



**marantz**®

**Model 2220B  
Stereophonic  
Receiver**

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## FOREWORD

For optimum performance and enjoyment from your Model 2220B Stereo Receiver, please study these instructions carefully. Installation and operation are not complicated, but its flexibility and features deserve your becoming familiar with its controls and connections.

This manual is divided into two parts. The first covers installation and operation in simple, nontechnical language. The second describes the 2220B in more detail with technical specifications and functional explanations.

For quick identification of the controls and connections, references to them are printed in **BOLDFACE TYPE**, exactly as they appear on the front and rear panels of your Receiver.

## GENERAL DESCRIPTION

The Marantz Model 2220B is an all solid state receiver incorporating the innovative design and unparalleled technology that have made Marantz famous in the audio component industry.

The 2220B features a sensitive stereo FM tuner, a highly selective AM tuner, and a low distortion preamplifier and amplifier on a single chassis. The FM tuner utilizes an FET front end, ceramic IF filter, and a phase locked loop multiplex decoder. The AM tuner features an advanced integrated circuit and ceramic IF filters for high selectivity and low interference. The amplifier sections permit the connection of two stereo pairs of loudspeakers, a turntable or record changer, two tape recorders, stereo headphones, and an auxiliary source such as an additional tuner or a TV sound source.

## AFTER UNPACKING

It is advisable to retain all original packing material to prevent damage should you wish to transport or ship the Model 2220B (refer to page 12 for repacking and shipping instructions). Be careful that you do not inadvertently throw away or lose the parts packed with the unit.

Please inspect your Model 2220B carefully for any signs of shipping damage. Our very strict quality control and professional pride ensure that each Model 2220B left the factory in perfect condition. If the unit is damaged or fails to operate, immediately notify your dealer. If the unit was shipped to you directly, notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for shipping damage. Save the carton and all packing material as evidence of damage for their inspection. Should assistance be required, the Marantz Company will cooperate fully in assisting your claim.

Please fill out and mail the Warranty Registration Card as soon as possible. The Marantz 3-year Warranty will not go into effect until the Marantz Company receives the registration card, which was packed in the carton with your Model 2220B.



Figure 1. Rear Panel Connection Facilities

## PREPARATION FOR USE

### REAR PANEL CONNECTIONS

Figure 1 shows the location of input and output jacks on the rear panel. These jacks are for "permanent" connections. Front panel jacks and their use will be discussed later. All connections to the rear panel should be made with the power to the entire system turned off. The rear panel signal connections are arranged in stereo pairs. All signal connections to the Model 2220B, with the exception of the FM antenna and loudspeakers, should be made with shielded audio cables. To avoid confusion, connect one cable at a time between the 2220B and the other components of your system. This is the safest way to avoid cross-connecting channels or confusing signal sources with destinations.

### PHONO INPUTS

The phono jacks are intended for use with magnetic phono cartridges and have a 47,000 ohm input impedance.

If a hum is heard when playing records, this is an indication that the record player or its connections are inadequately grounded. Connect a separate ground wire from the turntable or record changer frame to the **CHASSIS GROUND** binding post of the Model 2220B. If this is ineffective, try reversing the polarity of the turntable's power plug.

If hum persists, consult the instruction booklets for the turntable and/or phono cartridge.

### TAPE JACKS

#### TAPE 1 IN

The pair of **TAPE 1 IN** jacks serve two purposes:

1. By depressing the **TAPE 1 MONITOR** pushswitch, signals can be played from a tape recorder set for playback mode of operation. This permits playing the tape source stereophonically or monophonically as indicated by the position of the **MONO** pushswitch.
2. While your tape recorder is recording, you can monitor the resulting tape quality by depressing the **TAPE 1 MONITOR** pushswitch. This requires that your recorder be equipped with separate record and playback heads and separate record and playback electronics.

#### TAPE 2 IN

The signals from your tape recorder connected to the **TAPE 2 IN** jacks can be played back when the **SELECTOR** switch is placed in the **TAPE 2** position and the **TAPE 1 MONITOR** switch is released. In addition, these jacks allow tape copying from **TAPE 2** to **TAPE 1**. The resulting recording can be monitored by depressing the **TAPE 1 MONITOR** pushswitch.

#### TAPE 1 & 2 OUT

Connecting these jacks to the line inputs of a tape recorder permits recording from the program

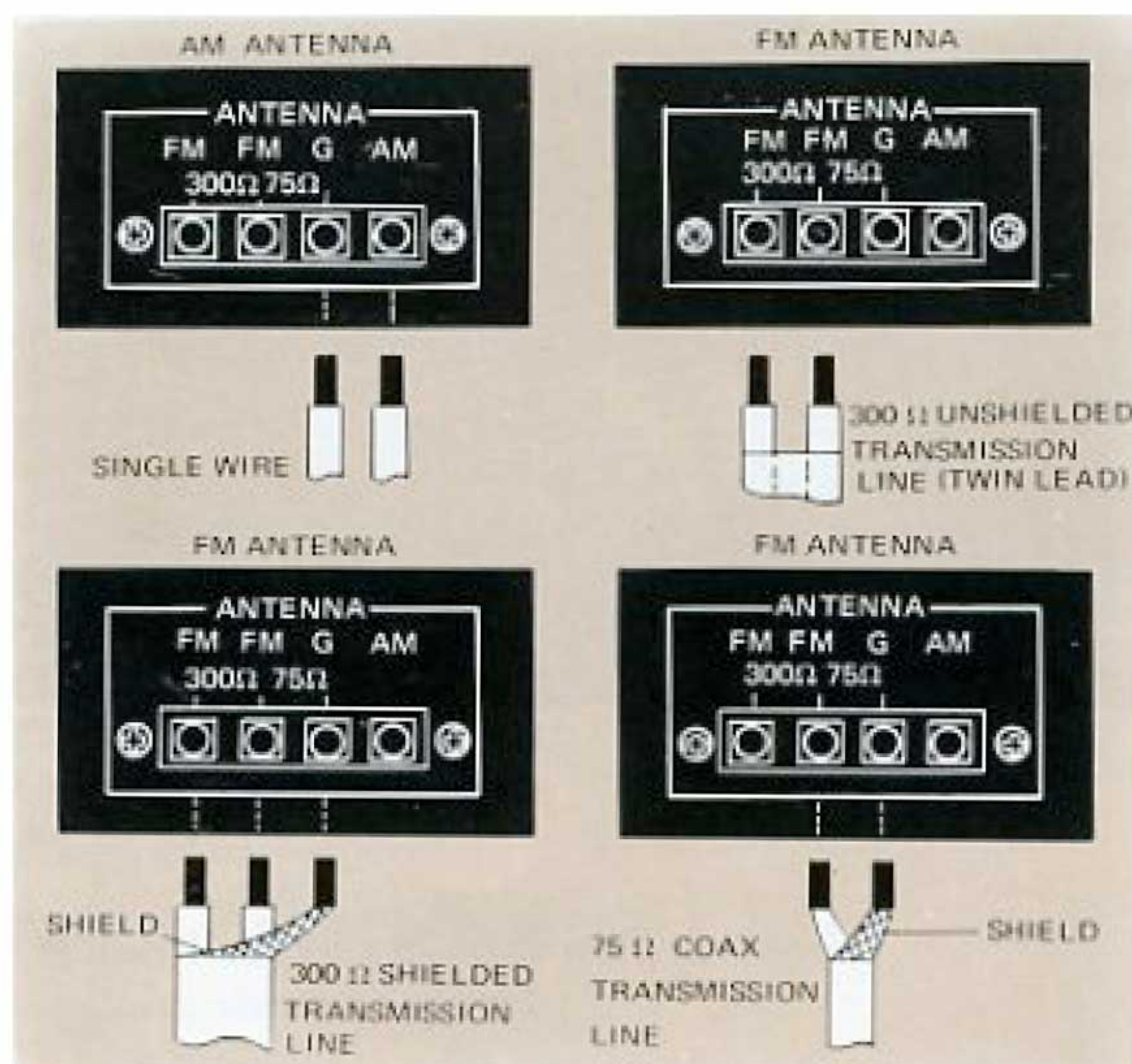


Figure 2. AM/FM Antenna Connection

source indicated by the **SELECTOR** switch. The signals available at this pair of jacks are not affected by the **BALANCE**, **VOLUME**, **TREBLE**, **BASS**, **LOW FILTER**, **HI FILTER**, **LOUDNESS**, and **MONO** pushswitches on the front panel.

## AUX INPUTS

The **AUX INPUT** jacks are for miscellaneous high level signal sources such as additional tuners and/or receivers, tape players, phonographs that provide RIAA equalized high level output, TV sound outputs and other external components.

## FM ANTENNA

The best FM reception is obtained with a Log-Periodic type antenna mounted on a good quality rotor system. For fringe areas, Marantz recommends a Log-Periodic antenna with six or more elements designed expressly for FM reception. To minimize local noise and multipath picked up by the lead-in wires, use a balanced and shielded 300 ohm cable or a coaxial 75 ohm cable with a 300 to 75 ohm matching transformer at the antenna. Unshielded lead-in acts as an omnidirectional antenna, and can cancel the directional benefits of your antenna. Low-loss 300 ohm shielded cable consists of two inner conductors plus an outer shield and insulating jacket. This type of shielded cable effectively prevents the lead-in from contributing multipath distortion.

For rural areas, it is recommended that a local

dealer be consulted about antenna installation and lightning arrestor protection. Master antenna systems are not recommended for use with your Model 2220B; such systems are usually designed expressly for television reception and frequently suppress FM signals before distribution. In addition, master antenna systems often severely reduce the quality of the FM signal. Where outdoor antennas are prohibited or inconvenient, place the antenna in vacant attic space or use a simple 300 ohm TV "rabbit ear" antenna or the ribbon-type folded dipole antenna supplied with the Model 2220B. Both are practical and will give satisfactory results in primary signal areas.

Your Model 2220B Receiver will accept either a 75 or 300 ohm antenna (see diagram, Figure 2). The 300 ohm antenna cable should be connected to the two terminals marked **FM** on the **ANTENNA** terminal. When using 75 ohm coaxial antenna cable, connect its shield to the **G** (**GROUND**) terminal, and its inner or center conductor to either of the **FM** terminals.

## AM ANTENNA

Your Tuner is equipped with an AM ferrite-rod antenna. **BEFORE USING THE MODEL 2220B, SWING THE ANTENNA OUT AS SHOWN IN FIGURE 3.**

The ferrite-rod antenna will give you satisfactory results in primary signal areas. However, an outdoor antenna will provide better reception in weaker signal areas. Two single wires are required to make an **AM** outdoor antenna. First, connect one end of a single wire to the **AM ANTENNA** terminal on the rear panel, and the other end to a very high horizontal antenna wire of 25 to 75 feet in length suspended between insulators in an outdoor location (the higher the better). Next, connect the other single wire between the "**G**" terminal of your Model 2220B and an authenticated earth ground (such as a metal water pipe).

## FM QUADRADIAL OUTPUT JACK

In anticipation of future four channel quadrasonic broadcasting, your Model 2220B is equipped with an **FM QUADRADIAL OUTPUT** jack. The signal available at this jack is the unequalized, buffered output of the FM discriminator. Its level, frequency response characteristics, and output impedance are ideal to drive a four channel adaptor. This jack can also be used as a simple "white noise" generator for checking the response characteristics of

loudspeakers or amplifiers. For this application, place the Model 2220B in FM mode with the muting off, and tune between FM stations to receive interstation noise.

## SPEAKER SYSTEMS

The **SPEAKER SYSTEMS** terminals on the rear panel can accommodate two stereo pairs of loudspeakers. Connect the main pair to the **MAIN** terminals. The **REMOTE** terminals are for a second stereo pair of loudspeakers (see Figure 4). Selection of loudspeaker systems is made with the **MAIN-SPKR-REMOTE** pushswitches on the front panel.

To connect the speakers to the 2220B, use ordinary #18 gauge two conductor lamp cord. For distances longer than 30 feet, use #16 gauge wire or heavier.

## SPEAKER PHASING

To assure the best stereo separation and frequency response, the speakers must be properly phased. The positive terminal on each speaker should be connected to its respective (+) terminal on the Model 2220B, and the negative or "common" terminal should be connected to its respective (-) terminal. To verify that a pair of speakers are correctly phased, perform the following test:

1. Complete the necessary signal connections so that program material may be played through the speakers.
2. Place the speakers in the center of the room.
3. Depress the **MONO** pushswitch and play a record (or radio or tape) with strong bass tones at a low volume level. Center the **BALANCE** control.
4. Position the speakers about six inches apart, face-to-face. Listen, particularly to the apparent loudness of the bass tones.
5. Next, turn off all power, but do not disturb the **VOLUME** or **BALANCE** settings. Reverse the connections on the right speaker only. Turn on the power and listen again. If the bass tones now seem louder than in (3), you have corrected the phasing between the speakers. If the bass notes now sound softer, turn off the power and re-connect the speakers as they had been originally.
6. If an additional pair of speakers is used along with the main speaker system, check phasing between the remote speakers and the main speakers. Use the **BALANCE** control to play only two speakers at once, and invert the wiring on the remote speakers as necessary. Do

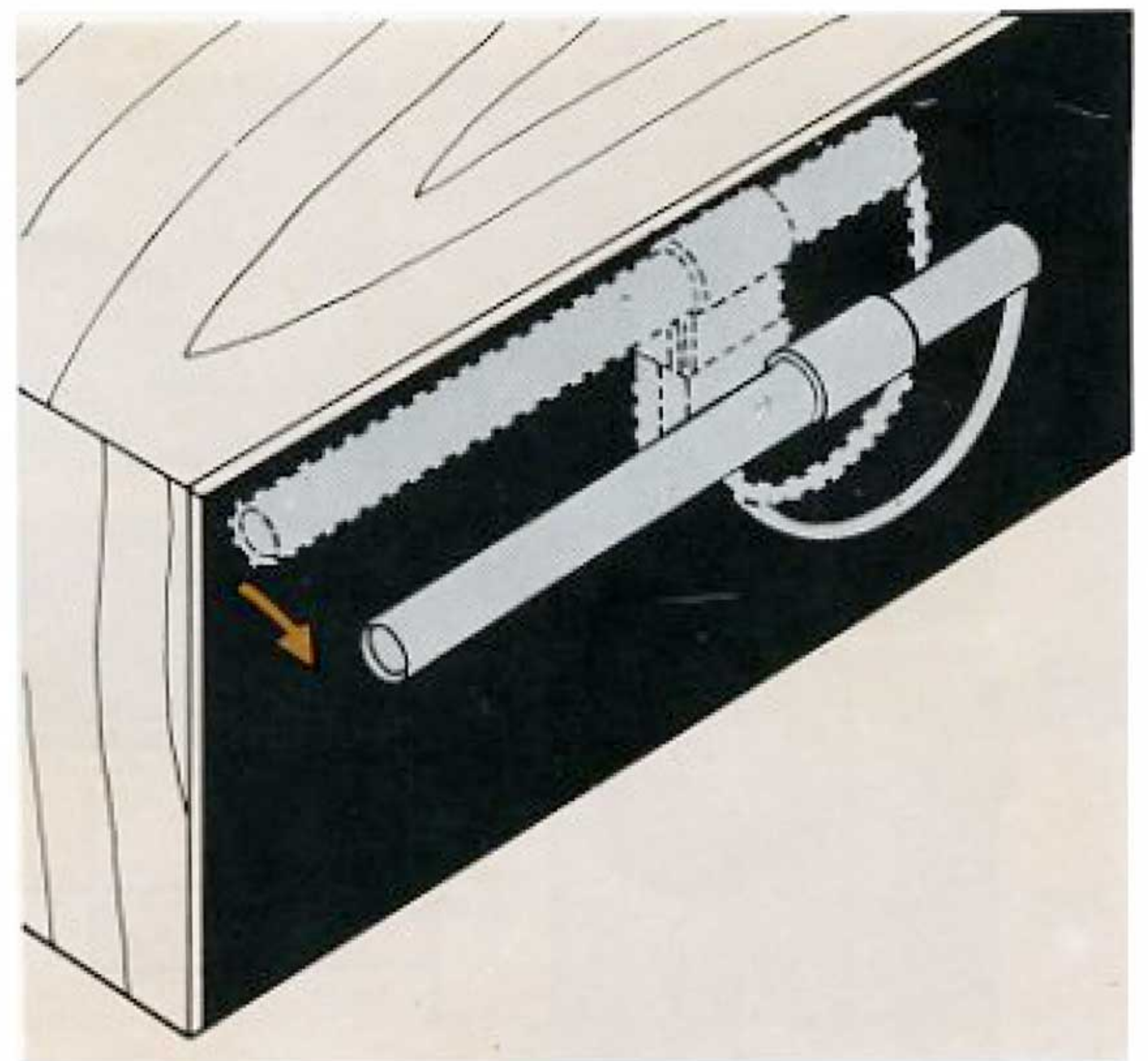


Figure 3. AM Ferrite-rod Antenna

not change the connections on the main speaker system.

7. Once having phased all speakers, you need not repeat this procedure in the future if you now mark the speaker connections and/or cables. Any method of coding is satisfactory, provided it enables you, in the future, to duplicate your now-correct hookup between speakers and amplifier.

Use caution when connecting your Model 2220B to a loudspeaker with built-in power supply such as an electrostatic loudspeaker. The "common" connection terminal of such a speaker may be capacitively coupled to ground through its own power supply. To protect the Model 2220B from distortion and possible overload, make sure the (-) terminals of the Model 2220B are connected to the "common" terminals of such a loudspeaker system.

**CAUTION:** NEVER DIRECTLY CONNECT THE LOUDSPEAKER TERMINALS OF ONE CHANNEL IN PARALLEL WITH THOSE OF ANY OTHER. ANY RESULTING DAMAGE IS NOT COVERED UNDER WARRANTY.

**NOTE:** Do not use 4 ohm speakers if main and remote speakers are to be used simultaneously. Use 8 or 16 ohm speakers only.

## CONNECTION TO AC OUTLET

With the front panel **POWER** pushswitch "OUT," plug the line cord into an electrical outlet supplying the proper voltage.

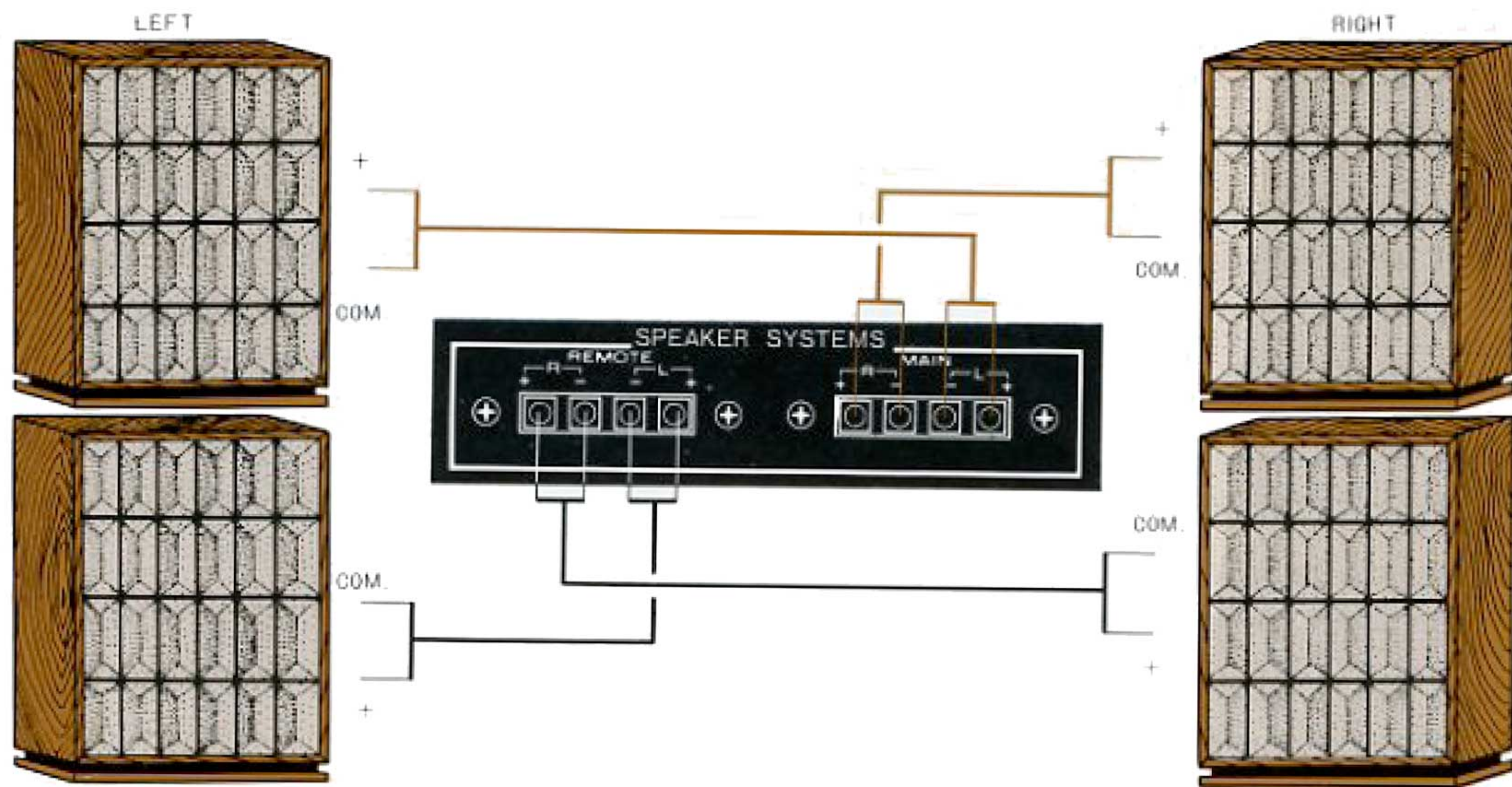


Figure 4. Loudspeaker System Connections

**CAUTION:** DO NOT PLUG YOUR MODEL 2220B INTO A DC OUTLET, AS SERIOUS DAMAGE WILL OCCUR.

#### CONVENIENCE OUTLETS

One **UNSWITCHED** and one **SWITCHED AC OUTLET** are provided on the rear panel for powering associated components of your system (tape recorder, record player, etc.).

#### AC PROTECTOR FUSE

This feature automatically disconnects **AC** power in the event of a power source or circuit overload. If the **POWER** pushswitch is activated and the front panel fails to illuminate and no sound is heard through the speakers, unscrew the fuse holder on the rear panel and visually inspect the fuse to see if the internal conducting filament has opened. If so, replace the fuse with one having the same specifications.

## SIMPLIFIED OPERATING PROCEDURES

When operating the Model 2220B Stereo Receiver for the first time, follow these simple directions. Later, full advantage can be taken of its versatility with the remaining controls and pushswitches.

Step 1. Connect the **FM** antenna to the

- appropriate terminals on the rear panel.
- Step 2. Connect the speakers to the **MAIN** speaker terminals.
- Step 3. Place all pushswitches in the "out" position.
- Step 4. Turn the **VOLUME** control all the way to the left (counterclockwise) and set the balance control in center position.
- Step 5. Rotate **TREBLE**, **MID** and **BASS** controls to the 12 o'clock position (each pair of pointers to dot).
- Step 6. Depress the **MAIN** speaker pushswitch.
- Step 7. Apply system power by depressing the **POWER** switch.
- Step 8. Select the desired program source by setting the **SELECTOR** switch to the appropriate position. If **FM** or **AM** is selected, rotate the Gyro-Touch **TUNING** knob until the desired station is tuned. Adjust the volume control to a comfortable listening level.

## MAIN CONTROLS AND SWITCHES

#### POWER SWITCH

The **POWER** switch, when depressed, supplies **AC** power to the Model 2220B and to the **SWITCHED** outlet on its rear panel.



Figure 5. Front Panel Controls and Jack

### SELECTOR SWITCH

The **SELECTOR** switch selects the program source for listening or recording. If a tape recorder's playback output has been connected to the **TAPE 2 IN** jacks on the rear panel, you can select tape listening by rotating the **SELECTOR SWITCH** to the **TAPE 2** position.

### VOLUME CONTROL

The **VOLUME** control adjusts the level of both output channels simultaneously while maintaining stereo balance at all normal settings. It does not effect the recording outputs.

### BALANCE CONTROL

This control alters the level of either output channel in situations where it is necessary to correct unbalanced programs sometimes encountered in older stereo recordings or in stereo broadcasts. As it is moved from its center position, it decreases the level in one output channel while maintaining the level in the other channel.

### BASS, MID AND TREBLE CONTROLS

These controls are used to adjust the tonal balance of program material to suit individual listening preference.

### TUNING METER

The Model 2220B is equipped with a dual purpose **TUNING** meter. The **TUNING** meter displays signal strength during **AM** reception and functions as a center tuning meter during **FM** reception.

### GYRO-TOUCH TUNING CONTROL

#### AM

Switch the **SELECTOR** to **AM** and tune to the

desired station. Then rotate the **GYRO-TOUCH TUNING** knob slightly back and forth until the maximum reading is obtained on the **TUNING** meter.

#### FM

Switch the **SELECTOR** to **FM** and tune to the desired station. Then slowly rotate the **GYRO-TOUCH TUNING** knob back and forth until the **TUNING** meter points to the center scale position. The multiplex section of the Model 2220B is equipped with electronically triggered circuits which automatically mute interstation noise and automatically switch to the proper mode of operation for stereo and monophonic **FM** broadcasts. In addition, the **STEREO** indicator light automatically indicates a stereo broadcast.

### DOLBY FM-25 $\mu$ S SWITCH

To listen to a Dolbyized **FM** broadcast, connect a Dolby noise reduction adaptor between the **TAPE 1 OUT** and **IN** jacks on the rear panel of the Model 2220B. Depress the **DOLBY FM-25 $\mu$ S** pushswitch, and depress the **TAPE 1 MONITOR** switch.

With the **DOLBY FM-25 $\mu$ S** switch in, the audio output signals are preset internally to standard Dolby level, and the de-emphasis time constant applied to the signals is also switched from 75  $\mu$ sec to 25  $\mu$ sec automatically.

### MAIN-SPKR-REMOTE SWITCHES

These switches select the loudspeaker terminals to which audio power is fed. Either the **MAIN** or the **REMOTE** stereo pair of loudspeakers may be operated individually, or simultaneously if both switches are depressed. When the two **MAIN-SPKR-REMOTE** switches are in the normal "out" position, all loudspeaker terminals are internally

disconnected from the power amplifier section. The signal at the headphones jack is not affected by the **MAIN-SPKR-REMOTE** switches.

The "out" position allows "private listening" when stereo headphones are used.

**NOTE:** Volume level should be reduced to minimum when switching speakers.

### PHONES JACK

This jack accepts headphones utilizing a standard three conductor phone plug (see Figure 6). It is internally connected to the power amplifier section through isolation resistors to provide adequate sound level with popular low impedance headphones as well as with high impedance units. Two or more sets of headphones may be used with the aid of "Y" connectors. However, output level will drop as additional headphones are added. The headphone jack output is not affected by the **MAIN-SPKR-REMOTE** switches.

### FM MUTING SWITCH

When tuning to FM broadcasts with the **MUTING** switch in its "in" position, the muting circuit will eliminate interstation noise. To prevent muting very weak stations along with the noise, the muting function may be switched out of the FM circuits by releasing the **MUTING** pushswitch.

### LOUDNESS SWITCH

The **LOUDNESS** switch compensates for human hearing characteristics by boosting the bass and treble response at low volume levels to achieve a more pleasing tonal balance.

### HI FILTER SWITCH

This switch can be used to reduce high frequency noise such as that associated with the playing of poorly recorded tapes or worn disc recordings. When the **AM** tuner is being used, this switch will help to suppress considerably the high pitched "whistle" caused by adjacent **AM** channel interference. This filter will also, along with high

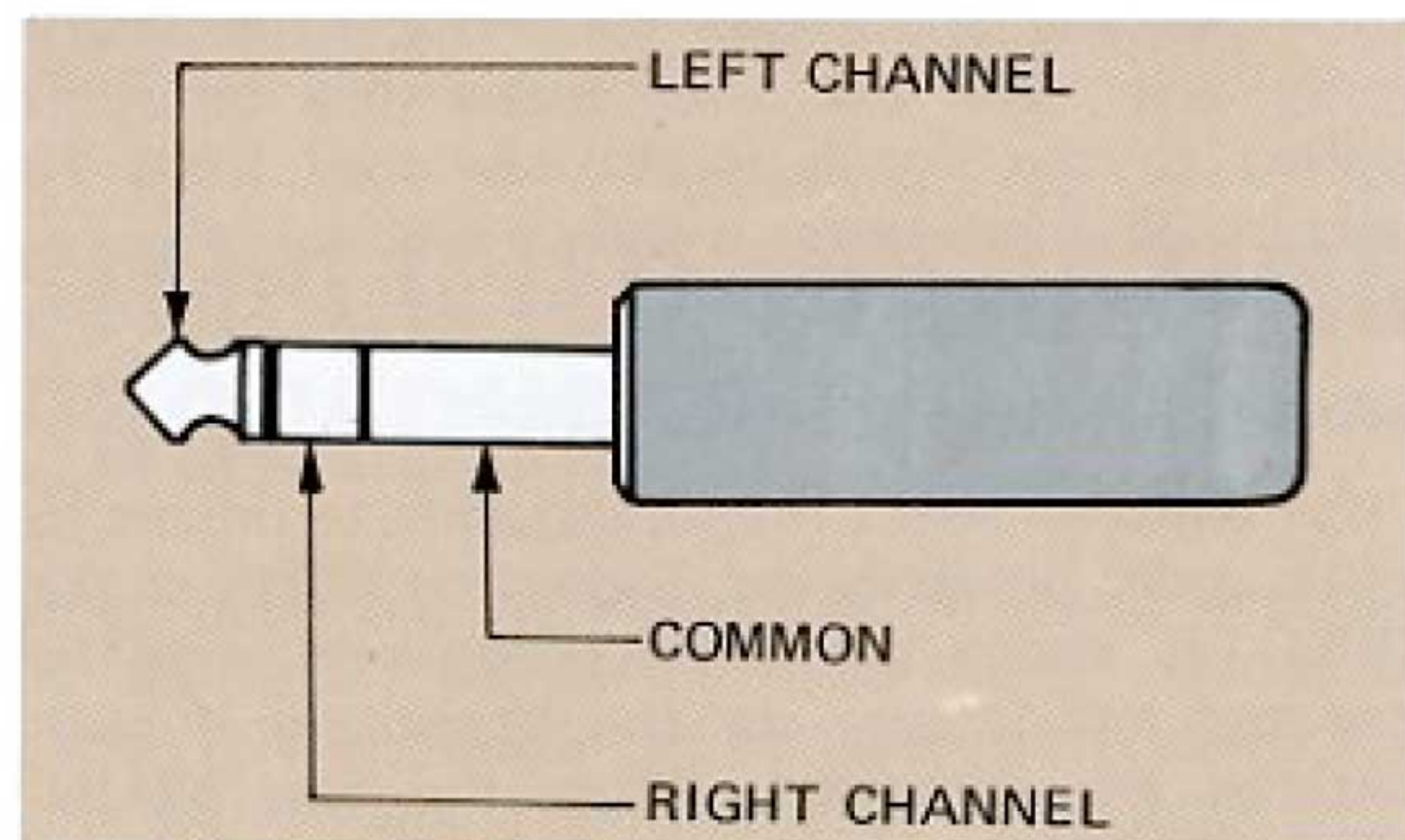


Figure 6. Stereophone Plug

frequency noise, slightly attenuate high frequency program material, and should therefore be used judiciously.

### MONO SWITCH

When a marginal stereo signal is received, random noise and phase modulation may cause the tuner's multiplex circuitry to trigger the **STEREO** mode intermittently. In this case, it is sometimes desirable to cancel the multiplex operation entirely in favor of obtaining a more listenable signal. The **MONO** switch performs this function and converts all output signals to the **MONOPHONIC** mode.

While playing a single channel source such as **TV** or **AM**, depress the **MONO** pushswitch to hear the source through both speakers. When playing a monophonic phonograph record, use this pushswitch to suppress rumble, record surface noise, and pinch effect distortion.

### TAPE 1 MONITOR SWITCH

When this pushswitch is "out", the program being recorded and heard is determined by the setting of the **SELECTOR** switch. With the **TAPE 1 MONITOR** pushswitch "in", the amplifier input connections are switched to the output of the tape recorder without affecting the signal presented to the tape recorder's input, thus allowing you to listen to the signal being recorded before and after recording. This switch is also known as the **TAPE-SOURCE** switch.

## TAPE RECORDING AND DUBBING

### RECORDING

The program source selected by the **SELECTOR** switch may be recorded on to either tape recorder. When the **SELECTOR** is set to **TAPE 2**, however, the **TAPE 2 OUT JACKS** are muted to prevent feedback oscillations that would occur if tape recorder 2 were inadvertently placed in the record mode, thus forcing it to record its own output.

### DUBBING

A tape played on tape recorder 2 may be copied on to tape recorder 1. Set the **SELECTOR** switch to **TAPE 2**. To monitor tape 1 as it is being recorded, depress the **TAPE 1 MONITOR** switch. To monitor the source (which is, in this case, tape 2), release **TAPE 1 MONITOR** switch. Either tape or source can be monitored without disturbing the actual recording process.

## RECORDING DOLBYIZED FM PROGRAMS

Dolbyized FM broadcasts contain Dolbyized audio information to which a special pre-emphasis is applied for the purpose of improving the noise reduction process. To make a Dolbyized tape recording of such a broadcast, depress the **DOLBY FM-25 $\mu$ S** switch to properly de-emphasize the signal, but bypass the noise reduction adaptor to record the Dolbyized audio directly onto the tape.

The inputs to the tape recorder in this application must be properly calibrated beforehand according to the procedure detailed in the Dolby unit's instruction booklet. To achieve proper calibration, it is necessary that the record level control on the Dolby unit be adjusted to the proper Dolby level by use of the reference tone transmitted by the FM station.

For monitoring purpose, connect the Dolby unit between the line outputs of the tape recorder and the **TAPE IN** jacks on the 2220B.

When using a tape recorder containing a built-in **FM DOLBY-25 $\mu$ S** de-emphasis circuit, a better signal-to-noise ratio can be achieved by using only the **DOLBY FM-25 $\mu$ S** circuit in the Model 2220B instead of the facilities in the tape recorder. Do not use both de-emphasis circuits simultaneously.

## CONVERTING YOUR STEREO SYSTEM TO 4-CHANNEL

In the future, you may decide to expand your stereo component system into a four channel sound system. Marantz simplifies this conversion by offering the Model 4000 Quadraxial Adaptor, which has been specifically designed and engineered to add the dimension of four channel sound to your stereo components. The Marantz Model 4000 incorporates all the technology required to convert your present Marantz components into a four channel sound system.

Features of the Marantz Model 4000 Quadraxial Adaptor:

- \*Accepts an external CD-4 disc demodulator
- \*SQ pocket for plugging in Marantz' **SQA-1** and **SQA-2** decoders and all future matrix decoders
- \*Complete provisions for accepting any four channel tape recorder

- \*Low and hi filters for rear channels
- \*Master volume control with switchable loudness compensation for all four channels
- \*Four channel fingertip balance controls
- \*Complete provisions for switching both **MAIN** and **REMOTE** four channel speaker systems
- \*Headphone jack for the rear channels
- \*Base and treble controls for the rear channels
- \*Accepts Marantz' Model RC-4 remote control unit.

The Model 4000 also incorporates Marantz' exclusive **VARIMATRIX** feature to synthesize four channel sound from any stereo source. Along with the Model 4000, all that is required is a basic amplifier and a pair of speakers. Further information can be obtained from your local Marantz dealer.

## TECHNICAL DESCRIPTION

### GENERAL

Figure 7 is a block diagram of the Model 2220B Receiver showing the main functional elements and input and output signal routing. For clarity, only the left audio channel is shown; the right audio channel is identical. The **MONO** switch is common to both channels. All audio controls are ganged to their counterparts in the right channel.

### FM FRONT END

FM antenna signals are applied through a balun transformer to the antenna coil which drives a field-effect transistor RF amplifier. The signals from the RF amplifier are fed through a double-tuned RF tank circuit to the mixer, which converts the carrier frequency to the 10.7 MHz intermediate frequency. Careful attention to thermal and electrical characteristics has minimized drift, thus obviating the necessity for AFC. A four section tuning capacitor tunes antenna, inter-stage, and oscillator circuits which provide exceptional selectivity and spurious signal rejection.

### FM IF AMPLIFIER

The IF amplifier consists of one L-C and two ceramic filters and five stages of IF amplifiers which include 3 stages of limiting. The characteristics of these ceramic filters are ideal in that phase linearity of the 200 kHz passband assures the elimination of a major source of high

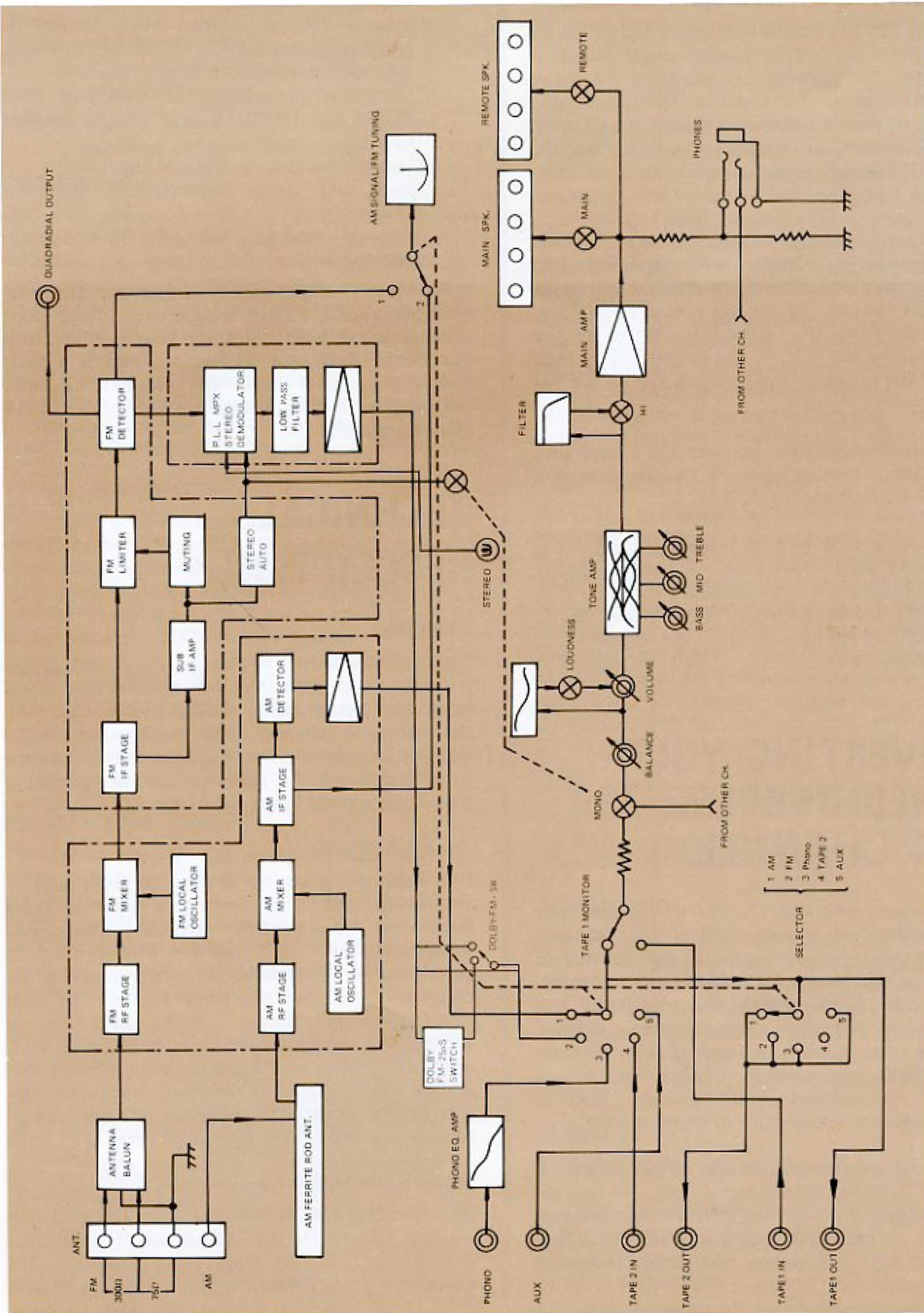


Figure 7. Functional Block Diagram.

frequency distortion and loss of stereo separation. Sharp passband cutoff slopes improve selectivity, permitting reception of closely spaced channels. The Model 2220B utilizes symmetrical diode limiter circuits consisting of high performance Gold Bond Hot Carrier type diodes and IF limiter amplifier with a very small dynamic aperture. Thus, undesirable Amplitude Modulation is removed from the IF signal within the limiter and a good capture ratio is maintained. The amplified and symmetrically limited FM signals are fed to the highly linear discriminator circuit. The detected audio signals are then distributed to the multiplex decoder circuit and the quadrantal output jack.

### FM STEREO DEMODULATION

The stereo composite signal obtained from the discriminator output is first fed to the FET muting circuit, then to the phase locked loop stereo demodulator IC circuit and decoded into both left and right channel signals. Each left and right channel signal is then applied to the 19 kHz low pass filter (LPF) and de-emphasis networks to remove the undesired switching components from the signal. It is then fed to the two audio amplifiers consisting of NPN-PNP direct-coupled feedback pair transistors and amplified to the required signal level of about 755mV RMS. Finally, each amplified signal is fed to the **SELECTOR** switch. The phase locked loop IC in the multiplex stereo demodulator circuit is equipped with a separate automatic Stereo/Monaural switching circuit. The circuit examines the input signal intensity and actuates the stereo demodulator and stereo indicator lamp automatically when the input signal is of sufficient strength to provide high quality stereo reception. When the input signal intensity is insufficient for this purpose, the stereo signal is automatically changed to a monaural signal to ensure quality reception and a high signal-to-noise ratio.

### MUTING CIRCUIT

In the absence of an FM carrier, all FM receivers inherently produce interstation noise. The muting circuit eliminates this noise, providing noise free tuning from station to station. A muting circuit consisting of a two transistor noise amplifier and an IC has been incorporated in the Model 2220B. The muting circuit also senses a detuned condition by sampling the DC offset at the discriminator output thus completely muting out the side slope spurious response of the unit. The circuit has been designed to minimize annoying switching noise as the tuning band is scanned.

### AM TUNER

The AM tuner portion of the 2220B is composed of an advanced integrated circuit (incorporating an RF amplifier, local oscillator, mixer, IF amplifier, detector and signal strength indication amplifier) and one transistor amplifier to amplify the detected audio signals. A three section variable capacitor improves spurious response rejection.

The ceramic filters utilized in the AM IF amplifier are designed for high selectivity and wide bandwidth for interference free, high quality AM reception. Following the AM IF amplifier, the AM detector recovers the audio modulation and presents this signal to the **SELECTOR** switch. The AM tuner and IF amplifier incorporate an automatic gain control circuit which maintains a constant volume level for all stations in the AM band.

### SELECTOR SWITCH

The Model 2220B has the capability to operate from a variety of program sources, such as AM or FM broadcasts, turntable (**PHONO**), tape player, or any other source capable of providing 200 mV output level (**AUX**). The **SELECTOR** switch connects the inputs of the **TONE** control amplifiers to the desired source.

### TAPE 1 MONITOR SWITCH

The **TAPE 1 MONITOR** switch selects between source and **TAPE 1 INPUT** jacks. When the **TAPE 1 MONITOR** switch is in its normal "out" position, the preamplifier receives its input from the **SELECTOR** switch. When the **TAPE 1 MONITOR** switch is depressed, the preamplifier receives its input from the **TAPE 1 IN** jacks.

### PHONO EQ AMPLIFIER

Phono signals of up to 100 mv can be handled without overloading. The equalization network provides precise equalization to the RIAA standard and sets the voltage gain of the phono preamplifier to 40 dB (at 1 kHz).

### MONO FUNCTIONS

When the **MONO** pushswitch is in the "in" position, the two channels are connected together through mixing resistors. In addition, the left and right channel tape input signals are connected together through the same resistor network. This facility allows all inputs to be converted to the monophonic mode.

## CONTROL CIRCUITS

The control circuits portion of the Model 2220B consists of the **BALANCE**, **VOLUME**, **BASS**, **MID**, **TREBLE**, and **HI FILTER**, controls. All controls affect the left and right channels simultaneously. With the controls set for flat response and volume control at maximum, the overall voltage gain from any high-level input to the loudspeaker terminals is approximately 37 dB.

### BALANCE CONTROL

The **BALANCE** control is a full range control which permits attenuation of each channel to cutoff. The change of attenuation in each channel as the control is moved from center has been designed to maintain total apparent loudness from both channels. This feature makes it a true stereo balance control.

### VOLUME CONTROL

The **VOLUME** control attenuates both channels simultaneously and maintains tracking to within 3 dB at any point of attenuation to -50 dB from maximum. Since the control is situated at the input of the tone amplifier, there is no possibility of overloading the amplifier stages under maximum rated output conditions. Thus, distortion is kept to a minimum. After attenuation by the **BALANCE** and **VOLUME** controls, the signal is applied to the tone control amplifier.

## TONE CONTROL AMPLIFIER

The **TONE CONTROL AMPLIFIER**'s circuitry uses a continuously variable NF type configuration. The signal from the **TONE CONTROL AMPLIFIER** feeds the HI filter circuit when the **HI FILTER** is activated.

## AMPLIFIER

The amplifier section of the Model 2220B is a direct coupled, full complimentary circuit providing 20 watts RMS output per channel (with both channels driven into 8 ohms) to the speaker systems. The Model 2220B utilizes current limiting and thermal compensation circuits to provide safe, highly stable operating conditions. The silicone output devices used in the power amplifier section provide a large collector dissipation margin. A speaker protection relay protects the speakers in the event of transistor failure, and eliminates low frequency transients when the unit is turned on and off.

# GENERAL SPECIFICATIONS

## POWER AMPLIFIER SECTION:

RATED POWER OUTPUT . . . . .	20 WATTS PER CHANNEL, CONTINUOUS AVERAGE POWER, BOTH CHANNELS DRIVEN.
POWER BAND . . . . .	20Hz to 20kHz
TOTAL HARMONIC DISTORTION . . . . .	0.5%
LOAD IMPEDANCE . . . . .	80HMS

INTERMODULATION DISTORTION . . . . .	0.5%
(any combination of two frequencies at or below rated power)	
FREQUENCY RESPONSE . . . . .	20 Hz to 20 kHz $\pm$ 1.0 dB
(from high level inputs)	
DAMPING FACTOR . . . . .	40

**PREAMPLIFIER SECTION:**

High Level:

Input Sensitivity and Impedance . . . . .	180 mV 50 k $\Omega$
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**PHONO:**

Dynamic Range (ratio of input . . . . .	93 dB
overload voltage to equivalent noise)	
Equivalent Input Noise . . . . .	2.2 $\mu$ V
Sensitivity and Impedance . . . . .	1.8 mV 47 k $\Omega$

**FM TUNER SECTION:**

IHF Usable Sensitivity . . . . .	2.2 $\mu$ V
Quieting Slope . . . . .	50 dB @ 5 $\mu$ V 58 dB @ 10 $\mu$ V 68 dB @ 50 $\mu$ V

Total Harmonic Distortion:

Mono . . . . .	0.3 %
Stereo . . . . .	0.5 %
Selectivity (Alternate Channel) . . . . .	50 dB
Capture Ratio . . . . .	2.5 dB
Stereo Separation at 1 kHz . . . . .	40 dB
Spurious Rejection . . . . .	90 dB
Image Rejection . . . . .	65 dB
IF Rejection . . . . .	80 dB
AM Suppression . . . . .	45 dB

**AM TUNER SECTION:**

Sensitivity . . . . .	25 $\mu$ V
Power Requirements . . . . .	120VAC, 50/60 Hz
At rated output, both channels operating . . . . .	130 Watts
Idling power (volume control at zero) . . . . .	30 Watts

Dimensions:

Panel Width . . . . .	17-3/8 Inches
Panel Height . . . . .	5-3/8 Inches
Depth . . . . .	14 Inches

Weight:

Unit alone . . . . .	23 lbs.
Packed for shipment . . . . .	29.6 lbs.

- b. Do not ship the unit installed in its accessory walnut cabinet; remove the unit from the cabinet before packing.
- c. Pack the unit carefully, using the original material as shown in Figure 8.  
PLEASE NOTE that if you have discarded, lost, or damaged the packing material, new packing material may be obtained by writing to the Marantz Technical Services Department. The carton, its fillers, and packing instructions will be returned to you at a nominal charge.
- d. Ship via a reputable carrier (do not use Parcel Post) and obtain a shipping receipt from the carrier.
- e. Insure the unit for its full value.
- f. Be sure to include your return address on the shipping label.

## SERVICE NOTES

### REPAIRS

Only the most competent and qualified service technicians should be allowed to service the Model 2220B. The Marantz Company and its factory-trained warranty station personnel have the knowledge and special equipment needed for repair and calibration of this precision instrument.

In the event of difficulty, refer to the list of Authorized Marantz Service Stations packed with the Model 2220B, or write directly to the Marantz Technical Services Department, P.O. Box 99, Sun Valley, California 91352, U.S.A., for the name and address of the Marantz warranty or authorized service station nearest your home or business. Please include the model and serial number of your unit together with a full description of what you feel is abnormal in its behavior.

### REPACKING FOR SHIPMENT

Should it become necessary to repack your Model 2220B for shipment to the factory, to an authorized service station, or elsewhere, please observe the following precautions:

- a. Do not ship your unit to the factory without an Authorized Return Label, which the Marantz Company will supply if the description of difficulties appears to warrant factory service.

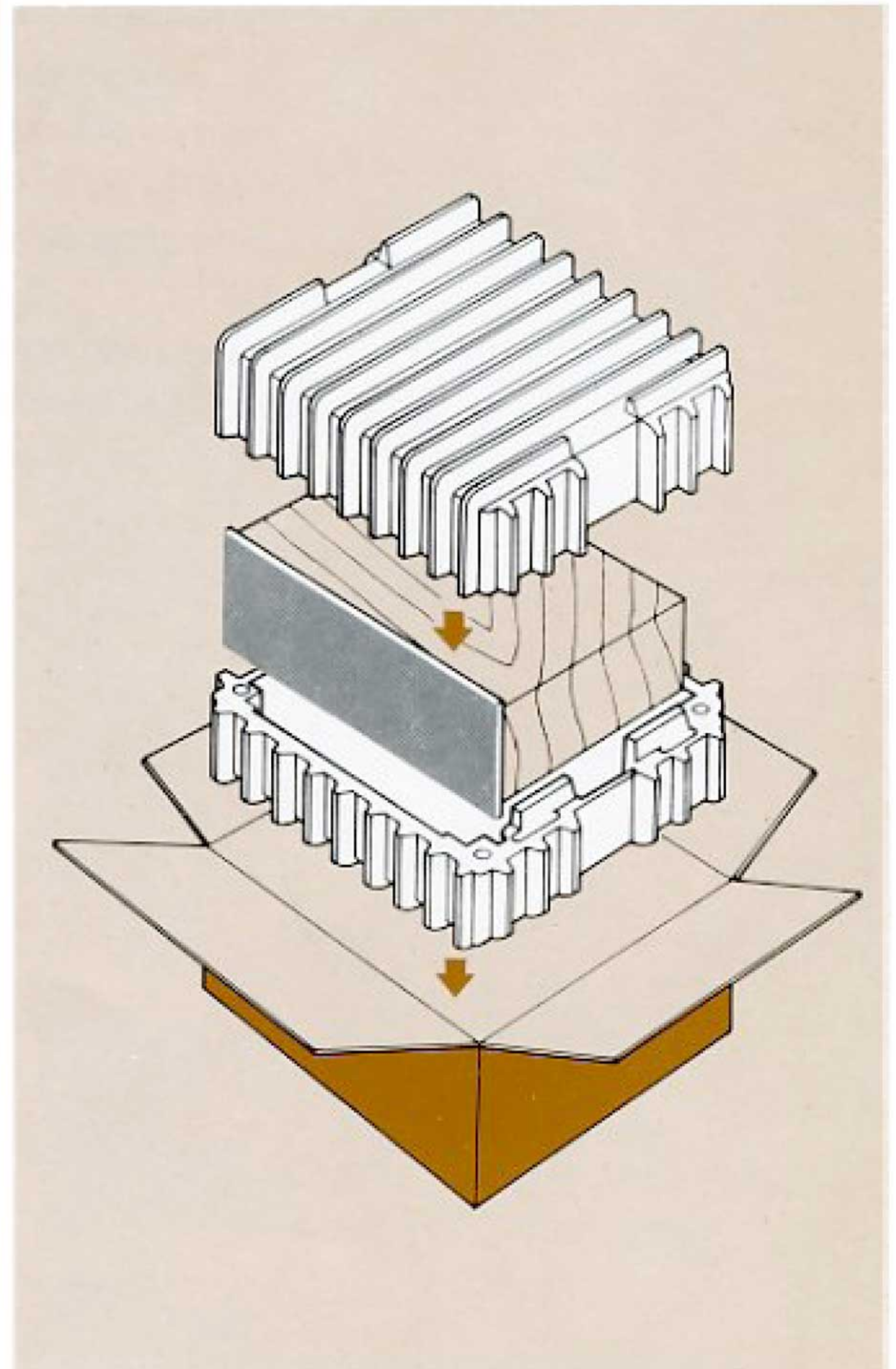


Figure 8. Packing Instructions

The Sound of Marantz  
is the compelling warmth of a Stradivarius.  
It is a dancing flute, a haughty bassoon  
and the plaintive call of a lone French horn.  
The Sound of Marantz is the sound of beauty,  
and Marantz equipment is designed to bring you  
the subtle joy of its delight.  
Wonderful adventures in sound await you  
when you discover that the Sound of Marantz  
is the sound of music at its very best.



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