

McIntosh  
MR 75

# OWNER'S MANUAL

## THE MR 75 AM/FM TUNER



Reading Time: 32 Minutes

Price \$2.00

**VARIOUS REGULATORY AGENCIES REQUIRE THAT WE BRING THE FOLLOWING INFORMATION TO YOUR ATTENTION. PLEASE READ IT CAREFULLY.**

**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.**

The McIntosh you have purchased is a Model MR 75. It has a serial number located on the rear panel of the chassis. Record that serial number here:

Serial Number

The model, serial number and purchase date are important to you for any future service. Record the purchase date here:

Purchase date

Upon application, McIntosh Laboratory provides a Three-Year Service Contract. Your McIntosh authorized Service Agency can expedite repairs when you provide the Service Contract with the instrument for repair. To assist, record your Service Contract number here:

Service Contract Number

Your MR 75 AM/FM Tuner can give you many years of satisfactory performance. If you have any questions, please contact:

**CUSTOMER SERVICE**  
**McIntosh Laboratory Inc.**  
**2 Chambers Street**  
**Binghamton, New York 13903**  
**Phone: 607-723-3512**

**Take Advantage of 3 years of Contract Service- Fill in the Application NOW.**

# Contents

SERVICE CONTRACT INFORMATION.....1  
INSTALLATION..... 2, 3  
HOW TO CONNECT AND  
BACK PANEL INFORMATION..... 4-6  
FRONT PANEL INFORMATION  
AND USE OF CONTROLS..... 6, 7  
PERFORMANCE LIMITS..... 8  
PERFORMANCE CHARTS..... 9, 10  
TECHNICAL DESCRIPTION..... 11, 12  
BLOCK DIAGRAM..... 13

## McINTOSH THREE YEAR SERVICE CONTRACT

An application for A THREE YEAR SERVICE CONTRACT is included with this manual.

The terms of the contract are:

1. McIntosh will provide all parts, materials and labor needed to return the measured performance of the instrument to the original performance limits. The SERVICE CONTRACT does not cover any shipping costs to and from the authorized service agency or the factory.
2. Any McIntosh authorized service agency will repair McIntosh instruments at normal service rates. To receive service under the terms of the SERVICE CONTRACT, the SERVICE CONTRACT CERTIFICATE must be presented when the instrument is taken to the service agency.
3. Always have service done by a McIntosh authorized service agency. If the instrument is modified or damaged as a result of unauthorized repair, the SERVICE CONTRACT will be cancelled. Damage by improper use or mishandling is not covered by the SERVICE CONTRACT.
4. The SERVICE CONTRACT is issued to you as the original purchaser. To protect you from misrepresentation, this contract cannot be transferred to a second owner.
5. To receive the SERVICE CONTRACT, your purchase must be made from a McIntosh franchised dealer.
6. Your completely filled in application for the SERVICE CONTRACT must be post-marked within 30 days of the date of purchase of the instrument.
7. To receive the SERVICE CONTRACT, all information on the application must be filled in. The SERVICE CONTRACT will be issued when the completely filled in application is received by McIntosh Laboratory Incorporated in Binghamton, New York.
8. Units in operation outside the United States and Canada are not covered by the McIntosh Factory Service Contract, irrespective of the place of purchase. Nor are units acquired outside the U.S.A. and Canada, the purchasers of which should consult with their dealer to ascertain what, if any, service contract or warranty may be available locally.

# THE MR 75 AM/FM TUNER



## Installation

The PANLOC system of installing equipment conveniently and securely is a direct result of McIntosh research. By depressing the two PANLOC buttons on the front panel, the instrument either can be locked firmly in place or it can be unlocked so that the chassis can slide forward, giving you easy access to the top and rear panels.

The trouble-free life of an electronic instrument is greatly extended by providing sufficient ventilation to prevent the build-up of high internal temperatures that cause deterioration. Allow enough clearance so that cool air can enter at the bottom of the cabinet and be vented from the top. With adequate ventilation the instrument can be mounted in any position. The recommended minimum space for installation is 15 inches (38.1 cm) deep, 17 inches (43.2 cm) wide, and 6 inches (15.2 cm) high.

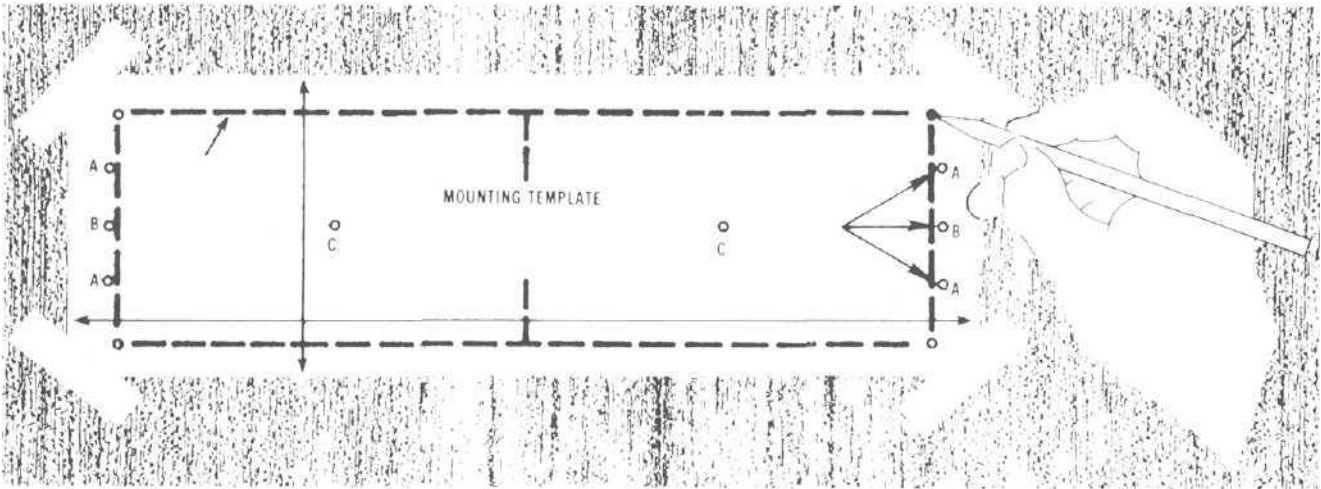
To install the instrument in a McIntosh cabinet, follow the instructions that are enclosed with the cabinet. For any other type of installation, follow these instructions:

1. Open the carton and remove the PANLOC brackets, hardware package, and mounting template. Remove the MR 75 from its plastic bag and place it upside down on the shipping pallet, then unscrew the four plastic feet from the bottom of the chassis.

2. Mark the cabinet panel  
Place the mounting template in the position on the cabinet panel where the instrument is to be installed, and tape it in place. The broken lines that represent the outline of the rectangular cutout also represent the outside dimensions of the chassis. Make sure these lines clear shelves, partitions, or any equipment. With the template in place, first mark the six A and B holes and the four small holes that locate the corners of the cutout. Then, join the four corner markings with pencil lines using the edge of the template as a straightedge.

3. Drill Holes  
Use a drill with a 3/16 inch bit held perpendicular to the panel and drill the six A and B holes. Then, using a drill bit slightly wider than the tip of your saw blade, drill one hole at each of two diagonally opposite corners. The holes should barely touch the inside edge of the penciled outline. **Before taking the next step, make sure that the six A and B holes have been drilled.**





#### 4. Saw the Panel Cutout

Saw carefully on the inside of the penciled lines. First make the two long cuts and then the two short cuts. After the rectangular opening has been cut out, use a file to square the corners and smooth any irregularities in the cut edges.

#### 5. Install the Mounting Strips

In the hardware package you will find two mounting strips and two sets of machine screws. For panels that are less than  $\frac{1}{2}$  inch thick, use the  $\frac{3}{4}$  inch screws; for panels that are more than  $\frac{1}{2}$  inch thick, use the  $1 \frac{1}{4}$  inch screws.

Starting at the right-hand side of the panel, insert a screw of proper length into the center hole in the panel, marked B on the template. On the back of the panel, align a mounting strip with the holes in the panel and tighten the screw until the screwhead is pulled slightly into the wood.

Repeat this procedure to attach the mounting strip to the left side of the panel.

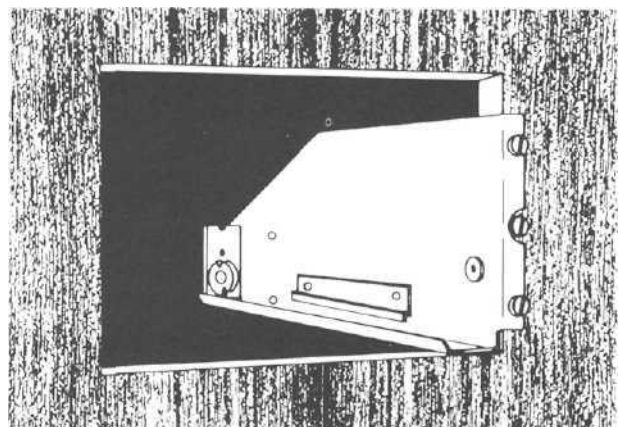
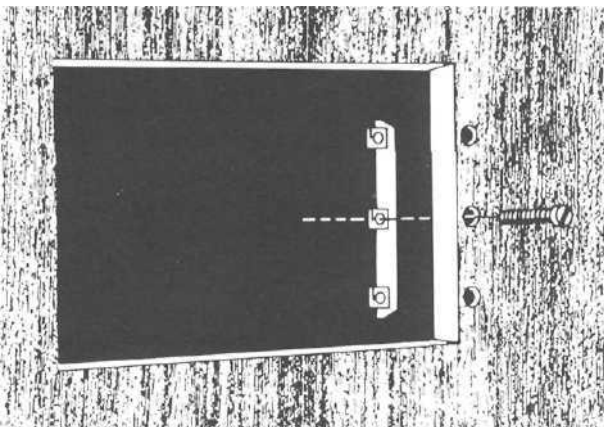
#### 6. Attach the PANLOC Brackets

Using two screws of proper length in the A holes on

each side, attach the PANLOC brackets to the cabinet panel; the short flange is mounted against the front (face) of the cabinet panel. The screws pass through the PANLOC bracket flange, the cabinet panel, and then through the mounting strips previously mounted.

#### 7. Install the Instrument

Guide the AC power cord through the panel opening to the back of the cabinet; then, slide the instrument into the opening carefully so that the rails on the bottom of each side of the chassis engage the tracks on the mounting brackets. Continue to slide the instrument into the cabinet until it is stopped by the adjust position latches. Press the latches inward, this permits the instrument to slide into the cabinet until its front panel is flush with the cabinet panel. Depress the PANLOC buttons at the lower left and right corners of the instrument panel to lock the unit firmly in the cabinet. Depressing the PANLOC buttons again will unlock the instrument so that it can slide forward to the adjust position; if you press inward on the adjust position latches then you can remove the instrument from the cabinet.



# How to Connect and Back Panel Information

Refer to the drawing on page 5.

## AUDIO OUTPUTS

Use the FIXED OUTPUT jacks on the rear panel to feed program to a stereo control preamplifier or other equipment which has its own volume control. The front panel VOLUME control does not affect the loudness of the tuner at the FIXED OUTPUT jacks. The output level is a nominal 1 volt for 100% FM modulation.

Use the VARIABLE OUTPUT jacks to connect to equipment such as a power amplifier or a tape recorder where control of the volume at the tuner is desired. The output at the VARIABLE OUTPUT jacks is a nominal 2.5 volts for 100% FM modulation. There is no difference in the signal quality at either pair of output jacks.

Both pairs of OUTPUT jacks may be used simultaneously. The output impedance at both outputs is very low so that long audio cables can be used without a loss of high frequencies due to cable capacity.

## CONNECTING AN FM ANTENNA

One of three antenna systems can be used: (1) an outdoor FM antenna, or (2) an VHF-TV antenna, or (3) the indoor dipole supplied.

An outdoor antenna is recommended for optimum performance in all areas. In fringe (outlying) areas, best results will be obtained with a highly directional FM antenna used in conjunction with a rotator. If the antenna uses a 300 ohm lead, connect it to the ANTENNA 300 $\Omega$  FM push connectors.

The coaxial cable of an unbalanced 75 ohm antenna connects to the rear panel ANTENNA 75ft FM type F coaxial connector.

An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

A VHF-TV antenna can be effective when it is designed for both FM and TV reception. Connect the two leads from the VHF-TV antenna to the ANTENNA 300ft FM push connectors.

The flexible folded dipole antenna (300 ohm) supplied with the MR 75 is for use in urban or high strength signal areas. Connect the two leads from the

dipole to the ANTENNA 300 $\Omega$  FM push connector.

The flexibility of the twin flat wire assembly permits it to be placed under a rug, tacked behind the stereo or placed in any other convenient location. In some cases, it may be necessary to "position" the antenna for best signal reception. This should be done before it is permanently located.

Avoid locating the antenna next to other wires or metal objects. Any indoor antenna may be ineffective in houses having metal siding or metal foil insulation.

## FM PRESELECTOR SWITCH

FM receivers can be overloaded by very large antenna input signals when the receiver is located very near to a FM broadcasting station or when a high gain directional antenna is used in a metropolitan area. An example of overload is where a FM station can be tuned in at two or more places on the dial. A preselector tuned circuit is built into the MR 75 to prevent overload.

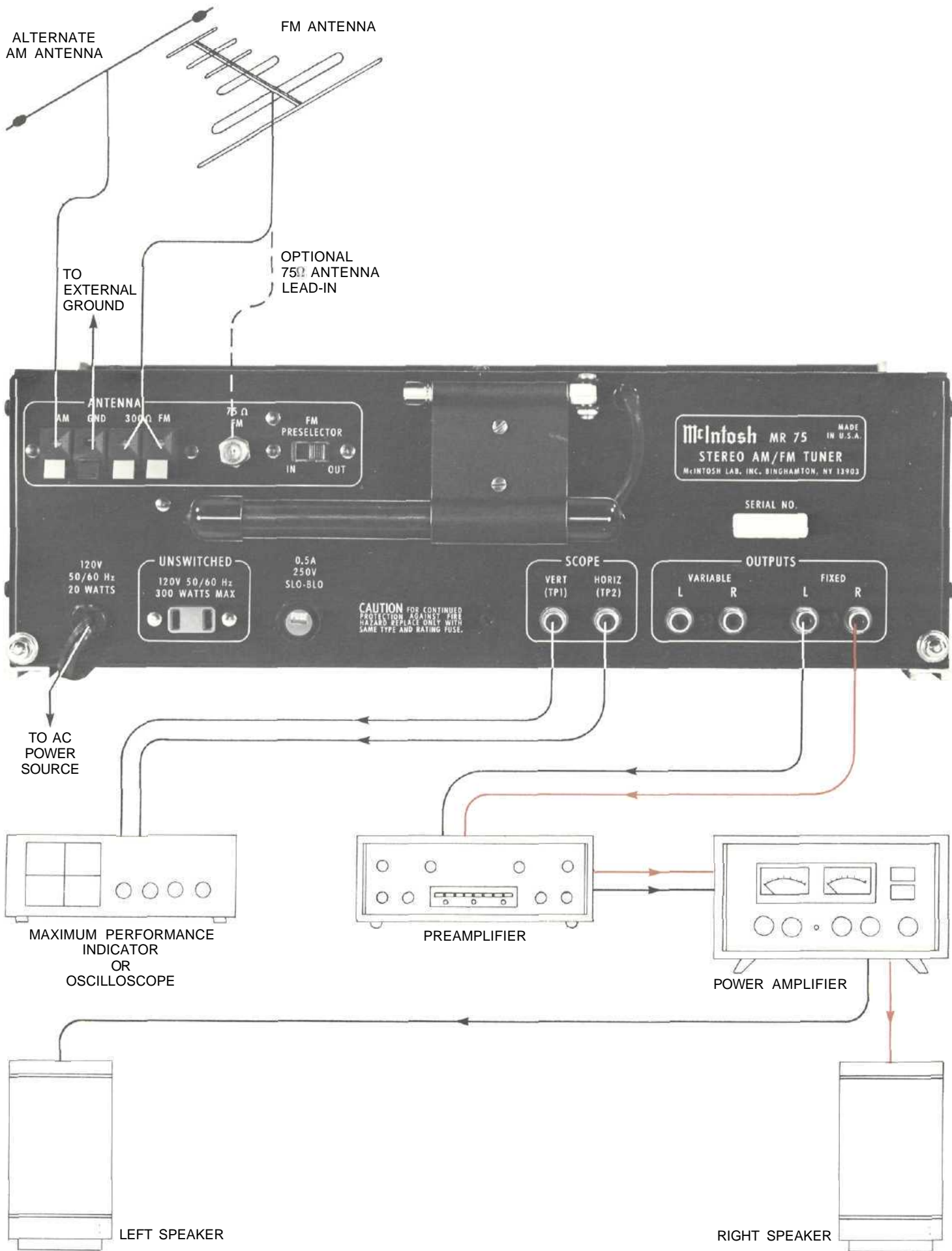
The preselector may be switched into or out of the FM RF circuit by a slide switch located on the rear panel.

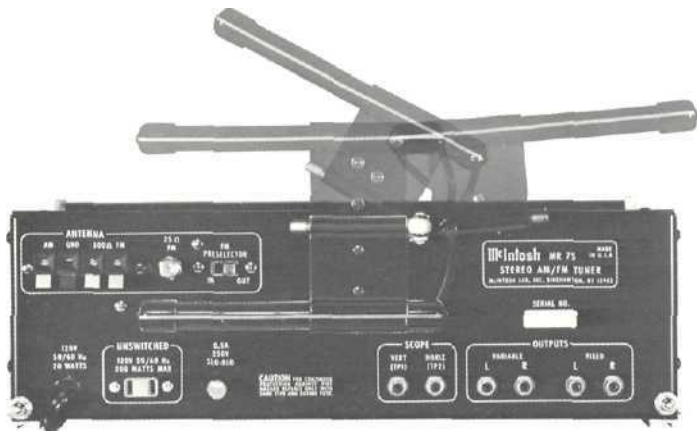
We recommend the FM PRESELECTOR switch be used in the "out" position for all FM listening conditions except where there is evidence of overload by strong stations. In that case, the "in" position will protect against overload. For most stations there will be no listening difference between the two switch positions.

## AM ANTENNA

For local and most moderately distant AM reception, the built-in ferrite loopstick antenna may be used. The AM loopstick antenna is on a swivel base and must be adjusted away from the chassis for best reception. The illustration at the top of page six shows examples of the many positions the AM antenna may be placed in. Try several positions until you locate the best performing location for your listening area.

Distant reception can be improved with the use of a copper antenna wire 50 to 150 feet in length. Suspend the wire in a straight line as high as possible. Attach the wire at each end with suitable glass or ceramic in-





sulators. Connect a lead-in wire at any convenient point on the antenna. It is recommended that a lightning arrester be used with an outdoor AM antenna. The arrester should be well grounded to a ground rod or cold water pipe.

## CONNECTING A MAXIMUM PERFORMANCE INDICATOR

The scope vertical and horizontal jacks on the rear panel are used to connect a McIntosh maximum performance indicator or an oscilloscope. Follow directions outlined in the maximum performance indicator owner's manual. The maximum performance indicator gives a display of signal strength versus frequency and allows adjusting a directional antenna for the best multipath free FM reception condition.

## UNSWITCHED AC POWER OUTLET

This outlet may be used to power auxiliary equipment such as an antenna rotator or a maximum performance indicator. Power is available whenever the MR 75 is connected to a power source.

## FUSE

A 0.5 AMP fuse protects the MR 75 circuits. The fuse does not protect additional equipment connected to the back panel AC outlet.

# Front Panel Information and Use of Controls

The MR 75 Tuner has a flexible control system. Proper use of these controls will yield a high level of performance.



### INPUT SELECTOR

The two position input selector functions as follows:

**AM:** Connects the AM tuner circuits for AM reception.

**FM:** Connects the FM tuner circuits for FM stereo or mono reception.



### MODE:

The mode switch has two positions: **STEREO** - In this position the tuner automatically switches from FM mono to FM stereo depending on the type of broadcast being received. **MONO** - In this position of the mode switch, all broadcasts are received monophonically.



### MUTE:

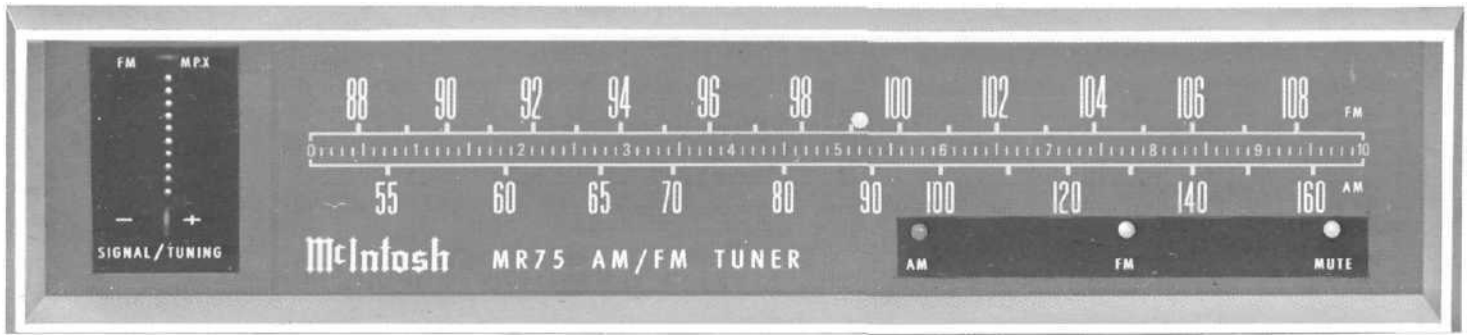
The mute switch has two positions: **ON**-background noise and hiss heard between FM stations is suppressed. **OFF** -inter-station muting is defeated.



### VOLUME CONTROL AND AC POWER SWITCH

The **VOLUME** control has been precision tracked throughout the listening range (0 to -65 dB) for accurate stereo balance. It sets the output level of the **VARIABLE OUTPUT** jacks and the front panel **HEADPHONE** jack. The **FIXED OUTPUT** jacks are not affected by the position of the **VOLUME** control. The **AC power switch** is part of the **VOLUME** control. Turning the **VOLUME** control fully counterclockwise turns the **AC power** off.





### FRONT PANEL INDICATORS

The MR 75 has three dial scales: 1. AM - marked 550 to 1600 kHz; 2. FM - marked 88 to 108 MHz; 3. Logging scale 0 to 100.

As the tuning knob is turned, the pointer moves across the dial. There are two LEDs on the pointer. When you have selected FM, one LED glows behind the FM scale, on AM the other glows behind the AM scale.

The Logging Scale is useful for retuning to your favorite station with great accuracy.

### TUNING KNOB

The Tuning Knob selects AM or FM stations. An AM station is tuned in correctly when the vertical column signal strength indicator shows a maximum. An FM station is correctly tuned when the center bar indicator at the bottom of the signal strength column illuminates and the signal strength display is at a maximum. There are indicators marked + and - on each side of the FM center bar. These light as you approach FM stations and indicate if you are above (+) or below (-) the station. When the center tuning bar lights, the FM AFL (automatic frequency lock) circuit is active and the tuner is locked to the FM station. This locked condition will give the best FM reception with lowest background noise, lowest distortion and best stereo separation.

Because of the locking action of the AFL circuit, the Tuning Knob can be tuned mechanically slightly away from the frequency of the FM station without detuning the MR 75. This makes tuning the MR 75 very

easy but can cause the MR 75 to not return to the FM station when power is turned off and on again. This condition can be avoided if, when tuning in a station, you stop turning the Tuning Knob as soon as the center bar indicator lights. Then the MR 75 will return to the same station when power is turned on again.

### INPUT INDICATORS

At the bottom right of the tuning dial area are three LED lamps; two indicate the status of the SELECTOR switch. The illuminated LED indicates whether AM or FM is selected.

The remaining LED marked "mute" indicates when the mute switch is in the "on" position.

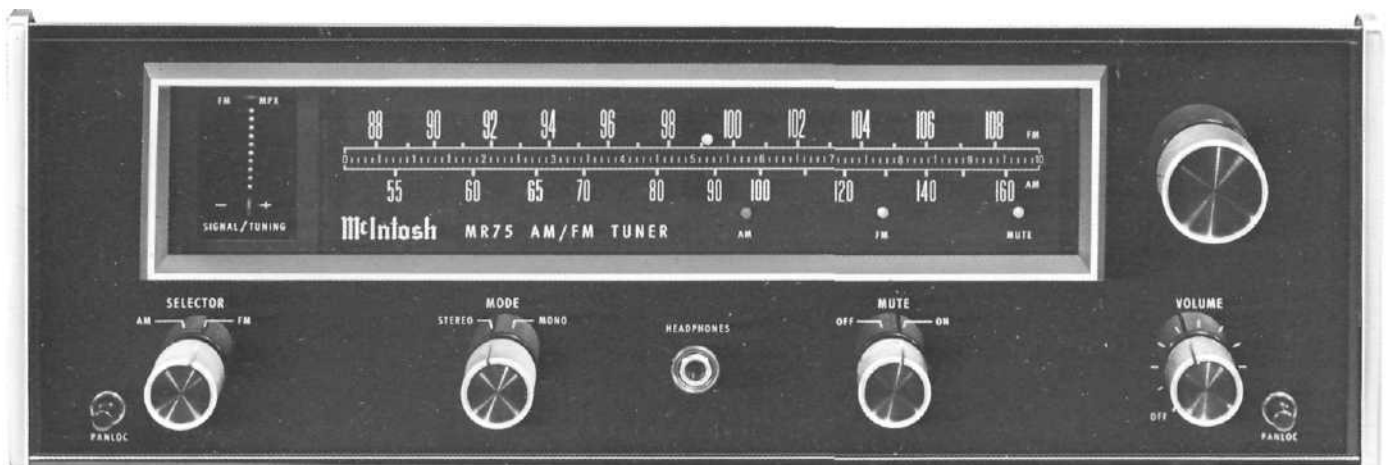
### SOLID STATE TUNING INDICATOR

The MR 75 utilizes an all solid state tuning indicator. Fourteen LEDs make up the display, which consists of four bars and 10 small dots.

The bar at the top indicates reception of a FM stereo multiplex (MPX) station. The 10 little dots arranged in a vertical column indicate relative station signal strength for AM or FM. The three bars at the bottom of the display indicate if you are tuned above (+), below (-), or right on-station when receiving FM. When tuning a FM station, the proper adjustment is when only the center on-station vertical bar indicator lights.

### HEADPHONE JACK

A HEADPHONE jack is provided to drive low impedance dynamic headphones from an internal power amplifier.



# Performance Limits

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new MR 75 from a McIntosh Franchised dealer it will be capable of performance at or exceeding these limits or you can return the unit and get your money back. McIntosh is the only manufacturer that makes this statement.

## FM SECTION

### Tuning

88 to 108 MHz

### Antenna Inputs

One 300ft balanced and one 75 $\Omega$  unbalanced.

### Intermediate Frequency

10.7 MHz

### Usable Sensitivity

2 $\mu$ M (11.2dBf) IHF

### Quieting Sensitivity

5 $\mu$ V (19.1dBf) IHF -50 dB (Mono)

50 $\mu$ V (39.5dBf) IHF -50 dB (Stereo)

### Signal To Noise Ratio

70 dB IHF minimum both Mono and Stereo

### Harmonic Distortion

0.18% (Mono) IHF maximum

0.38% (Stereo) IHF maximum

### Alternate Channel Selectivity

75 dB IHF minimum

### Image Rejection

100 dB IHF minimum

### Stereo Separation

45 dB minimum at 1 kHz

### Audio Frequency Response

20 Hz to 15 kHz +0, -1 dB

### Capture Ratio

1.8 dB

### Spurious Rejection

100 dB IHF minimum

### SCA Rejection

60 dB minimum

## AM SECTION

### Sensitivity

75 $\mu$ V IHF with external antenna

### Signal To Noise Ratio

45 dB minimum IHF or 55 dB at 100% modulation

### Frequency Response

+0 -6 dB from 20 Hz to 3500 Hz

### Harmonic Distortion

0.8% maximum at 30% modulation

### Adjacent Channel Selectivity

30 dB minimum IHF

### Image Rejection

65 dB minimum from 550 kHz to 1600 kHz

## GENERAL INFORMATION

### Audio Output

Variable: 2.5V into 5k $\Omega$

Fixed: 1V into 5k $\Omega$

### Audio Hum

75 dB down from 100 % modulation

### Power Requirement

120 Volts 50/60 Hz, 20 Watts

### Semi Conductor Complement

22 Bipolar Transistors

4 Field Effect Transistors

23 Silicon Diodes

15 Integrated Circuits

19 LED's

2 Bridge Rectifiers

## MECHANICAL INFORMATION

### SIZE:

Front panel measures 16 inches wide (40.6 cm) by 5 7/16 inches high (13.8 cm). Chassis measures 14 3/4 inches wide (37.5 cm) by 4 13/16 inches high (12.2 cm) by 13 inches deep (33 cm), including connectors. Knob clearance required is 1 1/4 inches (3.2 cm) in front of mounting panel.

### FINISH:

Front panel is anodized gold and black with special gold/tea! nomenclature illumination. Chassis is black.

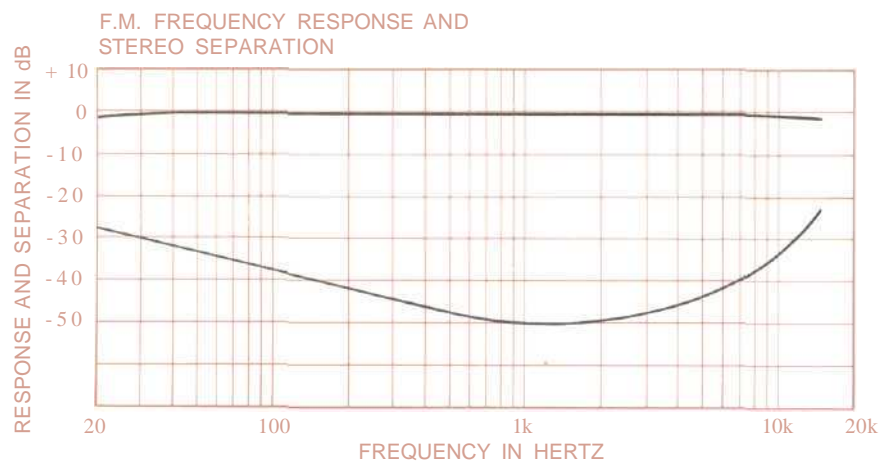
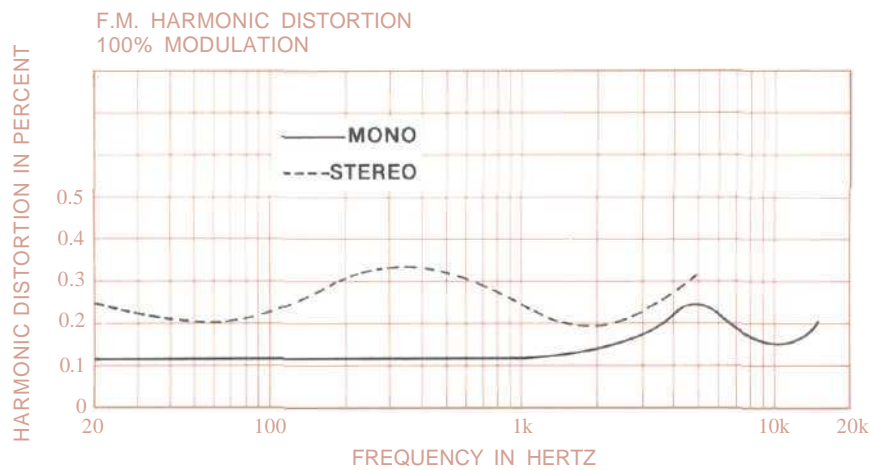
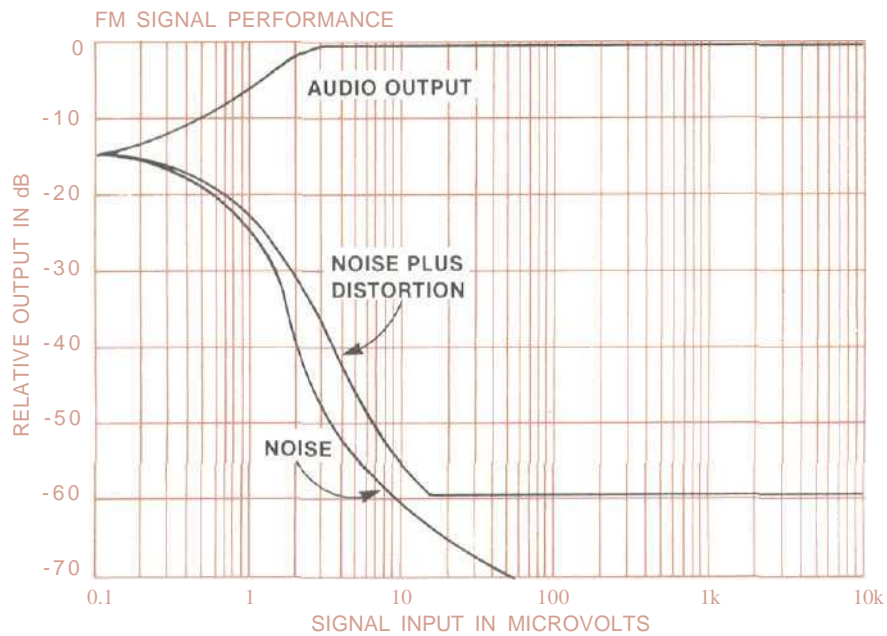
### MOUNTING:

Exclusive McIntosh developed professional PANLOC.

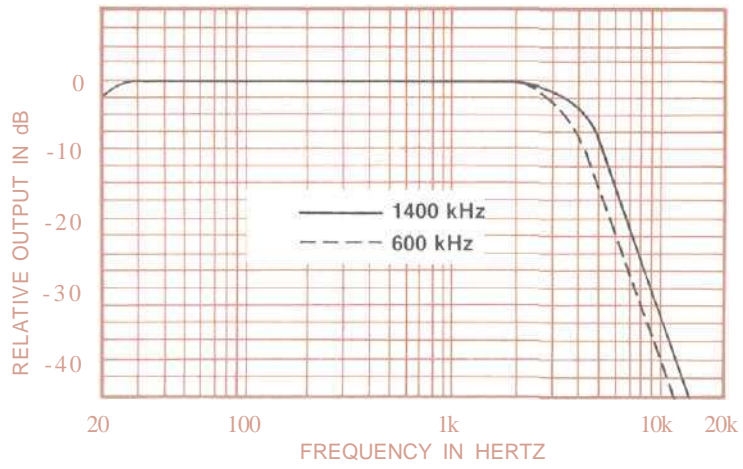
### WEIGHT:

23 pounds (10.43 kg) net, 35 pounds (15.88 kg) in shipping carton.

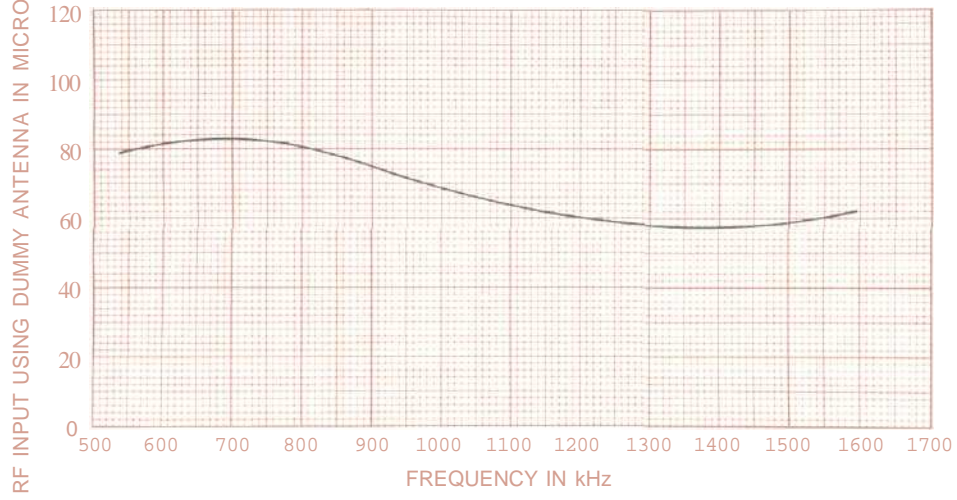
# Performance Charts



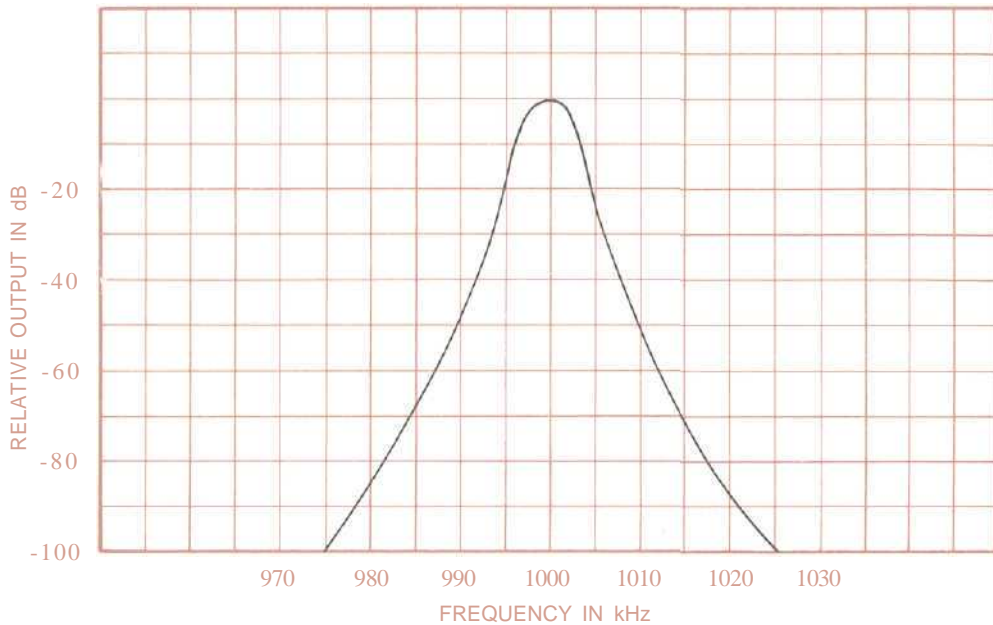
A.M. FREQUENCY RESPONSE  
80% Modulation



AM MINIMUM USABLE SENSITIVITY (IHF)  
RF INPUT USING DUMMY ANTENNA IN MICROVOLTS



AM SELECTIVITY  
AT 1000 kHz





# Technical Description

## FM SECTION

The radio frequency (RF) assembly houses the complete FM-RF front end and part of the AM-RF circuitry. An eight section variable capacitor is the heart of the RF assembly. Five sections, 1, 2, 4, 6 and 8 are used for FM and three sections, 3, 5 and 7 are for AM. Sections 1 and 2 of the capacitor are for the FM antenna RF input circuits. Section 2 is always in use, however, if additional RF selectivity is desired to protect against strong signal overload, additional preselector filtering is accomplished by adding section 1. This is accomplished by operation of the preselector switch on the rear panel. This switch directs a DC voltage that controls PIN semiconductor diodes to perform the RF switching functions electronically.

A MOS-FET RF amplifier follows section 2 to provide exceptional sensitivity while maintaining superior cross-modulation rejection over a wide dynamic range. Capacitor sections 4 and 6 follow the RF amplifier to increase selectivity and to provide correct impedance matching for the following fully balanced MOS-FET mixer.

The local oscillator is tuned by capacitor section 8. A MOS-FET buffer amplifier is employed between the oscillator and the mixer. The high input impedance of this amplifier insures that oscillator loading is minimal, therefore, oscillator stability is greatly enhanced. The oscillator is fine tuned by a varactor diode operated by a correction voltage generated by the Automatic Frequency Lock (AFL) circuit. AFL is a McIntosh patented circuit that turns on a lock voltage when manual tuning reaches the center of the FM station carrier. This AFL tuning aid insures the tuning is accurate for minimum distortion and best performance.

The FM-IF system that follows the mixer consists of five integrated circuit amplifiers and four piezoelectric filters. They combine to give a total amplification of 140 dB. The IF response characteristic is very selective, being 170 kHz wide at -3 dB and only 500 kHz wide at -50 dB. The response is symmetrical about the center frequency of 10.7 MHz. The IF filters are permanently sealed and cannot drift nor vibrate out of adjustment. The exceptionally high gain of the IF system assures proper limiting at all input signal levels. A Foster-Seely discriminator completes the IF system. The detected output of this discriminator has a high signal to noise ratio and extremely low distortion. This output feeds to the FM stereo multiplex section.

## FM STEREO MULTIPLEX

The heart of the multiplex section is a new third generation phase locked loop (PLL) stereo decoder integrated circuit (IC). This PLL IC incorporates two

special systems, an automatic variable separation control circuit to reduce background noise when receiving weak stereo stations, and tri-level digital waveform generation which eliminates interference from SCA signals and from the sidebands of adjacent channel FM signals.

The variable separation control is operated from the IF amplifier's signal strength detector. A smooth transition is provided from mono to stereo or from stereo to mono at weak signal levels to provide the optimum signal to noise ratio and best stereo separation for the prevailing signal conditions. The circuit operates only during stereo reception. It switches automatically to monophonic if the 19 kHz pilot tone is absent.

In the PLL the internal oscillator operates at 228 kHz, locked onto the 19 kHz pilot tone. The 228 kHz feeds a 3 stage Johnson counter via a binary divider to generate a series of square waves. Suitably connected NAND gates and exclusive OR gates produce the tri-level drive waveform for the various demodulators in the circuit. The usual square waveforms have been replaced in the PLL and decoder sections by tri-level waveforms. These tri-level forms contain no harmonics which are multiples of 2 or 3. This eliminates frequency translation and detection of interference from the side-bands of adjacent stations since the third harmonic of the sub-carrier (114 kHz) is excluded. It also eliminates interference from SCA broadcasts since the third harmonic of the pilot tone (57 kHz) is excluded. Unwanted spurious audible components and phase jitter in the PLL are inherently eliminated by this technique.

Additional advantages of the phase locked loop stereo demodulation are the elimination of inductors to minimize drift, integral lamp driving capability to indicate the presence of the 19 kHz pilot carrier, excellent channel separation over the entire audio frequency range, extremely low distortion, low output impedance, and transient-free mono/stereo switching.

After multiplex detection, 19 kHz pilot and 38 kHz carrier suppression circuits are used to prevent tape recorder interference.

The FM muting circuit is unusual. It operates both by detecting ultrasonic noise and by sensing correct tuning of the detector circuit. To 'un-mute' it is necessary for the signal to have an adequate signal-to-noise ratio and to be tuned to the center of the FM carrier. The MUTING circuit can be activated or defeated by the front panel muting switch. The muting of the audio signal is done with FET analog switches.

## AM SECTION

The AM-RF amplifier circuit includes a three section variable tuning capacitor in a metal enclosure. This three section variable capacitor is used for greater spurious rejection. The McIntosh AM-RF amplifier circuit is unique. It has constant sensitivity, constant selectivity and high image rejection across the complete AM band. Ordinary AM-RF circuits cannot do all of this simultaneously. This design achieves equal sensitivity even down to the low end of the band. Spurious, image and intermediate frequency rejection are all superior. The same circuit delivers equal selectivity across the entire band. Thus, there is no loss of audio frequency response at the low end of the band. Another advantage of the McIntosh circuit is freedom from cross modulation and overloading by strong local stations.

A loopstick antenna is provided which can be rotated for maximum sensitivity over 180 degrees. Each MR 75 loopstick is individually tuned. This custom matching of the loopstick to the AM-RF front end maximizes the performance of the antenna. A rear panel antenna connector is provided for connecting an external antenna if desired.

To maintain the excellent image rejection and spurious cross modulation rejection of the AM-RF amplifier, an autodyne circuit is used for the AM mixer. The AM-IF uses two double tuned IF transformers designed to obtain a high degree of selectivity yet allowing good audio fidelity. A 10 kHz active filter eliminates the whistle and irritating "monkey chatter" caused by an adjacent station. The automatic volume control

system was designed to prevent bursting or thumps when the AM is tuned through a strong signal. Distortion at low audio frequencies is minimized by using a two-section AVC filter instead of the conventional single section.

## OUTPUT/HEADPHONE AMPLIFIER

The output audio amplifier is a push-pull complementary class AB amplifier using a signal inverting differential stage at its input. This amplifier drives the variable output and the headphone jack.

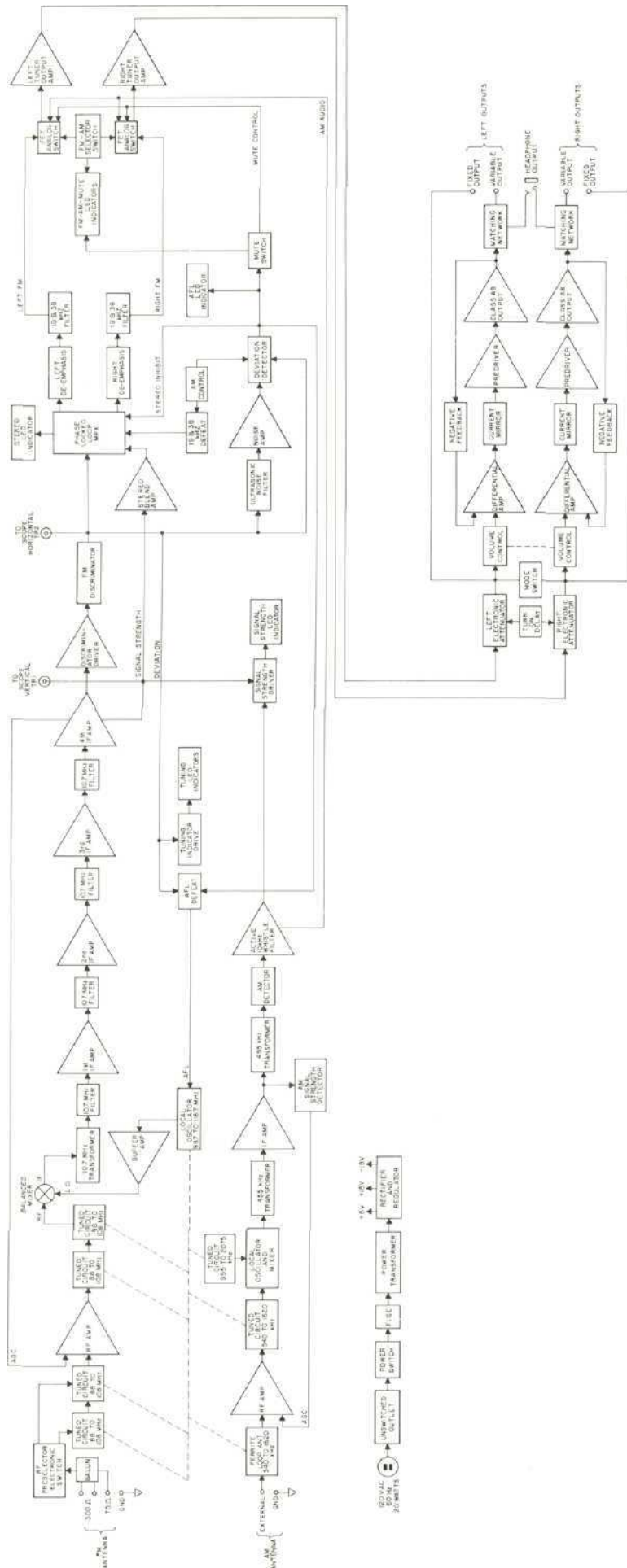
## TURN ON DELAY

A turn-on delay circuit is located ahead of the output amplifier. This circuit uses a light emitting diode/light dependent resistor network that functions to transmit no signal until two seconds after the power switch is turned on and to remove the output signal almost instantly upon power turn-off. Thus the turn-on and turn-off is transient and noise free.

## POWER SUPPLY

To minimize hum, radiation, and thus improve signal to noise ratio the MR 75 power transformer is triple shielded. Shielding includes a copper strap, a silicon steel strap, and finally a steel outer shell. The transformer secondary output voltage is fed to a full wave bridge rectifier and 2,200 microfarad filter capacitors to provide the +24 volts for powering the plus regulator and -24 volts for the minus regulator. The  $\pm 18$  volts needed for low level amplifier stages is supplied by integrated circuit voltage regulators.





McINTOSH MR 75 AM/FM TUNER

Block Diagram

# McIntosh

**McINTOSH LABORATORY INC.**

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607-723-3512

The continuous improvement of its products is the policy of McIntosh Laboratory Incorporated who reserve the right to improve design without notice.

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039281