

H A N D B O O K   O F   I N S T R U C T I O N S



**marantz**



model twenty three

*Stereophonic Tuner*

## WARRANTY

This instrument is guaranteed under the conditions outlined below to its original, registered owner, provided the purchase was made from a franchised Marantz dealer.

This instrument is guaranteed to remain free from operating defects for 3 years from the date of purchase. In the event that service is required, all necessary parts and labor will be furnished free of charge during this period except for tubes, which are guaranteed for ninety days.

This warranty is void if the serial number has been altered, removed, or defaced. The warranty is void if the equipment is altered, misused, mishandled, maladjusted, or is serviced by any parties not authorized by the Marantz Company. The warranty does not include any transportation costs incurred because of the need for service, unless a special agreement is provided in writing by the Marantz National Service Manager. Ordinary periodic check-ups are not included in the free warranty.

Marantz reserves the right to make changes in design and improve upon its products without any obligation to install these improvements in any of its products previously manufactured.

This warranty is in lieu of any or all others expressed or implied.

Should there be any questions, please contact the  
Marantz National Service Manager, Marantz Company, Inc.  
P.O. Box 99, Sun Valley, California 91352.

## PURCHASER'S RECORD

### REGISTRATION FOR MARANTZ EXTENDED WARRANTY

Model: Marantz Model Twenty three

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.

### CONTENTS OF CARTON

Marantz Model Twenty three Solid State Stereo Tuner

Handbook of Instructions

Warranty Registration Card with Prepaid Reply Envelope

(Notices and other enclosures may also be included)

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## GENERAL DESCRIPTION

The Model Twenty-three is an all solid state AM-FM STEREO tuner which benefits from the same advanced circuitry as the world's Finest FM tuner-the Marantz Model 20. An FM front end, AM front end, FM-AM amplifiers and FM Stereo demodulator and meter control amplifier are mounted on a single chassis and share a common power supply. Internal connections between these components have been designed to provide optimum performance from each component.

# FOREWORD

To obtain maximum performance and enjoyment from the Model Twenty-three Stereo tuner, please study these instructions carefully. Installation and operation of the Twenty-three is not complicated, but the extraordinary flexibility provided by its numerous features may not be fully appreciated unless a little time is spent becoming familiar with its controls and connection facilities.

For convenience, this manual is divided into two parts. The first covers installation and operation in a simple, non-technical manner. The second provides a more detailed description of the features and facilities of the Twenty-three. It has been written to answer the question "What goes on inside?", and to help in special applications. Detailed technical specifications are also included in this part.

For quick identification of the many controls, and connection facilities on the Twenty-three Stereo tuner, all references to them in this manual are printed in bold-face type. You will notice that the spelling, capitalization, abbreviation, and punctuation of all such markings appear exactly as lettered on the front and rear panels of the instrument.

## AFTER UNPACKING

It will be advantageous to save all the packing materials—carton, fillers, cushioning, etc. They will prove valuable in preventing damage should it ever become necessary to transport or ship the receiver. (Refer to Figure 7 for packing instructions.)

Please inspect the Model Twenty-three carefully for any signs of damage incurred in transit. It has undergone a very strict quality-control inspection and tests prior to packing; thus it left the factory in perfect operating condition. If damage is discovered, notify the transportation company 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 carton as evidence of damage for their inspection.

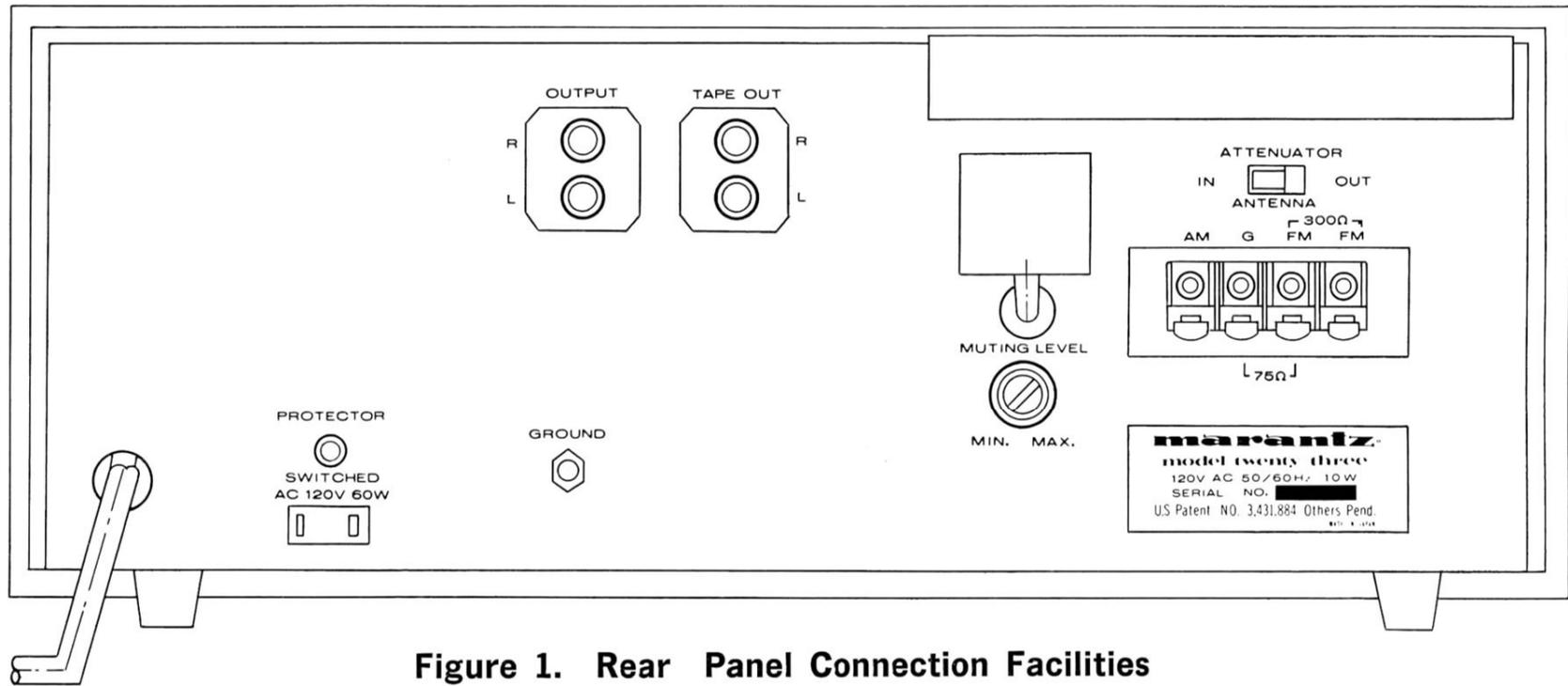


Figure 1. Rear Panel Connection Facilities

## PREPARATION FOR USE

### REAR PANEL CONNECTIONS

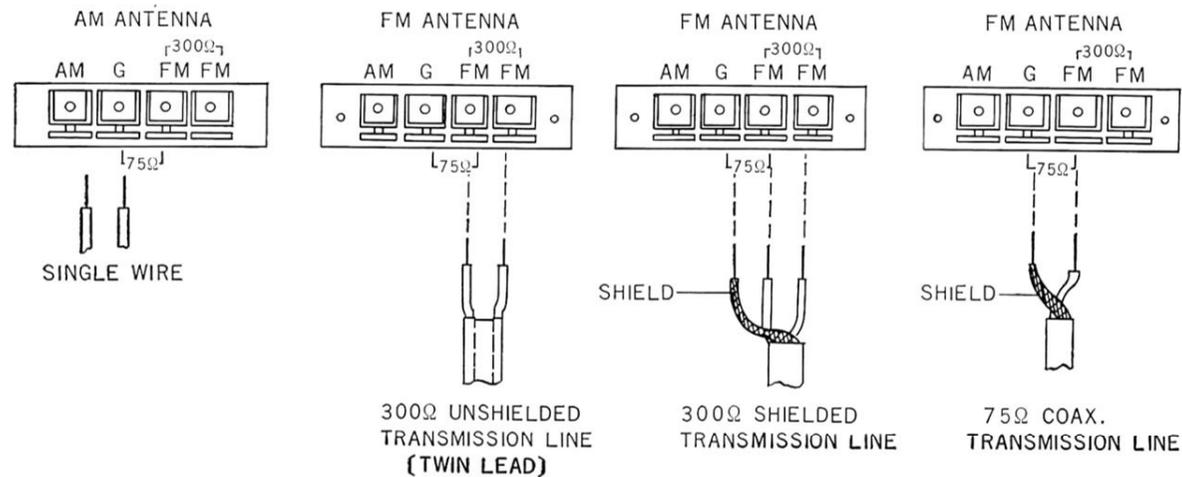
All signal connections to the Twenty-three, with the exception of the FM antenna should be made with shielded audio cables. Figure 1 shows the location of the input terminals and output jacks on the rear panel. These jacks and terminals are for “permanent” connections. The rear panel signal connections are arranged in stereo pairs. To avoid confusion, connect one cable at a time between the Twenty-three and the other components of the system. In this way, mixing up the channels and destinations, can be avoided.

### OUTPUT jacks

Audio output selected by the mode switch and controlled by the volume control is fed to these jacks. Before operating the Model Twenty-three these jacks must be connected to the input jacks of the preamplifier or stereo control center.

### TAPE OUT jacks

Connecting these jacks to the line or “radio” inputs of a tape recorder permits the recording of any program source material (as indicated by position of the mode switch). The output from these jacks is not affected by the volume control.



**Figure 2. FM/AM Antenna Connection**

## FM ANTENNA

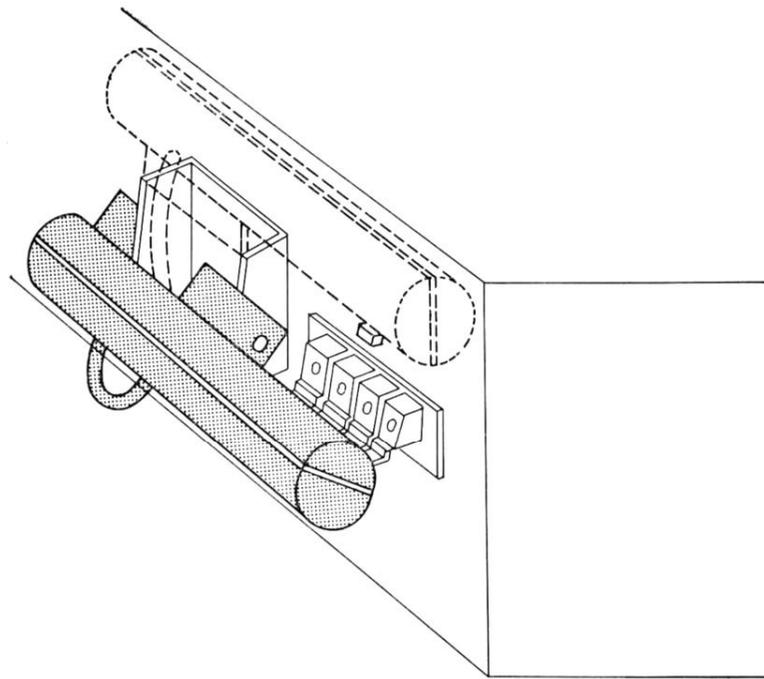
The best FM reception can be obtained with a "Log-Periodic" type antenna, used in conjunction with a good quality rotor system. In fringe areas, it is recommended that a "Log Periodic" antenna be used which has six or more elements and has been designed expressly for FM reception. For the greatest immunity from local noise and multipath pickup by the lead-in wire, a balanced and shielded 300-ohm cable should be used. (Because an unshielded lead-in wire acts as an omni-directional antenna, its pick-up can cancel the directional characteristics of your antenna.) Low-loss 300-ohm shielded cables are manufactured by Belden, ITT-Federal, Columbia Wire, and other companies. These cables consist 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.

In rural areas, it is recommended that a local dealer be consulted concerning antenna installation and lightning arrestor protection. Master antenna systems are not recommended for use with the Model Twenty-three. Master antenna systems are usually designed expressly for television reception and may frequently use 88-108 MHz (FM) filters to suppress FM signals before distribution. In addition, master antenna towers are fixed installations with no facilities for rotation. Master antenna systems, at best severely limit good-quality FM reception.

Where outdoor antennas are prohibited, or unsuitable for high-quality FM reception, the simplest form of 300-ohm TV "rabbit ear"

antenna or a simple ribbon-type folded dipole antenna, which is supplied with the Model 23 as an accessory, are the most practical and will give satisfactory results in primary signal areas. The Model Twenty-three Stereo tuner will accept either a 75-ohm or 300-ohm antenna cable. Refer to the appropriate connection diagram in Figure 2. Connection of all 300-ohm antenna cables should be made between the two terminals marked FM on the **ANTENNA** terminal. The terminal 'G', (**GROUND**) is provided for the connection of the antenna shield (when shielded cable is used). Connection of a 75-ohm antenna cable is made between the ground terminal 'G' and either of the FM terminals. Be sure to connect the shield of the 75-ohm cable to the center terminal (**GROUND**).



**Figure 3. AM Ferrite-rod Antenna**

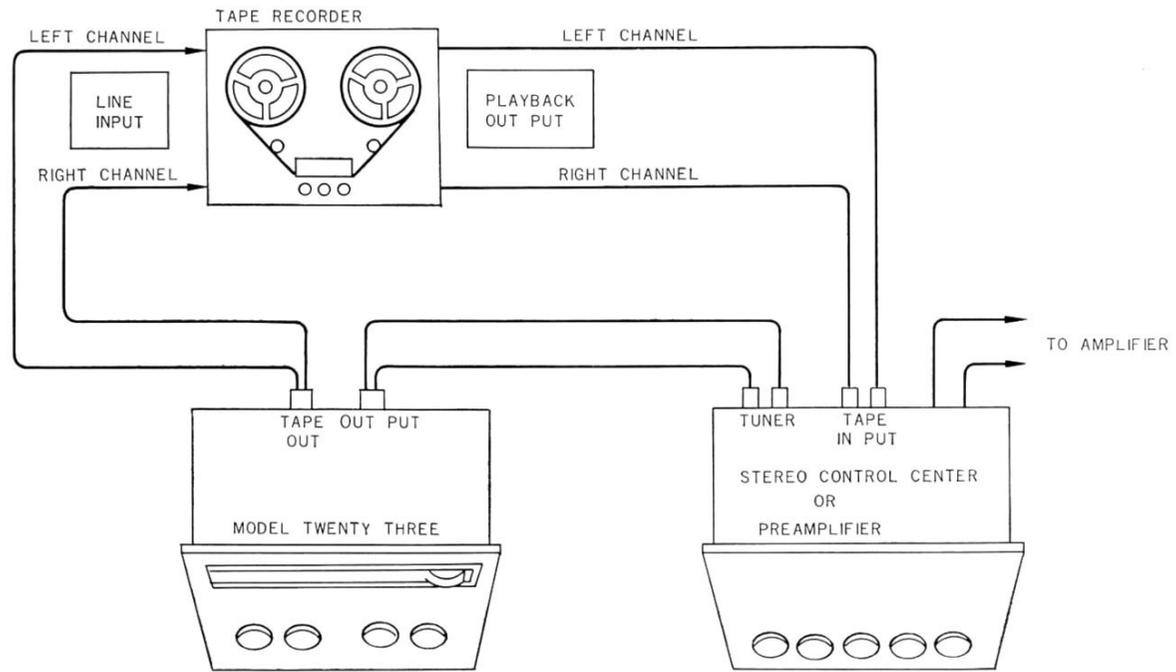
### **ANTENNA ATTENUATOR**

The Model 23 is equipped with an antenna attenuator which can be switched in or out from the antenna circuit. Use the attenuator switch in the IN position only when definite signs of overloading are apparent by reception of one station at multiple points on the dial, affecting the reception of a desired station. Overloading can also be noticed in some cases, by the presence of severe distortion which does not disappear by proper antenna orientation.

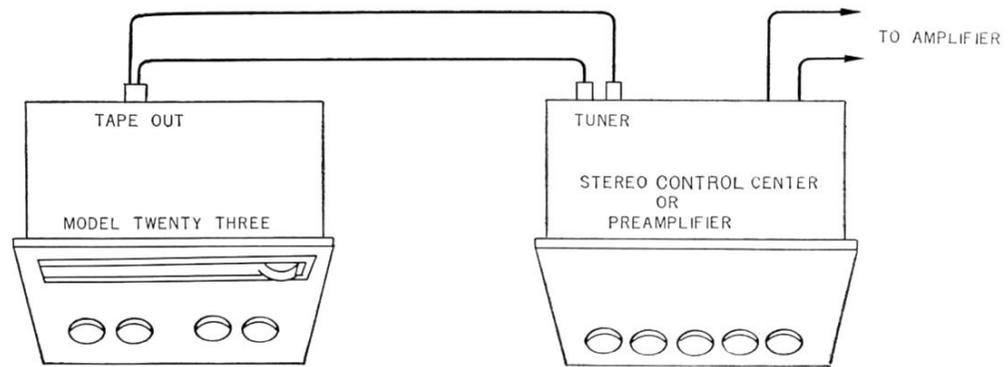
(Note: With the antenna attenuator switch in the In position the sensitivity of the set is greatly reduced, reducing also the number of stations that can be received.)

### **AM ANTENNA**

The Model Twenty-three is equipped with an AM ferrite-rod antenna. Before using the Model 23, pull the antenna out as shown in Figure 3, The ferrite-rod antenna will give satisfactory results in primary signal areas: no outdoor antenna will be necessary in these areas. But in rural areas, an outdoor antenna may be required for best reception. Two single wires are required to make an AM outdoor antenna. First, connect one end of the single wire to the AM antenna terminal on the rear panel, and fix the other end at a very high position outdoors (the higher the better), or swing it from the window of your room. Next, connect one end of the ther single wire to the G (ground) terminal and the other end to an earth ground, such as a water pipe.



VIEW. A



VIEW. B

**Figure 4. Connection Diagram**

## POWER CONNECTIONS

**Line Cord** With the **POWER** switch on the front panel set to **OFF** plug the line cord into an electrical outlet providing 105 to 125 volts, 50 to 60 Hz, **AC ONLY**.

### **Convenience Outlet:**

One **SWITCHED AC OUTLET** has been provided on the rear for powering the associated components.

## SIMPLIFIED OPERATING PROCEDURE

If operating the Model Twenty-three Stereo tuner for the first time, and you wish to use the **VOLUME** control of the Model 23, follow these simple directions.

- Step 1.** Connect tuner **OUTPUT** of the model Twenty-three to the tuner jacks of your stereo control center, taking care not to mix up left and right channels. See Figure 4A.
- Step 2.** Turn the **volume** control all the way to the left (fully counter clockwise)
- Step 3.** Turn on system **POWER** switch.
- Step 4.** Select the desired program source by turning the mode switch to the appropriate position. If FM is selected, rotate the "Gyro-Touch" **TUNING** knob until the desired station is tuned. Turn the **volume** control to provide a comfortable listening volume.

**Step 5.** When taking a tape recording, connect the **TAPE OUT** of the tuner to the input jacks of your tape recorder. Then select the desired program as stated above.

To utilize the volume control of your stereo control center, substitute the following steps for 1 and 2 above.

- Step 1.** Connect **TAPE OUT** jacks of the Model 23 to the **TUNER** jacks of your stereo control center, See Figure 4B.
- Step 2.** Turn the **VOLUME** control of your stereo control center all the way to the left (fully counter-clockwise).

The tuner section of the Model Twenty-three is equipped with electronically triggered IC 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 turns on in the presence of a stereo broadcast.

The Model Twenty-three is equipped with two tuning indicator meters and an antenna tuning switch. Their functions are as follows:

**SIGNAL STRENGTH** meter: This meter indicates the signal strength of any AM or FM broadcast.

**TUNING** meter: When tuned to center scale it indicates correct station tuning.

## TUNING

**AM TUNING:** For optimum AM reception, tune to the selected station then rotate the tuning knob slightly back and forth until the maximum reading is obtained on the **SIGNAL STRENGTH** meter. The **TUNING METER** and **ANTENNA TUNING** function is not used for AM.

**FM TUNING:** Switch to FM and tune to the desired station. Then rotate the tuning knob slightly back and forth until maximum reading is obtained on the **SIGNAL STRENGTH** meter. Then continue rotating the **TUNING** knob back and forth until the **TUNING** meter stops at the center scale position. When this reading has been obtained, the receiver is properly tuned.

**FM ANTENNA TUNING:** To obtain the best

possible FM reception, it will be necessary to adjust (rotate) the direction of the FM antenna to reduce multipath distortion (identical to TV "ghosts"). The Model Twenty-three receiver employs a **TUNING** meter for this purpose. To determine the correct antenna orientation for a given station, tune to the station (following the FM tuning instructions). Depress the **ANTENNA TUNING** pushbutton switch then rotate the FM antenna until the minimum reading is obtained on the **TUNING** meter or the minimum buzz sound is heard from the speaker. The **ANTENNA TUNING** switch must be released for listening.

**Hi-Blend Switch** When the mode switch is placed in the **HI BLEND** position there will be a slight reduction in high frequency stereo separation. With usual listening, the switch

should be in the normal "out" position. When listening to distant FM stereo programs with excessive background noise or interference, use of the **HI BLEND** switch will blend the left and right channels at high frequencies combining the advantage of **moderate** stereo separation with **moderate** suppression of out-of-phase noise and distortion components while maintaining full frequency response. This method differs from ordinary FM stereo noise filters which eliminate noise by reducing the high frequency response.

On noisy FM stereo broadcasts which cannot be satisfactorily improved by the use of the **HI BLEND** position the **FM MONO** position will eliminate all noise attributable to stereo reception. Of course, the stereo broadcast will then be received monophonically.

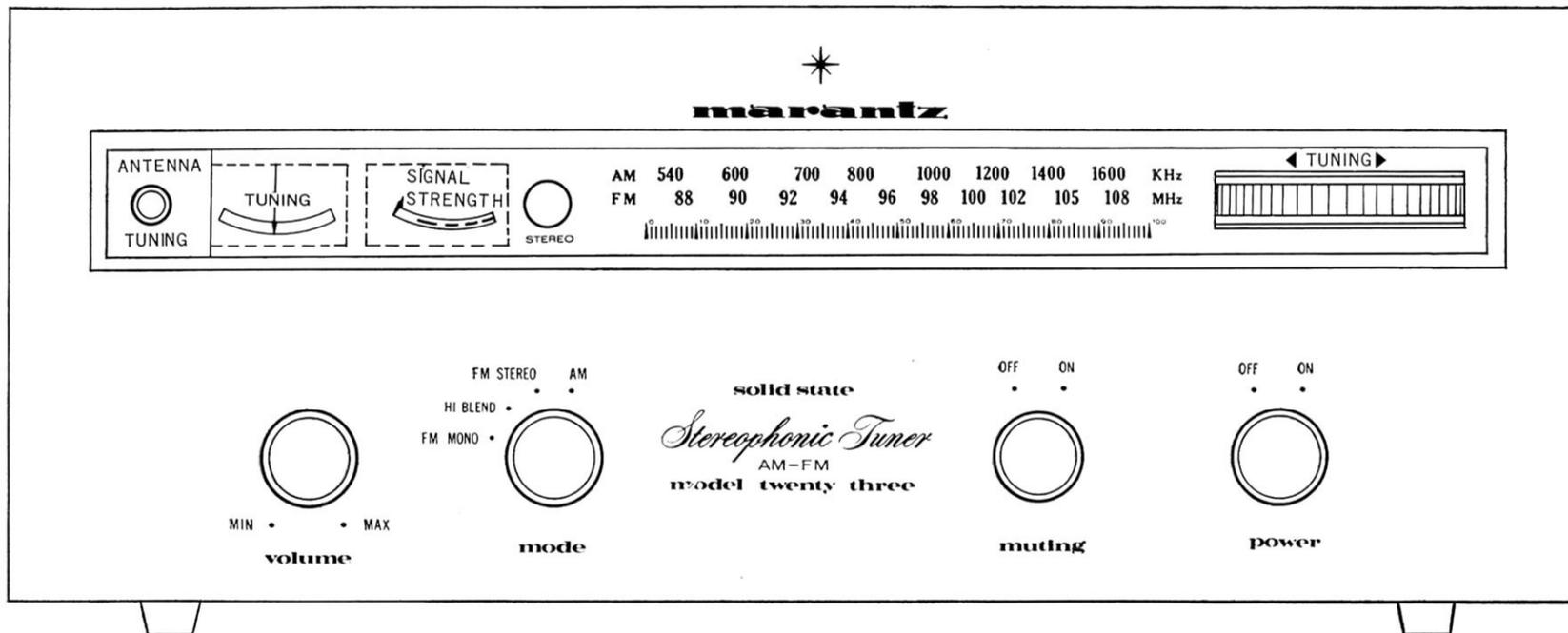


Figure 5. Front Panel Controls, Jacks

## MAIN CONTROLS

**POWER SWITCH** To turn on the **power**, place the **power** switch in the **ON** position. To turn off, place **power** switch in the **OFF** position.

**MODE SWITCH** This switch selects the mode of program source for listening or recording. When listening to AM broadcasts place the switch in the **AM** position.

When listening to FM stereo programs place the switch in the **FM STEREO** position. But when listening to distant FM stereo programs with excessive back ground noise or interferece, placing the switch in the **HI BLEND** position will blend the left and right channels at high frequencies combining the advantage of moderate stereo separation with moderate suppression of out-of-phase noise and distortion components while maintaining full frequency response.

Broadcasts which can not be satisfactorily improved by the use of

**HI BLEND** switch, place the mode switch in the **FM MONO** position this will eliminate all noises attributable to stereo reception. Of course, the stereo broadcast will then be received monophonically.

**Volume** This precision control maintains stereo balance within 3 dB at all normal settings. It controls the level of both output channels simultaneously and has no effect on the recording outputs.

**Muting Switch Level Control** When listening to FM broadcasts with the **Muting** switch in the **ON** Position, the interstation muting circuit will reduce noise to a comfortably low level while tuning from station to station. The muting threshold can be varied by rotating the **MUTING LEVEL** control on the rear panel. Because very weak stations may also be muted along with the noise, muting may be turned **OFF** when tuning to a weak station.

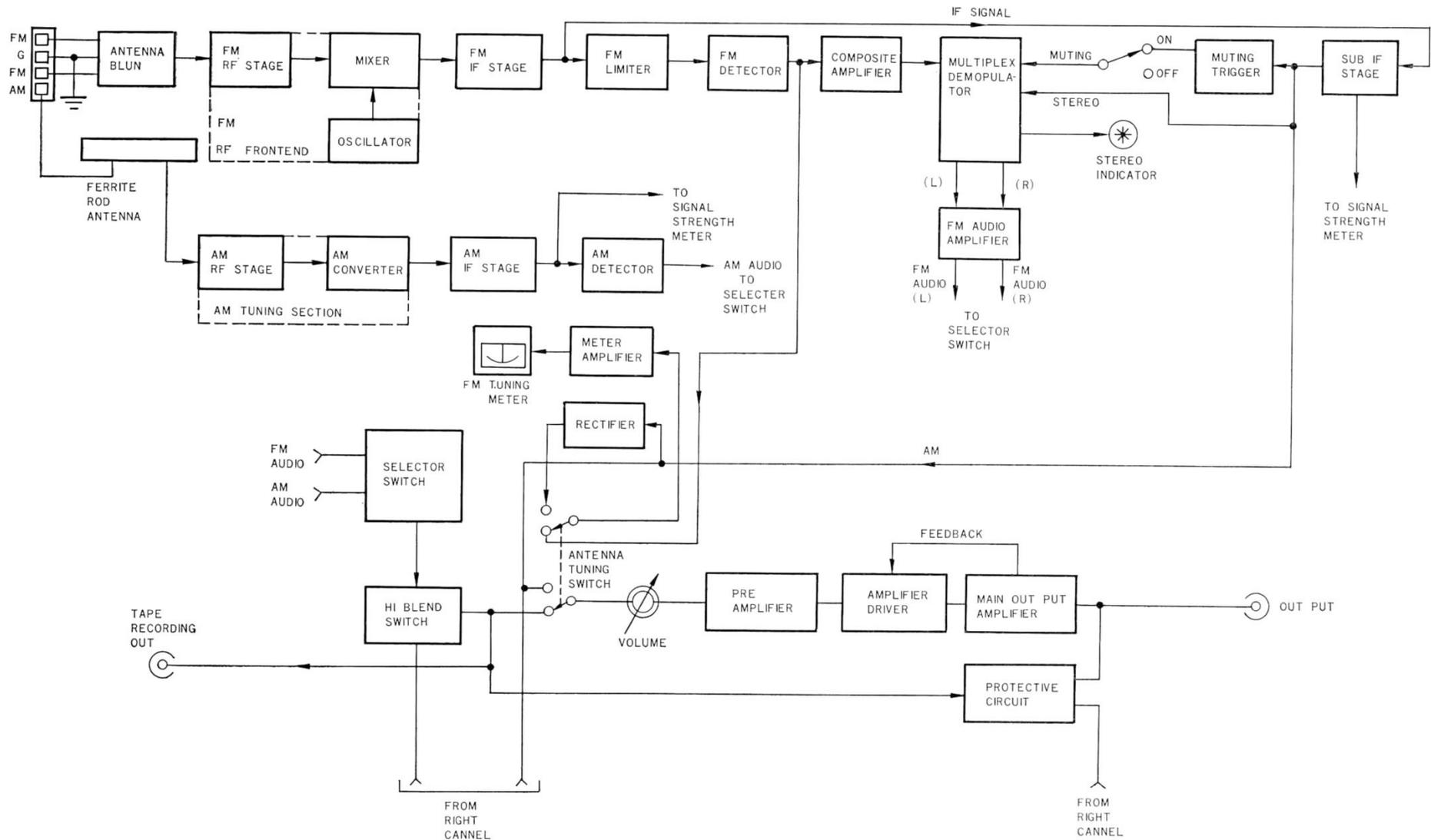


Figure 6. Functional Block Diagram

## TECHNICAL DESCRIPTION

### GENERAL

Figure 6 is a block diagram of the Twenty-three Tuner showing the principal functional

elements and input and output signal routing. Each AM and FM front end has its own IF stages. The switches are common to both channels. Volume controls are ganged.

## FUNCTIONAL DESCRIPTION

**Front End** FM antenna signals are applied through a Balun and Antenna coil to a field-effect transistor RF amplifier. An attenuator circuit is provided and connected to the **ANTENNA ATTENUATOR** switch on the rear panel. This attenuator switch is also connected between the Balun and Antenna coil. When the **ATTENUATOR** switch is placed in the “**OUT**” position, the attenuator circuit is cut off and FM signals are directly fed to the FM antenna coil. With **ATTENUATOR** switch placed in the “**IN**” position, the signals are attenuated about 20 dB by the attenuator circuit, then, fed to the Antenna coil. The signals from the RF amplifier are fed through the double-tuned RF tank circuit to the FET Mixer stage, 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, with its undesirable side effects. The 10.7 MHz converted signal is then fed to a phase-linear I. F. filter, followed by an IC limiter. It is then, processed through an FM discriminator. The output of the FM discriminator is fed to an IC multiplex demodulator through a **COMPOSITE AMP.** before the audio is routed to the FM audio amplifier.

**I. F. Stages** The I. F. section consists of three ICs ( $\mu$ A 703, two CA3011) and two ceramic filters. The characteristics of this filter are ideal in that the 200-KHz passband is phaselinear, with sharp cut off slopes. Its exceptional phase linearity assures the elimination of a major source of high-frequency distortion and loss of stereo separation. The

sharp cut-off slopes provide improved selectivity, permitting reception of closely spaced channels.

**Limiter** The model Twenty three utilizes an IC limiter amplifier with a very small dynamic symmetrical aperture, eliminating the need for an AGC circuit (which introduces low frequency distortion). Undesirable amplitude modulation (AM signals, AM noise, AM distortion) are removed from the I. F. signal within the limiter.

**Sub I. F. Stage** Low-level signals from a coupling capacitor in the I. F. stage are amplified and rectified in the sub I. F. stage. The resulting DC outputs drive the signal strength meter and muting trigger.

**Muting Trigger** When the carrier exceeds a predetermined level, the muting trigger activates - disabling the muting circuit.

**Antenna Tuning** An antenna tuning circuit is provided to find the optimum antenna direction for a desired station by displaying multipath distortion. Undesirable amplitude modulation contained in IF signals is detected into audible signals, then rectified into DC current in the output stage of the Sub-IF amplifier. The DC current is fed to the Meter Amplifier which drives the **TUNING Meter.**

The audible signals detected are fed to the Tone amplifier through the **ANTENNA TUNING** switch, and **balance** and **volume** controls. The distorted sound due to the undesirable amplitude modulation, which is proportional to the **TUNING** meter deflection, can be heard through the loudspeakers. The optimum antenna direction is found by rotating the FM

antenna that until minimum tuning meter deflection or buzzing sound is obtained.

**Demodulator** The composite audio signal containing stereo information is fed into the multiplex demodulator consisting of one IC and three tuning circuits (two 19 KHz, one 38 KHz). The MPX decoding IC performs all the functions necessary to detect the stereo information, and includes the Muting, Mono/Stereo, and Stereo lamp switching circuits. The demodulator has no trap for 67 KHz SCA signals, but any intermodulations caused by the SCA carrier are suppressed better than -50 dB. The MPX circuitry detects the transmitted 19 KHz stereo pilot signal and doubles its frequency to 38 KHz. In addition, the detection circuit activates the stereo trigger which turns on the stereo indicator lamp and switches in the multiplex decoding circuit. When no 19 KHz pilot is detected, the stereo trigger is de-activated, causing the stereo indicator to turn off. In addition, the multiplex decoding circuit is disabled and the monophonic audio signal is fed directly through the de-emphasis network and FM Audio amplifier to both **OUTPUT** jacks.

## TECHNICAL SPECIFICATIONS

### FM SECTIONS:

|  |                      |
|--|----------------------|
| IHF Usable Sensitivity .....   | 2.4 $\mu$ V          |
| Selectivity .....  | 80 dB                |
| Noise Quieting .....   | -53 dB at 5 $\mu$ V  |
|  | -59 dB at 10 $\mu$ V |
|  | -65 dB at 50 $\mu$ V |
| Total Harmonic Distortion, 400 Hz, 100% Mod ... (Mono) 0.3% (Stereo) 0.5%          |                      |
| Frequency Response (ref. 75 $\mu$ SEC. de-emphasis) ... $\pm$ 1 dB 20 Hz to 15 KHz |                      |
| Stereo Separation .....  | 1,000 Hz 40 dB       |
| Sub-Carrier (38 KHz) Suppression .....   | 60 dB                |
| Tuner Output .....   | 4 volts, rms         |

### GENERAL:

|                                     |  |
|-------------------------------------|--|
| Power Requirements .....            | 105 to 125 volts, rms                    |
|                                     | 50 to 60 Hz                              |
|                                     | 25 watts                                 |
| Dimensions—Panel Width .....        | 15- <sup>23</sup> / <sub>64</sub> inches |
| Panel Height .....                  | 5 <sup>3</sup> / <sub>4</sub> inches     |
| Depth behind panel .....            | 12- <sup>7</sup> / <sub>32</sub> inches  |
| Clearance for panel and knobs ..... | <sup>3</sup> / <sub>4</sub> inches       |
| Shipping Weight .....               | 24.2 Pound                               |

Specifications subject to change without notice.

# SERVICE NOTES

## —PROTECTOR—

The Marantz Model Twenty-three Tuner is protected by an over-current circuit breaker located on the rear panel.

In the event of an extended overcurrent the circuit breaker will operate and cutoff the power supply. Thus, no fuse is necessary.

When the Model Twenty-three is turned on, but is not operating and there is no dial illumination (assuming that the filament of the dial glass lamp is not burned out), reset the circuit breaker by simply pushing in the Red button of the **PROTECTOR**.

Do not depress the Red button for more than one second. If there is still no dial illumina-

tion, a local authorized Marantz dealer should be contacted.

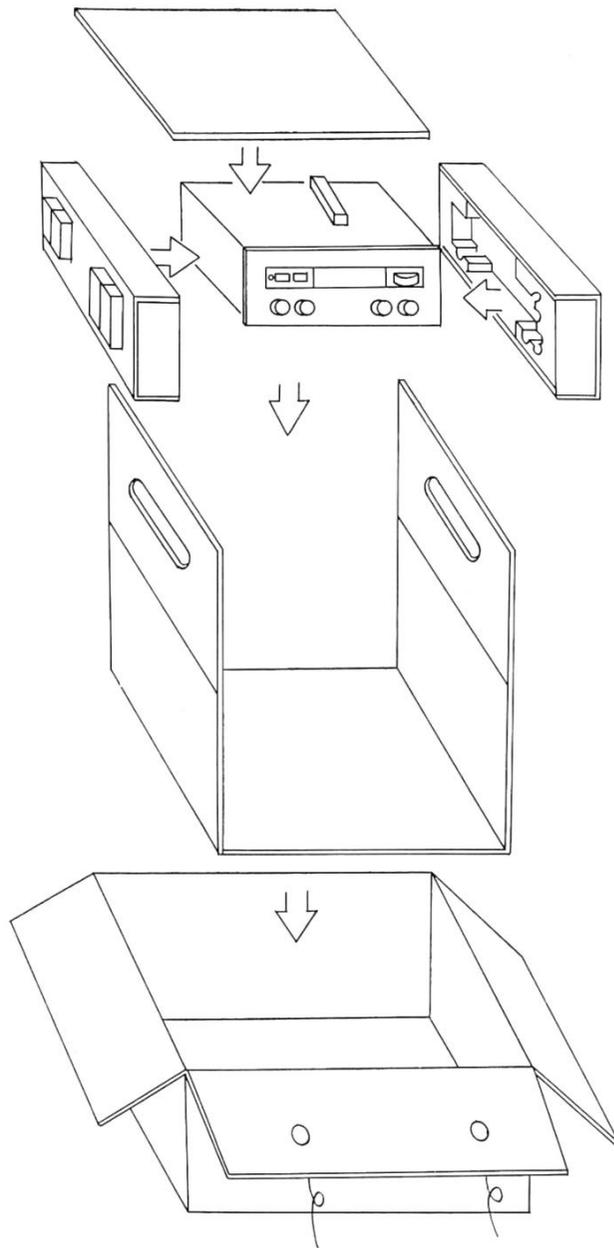
## REPAIRS

Only the most competent and qualified service technicians should be allowed to service the Marantz Model Twenty-three Tuner. 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, **ALWAYS REMOVE THE TUNER FROM ITS 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 unit 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.



Please pack the unit as illustrated.

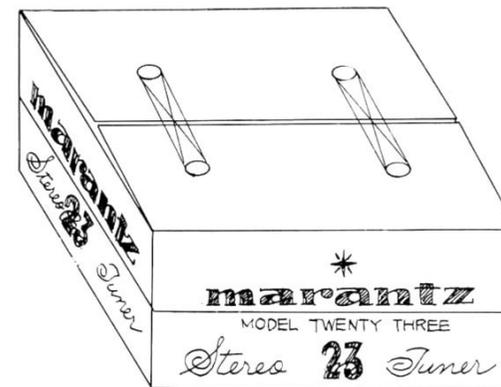
**CAUTION**

Please **DO NOT** ship unit mounted in its cabinet.

Insure unit 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.



**Figure 7. Packing Instructions**