

McIntosh

The **MAC 4100** is
the most
Value Packed Receiver
in the world



1. FIVE BAND PROGRAM EQUALIZER

Five separate controls allow great flexibility when compensating for program deficiencies.

2. "LED" POWER OUTPUT INDICATORS

Two columns of seven yellow "LED" indicators provide an indication of the amount of power being fed to your speakers.

3. POWER GUARD INDICATOR AND PROTECTION CIRCUIT

Two red "LED" power guard indicators indicate when the power amplifier has reached full output. At this point the power guard circuit begins to control amplification dynamically so that you will not hear the harsh distorted sound of square wave clipping. In addition your speakers are protected from burnout.

4. ELECTRONIC AUDIO SIGNAL SWITCHING

FET analog switches are used to give smooth switching transition from one input to another without clicks and pops.

5. SUPER-TRACKING VOLUME CONTROL

The volume control is a precision stepped at-

tenuator which has left to right tracking accuracy within 1 dB throughout its entire range. System balance is maintained at all listening levels.

6. LESS THAN 0.05% TOTAL HARMONIC DISTORTION

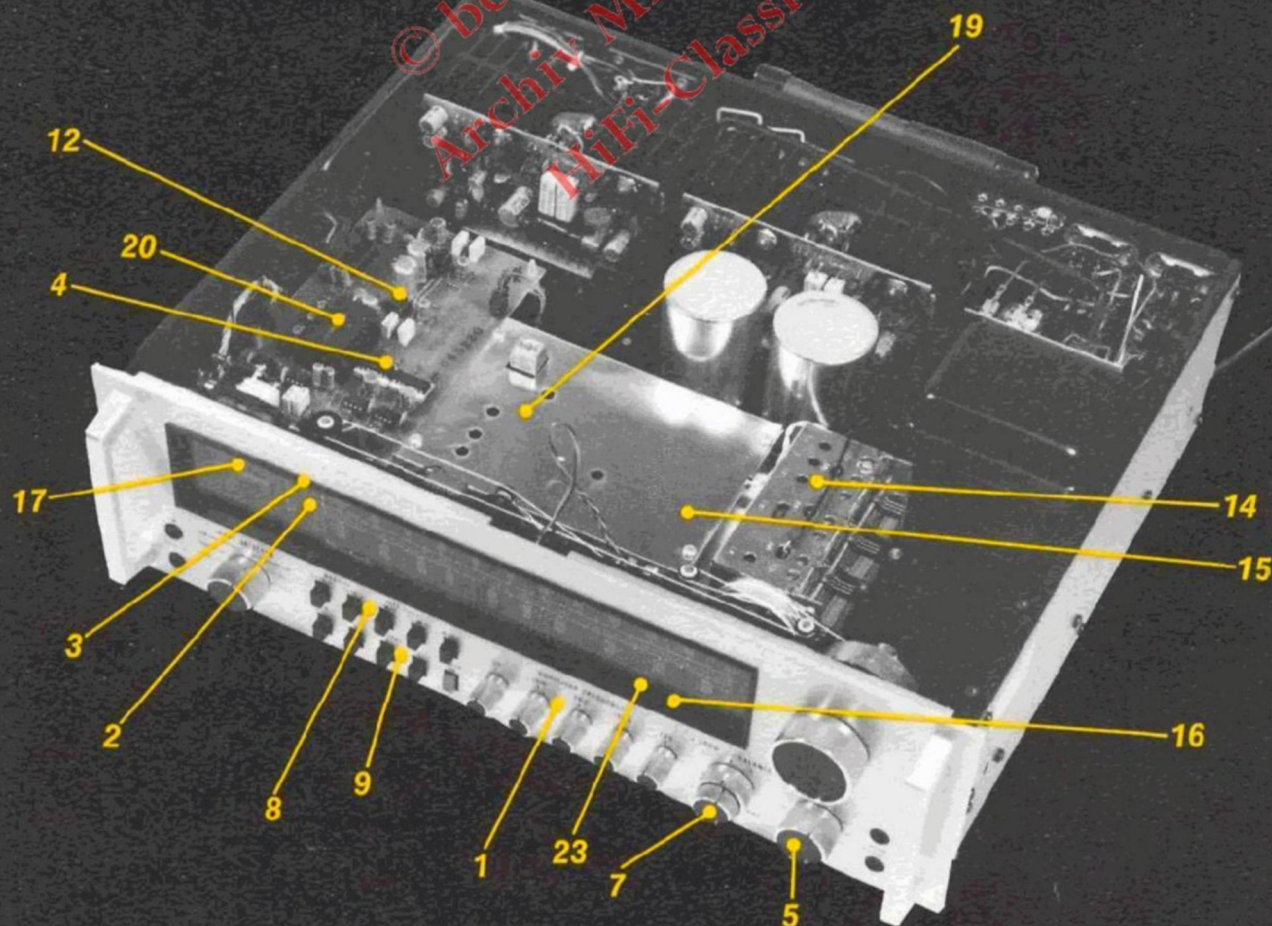
Harmonic distortion does not exceed 0.05% when measured from the phono input to the speaker output from 20 Hz to 20 kHz at all power levels from 250 mW to full rated output.

7. TRUE VARIABLE LOUDNESS COMPENSATION CONTROL

The loudness control operates independently of the volume control and its contour is accurately modeled after the Fletcher Munson family of "equal loudness" curves.

8. DUAL TAPE MONITOR AND TAPE COPY SWITCHES

Two tape recorders can record simultaneously from the program being listened to or you may record from one to the other without interfering with the "Listen" program.



AC 4100 FEATURES

9. SPEAKER SWITCHES FOR THREE SETS OF SPEAKERS

Three sets of loudspeakers may be used one at a time, two together, or all three simultaneously.

10. SPEAKER PROTECTION CIRCUITS

Loudspeakers are protected from burnout by the Power Guard circuit and also by other circuits that instantaneously disconnect the speakers in the event of the presence of DC on the output.

11. PREAMP OUTPUT • POWER AMP INPUT CONNECTIONS

Back panel connections provide the ability to insert room equalizers, reverberation units or other signal processing devices.

12. LOW NOISE ION-IMPLANTED J-FET OP-AMPS

New technology low noise operational amplifiers give lower noise and greater bandwidth than conventional devices.

13. ELECTRONIC ACTIVE FILTER ELEMENTS

"Active filter" technology is used to generate

the equivalent of the inductors normally used in equalizer filters. This eliminates the hum pickup or inductance non linearity that often occurs from conventional inductors.

14. MOS-FET FM FRONT END

Great signal sensitivity together with freedom from strong signal overload is made possible by using MOS Field Effect Transistors in the FM RF circuits.

15. ULTRA STABLE LINEAR-PHASE PIEZOELECTRIC FM IF FILTERS

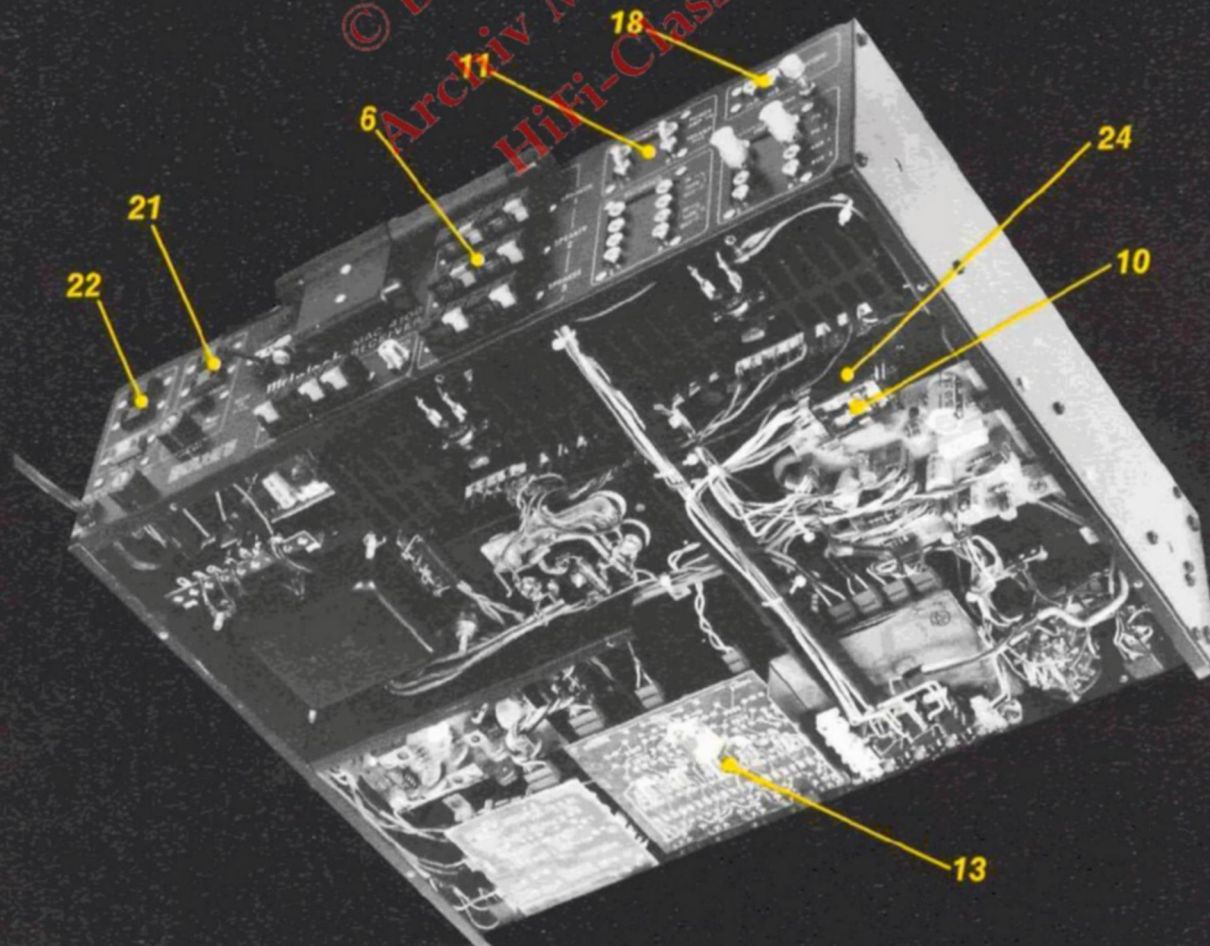
The IF filters are permanently sealed and never require adjustment. The IF response curve is extremely selective because of its very steep slope either side of center and yet it has a linear phase characteristic.

16. AUTOMATIC FREQUENCY LOCK

Perfect FM tuning is assured by holding off the tuning lock signal until manual tuning reaches the center of the FM carrier.

17. WIDE RANGE SIGNAL STRENGTH METER

The signal strength meter pointer responds all



the way from 1 microvolt of antenna noise pickup to over 50,000 microvolts of signal strength. This allows accurate directional antenna orientation.

18. FM TUNER SCOPE PLUG IN CONNECTIONS

An oscilloscope or maximum performance indicator may be connected easily to adjust a directional antenna for minimum FM multipath distortion.

19. FM MULTIPLEX THIRD GENERATION PLL CIRCUIT

Tri-level electronic switching in the multiplex decoder gives better separation, lower distortion, and superior SCA rejection. Contains tri-level logic for better separation. No inductors required, minimizing drift; Integral lamp driving capability to indicate presence of a 19 kc pilot carrier; Excellent channel separation over the entire audio frequency range; Extremely low distortion; Low output impedance; Transient free mono/stereo switching.

20. MULTIPLEX PILOT AND CARRIER SUPPRESSION CIRCUIT

The 19 kHz pilot and 38 kHz carrier are removed from the output thereby eliminating the possibility of introducing these undesirable signals to the tape recorder input.

21. "AUTO-ON" AC OUTLETS

Power to the entire stereo system can be controlled from either the front panel power switch or the power switch on a system turntable.

22. SWITCHED AC OUTLETS

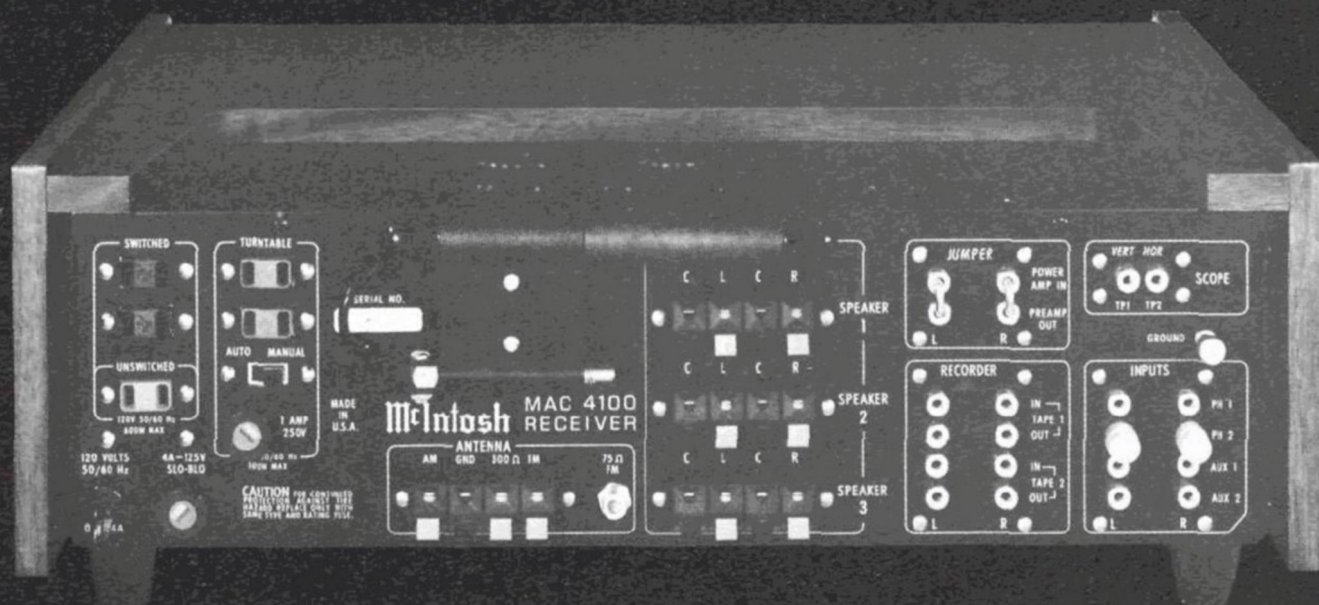
AC outlets are provided for accessory equipment that turn on and off with your receiver.

23. "LED" FUNCTION INDICATORS

System status is indicated by long life "LED" indicators.

24. TURN-ON TRANSIENT ELIMINATION CIRCUITS

Speaker outputs are connected only after power supplies and circuits have stabilized eliminating turn on thumps or clicks.



TECHNICAL HIGHLIGHTS

Phono Amplifier

The phono amplifier uses a new high technology integrated circuit operational amplifier. Its differential input stage has been optimized for low noise and low distortion performance. Open loop gain of this integrated circuit is 100,000. With high open loop gain a large amount of negative feedback can be used around the phono amplifier to further reduce noise and distortion. The feedback network also provides precision RIAA frequency compensation. It uses 1% metal film resistors and 5% poly film capacitors. To achieve low noise performance it is essential that the feedback network be very low impedance. As a consequence, the preamplifier must be capable of operating as a power amplifier to drive this impedance. The actual power output capability of this preamplifier stage is more than 100 milliwatts, a great margin beyond that which is required.

Input Selector Switching

Electronic input selector switching uses field effect analog switches. The mechanical input selector simply switches small amounts of DC which turn the FET analog switches off or on. This design eliminates degradation of frequency response and also eliminates noise pickup from long signal paths necessary with conventional mechanical switching. It means, as well, that switch clicks and pops have been eliminated.

Equalizer Amplifier

The equalizer amplifier is constructed with ion implanted junction field effect operational amplifiers. These new devices amplify signals with a 6 dB better signal to noise ratio than their bipolar counterparts. Five other operational amplifiers are each arranged in circuit configurations that are the equivalent of series tuned circuits, one at each of the five center frequencies. Each series tuned circuit is inserted via the control potentiometer in either the input circuit or feedback circuit of the FET op-amp thereby providing a boost and cut capability of 12 dB for each band of frequencies. The equalizer amplifier has a gain of 0 dB.

Power Guard

Amplifiers are capable of delivering large quantities of power when they are driven to clipping. Clipping is caused when the amplifier is asked to produce more power output than it can deliver with low distortion. A clipped amplifier can have more than 40% harmonic distortion. The extra energy content of the clipped signal will damage most loudspeakers, particularly the delicate high frequency tweeters. A new McIntosh advancement helps protect your speakers from this kind of damage. The MAC 4100 has a built-in waveform comparator that compares the wave shape of the input signal with the output signal. If the disparity between the two signals exceeds 0.5% (equivalent to 0.5% total harmonic distortion) a front panel signal illuminates in red at the top of the power output indicators. With any further increase in distortion the POWER GUARD circuit will operate. This circuit limits the input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD does not limit the dynamic range or the power output of the power amplifier. Clipping occurs when an amplifier runs out of power supply. Since POWER GUARD does not begin to work until this point is reached, the power capability of the amplifier is never affected.

FM Section

The FM-IF consists of five integrated circuits and four

piezo electric filters. They combine to give a total gain of over 140 dB. The signal is amplified over a million times. The response curve has nearly linear phase characteristics. The skirts of the response curve are very steep. The maximum width is 170 kHz at 3 dB and 500 kHz at 60 dB. The response is symmetrical each side of the center frequency. The filters are permanently sealed and never require adjustment. They cannot drift or vibrate out of adjustment. The exceptionally high gain of the five integrated circuits assures hard limiting at very low levels of input signal.

A "phase" or "Foster-Seeley" discriminator has been designed to complement the integrated circuit IF section. The detection output of the discriminator is extremely low in distortion.

FM Stereo Multiplex Section

The heart of the multiplex section is a new third generation phase lock 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 a 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 system. A smooth transition is provided from mono to stereo or visa versa 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 monaural if the 19 kHz pilot tone is absent.

In the PLL the internal oscillator operates at 228 kHz locked to 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 sidebands of adjacent stations since the third harmonic of the sub-carrier (114 kHz) is excluded and 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 with consequent intermodulation distortion 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 pushbutton. The switching on and off of the audio signal is done with FET analog switches.

MAC 4100 PERFORMANCE LIMITS

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new MAC 4100 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.

AMPLIFIER SECTION

POWER OUTPUT

100 watts minimum sine wave continuous average power output, per channel, both channels operating into 4 ohms 20 Hz to 20 kHz, with no more than .05% total harmonic distortion

75 watts minimum sine wave continuous average power output, per channel, both channels operating into 8 ohms 20 Hz to 20 kHz, with no more than .05% total harmonic distortion

OUTPUT LOAD IMPEDANCE

4 ohms, 8 ohms

RATED POWER BAND

20 Hz to 20 kHz

TOTAL HARMONIC DISTORTION

.05% maximum at any power level from 250 milliwatts to rated power per channel, 20 Hz to 20 kHz, both channels operating

INTERMODULATION DISTORTION

.05% maximum at any power level from 250 milliwatts to rated power per channel both channels operating for any combination of frequencies 20 Hz to 20 kHz

FREQUENCY RESPONSE

20 Hz to 20 kHz +0, -0.5 dB at rated power

HUM AND NOISE

Power Amp: 100 dB IHFA, 95 dB unweighted, below rated output

Tape and Aux Input: 95 dB IHFA, 90 dB unweighted, below rated output

Phono Input: 90 dB IHFA, 80 dB unweighted, below 10 mV input

DAMPING FACTOR

Greater than 30

INPUT SENSITIVITY AND IMPEDANCE

Power Amp: 2.5 V; 22,000 ohms

Tape and Aux: 250 mV; 100,000 ohms

Phono: 2 mV; 47,000 ohms; 87 pF

TAPE OUTPUT

Tuner: 1.0 V at 100% modulation (FM)

Tape: 250 mV with rated input

Phono: 250 mV with rated input

PROGRAM EQUALIZER

± 12 dB at 30, 150, 500, 1500, and 10,000 Hz

FM SECTION

SENSITIVITY

2mV (11.2 dB) IHF minimum

SIGNAL TO NOISE RATIO

70 dB IHF minimum

HARMONIC DISTORTION

Mono: 0.18% IHF maximum

Stereo: 0.38% IHF maximum

FREQUENCY RESPONSE

20 Hz to 15kHz +0, -1 dB

CAPTURE RATIO

1.8 dB

SELECTIVITY

75 dB IHF minimum

SPURIOUS REJECTION

90 dB IHF minimum

IMAGE REJECTION

80 dB IHF minimum

STEREO SEPARATION

45 dB minimum at 1 kHz

SCA REJECTION

60 dB minimum

AM SECTION

SENSITIVITY

75mV IHF (External antenna)

SIGNAL TO NOISE RATIO

45 dB minimum IHF, 55 dB at 100% modulation

HARMONIC DISTORTION

0.8% maximum at 30% modulation

FREQUENCY RESPONSE

3500 Hz @ -6 dB

ADJACENT CHANNEL SELECTIVITY

30 dB minimum IHF

IMAGE REJECTION

65 dB minimum, 540 kHz to 1600 kHz

GENERAL

SEMICONDUCTOR COMPLEMENT

45 Transistors

31 Integrated Circuits

62 Diodes

1 Silicon Controlled Rectifier

MECHANICAL INFORMATION

SIZE

In cabinet: 18-5/8 inches (473.1mm) wide, 6-1/2 inches (165.1mm) high, 15-1/2 inches (393.7mm) deep. Without cabinet: Front panel measures 17-9/16 inches (446.1mm) wide by 5-1/4 inches (133.4mm) high. Chassis measures 17-1/8 inches (435mm) wide by 4-15/16 inches high (125.4mm) by 13-1/2 inches (342.9mm) deep. Knob and handle clearance required 1-1/16 inches (27mm) in front of the mounting surface.

FINISH

Front panel is clear anodized to produce a brushed satin - silver finish with black anodized trim. Cabinet is walnut grained vinyl.

WEIGHT

42 pounds (19 kg) net

56 pounds (25.4 kg) in shipping carton

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

FRANCHISED DEALER

McIntosh

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