marantz

Model 4415 Quadradial 4 Receiver

Handbook of Instructions

We Sound Better

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Model 4415
Quadradial 4
Receiver

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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In the event that service is required, all necessary parts and labor will be furnished free of charge during the above stated periods. The conditions of this Warranty, and the extent of the responsibility of MARANTZ COMPANY, INC. under this Warranty, are as follows:

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2. The Warranty extends only in favor of the original, registered owner of the product.

3. The Warranty Registration Card must be transmitted to MARANTZ COMPANY, INC., P. O. Box 99, Sun Valley, California 91352, not later than TEN DAYS from date of purchase.

4. The Warranty will become void if repairs are effected by anyone other than an authorized MARANTZ Service Station.

5. If it becomes necessary to send this product or any defective part to MARANTZ COMPANY, INC., or to an authorized MARANTZ Service Station, all shipping charges must be fully prepaid. If the entire instrument is sent, it must be shipped in its original package. No accessories should be shipped with the product. If any accessories are shipped with the product, MARANTZ COMPANY, INC. shall have no liability whatsoever for loss of or damage to any such accessories, nor for the safe return thereof.

6. This Warranty shall be valid only if the purchase was made within the United States of America. The Warranty shall not apply unless shipment is made by the purchaser to the MARANTZ Service Station from a point within the United States. If the requested rapairs and/or parts exchange are within the terms of this Warranty, MARANTZ COMPANY, INC. will prepay return shipping charges, provided that such return shipment is to be made to an address located within the United States.

7. This Warranty is void if the Serial Number has been altered or removed. This Warranty shall not apply if the product has not been connected or operated in accordance with the instructions furnished by MARANTZ COMPANY, INC. This Warranty shall also be void if the product has been altered or repaired in any way which MARANTZ COMPANY, INC. believes has affected the stability or reliability of the product.

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9. This Warranty does not include the furnishings of labor or parts for user maintenance, as the same is described in the instruction manual or handbook furnished with this product.

10. This Warranty is valid only with respect to repairs effected by an authorized MARANTZ Service Station.

11. EXCEPT TO THE EXTENT THAT APPLICABLE LAW PRECLUDES A DISCLAIMER OF WARRANTY, THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS WITH RESPECT TO THIS PRODUCT, NOR ARE THERE ANY OTHER WARRANTIES WHICH EXTEND BEYOND THE PROVISIONS OF THIS WARRANTY. ORDINARY PERIODIC CHECK-UPS ARE NOT INCLUDED IN THIS WARRANTY.

12. MARANTZ COMPANY, INC. reserves the right to make changes in design and/or improvements upon its products without any obligation to include these changes in any products theretofore manufactured.

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Should there be any questions, please contact the
Marantz National Service Manager, Marantz Company, Inc.
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PURCHASER'S RECORD ▶

REGISTRATION FOR MARANTZ 3-YEAR GOLDEN WARRANTY

Model: Marantz Model 4415

Serial No. _____

Purchaser's Name _____

Purchased From (Name) _____

Address _____

Price Paid $ _____ Date Purchased _____

Date Warranty Reply Card Mailed _____

The above information becomes your permanent record of a valuable purchase. It should be promptly filled in at the same time that you fill in and mail the warranty registration reply card to Marantz. This information provides a valuable insurance record and must also be referred to should you have any correspondence with Marantz.

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GENERAL DESCRIPTION

Your Marantz Model 4415 is a high-quality Quadradial 4 Receiver developed by Marantz, a name famous for quality in the audio component industry.
The Model 4415 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 4415 will also reproduce any discrete 4-channel program as well as regular stereo and monaural programs. An optional plug-in decoder adapts the 4415 for any specific matrix system such as Columbia's SQ or Electro-Voice's Stereo 4.
The FM tuner section employs a FET for the RF amp. The IF tuning circuit employs ceramic filters of wider bandwidth and higher selectivity to provide high sensitivity and unparalleled interference free capacity. The FM stereo demodulator section utilizes up-to-date integrated circuits (IC). The integrated circuits incorporates the FM stereo demodulator circuits, stereo indicator circuit and buffer amplifier to obtain the low impedance output, and exhibits extremely high reliability.

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 4415, 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 4415 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 4415.

AFTER UNPACKING

It is advisable to save all original packing material to prevent damage should you wish to transport or ship the receiver (refer to Figure 19 for packing instructions). Please inspect your Model 4415 carefully for any signs of damage in transit. It has undergone stringent quality control inspection and tests prior to packing, and left the factory in perfect operating condition. If the unit is damaged, notify the carrier without delay. Only the consignee may institute a claim with the carrier for damage during shipment. However, the Marantz Company will cooperate fully in such an event. Save the damaged carton as evidence for inspection by the carrier.

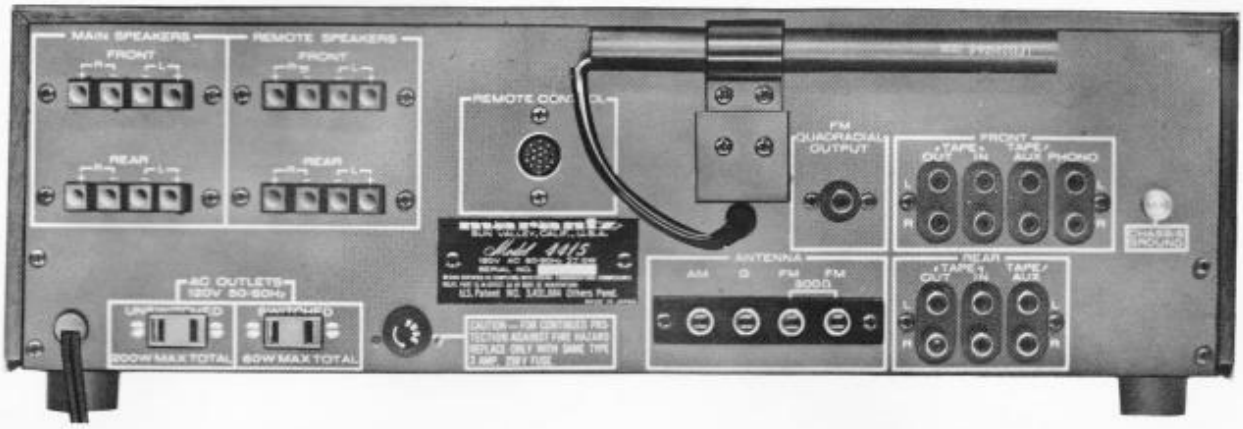


Figure 1. Rear Panel Connection Facilities

CONNECTING THE 4415

1. Using a balanced and shielded 300 ohm cable, connect an FM antenna to the 4415 as shown in Figure 2.

2. Using No. 18 or heavier lamp cord (zip cord), connect main speakers to the 4415 as follows:

LEFT FRONT SPEAKER	4415
- or GND or NEG or COMM or 0	to MAIN SPEAKERS FRONT L -
+ or HOT or POS or 1	to MAIN SPEAKERS FRONT L +

RIGHT FRONT SPEAKER	4415
- or GND or NEG or COMM or 0	to MAIN SPEAKERS FRONT R -
+ or HOT or POS or 1	to MAIN SPEAKERS FRONT R +

LEFT REAR SPEAKER	4415
- or GND or NEG or COMM or 0	to MAIN SPEAKERS REAR L -
+ or HOT or POS or 1	to MAIN SPEAKERS REAR L +

RIGHT REAR SPEAKER	4415
- or GND or NEG or COMM or 0	to MAIN SPEAKERS REAR R -
+ or HOT or POS or 1	to MAIN SPEAKERS REAR R +

3. Using shielded audio cables with phono plugs, connect your record player to the 4415 as follows:

RECORD PLAYER	4415
LEFT OUTPUT	to PHONO L
RIGHT OUTPUT	to PHONO R

4. If any discrete 4-channel playback device (Q-8 cartridge player, 4-channel reel-to-reel player, RCA/JVC discrete disc demodulator, etc.) is to be engaged in the system, make connections between the device and the 4415 using shielded audio cables with phono plugs as follows:

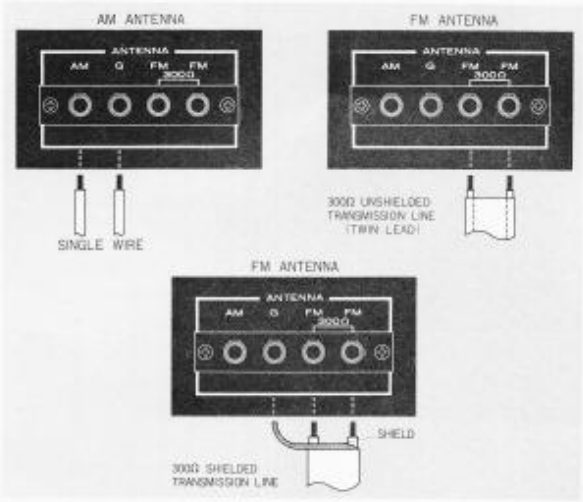


Figure 2. FM/AM Antenna Connection

DISCRETE 4-CHANNEL PLAYBACK DEVICE	4415
LEFT-FRONT or LF or CHANNEL 1 or TRACK 1	to FRONT TAPE/AUX L
LEFT-REAR or LR or CHANNEL 2 or TRACK 2	to REAR TAPE/AUX L
RIGHT-FRONT or RF or CHANNEL 3 or TRACK 3	to FRONT TAPE/AUX R
RIGHT-REAR or RR or CHANNEL 4 or TRACK 4	to REAR TAPE/AUX R

5. Using shielded audio cables with phono plugs, connect a discrete 4-channel tape recorder to the 4415 as follows:

DISCRETE 4-CHANNEL TAPE RECORDER	4415
LEFT-FRONT OUTPUT or LINE OUT	to FRONT TAPE IN L
LEFT-REAR OUTPUT or LINE OUT	to REAR TAPE IN L
RIGHT-FRONT OUTPUT or LINE OUT	to FRONT TAPE IN R
RIGHT-REAR OUTPUT or LINE OUT	to REAR TAPE IN R
LEFT-FRONT INPUT or LINE IN	to FRONT TAPE OUT L
LEFT-REAR INPUT or LINE IN	to REAR TAPE OUT L
RIGHT-FRONT INPUT or LINE IN	to FRONT TAPE OUT R
RIGHT-REAR INPUT or LINE IN	to REAR TAPE OUT R

6. Pull the AM ferrite-rod antenna out as shown in Figure 3.

7. Set the controls and switches as follows:

FRONT L-R balance	Mid position
REAR L-R balance	Mid position
FRONT-REAR balance	Mid position
mode	**VARI-MATRIX**
dimension	Mid position
remote control	**LOCAL**
bass and **treble** controls	Mid position
volume	Minimum (fully counter-clockwise)
MAIN SPKR	ON (in)
REMOTE SPKR	OFF (out)
MUTING	ON (in)
TAPE MON	OFF (out)
HI FILTER	OFF (out)
LOUDNESS	OFF (put)
Power	OFF (out)

8. Plug the 4415 into the A.C. wall outlet.

9. Turn the **power** switch ON.

10. Select the desired program source by setting the **selector** switch to appropriate position.

11. If phono is selected, put on a stereo record. If FM is selected, tune to a stereo broadcast.

12. Increase the **volume** control to a comfortable listening level.

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
A stereo record player may be connected to the **PHONO** jacks.
High level 2-channel playback devices (tuner, tape player, record player with equalized high level output, etc.) may be connected to the **FRONT TAPE/AUX** or **TAPE IN** jacks.

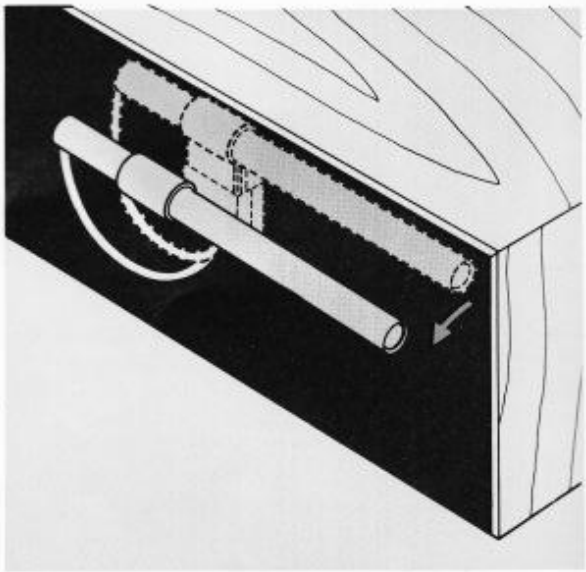


Figure 3. AM Ferrite-rod Antenna

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

REMOTE SPEAKERS

The 4415 can 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 **REMOTE SPEAKERS** terminals as you did the main speakers.
The **MAIN** and **REMOTE SPKR** switches on the front panel now permits activation of MAIN and/or REMOTE groups of loudspeakers.
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 4415, 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 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

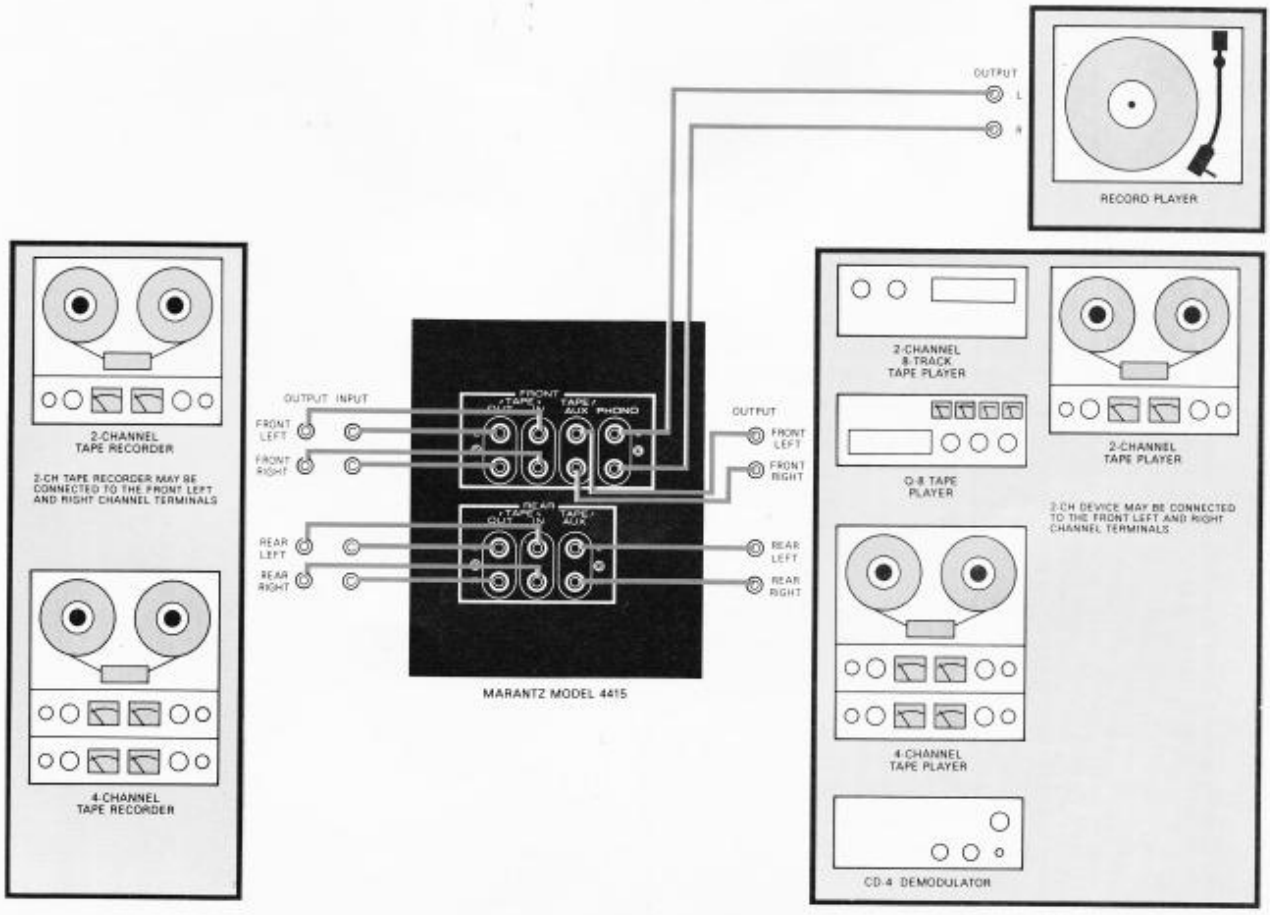


Figure 4. Connection Diagram

Figure 5. Front Panel Controls and Jacks

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.

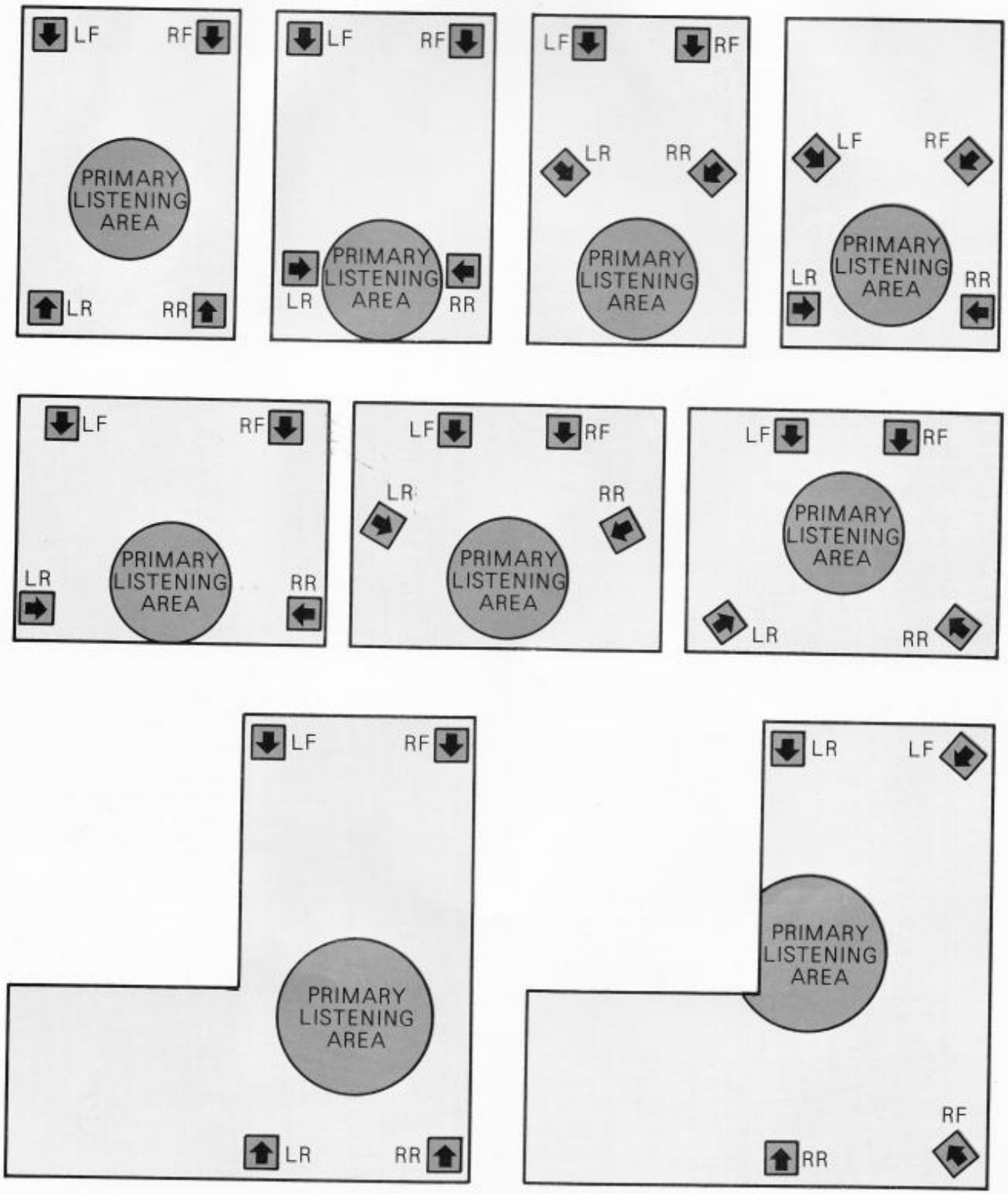


Figure 6. Speaker Placement

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:

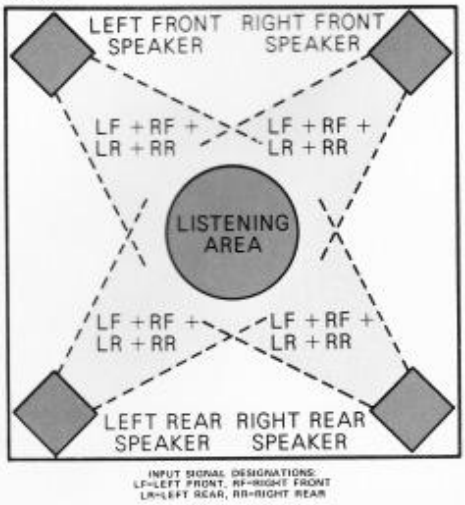


Figure 7. Mono Mode Sound Dispersion

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:

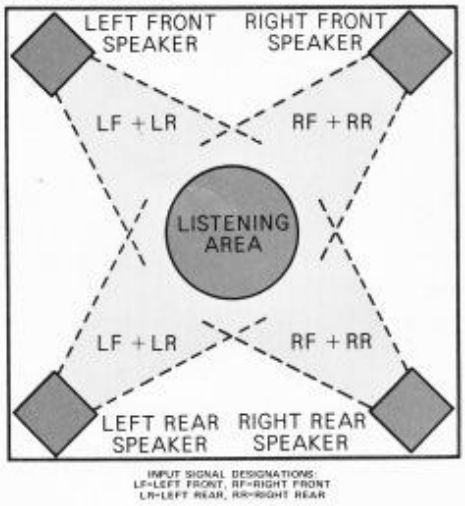


Figure 8. 2-channel Mode Sound Dispersion

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:

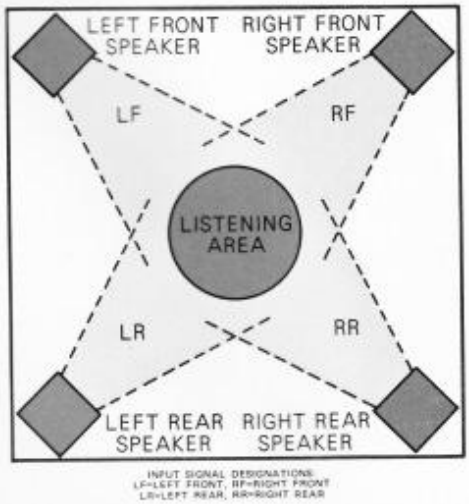


Figure 9. Discrete Mode Sound Dispersion

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:

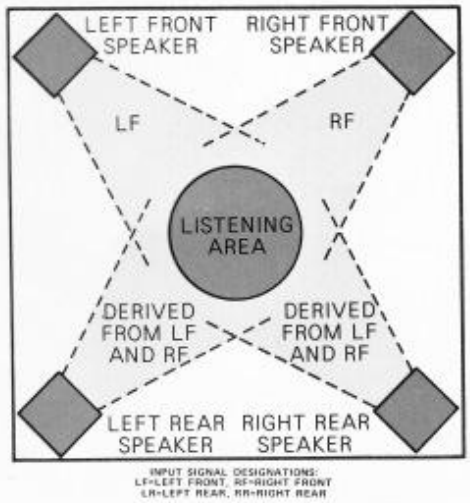


Figure 10. Vari-Matrix Mode Sound Dispersion

SQ DECODER

With the **mode** switch on **SQ DECODER** any rear input signals to the 4415 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**.

DIMENSION

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 4415 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 **REAR,** and then adjust **REAR L-R balance.** Now you are ready to adjust the **FRONT-REAR** control for the most pleasing overall balance.

SELECTOR SWITCH

The **selector** switch selects the program source for listening or recording. The switch can select any of four signal sources: **AM, FM, PHONO** and **TAPE/AUX.** With the switch set at **TAPE/AUX,** the signal source connected to the **TAPE/AUX** jacks on the rear panel can be played back. To playback recorder connected to the **TAPE IN** jacks, set the **TAPE MON** pushswitch "in".

BASS AND TREBLE CONTROLS

These control the low and high frequency response of the amplifier. With both **bass** and **treble** controls set at the center position, frequency response of the amplifier 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 selected by the **selector** switch 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.

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 **FRONT** and **REAR phones** jacks is not affected by the **MAIN** and **REMOTE SPKR** switches.

POWER SWITCH

This pushswitch turns the power on and off. When the **power** switch is "in" the dial lamps illuminate. Be sure to turn the power pushswitch off before plugging or unplugging the power cord.

FRONT AND REAR PHONES JACKS

These jacks accept a standard 3-conductor phone plug employed with standard stereo or 4-channel headphones. When using 2-channel headphones, insert the plug into the **FRONT phones** jacks. When using 4-channel headphones, insert the front plug into the **FRONT phones** jack and the rear plug into the **REAR phones** jack. Either high- or low-impedance headphones may be used.

LOUDNESS SWITCH

When listening at low levels, set this switch "in". The **LOUDNESS** switch boosts bass and treble tones to compensate for the human ear's response to those frequencies at low volume levels.

HI FILTER SWITCH

With this pushswitch set "in", the high frequency filter suppresses high frequency noise such as "scratch" from worn phonograph records, and tape "hiss". The filter will also slightly reduce high frequencies in the program material. When the program does not have high frequency noise, the **HI FILTER** pushswitch should be "out".

TUNING METER

The model 4415 is equipped with a big **SIGNAL STRENGTH** meter for easy and correct tuning. The **SIGNAL STRENGTH** meter indicates the signal strength of any AM or FM broadcast.

TUNING

AM: For optimum AM reception, tune to the desired station. Then rotate the **TUNING** knob slightly back and forth until the maximum reading is obtained on the **SIGNAL STRENGTH** meter.

FM: Set the selector switch to **"FM"** and tune to the desired station. Then slowly rotate the **TUNING** knob slightly back and forth until maximum reading is obtained on the meter.

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 turned off by releasing the **MUTING** pushswitch to "OUT" position, and thus switching all muting out of the FM circuits.

VOLUME

This control regulates volume of all four channels simultaneously.

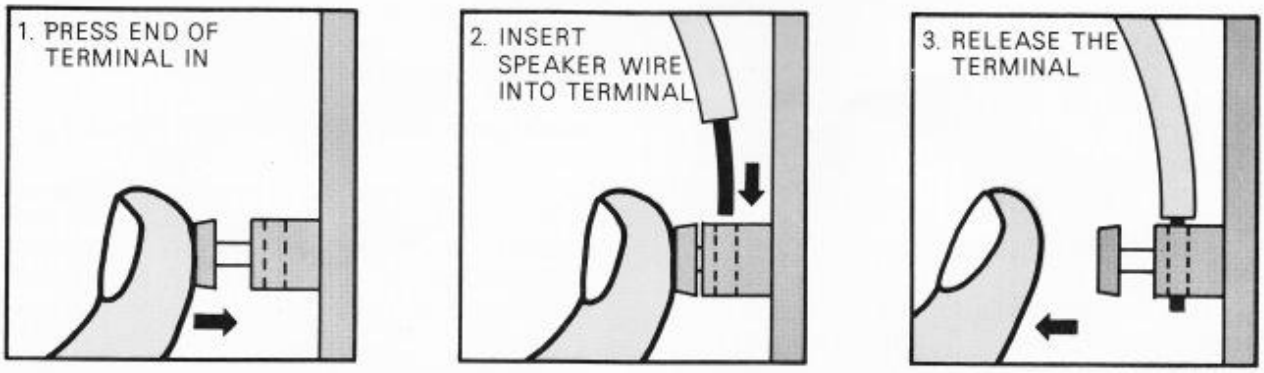


Figure 11. Quick Connect Speaker Terminal

REAR PANEL FEATURES

PHONO JACKS

These two jacks are intended for use with magnetic cartridges requiring a standard 47,000 ohm resistive load. If a hum is heard when playing a record, try reversing the polarity of the turntable power plug. If this is ineffective, connect a separate ground wire from the turntable or record changer frame to the **CHASSIS GROUND** binding post of the 4415.
(Refer to "CONNECTING THE 4415", page 2.)

TAPE/AUX JACKS

These jacks are for connection of any 4-channel high level equipment source manufacturers may use different terminology for the four channels, and care should be exercised to avoid confusing the signal channel terminations.
The followings are examples of 4-channel nomenclature equivalents:

LEFT FRONT – LF – LF – CHANNEL 1 – TRACK 1
LEFT REAR – LR – LB – CHANNEL 2 – TRACK 2
RIGHT FRONT – RF – RF – CHANNEL 3 – TRACK 3
RIGHT REAR – RR – RB – CHANNEL 4 – TRACK 4

TAPE IN AND TAPE OUT JACKS

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

MAIN AND REMOTE SPEAKERS TERMINALS

Sixteen quick-connect terminals are provided; eight for main speakers and eight for remote speakers. (Refer to "CONNECTING THE 4415", page 2 , and "REMOTE SPEAKERS", page 4.)
Terminals work as follows:
1) Press terminal in 2) Insert speaker wire 3) Release terminal

POWER CONNECTION

Plugs into 117 Volt A.C. outlet.

CAUTION:
DO NOT PLUG THE MODEL 4415 INTO A D.C. 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.

FM ANTENNA TERMINALS

These terminals connect to an FM antenna. For best FM reception, Marantz recommends a log-periodic antenna mounted on a good quality rotor system. For rural areas, it is recommended that a local dealer be consulted about antenna installation and lightning arrestor protection. Master antenna system is not recommended for use with your Model 4415; such systems are usually designed expressly for television reception and frequently suppress FM signals before distribution. In addition, master antenna systems often severely limit good quality FM reception. Where outdoor antennas are prohibited or inconvenient, use a simple form of 300 ohm TV "rabbit ear" antenna or the simple ribbon-type folded dipole antenna supplied with the 4415. Both are practical and will give satisfactory results in primary signal areas.
(Refer "CONNECTING THE 4415", page 2.)

AM ANTENNA TERMINAL

This terminal connect to an AM antenna. The 4415 is equipped with an ferrite-rod antenna for AM reception and it will give satisfactory results to primary signal areas. However, an outdoor antenna will provide better reception. 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 at a very high position outdoors, or swing it from the window of your room. Next, connect the other single wire between the **"G"** terminal and an earth ground (such as a water pipe).
(Refer Figure 2, page 2.)

FM QUADRADIAL OUTPUT JACK

In anticipation of the coming of 4-channel stereo broadcast, your model 4415 is equipped with the **FM QUADRADIAL OUTPUT** jack. The signal available at this jack is unequalized output of the FM discriminator. It's frequency response characteristics and signal level are ideal to drive any

4-channel adaptor. This jack can also be used as a simple white noise generator for frequency response check of loudspeakers or amplifiers. For this application, use muting off the model 4415 in FM mode and tune off from any FM signal.

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 selector switch. Put the recorder connected to the TAPE **OUT** jacks in the record mode.

For additional information, refer to "MODE SWITCH", page 7, and "TAPE MON SWITCH", page 8.

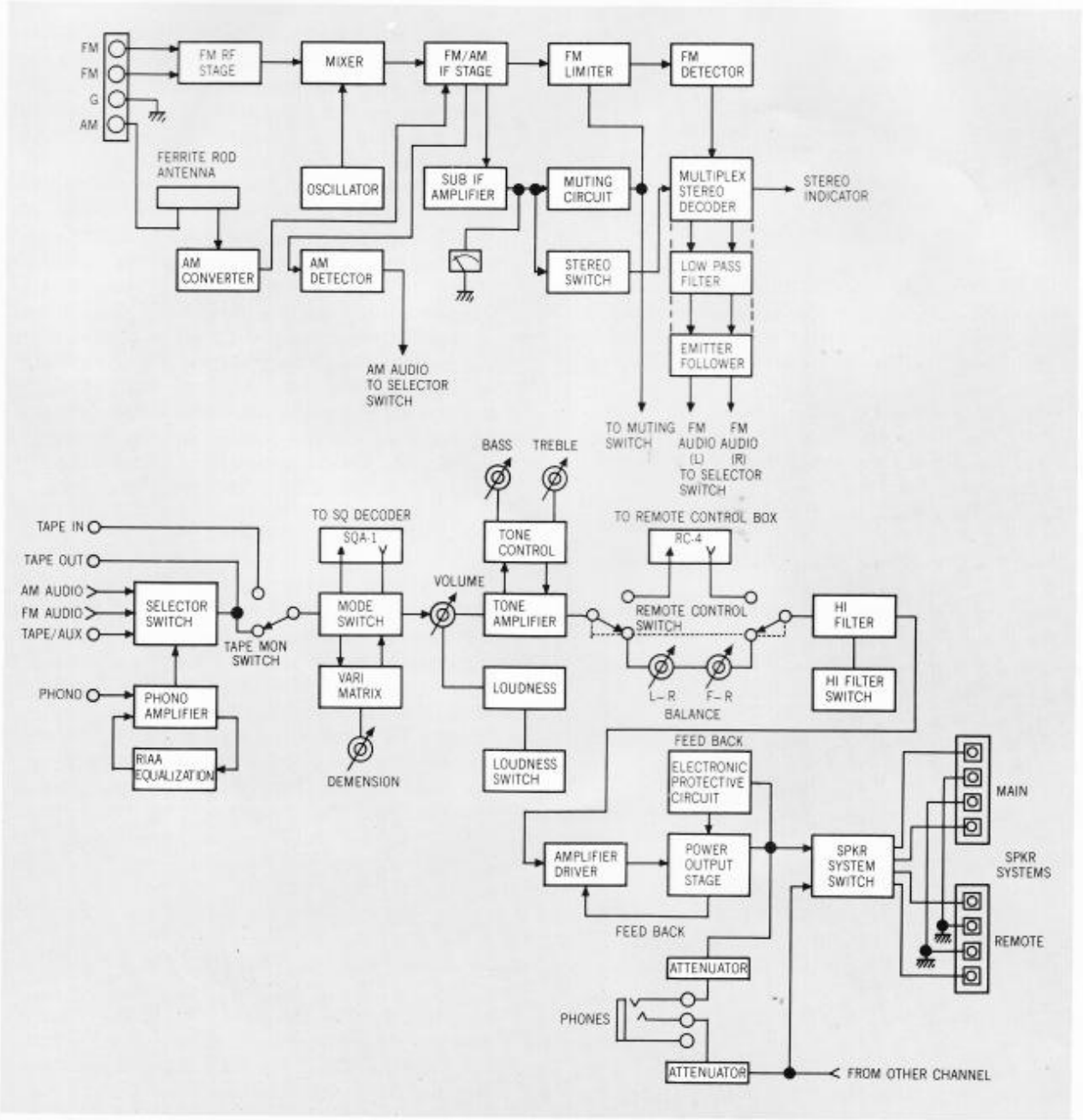


Figure 12. Functional Block Diagram

TECHNICAL DESCRIPTION

GENERAL

Figure 12 is a block diagram of the model 4415 Quadradial 4 Receiver showing main functional elements and input and output signal routing. For clarity, only a single audio channel is shown; other channels are identical, **PHONO** input jacks are provided only for the front pair of channels.

FUNCTIONAL DESCRIPTION

FRONT END

FM antenna signals are applied to the antenna coil which drives a field-effect transistor RF amplifier. The signals from the RF amplifier are fed through a tuned RF tank circuit to the Mixer stage, which is also fed by the signal generated by a local oscillator. This mixer converts the carrier frequency to the 10.7MHz intermediate frequency. careful attention to its thermal and electrical characteristics has minimized drift, thus obviating the necessity for AFC. The 10.7MHz converted signal is then fed to a phaselinear ceramic IF filter, followed by a limiter stage. It is then, in turn, processed through an FM discriminator. The output of the FM discriminator is fed to the stereo demodulator circuit.

FM IF AMPLIFIER

The IF amplifier consists of 2 ceramic filters and 5 stages of IF amplifiers including limiter stages. The characteristics of these ceramic filters are ideal in that the 200 KHz passband and phase linearity assures the elimination of a major source of high frequency distortion and loss of stereo separation. The sharp cut-off slope improve selectivity, permitting reception of closely spaced channels. The Model 4415 utilized 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 good capture ratio is also assured. The amplified and symmetrically limited FM signals are fed to the super-linear discriminator circuit.
The detected audio signals are, then, distributed to the MPX Decoder circuit, and the **FM QUADRADIAL OUTPUT** jack on the rear panel.

FM STEREO DEMODULATOR

The composite signal from the demodulator transformer is fed into the multiplex stereo demodulator, which is composed of fully integrated circuits with the exception of the circuit containing the inductor and capacitor.

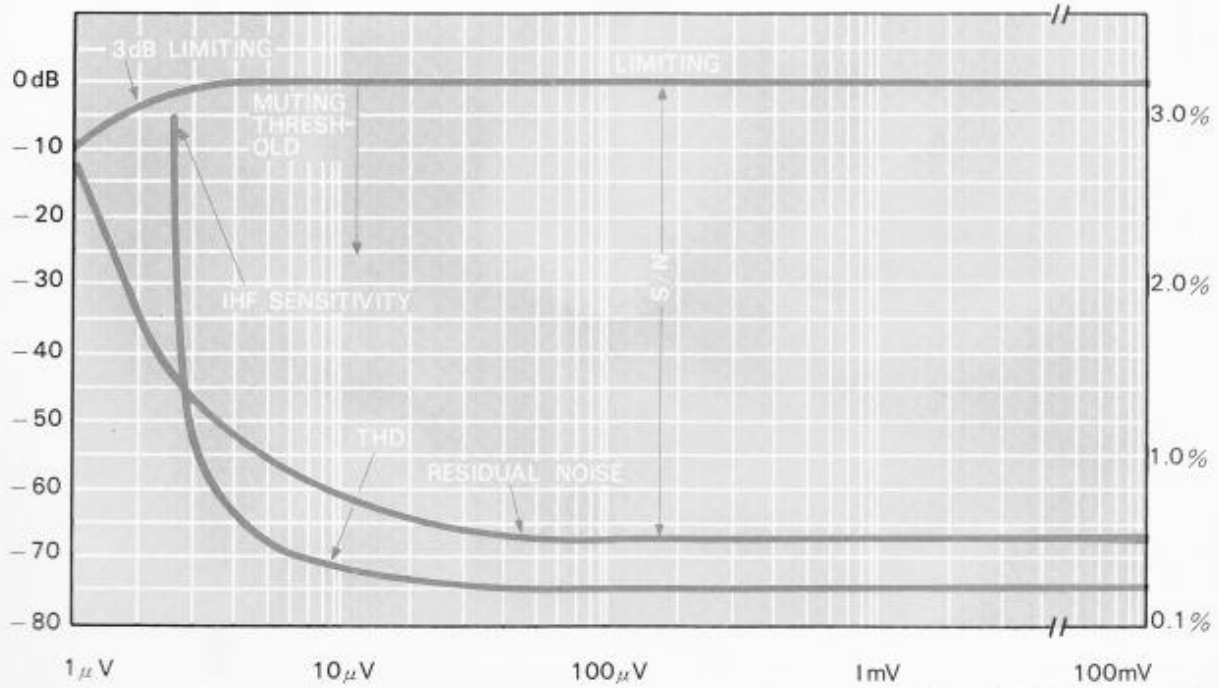


Figure 13. FM Characteristics

This integrated circuit is equipped with a lamp display circuit for stereo operation and a buffer amplifier to obtain the low impedance output.
To insure stability, reliability and high degree of separation this stereo demodulator employs an air-tight coil integral with the inductor and capacitor.
The multiplex stereo demodulator circuit is equipped with a separate automatic Stereo/Monaural switching circuit. The circuit checks the input signal intensity and actuates the stereo demodulator and stereo indicator lamp automatically only when the input signal is of sufficient strength to provide high quality stereo broadcasting. When the input signal intensity is insufficient for this purpose, the stereo signal is automatically changed to a monaural signal to insure reception with a high quality signal-to-noise ratio.

MUTING CIRCUIT

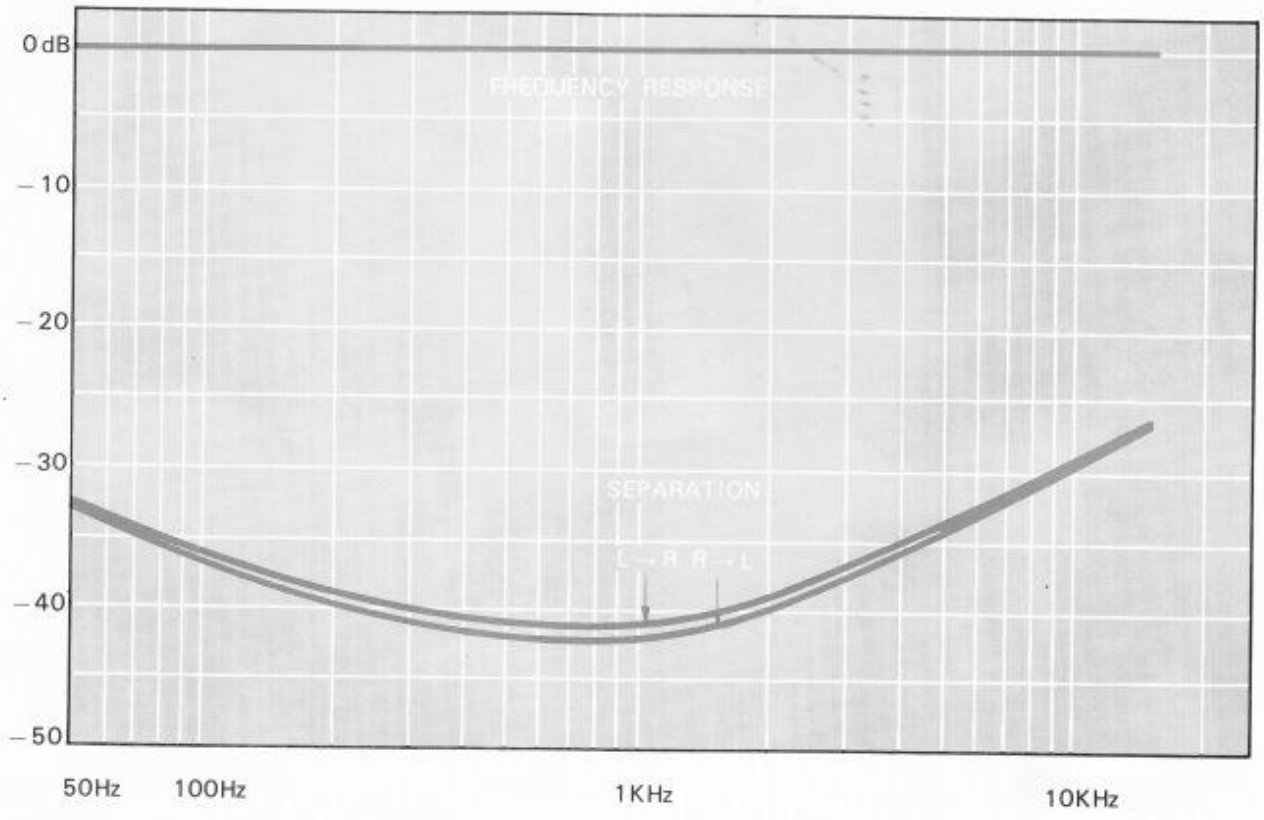
In the absence of an FM carrier, all FM receivers produce a peculiar noise. The muting circuit eliminates this noise, providing you with noise-free tuning from station-to-station.
A muting circuit, consisting of a three-transistor switching circuit, has been incorporated in the Model 4415. The muting circuit perfectly mutes out all the interstation noise and also completely mutes out the side slope spurious response of the unit. The circuit has been designed to minimize annoying "pop" noise for velvet smooth tune in and tune out.

AM TUNER

The ceramic filter utilized in the Model 4415 IF amplifier provides higher selectivity and wider bandwidth for more interference-free hi-fi reception.
The detector following the IF amplifier is provided to transmit detected signals to the selector switch.
The AM front end and IF section is equipped with an automatic volume control circuit which maintains the level of all stations constant.

PHONO AMPLIFIERS

These amplifiers permit phono signals of up to 100 millivolts to be handled without overloading. The RIAA equalization network provides precise equalization and sets the phono preamplifier voltage gain to 40dB (at 1,000Hz). Figure 15 shows the RIAA reproducing characteristic together with the recording characteristic. The net result after playback is a flat frequency response.



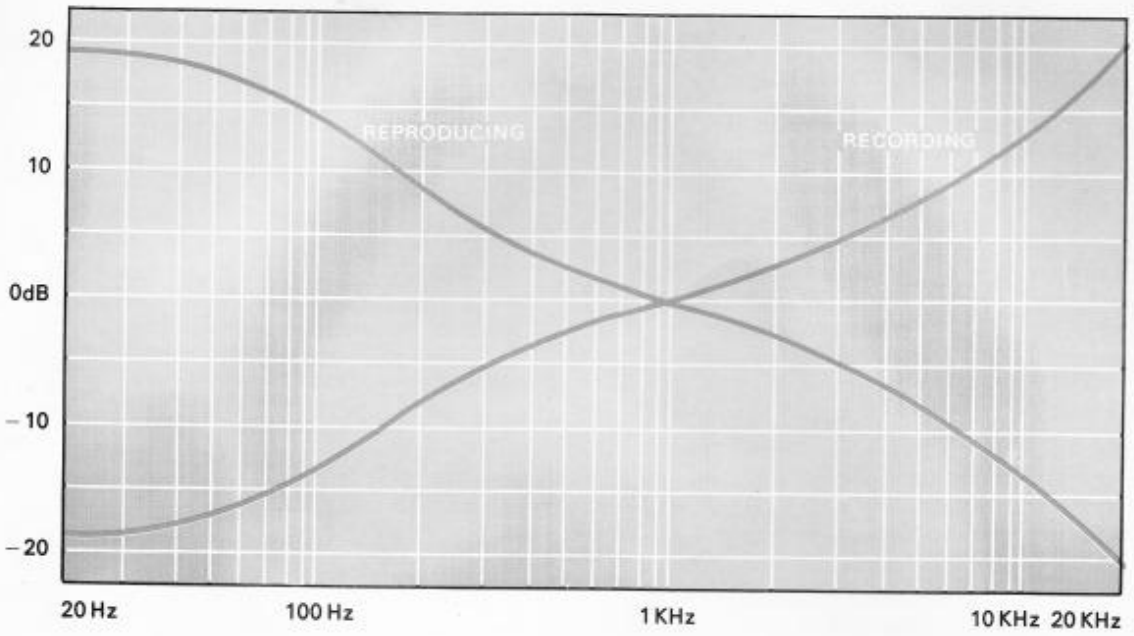


Figure 15. Phono Equalization Characteristics

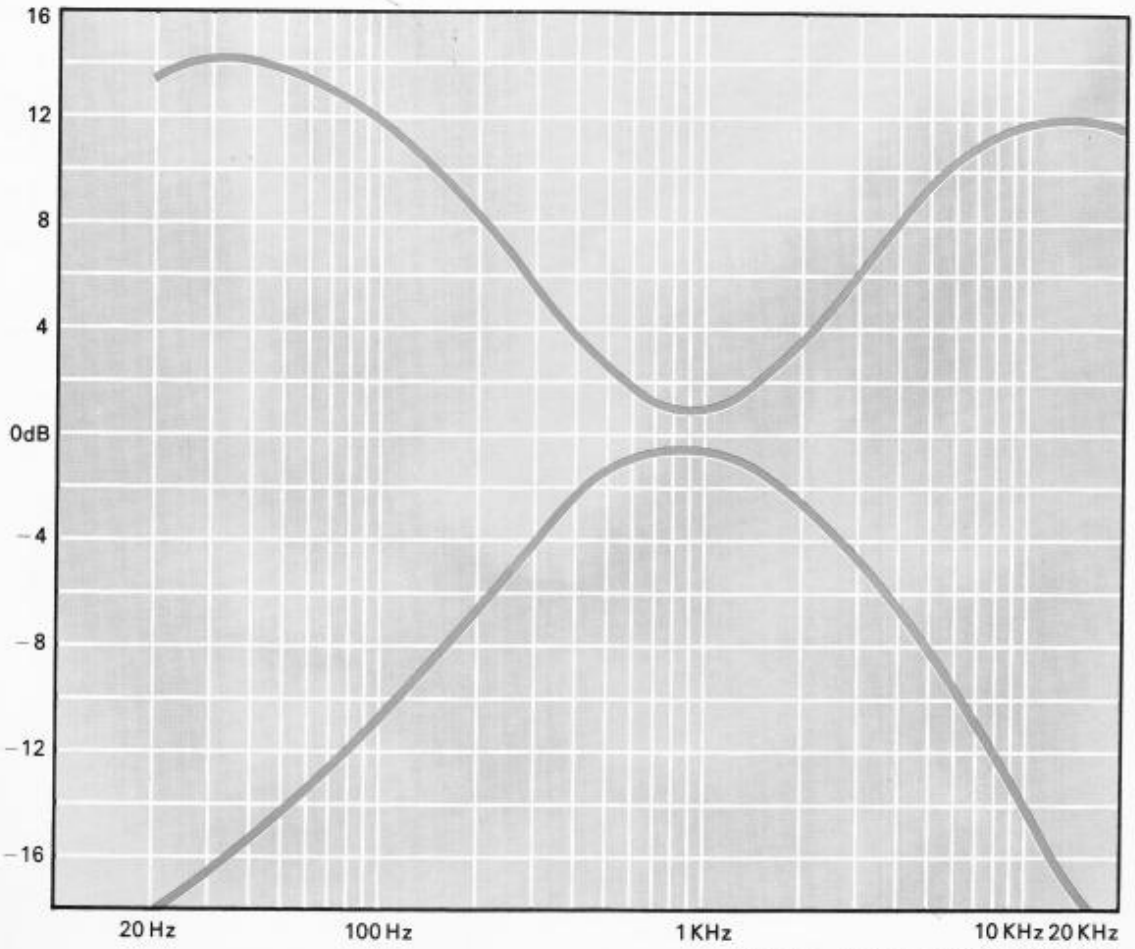


Figure 16. Tone Control Characteristics

SELECTOR SWITCH

The **selector** switch selects the program source for listening or recording. The Model 4415 has two sets of input jacks: **PHONO** and **TAPE/AUX.** Any discrete 4-channel program source can be connected to the **TAPE/AUX** jacks. The input sensitivity for each set of input jacks is 2.0 millivolts at **PHONO**, and 150 millivolts at **TAPE/AUX.** The **selector** switch outputs are fed through the **TAPE OUT** jacks on the rear panel and the **TAPE MON** pushswitch to the **mode** switch.

TONE CONTROL

After **volume** level control, each channel program source is fed into the tone control network. The network uses an emitter follower at the input stage for the high-impedance termination of the **volume** control output and low driving impedance to the R-C type tone control network. The bass and treble responses are adjusted by ganged variable resistors.
Each signal adjusted for bass and treble in the tone control network is amplified in two-stage direct-coupled NPN and PNP configuration and is delivered to the balance control/remote control section.
The driving impedance to the balance control/remote control section is satisfactorily reduced by NFB.
Figure 16 shows the frequency response curves for maximum **boost** and **cut** for each control.

POWER AMPLIFIER

Four power amplifiers are incorporated for driving each channel 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 17 shows the distortion factor-to-output characteristics of the Model 4415; Figure 18 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.

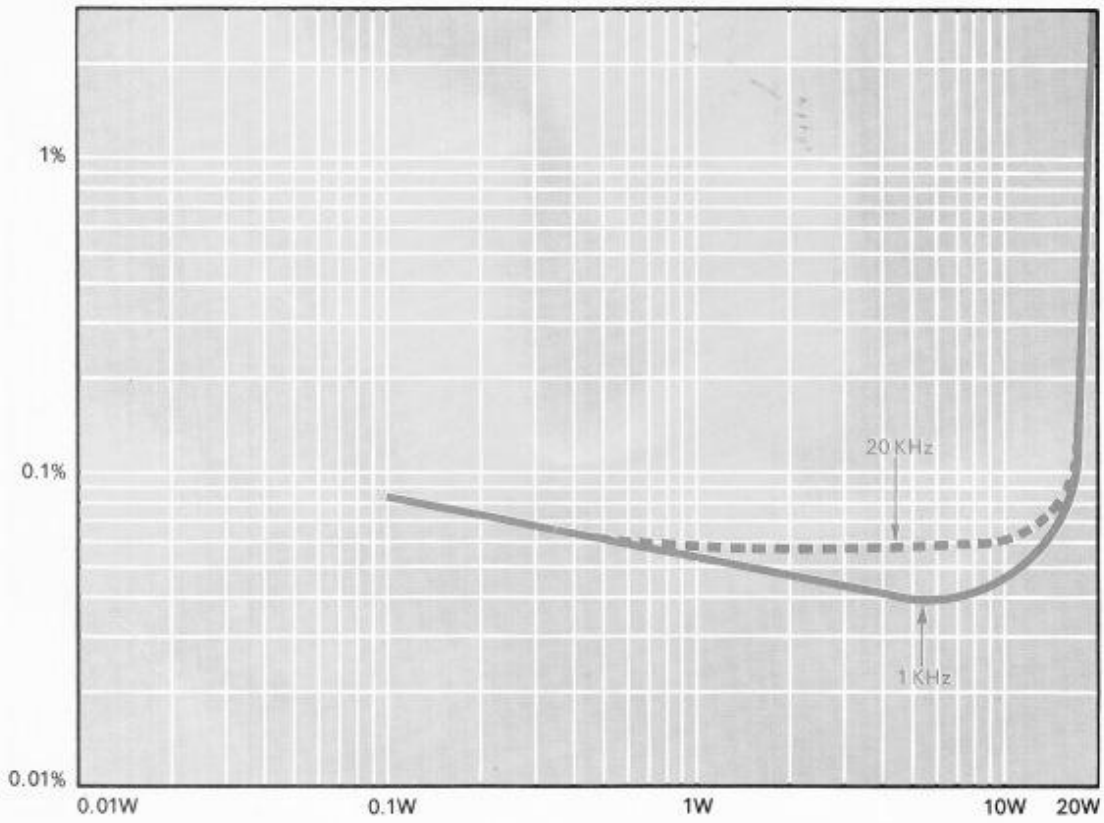


Figure 17. Harmonic Distortion

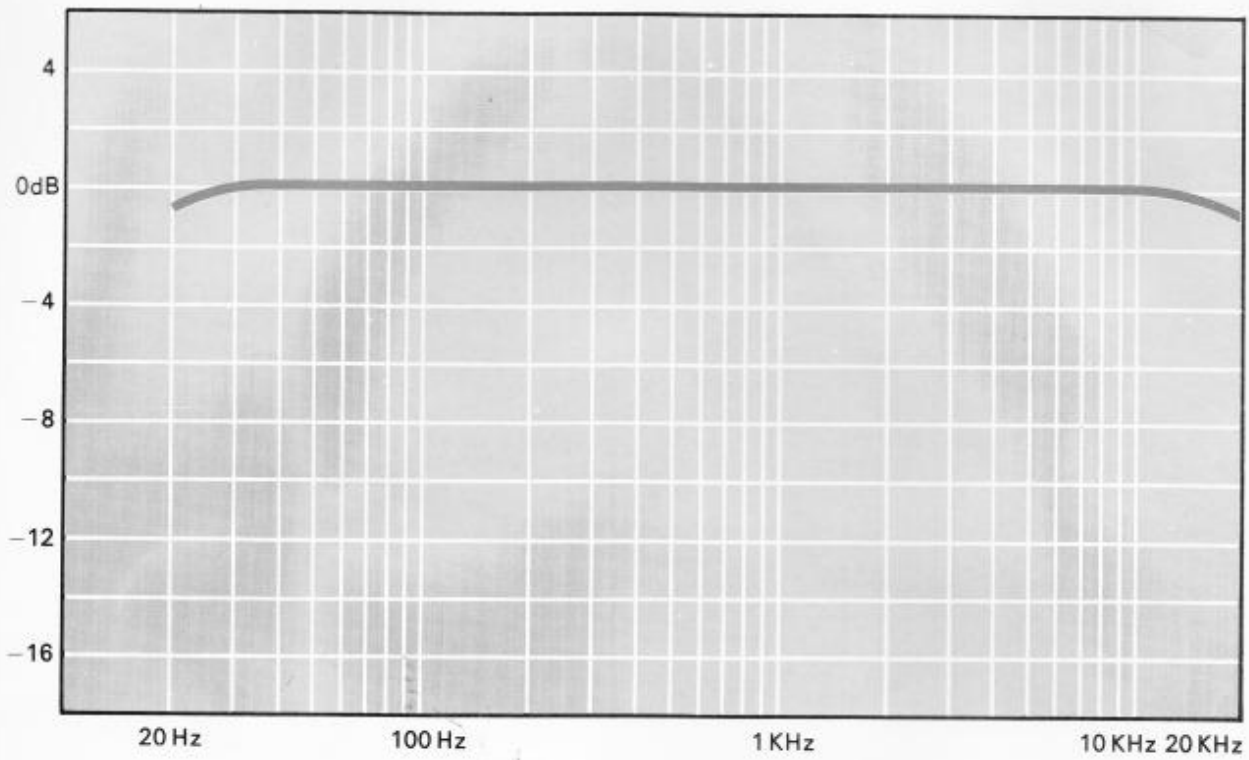


Figure 18. Frequency Response

TECHNICAL SPECIFICATIONS

FM SECTION:

Tuning Frequency Range	88 – 108 MHz
IHFM Usable Sensitivity	3.0 μV
IHF Selectivity	50 dB
Capture Ratio	2.5 dB
Image Rejection Ratio at 106 MHz	50 dB
Signal to Noise Ratio (Mono)	65 dB
Signal to Noise Ratio (Stereo)	55 dB
Total Harmonic Distortion (Mono)	0.2 %
Total Harmonic Distortion (Stereo)	0.5 %
Frequency Response (ref. 75 μ sec. de-emphasis)	50 Hz – 15 KHz ± 1 dB
Stereo Separation at 1 KHz	40 dB
Quadradial Output (400 Hz 75 KHz dev.)	300 mV

AM SECTION:

Tuning Frequency Range	540 – 1605 KHz
Usable Sensitivity	20 μV
Selectivity	20 dB
Image Rejection Ratio at 1400 KHz	40 dB
Signal to Noise Ratio	43 dB
Frequency Response (–3 dB)	50 Hz – 4 KHz
Total Harmonic Distortion	1%

AUDIO SECTION

Input Impedance–Low level input	Phono 47K ohm
High level input	100K ohm
Input Sensitivity–Phono	2.0 mV for 15W output
High level	150 mV for 15W output
Frequency Response	±2.0 dB, 30 Hz to 20 KHz at 1W output
Intermodulation Distortion	Less than 1.0 % at rated power output from 40 Hz to 16 KHz with all channels driven (S.M.P.T.E.)
Total Harmonic Distortion	Less than 1.0 % at rated power output 40 Hz to 16 KHz with all channel driven
Damping Factor	Greater than 45 into 8 ohms load
Total Noise–From magnetic phono input	Less than 3μV equivalent input at rated
to power amp output	output into 8 ohms load
Volume Tracking	Within 3 dB
Rated Continuous (RMS) Output	
Per channel, all channels operating simultaneously	15W at 4 and 8 ohms
	7.5W at 16 ohms
Comparable Total Music Power	90W at 8 ohms

GENERAL

Power Requirements	120V AC 50 to 60 Hz
Power Consumption–at rated power output, all channels	220 watts
idling (no signal)	20 watts
Dimensions–Panel Width	17-21/64 inches
Panel Height	5-25/64 inches
Depth	14-3/8 inches
Weight–Unit alone	26.5 lbs
Packed for Shipment	37.5 lbs

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

Please Pack the Receiver as Illustrated.

CAUTION

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

Insure the receiver 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 4415 Quadradial 4 Receiver. 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 receiver is mounted in its accessory walnut cabinet, **ALWAYS REMOTE 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 receiver 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.

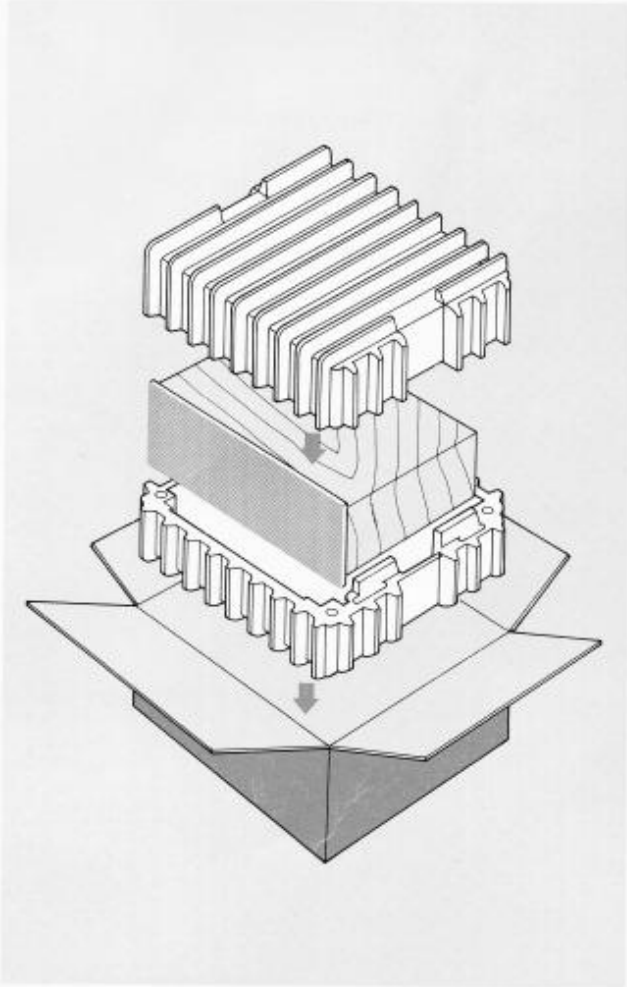


Figure 19. Packing Instructions

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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