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Model 2440 Quadradiant 4 Adapter Amplifier

Handbook of Instructions

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**Model 2440
Quadradial 4
Adapter Amplifier**

MARANTZ CO., INC. · P.O. BOX 99 · SUN VALLEY, CALIFORNIA · 91352
A WHOLLY-OWNED SUBSIDIARY OF SUPERSCOPE INC., SUN VALLEY, CALIFORNIA 91352

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REGISTRATION FOR MARANTZ 3-YEAR GOLDEN WARRANTY

Model: Marantz Model 2440 _____

Serial No. _____

Purchaser's Name _____

Purchased From (Name) _____

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Price Paid \$ _____ Date Purchased _____

Date Warranty Reply Card Mailed _____

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PURCHASER'S RECORD ►

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GENERAL DESCRIPTION

The Marantz Model 2440 Quadradial Adaptor-Amplifier converts any stereo system with tape-source monitor feature to a full-featured 4-channel system. The 2440 incorporates Marantz' exclusive Vari-Matrix circuit which simulates 4-channel sound from normal 2-channel stereo programs, and is capable of reproducing 4-channel sound from any matrix-encoded source. The 2440 will also reproduce any discrete 4-channel program as well as regular stereo and monaural programs. An optional plug-in decoder adapts the 2440 for specific matrix systems such as Columbia's SQ or Electro-Voice's Stereo 4.

Optional Accessories Are:

- SQA-1 Plug-In SQ Decoder with Front-Rear Logic
- RC-4 Remote Balance and Volume Control
- WC-22 Walnut Cabinet

FOREWORD

To obtain optimum performance and enjoyment from the Model 2440, please study these instructions carefully. Installation and operation are not complicated if step-by-step instructions are followed.

This manual is divided into two parts. The first covers installation and operation in simple, non-technical language. The second describes the Model 2440 in more detail with technical specifications and functional explanations.

For quick identification of the controls and connections, references to them are printed in bold face type, exactly as they appear on the front and rear panels of the Model 2440.

These instructions assume your present system includes a stereo receiver (tuner, preamp, and amp sections on a single chassis). If your system includes a stereo integrated amplifier (preamp and amp sections only on a single chassis), or a stereo preamplifier (with separate amp and tuner chassis), procedures are the same. References to "receiver" in these cases refer to your integrated amplifier or preamplifier.

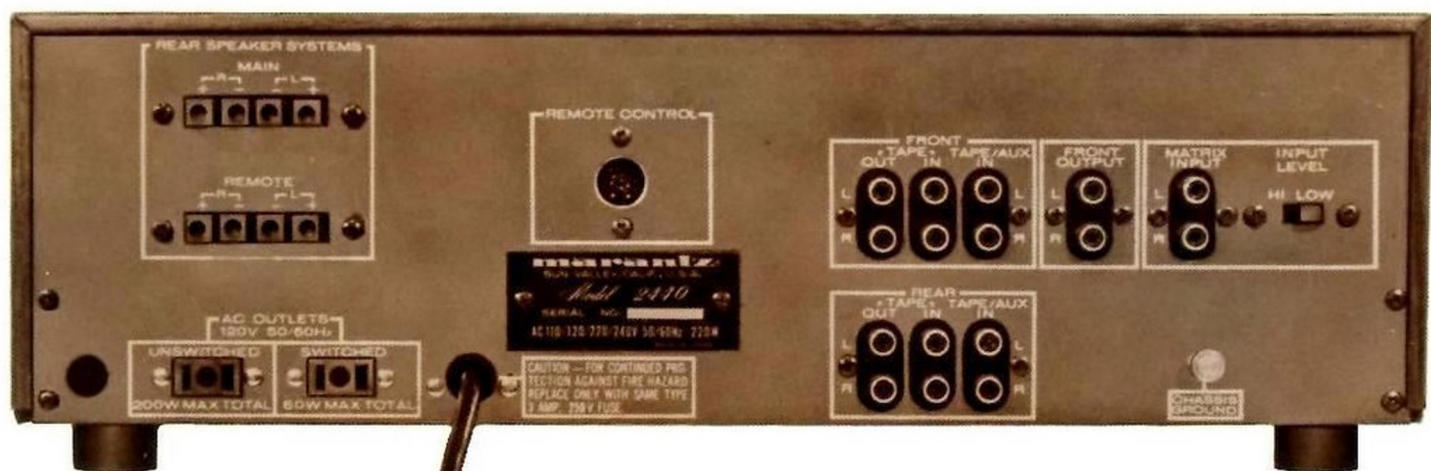


Figure 1. Rear Panel Connection Facilities

CONNECTING THE 2440

1. Turn the receiver off and unplug it from the A.C. wall outlet.
2. Remove all cables from the receiver's monitor (TAPE IN and TAPE OUT) jacks.
3. If you intend to stack the 2440 and receiver, place the receiver on top of the 2440. You need not disturb the receiver's other connections (phono, antenna, speakers, etc). If units will not be stacked, place the 2440 close to the receiver.
4. Using shielded audio cables with phono plugs, make these connections between the receiver and the 2440:

RECEIVER		2440
TAPE OUT (LEFT)	to	MATRIX INPUT L
TAPE OUT (RIGHT)	to	MATRIX INPUT R
TAPE IN (LEFT)	to	FRONT OUTPUT L
TAPE IN (RIGHT)	to	FRONT OUTPUT R

5. Using No. 18 or heavier lamp cord (zip cord), connect main rear speakers to the 2440 as follows:

LEFT REAR SPEAKER	2440
-or GND or NEG or COMM or 0	to MAIN L-
+ or HOT or POS or 1	to MAIN L+
RIGHT REAR SPEAKER	2440
-or GND or NEG or COMM or 0	to MAIN R-
+ or HOT or POS or 1	to MAIN R+

6. If in Step 2, above, you disconnected a stereo tape deck, re-connect it to the 2440 as follows:

TAPE DECK		2440
LEFT INPUT	or LINE IN to	FRONT TAPE OUT L
RIGHT INPUT	or LINE IN to	FRONT TAPE OUT R
LEFT OUTPUT	or LINE OUT to	FRONT TAPE IN L
RIGHT OUTPUT	or LINE OUT to	FRONT TAPE IN R

7. Put the receiver's tape-source monitor switch in the TAPE position.
8. Set the controls as follows:

RECEIVER CONTROLS

Volume	Mid (12 o'clock) position
Balance	Mid position
Source Selector	Phono or FM
Speakers	ON

2440 CONTROLS

FRONT L-R balance	Mid position
REAR L-R balance	Mid position
FRONT-REAR balance	Mid position
mode	Vari-Matrix position
dimension	Mid position
remote control	LOCAL
rear bass and rear treble	
controls	Mid position
master volume	Minimum (fully counterclockwise)
MAIN SPKR	ON (in)
REMOTE SPKR	OFF (out)
TAPE MON	OFF (out)
TAPE/AUX	OFF (out)

9. Plug the 2440 into the A.C. wall outlet or into your receiver's A.C. outlet.
10. Plug the receiver into the A.C. wall outlet.



Figure 2. Front Panel Controls and Jack

11. Turn the power switches of both units ON.
12. If phono is selected, put on a stereo record. If FM is selected, tune to a stereo broadcast.
13. Increase the 2440's master volume control to a comfortable listening level.
14. Increase or decrease the receiver's volume control until a pleasant front-rear balance is achieved.

NOTE: If obvious distortion exists at moderate listening levels, move the 2440's rear panel **MATRIX INPUT LEVEL** switch from **LOW** to **HIGH**.

Your complete 4-channel system is now operative, and you may experiment with the various controls to discover their effects. The remainder of this manual explains how to use your system most effectively.

SOURCE DEVICES

2-channel

2-channel playback devices (record changer, tuner, tape player, etc.) may be connected to the receiver as usual.

A 2-channel tape recorder may be connected to the **FRONT TAPE IN** and **TAPE OUT** jacks of the 2440.

4-channel

Discrete 4-channel playback devices (Q-8 cartridge player, 4-channel reel-to-reel player, RCA/JVC discrete disc demodulator, etc.) may be connected to the **TAPE/AUX IN** or **TAPE IN** jacks of the 2440.

A discrete 4-channel tape recorder may be connected to the **TAPE IN** and **TAPE OUT** jacks on the 2440.

REMOTE SPEAKERS

If your receiver will accommodate both main and remote speaker systems, a second group of four speakers may be set up in another room. Connect these four remote speakers to the receiver and 2440 as you did the main speakers, but use the **REMOTE** speaker terminals on your receiver and 2440.

Your receiver's speaker switching now permits activation of **MAIN FRONT** and/or **REMOTE FRONT** speaker pairs. Similarly, your 2440's speaker switching permits activation of **MAIN REAR** and/or **REMOTE REAR** speaker pairs. With the 2440, the (MAIN and/or REMOTE) speaker pair is "on" when the pushswitch is "in".

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

SPEAKER PHASING

To assure the best 4-channel separation and frequency response, the following tests will verify that all four speakers are correctly phased.

1. After the speakers are connected to the receiver and the 2440, place all four speakers in the center of the room.
2. Set mode switch at **MONO**. Play a record (or radio or tape) with strong bass tones, at a low volume level. Center the **FRONT L-R** and **REAR L-R balance** controls. Set **FRONT-REAR balance** control at extreme **FRONT** position.
3. Position the front (left and right) speakers about six inches apart, face-to-face. Listen, particularly to the apparent loudness of the

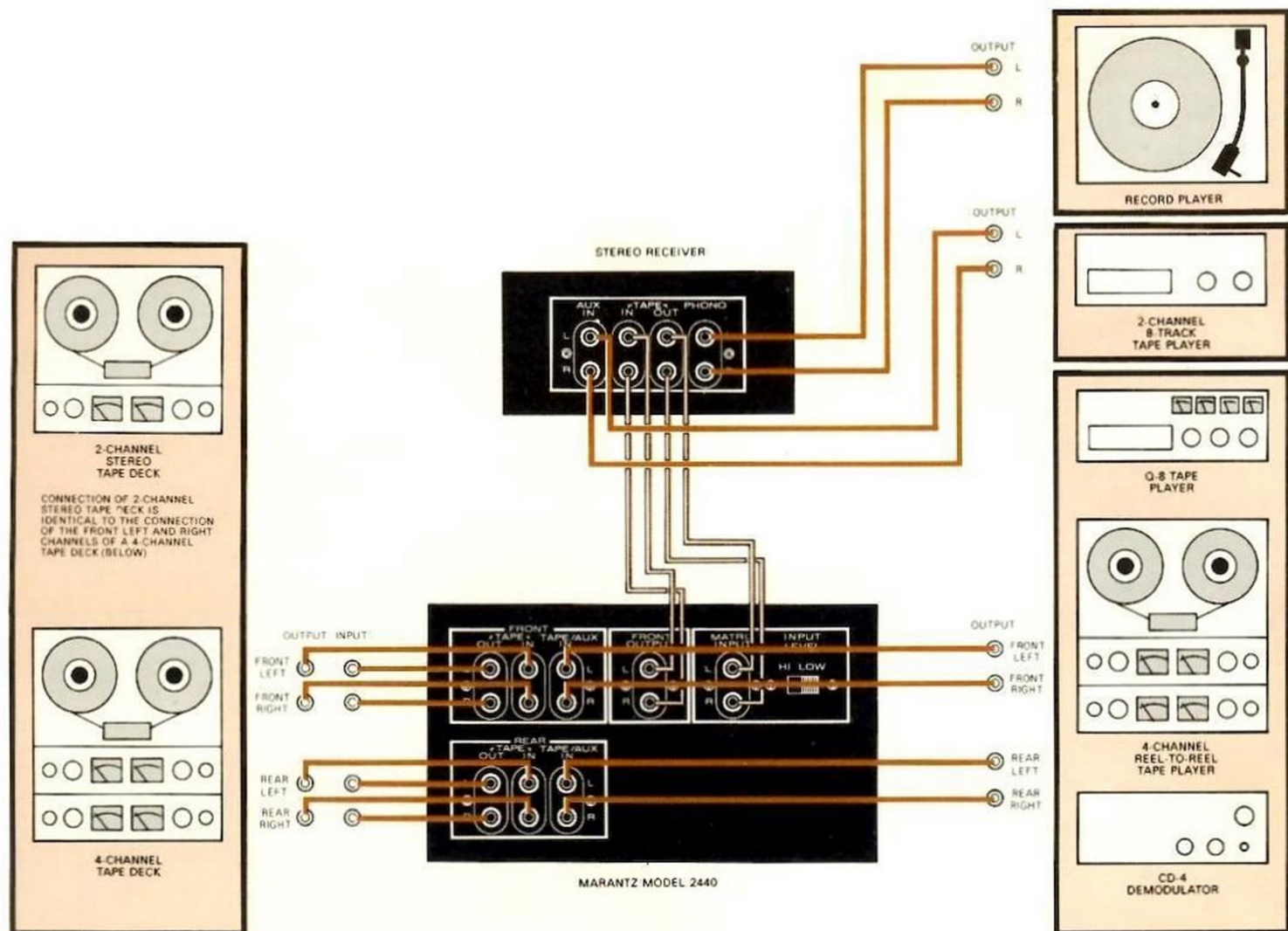


Figure 3. Connection Diagram

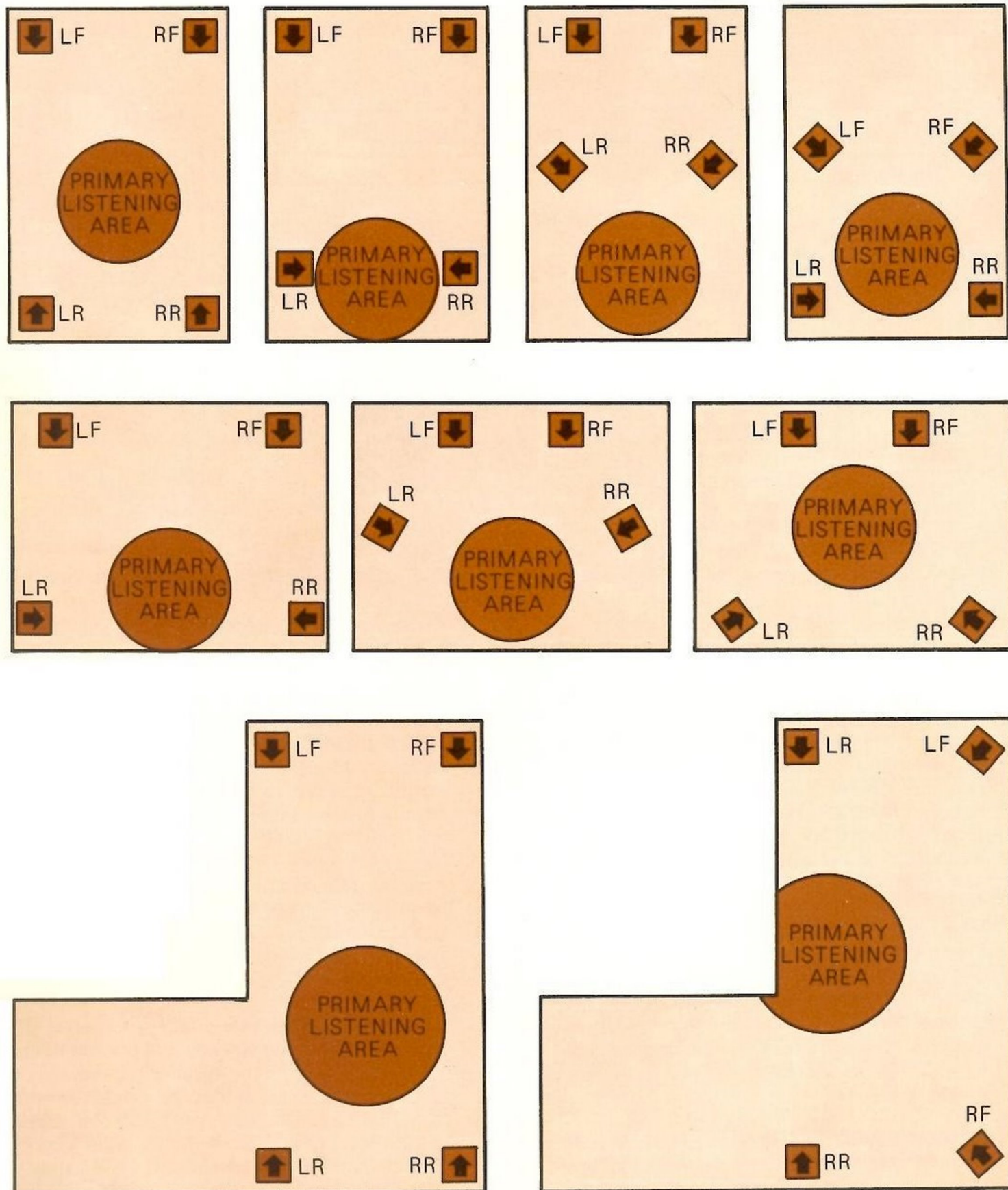
bass tones.

4. Next, turn off all power, but do not disturb the volume, tone, or balance settings. Reverse connections on the right-front 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 front (left and right) speakers. If the bass tones now sound softer, then turn off all power, and reconnect the right-front speaker as you first had it connected.
5. Now check phasing between the two left (front and rear) speakers. Set both **FRONT L-R** and **REAR L-R** balance controls at extreme **L** position, and set **FRONT-REAR** balance for equal loudness from the two speakers. Position the two speakers face-to-face, about six inches apart, and listen for bass as in (3).
6. Turn off power. Experimentally reverse connections only on the left rear speaker. Turn on power and listen. Retain the left-rear speaker connections which give the "best bass" as in (4).
7. Last, check phasing between the two rear (left and right) speakers. Center both **FRONT** and **REAR** balance controls. Set **FRONT-REAR** balance control at extreme **REAR** position. Position the two rear speakers face-to-face as before. Listen for bass.
8. Turn off power. Experimentally reverse connections only on the right rear speaker. Listen again to determine the "best bass" method of connecting the right-rear speaker. All speakers will then be in phase, and you may use all controls normally.
9. Once having phased your four speakers, you need not repeat the procedure in the future if you now codify the speaker connections and/or the speaker cables. Any method of codifying is satisfactory, provided it enables you in the future to duplicate your now-correct hookup between speakers and amplifiers.

SPEAKER PLACEMENT

Experimentation will reveal the best speaker locations in your room. The following placements are suggested.

Figure 4. Speaker Placement



FRONT PANEL FEATURES

MODE SWITCH

MONO

When the **mode** switch is in the **MONO** position, all input signals are summed. Speakers are driven as follows:

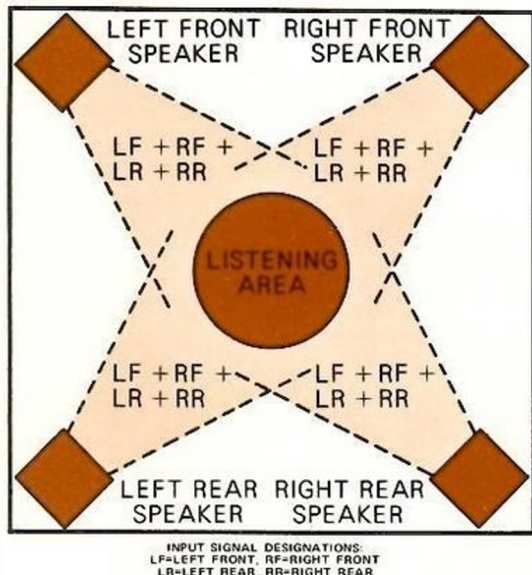


Figure 5. Mono Mode Sound Dispersion

Use the **MONO** position for a) Phasing speakers and b) Playing a monaural source such as TV audio, AM radio, or monaural records through all four channels.

2 CH

When the **mode** switch is in the **2 CH** position, left-front and left-rear inputs are summed. Right-front and right-rear inputs are summed. Speakers are driven as follows:

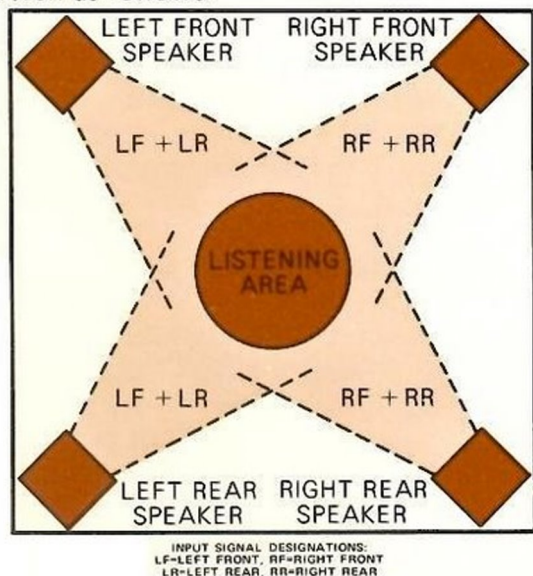


Figure 6. 2 CH Mode Sound Dispersion

Use the **2 CH** position for playing regular stereo records without synthesizing rear channels.

DISCRETE

When the **mode** switch is in the **DISCRETE** position, each input signal goes to its respective output channel. Speakers are driven as follows:

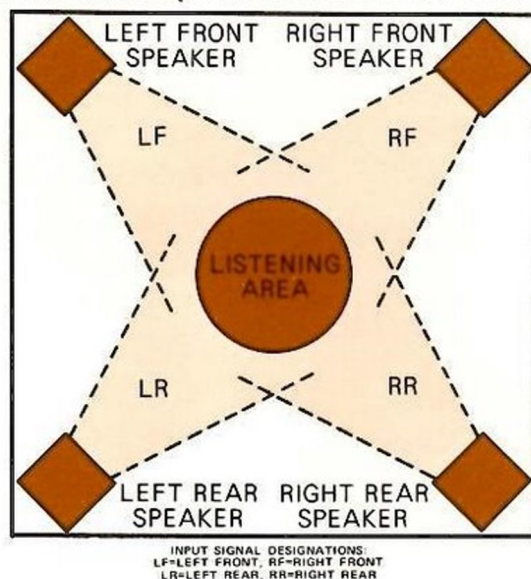


Figure 7. Discrete Mode Sound Dispersion

Use the **DISCRETE** position for a) Playing discrete 4-channel sources such as Q-8 cartridges, or JVC/RCA records, and b) Playing 2-channel stereo programs through front speakers only.

VARI-MATRIX

When the **mode** switch is in the **VARI-MATRIX** position, rear input signals are internally disconnected. Left-front and right-front inputs feed left-front and right-front speakers, as in the **DISCRETE** MODE. Rear channel signals are "synthesized" or derived from the left-front and right-front input signals. The characteristics of the rear channel signals are varied by the **dimension** control. Speakers are driven as follows:

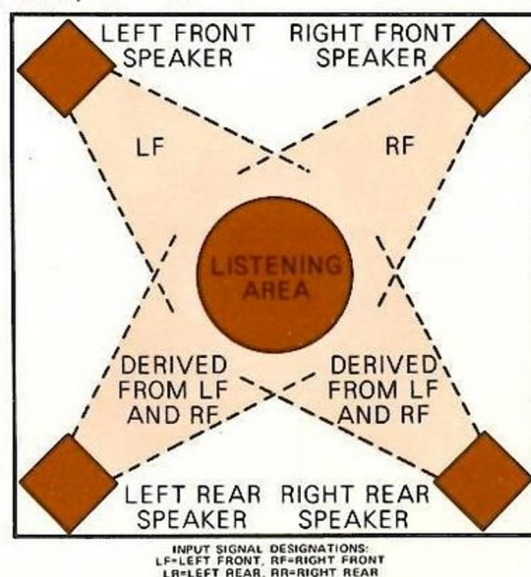


Figure 8. Vari-Matrix Mode Sound Dispersion

SQ DECODER 4 CHANNEL

With the **mode** switch on **SQ DECODER**, any rear input signals to the 2440 are internally disconnected. The rear channel outputs are, instead, derived from front channel signals which have been processed by the plug-in decoder. The characteristics of these derived rear channel outputs are determined by the type of plug-in decoder.

Use the **SQ DECODER** position only with an optional plug-in decoder installed. Without this optional decoder, there will be no output when the **mode** switch is on **SQ DECODER**.

DEMENSION

The **dimension** control is operative only when the **mode** switch is set to the **VARI-MATRIX** position. This control optimizes the 4-channel **VARI-MATRIX** effect.

BALANCE CONTROLS

The Model 2440 has three **balance** controls: **FRONT L-R**, **REAR L-R**, and **FRONT-REAR**. The **FRONT L-R** slide knob adjusts the balance between the front-left and right channels. The **REAR L-R** slide knob adjusts the balance between the rear left and right channels. The **FRONT-REAR** slide knob adjusts the balance between front and rear pairs of channels. To balance the front channels, first set the **FRONT-REAR** control all the way to the **FRONT**, to silence the rear speakers while you adjust the **FRONT L-R** balance control. To balance the rear channels, move the **FRONT-REAR** control all the way to the **REAR**, and then adjust **REAR L-R** balance. Now you are ready to adjust the **FRONT-REAR** control for the most pleasing overall balance.

REAR BASS AND REAR TREBLE CONTROLS

These control the low and high frequency response of the rear channels. Your receiver controls the tone of the front channels. With both **rear bass** and **rear treble** controls set at the center position, frequency response of the rear channels becomes flat. Turn either tone control knob clockwise to boost, or counter-clockwise to attenuate its respective frequency range.

TAPE MON SWITCH

With this pushswitch "in", the signal connected to the rear panel **TAPE IN** jacks is played back. The signal at the **MATRIX INPUT** (or **TAPE/**

AUX inputs if the **TAPE/AUX** pushswitch is "in") continues to feed the **TAPE OUT** jacks, regardless of the position of the **TAPE MON** switch.

Operation is as follows:

To play back a source connected to the **TAPE IN** jacks, put the monitor switch "in".

To monitor a recording on a three-head tape recorder while a program is being recorded, be sure the **mode** switch is in the **DISCRETE**, **VARI-MATRIX**, or **SQ DECODER** position. The recorded signal may be compared to the source signal by using the **TAPE MON** switch.

To record a discrete 4-channel source on a 4-channel recorder, put the **mode** switch in **DISCRETE**.

To record a 2-channel stereo program on a 2-channel recorder, put the **mode** switch in the **2 CH** or **discrete** position.

To record a discrete 4-channel source on a 2-channel recorder, put the **mode** switch in the **2 CH** position. Leave the **TAPE MON** button "out" while recording. This will feed the sum of the left-front and left-rear inputs to the left-front **TAPE OUT** jack, and the sum of the right-front and right-rear inputs to the right-front **TAPE OUT** jack.

To record any type of source on a monaural recorder, put the **mode** switch in the **MONO** position. Leave the **TAPE MON** button "out" while recording.

TAPE/AUX SWITCH

With this switch "in", the signal connected to the **TAPE/AUX** jacks on the rear panel is played back.

REMOTE CONTROL SWITCH

This switch assigns control of balance and volume to the optional RC-4 Remote Control. When the RC-4 is not used, the remote control switch must be in the LOCAL position.

MAIN AND REMOTE SPKR SWITCHES

These switches select the loudspeaker terminals to which audio power is fed. The **MAIN** and **REMOTE** groups of loudspeakers may be operated separately or simultaneously. With both speaker switches in the "out" position, all loudspeakers are disconnected. The signal at the rear **phones** jack is not affected by the **MAIN** and **REMOTE** switches.

POWER SWITCH

This pushswitch turns the power on and off.

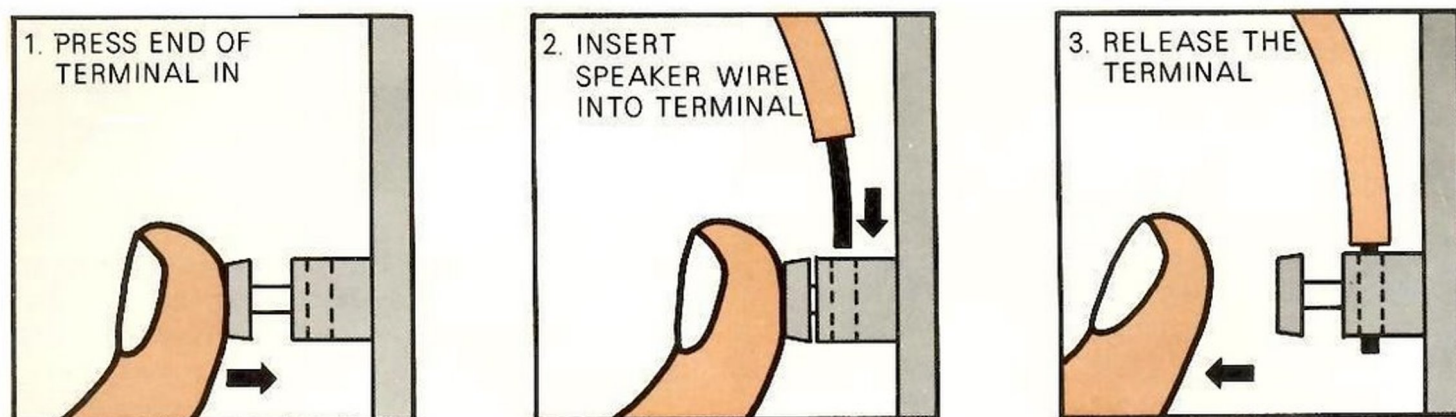


Figure 9. Quick-Connect Speaker Terminal

When the **power** switch is "in" the meter lamps illuminate. Be sure to turn the **power** pushswitch off before plugging or unplugging the power cord.

REAR PHONES JACK

This jack accepts a standard 3-conductor phone plug employed with standard stereo or 4-channel headphones. When using 2-channel headphones, insert the plug into the phones jack on your receiver. When using 4-channel headphones, insert the front plug into the phones jack on your receiver and the rear plug into the **rear phones** jack on your 2440. Either high-or low-impedance headphones may be used.

METERS

The meters on the front panel indicate the presence of an audio signal in each of the four channels. Relative output levels are indicated to assist in setting four channel balance.

MASTER VOLUME

This control regulates volume of all four channels simultaneously.

REAR PANEL FEATURES

MATRIX INPUT LEVEL SWITCH

Normally this switch is in the **LOW** position, providing an input sensitivity of 150mV. If the sound is distorted, the tape output level of the receiver may be too great. In this case, put the **INPUT LEVEL** switch in the **HIGH** position. This results in a sensitivity of 750mV.

MATRIX INPUT JACKS

These two jacks connect to the **TAPE OUT** jacks of the receiver (Refer to "CONNECTING THE 2440", page 2).

FRONT OUTPUT JACKS

These two jacks connect to the **TAPE IN** jacks on the receiver (Refer to "CONNECTING THE 2440", page 2).

TAPE IN AND TAPE OUT JACKS

These four jacks are for the connection of a 2-channel or 4-channel tape recorder. (Refer to "SOURCE DEVICES", page 3).

REAR SPEAKER SYSTEM TERMINALS

Eight quick-connect terminals are provided; four for main speakers and four for remote speakers. (Refer to "CONNECTING THE 2440", page 2 , and "REMOTE SPEAKERS." page 3 .)

Terminal work as follows:

- 1) Press terminal in
- 2) Insert speaker wire
- 3) Release terminal

POWER CONNECTIONS

The Model 2440 is equipped with a universal power transformer to permit operation at any standard AC line voltage and frequencies of 50 Hz to 60 Hz. For operation at line voltages other than indicated on the rear panel nameplate, have a qualified technician perform the simple wiring changes necessary.

CONNECTION TO AC OUTLET

With the front panel power pushswitch "OUT", plug the line cord into an electrical outlet supply-

ing the proper voltage.

CAUTION: DO NOT PLUG YOUR MODEL 2440 INTO A DC OUTLET. SINCE SERIOUS DAMAGE WILL OCCUR.

AC CONVENIENCE OUTLETS

Two A.C. outlets, one switched and one unswitched, are provided on the rear panel to supply power to associated components of the system (tape recorder, record player, etc.) The maximum power available from the **UNSWITCHED** and **SWITCHED A.C. OUTLETS** is 200 Watts and 60 Watts, respectively.

REMOTE CONTROL

This rear panel **REMOTE CONTROL** connector and front panel switch are intended for use only with the optional Model RC-4 Remote Control. For use, follow the instructions supplied with the RC-4.

EXTERNAL DECODER CONNECTION

A pocket on the bottom of the chassis will accommodate MARANTZ 4-channel decoders such as the Model SQA-1. For use, follow the instructions supplied with the optional decoder.

TAPE RECORDING

Instructions for connecting a recorder and playing back a tape are given in "SOURCE DEVICES", page 3.

To record, select the desired program source, using the receiver's source selector. If the desired source is connected to the **TAPE/AUX** jacks on the 2440, push the **TAPE/AUX** button "in". Put the recorder connected to the 2440 in the record mode.

For additional information, refer to "MODE SWITCH", page 6, and "TAPE MON SWITCH", page 7.

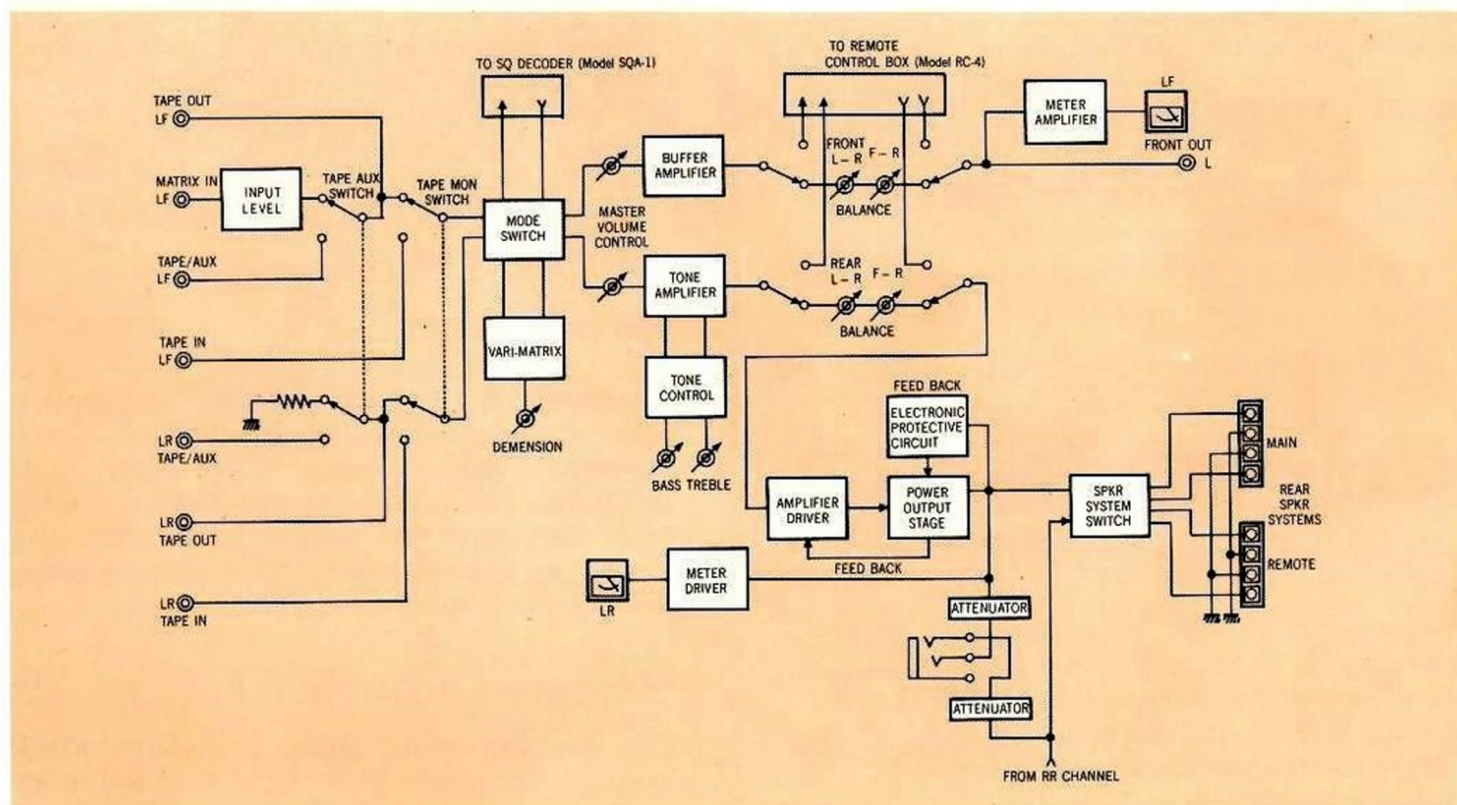
TECHNICAL DESCRIPTION

GENERAL

The block diagram of the Model 2440 is shown in Figure 10. To simplify the description, only the left-front (LF) and left-rear (LR) channels are shown.

The Model 2440 is primarily comprised of the **VARI-MATRIX** circuit for conversion of the 2-channel program source into 4-channel, **TONE CONTROL** circuit for rear channels, two power amplifiers for rear channels, buffer amplifiers for front channels, control circuits, meter circuits and power supply circuit.

Figure 10. Functional Block Diagram



INPUT LEVEL SELECTOR

The 2-channel signal applied to the **MATRIX INPUT** jacks on the rear panel is fed to the **TAPE/AUX** switch through the **INPUT LEVEL** switch. When the **INPUT LEVEL** switch is in the "LOW" position, the input signal is connected directly to the **TAPE/AUX** switch. When the **INPUT LEVEL** selector is in the "HI" position, the input signal is connected to the **TAPE/AUX** switch after having been attenuated by approximately 14 dB.

TAPE/AUX

The **MATRIX INPUT** and front **TAPE/AUX** signals are connected to the front channel section of the **TAPE/AUX** switch. The rear **TAPE/AUX** signals are connected to the rear channel section of the **TAPE/AUX** switch. When the **TAPE/AUX** switch is "in", the signal from the **TAPE/AUX**

terminals is sent to the **TAPE MON** switch. The output of the **TAPE/AUX** switch is sent to the **TAPE MON** switch and to the **TAPE OUT** jacks on the rear panel.

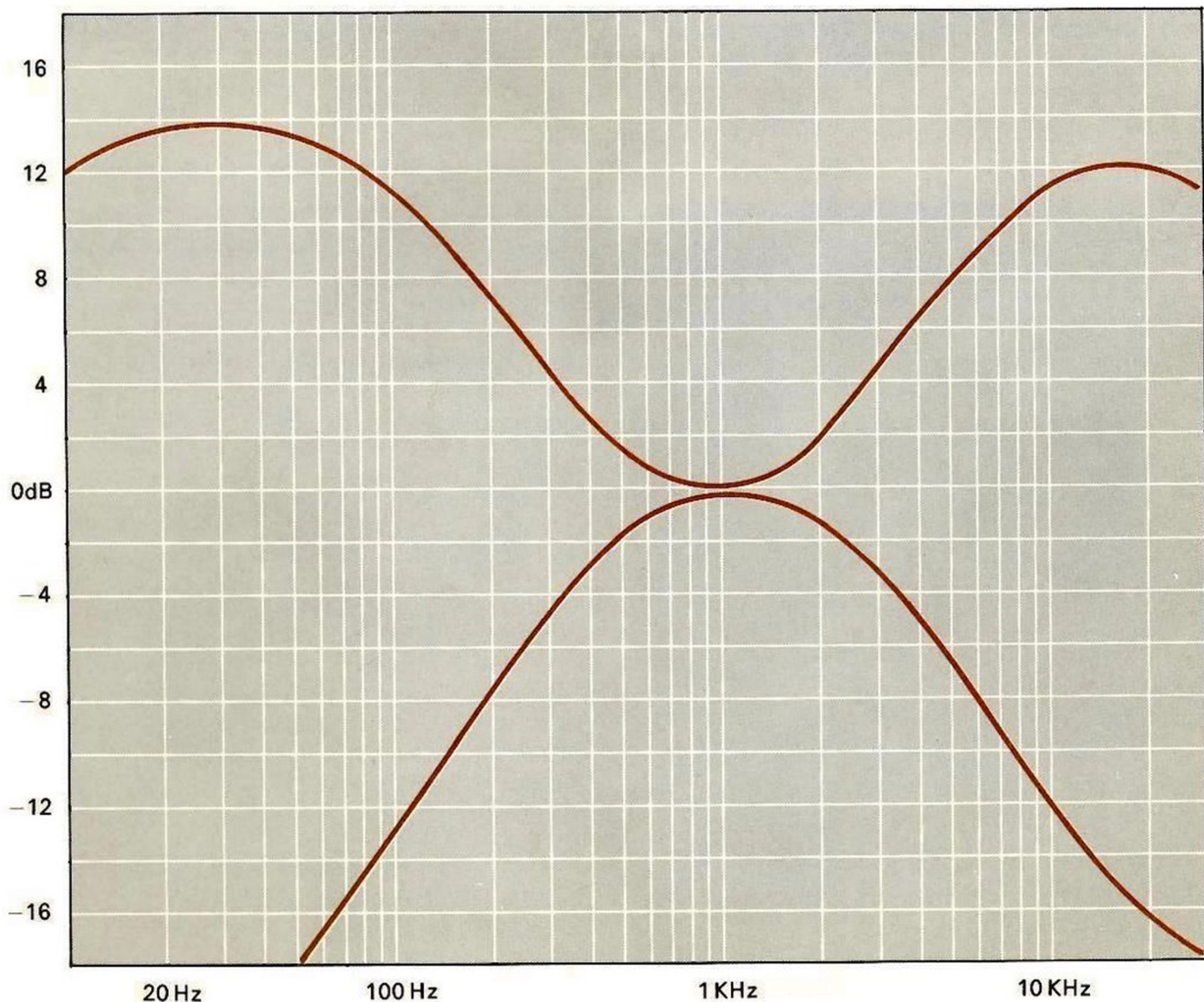
BUFFER AMPLIFIER

The front channel signal levels (LF and RF), are adjusted by the **master volume** control and sent to the buffer amplifier to compensate for the attenuation in the balance/remote control section where the signal is fed through the **remote control** switch.

TONE CONTROL CIRCUIT

The signal levels of the rear two channels (LR and RR) are adjusted by the **master volume** control and fed to the **TONE CONTROL** circuit. The input stage of the **TONE CONTROL** circuit consists of a direct-coupled circuit consisting of

Figure 11. Tone Control Characteristics



an NPN transistor and PNP transistor with bootstrap configuration to produce a high impedance termination for the **master volume** control.

The **TONE CONTROL** circuit is of the NF type with continuously-variable response. The **bass** and **treble** circuits operate on rear channels only. The frequency responses at the maximum boost and cut are shown in the Figure 11. When the **bass** and **treble** controls are set at the center position, the frequency response of the rear channels is flat.

A direct-coupled circuit consisting of NPN and PNP transistors is used at the output of the **TONE CONTROL** amplifier.

POWER AMPLIFIER

Two power amplifiers are incorporated for driving left-rear and right-rear speakers. Each of these amplifiers includes preamplifier, driver, and output circuits. The preamplifier and driver circuits have A.C. negative feedback and D.C. negative feedback, respectively, from the output circuit. This provides superior dynamic characteristics and satisfactory D.C. stability. The output circuit uses a complimentary Darlington configuration

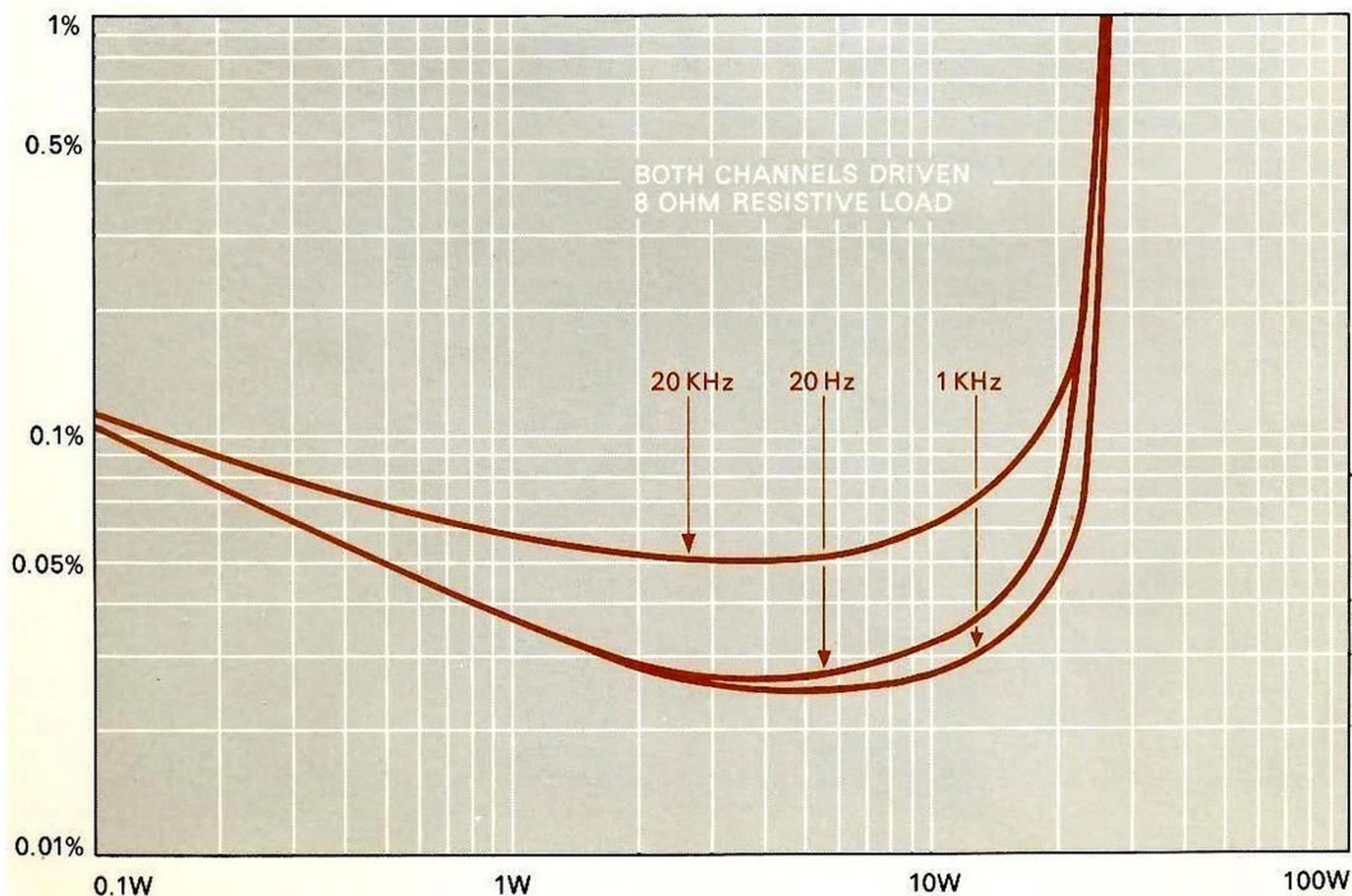
with high - power NPN transistors having superior linearity and sufficient collector loss margin. The output circuit provides a very low output impedance for a good damping factor, as well as sufficient negative feedback to the preamplifier circuit. Figure 12 shows the distortion factor-to-output characteristics of the Model 2440; Figure 13 is the frequency response. The amplifiers incorporate an all-electronic protective circuit which protects the output transistors from breakdown. The protective circuit, comprised of two transistors and two diodes for each channel, limits the maximum current through the output transistors to a safe, predetermined value.

LEVEL METERS

Model 2440 is equipped with four meters which indicate the signal levels of each channel. The meter signals of the front channels are obtained from the output of the **balance control**/remote control section, amplified by the **METER** amplifier, and rectified into D.C. to drive the front channel meters.

The rear channel meters are driven by the output of the power amplifiers which are rectified by the meter driver.

Figure 12. Harmonic Distortion



CAUTION

Please **DO NOT** ship your Amplifier mounted in its accessory walnut cabinet.

Insure amplifier for full value:

Make sure that your correct return address is on shipping label.

Ship via a reputable carrier. **DO NOT USE PARCEL POST.** Be sure to obtain receipt from carrier.

SERVICE NOTES

REPAIRS

Only the most competent and qualified service technicians should be allowed to service the Marantz Model 2440. The Marantz Company and its warranty station personnel have the knowledge and special equipment needed for the repair and calibration of this precision instrument. In the event of difficulty, write directly to the factory (to the attention of the **technical service department**) for the name and address of the nearest Marantz warranty or authorized service station. Please include the model and serial number of the unit together with a description of the problem. If it should ever be necessary to ship the unit to the factory or authorized service station, and your amplifier is mounted in its accessory walnut cabinet, **ALWAYS REMOVE IT FROM THE CABINET BEFORE PACKING.**

DO NOT SHIP THE ACCESSORY WALNUT CABINET.

Pack the unit carefully, using the original packing material. If the packing material has been discarded, lost, or damaged, write to the factory (to the attention of the **technical service department**) for new packing material. Carton, fillers, and packing instructions will be shipped to you at a nominal charge. No Amplifier should be returned to the factory without an Authorized Return Label which the Marantz company will supply if the description of difficulties appears to warrant factory service.

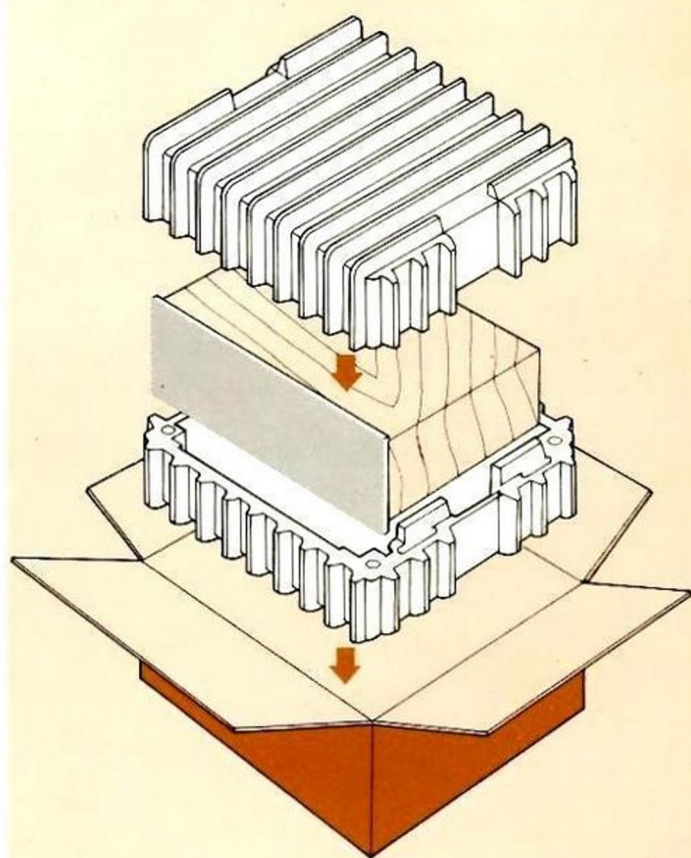


Figure 14. Packing Instructions

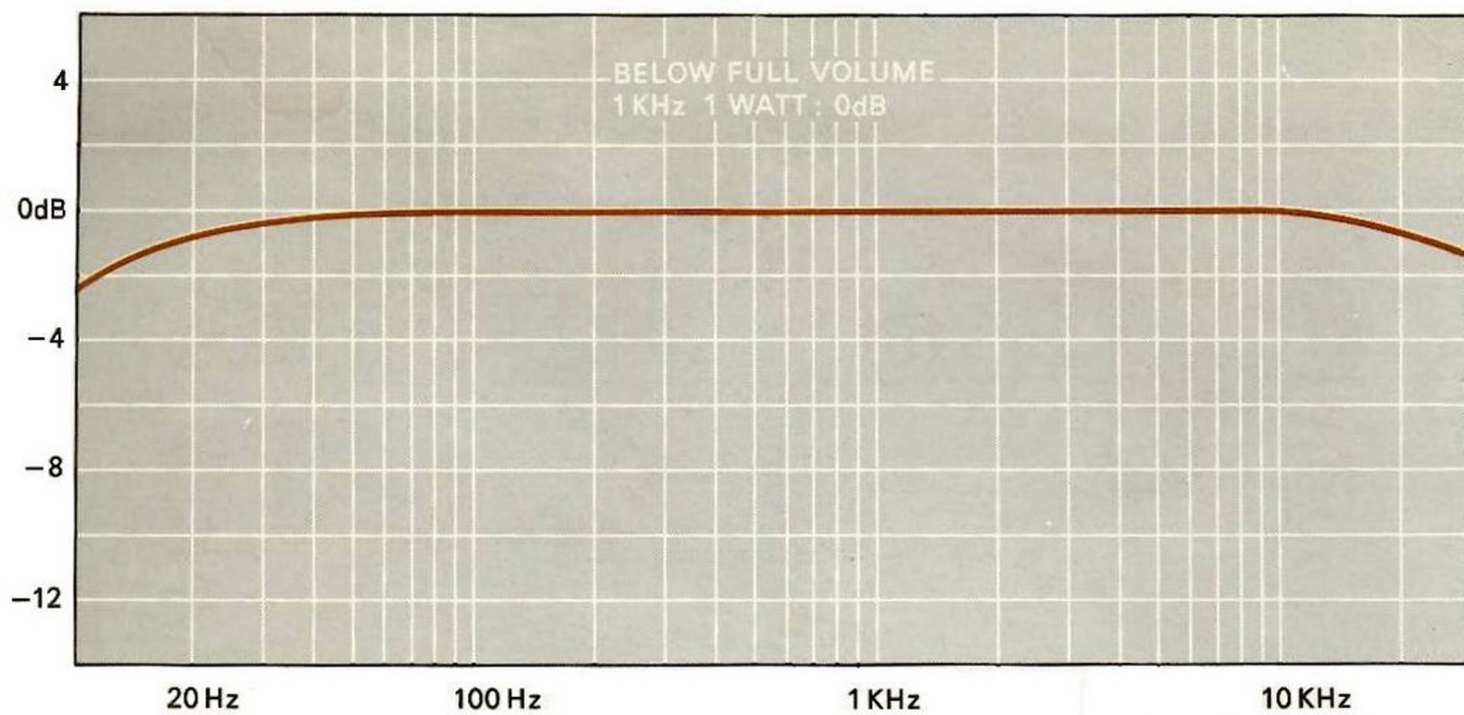


Figure 13. Frequency Response

TECHNICAL SPECIFICATIONS

Rated Continuous (RMS) Power Output per Chennel, Both Channels Operating Simultaneously, 20Hz to 20,000Hz		20 Watts at 4 and 8 ohms 10 Watts at 16 ohms
Comparable Total Music Power (IHF)		60 Watts at 8 ohms
High-level Hum and Noise (Ref. 20 W at 8 ohms)		-80 dB
I.M. Distortion (SMPTE), at Rated Power		0.3%
Distortion decreases as power is lowered		
Total Harmonic Distortion at Rated Power		0.3% Maximum
Distortion decreases as power is lowered		
Power Bandwidth (IHF) for 0.3% THD		5 Hz to 45,000 Hz
Damping Factor (Ref. 8 ohms)		Greater than 45
Input Sensitivity (for 20W at 8 ohms)		150mV
Input Impedance		100K ohms
Channel Separation 20 Hz to 20,000 Hz		30 dB Minimum
Front Channel Maximum Output Voltage for 1% THD		1,000mV
Front Channel Total Harmonic Distortion at 150mV Output		0.1% Maximum
Power Requirement		110/120/220/240V AC 50 to 60 Hz
At Rated Output, Both Channels Operating		220 Watts
Idling Power (Volume Control at Zero)		20 Watts
Dimensions		
Panel Width		17-21/64 Inches
Panel Height		5-25/64 Inches
Depth		14-3/8 Inches
Weight		
Unit alone		24.2 lbs
Packed for Shipment		35 lbs

*These specifications and exterior designs may be changed for improvement without advance notice.

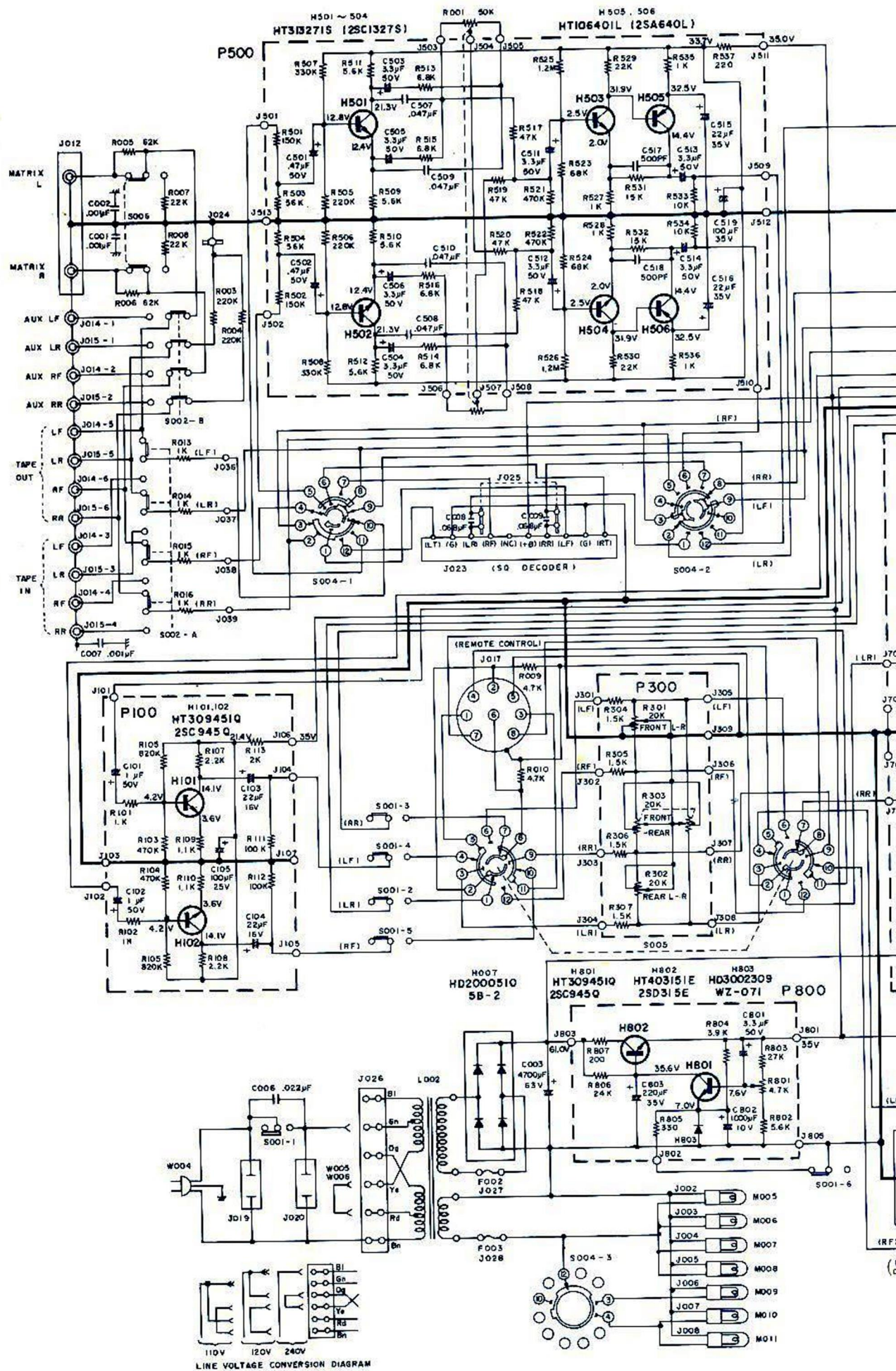


DIAGRAM FOR MODEL 2440

