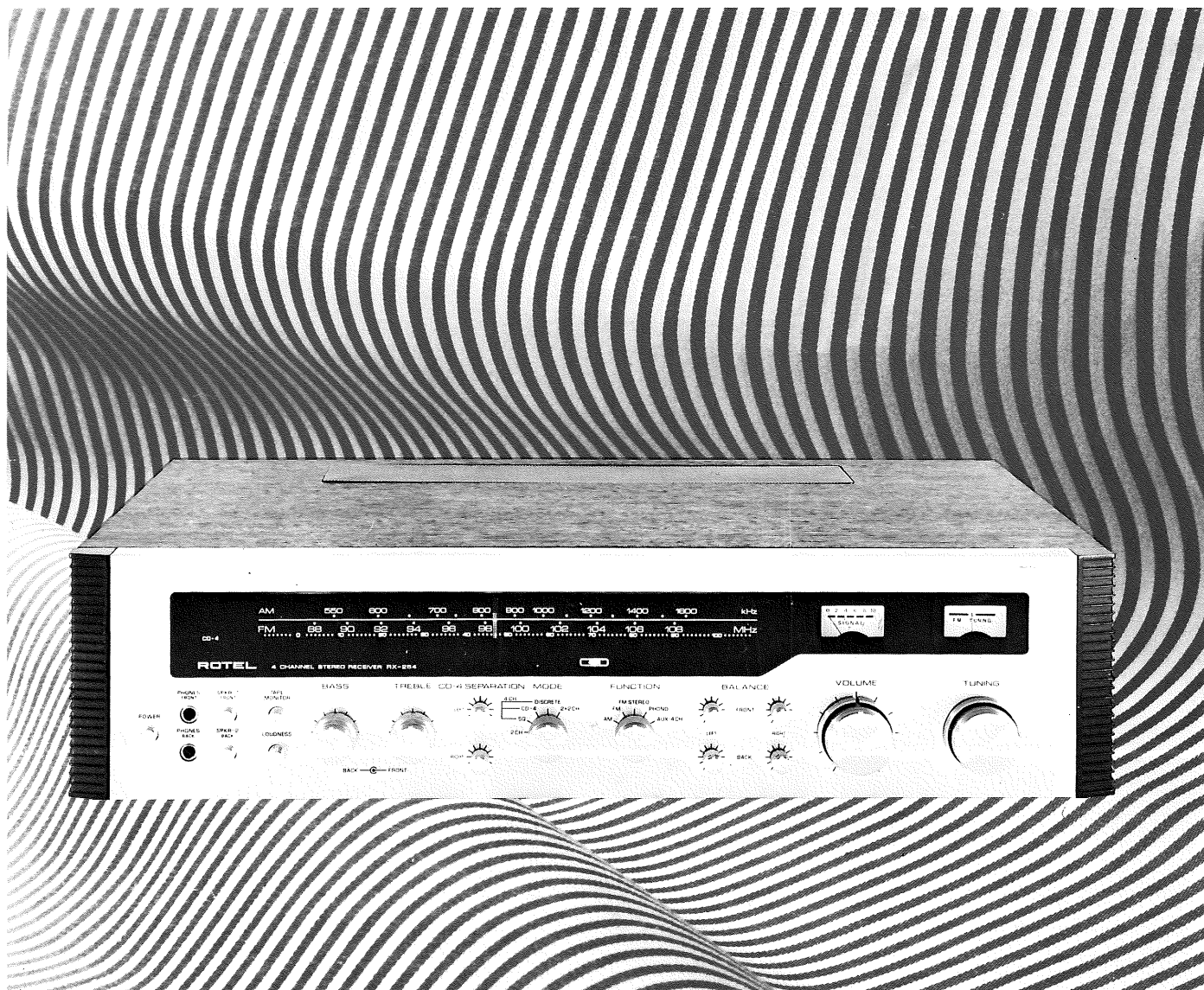


Quality. Uncompromised.

# ROTEL®



## OWNER'S MANUAL

# RX-254

4-CHANNEL STEREO RECEIVER

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## INTRODUCTION

The Rotel Model RX-254 is an entirely new multi-channel receiver that contains, in one compact yet efficiently designed unit, all the advanced electronics of a complete high fidelity music control center.

This receiver will play many program sources through different modes. Besides AM, FM and FM STEREO broadcasts, you can listen to FM matrix-encoded 4-channel by the use of SQ Matrix Circuit built into the receiver. You may enjoy either 2-channel stereo records or 4-channel records that are encoded with SQ Matrix, discrete 4-channel records with CD-4 demodulator circuit built-in, and stereo tapes or discrete 4-channel tapes. Also, if you wish, you may convert regular 2-channel stereo sources to simulated 4-channel sound by the use of SQ Matrix.

This receiver has connections for four speakers necessary

## INSTALLATION

**Warning:** Do not apply power to the receiver without first making sure that speakers are connected properly and that the receiver's VOLUME is set to minimum.

### LOCATING THE RECEIVER

Although the receiver normally does not develop high heat, it should be placed in such a way that its ventilation system will not be impeded. Place that receiver on a hard surface — any conveniently located shelf or table where not affected by heat. Leave at least 2 inches clearance on each side and in the rear of the receiver, and about 3 inches above the receiver. Never directly place an object on the ventilation at the top of the receiver.

### LOCATING SPEAKERS

**Caution:** Check that each speaker's rated impedance is 8 ohms or higher. (The value should be marked near its connecting terminals or indicated in its instruction book or, if not, consult your local dealer). If any speaker is rated at 4 ohms, severe overload and distortion may be incurred. Also when the AMP. COUPLING SWITCH is in the STEREO position, the speaker power ratings should be 30 watts (RMS) and in the QUAD position the four speakers should not be rated less than 15 watts (RMS) each.

for 4-channel operation. However, you may utilize only one pair for 2-channel stereo operation; in this case you may use the other pair as a remote system in another room. And for a further accommodation, Rotel has a specially incorporated system by which you can play the phonograph through the remote pair of speaker systems and a different program through the main pair in the other room at the same time, giving you, in a sense, two 2-channel stereo systems.

Though the above description may sound complicated, the operations are really simple if you read at least the first two sections of this manual. The third section covers additional components that can be connected and the use of auxiliary facilities in detail, and is recommended to be followed if you wish to realize the full potential of this highly advanced and superbly engineered equipment.

### A. 2-CHANNEL (STEREO) OPERATION

**1. MAIN SPEAKERS** There is one speaker for one channel. So, you only need two speakers for 2-channel stereo operation. Place both speakers against a wall or on a shelf so that they face your selected listening position and are equal distance from you. For optimum stereo effect, they should be 10 to 15 feet apart and, if possible, at about ear level height. You may determine best locations to suit your personal tastes and listening conditions. Reference: 4CH FRONT or STEREO SPKR-1 speaker terminals.

**2. REMOTE SPEAKERS** If you wish to enjoy 2-channel stereo sound in another room of your home, you can connect a pair of speakers to the STEREO SPKR-2 terminals located on the receiver's rear panel. Though you will require long cable between the receiver and the speakers in another room, make sure they are not longer than 50 — 60 feet in length and that they are of heavy duty type in order to prevent loss of volume.

Follow the procedure described above in item (1) for placing the remote speakers.

### B. "2 x 2CH" STEREO OPERATION

This is an operation in which you may play any 2-channel stereo function you like through the main speakers, while at the same time someone else enjoys the phonograph program through the remote speakers located in another room. The operating mode is controlled by a switch on the receiver's front panel.

The placement of all speakers is exactly the same as described in section A.

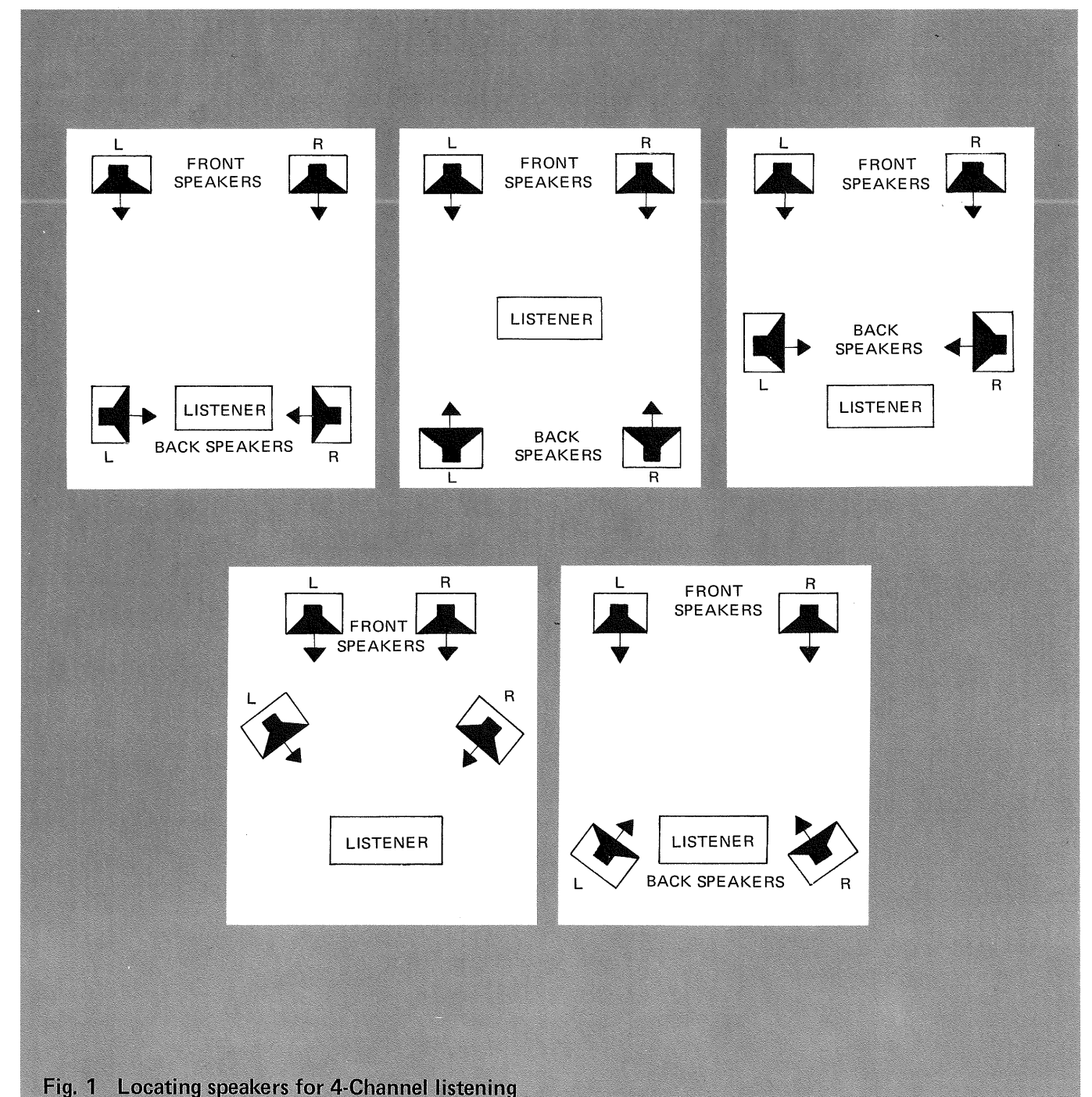
### C. 4-CHANNEL OPERATION

Four speakers will be required in one room in this operation and will be referred to as LEFT and RIGHT, FRONT and BACK.

Place a pair of FRONT speakers in the same manner as described above in the item (1) of 2-CHANNEL (STEREO) OPERATION section.

Placement of the BACK speakers will vary with your room size, seating arrangement and acoustics. When

connecting the speakers to the receiver, make sure you provide allowance on the length of cables as later on you may wish to locate the speakers differently from the original positions. We have suggested several ways of placing the BACK speakers as illustrated in Fig. 1, but you may arrange them in any way to suit your tastes and listening conditions. Try some experimentations to locate optimum position for best sound dispersion and ambience.



SPEAKER CONNECTION

**Caution:** Do not apply power to the receiver until you are sure that speakers are connected properly as described below.

When connecting the speakers, make sure that the bare wires at the ends of each cable do not touch each other or adjacent terminals.

As shown in Fig. 2, the speaker terminals are plastic-head screw types, and are arranged into two boards, one for 4CH FRONT or STEREO SPKR-1 and the other for 4CH

BACK or STEREO SPKR-2 (the nomenclature depends upon whether you wish to operate the receiver in 4-channel or 2-channel stereo). One pair of terminals marked black and red will be used for each speaker.

Connect your right speaker ("right" as seen from your listening position) to the terminal marked RIGHT and your left speaker to the one marked LEFT.

Connect one lead of each speaker cable to its corresponding terminal (red), and another end to the adjacent terminal (black) marked —. Make sure the positive (+)

lead of the speaker is connected to the corresponding black terminal and the ground (—) lead of the speaker to the adjacent black terminal.

It is important to connect each ground lead to the black terminal adjacent to the corresponding red terminal for each speaker. Connecting to any other black terminal may hinder performance of speakers.

**Note:** If necessary, after stripping each end of speaker leads to obtain a bare wire, twist the bare strands together so it will be easy to wrap around the receiver's terminal and also prevent shorting among stray strands.

This switch is marked QUAD on one side and STEREO on the other side. It is set at QUAD position when shipped from our factory. Check the correct setting before you connect the receiver to power source, and leave the switch at QUAD position when using the receiver as a 4-channel unit.

If you plan to operate the receiver as a stereo receiver, slide the switch to STEREO position. In this way the receiver combines its four power amplifiers to two channels, resulting in doubling the power output per channel. The receiver now has the capability of delivering double power to your main speakers and, if desired, to remote speakers as well.

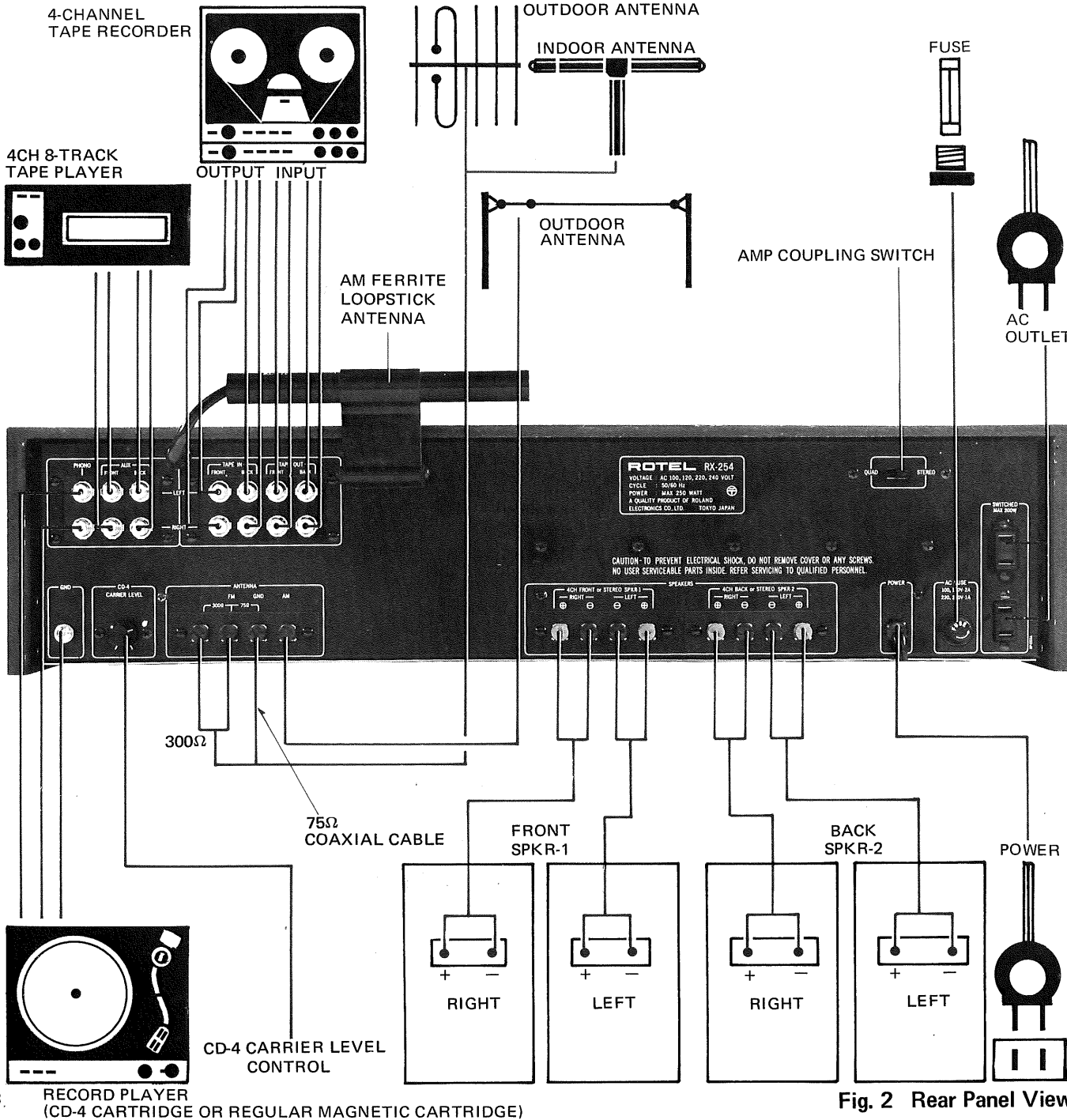


Fig. 2 Rear Panel View

AM ANTENNA CONNECTION

A ferrite-core AM loopstick antenna is affixed to the rear panel of the receiver. For optimum reception swing the loopstick fully out from the rear panel away from the receiver chassis.

If you live in a difficult reception area and the AM loopstick does not give consistent or sufficient reception, an external antenna may be required. There is a terminal post on the rear panel for such antenna connection, so refer to the ANTENNAS section of this manual for installing external antenna.

FM ANTENNA CONNECTION

Due to the high sensitivity of the FM tuner section of the receiver, the 'T'-shape dipole antenna supplied is sufficient for most locations. Connect this to both FM antenna terminal marked 300 ohms, and mount it horizontally, for instance by tacking or taping to the shelf on which the receiver is mounted.

In difficult reception areas, the use of a better indoor antenna or, in some extreme cases, an outdoor antenna may prove necessary. Refer to the ANTENNAS section of this manual for installing external antennas.

COMPONENTS CONNECTIONS

This receiver is designed to handle a record player with magnetic or CD-4 cartridge, a stereo or a discrete 4-channel tape recorder, an additional auxiliary component such as stereo or 4-channel 8-track cartridge player. We recommend that you familiarize yourself with basic operations before connecting any such units. Refer to the ADDITIONAL COMPONENTS section provided in this manual for connections and operations of these components.

AMP. COUPLING SWITCH

**Caution:** This switch located on the rear panel should be used ONLY when you wish to operate the receiver as a stereo receiver. NEVER HANDLE THE SWITCH WHILE POWER IS ON; ALWAYS DISCONNECT FROM POWER SOURCE WHEN MOVING THE SWITCH.

AC OUTLETS

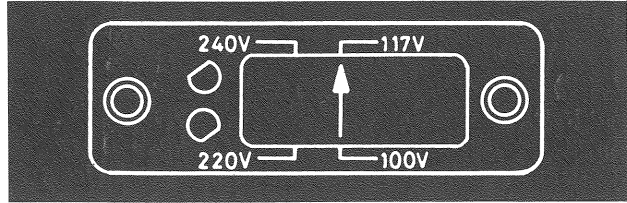
The outlets marked SWITCHED on the rear panel provide power and switching control to whatever component you may wish to connect to the receiver. For example, if you connect the power cord of your record player or changer to one of the outlets, the record player or changer will be activated and deactivated by the power switch on the receiver.

**Caution:** Do not connect components whose total power consumption exceeds 200 watts.

VOLTAGE SELECTION

The amplifier is a variable voltage equipment that can run on 100V, 117V, 220V or 240V power supply. Your unit comes already preset at the proper voltage for use in your area; however, if you move to an area where the power supply voltage is different, the voltage setting can be manually changed. BE SURE THAT YOUR UNIT IS NOT CONNECTED TO THE POWER SOURCE BEFORE ATTEMPTING TO MAKE THIS CHANGE.

To change the voltage setting, remove the cabinet and locate the VOLTAGE SELECTOR (see figure below). Pull up the Voltage Selector plug which has a white arrow on its top. Reinsert the Plug to the Selector Base so that the head of the arrow lines up with the pointer line of the voltage you desire.



CONNECTING TO POWER SUPPLY

Before connecting up ensure that the voltage selector is set correctly for your supply, and a suitable plug fitted. If you need to fit a plug, ensure live, neutral and (where appropriate) earth leads are connected to the proper terminals. Ensure the terminals are screwed down firmly, and no loose strands of wire are present.

## OPERATION

Refer to Fig. 3 for the locations of the switches and the controls of the receiver, and follow the instruction below carefully in order to master complete operation of the receiver. Refer to OPERATION CHART for proper controls, settings, and desired model of operation.

### CONTROLS AND SWITCHES

#### A. PUSH BUTTON SWITCHES

The push button switches used are all of the PUSH/PUSH type; that is push in to activate the circuit and push again to release or deactivate the circuit. In describing these switches we will consider the "in" position to be "ON" and the "out" position to be "OFF".

**1. POWER SWITCH:** performs the function as its name denotes. It supplies power to the receiver and to the switched AC outlets. When the switch is "ON", the dial scale board will be illuminated.

**Note:** If the dial scale board does not light or no sound comes out of speakers, or if the receiver suddenly goes off during normal operation, refer to FUSES section in this manual.

**2. SPEAKERS — SPKR-1/FRONT:** in "ON" position activates the speakers connected to 4CH FRONT or STEREO SPKR-1 speaker terminals on the rear panel, and in "OFF" position deactivates the speakers for such as private listening with headphones. The speakers are referred to as FRONT when in any 4-channel mode and as MAIN when in 2-channel or dual 2-channel mode.

**3. SPEAKERS — SPKR-2/BACK:** operates in the same manner as the above switch, and is used for the speakers connected to 4CH BACK or STEREO SPKR-2 speaker terminals on the rear panel. The speakers are referred to as BACK when in any 4-channel mode and as REMOTE when in 2-channel or dual stereo mode.

**4. TAPE MONITOR SWITCH:** is used in conjunction with a tape recorder connected to the TAPE terminals on the rear panel, and serves a dual function. For playback push "IN" to MONITOR position (in this case, position of settings on the function selector control becomes irrelevant as it is overridden); for recording, if your tape recorder has a separate playback head, setting at MONITOR position will allow you to listen to the program as being recorded (monitoring). Refer to the ADDITIONAL COMPONENTS section for details. Always leave the switch "OFF" when not operating the tape recorder.

**5. LOUDNESS SWITCH:** in "ON" position activates a circuit which boosts bass tones at low volume control settings. This compensates for listening levels. However, use this button only at low volume control settings and leave it "OFF" at normal and high volume settings to prevent booming noise or overload on some speakers.

#### B. ROTARY CONTROLS

**6. BASS control:** regulates low frequency sounds, as desired, to suit personal tastes, speaker characteristics, room acoustics, etc. The center setting gives normal (flat) frequency response. Rotate clockwise to increase the bass tones, and counterclockwise to decrease. The front section of the knob controls the tone of the front speakers in any of the 4-channel modes, the tone of the main speakers in the 2 x 2CH mode and the tone of all (both main and remote) speakers in the 2CH mode. The back section of the knob controls the tone of the back speakers in any of the 4-channel mode, the tone of the REMOTE speakers in the 2 x 2CH mode and is inoperative in the 2-channel mode.

**7. TREBLE control:** regulates high frequency sounds, and operates in the same manner as the BASS CONTROL. The front section of the knob controls the tone of the front speakers in any of the 4-channel modes, the tone of the main speakers in the 2 x 2CH mode and the tone of all (both main and remote) speakers in the 2CH mode. The back section of the knob controls the tone of the back speakers in any of the 4-channel mode, the tone of the REMOTE speakers in the 2 x 2CH mode and is inoperative in the 2-channel mode.

**8. CD-4 SEPARATION controls:** regulate proper separation characteristic among the channels for the CD-4 operation. See ADDITIONAL COMPONENTS section of this manual for details.

**9. MODE selector control:** allows you to select the mode of operation, 4-channel or 2-channel stereo. Furthermore, there are three types of 4-channel and two types of 2-channel modes.

**4CH SQ —** activates the SQ Matrix Circuit to decode and play back any program sources which are pre-encoded with SQ matrix method. Usually, the sources are records and FM broadcasts. Use both FRONT and BACK speakers for this 4-channel operation. Also, if you wish, you may convert regular 2-channel sources to simulated 4-channel sound in this position.

**4CH DISCRETE —** is used for true 4-channel operation with any 4-channel source connected to either the AUX/4-CH or MONITOR inputs. Use both FRONT and BACK speakers.

**4CH CD-4 —** activates the CD-4 Demodulator Circuit to play back discrete 4-channel records processed by the CD-4 method. Use both FRONT and BACK speakers for this 4-channel operation, noting the control must be used in conjunction with the PHONO position of function selector control.

These three 4-channel positions described above are all visually indicated by an illuminated figure "4CH" at

the left of the tuning scale of the front panel. It will not light in any other position.

**2CH —** is used for all regular 2-channel stereo program sources. Use with MAIN speakers or, if any, REMOTE speakers or both together.

**2 x 2CH —** is used for all regular 2-channel stereo program sources. It differs from 2CH position in that it allows the receiver to play a different program through REMOTE speakers than the one through MAIN speakers. When set to this position, the function of the function selector control is overridden for the remote speakers and only the record player or changer connected to PHONO terminals on the rear panel becomes useable through REMOTE speakers. Meanwhile, you may use all positions on the function selector control through MAIN speakers; that is, while you are playing records in one room someone else listen to AM, FM or tape in another room.

A figure "2 x 2CH" will light up at the tuning board to indicate that the receiver is in 2 x 2CH mode.

**Note:** IF THE RECEIVER IS IN ONE OF THE 4-CHANNEL MODES OR THE 2 x 2CH MODE, MAKE SURE THE AMP. COUPLING SWITCH ON THE REAR PANEL IS IN THE QUAD POSITION; AND IF IN THE 2CH STEREO MODES, MAKE SURE IT IS SET IN THE STEREO POSITION.

**10. FUNCTION selector control:** enables you to select the program you desire from AM, FM, FM STEREO PHONO and AUX/4CH.

**11. BALANCE controls:** regulate the relative sound outputs from each channel. In any of the 4-channel modes, these controls regulate the sound output of the speakers as indicated, i.e., the top left control is for the left front speaker, etc. In the 2 x 2CH mode the top two controls regulate the sound output of the two main speakers (left and right as indicated). The bottom two controls similarly regulate the sound output of the two remote speakers. In the 2-channel mode, the top two controls regulate the sound output of all (main and remote) speakers. The top left control regulates both (main and remote) left channels and the top right control regulates both right channels. The bottom two controls are inoperative. Turn each control clockwise to increase the sound level and counterclockwise to decrease. Set the controls relative to each other in order to obtain optimum balance effect, depending on your listening position.

**12. VOLUME control:** regulates the volume level of all channels simultaneously. Rotate the knob clockwise to increase the volume and counterclockwise to decrease.

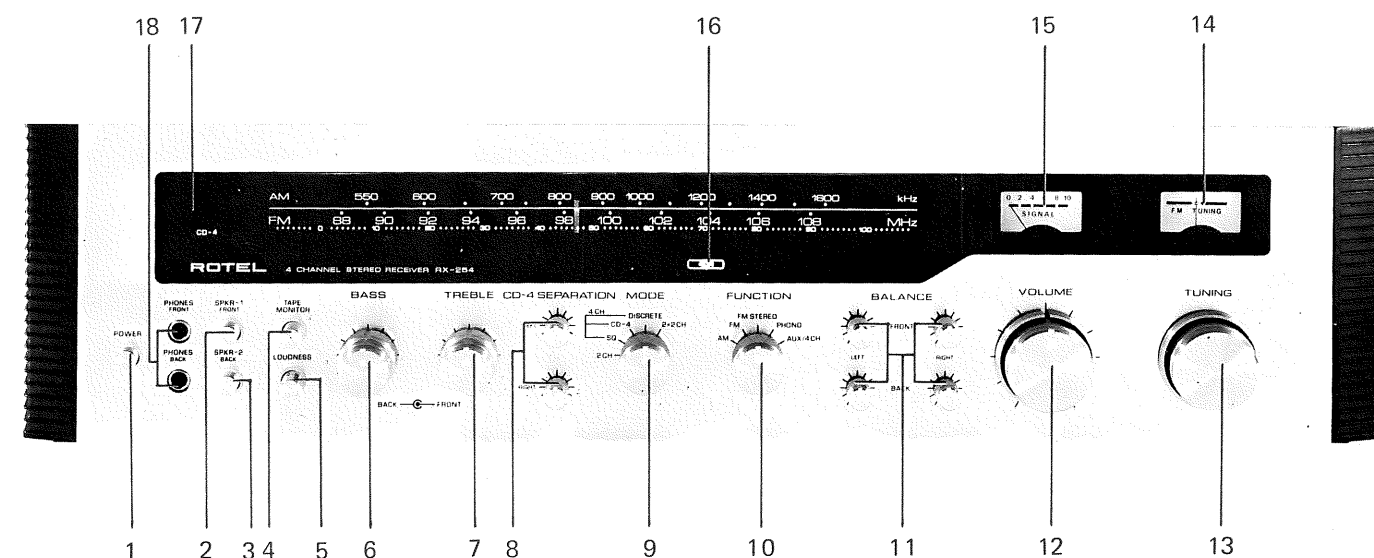


Fig. 3 Front Panel View

**13. TUNING KNOB:** allows you to tune in, in conjunction with lighted dial pointer, AM or FM stations with smooth flywheel action and precision.

### C. ILLUMINATED INDICATORS

**14. FM CENTER TUNING METER:** designed to operate on a null or "zero" center principal. Tune for the dead center position for best possible reception and minimum distortion.

**15. SIGNAL STRENGTH TUNING METER:** provides visual indication of signal strength of reception for AM and FM broadcasts. Turn the TUNING knob to obtain maximum deflection of the meter pointer to the right for optimum reception.

**16. MODE INDICATORS:** as noted on the MODE SELECTOR section above, the numerical figures light up automatically to indicate whether the receiver is in 4-channel or 2-channel stereo. "4CH" will light for 4-channel, "2CH" for 2-channel and "2 x 2CH" for dual 2-channel.

**17. STEREO INDICATOR:** automatically lights up "STEREO" on the dial scale board to visually indicate whenever an FM stereo broadcast is tuned. The function selector control must be set at FM MPX position for stereo reception.

**Note:** In some cases, very weak stereo signals may not activate the stereo indicator. In this case the program will be reproduced monaurally.

**18. PHONES RECEPTACLES:** simply plug in your headphones plug to these receptacles for private listening. For 4-channel head-phones, plug in to both FRONT and BACK receptacles. If you are playing the receiver as dual 2-channel system (the model selector control at 2 x 2CH position), you can use a 2-channel headphone plugged into the FRONT receptacle to listen to the sound of the main speakers and another person may

use another set of 2-channel headphones plugged into BACK receptacle to listen to sound from the REMOTE speakers. In the 2-channel position one or two pairs of 2-channel phones may be used to listen to the same program by plugging into either of the two phone receptacles. Turn off all speaker switches if you are listening to headphones only.

### RECEIVING FM AND AM BROADCASTS

Under normal use for all FM broadcasts the function selector control should be set at the FM STEREO position. If a station you wish to listen to is transmitting stereo your receiver will automatically switch on the multiplex circuit and you will hear the broadcast in stereo. Should the station conclude broadcasting in stereo, the receiver will automatically switch back to monaural reception. Use the stereo indicator light as a guide to locate stereo stations.

Should you receive a weak station whose signal quality is degraded by noise or poor reception conditions, and you wish to listen to this stereo broadcast more clearly, place the function selector control at FM position. Although you can listen to the station only in mono, the signal reception will be improved. For regular FM or FM stereo the MODE selector should be in the 2CH. For simulated 4-channel sound the MODE selector should be in the 4CH SQ position.

If you wish to listen to SQ matrix-encoded 4-channel broadcasts, set the MODE selector to the 4CH SQ MATRIX and the function selector control to the FM STEREO position. Push "ON" both speaker switches.

For AM broadcasts, the function selector control should be set at the AM position. Though AM is only monaural, you may play in the 4CH SQ or 2-channel stereo model for respective effect. Normally, the MODE selector control should be set at 2CH position.

In all cases, tune for the desired station with the tuning knob, using the tuning meter to assure the strongest possible reception. Utilize other controls to enhance your listening conditions and pleasure.

another cable emerging from record player besides the output cables, connect it to the ground terminal marked GND on the rear panel near the PHONO jacks. **Note:** To avoid loss of the high frequency response due to excessively long cables, shielded cables not exceeding 10 feet in length should be used to connect your record player. Usually, cables supplied with your record player are sufficient.)

2. When you wish to play the record player with regular magnetic cartridge, set the function selector control to PHONO position. If you are listening to 2-channel stereo records, turn the mode selector control to 2CH position; if listening to SQ 4-channel records or for simulated 4-channel sound from 2-channel records, turn then mode selector to 4CH SQ position. Activate either or both speaker push buttons, MAIN or REMOTE, for stereo operation, and activate both switches for all four speakers when in 4-channel operation.

When you wish to play the receiver in dual-stereo mode, only record player or changer can be operated through the speakers connected to the REMOTE speaker terminals. On the other hand, all program sources can be heard through the MAIN speakers. For this operation, set the function selector control to 2 x 2CH and activate both speaker switches. Play the record player through the REMOTE speakers and other programs such as AM or FM broadcasts or tapes through the MAIN speakers.

Adjust the volume, bass, treble and balance controls to suit your personal tastes and listening conditions.

3. When you wish to play the record player with CD-4 cartridge and listen to discrete 4-channel records, set the function selector control to PHONO position and the mode selector control to 4CH CD-4 position. Before you play first CD-4 record, it is necessary to adjust CD-4 separation and output levels among the channels in order to tune the receiver to match the particular CD-4 cartridge you will be using.

a) Carrier level adjustment — activate both speaker switches and set the volume control to normal listening position. Play the enclosed CD-4 test record at the section titled "CARRIER LEVEL (30kHz) ADJ. TONE". Locate the Carrier Level Control at the rear panel, and turn the knob all the way clockwise to maximum. Slowly turn back the knob counter-clockwise until the sound of test signal becomes undistorted, and from that point turn the knob clockwise 15 to 30 degree angle. Once you have set the carrier level, NEVER ADJUST IT UNLESS YOU CHANGE CD-4 CARTRIDGE OR STYLUS AS WELL AS AFTER PLAYING FOR EXCEPTIONALLY LONG TIME.

b) Separation adjustment — set the volume at normal listening position, and turn all the balance controls counter-clockwise to minimum except for the BACK LEFT control which should be set clockwise to maximum. Play the test record at "CD-4 ADJUSTMENT TONE". Adjust the LEFT CD-4 Separation knob until the sound from the BACK LEFT speaker becomes minimum. Repeat the procedure

for the BACK RIGHT speaker using the RIGHT CD-4 Separation knob and the BACK RIGHT balance control. Also, play "CHANNEL BALANCE ADJ. TONE" from the test record, and adjust the four balance controls.

### TAPE RECORDER

1. The receiver is equipped with one pair each of input jacks for FRONT and BACK channels and one pair each of output jacks for FRONT and BACK channels. Input jacks are used for playing back of pre-recorded tapes, and output jacks are used for recording of program materials such as AM or FM broadcasts and records. The eight jacks are marked TAPE. Tape recorders to be connected can be reel-to-reel type, cassette type or 8-track cartridge type.

If your tape recorder is a 2-channel stereophonic type connect its RIGHT and LEFT output cables to corresponding input jacks marked FRONT IN and its RIGHT and LEFT input cable to corresponding jacks marked FRONT OUT. If your tape recorder is a discrete 4-channel type, connect its FRONT RIGHT and LEFT output cables to corresponding input jacks marked FRONT IN and its REAR RIGHT and LEFT output cables to corresponding BACK IN input jacks. Similarly, plug the tape recorder's FRONT RIGHT and LEFT input cable to corresponding jacks marked FRONT OUT and REAR RIGHT and LEFT input cable to corresponding jacks marked BACK OUT.

2. a) Tape Playback — When you wish to play pre-recorded tapes, push the TAPE switch on the front panel "ON" to MONITOR. This will override the function of the FUNCTION selector control and let you operate the tape recorder regardless of the FUNCTION selector setting. Turn the MODE selector control to 2CH position if you are listening to 2-channel stereo tapes, or to 4CH DISCRETE position if you are listening to discrete 4-channel tapes. You may set the control to 4CH SQ position if tapes you are playing have been encoded by SQ matrix; or for simulated 4-channel sound from 2-channel stereo tapes. Set it to 2 x 2CH position if you wish to play stereo tapes from the MAIN speakers only in another room.

Adjust the volume, bass, treble and balance controls to suit your personal tastes and listening conditions.

b) Tape Recording — you can record with your tape recorder any program materials that can be played through this receiver. Turn the function selector control to AM, FM, FM STEREO, PHONO or AUX depending on which program you wish to record, and operate your tape recorder while listening to the program.

## ADDITIONAL COMPONENTS

Refer to Fig. 2 for visual directions of connecting additional components.

### RECORD PLAYER OR CHANGER

1. The receiver is equipped with one pair of RCA-type input jacks on the rear panel for the connection of stereo record player or changer. Connect the RIGHT output cable of record player to the RIGHT jack and the LEFT output cable to the LEFT jack. If there is

Always leave the TAPE switch "OFF" if your tape recorder has no separate playback head (look up in its owner's manual to see if the tape recorder is equipped with separate playback and record heads). If your tape recorder has the separate playback head, pushing "ON" the TAPE switch to MONITOR position will let you "monitor" the recording program as it is actually being recorded). Hence, you may compare the program as played by the receiver to the same program as being recorded by pushing in and out the TAPE switch.

NOTE: You will not obtain any sound if the TAPE switch is at MONITOR position unless the recorder has a separate playback head. Also, volume, bass, treble and balance controls of this receiver will have no effect upon the recording, so you should use the controls on the tape recorder.

AUXILIARY COMPONENTS

The receiver is equipped with two pairs of AUX input jacks on the rear panel for connection of additional program sources; tape playback deck or inputs from tape recorder, 8-track cartridge player or if so desired, a CD-4 Decoder.

ANTENNAS

FM ANTENNAS

If the single wire antenna supplied is inadequate for FM reception in your area, it may be necessary to replace it with better indoor antennas or, in some extreme case, outdoor antennas.

1. INDOOR ANTENNAS — you may replace the single wire antenna with a "T"-shape dipole antenna (See Fig. 2), by connecting its leads to both FM antenna terminals on the rear panel marked 300 ohms. Fasten the short arms of the dipole antenna horizontally to a non-metallic surface, for instance by tacking to the shelf on which the receiver is mounted or to the wall where reception is optimum. You may use other indoor antennas such as "rabbit-ears" or telescopic antennas which can be rotated for best reception of the desired signal. Connection of such antennas is exactly the same as the dipole antenna.

CAUTION: Make sure the leads connected to the antenna terminals on the rear panel do not touch each other, as it will impede reception performance.

2. OUTDOOR ANTENNAS — In weak-signal 'fringe' areas, an outdoor antenna may be necessary if indoor antennas do not give satisfactory results. If you already have an outdoor VHF television antenna, this antenna

- 1. If the additional component you wish to use is 2-channel stereo equipment, connect its RIGHT and LEFT output cables to the corresponding jacks of AUX terminals marked FRONT. If you wish to use 4-channel equipment, connect its FRONT RIGHT and LEFT output cables to the corresponding FRONT jacks, and BACK RIGHT and LEFT output cables to the corresponding BACK jacks.
- 2. When you wish to play the additional component connected to the receiver, set the function selector control to AUX position. Set the MODE selector control to 2CH if you are listening to 2-channel stereo sources, or to 4CH DISCRETE if you are listening to 4-channel sources such as discrete 4-channel 8-track cartridge. You may set the control to 4CH SQ position if the tapes you are playing have been encoded by SQ matrix or for simulated 4-channel sound from 2-channel sound. Set it to 2 x 2CH position if you wish to play 2-channel stereo tapes or other sources from the MAIN speakers only.

Adjust the volume, bass, treble and balance controls to suit your personal tastes and listening conditions.

may prove suitable for FM reception as well. To test it, connect the TV antenna to the FM antenna terminals marked 300 ohms on the receiver's rear panel. If the results are satisfactory, obtain a TV/FM splitter/coupler so that you can operate both the TV set and the receiver from the antenna simultaneously. (See Fig. 2.) If the TV antenna does not serve the purpose, you may have to use an outdoor antenna designed specially for FM. Follow its instruction manual for information and usage.

- 3. The receiver is also equipped with the antenna terminals for 75 ohms for FM coaxial cable antenna.

AM ANTENNAS

If AM reception is marred because you live in a steel-framed building, or if you wish to supplement the built-in AM antenna for improved reception of weak stations, connect an insulated, flexible, single-conductor wire to the AM antenna terminal on the rear panel of the receiver. The wire should be as long as possible, and should be run in a straight line along a non-metallic surface or under a rug. In some cases, reception may be further improved by draping the wire out a window or by connecting it to an outdoor whip or rod antenna. (See Fig. 2)

FUSES

The receiver is protected with a 2A (ampere) fuse for the AC circuit. If the receiver fails to operate when plugged in and turned on or if it suddenly becomes completely inoperative while playing (i.e., all dial, meter, and indicator lamps go off and speakers are silent regardless of speakers switches and selector controls selected), the fuse may have been blown.

In order to replace fuse, always turn off the receiver and disconnect its power cord from the electrical outlet.

The fuse is in the black fuse holder marked AC FUSE at the rear panel of the receiver (Fig. 2). To replace the fuse,

unscrew the fuse holder cap to the left (in the direction of the arrow on the cap) until it disengages from the receptacle and remove the fuse from the cap. Check if the fuse is actually blown, and replace it with a fuse of exactly the same rating and insert the fuse back to the fuse holder. Replace the fuse holder in the receptacle turning the fuse holder cap to the right.

CAUTION: If the unit still does not operate, or if it becomes inoperaipte within a short time, do not attempt to replace the fuse or fuses again. Consult your local dealer or service center.

SPECIFICATIONS

AMPLIFIER SECTION

Music Power Output (IHF)	100 W (4 ohms)
Continuous Power Output (RMS)	20 W/ch (8 ohms 4CH)
(each channel driven)	27 W/ch (8 ohms, STEREO)
Continuous Power Output (RMS)	12 W x 4 (8 ohms at 1 KHz, 4CH)
	24 W x 2 (8 ohms at 1 kHz, STEREO)
Harmonic Distortion	less than 0.1% (1 kHz)
IM Distortion	less than 0.3% (70 Hz + 7 kHz, 4 : 1)
Power Bandwidth (IHF)	20 to 50,000Hz (8 ohms)
Frequency Response	10 to 80,000Hz ± 3dB
Damping Factor	30 (8 ohms, 1 KHz)
Input Sensitivity Impedance	TAPE MONITOR 180mV/30kHz
	AUX 180mV/30kHz
	PHONO (variable) 1 to 10mV/80kHz
Tape Output Level	800 mV/6 Kohms
Phono Overload	80 mV (1 kHz)
Phono Equalization	RIAA S.T.D. ± 1.5 dB
Base Control	± 10 db at 100 Hz
Treble Control	± 10 db at 10 kHz
Loudness Contour	+ 7 db/100 Hz, + 3dB/10 kHz
Crosstalk	55 db
Hum and Noise (S/N)	PHONO 65 db
(continuous power output)	TAPE 80 db
	Residual 1.0mV
Speaker Impedance	4 to 16 ohms

FM TUNER SECTION

Frequency Range	88 to 108 MHz
Sensitivity (IHF)	2.9 microvolts
Signal-to-Noise Ratio	65 dB
Harmonic Distortion	0.2 %
Selectivity	65 db
Capture Ratio	3 db
Stereo Separation	35 db at 1 kHz
IF Rejection	70 db
Image Rejection	55 db
Spurious Response Rejection	70 db
SCA Suppression	60 db
AM Suppression	50 db

AM TUNER SECTION

Frequency Range	525 to 1650 kHz
Sensitivity	20 microvolts
Selectivity	25 db
IF Rejection	45 db
Image Rejection	50 db

GENERAL

Power Consumption	250W (maximum)
Power Supply	100, 120, 220, 240V
	50/60 Hz
Dimensions (overall)	21-1/2"W x 13"D x 5-1/2"H
Weight (net)	10 kg/22 lbs.

Note: features and specifications subject to changes for improvement without prior notice.

# OPERATION CHART

This chart should be used for playback operation of all program sources in 4-channel and stereo.  
Refer to it as often as possible when using the receiver.

PROGRAM SOURCE	INPUT TERMINAL CONNECTION	SWITCH POSITIONS				RESULTS		
		AMP COUPLING	FUNCTION SELECTOR	MODE SELECTOR	TAPE MONITOR BUTTON	HOW REPRODUCED IN SPEAKERS	NUMBER OF OPERATING SPEAKERS	POWER AVAILABLE AT SPEAKER
SQ RECORD DISC	PHONO	QUAD	PHONO	4CH SQ	OFF	4-CHANNEL	4	NORMAL
		STEREO		2CH		2-CHANNEL	2 MAIN or 2 REMOTE, or BOTH	DOUBLE
		QUAD	DISREGARD	2 x 2CH		2-CHANNEL	2 REMOTE	NORMAL
CD-4 or RCA DISCRETE RECORD DISC	PHONO	QUAD	PHONO	4CH CD-4	OFF	4-CHANNEL	4	NORMAL
4-CHANNEL DISCRETE TAPE	ALL TAPE MONITOR IN	QUAD	DISREGARD	4CH DISCRETE	MONITOR	4-CHANNEL	4	NORMAL
	ALL AUX	QUAD	AUX/4CH	4CH DISCRETE	OFF	4-CHANNEL	4	NORMAL
STEREO TAPE	FRONT TAPE MONITOR IN (or FRONT AUX)	STEREO	DISREGARD (or AUX)	2CH	MONITOR (or OFF)	2-CHANNEL	2 MAIN or 2 REMOTE, or BOTH	DOUBLE
		QUAD	DISREGARD (or AUX)	4CH SQ	MONITOR (or OFF)	simulated 4-CHANNEL	4	NORMAL
		QUAD	DISREGARD (or AUX)	2 x 2CH	MONITOR (or OFF)	2-CHANNEL	2 MAIN	NORMAL
SQ TAPE	FRONT TAPE MONITOR IN	QUAD	DISREGARD	4CH SQ	MONITOR	4-CHANNEL	4	NORMAL
	FRONT AUX	QUAD	AUX	4CH SQ	OFF	4-CHANNEL	4	NORMAL
STEREO RECORD DISC	PHONO	QUAD	PHONO	4CH SQ	OFF	simulated 4-CHANNEL	4	NORMAL
		STEREO		2CH		2-CHANNEL	2 MAIN or 2 REMOTE, or BOTH	DOUBLE
		QUAD		2 x 2CH		2-CHANNEL	2 REMOTE	NORMAL
FM STEREO (or AM/FM)	Q ANTENNA	QUAD	FM STEREO (or AM/FM)	4CH SQ	OFF	simulated 4-CHANNEL	4	NORMAL
		STEREO		2 CH		2-CHANNEL	2 MAIN or 2 REMOTE, or BOTH	DOUBLE
		QUAD		2 x 2CH		2-CHANNEL	2 MAIN	NORMAL
FM SQ	ANTENNA	QUAD	FM STEREO	4CH SQ	OFF	4-CHANNEL	4	NORMAL

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TOKYO JAPAN

Printed in Japan