

NEW DESIGN  
CONCEPTS,  
MODERN HIGH  
SPEED COMPUTERS,  
LATEST TEST  
EQUIPMENT,  
And, thorough,  
uninhibited research  
has developed the  
new technology  
necessary for  
the first  
truly  
low  
distortion  
FM Tuner...the  
MCINTOSH MR 77!



McIntosh research is a continuous program of exploration for new technology that permits performance improvement and greater value for you. This intensive research program developed the new technology necessary for the realization of these two new design concepts for the MR 77.

## 1 THE LINEAR PHASE IF FILTER

Even since the beginning of FM, research engineers have realized that constant delay, or linear phase, IF filters were necessary for low distortion reception. Crude approximations to constant delay have always been used in FM tuners — with disappointing results. So-Called "Butterworth" or "Legandre" filters offer only a fair compromise with respect to delay error. Crystal and ceramic filters, usually based on the "Chebychev" model, work fairly well and give good selectivity, but none of these are constant delay (linear-phase) filters. Commercial tuners using these filters can show 5% stereo IM distortion at 100% modulation, and have delay errors up to 100%. In sharp contrast, the linear phase filter allows a tuner to show only .1% IM distortion at 100% modulation and has a delay error of only 1.2% in the useful bandpass. In its useful bandpass, it is a true mathematical approximation to linear-phase — the world's finest selective, linear-phase, minimum-phase shift filter.

A FORTRAN computer program using an algorithm that took six years to develop was used in its design. The mathematical complexity of the filter design procedure is almost beyond belief. Using a process called "numerical integration in the complex S-plane," a high speed IBM 1130 computer spent eighteen minutes on the design of the MR 77 IF filter. A human engineer, working twenty-four hours a day and seven days a week, would have taken 300 years to finish this work . . . assuming he made no mistakes!

## 2 LINEAR PHASE BRIDGE DISCRIMINATOR

The linear phase filter would be useless if it had to work into an ordinary FM detector. Thus a new detector with suitably low distortion had to be developed. A search of the available literature revealed a little-known bridge circuit with a theoretical distortion of zero! However, designing a practical working circuit for a commercially feasible stereo tuner took some doing. A U. S. patent is pending on this circuit.

Distortion performance of the bridge detector is close to the theoretical zero. In addition to its excellent distortion performance, the bridge detector also exhibits capture ratio close to 0 dB. The linear-phase bridge discriminator uses a balanced transmission line bridge in conjunction with a differential voltage-doubling rectifier to achieve 99.9% accuracy demodulation of FM signals. The only adjustments in the MR 77 detector are two simple variable resistors. These resistors center the tuning meter and set the transistor bias. Complex tuning for minimum distortion is not needed.

## YOU ARE PROTECTED WHEN YOU BUY MCINTOSH

Every McIntosh instrument — every one — is tested to be equal to or better than the performance limits advertised. When a performance limit of 0.2% harmonic distortion is established for an instrument, McIntosh means that every, each, all of the instruments manufactured must be capable of performance to that limit — or better — or your full purchase price is refunded.

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e ready to trade. Step up

# PERFORMANCE LIMITS

Performance Limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that the MR 77 you buy must be capable of performance at or exceeding the limits or you get your money back. McIntosh is the only manufacturer that makes this guarantee.

## USABLE SENSITIVITY

2 microvolts for 35 dB of quieting; 2.5 microvolts at 100% modulation ( $\pm 75$  kHz deviation) for 3% total noise and harmonic distortion

## SIGNAL TO NOISE RATIO

75 dB below 100% modulation

## HARMONIC DISTORTION

Will not exceed 0.2% mono or stereo at 100% modulation, 20 Hz to 15,000 Hz

## INTERMODULATION DISTORTION

Will not exceed 0.2% mono or stereo for any combination of frequencies from 20 Hz to 15,000 Hz with peak modulation equal to 100% or less.

Typically 0.1%

## AUDIO FREQUENCY RESPONSE

$\pm 1$  dB 20 Hz to 15,000 Hz with standard de-emphasis, (75  $\mu$ S) and 19,000 Hz pilot filter

## CAPTURE RATIO

0.25 dB detector only

2.5 dB complete tuner at 100% modulation

## SPURIOUS REJECTION

100 dB.

## IMAGE REJECTION

100 dB; 88 to 108 MHz (IHF)

## SELECTIVITY

Adjacent channel 6 dB IHF, carrier 47 dB down

Alternate channel 50 dB IHF, carrier 90 dB down

## STEREO SEPARATION

40 dB at 1,000 Hz

## STEREO FILTER

10 dB noise reduction in position 1

20 dB noise reduction in position 2

## SCA FILTER

50 dB down from 67 kHz to 74 kHz

275 dB per octave slope

## DRIFT

25,000 Hz in first two minutes; thereafter 5,000 Hz in normal temperatures

## MUTING

70 dB noise reduction between stations

## MUTING THRESHOLD

Position 1, 5 microvolt

Position 2, 20 microvolt

## ANTENNA INPUTS

300 ohms balanced; 75 ohms unbalanced

## MAXIMUM SIGNAL INPUT

12 RF volts across 300 ohms antenna terminals will not increase harmonic or intermodulation distortion

## AUDIO OUTPUT

2.5 volts into 47,000 ohms

1 volt into 600 ohms from fixed output

## IF SYSTEM

8-Pole linear phase filter

2 IC's

1 J-FET, and push-pull overlay power transistor stage driving a linear phase bridge discriminator

## STEREO INDICATOR

Front panel stereo light activated by 19,000 Hz only

## AUTOMATIC MONO-STEREO SWITCH

McIntosh developed; all electronic automatic mono-stereo switching circuit

## SEMICONDUCTOR COMPLEMENT

21 Transistors

4 Integrated Circuits

1 Indicator Tube

## POWER REQUIREMENT

120 volts 50/60 Hz, 35 watts

## MECHANICAL INFORMATION

### FRONT PANEL

16 inches wide (40.64 cm) by 5-7/16 inches high (13.81 cm)

### CHASSIS

15 inches wide (38.1 cm) by 13 inches deep (33.02 cm) including PANLOC shelf and back panel connectors. Knob clearance: 1½ inches (3.81 cm) in front of mounting panel

### FINISH

Front Panel: Anodized gold and black with special gold/teal nomenclature illumination. Chassis Chrome and black

### MOUNTING

McIntosh developed professional PANLOC

### WEIGHT

27 pounds (12.25 kg) net

39 pounds (17.69 kg) in shipping carton

FRANCHISED DEALER

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