AM/FM STEREO RECEIVER

SX-980

OPERATING INSTRUCTIONS

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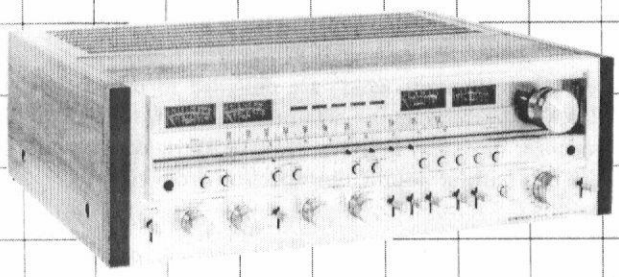


Walnut veneered top and side panels are used in the construction of this cabinet.

IMPORTANT NOTICE

The serial number for this equipment is located on the rear panel.
Please write this serial number on your enclosed warranty card and keep in a secure area. This is for your security.

CONTENTS

PIONEER

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

FEATURES

Power Amplifier for a Continuous Power Output of 80 Watts Per Channel and for Ultra-Stable Sound Reproduction

- The adoption of a single-stage differential amplifier with low-noise dual transistors, pre-driver stage a current mirror load and an SEPP circuit provides a bumper power output of 80 watts + 80 watts (continuous power output of 80 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.05% total harmonic distortion) which is extremely stable. These features also guarantee a stable operation at all times from low outputs to high outputs.
- The power amplifier is configured as a DC power amplifier with the capacitors removed from the NFB circuit for a flat gain response all the way from the lowest of the low frequencies up to the audio frequencies. At the same time, the design is engineered for low distortion with the incorporation of newly developed power transistors.
- The large-sized transformer with its superb regulation employ two 18,000μF large-capacity electrolytic capacitors in the power supply and permit high sound quality even at lowest frequencies.

IC-Based FM Tuner with High Selectivity, High S/N and Low Distortion

- The FM front end incorporates a 1-stage RF circuit that employs a 4-gang tuning capacitor and a dual-gate MOS FET for high gain and low noise. This configuration excels in ridding the sound of undesirable interference for impressive statistics: 1.7μV (IHF) sensitivity, more than 100dB spurious response ratio and more than 90dB image response ratio.
- The FM IF amplifier combines three dual-element phase-linear ceramic filters with two IC's which contain quadrature detectors for a high selectivity (80dB) and a low distortion (MONO: 0.1% at 1kHz).
- The stereo demodulator employs an NFB-type PLL MPX IC with a automatic pilot canceller which automatically cancels out the pilot signals without reducing the high-end frequency. This means that the leak carrier level is amply suppressed for a tip-top separation and flat frequency response in the reproduction frequency band.

AM Tuner Includes Newly Developed IC

The tuned AM RF amplifier circuit incorporates a newly developed high-sensitivity, low-distortion IC and 2-gang variable capacitor. These contribute to enhanced imaging and RF interference rejection capabilities. Since the optimum AGC voltage is supplied to each section, stable reception can be obtained with low spurious interference and distortion even in high field strength areas.

Precise Record Equalization

- A balanced power supply is used in the equalizer amplifier to obtain a maximum allowable input of 200mVrms (1kHz). Low distortion record playback can thus be enjoyed even with high output phono cartridges and music sources containing large peak signals.
- The equalizer elements which are designed to produce the RIAA characteristics use high-precision parts to keep the equalizer deviation between 20Hz – 20kHz down to ±0.2dB for faithful sound reproduction from records.

Other Features

TURNOVER switches: These switches yield variations in the curves of the tone controls when they are operated in conjunction with the other bass and treble tone controls. One is used for the bass and the other for the treble, thereby allowing plenty of variation in tone control adjustment.

Highly reliable protection circuitry: In order to protect the speakers and the power transistors, this receiver features a newly developed protection IC as well as a special muting circuit that cuts out the noise produced by the on/off operation of the power switch. Needless to say, these are very dependable and stable protection circuits. In addition, there is an inrush current suppressor circuit which suppresses surges of current when the power is switched on.

FM 25μs switch: The receiver's front panel is equipped with a de-emphasis selector switch which is useful when the receiver is tuned into an FM Dolby station. This facilitates operation when the receiver is set up for the reception of an FM Dolby broadcast.

TAPE DUPLICATE switch: This switch allows you to use two tape decks to edit or duplicate material recorded on one tape to another. Duplication from an open-reel deck to a cassette deck, for example, can be performed in a one-touch operation.

Power meters: Each channel has its own power meter (0.01W — 160W display range) with a logarithmic compression scale. These meters feature a fast response speed, and they enable you to read out the power values at an 8-ohm impedance across a power band stretching from 0.01W up to the maximum output of the receiver.

6kHz (high) and 15Hz (low) filter switches: Featured are a filter for 6dB/octave attenuation at frequencies below 15Hz in order to eliminate ultra-low-range noise generated by warps in the records, and also a 6kHz (6dB/oct attenuation) filter that eliminates high-range noise such as that produced by scratches on the records and hiss.

**Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifiers.*

STEREO SYSTEM COMPOSITION

Tape Deck
- Be sure to install reel clamps when using vertically.
- Always keep heads clean.
- Do not neglect recorded tape for long periods.
- Avoid magnetic felds.

SX-980 (Keep connecting cords as short as possible.)

Turntable
- Protect from vibrations and close dust cover whenever possible.
- Store records vertically and protect from dust and dirt.

Furniture materials can improve tone.

Thick curtain shuts out direct sunlight.

Speaker System
Rear and side panels of left and right speakers should have the same surroundings. (Placing with rear panel against an wall improves bass.)
Install speakers so that vibrations are not transferred directly to the floor.
(Employ stands or concrete blocks with bookshelf type speakers.)

Carpet
Absorbs sound and vibrations.
(Placing on floor in front of speakers is also effective.)

Listening position slightly to the rear of the apex of an equilateral triangle formed with left and right speakers.

INSTALLATION CAUTIONS

To ensure the best sound quality and trouble-free operation, avoid setting up the SX-980 in any of the locations described below.

Location liable to downgrade performance and result in breakdowns	Resulting trouble
1. Locations exposed to direct sunlight, or near heaters.	1. External heat causes the performance of the circuit parts to deteriorate, and operation becomes unstable.
2. Locations with poor ventilation, or with high humidity or moisture contents, or dusty locations.	2. Cause of faulty contact in input/output terminals, and rust. High humidity and a high moisture content cause deterioration in insulation. There is also the danger of current leakage and heat generation in the circuit parts. Dust or grease in the rotating parts causes the parts to deteriorate.
3. Locations susceptible to vibration.	3. These locations affect the precision parts adversely.
4. Locations where an AM radio or TV set is being used simultaneously.	4. Mutual interference can occur from the oscillator circuits used in these products.

Don't put anything on the top of the receiver because high power receiver will produce a lot of heat. Also leave sufficient around the receiver for adequate ventilation.

CONNECTION DIAGRAM

FM outdoor antenna

T-type FM antenna

AM outdoor antenna

PRE/POWER AMP
The bridge connecting plugs between PRE AMP OUT and POWER AMP IN jacks should always be left in position in normal use. If they are disconnected or removed no sound will come from the speakers. Always be sure to switch off the power supply before attempting to remove them. Refer to the section "USING THE PREAMP OUT AND POWER AMP IN JACKS" on page 17.

CONVENIENCE OUTLETS
SWITCHED: (150W MAX)
UNSWITCHED: (TOTAL 200W MAX)
A frequently used component (turntable, tape deck, etc.) can be plugged into this outlet. By leaving the power switch of that component in the ON position, power supply to the component will be coupled with the receiver switch operation.
Less frequently used components, which do not require coupled power, can be plugged into either of these outlets.

Turntable 1
(PHONO 1)

Ground

SERIAL NUMBER

Left
Right
Speaker systems
(SPEAKERS A)

Turntable 2
(PHONO 2)

Cartridge tape player (AUX)

Tape deck 1
(TAPE 1)

Tape deck 2
(TAPE 2)

AC 120V
60Hz only

Left
Right
Speaker systems
(SPEAKERS B)

CONNECTIONS

PRECAUTIONS

- Set the POWER switch to ON only when you have completed all the connections of the stereo system. Always set this switch to its bottom position (OFF) if you want to change the connections.
- All the receiver's jacks are aligned for easy connection in two rows: the top row for L (left channel) and the bottom row for R (right channel). Always connect L to L and R to R with the audio component output and input jacks.
- Make sure that the connections are secure. Improper connections can generate noise and cause the sound to be cut off.

SPEAKER SYSTEMS

The receiver is provided with two sets of SPEAKERS output terminals. Use the A set when connecting only one set of speakers.
Viewed from the front, the R (right channel) SPEAKERS terminals are on the right and the L (left channel) SPEAKERS terminals are on the left. Connect the left channel speaker to the L terminals and the right channel speaker to the R terminals. The red L and R SPEAKERS terminals have a plus polarity and the black terminals have a minus polarity ; the speaker systems also have the same dual polarities (plus, minus). When connecting, always connect minus to minus and plus to plus (Fig. 1).

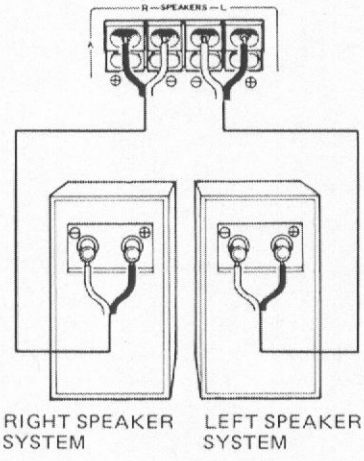


Fig. 1

NOTE:
If you want to use two sets of speaker systems, make sure that the impedance of each system is 8 ohms or more. If the impedance is less than 8 ohms, the protective circuitry will be actuated when the volume is turned up and you will not be able to enjoy proper stereo performance.

Connecting the speaker lead wires to the SPEAKERS terminals (Fig. 2)

1. Strip about 10mm of the insulation from the end of the speaker lead wires. If the conductor is stranded, twist the strands together so that they do not come into contact with other terminals.
2. Depress the terminal buttons and insert the lead wires into the terminal holes.
3. Release the buttons and check that the lead wires are secure.

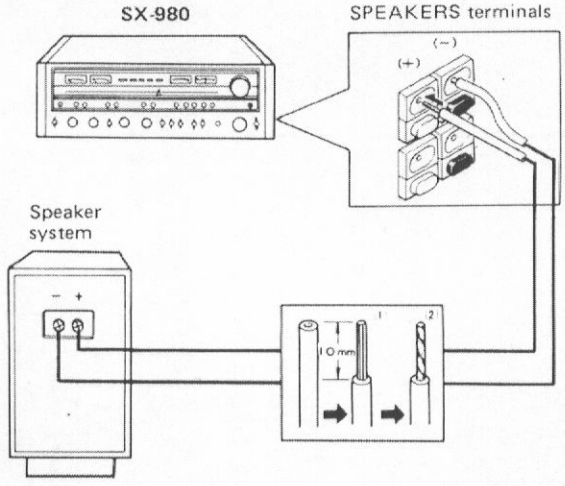


Fig. 2

NOTES:
1. *The high output power of this receiver requires that the speaker lead wires have an ample current carrying capacity. Use wires with a high capacity and connect them securely. If you use low capacity wires and do not connect them properly, the reproduced sound will be adversely affected and heat generation or short circuits may be caused.*
2. *This receiver delivers a high output power and so make sure that you use speakers with a high allowable input.*

TURNTABLE CONNECTIONS

Connect the output cords of a turntable using a moving magnet (MM) cartridge to the PHONO 1 input jacks. Connect the ground lead of the turntable to the GND terminal on the receiver (Fig. 3).

NOTES:
- *In addition to turntables using MM cartridges, there are others that employ induced magnet (IM), moving iron (MI) and high-output moving coil (MC) cartridges. If you intend to use a turntable with a low-output MC cartridge, always provide a special MC cartridge boosting transformer or head amplifier.*

- *Connect your second turntable to the PHONO 2 input jacks.*
- *If your turntable is fitted with two tonearms, the output cords for each of the tonearms should be connected to the PHONO 1 and PHONO 2 input jacks.*

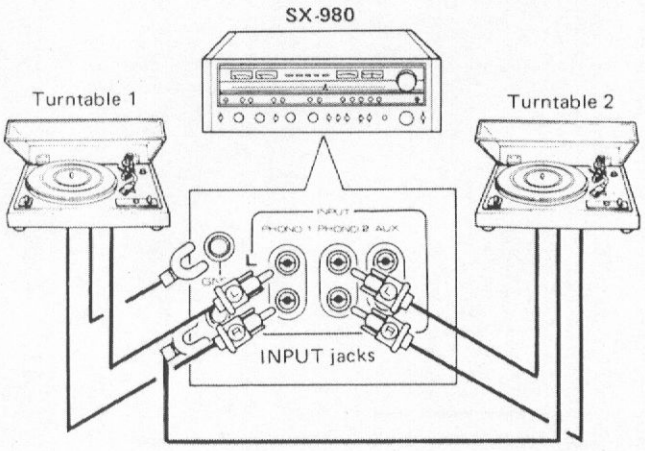


Fig. 3

TAPE DECK CONNECTIONS

The receiver is provided with two sets of recording (TAPE REC) output jacks and two sets of playback (TAPE PLAY) input jacks. Connect each of the jacks in the following way using the connecting cords which come with the tape deck. The upper row of jacks is for the left channel (L) and the lower row for the right channel (R) (Fig. 4).

Connections for recording

Connect the recording input jacks (LINE INPUT) on the tape deck to the TAPE 1 REC jacks on the receiver.

Connections for playback

Connect the playback output jacks (LINE OUTPUT) on the tape deck to the TAPE 1 PLAY jacks on the receiver.

NOTE:
Connect your second tape deck to the TAPE 2 jacks (REC, PLAY).

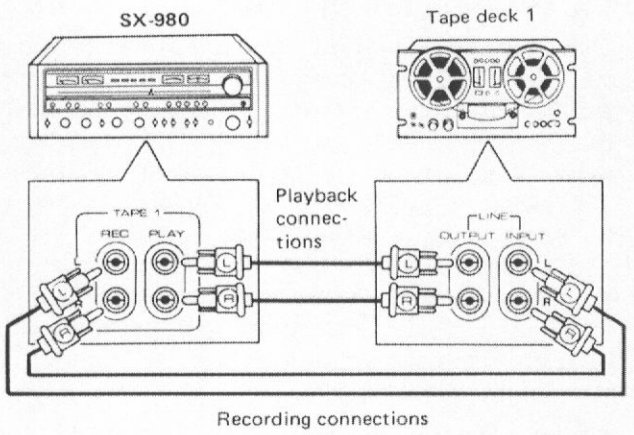


Fig. 4

AC OUTLETS AND POWER PLUGS

Plug the power plug of your audio components into the SWITCHED and UNSWITCHED convenience outlets.

SWITCHED. . . . The power supplied through this outlet is coupled to the operation of the receiver's POWER switch, so when the POWER switch is turned to ON, power is supplied through this outlet and when turned to OFF, power is cut off. For instance, if you connect a turntable to the outlet and keep its power switch at ON, you can turn it on and off by turning the receiver's POWER switch on and off. The maximum power capacity which may be connected to the SWITCHED outlet is 150W.

UNSWITCHED. . Power is always supplied through these two outlets regardless of the position of the POWER switch. The maximum power capacity which may be connected to these two outlets is 200W.

- Never connect an iron or a toaster to these outlets.
- Do not get the power outlets and the power plugs wet of touch them with wet hands since you may get an electric shock.

ANTENNA AND GROUND CONNECTIONS

FM ANTENNA CONNECTIONS

The signals transmitted by an FM broadcasting station inevitably become weak when received behind mountains, between buildings and inside reinforced concrete structures. In weak-signal areas, signals which are reflected off mountains and other obstacles in their path may be picked up by the antenna, which causes a multipath effect. This adversely affects the sound received. This is why it is necessary to choose an antenna and an installation location which are best suited to cope with the ambient conditions and the strength of the signals.

Special FM antennas

It is recommended that you use a special FM antenna in order to obtain input signals which will allow your receiver to display its capabilities to the full.

- When installing your antenna, refer to the instructions in 'FM RECEPTION' on page 13 and determine in which direction the antenna should point for the best reception, all the while listening to a broadcast to check the reception. Mount the antenna securely.
- In accordance with the application of the antenna, use a 75-ohm coaxial cable or a 300-ohm feeder to connect the antenna to the receiver.

75-ohm coaxial cable: As shown in Fig. 5, connect the cable to the 75Ω UNBAL terminal of the receiver. This cable is used in locations near roads with a great deal of traffic, and near overhead high-tension power lines which generate a lot of noise. It is also used when the antenna and the receiver are far apart.

300-ohm feeder: As shown in Fig. 6, connect the feeder to the 300Ω BAL terminals. Use it when there is little external noise and when the antenna and the receiver are not far apart.

NOTE:
Consult your nearest PIONEER dealer concerning the special FM antenna and the 75-ohm coaxial cable.

T-type antenna

When the broadcasting station is located nearby and when the FM signals are strong in wooden frame buildings and others, you can use the accessory T-type antenna (Fig. 6).

As shown in Fig. 6 connect the end of the T-type antenna to the 300-ohm terminal. Spread the two arms of the antenna horizontally and while listening to an FM station, rotate the antenna through 180 degrees and position it for the best reception. Tape the antenna to a wall or ceiling.

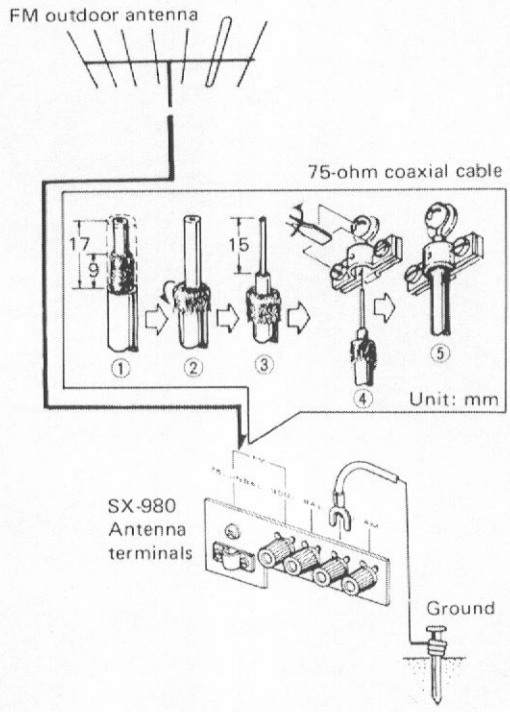


Fig. 5

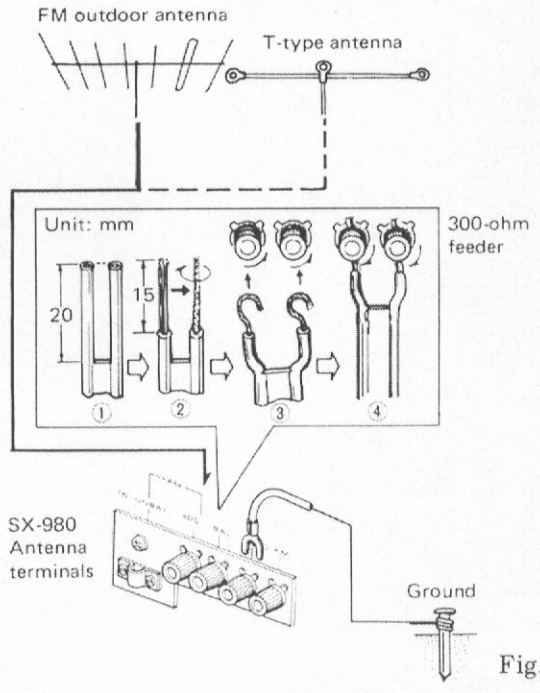


Fig. 6

AM ANTENNA CONNECTION

Move the AM bar antenna on the rear panel of the receiver and find the best reception position, all the while following the instructions outlined on page 13 under 'AM RECEPTION.'

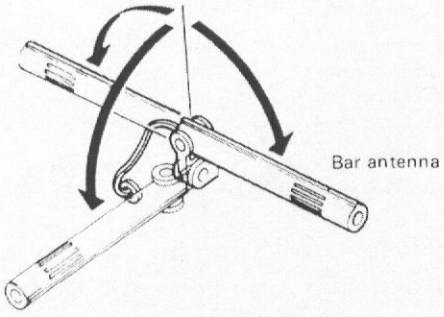


Fig. 7

NOTES:

- *The AM bar antenna on the receiver's rear panel displays directivity and so some stations may be poorly received. In such cases, change the installation direction of the receiver.*
- *If the receiver is installed right up against a wall in a reinforced concrete building, the reception may be adversely affected. Therefore, it is a good idea to erect an indoor AM antenna.*

- If you still cannot obtain good reception even by moving the AM bar antenna, erect an indoor AM antenna with a vinyl insulated wire (about 5–6 meters long). As shown in Fig. 8, connect the lead wire to the AM antenna terminal, and tape it to the wall or ceiling.
- If you live in an area where the reception is poor even if you erect an indoor AM antenna, use a tree to erect an outdoor AM antenna with a vinyl insulated wire (Fig. 8).

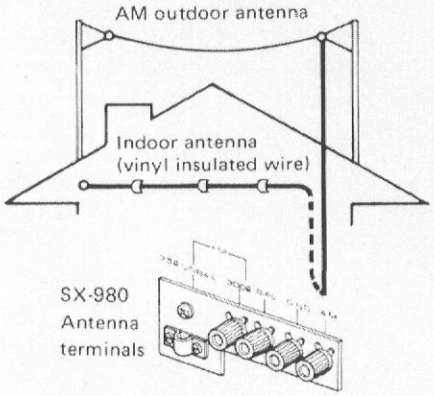


Fig. 8

GROUNDING

As shown in Figs. 5 & 6, connect a ground wire to the GND terminal on the receiver for maximum safety and noise reduction. Never make this connection near gas pipes and other potentially dangerous locations.

FM ANTENNA LOCATION

It is important to choose with care the locations where you will install your FM antenna for the stable reception of the signals from FM broadcasting stations and for superior sound reproduction. Bear in mind the following points and determine the optimum location (height and direction).

1. The ideal place for the antenna is somewhere where it can pick up the signals transmitted from the FM broadcasting station antenna directly. Locations where these signals cannot be picked up directly because of obstacles in their path or because the receiver's antenna is located in a low building surounded by higher buildings, are affected by the multipath effect caused when signals are reflected off these obstacles or buildings. In such places, the sound will be distorted and the separation between the left and right channels will deteriorate.
   Choose a height and a direction for the antenna where the multipath effect will be minimal.
2. Erect your antenna as far away as possible from roads so that there is no interference from automobile ignition noise, and also from high-tension power lines and neon signs.
3. Keep your antenna at least two meters away from sheet-metal roofs, concrete buildings and TV antennas.

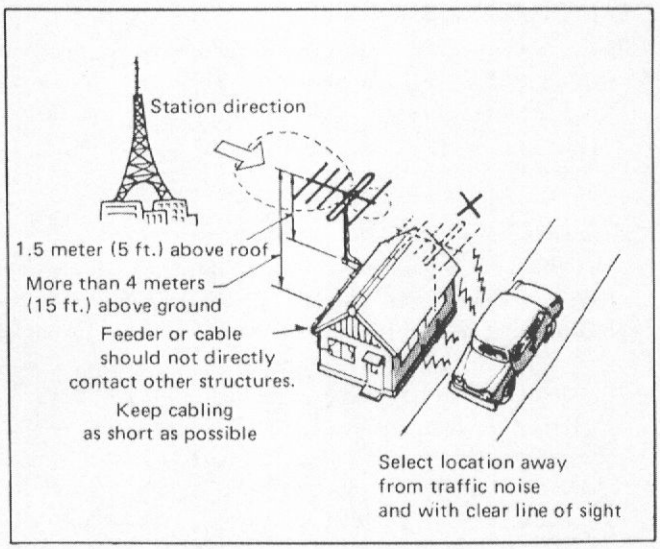


Fig. 9

FRONT PANEL FACILITIES

POWER SWITCH

Flip this switch to the ON position to supply power to the stereo receiver. There will be a short delay when it is set to ON, because the muting circuit has been actuated to suppress the unpleasant noise that is sometimes generated when the power is switched on and off.

PHONES JACK

Plug the headphones into this jack when you want to listen through your stereo headphones.
Release both SPEAKERS buttons if you want to listen to the sound through your headphones only. (This means that both buttons will be released).

POWER METERS

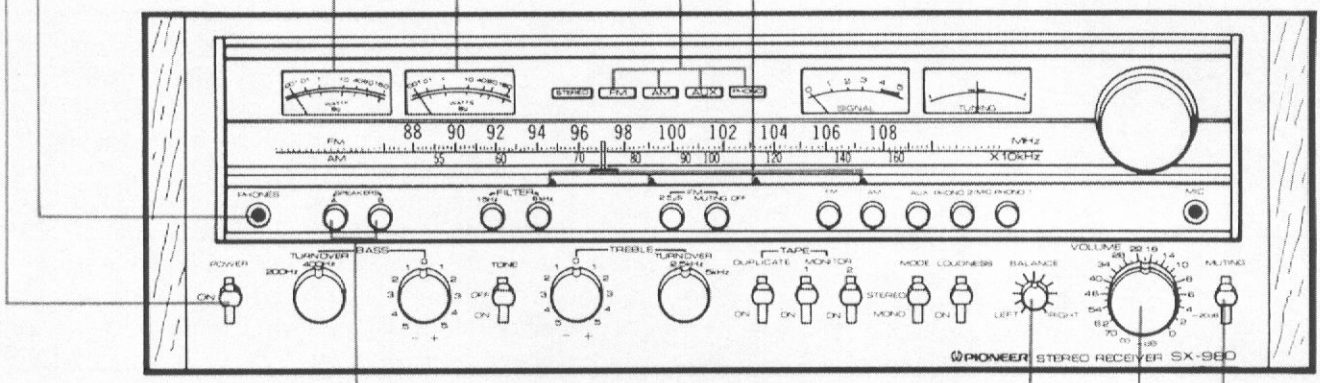
These power meters allow you to read out the rated power level when speakers with a nominal impedance of 8 ohms are connected to the receiver's speaker terminals.

NOTE:
These values are related to the impedance of the speakers and they vary according to the frequency. In order to find out the exact output level, connect an 8-ohm dummy load instead of the speakers.

FUNCTION INDICATOR

MEMORY MARKERS

These are very convenient for frequent tuning in to the same broadcasting station.



SPEAKERS BUTTONS

Press the button corresponding to the speakers connected to the SPEAKERS terminals (A or B) on the rear panel. You can press both of these buttons to listen to sound from two pairs of speaker systems at the same time.

BALANCE CONTROL

Use this control to balance the volume of the left and right channels. First, however, set the MODE switch to MONO, and adjust so that the sound appears to come from somewhere exactly between the two speakers. If the sound appears to be louder on the right, it means that the volume of the right channel is higher. Turn the BALANCE control to the left and adjust. Conversely, if the sound appears to be louder on the left, it means that the volume of the left channel is higher. Therefore, turn the BALANCE control to the right and adjust. After adjusting, return the MODE switch to STEREO.

MUTING SWITCH

Set this switch to the −20dB position to attenuate the audio output indicated by the VOLUME control by 20dB. There is no need to adjust the VOLUME control if you use this switch when turning down the audio output temporarily and when changing over records or tapes. For further details, refer to page 15.

VOLUME CONTROL

Use this control to adjust the output level to the speakers and headphones. Turn it clockwise to increase the output level. No sound will be heard if you set it to ∞. The scale is graduated in dB which indicate the attenuation when the maximum output level is 0dB.

TONE SWITCH

Set this switch to ON when adjusting the BASS and TREBLE controls. In the OFF position, it causes the amplifier to operate with a flat frequency response.

FUNCTION BUTTONS

Press the function button which corresponds to the program source. Turn the VOLUME control down first before selecting a different function button while the sound from one program source is being reproduced.

FM . . . . . Press this button for FM broadcasts. The FM STEREO indicator lights up when the receiver is tuned into an FM stereo broadcast. The sound is automatically received monophonically during FM monophonic broadcasts.

AM . . . . . Press this button for AM broadcasts.

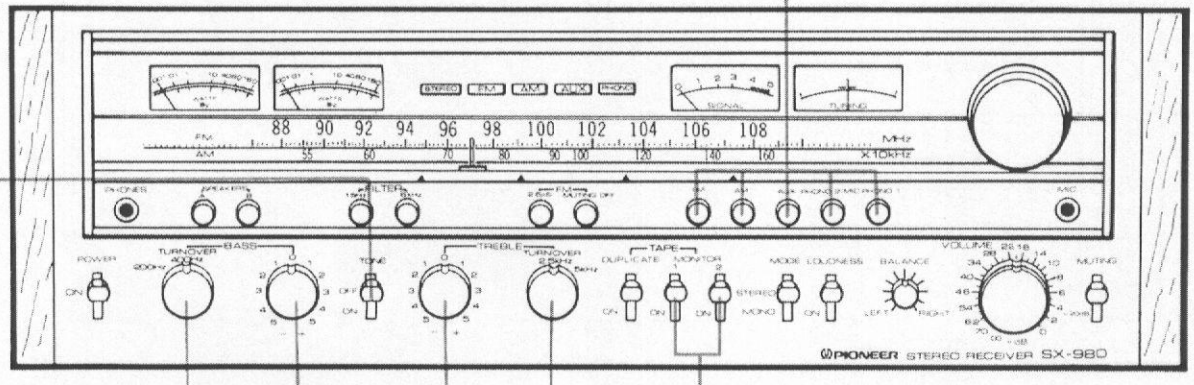
AUX . . . . . Press this button when listening to an audio component connected to the AUX input jacks.

PHONO 2/MIC . . Press this button when playing a record on the turntable connected to the PHONO 2 jacks, or when using a microphone which you have plugged into the MIC jack.

PHONO 1 . . . . . Press this button when playing a record on the turntable connected to the PHONO 1 jacks.

NOTES:

1. *Unplug the microphone from the MIC jack when you do not intend to use the microphone otherwise you will not be able to use the PHONO 2 jacks.*
2. *Only one function button should be pressed at a time.*



BASS AND TREBLE CONTROLS

Use these controls to adjust the bass and the treble. If you set the TONE switch to ON and turn the BASS control to the right from its center position, you will be able to emphasize the sound in a frequency range which is lower than that selected by the BASS TURNOVER switch. Conversely, turning this control from the center position to the left will attenuate the sound.

You can use the TREBLE control to adjust the sound in a frequency higher than that selected by the TREBLE TURNOVER switch. For further details, refer to "TURNOVER SWITCHES" on page 15.

BASS TURNOVER SWITCH

Use this switch to change over the frequency at which the sound adjustment with the BASS control is starting to take effect. Select 200Hz or 400Hz in accordance with the characteristics of your listening room and of your speakers, and with your general preference.

TAPE MONITOR SWITCHES (1, 2)

Set switch 1 to ON with a tape deck which is connected to the TAPE 1 jacks (REC and PLAY) when you want to monitor the playback or recording of a tape. The tape on a deck which is connected to the TAPE 2 jacks (REC and PLAY) can be similarly monitored by setting switch 2 to ON. For further details, refer to "TAPE DECK OPERATIONS" on page 16.

NOTE:

Set these switches to the upper (off) position when listening to records or a broadcast.

TREBLE TURNOVER SWITCH

Use this switch to change over the frequency at which the sound adjustment with the TREBLE control is starting to take effect. Select 2.5kHz or 5kHz in accordance with the characteristics of your listening room and of your speakers, and with your general preference.

TUNING METER

When tuning in to an FM station, the optimum reception position is indicated when the meter pointer deflects to dead center. Check that the SIGNAL meter pointer has deflected as far to the right as possible.

SIGNAL METER

When tuning in to an AM or FM station, the optimum reception position is indicated by the maximum deflection of the meter pointer to the right.

FM MUTING BUTTON

ON (released position) . . . Release this button to suppress unpleasant inter-station noise when tuning between FM stations.

OFF (depressed position) . Depress this button to pick up weak stations.

MIC JACK

Plug your microphone into this jack.

The microphone signals are reproduced in mono through the left and right speakers.

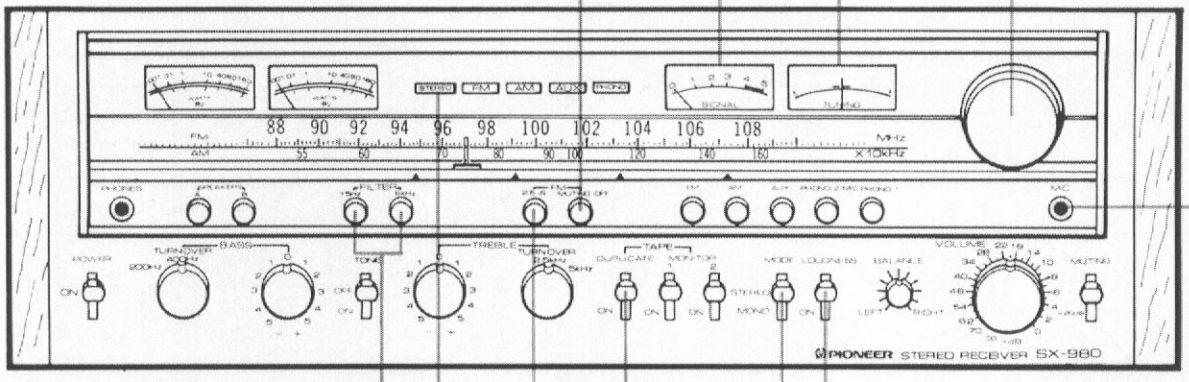
NOTE:

A high impedance (approx. 50 kilohms) dynamic type microphone with a standard plug can be connected to this jack.

TUNING KNOB

Use this to tune in to broadcasting stations.

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



STEREO INDICATOR

This indicator lights up when the receiver is tuned to receive a stereo broadcast.

FILTER BUTTONS

15Hz . . When this button is pressed, a 6dB/oct attenuation can be provided for frequencies below 15Hz. This means that you can cancel out noise in the ultra-low frequencies which is generated by low-pitched rumble from a turntable and other forms of distortion. Although this noise cannot be heard, it can generate intermodulation distortion and damage the speakers.

6kHz . . Press this button to provide a 6dB/oct attenuation at frequencies above 6kHz. Set it to this position when you find high-frequency noise, such as that from scratched records, unpleasant.

FM 25μs BUTTON

Press this button when listening to a Dolby* FM broadcast; otherwise keep this button at the released position. For further details, refer to page 15.

LOUDNESS SWITCH

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

MODE SWITCH

Use this switch for selecting mono or stereo performances.

STEREO: Set to this position for normal stereo operation.

MONO: When set to this position, the left and right channel signals will be mixed and reproduced monophonically from both speaker systems.

TAPE DUPLICATE SWITCH

Set this switch to ON when you want to duplicate or edit a pre-recorded tape using two tape decks. For further details, refer to "TAPE DECK OPERATIONS" on page 16.

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

PRIOR TO SWITCHING POWER ON

Before switching the power on, set the various controls as follows:

1. Set the two FILTER buttons to the released positions.
2. Press the SPEAKERS button that corresponds to the speaker system which is connected to the SPEAKERS terminals on the rear panel.
3. Set the FM 25μs button to the released position.
4. Set the FM MUTING button to the released position (ON).
5. Set the VOLUME control to the ∞ position.
6. Set the BALANCE control to the center position.
7. Set the MODE switch to STEREO.
8. Set the TAPE MONITOR switches to the upper positions (OFF).
9. Set the DUPLICATE switch to the upper position (OFF).
10. Set the TONE switch to OFF.
11. Set the MUTING switch to the upper position (OFF).

PROTECTION CIRCUIT

For some 6 to 10 seconds after the receiver is switched ON, no sound will be heard. This is due to the operation of protection circuits which are designed to safeguard transistors and speakers from possible damage due chiefly to switching transients, etc. Should the receiver remain silent for considerably longer than this, switch off and check the speaker system connections. Should the receiver suddenly go silent while you are listening to it, and a continuous series of "clicks" can be heard from relay contacts opening and closing within the receiver, this can be an indication of a short circuit in the speaker system connections. Switch off, and re-check the speaker system impedances, etc. The protection circuit re-sets itself automatically, so that normal operation is resumed as soon as the fault is corrected.

FM RECEPTION

1. Depress the FM function button.
2. Slightly turn the VOLUME control clockwise direction to obtain the sound.
3. Select the broadcasting station with the tuning knob. Adjust so that the signal meter pointer deflects as far to the right as possible and the tuning meter pointer is centered, as indicated in Fig. 10.
   - Press the FM MUTING button if the signals from the station are weak.
   - If the program is being broadcast in stereo, the STEREO indicator will come on.
4. Adjust the volume with the VOLUME control.
5. To adjust the tone, first set the TONE switch to ON, and then adjust the BASS and TREBLE controls for the preferred bass and treble levels.

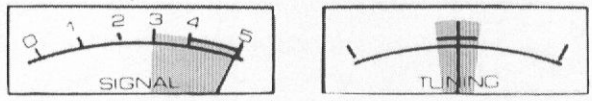


Fig. 10

AM RECEPTION

1. Depress the AM function button.
2. Slightly turn the VOLUME control clockwise direction to obtain the sound.
3. Turn the tuning knob to select a station. The best reception is obtained when the signal meter pointer deflects to the extreme right (see Fig. 11).
4. Adjust the volume with the VOLUME control.
5. To adjust the tone, first set the TONE switch to ON, and then adjust the BASS and TREBLE controls for the preferred bass and treble levels.

Fig. 11

NOTE:
If, when listening to either an FM or AM broadcast, your listening pleasure is seriously affected by poor sensitivity or strong interference, refer to the section "ANTENNA AND GROUND CONNECTIONS" on page 8, and make any necessary changes.

PLAYING RECORDS

1. If your turntable is connected to the PHONO 1 input jacks, depress the PHONO 1 function switch. If it is connected to the PHONO 2 input jacks, depress the PHONO 2 function switch.
2. Operate the turntable to play the record.
3. Adjust the volume with the VOLUME control.
4. To adjust the tone, first set the TONE switch to ON, and then adjust the BASS and TREBLE controls for the preferred bass and treble levels.

Precautions when playing records

- Lower the stylus gently onto the surface of the record. It is a good idea to set the MUTING switch to −20dB or to turn the volume down when lowering the stylus onto the record.
- Depress the 15Hz button if there is a great deal of noise or if the speaker cone paper is seen to be moving despite the fact that you cannot hear the sound during a performance.
- Do not cause the turntable to vibrate while a record is being played since this will cause the stylus to jump and scratch the record. Do not turn off the power if the stylus is still tracing grooves on the record.

USING THE MICROPHONE

1. Connect the microphone to the MIC jack.
2. Depress the PHONO 2/MIC function button.
3. Adjust the sound level by turning the VOLUME control gradually to the right.

NOTES:

1. *Under certain conditions, microphones are liable to give rise to howl or feedback noise. Take care not to raise the volume too much when the microphone is close to the speaker systems or in a room with a great deal of resonance. It is a good idea to set the BASS and TREBLE controls to their center positions or switch the TONE switch to the OFF position.*
2. *You cannot use the microphone to perform mixing operations with other program sources.*
3. *You should unplug the microphone jack when not using the microphone, otherwise you cannot use the turntable connected to PHONO 2 jacks.*
4. *You should use high impedance (above 20 kilohms) microphones of the dynamic type, with standard 6mm diameter phones plug.*

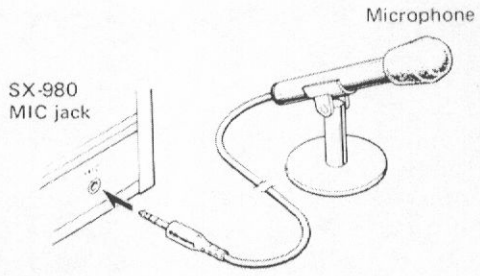


Fig. 12

USING THE AUX JACKS

You can connect an 8-track cartridge tape player, TV tuner, second tuner or tape deck playback output to these jacks. (See Fig. 13).

PROCEED AS FOLLOWS:

1. Depress the AUX function button.
2. Operate the audio component which you have connected to the AUX jacks.
3. Adjust the volume with the VOLUME control.
4. To adjust the tone, first set the TONE switch to ON, and then adjust the BASS and TREBLE controls for the preferred bass and treble levels.

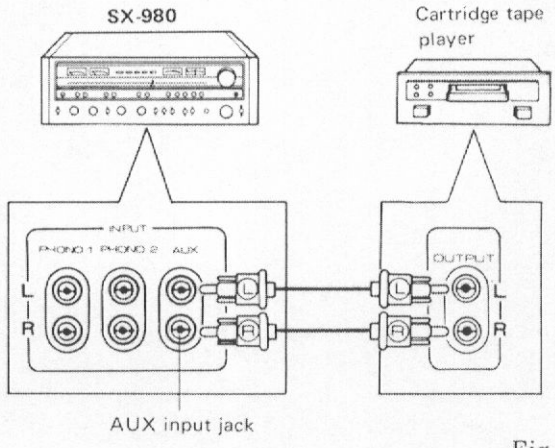


Fig. 13

EFFECTIVE OPERATION

TURNOVER SWITCHES

As shown in Fig. 14, the receiver adopts a tone control system that combines the BASS and TREBLE controls with two TURNOVER switches which are used to select the frequency. Select the frequency with the TURNOVER switches and then enhance or attenuate the sound in the lower (or higher) frequencies with the BASS (or TREBLE) controls.

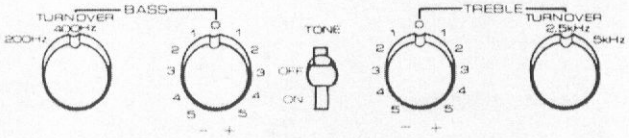


Fig. 14

For instance, if the BASS TURNOVER switch is set to 400Hz (see Fig. 15), the bass covers a wide frequency spectrum and can be enhanced (or reduced) with large gain per step of the BASS control. For this reason, the reproduced sound sometimes seems unnatural depending on the program source, but this can be remedied by setting the switch to 200Hz.

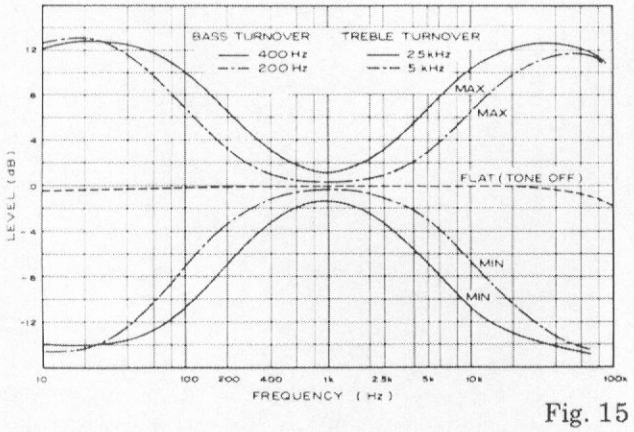


Fig. 15

VOLUME CONTROL AND MUTING SWITCH

The VOLUME control scale is directly calibrated in dB. By adjusting it in combination with the MUTING switch, it is possible to adjust the attenuation more finely across a very wide range. The attenuation (volume) is equal to the VOLUME control indication plus 20dB.

- One convenient application of the MUTING switch is for temporarily reducing the volume while changing records, tapes or for other applications. This eliminates the need for continual re-adjustment of the VOLUME control.
- With late-night listening or at other times when low volumes are used, precise adjustment becomes difficult when the VOLUME control is near the ∞ position. In these cases, it is convenient to first set the MUTING switch to −20dB and then adjust the VOLUME control.

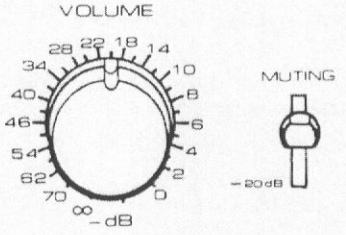


Fig. 16

RECEPTION OF FM DOLBY BROADCASTS

If you live in an area where you can receive FM Dolby broadcasts, you can listen in if you connect an optional Dolby adaptor to the TAPE 2 jacks.

1. Connect the Dolby adaptor to the TAPE 2 jacks (REC, PLAY), as shown in Fig. 17.
2. Depress the FM 25μs button.
3. Set the TAPE MONITOR 2 switch to ON.
4. Operate the Dolby adaptor.
5. Depress the FM function button and tune in to the Dolby broadcast with the tuning knob. For reception, refer to "FM RECEPTION" since the procedure is the same.

NOTES:

- *For detailed instructions on connections and the handling of the Dolby adaptor, refer to its operating instructions.*
- *When you are not listening to an FM Dolby broadcast, return the FM 25μs button and the TAPE MONITOR 2 switch to their original positions.*

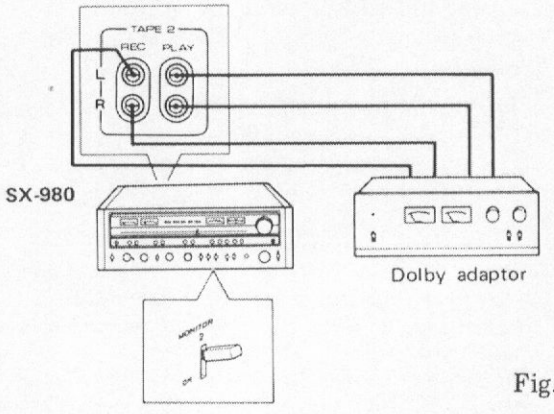


Fig. 17

TAPE DECK OPERATIONS

PLAYBACK

Proceed as follows when playing back pre-recorded music tapes available on the open market, and tapes on which you have recorded programs:

1. As shown in Fig. 18, set the TAPE MONITOR switch 1 to ON if the tape deck is connected to the TAPE 1 jacks. Set the TAPE MONITOR switch 2 to ON if it is connected to the TAPE 2 jacks.
2. Operate the tape deck controls for playback.
3. Adjust the volume with the VOLUME control.
4. To adjust the tone, first set the TONE switch to ON, and then adjust the BASS and TREBLE controls for the preferred bass and treble levels.

NOTES:

1. Always return the TAPE MONITOR switch to the upper position (OFF) when you are not playing back a tape.

2. As long as the TAPE MONITOR switch 1 or 2 is at ON, you will be able to play back a tape regardless of the setting of the function buttons.

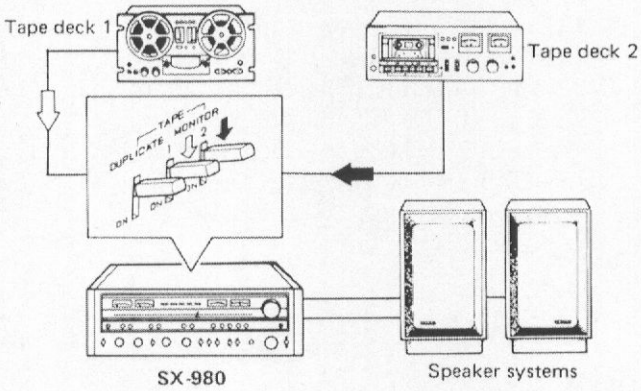


Fig. 18

RECORDING

1. Press the function button that corresponds to the program source which you intend to record (for example, a record off a turntable or an FM broadcast).
2. Set the DUPLICATE switch to OFF (upper position).
3. Play the selected program source.
4. Operate the tape deck controls and start recording.

NOTES:

1. When recording, keep the MODE switch at STEREO.

2. Adjust the recording level with the tape deck's recording level controls.

3. The receiver's VOLUME, BASS and TREBLE controls have no affect on the recorded sound when a recording is being made.

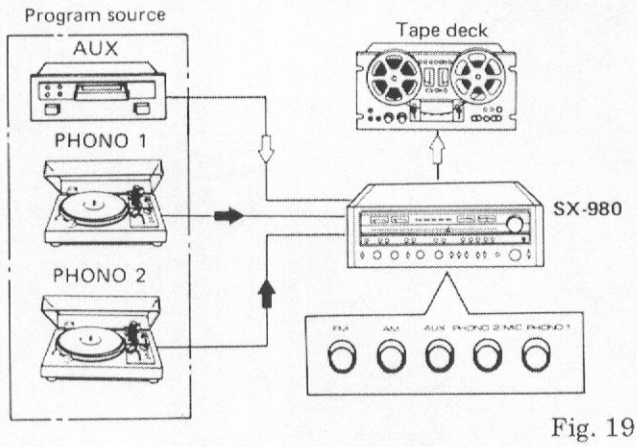


Fig. 19

Tape monitoring

If a recording is being made on a 3-head tape deck, the recorded sound can be monitored through the speaker systems if the TAPE MONITOR switch 1 or 2 is set to ON. In this case, both recording and playback connections must be made.

NOTE:

If you have a 2-head open-reel deck or cassette deck, you will not be able to monitor the recorded sound even if you set the TAPE MONITOR switch to ON. However, you will be able to hear the sound at the playback end (program source).

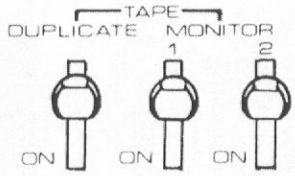


Fig. 20

Duplicating and editing recorded tapes

If you have two tape decks, a recording of, say, a complete FM broadcast can be made and then those items that you want for your permanent 'tape library' can be selected and re-recorded onto another tape. It is also possible to duplicate tapes from an open-reel tape deck onto a cassette tape deck.

1. As shown in Fig. 21, connect the tape decks to the receiver's TAPE 1 and TAPE 2 jacks.
2. Set the DUPLICATE switch to ON.
3. Play back the recorded tape on tape deck 1 and record it on tape deck 2. It is also possible to play the tape back on tape deck 2 and record it on tape deck 1.
4. Set the TAPE MONITOR switch 1 or 2 to ON when you want to monitor the recorded sound.

- Do not set both tape decks to the recording mode at the same time.

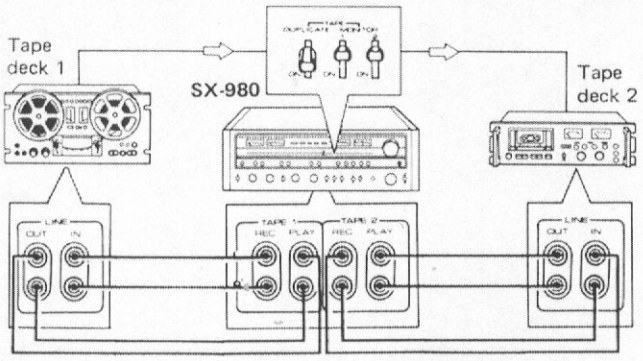


Fig. 21

USING PREAMP OUT AND POWER AMP IN JACKS

If the connections between the PREAMP OUT and POWER AMP IN jacks are removed (see Fig. 22), it is possible to use the preamplifier section and the power amplifier section independently. However, for normal use always keep these connections in place since once you remove them, no sound will be heard through the speakers. Always set the POWER switch to OFF when removing or replacing these connections.

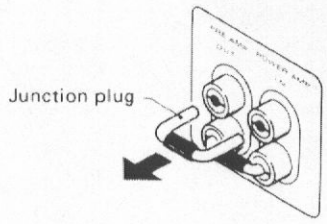


Fig. 22

INDEPENDENT PREAMPLIFIER SECTION

As shown in Fig. 23, you can connect a high output power stereo power amplifier or a home-built power amplifier to the PREAMP OUT jacks and compare the sound with the power amplifier section of the stereo receiver.

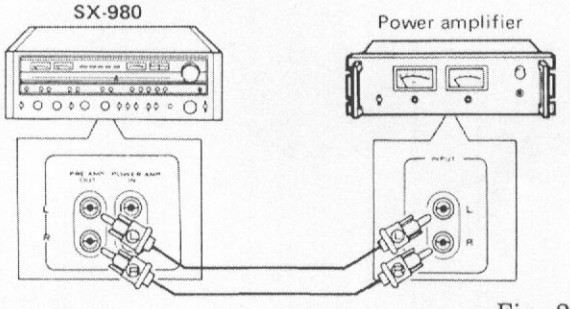


Fig. 23

INDEPENDENT POWER AMPLIFIER SECTION

As shown in Fig. 24, you can connect a stereo amplifier which you may have to the POWER AMP IN jacks and compose your own stereo system.

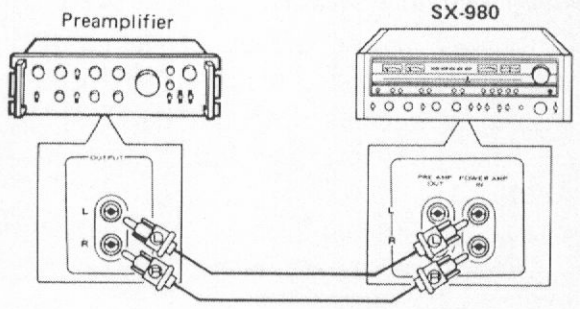
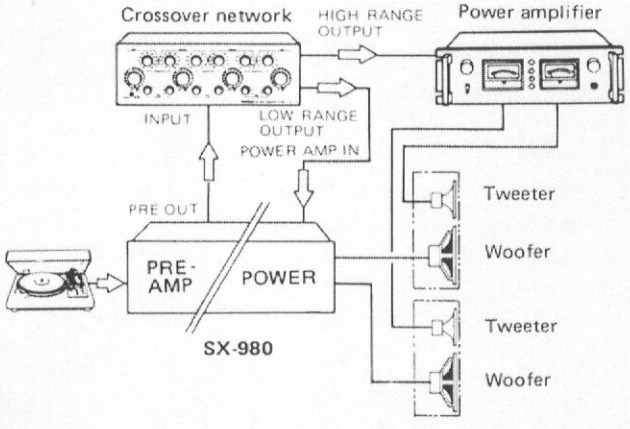


Fig. 24

COMPOSING A MULTI-AMPLIFIER SYSTEM

As shown in Fig. 25, you can compose your own multiamplifier system if you connect an optional stereo power amplifier and crossover network. A multi-amplifier system splits up the audible frequency range into different frequency bands. Each of these bands is then amplified by the amplifiers and so this has the advantage of reducing intermodulation distortion.



2-way multi-amplifier system

Fig. 25

SPECIFICATIONS

Semiconductors

FETs 3
ICs 8
Transistors 35
Diodes 45

Power Amplifier Section

Continuous power output of 80 watts* per channel, min., at 8 ohms or 100 watts* per channel at 4 ohms from 20 Hertz to 20,000 Hertz with no more than 0.05% total harmonic distortion.

Total Harmonic Distortion (20 Hertz to 20,000 Hertz)
  Continuous Rated Power Output . .No more than 0.05%
  40 watts per channel power
    output, 8 ohms . . . . . No more than 0.02%
  1 watt per channel power
    output, 8 ohms . . . . . No more than 0.02%
Intermodulation Distortion (50 Hertz: 7,000 Hertz = 4:1)
  Continuous Rated Power Output . .No more than 0.05%
  40 watts per channel power
    output, 8 ohms . . . . . No more than 0.02%
  1 watt per channel power
    output, 8 ohms . . . . . No more than 0.02%
Frequency Response . . . 5 Hertz to 100,000 Hertz $^{+0}_{-1.5}$dB
Input Sensitivity/Impedance
  POWER AMP IN . . . . . 1V/50 kilohms
Output
  SPEAKERS . . . . . A, B, A+B
Damping Factor
  (20 Hertz to 20,000 Hertz, 8 ohms) 30
Hum and Noise (IHF, short-circuited, A Network) . . 100dB

Preamplifier Section

Input (Sensitivity/Impedance)
  PHONO 1, 2 . . . . . 2.5mV/50 kilohms
  MIC . . . . . 7.5mV/50 kilohms
  AUX . . . . . 150mV/50 kilohms
  TAPE PLAY 1 . . . . . 150mV/50 kilohms
  TAPE PLAY 2 . . . . . 150mV/50 kilohms
PHONO Overload Level (1kHz; T.H.D.: 0.05%)
  PHONO 1, 2 . . . . . 200mV
Output Level/Impedance
  TAPE REC 1 . . . . . 150mV
  TAPE REC 2 . . . . . 150mV
  PREAMP OUT . . . . . 1V/1 kilohms
Total Harmonic Distortion
  (20Hz to 20,000Hz, 1V output) . . .No more than 0.05%
Frequency Response
  PHONO(RIAA equalization) .20Hz to 20,000Hz ±0.2dB
  AUX, TAPE PLAY . . . . . 5Hz to 100,000Hz $^{+0}_{-3}$dB
Tone Control
  BASS . . . . . ±7dB/±10dB (100Hz)
    Turnover Frequency 200Hz/400Hz
  TREBLE . . . . . ±7dB/±10dB (10kHz)
    Turnover Frequency 5kHz/2.5kHz
Filter
  LOW 15Hz (6dB/oct.)
  HIGH 6kHz (6dB/oct.)
Loudness Contour (Volume control set
  at −40dB position) . . . . +6dB (100Hz), +3dB (10kHz)
Hum and Noise
  (IHF, short-circuited, A Network)
  PHONO 76dB
  AUX, TAPE PLAY 90dB
Muting . . . . . −20dB

FM Tuner Section

Usable Sensitivity
  MONO 9.8dBf (1.7μV)
50dB Quieting Sensitivity
  MONO 14.2dBf (2.8μV)
  STEREO 37dBf (39μV)
Signal-to-Noise Ratio
  (at 75dBf) . . STEREO 74dB
  (at 65dBf) . . MONO 80dB
    STEREO 71dB
Distortion (at 65dBf)
  100Hz MONO/STEREO 0.1%/0.2%
  1kHz MONO/STEREO 0.1%/0.15%
  6kHz MONO/STEREO 0.1%/0.2%
Frequency Response . . . . . 30Hz to 15,000Hz ±0.5dB
Capture Ratio 1.0dB
Alternate Channel Selectivity 80dB
Spurious Response Ratio 100dB
Image Response Ratio 90dB
IF Response Ratio 100dB
AM Suppression Ratio 55dB
Muting Threshold 19.2dBf (5μV)
Stereo Separation . . . 50dB (1kHz), 35dB (30Hz − 15kHz)
Subcarrier Product Ratio 65dB
SCA Rejection Ratio 65dB
Antenna Input . . . . . 300 ohms balanced
    75 ohms unbalanced

AM Tuner Section

Sensitivity (IHF, Ferrite antenna) 300μV/m
(IHF, Ext. antenna) 15μV
Selectivity 30dB
Signal-to-Noise Ratio 50dB
Image Response Ratio 40dB
IF Response Ratio 40dB
Antenna . . . . . Built-in Ferrite Loopstick Antenna

Miscellaneous

Power Requirements 120V 60Hz
Power Consumption . . . . . 260W (UL), 560VA (CSA)
800W (max.)
Dimensions . . . . . 526(W) x 176(H) x 440(D) mm
21-11/16(W) x 6-15/16(H) x 17-5/16(D) in
Weight Without Package 18.8kg (41lb 6oz)
With Package 21.7kg (47lb 12oz)

Furnished Parts

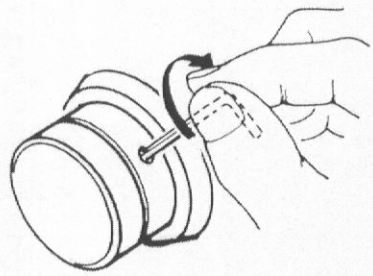
FM T-type Antenna 1
Operating Instructions 1
Hex. Wrench 1

**Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifiers.*

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

HEX WRENCH

The accessory hexagonal wrench is provided for removing the TUNING knob and VOLUME knob or tightening their set screws should they become loose.
If required, loose the set screw by inserting the wrench into the hole on the side of the knob and turning the wrench counter-clockwise. Be particularly careful not to scratch the front panel when employing the wrench.



CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

If your stereo appears to malfunction, first check such things as the controls (power switch, function selector, tape monitor, etc.) and connecting cords (components connected correctly).

Noise: There are a variety of noises relating to the operation of a hi-fi unit. These are generally divided into two types; (1) the unit is faulty (a transistor or part has deteriorated) and (2) an external source is adding to the unit.

When a hi-fi unit produces an unpleasant noise, it is often assumed that the unit is faulty, but statistical records indicate that the majority of noises produced in hi-fi acoustic units result from external sources of noise: Due to the inherent high sensitivity and the high fidelity in reproduction, the unit amplifies and reproduces extraneous noises, however small, into audible output noise. If your receiver produces a noise, check according to the following table and trace out the source of noise for the appropriate corrective action.

	Symptom	Suspected source of noise	Diagnosis and remedy
When listening to broadcasts	Continuous or intermittent buzzing noise.	• Static (lightning) • Fluorescent lamp, motor, or thermostat may be in use in house or in the vicinity of the house.	In many cases, it is very difficult to remove the source of noise. In order to make the radio input larger than the noise level, set up a good outdoor antenna and make a complete grounding.
	When a station is tuned in, hum is mixed in the program.	• Poor fluorescent lamp, motor, or electric heater may be in use in house or near the house.	Reversing the line plug may occasionally alleviate this noise problem. Usually it is very difficult to eliminate the noise.
	Hissing sound noise in AM (medium wave) reception.	• The frequency of an adjacent station is interfering with that of the station being tuned in (10kHz beat interference). • TV set is on in the same house with the receiver.	Impossible to remove such interference. If the cause of such noise is the TV set, increase the distance between the TV set and receiver.
	Static noise (in particular, when automobiles run close to the house).	• White noise generated from automobile engines. • High frequency sewing machine or welding machine being used near your house.	In an area surrounded by hills or high buildings, the FM input signals are very weak. Thus the noise limiter in the circuit loses its function. Set up an FM outdoor antenna having many director elements.
	Reception of FM stereo program contains more noise than FM mono program.	• Note that the service area covered by an FM stereo broadcast is about 50% of that of a regular mono broadcast.	Increasing the FM input signal may alleviate this problem. Use an exclusive FM outdoor antenna instead of the indoor T-type antenna.
When playing records	Hum or buzz. When switched to radio reception, the noise disappears.	• Poor connection of shielded wire. (a) • Jack connection is loose. (b) • Line cord of fluorescent lamp passes near the shielded wire. (c) • Poor grounding. (d) • Ham transmitting station or TV transmitting station is near your house. (e)	Correct the conditions stated in (a), (b), (c) or (d). In case of (e), report it to an official authority.
	Output tone quality is poor and mixed with noise. Treble is not clear.	• Stylus is worn. (a) • Record is worn. (b) • Dust adhering to stylus. (c) • Stylus is improperly mounted. (d) • Stylus pressure is not correct. (e) • The TREBLE level is too high.	Check (a) through (e) and correct the condition. Lower the TREBLE level.
When using microphone	In playing a record, increasing the volume causes howling.	• Distance between the turntable and the speakers is too short. • The turntable or speakers supports are unstable.	Increase the distance or rearrange the installation of the unit and speakers. (Installing the turntable on a firm, solid stand may alleviate this problem.) Do not enhance the BASS sound level excessively.
	Howling occurs	• Feedback between microphone and speakers.	• Keep microphone away from speakers. • Do not set the VOLUME control too high. • Set BASS and TREBLE controls to center positions.

PIONEER ELECTRONIC CORPORATION
4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
U.S. PIONEER ELECTRONICS CORPORATION
85 Oxford Drive, Moonachie, New Jersey 07074, U.S.A.
PIONEER ELECTRONIC (EUROPE) N.V.
Luithagen-Haven 9, 2030 Antwerp, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD.
178-184 Boundary Road, Braeside, Victoria 3195, Australia
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