend stereo dynamic headphones.

⑥SPEAKERS/HEADPHONES SWITCH

After plugging in the headphones, turn this switch to PHONE, the speakers are disconnected.

⑦NOISE FILTER

Turn on this switch to eliminate or reduce a record scratching noise or other noises at relatively high frequencies.

⑧LOUDNESS SWITCH

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

⑨VOLUME CONTROL

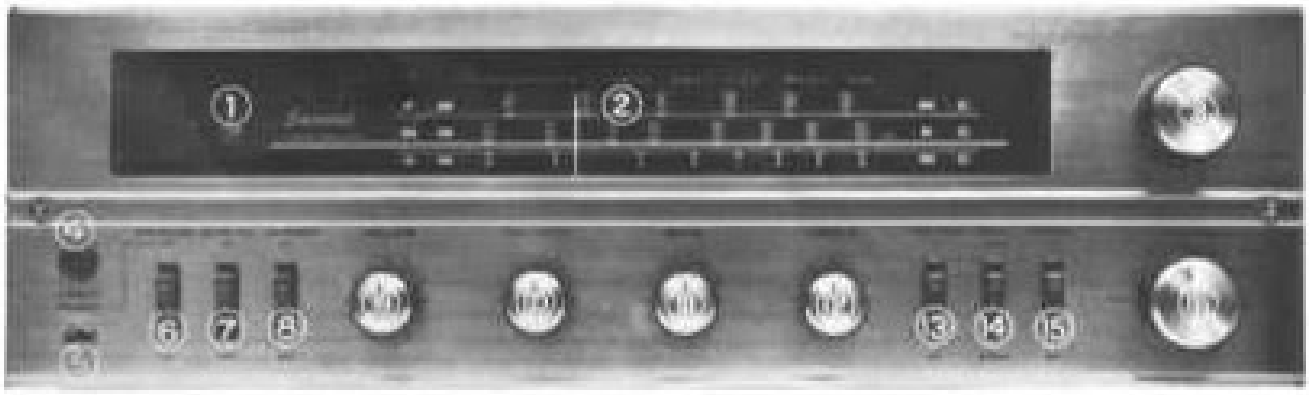
This control is used to adjust the volume of the broadcasts, record playing, tape playback etc. As it is turned clockwise, the volume is increased, or vice versa.

⑩BALANCE CONTROL

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

⑪BASS CONTROL

This control is used to adjust the sound level in bass notes. Turn it further from FLAT to right and the bass notes are more emphasized, or vice versa.



⑫TREBLE CONTROL

This control is used to adjust the sound level in high tones. Turn it further from FLAT to right and the high notes are more emphasized, or vice versa.

⑬TAPE MONITOR SWICH

When recording on the tape by use of a hi-fi tape recorder, turn on this switch to make the tape monitor circuit. The sound is recorded and reproduced at the same time.

NOTE :

In case of playback, turn it off. Except for the above uses, it must be in OFF position.

⑭MODE SWITCH (STEREO/MONO)

To enjoy FM MPX stereo broadcast, stereo record or stereo tape, set this switch to STEREO. To enjoy monaural broadcast, record or tape, set this switch to MONO. Regardless of the input signals (L and/or R), the output signals drive right and left speakers.

MODE SWITCH			
STEREO	SIGNAL	R L	SOUNDS
MONO	SIGNAL	R L	SOUNDS

⑮FM-AFC SWITCH

This switch is used to prevent the selected FM station from tuning off, maintaining the frequency automatically within specified limits. Be sure to turn it on after selecting your desired FM station. If one station will be affected by another station, it should be turned off.

⑯FUNCTION SWITCH

This switch is used to select your desired program source.

PHONO .....Record playing.
SW .....Short wave radio reception.
MW .....Medium wave radio reception.
FM .....FM radio reception.
AUX-1(MPX) FM multiplex reception by use of FM MPX adapter.
AUX-2 .....Reproduction by TV or other inputs (record playing by means of a crystal cartridge).

OPERATIONS

RADIO RECEPTION

A) FM RECEPTION

1. Set the FUNCTION switch to FM position.
2. Leave the MODE switch in either MONO or STEREO.
3. Select your desired station by means of the tuning knob and the magic eye.
4. Turn on the FM-AFC switch.
5. Adjust other controls and switches properly.

B) MW RECEPTION

1. Set the FUNCTION switch to MW position.
2. Leave the MODE switch in either MONO or STEREO.
3. Select your desired station by means of the tuning knob and the magic eye.
4. Adjust other controls and switches properly.

C) SW RECEPTION

1. Set the FUNCTION switch to SW position.
2. Leave the MODE switch in either MONO or STEREO.
3. Select your desired station by means of the tuning knob and the magic eye.
4. Adjust other controls and switches properly.

D) FM STEREO RECEPTION (FCC SYSTEM)

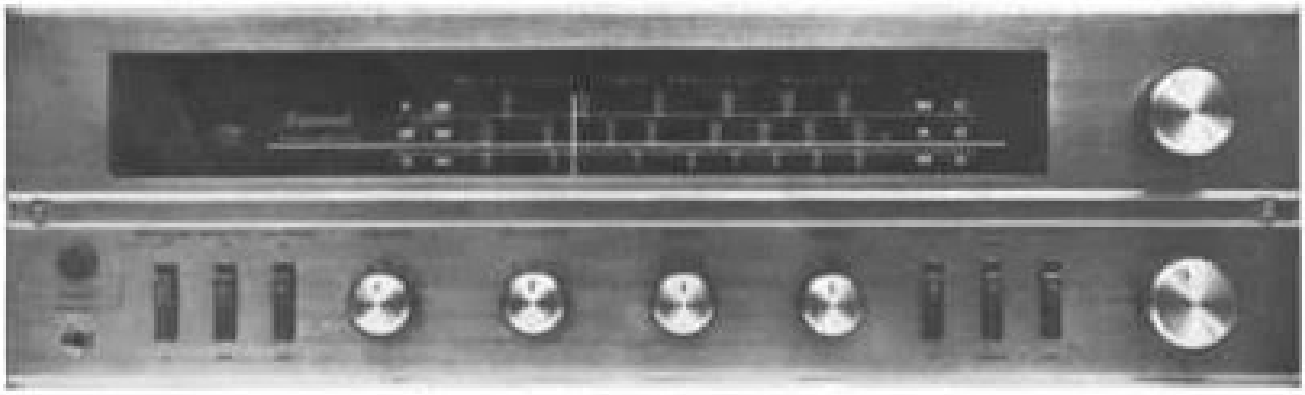
1. Connect a FM MPX stereo adapter to this amplifier.
2. Set the FUNCTION switch to AUX-I (MPX) position.
3. Set the MODE switch to STEREO position.
4. Select your desired station by means of the tuning knob and the magic eye. After tuning in the station, set on the adapter.
5. Turn on the FM-AFC switch.
6. Adjust the BALANCE control to the proper position.
7. Adjust other controls and switches properly.

RECORD PLAYING

1. Set the FUNCTION switch to PHONO position.
2. Set the MODE switch to STEREO or MONO depending on the type of the record player.
3. Switch on the record player at correct speed (rpm).
4. Place the pickup on the record.
5. Adjust the BALANCE control to the proper position.
6. Adjust other controls and switches properly.

NOTES:

1. To play monaural records on a stereo record player, follow the same procedures for stereo records.
2. To obtain the best balance of sound between both channels, play a monophonic record just like a stereo record and adjust the BALANCE control so that the sound is heard at a point midway between the right and left speakers.



TAPE RECORDING AND PLAY-BACK

A) TAPE RECORDING

1. Set the FUNCTION switch to the program source which is going to be recorded.
2. Set the MODE switch to STEREO for stereo recording or to MONO for monophonic recording.
3. Set the tape recorder for recording.
4. Operate the tape recorder and adjust the controls and switches of this amplifier properly.

B) PLAYBACK

1. Turn on the TAPE MONITOR switch.
2. Set the MODE switch to STEREO or MONO depending on the type of the tape recorder used.
3. Set the tape recorder for playback.
4. Adjust the controls and switches of this amplifier properly.

C) MONITORING

To monitor the tape by use of a 3-head tape recorder, follow the same procedures as for playback.

NOTES:

1. The sound level to be recorded on the tape is not controlled by the amplifier knobs.
2. To obtain the best recording result, record on the tape through the amplifier rather than through a microphone placed in front of the speakers.
3. Before use of the tape recorder, be sure to look up the manufacturer's instructions.
4. The TAPE MONITOR switch must be in "OFF" position except for tape monitoring and playback.

HINTS ON USE

HOW TO ELIMINATE UNPLEASANT RADIO NOISE

A) AM BROADCASTS

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

Usually the noise is heard in the area where the station signal is too weak due to topography, buildings etc. To eliminate it, connect FSC wire to the AM antenna terminal of this amplifier and put it up on the wall of your listening room. If the noise is still heard or the sensitivity of the amplifier is still poor, an outdoor antenna should be installed.

A noise may be heard depending time, frequency, station etc. To eliminate such a noise, connect a ground wire to the amplifier or turn the power plug upside down.

B) FM BROADCASTS

There are two troublesources in the FM radio noises; one is caused by the insufficient antenna input and the other is caused by other electrical appliances placed near the amplifier. The poor antenna input is due to badly installed antenna or remoteness from the station. Change the height and direction of the FM antenna (supplied). If the noise is still heard, use an indoor TV antenna or an outdoor one. When the FM antenna is used together with the TV antenna, make sure the TV picture is not affected.

Note that an excessively long antenna may rather cause a noise.

The sensitivity of the amplifier varies depending on the transmitting conditions of the stations. It happens, therefore, that one station signal is well received but the other station signal is ill received.

C) NOISE COMMON TO FM AND AM BROADCASTS

If you live in a closely built-in area, noises may be caused by some outside factors. To eliminate, install a noise arrester with the electrical appliances or the power source of the amplifier.

D) FM MPX STEREO

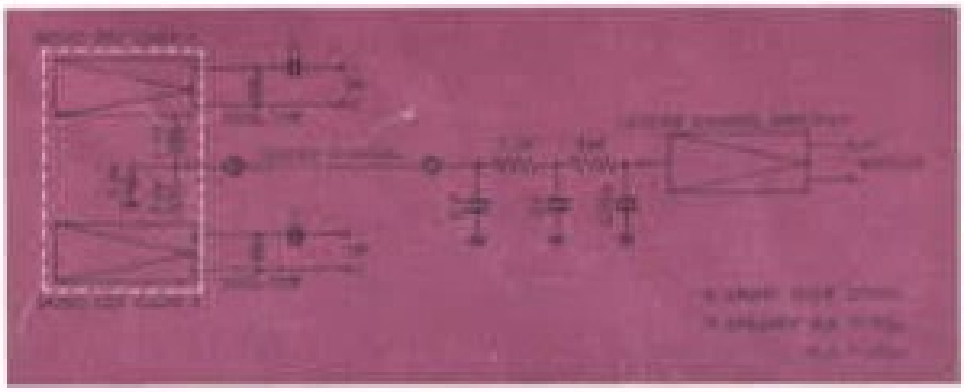
To eliminate a noise in the FM multiplex stereo, switch on the NOISE FILTER and adjust the TREBLE control to FLAT or turn it further to left.

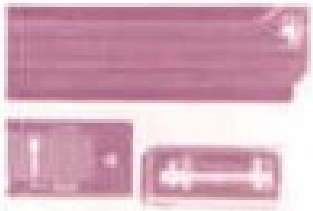
FM MPX STEREO ON MONO

You can enjoy FM MPX stereo broadcasts just like mono by setting the MODE switch to MONO and the FUNCTION switch to FM. This method is recommended if the station signal is weak and the FM MPX stereo program is impaired by noises.

FM BROADCASTS

The FM broadcasts are characterized by more faithful reproduction of sound than the AM broadcasts. There is no noise and no jamming. One disadvantage in the FM is that the selected station is tuned off from time to time while listening. To prevent it, your the 220 possesses a built-in FM-AFC circuit. Be sure to select your desired station and then turn on the FM-AFC switch.





There are two systems in the FM MPX stereo broadcasts: FCC system (AM-FM system) and EM-FM system. Your the 220 is designed to receive the FM stereo of the FCC system.

In the FCC system, also called "single wave AM-FM system", the signal that contains the sum of the right and left stereo channels (L+R) is frequency-modulated in the main channel, while the signal that is the difference between the left and right channels (L−R) is amplitude-modulated in the sub-channel.

For easier demodulation, the FCC system employs the Compatible System of the composite signals in which a 19-KHz pilot carrier and a 67-KHz sub-signal of the SCA channel signal are added to the Main signals of L+R and L−R. This system assures clear and noiseless Hi-Fi music.

Your the 220 is designed to receive the FM stereo of the FCC system by connecting a FM Multiplexer (Kenwood's the MP-2 is recommended for use, which is provided with the compatible system built within).

3-D STEREO SYSTEM

The 3-D stereo system has become popular in the increasing number of stereo fans. The speaker arrangement for this new system is characterized by a woofer installed at a point midway between right and left groups of tweeter/midrange speakers. This idea is based on the fact that human ears are not sensitive to the direction of sound whose frequency is less than 200 to 300 cps. Therefore, only one woofer is good enough for this system.

You can enjoy the 3-D stereo system by connecting a bass amplifier together with a woofer to the center channel terminal of this amplifier as described in Section "Connections, 3D Stereo System".

FUSE

If the amplifier does not function at all due to the blown fuse, remove its line cord from the outlet and then replace the fuse. Use a 3-ampere cartridge fuse. Never attempt to use a wire or a fuse with improper capacity. Before replacing, be sure to trace the trouble source and repair.

TO CONNECT TAPE RECORDER TO AMPLIFIER

To connect a tape recorder, record player etc. to this amplifier, be sure to use shielded wire. The use of an ordinary cord or PVC wire may cause hum or buzz. The maximum length of the shielded wire is 1.5 meters.

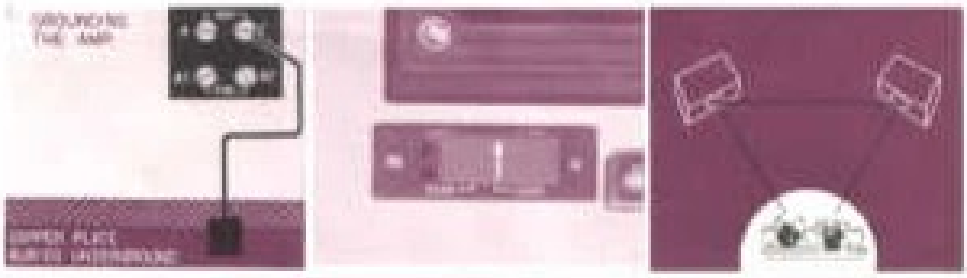
TO ELIMINATE DEEP HOWLING

Deep howling or buzzing on record playing is caused not by the amplifier, but by the record player placed on or near the speaker box. To eliminate it, keep a proper distance between them or place it on a thick cushion. Other causes may be the use of other than the shielded wire, defective connecting wire, improper connection or no grounding of the record player.

WRONG PHASED SPEAKERS

Incorrect phasing is evidenced by loss of bass when you are listening to a monaphonic record on a stereo record player at a point midway between the two speaker systems. To phase correctly, reverse wires of either speaker system.

HINTS ON USE



GROUNDING

Connect one end of a PVC wire or enamel wire to the E terminal of the amplifier and another end to the ground by using a copper plate as shown above. Radio noise may be reduced.

AC OUTLET

The AC outlet on the back panel is not connected or disconnected by the power switch on the front panel. The capacity is 120VA. Be sure to use it within the limit.

HEAT FROM THE AMP

Don't worry about the heat that is radiated from the amplifier. Air vents in the top and back plates assure you of a long continuous use. Some simple precautions should be observed. Place nothing on the amplifier. Don't install the amplifier in an air-tight box.

CONNECTIONS MUST BE PERFECT

Lead wires must be connected correctly and firmly to the speaker outputs and inputs. Loose and/or wrong connection may cause noises and malfunction of the amplifier. Before the connection, be sure to look up manufacturer's instructions of the record player and tape recorder used.

FOR THE BEST STEREO EFFECT

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

Positioning of speakers is not as pleasing in the stereo systems. 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.

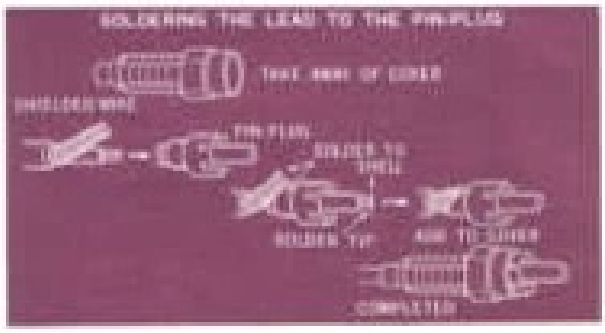
WHERE TO BE PLACED

The amplifier should be installed in 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.

VOLTAGE SELECTOR PLUG

The voltage selector plug allows you to use this amplifier at any of the four different supply voltages: 100, 117, 220 and 240 volts. If you'll move to the area where the supply voltage is not the same as before, pull out the plug and reset the arrow (➡) marked on it to the figure of volts in the new area.



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 B. poor power cord C. poor plug contact		Replace it. Replace it. Replace the plug connect 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_1) or short-circuit of pass condenser ($C_{[illegible]}$)

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—$V_{[illegible]}$ 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.	$V_{[illegible]}$—$V_{[illegible]}$
	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 $C_{[illegible]}$, poor IFT ($T_{[illegible]}$—$T_{[illegible]}$). Short-circuit of $C_{[illegible]}$, $C_{[illegible]}$, $C_{[illegible]}$. Trouble in the local oscillating circuit of V_1 (6AQ8)
C. Only the AM tuner does not work.	1. Broken wires of vacuum tube heaters in the AM tuner system.	$V_{[illegible]}$, $V_{[illegible]}$
	2. In case there is something wrong in the vacuum tube and voltage in resp. places in the AM tuner 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 resp. places in the AM tuner system.	Poor IFT ($T_{[illegible]}$, $T_{[illegible]}$) or coil $L_{[illegible]}$, $L_{[illegible]}$, $L_{[illegible]}$, $L_{[illegible]}$. Poor diode (OA 91). Short-circuit of $C_{[illegible]}$ and $C_{[illegible]}$. Insufficient capacity of $C_{[illegible]}$.
D. The phono does 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 ($S_{[illegible]}$).
	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 0.01 μF.	$C_{[illegible]}$, $C_{[illegible]}$
A. In case of small sounds of resp. AUX, FM, AM tuners, phono, tape recorder.	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. Poor fixed resistor.	
	2. Short-circuit rearing in the output transformer.	$T_{[illegible]}$, $T_{[illegible]}$
	3. Drop in condenser capacity and short circuit.	Insufficient capacity of $C_{[illegible]}$, $C_{[illegible]}$, $C_{[illegible]}$, $C_{[illegible]}$, $C_{[illegible]}$, $C_{[illegible]}$ and tubular electrolytic condensers $C_{[illegible]}$, $C_{[illegible]}$
	4. Deterioration of vacuum tubes.	$V_{[illegible]}$—$V_{[illegible]}$
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.

SERVICE NOTE

Symptoms (1)	Symptoms (2)	Likely defective places
	3. Poor diode	Germanium diode (GA 91)
	4. Drop in Q of coils etc.	$L_{...}$ $L_{...}$
	5. Poor condensers	Insufficient capacity of $C_{...}$ $C_{...}$ $C_{...}$ unique unit parts CR-C, CR-2
	6. Poor contact of the rotary switch	$S_{...}$
C. In case of small AM broadcasting sounds with nothing wrong in voltage test places.	1. Divergence on tracking regulation	Refer to the regulation method of the AM tuner
	2. Divergence on IFT regulation	Refer to the regulation method of the AM tuner
	3. Poor diode	GA 91
	4. Drop in Q of coils etc.	$L_{...}$ $L_{...}$ $L_{...}$ $L_{...}$
	5. Poor condensers	Insufficient capacity of $C_{...}$ $C_{...}$ $R_{...}$ composed parts CR-1
	6. Poor contact of the rotary switch	$S_{...}$ a, c, f, g
D. In case of small sounds of the phono, recording system with nothing wrong in voltage in resp. places.	1. In case of the poor contacts of the selector switch	$S_{...}$ a, c, e, g
	2. In case there is something wrong in the input circuit	Poor contact of the pin jack or poor shielding wires
	3. Poor condenser of the attached appliances connected	——
	4. Poor coupling condensers	$C_{...}$ $C_{...}$ $C_{...}$ $C_{...}$
	5. Insufficient capacity of emitter bypass condensers	$C_{...}$ $C_{...}$
A. In case the sounds from the AUX terminal are distorted much	1. Deterioration of vacuum tubes	V_3–V_{11}
	2. Partial short-circuit resting in the output transformer	$T_{...}$ $T_{...}$
	3. Poor speaker	——
	4. Distortion resulted from the attached appliances connected	——
B. In case the FM broadcasting sounds are distorted much.	1. Poor tuning and small input of the antenna	Refer to the Item. ANTENNAS in this manual
	2. Divergence on 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	GA 91
	5. Insufficient capacity of the condensers in the FM tuner part	
C. 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	GA 91
	4. Insufficient capacity of condenser and short circuit	Insufficient capacity of $C_{...}$ puncture of $C_{...}$
D. In case the sounds of the phono, tape recording systems are distorted much	1. In case of much distortion in the attached appliances connected	——
	2. Poor tubular electrolytic condensers	Puncture of $C_{...}$ and $C_{...}$
A. In case of big humming from the AUX terminal	1. Insufficient capacity of the electrolytic condensers	$C_{...}$ $C_{...}$ $C_{...}$ $C_{...}$
	2. Inner touch of vacuum tubes	V_3–V_{11}
	3. Big humming in the attached appliances connected	——
	4. Poor regulation of the hum balancer.	$VR_{...}$ $VR_{...}$
	5. Broken wire of the NF resistors	$R_{...}$ $R_{...}$

Symptoms (1)	Symptoms (2)	Likely defective places
B. In case of big humming in FM broadcasting.	1. Noise generated when tuned in a channel.	Reverse connection of the power plug or poor earthing condition of the chassis.
	2. Inner touch of vacuum tubes.	$V_1 \sim V_5$
C. In case of big humming in AM broadcasting.	1. Noise generated when tuned in a channel.	Reverse connection of the power plug or poor earthing condition of the chassis.
	2. Inner touch of vacuum tubes.	$V_1 \sim V_5$
D. In case of big humming in the phono, tape recording system.	1. Poor condition of shielding wires of sound appliances and their connection.	Refer to the item "HINTS ON USE" in 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 noise of sound appliances.	——
A. In case of loud noises from the AUX terminal.	1. Break wiring in the fixed resistor wires and touch of parts.	R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}
	2. Short-circuit wiring of the condensers and touch of parts.	C_{11}, C_{12}, C_{13}, C_{14}
	3. Break wiring in the primary side of the output transformers.	T_1, T_2
	4. Inner touch of vacuum tubes.	$V_1 \sim V_5$
B. In case of a great many noises in FM broadcasting.	1. Weak signal voltage and poor condition of the antenna.	Refer to the item "ANTENNA" in this manual.
	2. Poor vacuum tubes high bowing.	$V_1 \sim V_5$
	3. Break wiring in the fixed resistor wires and touching of parts.	R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}
	4. Short-circuit of condensers and touch of parts.	C_{11}, C_{12}, C_{13}, C_{14}, C_{15}
C. In case of a great many noises in the record, tape recording system.	1. Poor condition of fixed resistors and break wiring of the resistor wires.	$R_{11} \sim R_{18}$
	2. poor condensers.	$C_{11} \sim C_{15}$
	3. Inner noises and poor connection of the attached appliances connected.	——
A. While the FM tuner is working normally.	1. The tuning Vacuum Tube does not work at all.	Poor V_{11} or broken wire of R_{11}, R_{12}
	2. The tuning Vacuum Tube works slightly.	• It varies depending on the intensity of the electric field resulted from regional differences.
		• It is caused by poor condition of the FM antenna.
B. While the AM tuner is working normally.	1. The tuning Vacuum Tube does not work at all.	Poor V_{11} and broken wire of R_{11}, R_{12}
	2. The tuning Vacuum Tube works slightly.	• It varies depending on the intensity of the electric field resulted from regional differences.

PARTS LIST

Part No.	Nomenclature
R1	220 Ω ¼ Watt 10% Carbon Fixed Resistor
R2	33 KΩ ¼ Watt 10% Carbon Fixed Resistor
R3	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R4	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R5	2 KΩ ¼ Watt 10% Carbon Fixed Resistor
R6	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R7	68 Ω Enclosed in CR-1
R8	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R9	30 KΩ ¼ Watt 10% Carbon Fixed Resistor
R10	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R11	68 Ω Enclosed in CR-1
R12	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R13	68 KΩ Enclosed in CR-2
R14	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R15	15 KΩ ¼ Watt 10% Carbon Fixed Resistor
R16	10 KΩ ¼ Watt 10% Carbon Fixed Resistor
R17	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R18	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R19	10 KΩ ¼ Watt 10% Carbon Fixed Resistor
R20	10 KΩ ¼ Watt 10% Carbon Fixed Resistor
R21	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R22	82 KΩ ¼ Watt 10% Carbon Fixed Resistor
R23	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R24	22 KΩ ¼ Watt 10% Carbon Fixed Resistor
R25	51 Ω ¼ Watt 10% Carbon Fixed Resistor
R26	3.3 KΩ ¼ Watt 10% Carbon Fixed Resistor
R27	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R28	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R29	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R30	22 KΩ ¼ Watt 10% Carbon Fixed Resistor
R31	1 KΩ ¼ Watt 10% Carbon Fixed Resistor
R32	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R33	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R34	4.7 MΩ ¼ Watt 10% Carbon Fixed Resistor
R35	4.7 MΩ ¼ Watt 10% Carbon Fixed Resistor
R36	1.5 KΩ ¼ Watt 10% Carbon Fixed Resistor
R37	1.5 KΩ ¼ Watt 10% Carbon Fixed Resistor
R38	470 KΩ ¼ Watt 10% Carbon Fixed Resistor
R39	470 KΩ ¼ Watt 10% Carbon Fixed Resistor
R40	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R41	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R42	270 KΩ ¼ Watt 10% Carbon Fixed Resistor
R43	270 KΩ ¼ Watt 10% Carbon Fixed Resistor
R44	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R45	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R46	1 MΩ ¼ Watt 10% Carbon Fixed Resistor
R47	390 KΩ ¼ Watt 10% Carbon Fixed Resistor
R48	390 KΩ ¼ Watt 10% Carbon Fixed Resistor
R49	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor

Part No.	Nomenclature
R50	2.2 MΩ ¼ Watt 10% Carbon Fixed Resistor
R51	5.6 KΩ ¼ Watt 10% Carbon Fixed Resistor
R52	5.6 KΩ ¼ Watt 10% Carbon Fixed Resistor
R53	470 KΩ ¼ Watt 10% Carbon Fixed Resistor
R54	470 KΩ ¼ Watt 10% Carbon Fixed Resistor
R55	270 KΩ ¼ Watt 10% Carbon Fixed Resistor
R56	220 KΩ ¼ Watt 10% Carbon Fixed Resistor
R57	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R58	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R59	22 KΩ ¼ Watt 10% Carbon Fixed Resistor
R60	22 KΩ ¼ Watt 10% Carbon Fixed Resistor
R61	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R62	100 KΩ ¼ Watt 10% Carbon Fixed Resistor
R63	82 KΩ ¼ Watt 10% Carbon Fixed Resistor
R64	82 KΩ ¼ Watt 10% Carbon Fixed Resistor
R65	2.2 KΩ ¼ Watt 10% Carbon Fixed Resistor
R66	2.2 KΩ ¼ Watt 10% Carbon Fixed Resistor
R67	100 Ω ¼ Watt 10% Carbon Fixed Resistor
R68	100 Ω ¼ Watt 10% Carbon Fixed Resistor
R69	220 KΩ ½ Watt 10% Carbon Fixed Resistor
R70	220 KΩ ½ Watt 10% Carbon Fixed Resistor
R71	22 KΩ ½ Watt 10% Carbon Fixed Resistor
R72	1.8 KΩ ½ Watt 10% Carbon Fixed Resistor
R73	1.8 KΩ ½ Watt 10% Carbon Fixed Resistor
R74	22 KΩ ½ Watt 10% Carbon Fixed Resistor
R75	22 KΩ ½ Watt 10% Carbon Fixed Resistor
R76	1 MΩ ½ Watt 10% Carbon Fixed Resistor
R77	1 MΩ ½ Watt 10% Carbon Fixed Resistor
R78	68 KΩ ½ Watt 10% Carbon Fixed Resistor
R79	68 KΩ ½ Watt 10% Carbon Fixed Resistor
R80	100 KΩ ½ Watt 10% Carbon Fixed Resistor
R81	100 KΩ ½ Watt 10% Carbon Fixed Resistor
R82	100 KΩ ½ Watt 10% Carbon Fixed Resistor
R83	100 KΩ ½ Watt 10% Carbon Fixed Resistor
R84	470 KΩ ½ Watt 10% Carbon Fixed Resistor
R85	470 KΩ ½ Watt 10% Carbon Fixed Resistor
R86	470 KΩ ½ Watt 10% Carbon Fixed Resistor
R87	470 KΩ ½ Watt 10% Carbon Fixed Resistor
R88	5 KΩ 1 Watt 10% Carbon Fixed Resistor
R89	1.7 KΩ 20 Watt Wire Wound Resistor
R90	300 Ω 20 Watt Wire Wound Resistor
R91	220 Ω 1 Watt 10% Carbon Fixed Resistor
R92	220 Ω 1 Watt 10% Carbon Fixed Resistor
R93	8 Ω 10 Watt Wire Wound Resistor
R94	8 Ω 10 Watt Wire Wound Resistor
R95	2.2 KΩ ½ Watt 10% Carbon Fixed Resistor
R97	2.2 KΩ ½ Watt 10% Carbon Fixed Resistor
R98	3.3 KΩ ½ Watt 10% Carbon Fixed Resistor

Part No.	Nomenclature				
R=	33 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	33 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	1 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	1 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	470 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	2.2 K Ω	1 Watt	10%	Carbon	Fixed Resistor
R=	6.8 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	2.2 M Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	2.2 M Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	5.6 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	4.7 K Ω	½ Watt	10%	Carbon	Fixed Resistor
R=	33 Ω	½ Watt	10%	Carbon	Fixed Resistor
C=	30 pf	250 WV	10%	Ceramic	tubular
C=	0.001 μf	250 WV	±½%	Ceramic	tubular
C=	10 pf	250 WV	10%	Ceramic	tubular
C=	12 pf	250 WV	10%	Ceramic	tubular
C=	100 pf	250 WV	10%	Ceramic	tubular
C=	30 pf	250 WV	10%	Ceramic	tubular
C=	18 pf	250 WV	10%	Ceramic	tubular
C=	5 pf	250 WV	10%	Ceramic	tubular
C=	0.001 μf	250 WV	±½%	Ceramic	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	30 pf	250 WV	10%	Ceramic	tubular
C=	0.01 μf	enclosed in CR-1			
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	100 pf	250 WV	10%	Ceramic	tubular
C=	200 pf	250 WV	10%	Ceramic	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.01 μf	enclosed in CR-1			
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	80 μf	300 WV		electrolytic	tubular
C=	30 pf	enclosed in CR-2			
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.002 μf	250 WV	±½%	Ceramic	tubular
C=	200 pf	250 WV	10%	Ceramic	tubular
C=	200 pf	250 WV	10%	Ceramic	tubular
C=	5 μf	12 WV		electrolytic	tubular
C=	0.02 μf	400 WV	10%	oil	tubular
C=	0.001 μf	250 WV	±½%	Ceramic	tubular
C=	0.002 μf	250 WV	±½%	Ceramic	tubular
C=	0 - 10 pf	250 WV	10%	Ceramic	tubular
C=	200 pf	250 WV	10%	Ceramic	tubular
C=	0 - 10 pf	250 WV	10%	Ceramic	tubular
C=	400 pf	500 WV	10%	Mica	tubular
C=	30 pf	250 WV	10%	Ceramic	tubular

Part No.	Nomenclature				
C=	2500 pf	500 WV	10%	Mica	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.02 μf	400 WV	10%	oil	tubular
C=	0.01 μf	50 WV	±½%	Ceramic	tubular
C=	0.01 μf	400 WV	10%	oil	tubular
C=	100 μf	150 WV		electrolytic	tubular
C=	100 μf	150 WV		electrolytic	tubular
C=	0.01 μf	400 WV	10%	oil	tubular
C=	100 μf	50 WV		electrolytic	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.01 μf	250 WV	±½%	Ceramic	tubular
C=	0.005 μf	600 WV	±½%	oil	tubular
C=	100 μf	50 WV		electrolytic	tubular
C=	3 μf	6 WV		electrolytic	tubular
C=	5 μf	6 WV		electrolytic	tubular
C=	300 pf	250 WV	10%	Mica	tubular
C=	300 pf	250 WV	10%	Mica	tubular
C=	0.001 μf	50 WV	10%	Mylar	tubular
C=	0.001 μf	50 WV	10%	Mylar	tubular
C=	0.1 μf	50 WV	10%	Mylar	tubular
C=	0.1 μf	50 WV	10%	Mylar	tubular
C=	5 μf	150 WV		electrolytic	tubular
	0.002 μf	250 WV		Ceramic	tubular
C=	30 μf	6 WV		electrolytic	tubular
C=	30 μf	6 WV		electrolytic	tubular
C=	0.02 μf	400 WV	10%	oil	tubular
C=	0.02 μf	400 WV	10%	oil	tubular
C=	110 pf	250 WV	10%	Ceramic	tubular
C=	130 pf	250 WV	10%	Ceramic	tubular
C=	40 pf	250 WV	10%	Ceramic	tubular
C=	40 pf	250 WV	10%	Ceramic	tubular
C=	0.001 μf	400 WV	10%	oil	tubular
C=	0.001 μf	400 WV	10%	oil	tubular
C=	0.005 μf	50 WV	10%	Mylar	tubular
C=	0.005 μf	50 WV	10%	Mylar	tubular
C=	0.02 μf	50 WV	10%	Mylar	tubular
C=	0.02 μf	50 WV	10%	Mylar	tubular
C=	0.001 μf	400 WV	10%	oil	tubular
C=	0.001 μf	400 WV	10%	oil	tubular
C=	180 pf	250 WV	10%	Ceramic	tubular
C=	180 pf	250 WV	10%	Ceramic	tubular
C=	0.005 μf	50 WV	10%	Mylar	tubular
C=	0.005 μf	50 WV	10%	Mylar	tubular
C=	20 μf	350 WV		electrolytic	lug terminal
C=	30 μf	6 WV		electrolytic	tubular
C=	30 μf	6 WV		electrolytic	tubular
C=	250 pf	250 WV	10%	Mica	tubular

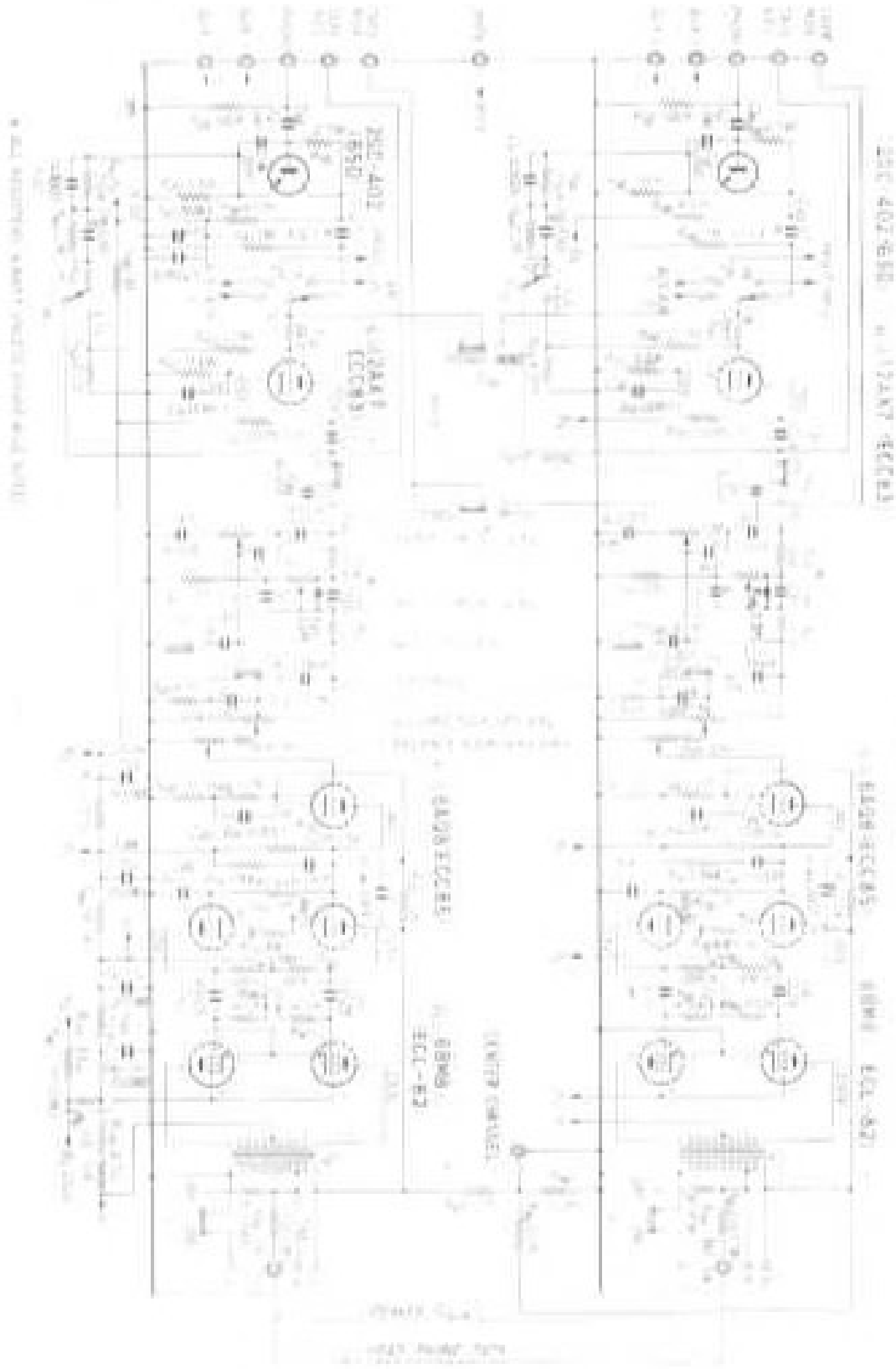
PARTS LIST

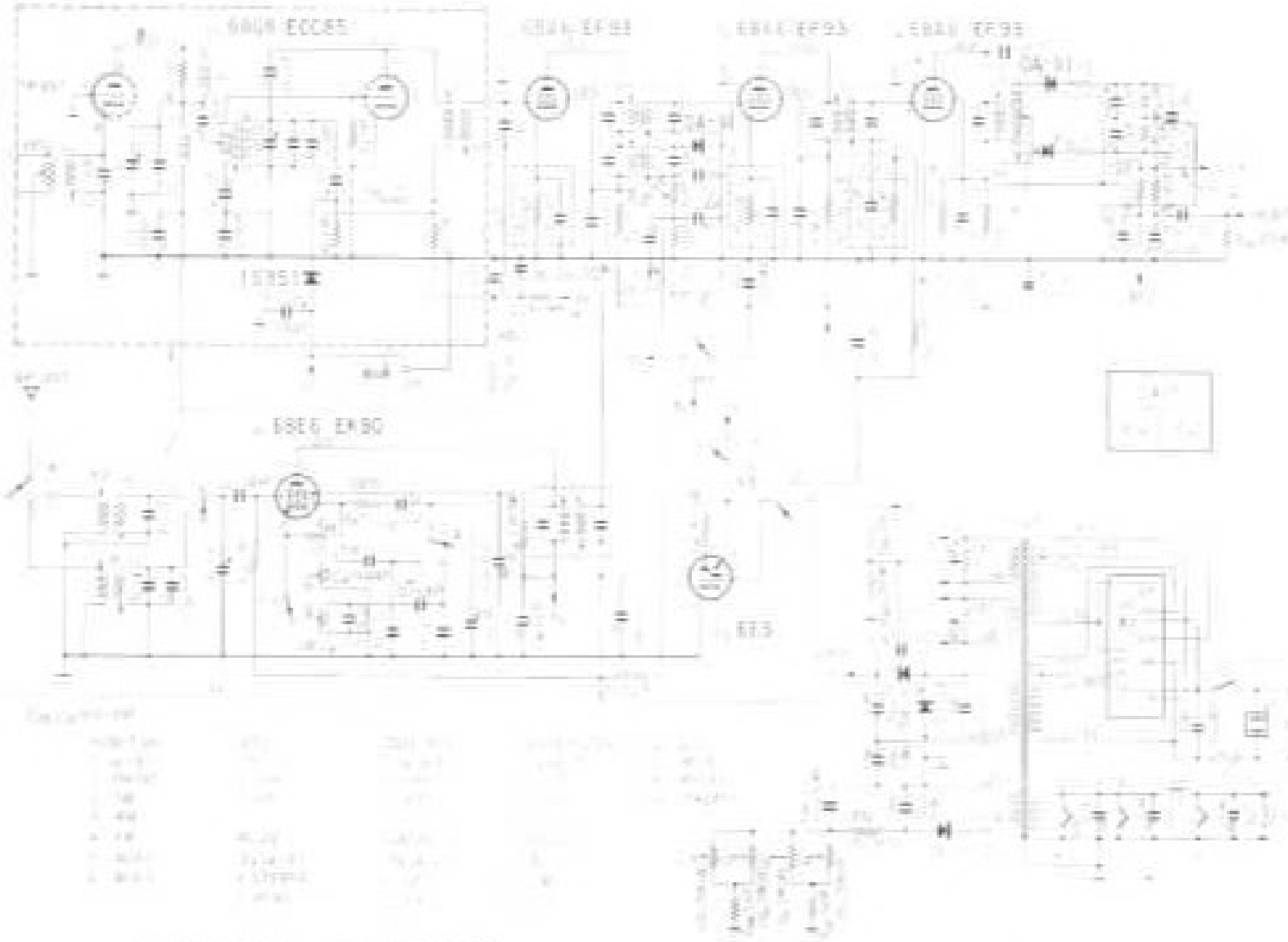
◎ Trimmer attached to 4 gang variable capacitor
[ ] 4 gang variable capacitor

Part No.	Nomenclature
C[illegible]	230 pF 250 WV 10% Mica tubular
C[illegible]	20 μF 350 WV electrolytic Lug terminal
C[illegible]	0.1 μF 400 WV 10% oil tubular
C[illegible]	0.1 μF 400 WV 10% oil tubular
C[illegible]	0.25 μF 400 WV 10% oil MP tubular
C[illegible]	0.25 μF 400 WV 10% oil MP tubular
C[illegible]	0.25 μF 400 WV 10% oil MP tubular
C[illegible]	0.25 μF 400 WV 10% MP tubular
C[illegible]	20 μF 350 WV electrolytic Lug terminal
C[illegible]	20 μF 350 WV electrolytic Lug terminal
C[illegible]	200 pF 250 WV 10% Ceramic tubular
C[illegible]	200 pF 250 WV 10% Ceramic tubular
C[illegible]	0.03 μF 400 WV 10% tubular
C[illegible]	0.03 μF 400 WV 10% tubular
C[illegible]	20 μF 300 WV electrolytic tubular
C[illegible]	330 pF 500 WV 10% Mica tubular
C[illegible]	330 pF 500 WV 10% Mica tubular
C[illegible]	1 μF 250 WV ±0.5% Ceramic tubular
VR-1,2	100 Ω Hum Balancer
VR-3	20 KΩ (B) Variable Resistor Driver Type
VR-4,5	1 MΩ (M) Variable Resistor 2φ Type (Tone control)
VR-6	500 KΩ (B) Variable Resistor 2φ Type (Volume, Loudness Tap 250 KΩ)
VR-7	500 KΩ (BH) Variable Resistor 2φ Type (Balance control)
VR-8	20 KΩ (B) Variable Resistor Driver Type
VR-9	20 KΩ (B) Variable Resistor Driver Type
VR-10	20 KΩ (B) Variable Resistor Driver Type
VC-1	5~17 pF Variable capacitor (FM RF Tuning)
VC-2	5~23 pF Variable capacitor (FM oscillator)
VC-3	12~430 pF Variable capacitor (AM ANT Tuning)
VC-4	12~430 pF Variable capacitor (AM oscillator)
◎ TC-1,2	8 pF Trimmer condenser
◎ TC-3,4,5,6	20 pF Trimmer condenser
V1	6AQ8 FM, RF, OSC & mixer
V2	6BA6 AM 2nd, FM 1st IF amp
V3	6BA6 FM 2nd IF amp
V4	6BA6 FM Limiter
V5	6BE6 AM converter
V6	12AX7 pre amp
V7	6AQ8 Audio amp

Part No.	Nomenclature
V[illegible]	6BM8 phase inverter & power amp
V[illegible]	AE1 Tuning indicator
L1	FM Antenna coil
L2	FM RF coil
L3	FM RF choke
L4	FM Oscillator
L5	MW Antenna coil (420002)
L6	SW Antenna coil
L7	MW oscillator coil
L8	SW oscillator coil
L9	Heater choke
T1	1st FM I.F.T. 10.7MHz
T2	2nd FM I.F.T. 10.7MHz (423303)
T3	2nd AM I.F.T. 455KHz (423004)
T4	1st AM I.F.T. 455KHz (423003)
T5	3rd FM I.F.T. 10.7MHz (423303)
T6	FM Discriminator 10.7MHz (423504)
T7	Power Transformer (40000?)
T8,9	Output transformer (41003) (Primary 4.3 KΩ Secondary 8 Ω, 16 Ω)
2SC 402/2SC630	Silicon Transistor (pre amp)
SE-0.5b	Silicon diode (rectifier) AC (rms) 420 V 1: 500 mA −35°C~125°C
SE-05-03	Silicon diode (rectifier) AC (rms) 140 V 1: 300 mA −35°C~125°C
OA-91	Germanium diode (AM, FM Detector) Vp: 90V 1D: 30mA −55°C~75°C
1S-331	Variable capacitor (FM, AFC)
JAC-1	Head phone jack
PU-1	Power connector
PL	Pilot lamp
	Fuse Type 6.3V 0.3A
F	Fuse 2A
S1	Function selector 1-4-11-6
S2	FM AFC Switch
S3	Mode Switch
S4	Tape Monitor Switch
S5	Loudness Switch
S6	Noise Filter Switch
S7	Speaker Switch
PS-1	Power Switch
CO-1	AC. Receptacle

SCHEMATIC DIAGRAM



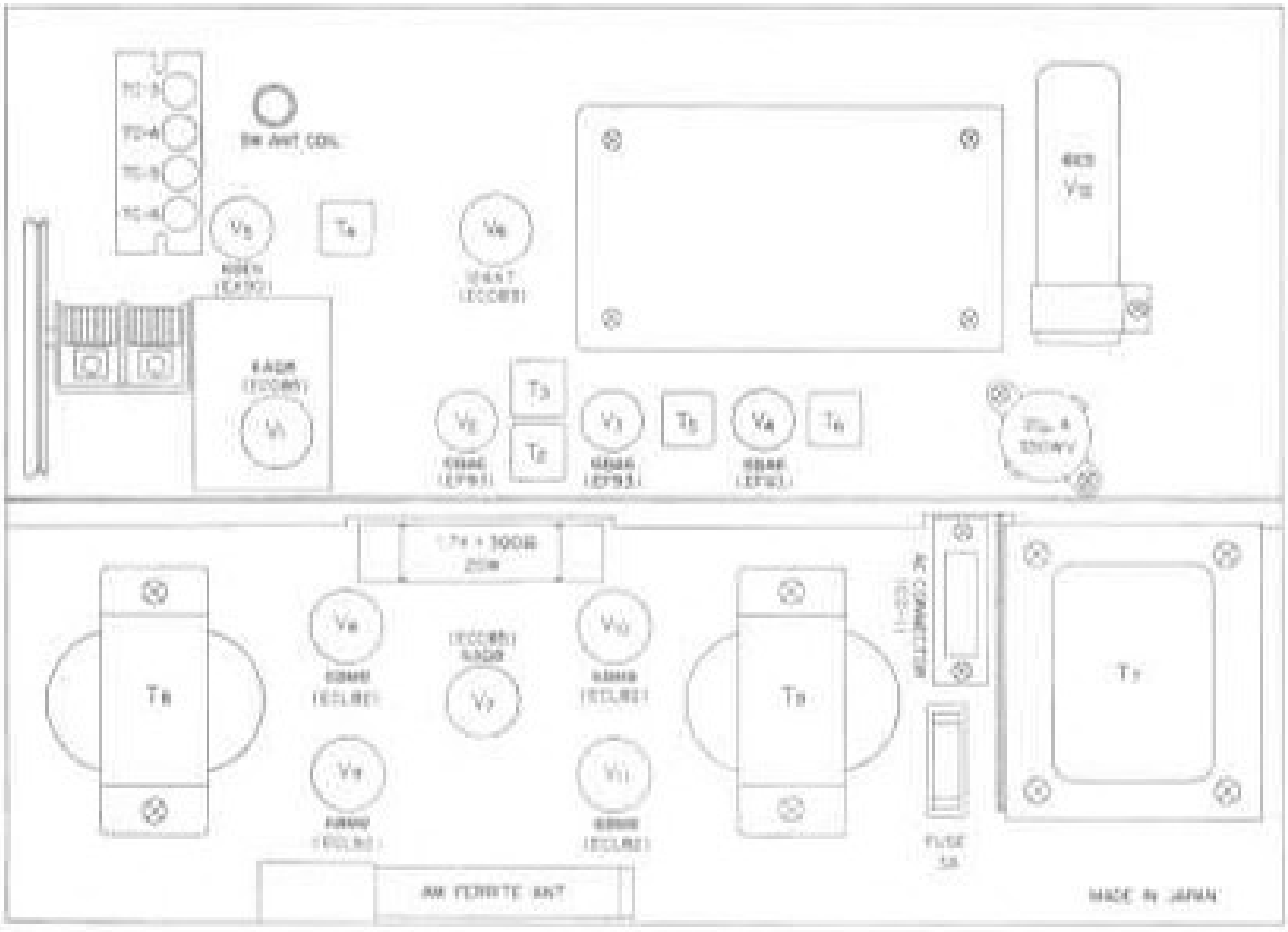


AM ALGNMENT PROCEDURE

Turn tuning gang fully. Center carrier wave. Set pointer at reference mark.

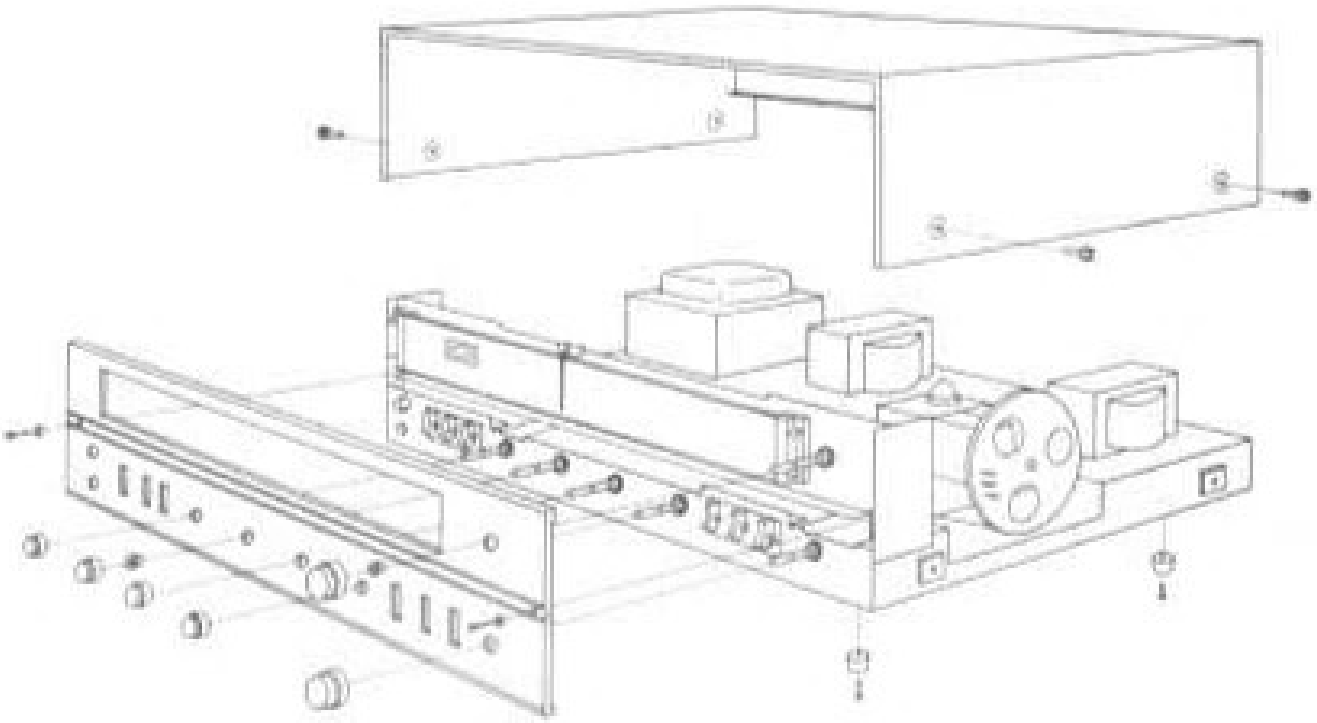
STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	DIAL SETTING	ADJUST	ADJUST FOR
1.	IF Trans-former	455 KHz ±30 KHz sweep generator	Pin 7 6BE6	Sweep input at ⓧ		1st I.F.T. - (T_4) Primary & secondary 2nd I.F.T. - (T_5) Primary & secondary	Best I.F.T Wave form
2.	OSC.	AM-OSCILLATOR 600 KHz 400 c.y. 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	600 KHz	OSC. coil L_7	Maximum
3.	OSC.	1400 KHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	1400 KHz	OSC. Trimmer TC-5	Maximum
4.		Reiterate 2, 3					
5.	Antenna	600 KHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	600 KHz	Ferrite Loop Antenna at coil L_1	Maximum
6.	Antenna	1400 KHz 400 Hz 30% Modulation		oscilloscope & V.T.V.M. or output load	1400 KHz	Antenna circuit at Trimmer TC-3	Maximum
7.		Reiterate 5, 6					
8.	OSC.	AM-OSCILLATOR 4 MHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	4 MHz	OSC. coil L_6	Maximum
9.	OSC.	12 MHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	12 MHz	OSC. Trimmer TC-6	Maximum
10.		Reiterate 8, 9					
11.	Antenna circuit	4 MHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T.V.M. or output load	4 MHz	Antenna coil L_5	Maximum
12.	Antenna	12 MHz 400 Hz 30% Modulation		oscilloscope & V.T.V.M. or output load	12 MHz	Antenna Trimmer TC-4	Maximum
13.		Reiterate 11, 12					

PARTS LAYOUT



REMOVALS DISASSEMBLE/DIAL CORD STRING

DISASSEMBLE REMOVALS



DIAL CORD STRING