

McIntosh<sup>®</sup>

**SALESPERSON'S HANDBOOK**



# McINTOSH PRODUCT PREVIEWS

As new McIntosh models are conceived and designs completed, the Engineering Department creates a document called a PRODUCT PREVIEW on each of these new products. The preview is a complete and detailed description of the new unit. You will find information on all the important features and their benefits to your customers. A technical description and performance specifications reveal all the advanced design performance capabilities of the product.

The following subjects are included in each preview:

- 1) Promotional Highlights
- 2) Features and Benefits
- 3) Performance Specifications
- 4) Front Panel Information
- 5) Rear Panel Information
- 6) Technical Description
- 7) Front Panel Drawing
- 8) Rear Panel Drawing

These previews provide valuable information that will help you increase your knowledge about these exciting new McIntosh products. The more you know about a new McIntosh model, the easier it will be to sell.

McIntosh wants you to know as much as possible about new models as soon as possible, so the information in the product previews is created early in the development time cycle. However, every effort is made to make these product previews reflect as accurately as possible the characteristics of the production units you will sell.

PRODUCT PREVIEW

**MC1000**  
**Power Amplifier**

Project 699

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## Promotional Highlights

- New Double Balanced Push Pull Design
- Greater than 160 amps Output Current Capability
- Over 400 Joules of Energy Storage
- Gold Plated High Current Output Terminals
- Large Illuminated Peak Responding Output Wattmeter
- Watts Hold
- Ultra Low Distortion
- Wide Power Bandwidth
- Power Guard
- Output Autoformer
- Thermal Protection
- Balanced Input

- DC Output Protection
- Regulated Illumination
- Turn On Delay
- Half Inch Plate Glass Front Panel
- Modular Construction with Gold Plated Connectors
- Optional Mounts for Standard 19" Panel Rack
- Silent Convection Cooling

## Features and Benefits

### NEW DOUBLE BALANCED PUSH PULL DESIGN

The MC1000 amplifier is fully balanced from input to speaker output. Two matched amplifiers operate in PUSH-PULL with their outputs combined in the "Output Autoformer". Each half of the amplifier contains complimentary balanced circuitry. The resulting double balanced configuration cancels virtually all distortion. This circuit is possible ONLY with the exclusive "McINTOSH OUTPUT AUTOFORMER".

### HIGH OUTPUT CURRENT

Greater than 160 amperes peak output current to drive uneven speaker loads. Some poor speaker designs have input impedances that dip to 1 or 2 ohms at various frequencies. The MC1000 has the output current reserve to drive them. Over 4KW output on tone bursts.

### OVER 400 JOULES OF ENERGY STORAGE

Huge main filter capacitors that guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

### GOLD PLATED OUTPUT TERMINALS

McIntosh gold output terminals deliver full power output to speaker wires from 18GA to 4GA (4GA is .204 inches in dia. You can connect directly to the wire. Special lugs or pins that can cause power loss are not required. Single or Dual "BANANA" plugs may also be used.

### ILLUMINATED PEAK RESPONDING OUTPUT WATT-METER

The McIntosh MC1000 is the first high power amplifier to have an Output Wattmeter that responds

95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

#### WATTS HOLD

The "Watts Hold" mode for the output meter, records and displays the highest power output peak of the source material being amplified.

#### ULTRA LOW DISTORTION

Distortion so low that it defies measurement, even with the finest distortion analyzers. At mid-frequencies, 8 ohm load, the distortion meter reads the residual distortion of the oscillator (.0002%) with or without the MC1000 in the circuit. This means the amplifier distortion is lower than the analyzer is capable of measuring.

#### WIDE POWER BANDWIDTH

Full power output capability well above and below the frequencies that can be heard by humans.

#### POWER GUARD

The exclusive McIntosh circuit that prevents harsh sounding clipping and helps protect your speakers from damage.

#### THERMAL PROTECTION

Thermal sensors that turn off the AC power if improper loading or ventilation causes the amplifier to over heat.

#### TURN ON DELAY

The MC1000 has a circuit that delays amplifier operation for about two seconds after turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your speakers.

#### BALANCED INPUT

Modern technology has made it possible to build preamps and amps with the high signal to noise ratio necessary to reproduce the sound quality present on compact discs. However, the interconnecting cables can pick up interference from other equipment or appliances. The balanced input on the MC1000 provides a minimum of 40dB (100 times) more protection against such noise pick up.

#### OUTPUT AUTOFORMERS

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi Fi industry. In the MC1000 it provides proper matching for 2, 4 and 8 ohm loads. It protects your speaker from damage in the event of an output transistor failure, provides low distortion power transfer at frequencies well beyond human hearing and delivers peak output current in excess of 160 amperes.

#### REGULATED ILLUMINATION

The tremendous peak output power capability of the MC1000 has made the addition of a circuit that regulates the brilliance of the panel and meter illumination necessary. When there are high power output demands the line voltage may sag however this new circuit prevents the lights from dimming.

#### MODULAR CONSTRUCTION

If service should be required, modular construction makes repairs easier. Gold plated connectors are used to assure long life and distortion free connections even in hostile environments.

#### SILENT CONVECTION COOLING

New "High Efficiency Circuits", superior components and large area heatsinks, over 2,800 square inches, contribute to cool operation. No fans are required.

## Performance Specifications

#### POWER OUTPUT

1000 watts into an 8, 4 or 2 ohm load is the minimum sine wave continuous average power output. The output RMS voltage is:

89.4 across 8 ohms  
63.2 across 4 ohms  
44.7 across 2 ohms

#### OUTPUT LOAD IMPEDANCE

Terminals for 8, 4 and 2 ohms.

#### RATED POWER BAND

20Hz to 20kHz

#### TOTAL HARMONIC DISTORTION

0.005% maximum harmonic distortion at any level from 250 milliwatts to rated power output.

#### DYNAMIC HEADROOM

2.1dB

**FREQUENCY RESPONSE**

+ 0, -0.25dB from 20Hz to 20kHz  
+ 0, -3.0dB from 10Hz to 100kHz

**INPUT SENSITIVITY**

2.5 volts

**A-WEIGHTED SIGNAL TO NOISE RATIO**

Balanced, 90dB (120dB below rated output)  
Unbalanced, 85dB (115dB below rated output)

**INTERMODULATION DISTORTION, SMPTE**

0.005% maximum if instantaneous peak power output does not exceed twice the output power rating.

## Ratings

**WIDE BAND DAMPING FACTOR, 8 ohm output**  
200

**INPUT IMPEDANCE**

10,000 ohms

**POWER GUARD**

Clipping is prevented and THD does not exceed 2% with up to 14dB overdrive at 1 kHz.

**POWER REQUIREMENTS**

120 volts, 50/60Hz, 12 amps UL/CSA.

## How to Connect Amplifier

**INPUT**

Use a shielded cable to connect the signal from the preamplifier or signal source to the power amplifier input. Locate the cable away from speaker leads and AC power cords. All connections are made on the back of the MC1000.

**OUTPUT**

Selection of the proper gauge wire to connect the loudspeaker preserves the quality of sound reproduction for which the loudspeaker has been designed. If under-size wire is used, resistance is added to the amplifier/loudspeaker combination which adversely affects the performance. Added resistance causes reduction of damping characteristics, modification of frequency response and reduction in power output. The output terminals will accommodate wire gauges 16 through 4.

Use lamp cord or wire with similar type of insulation to connect the speaker to the amplifier. In all cases, the leads to and from the speaker should be twin conductor or twisted together. Select the correct size wire for the wire length from the chart. It is recommended that the DC resistance of the speaker leads be less than 2.5% of the speaker impedance. Resistance of the leads should be computed for the length of wire both to and from the speaker.

**MAXIMUM WIRE LENGTH**

- For 2 ohm Load -  
Wire

| Gauge | Feet | Meters |
|-------|------|--------|
| 12    | 15   | 4.6    |
| 10    | 25   | 7.6    |
| 8     | 40   | 12.2   |
| 6     | 60   | 18.3   |
| 4     | 100  | 30.5   |

- For 4 ohm Load -  
Wire

| Gauge | Feet | Meters |
|-------|------|--------|
| 14    | 20   | 6.1    |
| 12    | 30   | 9.1    |
| 10    | 50   | 15.2   |
| 8     | 80   | 24.4   |
| 6     | 120  | 36.6   |

- For 8 ohm Load -  
Wire

| Gauge | Feet | Meters |
|-------|------|--------|
| 16    | 25   | 7.6    |
| 14    | 40   | 12.2   |
| 12    | 60   | 36.6   |
| 10    | 100  | 30.5   |
| 8     | 150  | 45.7   |

Wire lengths above represent the wire resistance equal to 2.5% of the speaker impedance.

For multiple speaker operations, run separate leads from the amplifier to the speakers.

**CONNECTING A LOUDSPEAKER**

Use the terminals that match the rated impedance of your speaker 2, 4 or 8 ohms.

**AC POWER**

The amplifier AC power cord is plugged into a

120 volt 50/60Hz wall outlet.

The MC1000 draws 12 amperes from the 120 volt power line when amplifying music or speech. Plug the AC power cord directly into a wall outlet that has the at least 12 amperes capacity. Do not plug the MC1000 into an auxiliary AC power outlet on a preamplifier or other source equipment as this equipment generally cannot supply 12 amperes. If remote power operation is desired, use an external power control relay like the McIntosh SCR2A, SCR3 or R612 relays. If an extension cord is required, it must be heavy duty with 14 gauge wire or heavier.

The amplifier uses only 2 amperes while idling. If the amplifier is driven to rated output using sine wave signals, it will draw 20 amperes.

## Front Panel Controls

### ILLUMINATED OUTPUT WATTMETER

The McIntosh MC1000 is the first high power amplifier to have an Output Wattmeter that responds 95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

### METER MODE

The METER MODE switch has two positions: WATTS and HOLD.

### WATTS

In the WATTS position, the meter needle indicates the variations in program loudness. Although the primary output calibration of the meter is from 10 milliwatts up to 1000 watts, the rated power output of the MC1000; the additional indications to the right of the 1000 watts mark, are 2KW & 4 KW. While the MC1000 cannot reach this power level continuously it is possible for short interval peaks to considerably exceed the 1000 watts continuous rating.

### HOLD

In the HOLD position, the meter needle locks to the highest power peak in a sequence of peaks. The meter is driven to maximum power, electronically held there until a higher peak passes through the amplifier. If no further peaks are reached the meter needle will very

slowly return to its rest position (decay rate: 6dB per minute).

### POWER

The POWER switch turns the MC1000 ON or OFF. If you wish to control the AC power from a preamplifier control center, leave the switch in the ON position and use an R612 or SCR-3 power controller.

## Power Guard Operation

### *The McIntosh Exclusive Protection Circuit*

Improved recordings and recording techniques have imposed higher power demands on today's amplifiers. Poorly designed amplifiers can present music listeners with a form of harsh unpleasant distortion due to amplifier overload (hard clipping). Clipping, which looks and acts like non musical square waves, is caused when the amplifier is asked to produce more power output with low distortion than it is capable of or designed to deliver. Amplifiers, when driven to clipping, can deliver up to 40% harmonic and intermodulation distortion that decreases the pleasure and enjoyment you get from listening. This form of distortion (clipping signal) also produces extra heat energy which will damage most speakers. McIntosh leadership in engineering has developed the Power Guard circuit which - (1) dynamically prevents power amplifiers from being overdriven into hard clipping - (2) assures that the amplifier will produce its maximum output without increased distortion • (3) protects your speaker from excessive heating. Power Guard is a patented McIntosh design (U.S. patent #4048573).

The MC1000 has a circuit that compares the wave shape of the output signal to the input signal. If the disparity between the two signals, due to overdrive, exceeds an average of 0.3% (equivalent to 0.3% total harmonic distortion) an amber POWER GUARD indicator illuminates. With any further increase in distortion the POWER GUARD circuit operates to limit the amplifier input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD only operates when the amplifier is asked to deliver more power than that for which it was designed.

## Rear Panel Information

### OUTPUT

Output connections for impedances of 2, 4 and 8 ohms are provided on secure, screw type, gold plated terminals.

### INPUT

A balanced and unbalanced input are provided.

### AC POWER

The MC1000 is rated for 120 volts, 50/60 hertz.

## Technical Description

The MC1000 is a power amplifier designed to operate with a loudspeaker having a nominal impedance of 2, 4 or 8 ohms.

It features a new circuit design that holds harmonic distortion far below the amplifiers remarkably low noise floor. Only by using special spectrum analysis measuring techniques is the distortion measurable at all.

### DESIGN PHILOSOPHY

The secret to this performance will sound very simple, but it is more difficult to carry out than it may seem. The principle used in the design of the MC1000 was to arrange every stage of voltage or current amplification to be as linear as possible.

This linear operation is accomplished by using several different techniques.

1. Each transistor is selected to have nearly constant current gain (Beta) over the entire range of currents at which the transistor must operate.
2. The load impedance presented to each amplification stage is made to be as uniform as possible for all signal levels.
3. The input impedance of stages is increased and linearized where possible by using emitter degeneration.
4. Resistors and capacitors in the signal path are carefully selected to have exceedingly low voltage coefficients (low change of resistance or reactance with applied voltage). Precision metal film resistors

and low dielectric absorption film capacitors are used in all critical circuit locations.

5. Output transistors have matched uniform current gain, high current gain-bandwidth product, low output capacitance, and large active-region safe operating area. These characteristics and the automatic tracking bias system eliminates cross-over distortion. The distortion graphs show clearly that distortion does not increase at low power output levels.

### OVER 400 JOULES OF ENERGY STORAGE

Huge main filter capacitors are used to guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

### ILLUMINATED, PEAK RESPONDING OUTPUT WATTMETER

The MC1000 is the first high power amplifier to have a REAL OUTPUT WATTMETER. The power output in WATTS of any amplifier is determined by multiplying the output voltage (E) by the output current (I),  $EI = W$ . Output meters on other amplifiers are only voltmeters. Output current is not considered. Calibration is in watts and is based on the false premise that all speakers have a fixed impedance regardless of frequency. In fact, the impedance of many poor speakers designs varies by as much as 4 to 1. For a specific output voltage the current varies inversely to the speaker impedance. So if the speaker impedance is lower, the output current and power are higher. Since McIntosh can not control other manufacturers speakers, we decided to provide extra output current to drive these mismatched low impedances and to indicate the REAL output power required to drive them. Therefore the meter circuit in the MC1000 electronically measures both voltage and current, multiplies them and displays the REAL OUTPUT POWER IN WATTS.

Another important feature of these output wattmeters is their ability to respond 95% full scale to a single cycle tone burst at 2kHz. After voltage and current are measured and multiplied, the product is fed to a special circuit that accelerates the meter pointer in the upward direction. When it reaches its peak, it pauses only long enough for the human eye to perceive its position, then returns to 0. Response is almost 10 times faster than a professional VU meter.

A front panel switch is provided to change the meter to the WATTS HOLD mode of operation, fast upward movement of the pointer but greatly increased



HOLD time at the peak of its travel. The highest power output of the source material is thus recorded.

#### OUTPUT AUTOFORMER

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi Fi industry. In the MC1000 it provides proper matching for 2, 4 and 8 ohm loads. It protects your speaker from damage in the event of an output transistor failure, provides low distortion power transfer at frequencies well beyond human hearing and delivers peak output currents in excess of 160 amperes.

#### PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertised that their products do not require or use protection circuits and that such circuits compromise performance. McIntosh Laboratory agrees that diligent measures are required to allow unrestricted performance, but we also insist that protection circuits are desirable and necessary to prevent amplifier or loudspeaker damage due to abnormal circumstance and that they actually enhance performance. The MC1000 incorporates seven protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

#### POWER GUARD

Power Guard, a unique feature of McIntosh amplifiers, assures that the MC1000 will deliver full power free of clipping distortion. Clipping is caused when an amplifier is asked to produce more power output than its design is capable of delivering with low distortion. Amplifiers that are overdriven may deliver large quantities of power when they are clipping but they have more than 40% harmonic distortion. In this mode, the sound is grossly distorted and the extra energy content of the clipped signal will damage most loudspeakers. The McIntosh Power Guard circuit protects your ears and your speakers from this kind of damage.

The Power Guard circuit consists of a waveform comparator which monitors the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparator produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.3% (equivalent to 0.3% total harmonic distortion) the comparator output causes the amber power guard indicator to light. If there is a further increase in the disparity the comparator output controls an electronic attenuator at the amplifier input to reduce the amplifier gain, thus holding the amplifier output to a low distortion value. Overdrive

by 14dB is possible before the output distortion exceeds 2%.

#### SENTRY MONITOR

All power transistors have limits for the maximum amount of power they can handle. The MC1000 output transistors and power supply have been designed to allow very high current flow into properly matched load impedances. If, however, a short circuit or very low value of load impedance is applied to the output of the MC1000, destructive current levels could be reached if it was not controlled by the Sentry Monitor circuit. This circuit senses the dynamic operating time, voltage, and current of the amplifier output stage and controls the current flow confining it to nondestructive limits. Sentry Monitor does not limit the power output available from the amplifier.

#### THERMAL CONTROL

All power transistors have limits for the maximum amount of heat they can tolerate. The MC1000 uses a highly efficient amplifying circuit which produces relatively little heat for the output power produced. The amplifier has 8 oversized heatsinks to dissipate transistor generated heat. Natural convection air flow is sufficient for cool operation. Should the cooling air be blocked or should the amplifier operating temperature become too high, thermal cutouts within the amplifier will turn off the power to the amplifier. When the amplifier has cooled, it will automatically turn on again.

#### TURN-ON DELAY

The MC1000 has a turn-on delay circuit that delays amplifier operation for about 2 seconds after power turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers.

#### DIRECT CURRENT FAILURE PROTECTION

The auto transformer protects speakers from damage in the event of amplifier failure. Should a direct current component appear in the output it is shunted by the auto transformer and DC cannot damage the speaker.

#### POWER LINE INRUSH PROTECTION

Turn on inrush current is cushioned by thermistors in the power transformer primary circuit. A soft start is achieved that eliminates component stress during turn-on.

#### CIRCUIT OPERATION

The power output amplifier uses two balanced stages of voltage amplification followed by three stages

of current amplification. All stages are complimentary balanced. Even number harmonics are canceled by the balanced circuits. This means that the amplifying stages have less total harmonic distortion and less negative feedback is required to achieve ultra low distortion.

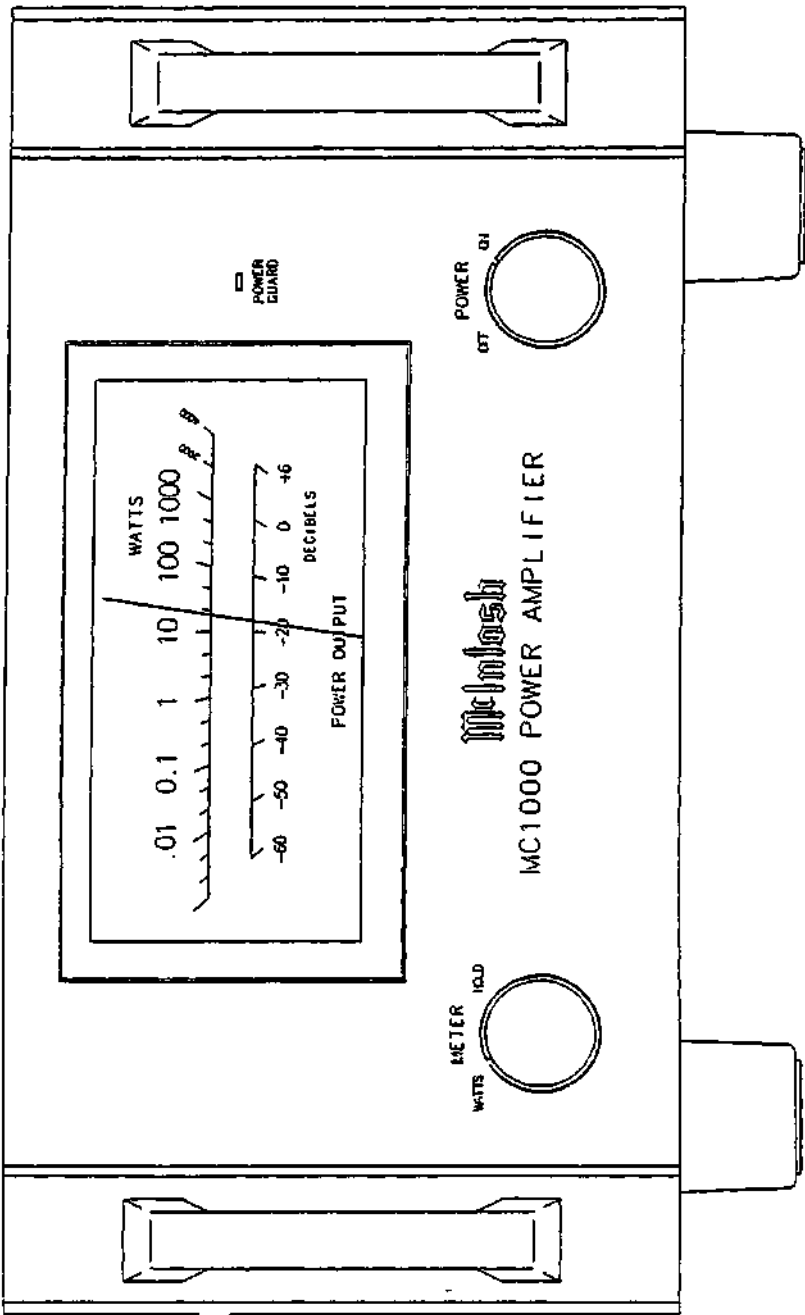
The signal is fed to the input of the balanced differential stages. Feedback from the amplifier output is applied to the other inputs. The differential amplifiers drive a balanced cascade connected voltage amplifier stage. Current mirrors are also used to improve bandwidth and linearity.

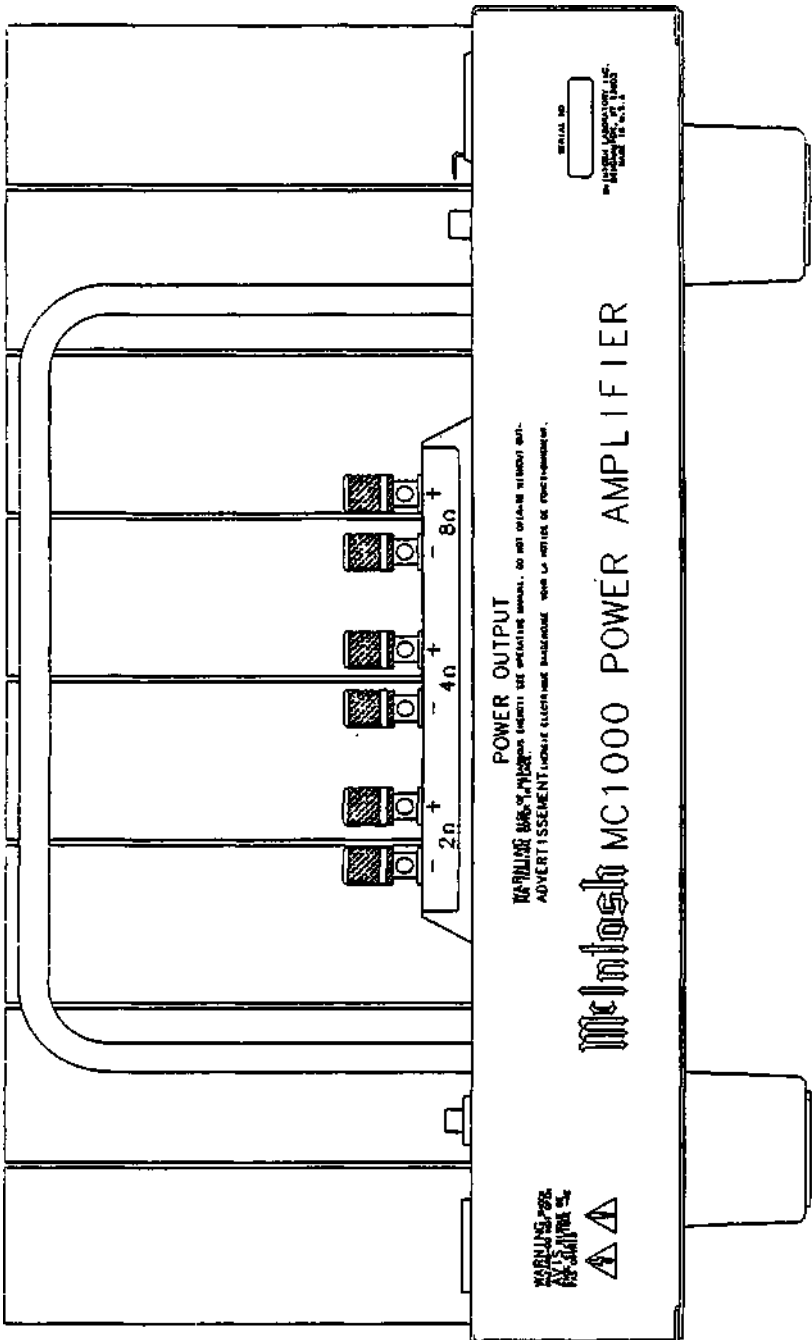
The cascade voltage amplifiers output feeds complementary Darlington connected driver transistors. These supply the signal to 20 complementary connected output transistors per side. Ancillary components for Power Guard, Sentry Monitor, Power Output Meter and other protection circuits interconnect with the amplifier circuits. The power supply uses a massive power transformer, full wave bridge rectifiers. Large filter capacitors having 400 joules of energy storage. Eight large heatsinks provide cooling for the 40 output power transistors.

The mechanical and electrical design of the MC1000 is the result of the many years of engineering and manufacturing experience held by the staff at McIntosh. This "know how", the meticulous attention to design and production details, makes the MC1000 the finest amplifier ever produced by McIntosh Laboratory.

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Rear Panel Layout

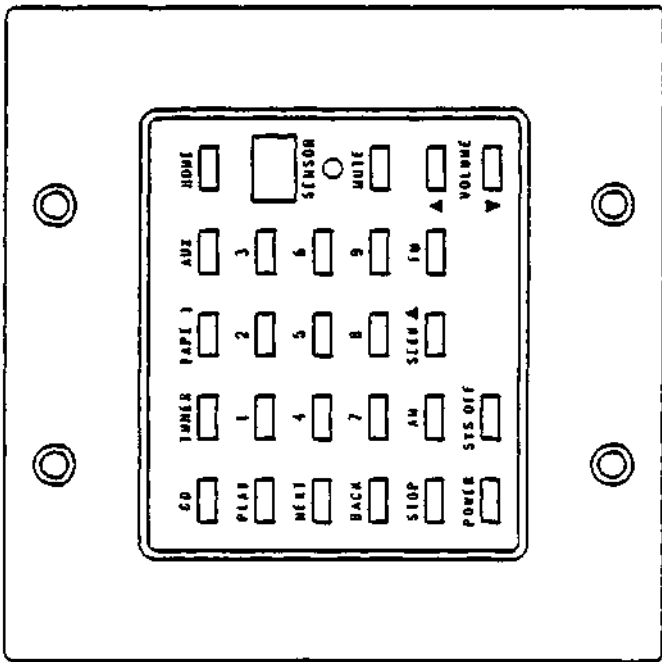
MC1000 POWER AMPLIFIER

McIntosh Laboratory Inc. June 24, 1992

# MC1000

## MC1000 Engineering Model Performance Measurements

|                                      |            | <u>2 Ohm</u> | <u>4 Ohm</u> | <u>8 Ohm</u> |
|--------------------------------------|------------|--------------|--------------|--------------|
| Harmonic Distortion<br>at 1000W      | 20Hz       | .0015%       | .0012%       | .0008%       |
|                                      | 1kHz       | .0013%       | .0010%       | .0009%       |
|                                      | 20kHz      | .0027%       | .0030%       | .0025%       |
| IM Distortion<br>at 1000W            |            | .0030%       | .0030%       | .0028%       |
| Maximum Power Output<br>at .005% THD | 20Hz       | 1135W        | 1175W        | 1218W        |
|                                      | 1kHz       | 1232W        | 1215W        | 1265W        |
|                                      | 20kHz      | 1210W        | 1195W        | 1243W        |
| IHF Dynamic Headroom                 |            | 2.0dB        | 2.1dB        | 2.4dB        |
| Frequency Response<br>-Unbalanced    | 20Hz       | -.04dB       | -.04dB       | -.04dB       |
|                                      | 20kHz      | -.15dB       | -.10dB       | -.07dB       |
| -Balanced                            | 20Hz       | -.15dB       | -.15dB       | -.15dB       |
|                                      | 20kHz      | -.17dB       | -.12dB       | -.09dB       |
| Peak Current with<br>IHF Tone Burst  |            | 142A         | 110A         | 76A          |
| Peak Current<br>1 MS Tone Burst      |            | 183A         | 136A         | 96A          |
| Damping Factor - 1 kHz               |            | 28           | 67           | 640          |
| Damping Factor - 20kHz               |            | 21           | 43           | 628          |
| Noise - Balanced                     | Flat       | 115dB        |              |              |
|                                      | "A"        | 122dB        |              |              |
| Noise - Unbalanced                   | Flat       | 110dB        |              |              |
|                                      | "A"        | 117dB        |              |              |
| Input Sensitivity<br>8 ohm output    | Balanced   | 2.61V        |              |              |
|                                      | Unbalanced | 2.57V        |              |              |
| Input Balance                        | 1kHz       | -49dB        |              |              |
|                                      | 20kHz      | -36dB        |              |              |



PRODUCT PREVIEW

**MC7100**  
**Stereo Power Amplifier**

Project 689

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**Promotional Highlights**

- High Output Current Capability
- Over 50 Joules of Energy Storage
- Gold Plated Output Terminals
- Toroid Power Transformer
- Ultra Low Distortion
- Wide Power Bandwidth
- Power Guard
- Thermal Protection
- DC Output Protection
- Turn On Delay
- Modular Construction

**Features and Benefits**

**HIGH OUTPUT CURRENT**

Greater than 18 amperes peak output current to drive uneven speaker loads. Some poor speaker designs have input impedances that dip to 1 or 2 ohms at various frequencies. The MC7100 has the output current reserve to drive them.

**OVER 50 JOULES OF ENERGY STORAGE**

Huge main filter capacitors that guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

**GOLD PLATED OUTPUT TERMINALS**

McIntosh gold plated output terminals will deliver full output power to all speakers.

**ULTRA LOW DISTORTION**

Distortion so low that it defies measurement, even with the finest distortion analyzers. At mid-frequencies, 8 ohm load, the distortion meter reads the residual distortion of the oscillator (.0002%) with or without the MC7100 in the circuit. This means the amplifier distortion is lower than the analyzer is capable of measuring.

**WIDE POWER BANDWIDTH**

Full power output capability well above and below the frequencies that can be heard by humans.

**POWER GUARD**

The exclusive McIntosh circuit that prevents harsh sounding clipping and protects your speakers from damage.

**THERMAL PROTECTION**

Thermal sensors that turn off the speakers if improper loading or ventilation causes the amplifier to over heat.

**DC OUTPUT PROTECTION**

A circuit that turns off the speakers if for any reason a DC voltage appears at the speaker terminals. This prevents speaker damage.

**TURN ON DELAY**

The MC7100 has a circuit that delays amplifier operation for about two seconds after turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your speakers.

**MODULAR CONSTRUCTION**

If service should be required, modular construction makes repairs easier.

**TOROID POWER TRANSFORMER**

The toroid permits a low profile design with low noise and cool operation.

## Performance Specifications

**STEREO POWER OUTPUT**

150 watt into 4 ohm loads or 100 watts into 8 ohm loads minimum sine wave continuous average power output per channel, both channels operating. The output RMS voltage is:

28.3 across 8 ohms  
24.5 across 4 ohms

**MONO (Bridged):**

300 watts into an 8 ohm load minimum sine wave continuous average power output, which is 49 volts RMS.

**OUTPUT LOAD IMPEDANCE****STEREO**

8 or 4 ohms.

**MONO**

8 ohms.

**RATED POWER BAND**

20Hz to 20kHz

**TOTAL HARMONIC DISTORTION**

0.005% maximum harmonic distortion at any power level from 250 milliwatts to rated power output

**IHF DYNAMIC HEADROOM**

8 ohms, 1 7dB  
4 ohms, 2.1dB

**FREQUENCY RESPONSE**

+0, -0.25dB from 20Hz to 20kHz  
+0, -3.0dB from 10Hz to 100kHz

**INPUT SENSITIVITY**

1 4 volts (2.5V at gain control center detent)

**A-WEIGHTED SIGNAL-TO-NOISE RATIO**

95dB (115dB below rated output)

**INTERMODULATION DISTORTION, SMPTE**

0.005% maximum if instantaneous peak power output does not exceed twice the output power rating.

## Ratings

**WIDE BAND DAMPING FACTOR**

8 ohms, 200  
4 ohms, 100

**INPUT IMPEDANCE**

20,000 ohms

**POWER GUARD**

Clipping is prevented and THD does not exceed 2% with up to 15dB overdrive at 1 kHz.

**POWER REQUIREMENTS**

120 volts, 50/60Hz, 3.0 amps UL/CSA

## How to Connect Amplifier

**INPUT**

Use shielded cables to connect the signal from the preamplifier or signal source to the power amplifier input. To minimize the possibility of hum the shielded cables should be run parallel to each other or loosely twisted together. Locate the cables away from speaker leads and AC power cords. All connections are made on the back panel of the MC7100.

The left output of the preamplifier should be plugged into the LEFT INPUT jack of the power amplifier. The right output of the preamplifier should be plugged into the RIGHT INPUT jack of the power amplifier.

**OUTPUT**

Selection of the proper gauge wire to connect the loudspeakers preserves the quality of sound reproduction for which the loudspeakers have been designed. If undersize wire is used, resistance is added to the amplifier/loudspeaker combination which adversely affects the performance. Added resistance causes reduction of damping characteristics, modification of frequency response and reduction in power output.

Use lamp cord or wire with similar type of insulation to connect the speakers to the amplifier. In



all cases, the leads to and from the speaker should be twin conductor or twisted together. When using 8 ohm speakers and for the normally short distances of under 30 feet between the amplifier and speaker, No. 18 wire or larger can be used. For distances over 30 feet between the amplifier and speaker use larger diameter wire. Select the correct size wire for the wire length from the chart. It is recommended that the DC resistance of the speaker leads be less than 5% of the speaker impedance. Up to 10% can be tolerated. Resistance of the leads should be computed for the length of wire both to and from the speaker or speakers.

#### MAXIMUM WIRE LENGTH

- For 4 ohm Load -

| Wire Gauge | Feet | Meters |
|------------|------|--------|
| 18         | 15   | 4.6    |
| 16         | 25   | 7.6    |
| 14         | 40   | 12.2   |
| 12         | 60   | 18.3   |
| 10         | 100  | 30.5   |

- For 8 ohm Load •

| Wire Gauge | Feet | Meters |
|------------|------|--------|
| 18         | 30   | 9.1    |
| 16         | 50   | 15.2   |
| 14         | 80   | 24.4   |
| 12         | 120  | 36.6   |
| 10         | 200  | 61.0   |

Wire lengths above represent the wire resistance equal to 5% of the speaker impedance.

For multiple speaker operations, run separate leads from the amplifier to the speakers.

#### CONNECTING LOUDSPEAKERS

Connect the leads from the left loudspeaker to the Left - and + OUTPUT terminals on the MC7100. Connect the leads from the right loudspeaker to the Right - and + terminals. For MONO bridged operation connect the speaker to the MONO - and + output terminals.

#### AC POWER

The amplifier AC power cord is plugged into a 120 volt 50/60Hz wall outlet, or into a outlet on the preamplifier. If you wish to control the AC power from a preamplifier control center, be sure the AC cord of the

MC7100 is plugged into the controlled outlets on the rear of the preamplifier control center.

## Power Guard Operation

*McIntosh Exclusive Digital Dynamic Protection Circuit*

Improved recordings and recording techniques have imposed higher power demands on today's amplifiers. Poorly designed amplifiers can present music listeners with a form of harsh unpleasant distortion due to amplifier overload (hard clipping). Clipping, which looks and acts like non musical square waves, is caused when the amplifier is asked to produce more power output with low distortion than it is capable of or designed to deliver. Amplifiers, when driven to clipping, can deliver up to 40% harmonic and intermodulation distortion that decreases the pleasure and enjoyment you get from listening. This form of distortion (clipping signal) also produces extra heat energy which will damage most speakers. McIntosh leadership in engineering has developed the Power Guard circuit which - (1) dynamically prevents power amplifiers from being overdriven into hard clipping - (2) assures that the amplifier will produce its maximum output without increased distortion - (3) protects your speaker from excessive heating. Power Guard is a patented McIntosh design (U.S. patent #4048573).

The MC7100 has a circuit that compares the wave shape of the output signal to the input signal. If the disparity between the two signals, due to overdrive, exceeds an average of 0.3% (equivalent to 0.3% total harmonic distortion) an amber POWER GUARD indicator illuminates. With any further increase in distortion the POWER GUARD circuit operates to limit the amplifier input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD only operates when the amplifier is asked to deliver more power than that for which it was designed.

## Rear Panel Information

#### LEFT GAIN

Use the LEFT GAIN control to adjust the output in the left channel to the desired listening level. Turn the control clockwise to increase the output.

#### RIGHT GAIN

Use the RIGHT GAIN control to adjust the output

in the right channel to the desired listening level. Turn the control clockwise to increase the output.

The input sensitivity of the MC7100 is 1.4V with the gain controls full CW. If one desires to match the 2.5V rating for McIntosh preamps simply turn each gain control CCW to the detent position on the control.

The right gain control also controls the gain in the MONO mode of operation.

#### LEFT AND RIGHT OUTPUT

For STEREO operation, output connections for impedances of 4 to 8 ohms are provided on secure, screw type, gold plated terminals. Connections for mono output are marked below the terminals.

#### INPUT

In the STEREO mode of operation both input jacks accept signal. For MONO operation use only the Right input jack and place the MODE switch in MONO.

#### AC POWER

The MC7100 is rated for 120 volts, 50/60 hertz. It uses 0.5 amperes when there is no signal output and up to 5 amperes with both channels delivering rated power. A 5 ampere fuse protects the MC7100 electrically. The AC power outlet provided for auxiliary equipment is neither fused nor switched.

## Technical Description

The MC7100 is a stereo power amplifier designed to operate with loudspeakers having a nominal impedance of 4 or 8 ohms.

It features a new circuit design that holds harmonic distortion far below the amplifiers remarkably low noise floor. Only by using special spectrum analysis measuring techniques is the distortion measurable at all.

#### DESIGN PHILOSOPHY

The secret to this performance will sound very simple, but it is more difficult to carry out than it may seem. The principle used in the design of the MC7100 was to arrange every stage of voltage or current amplification to be as linear as possible.

This linear operation is accomplished by using several different techniques.

- 1 Each transistor is selected to have nearly constant current gain (Beta) over the entire range of currents

at which the transistor must operate

2. The load impedance presented to each amplification stage is made to be as uniform as possible for all signal levels.
3. The input impedance of stages is increased and linearized where possible by using emitter degeneration.
4. Resistors and capacitors in the signal path are carefully selected to have exceedingly low voltage coefficients (low change of resistance or reactance with applied voltage). Precision metal film resistors and low dielectric absorption film capacitors are used in all critical circuit locations.
5. Output transistors have matched uniform current gain, high current gain-bandwidth product, low output capacitance, and large active-region safe operating area. These characteristics and the automatic tracking bias system eliminates crossover distortion. The distortion graphs show clearly that distortion does not increase at low power output levels.

#### OVER 50 JOULES OF ENERGY STORAGE

Huge main filter capacitors are used to guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

#### PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertised that their products do not require or use protection circuits and that such circuits compromise performance. McIntosh Laboratory agrees that diligent measures are required to allow unrestricted performance, but we also insist that protection circuits are desirable and necessary to prevent amplifier or loudspeaker damage due to abnormal circumstance and that they actually enhance performance. The MC7100 incorporates seven protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

#### POWER GUARD

Power Guard, a unique feature of McIntosh amplifiers, assures that each channel of the MC7100 will deliver full power free of clipping distortion. Clipping is caused when an amplifier is asked to produce more power output than its design is capable of delivering with low distortion. Amplifiers that are overdriven may

deliver large quantities of power when they are clipping but they have more than 40% harmonic distortion. In this mode, the sound is grossly distorted and the extra energy content of the clipped signal will damage most loudspeakers. The McIntosh Power Guard circuit protects your ears and your speakers from this kind of damage.

The Power Guard circuit consists of a waveform comparator which monitors the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparator produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.3% (equivalent to 0.3% total harmonic distortion) the comparator output causes the amber POWER GUARD indicator to light. If there is a further increase in the disparity the comparator output controls an electronic attenuator at the amplifier input to reduce the amplifier gain, thus holding the amplifier output to a low distortion value. Overdrive by 14dB is possible before the output distortion exceeds 2%.

#### SENTRY MONITOR

All power transistors have limits for the maximum amount of power they can handle. The MC7100 output transistors and power supply have been designed to allow very high current flow into properly matched load impedances. If, however, a short circuit or very low value of load impedance is applied to the output of the MC7100, destructive current levels could be reached if it was not controlled by the Sentry Monitor circuit. This circuit senses the dynamic operating time, voltage, and current of the amplifier output stage and controls the current flow confining it to nondestructive limits. Sentry Monitor does not limit the power output available from the amplifier.

#### THERMAL CONTROL

All power transistors have limits for the maximum amount of heat they can tolerate. The MC7100 uses a highly efficient amplifying circuit which produces relatively little heat for the output power produced. The amplifier has oversized heatsinks to dissipate transistor generated heat. Natural convection airflow is sufficient for cool operation. Should the cooling air be blocked or should the amplifier operating temperature become too high, thermal cutouts within the amplifier will turn off the speakers. Both POWER GUARD indicators will light continuously to show thermal protection is operating. When the amplifier has cooled, it will automatically turn on again.

#### TURN-ON DELAY

The MC7100 has a turn-on delay circuit that delays amplifier operation for about 2 seconds after power turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers.

#### DIRECT CURRENT FAILURE PROTECTION

A circuit is provided that turns off the speakers if for any reason a DC voltage appears at the speaker terminals. This prevents speaker damage.

#### POWER LINE INRUSH PROTECTION

Turn on inrush current is cushioned by a thermistor in the power transformer primary circuit. A soft start is achieved that eliminates component stress during turn-on.

#### CIRCUIT OPERATION

The audio input passes through the gain control to the power guard attenuator. The output amplifier follows the attenuator.

The power output amplifier uses two stages of voltage amplification followed by three stages of current amplification. All stages are complimentary balanced. Even number harmonics are canceled by the balanced circuits. This means that the amplifying stages have less total harmonic distortion and less negative feedback is required to achieve ultra low distortion.

The signal is fed to one input of the balanced differential stage. Feedback from the amplifier output is applied to the other input. The differential amplifiers drive a balanced cascode connected voltage amplifier stage. Current mirrors are also used to improve bandwidth and linearity.

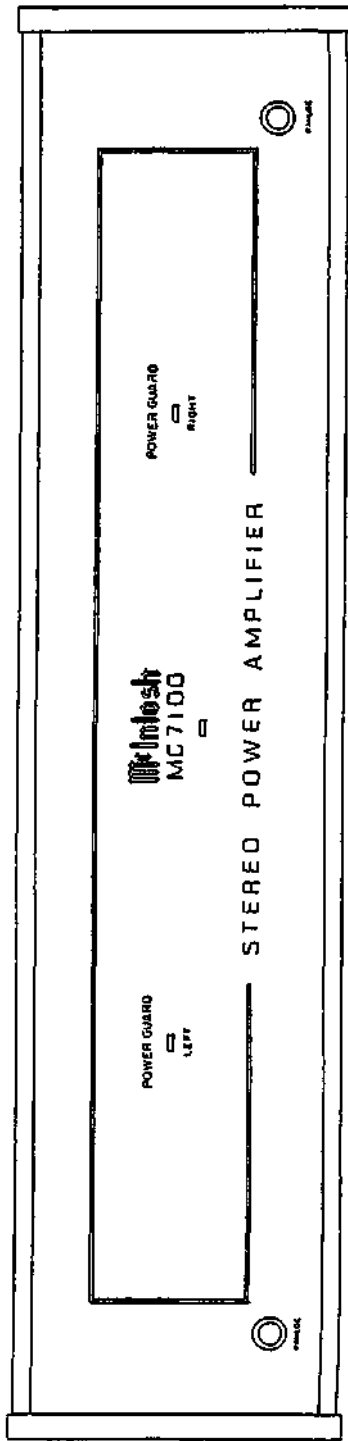
The cascode voltage amplifier output feeds complementary Darlington connected driver transistors. These supply the signal to 4 complementary connected output transistors per channel. Ancillary components for Power Guard, Sentry Monitor and other protection circuits interconnect with the amplifier circuits. The power supply uses a massive power transformer, full wave bridge rectifiers and large filter capacitors having 50 joules of energy storage. Large heatsinks provide cooling for the 8 output power transistors.

The mechanical and electrical design of the MC7100 is the result of the many years of engineering and manufacturing experience held by the staff at McIntosh. This "know how", the meticulous attention to design and production details, makes the MC7100

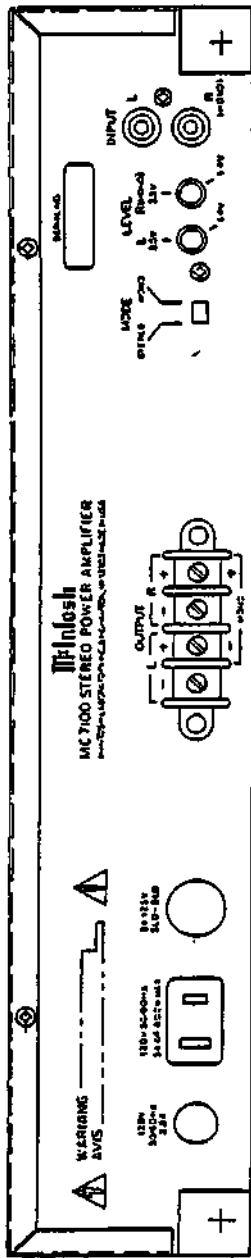
**one of the finest amplifiers ever produced by McIntosh  
Laboratory-**

**Issued by Engineering Department:  
October 29, 1991**

**Revised:  
November 1, 1991  
December 17, 1991  
January 22, 1992**



Front Panel Layout  
**MC7100 STEREO POWER AMPLIFIER**  
McIntosh Laboratory Inc. October 22, 1991



Rear Panel Layout  
 MC7100 STEREO POWER AMPLIFIER  
 McIntosh Laboratory Inc. October 22, 1991

PRODUCT PREVIEW

**MC7150**  
**Stereo Power Amplifier**

Project 654

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**Promotional Highlights**

- High Output Current Capability
- Over 58 Joules of Energy Storage
- Gold Plated Output Terminals
- Large Illuminated Peak Responding Output Wattmeters
- Watts Hold
- Ultra Low Distortion
- Wide Power Bandwidth
- Power Guard
- Thermal Protection
- DC Output Protection
- Turn On Delay
- Modular Construction

**Features and Benefits**

**HIGH OUTPUT-CURRENT**

Greater than 50 amperes peak output current to drive uneven speaker loads. Some poor speaker designs have input impedances that dip to 1 or 2 ohms at various frequencies. The MC7150 has the output current reserve to drive them.

**OVER 58 JOULES OF ENERGY STORAGE**

Huge main filter capacitors that guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

**GOLD PLATED OUTPUT TERMINALS**

McIntosh gold plated output terminals will deliver full output power to all speakers.

**ILLUMINATED PEAK RESPONDING OUTPUT WATT-METERS**

The McIntosh MC7150 is the first high fidelity power amplifier to have Output Wattmeters that respond 95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

**WATTS HOLD**

The "Watts Hold" mode for the output meters, records and displays the highest power output peak of the source material being amplified.

**ULTRA LOW DISTORTION**

Distortion so low that it defies measurement, even with the finest distortion analyzers. At mid-frequencies, 8 ohm load, the distortion meter reads the residual distortion of the oscillator (.0002%) with or without the MC7150 in the circuit. This means the amplifier distortion is lower than the analyzer is capable of measuring.

**WIDE POWER BANDWIDTH**

Full power output capability well above and below the frequencies that can be heard by humans.

**POWER GUARD**

The exclusive McIntosh circuit that prevents harsh sounding clipping and protects your speakers from damage.

**THERMAL PROTECTION**

Thermal sensors that turn off the AC power if improper loading or ventilation causes the amplifier to over heat.

**TURN ON DELAY**

The MC7150 has a circuit that delays amplifier operation for about two seconds after turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your speakers.

**OUTPUT AUTOFORMERS**

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi Fi industry. In the MC7150 they provide proper matching for 2, 4 and 8 ohm loads. They protect your speakers from damage in the event of an output transistor failure, provide low distortion power transfer at frequencies well beyond human hearing and deliver peak output current in excess of 53 amperes.

**MODULAR CONSTRUCTION**

If service should be required, modular construction makes repairs easier.

## Performance Specifications

**STEREO POWER OUTPUT**

150 watts into 8, 4 or 2 ohm loads is the minimum sine wave continuous average power output per channel from 20Hz to 20,000Hz with both channels operating. The output RMS voltage is:

- 34.6 across 8 ohms
- 24.5 across 4 ohms
- 17.3 across 2 ohms

**OUTPUT LOAD IMPEDANCE****STEREO**

8, 4 or 2 ohms by connecting to the proper output terminals.

**RATED POWER BAND**

20Hz to 20kHz

**TOTAL HARMONIC DISTORTION**

0.005% maximum harmonic distortion at any power level from 250 milliwatts to rated power per channel from 20Hz to 20,000Hz, both channels operating.

**INTERMODULATION DISTORTION**

0.005% maximum if instantaneous peak per output

does not exceed twice the output rating per channel, with both channels operating, for any combination of frequencies from 20Hz to 20,000Hz.

**FREQUENCY RESPONSE** (at 1 watt output)

+ 0, -0.25dB from 20Hz to 20kHz  
+ 0, -3.0dB from 10Hz to 100kHz

**HUM AND NOISE** (A-weighted)

110dB below rated output

**IHF DYNAMIC HEADROOM**

1.8dB

**DAMPING FACTOR**

Greater than 40

**INPUT IMPEDANCE**

20,000 ohms

**INPUT SENSITIVITY**

1.4 volts (2.5V at gain control center detent)

**POWER REQUIREMENTS**

120 volts, 50/60Hz, .5 to 7 amps

**SEMICONDUCTOR COMPLEMENT**

- 62 Silicon Diodes
- 2 Light Emitting Diodes
- 72 Bipolar Transistors
- 7 Integrated Circuits

## How to Connect Amplifier

**INPUT**

Use shielded cables to connect the signal from the preamplifier or signal source to the power amplifier input. To minimize the possibility of hum the shielded cables should be run parallel to each other or loosely twisted together. Locate the cables away from speaker leads and AC power cords. All connections are made on the back panel of the MC7150.

The left output of the preamplifier should be plugged into the LEFT INPUT jack of the power amplifier. The right output of the preamplifier should be plugged into the RIGHT INPUT jack of the power amplifier.

**OUTPUT**

Selection of the proper gauge wire to connect the loudspeakers preserves the quality of sound re-



production for which the loudspeakers have been designed. If undersize wire is used, resistance is added to the amplifier/loudspeaker combination which adversely affects the performance. Added resistance causes reduction of damping characteristics, modification of frequency response and reduction in power output.

Use lamp cord or wire with similar type of insulation to connect the speakers to the amplifier. In all cases, the leads to and from the speaker should be twin conductor or twisted together. When using 8 ohm speakers and for the normally short distances of under 30 feet between the amplifier and speaker, No. 18 wire or larger can be used. For distances over 30 feet between the amplifier and speaker use larger diameter wire. Select the correct size wire for the wire length from the chart. It is recommended that the DC resistance of the speaker leads be less than 5% of the speaker impedance. Up to 10% can be tolerated. Resistance of the leads should be computed for the length of wire both to and from the speaker or speakers.

#### MAXIMUM WIRE LENGTH

##### - For 4 ohm Load -

| Wire Gauge | Feet | Meters |
|------------|------|--------|
| 18         | 15   | 4.6    |
| 16         | 25   | 7.6    |
| 14         | 40   | 12.2   |
| 12         | 60   | 18.3   |
| 10         | 100  | 30.5   |

##### - For 8 ohm Load -

| Wire Gauge | Feet | Meters |
|------------|------|--------|
| 18         | 30   | 9.1    |
| 16         | 50   | 15.2   |
| 14         | 80   | 24.4   |
| 12         | 120  | 36.6   |
| 10         | 200  | 61.0   |

Wire lengths above represent the wire resistance equal to 5% of the speaker impedance.

For multiple speaker operations, run separate leads from the amplifier to the speakers.

#### CONNECTING LOUDSPEAKERS

Connect the leads from the left loudspeaker to the Left and Common OUTPUT terminals on the MC7150.

Connect the leads from the right loudspeaker to the Right and Common terminals. Use the terminal that matches the rated impedance of your speakers 1, 4 or 8 ohms.

#### AC POWER

The amplifier AC power cord is plugged into a 120 volt 50/60Hz wall outlet, or into a outlet on the preamplifier.

#### FUSE

A 7-amp slow blow fuse protects the MC7150 circuits. The fuse does not protect additional equipment connected to the rear panel AC power outlet.

## Front Panel Controls

#### ILLUMINATED OUTPUT WATTMETERS

The McIntosh MC7150 is the first high fidelity power amplifier to have Output Wattmeters that respond 95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

#### LEFT GAIN

Use the LEFT GAIN control to adjust the output in the left channel to the desired listening level. Turn the control clockwise to increase the output.

#### RIGHT GAIN

Use the RIGHT GAIN control to adjust the output in the right channel to the desired listening level. Turn the control clockwise to increase the output.

The input sensitivity of the MC7150 is 1.4V with the gain controls full CW. If one desires to match the 2.5V rating for McIntosh preamps simply turn each gain control CCW to the detent position on the control.

#### METER MODE

The METER MODE switch has two positions: WATTS and HOLD.

#### WATTS

In the WATTS position, the meter needle indicates the variations in program loudness. Although the primary output calibration of the meters is from 1.5

milliwatts up to 150 watts, the rated power output of the MC7150; the additional indication to the right of the 150 watts mark, is 600 watts. While the MC7150 cannot reach this power level continuously it is possible for short interval peaks to considerably exceed the 150 watts continuous rating.

#### **HOLD**

In the HOLD position, the meter needle locks to the highest power peak in a sequence of peaks. The meter is driven to maximum power, electronically held there until a higher peak passes through the amplifier, which moves the meter needle to a new indication. If no further peaks are reached the meter needle will very slowly return to its rest position (decay rate: 6dB per minute).

#### **POWER**

The POWER switch turns the MC7150 ON or OFF. The switch does not control the power outlet on the back panel. If you wish to control the AC power from a preamplifier control center, leave the switch in the ON position. Be sure the AC cord of the MC7150 is plugged into the controlled outlets on the rear of the preamplifier control center.

OFF: In the OFF position the AC power to the amplifier is turned off.

## **Power Guard Operation**

*McIntosh Exclusive Digital Dynamic Protection Circuit*

Improved recordings and recording techniques have imposed higher power demands on today's amplifiers. Poorly designed amplifiers can present music listeners with a form of harsh unpleasant distortion due to amplifier overload (hard clipping). Clipping, which looks and acts like non musical square waves, is caused when the amplifier is asked to produce more power output with low distortion than it is capable of or designed to deliver. Amplifiers, when driven to clipping, can deliver up to 40% harmonic and intermodulation distortion that decreases the pleasure and enjoyment you get from listening. This form of distortion (clipping signal) also produces extra heat energy which will damage most speakers. McIntosh leadership in engineering has developed the Power Guard circuit which - (1) dynamically prevents power amplifiers from being overdriven into hard clipping - (2) assures that the amplifier will produce its maximum output without increased distortion - (3) protects your speaker from excessive heating. Power Guard is a patented McIntosh design (U.S. patent #4048573).

The MC7150 has a circuit that compares the wave shape of the output signal to the input signal. If the disparity between the two signals, due to overdrive, exceeds an average of 0.3% (equivalent to 0.3% total harmonic distortion) an amber POWER GUARD indicator illuminates. With any further increase in distortion the POWER GUARD circuit operates to limit the amplifier input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD only operates when the amplifier is asked to deliver more power than that for which it was designed. While the power output remains within these limits the POWER GUARD indicators do not illuminate.

## **Rear Panel Information**

#### **LEFT AND RIGHT OUTPUT**

For stereo operation, output connections for impedances of 2, 4 and 8 ohms are provided on secure, screw type, gold plated terminals.

#### **INPUT**

In the stereo mode of operation both input jacks accept signal.

#### **AC POWER**

The MC7150 is rated for 120 volts, 50/60 hertz. It uses 0.5 amperes when there is no signal output and up to 7 amperes with both channels delivering rated power. A 7 ampere fuse protects the MC7150 electrically. The AC power outlet provided for auxiliary equipment is neither fused nor switched.

## **Technical Description**

The MC7150 is a stereo power amplifier designed to operate with loudspeakers having a nominal impedance of 2, 4 or 8 ohms.

It features a new circuit design that holds harmonic distortion far below the amplifiers remarkably low noise floor. Only by using special spectrum analysis measuring techniques is the distortion measurable at all.

#### **DESIGN PHILOSOPHY**

The secret to this performance will sound very simple, but it is more difficult to carry out than it may seem. The principle used in the design of the MC7150 was to arrange every stage of voltage or current

amplification to be as linear as possible.

This linear operation is accomplished by using several different techniques.

1. Each transistor is selected to have nearly constant current gain (Beta) over the entire range of currents at which the transistor must operate.
2. The load impedance presented to each amplification stage is made to be as uniform as possible for all signal levels.
3. The input impedance of stages is increased and linearized where possible by using emitter degeneration.
4. Resistors and capacitors in the signal path are carefully selected to have exceedingly low voltage coefficients (low change of resistance or reactance with applied voltage). Precision metal film resistors and low dielectric absorption film capacitors are used in all critical circuit locations.
5. Output transistors have matched uniform current gain, high current gain-bandwidth product, low output capacitance, and large active-region safe operating area. These characteristics and the automatic tracking bias system eliminates cross-over distortion. The distortion graphs show clearly that distortion does not increase at low power output levels.

#### OVER 58 JOULES OF ENERGY STORAGE

Huge main filter capacitors are used to guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

#### ILLUMINATED, PEAK RESPONDING OUTPUT WATTMETERS

The MC7150 is the first high fidelity power amplifier to have REAL OUTPUT WATTMETERS. The power output in WATTS of any amplifier is determined by multiplying the output voltage (E) by the output current (I),  $EI = W$ . Output meters on other amplifiers are only voltmeters. Output current is not considered. Calibration is in watts and is based on the false premise that all speakers have a fixed impedance regardless of frequency. In fact, the impedance of many poor speakers designs varies by as much as 4 to 1. For a specific output voltage the current varies inversely to the speaker impedance. So if the speaker impedance is lower, the output current and power are higher. Since McIntosh can not control other manufacturers speakers,

we decided to provide extra output current to drive these mismatched low impedances and to indicate the REAL output power required to drive them. Therefore the meter circuit in the MC7150 electronically measures both voltage and current, multiplies them and displays the REAL OUTPUT POWER IN WATTS.

Another important feature of these output wattmeters is their ability to respond 95% full scale to a single cycle tone burst at 2kHz. After voltage and current are measured and multiplied, the product is fed to a special circuit that accelerates the meter pointer in the upward direction. When it reaches its peak, it pauses only long enough for the human eye to perceive its position, then returns to 0. Response is almost 10 times faster than a professional VU meter.

A front panel switch is provided to change the meters to the WATTS HOLD mode of operation, fast upward movement of the pointer but greatly increased HOLD time at the peak of its travel. The highest power output of the source material is thus recorded.

#### OUTPUT AUTOFORMERS

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi Fi industry. In the MC7150 they provide proper matching for 2, 4 and 8 ohm loads. They protect your speakers from damage in the event of an output transistor failure, provide low distortion power transfer at frequencies well beyond human hearing and deliver peak output currents in excess of 53 amperes.

#### PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertised that their products do not require or use protection circuits and that such circuits compromise performance. McIntosh Laboratory agrees that diligent measures are required to allow unrestricted performance, but we also insist that protection circuits are desirable and necessary to prevent amplifier or loudspeaker damage due to abnormal circumstance and that they actually enhance performance. The MC7150 incorporates seven protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

#### POWER GUARD

Power Guard, a unique feature of McIntosh amplifiers, assures that each channel of the MC7150 will deliver full power free of clipping distortion. Clipping is caused when an amplifier is asked to produce more power output than its design is capable of delivering with low distortion. Amplifiers that are overdriven may deliver large quantities of power when they are clipping

but they have more than 40% harmonic distortion. In this mode, the sound is grossly distorted and the extra energy content of the clipped signal will damage most loudspeakers. The McIntosh Power Guard circuit protects your ears and your speakers from this kind of damage.

The Power Guard circuit consists of a waveform comparator which monitors the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparator produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.3% (equivalent to 0.3% total harmonic distortion) the comparator output causes the amber power guard indicator to light. If there is a further increase in the disparity the comparator output controls an electronic attenuator at the amplifier input to reduce the amplifier gain, thus holding the amplifier output to a low distortion value. Overdrive by 14dB is possible before the output distortion exceeds 2%.

#### **SENTRY MONITOR**

All power transistors have limits for the maximum amount of power they can handle. The MC7150 output transistors and power supply have been designed to allow very high current flow into properly matched load impedances. If, however, a short circuit or very low value of load impedance is applied to the output of the MC7150, destructive current levels could be reached if it was not controlled by the Sentry Monitor circuit. This circuit senses the dynamic operating time, voltage, and current of the amplifier output stage and controls the current flow confining it to nondestructive limits. Sentry Monitor does not limit the power output available from the amplifier.

#### **THERMAL CONTROL**

All power transistors have limits for the maximum amount of heat they can tolerate. The MC7150 uses a highly efficient amplifying circuit which produces relatively little heat for the output power produced. The amplifier has 4 oversized heatsinks to dissipate transistor • generated heat. Natural convection airflow is sufficient for cool operation. Should the cooling air be blocked or should the amplifier operating temperature become too high, thermal cutouts within the amplifier will turn off the power to the amplifier. When the amplifier has cooled, it will automatically turn on again.

#### **TURN-ON DELAY**

The MC7150 has a turn-on delay circuit that delays amplifier operation for about 2 seconds after power turn

on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers.

#### **DIRECT CURRENT FAILURE PROTECTION**

The autotransformer protects speakers from damage in the event of amplifier failure. Should a direct current component appear in the output it is shunted by the autotransformer and DC cannot damage the speaker.

#### **POWER LINE INRUSH PROTECTION**

Turn on inrush current is cushioned by thermistors in the power transformer primary circuit. A soft start is achieved that eliminates component stress during turn-on.

#### **CIRCUIT OPERATION**

The audio input passes through the gain control to a preamplifier. The output amplifier is driven by the preamplifier.

The power output amplifier uses two stages of voltage amplification followed by three stages of current amplification. All stages are complimentary balanced. Even number harmonics are canceled by the balanced circuits. This means that the amplifying stages have less total harmonic distortion and less negative feedback is required to achieve ultra low distortion.

The signal is fed to one input of the balanced differential stage. Feedback from the amplifier output is applied to the other input. The differential amplifiers drive a balanced cascode connected voltage amplifier stage. Current mirrors are also used to improve bandwidth and linearity.

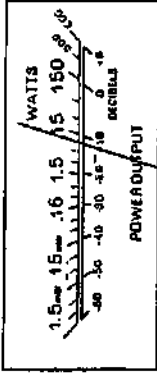
The cascode voltage amplifier output feeds complementary Darlington connected driver transistors. These supply the signal to 6 complementary connected output transistors per channel. Ancillary components for Power Guard, Sentry Monitor, Power Output Meters and other protection circuits interconnect with the amplifier circuits. The power supply uses a massive power transformer, full wave bridge rectifiers. Large filter capacitors having 58 joules of energy storage. Four large heatsinks provide cooling for the 12 output power transistors.

The mechanical and electrical design of the MC7150 is the result of the many years of engineering and manufacturing experience held by the staff at McIntosh. This "know how", the meticulous attention to design and production details, makes the MC7150

one of the finest amplifiers ever produced by McIntosh  
Laboratory.

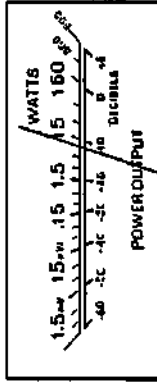
Issued by Engineering Department:  
December 6, 1990

Revised: January 4, 1991  
October 20, 1991

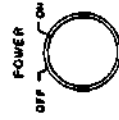
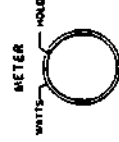


**McIntosh**  
**MC 7150**

POWER GUARD  RIGHT  
 LEFT



DIGITAL DYNAMIC STEREO POWER AMPLIFIER



PA-1000



PA-1000

Front Panel Layout  
 MC7150 POWER AMPLIFIER  
 McIntosh Laboratory Inc. November 14, 1981

PRODUCT PREVIEW

**MC7300  
STEREO  
POWER AMPLIFIER**

Project 638

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**PROMOTIONAL HIGHLIGHTS**

- High Output Current Capability
- Over 227 Joules of Energy Storage
- 50 Amps Gold plated Output Terminals
- Large Illuminated Peak Responding Output Wattmeters
- Watts Hold
- Ultra Low Distortion
- Wide Power Bandwidth
- Power Guard
- Thermal Protection
- DC Output Protection
- Regulated Illumination

- Turn On Delay
- Balanced Inputs
- Modular Construction
- Output Autoformers

**FEATURES AND BENEFITS**

**HIGH OUTPUT CURRENT**

Greater than 85 amperes peak output current to drive uneven speaker loads. Some poor speaker designs have input impedances that dip to 1 or 2 ohms at various frequencies. The MC7300 has the output current reserve to drive them.

**OVER 227 JOULES OF ENERGY STORAGE**

Huge main filter capacitors that guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

**50 AMP GOLD PLATED OUTPUT TERMINALS**

An exclusive McIntosh gold plated output terminal that will deliver full output power to speaker wires from 16GA to 4GA. 4 gauge wire is .204 inches in diameter, nearly 1/4 of an inch. ("Monster Cable" is 8GA, .128 inches in dial. You can connect directly to the wire. Special lugs or pins that can cause power loss are not required.

**ILLUMINATED PEAK RESPONDING OUTPUT WATTMETERS**

The McIntosh MC7300 is the first high power amplifier to have Output Wattmeters that respond 95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

**WATTS HOLD**

The "Watts Hold" mode for the output meters, records and displays the highest power **output** peak of the source material being amplified.

**ULTRA LOW DISTORTION**

Distortion so low that it defies measurement, even with the finest distortion analyzers. At mid-frequencies, 8 ohm load, the distortion meter reads the residual distortion of the oscillator ( 0.002%) with or without the MC7300 in the circuit. This means the amplifier distortion is lower than the analyzer is capable of measuring.

**BALANCED INPUTS**

Modern technology has made it possible to build preamps and amplifiers with the high signal to noise ratio necessary to reproduce the sound quality present on compact discs. However, the interconnecting cables can pick-up electrical interference from other equipment or appliances. The balanced inputs on the MC7300 provide a minimum of 40dB more protection against such noise pick-up.

**WIDE POWER BANDWIDTH**

Full power output capability well above and below the frequencies that can be heard by humans.

**POWER GUARD**

The exclusive McIntosh circuit that prevents harsh sounding clipping and protects your speakers from damage.

**THERMAL PROTECTION**

Thermal sensors that turn off the AC power if improper loading or ventilation causes the amplifier to over heat.

**REGULATED ILLUMINATION**

The tremendous peak output power capability of the MC7300 has made the addition of a circuit that regulates the brilliance of the illumination necessary. When there are high power output demands, the line voltage may sag, however this new circuit prevents the panel lights from dimming.

**TURN ON DELAY**

The MC7300 has a circuit that delays amplifier operation for about two seconds after turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your speakers.

**OUTPUT AUTOFORMERS**

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi Fi industry. In the MC7300 they provide proper matching for 2, 4 and 8 ohms loads in

stereo and 1,2,4,8 and 16 ohms in mono. They protect your speakers from damage in the event of an output transistor failure, provide low distortion power transfer at frequencies well beyond human hearing and deliver peak output currents in excess of 85 amperes.

**MODULAR CONSTRUCTION**

If service should be required, modular construction makes repairs easier.

**PERFORMANCE SPECIFICATION****STEREO POWER OUTPUT**

300 watts into 8, 4 or 2 ohm loads is the minimum sine wave continuous average power output per channel from 20Hz to 20,000Hz with both channels operating. The output RMS voltage is

49.0 across 8 ohms  
34.6 across 4 ohms  
24.5 across 2 ohms

**MONO-BRIDGE POWER OUTPUT**

600 watts into a 16, 8 or 4 ohm load in the minimum sine wave continuous average power output from 20Hz to 20,000Hz. The output RMS voltage is

98.0 across 16 ohms  
69.3 across 8 ohms  
49.0 across 4 ohms

**MONO-PARALLEL POWER OUTPUT**

600 watts into a 4, 2 or 1 ohm load is the minimum sine wave continuous average power output from 20Hz to 20,000Hz. The output RMS voltage is

49 across 4 ohms  
34.6 across 2 ohms  
24.5 across 1 ohm

**OUTPUT LOAD IMPEDANCE****STEREO**

8, 4 or 2 ohms by connecting to the proper output terminals.

**MONO**

16, 8, 4, 2 or 1 ohms by connecting to proper output terminals.

**RATED POWER BAND**

20Hz to 20kHz



**TOTAL HARMONIC DISTORTION****STEREO**

0.005% maximum harmonic distortion at any power level from 250 milliwatts to rated power per channel from 20Hz to 20,000Hz, both channels operating

**MONO**

0.005% maximum harmonic distortion at any power level from 250 milliwatts to rated power from 20Hz to 20,000Hz

**INTERMODULATION DISTORTION****STEREO**

0.005% maximum if instantaneous peak per output does not exceed twice the output rating per channel, with both channels operating, for any combination of frequencies from 20Hz to 20,000Hz

**MONO**

0.005% maximum if instantaneous peak power output does not exceed twice the output rating for any combination of frequencies from 20Hz to 20,000Hz

**FREQUENCY RESPONSE** (at one watt output)

+0, -0.25dB from 20Hz to 20kHz

+0, -3.0dB from 10Hz to 100kHz

**HUM AND NOISE** (A-weighted)

105dB below rated output

**IHF DYNAMIC HEADROOM**

1.9dB

**DAMPING FACTOR**

Greater than 40

**INPUT IMPEDANCE**

20,000 ohms Unbalanced

40,000 ohms Balanced

**INPUT SENSITIVITY**

Switchable for either 1.4 or 2.5 volts

**POWER REQUIREMENTS**

120 volts, 50/60Hz, 0.6 to 13 amperes

**FRONT PANEL INFORMATION****ILLUMINATED OUTPUT WATTMETERS**

The McIntosh MC7300 is the first high power amplifier to have Output Wattmeters that respond 95% full scale to a single cycle tone burst at 2kHz. Voltage and current output are electronically measured, multiplied and fed to a special circuit that accelerates the pointer movement in the upward direction. When the pointer reaches its peak it pauses only long enough for the human eye to perceive its position, then drops. It is almost 10 times faster than a professional VU meter.

**POWER GUARD**

This exclusive McIntosh circuit prevents harsh sounding clipping and protects your speakers from damage. The MC7300 has a circuit that compares the wave shape of the output signal to the input signal. If the disparity between the two signals, due to overdrive, exceeds an average of 0.3% (equivalent to 0.3% total harmonic distortion) an amber POWER GUARD indicator illuminates. With any further increases in distortion the POWER GUARD circuit operates to limit the amplifier input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD only operates when the amplifier is asked to deliver more power than that for which it was designed. While the power output remains within these limits the POWER GUARD indicators do not illuminate.

**LEFT GAIN**

Use the LEFT GAIN control to adjust the output in the left channel to the desired listening level. Turn the control clockwise to increase the output.

**RIGHT/MONO GAIN**

Use the RIGHT/MONO GAIN control to adjust the output in the right channel to the desired listening level. Turn the control clockwise to increase the output.

When connected for monophonic operation use the RIGHT/MONO GAIN to adjust the total output to the desired listening level. The rear panel MODE SWITCH must be in the MONO-BRIDGE or MONO PARALLEL POSITION.

**METER MODE**

The METER MODE switch has two positions: WATTS and HOLD.

**WATTS**

In the WATTS position, the meter needle indicates the variations in program loudness. Although the primary output calibration of the meters is from 3.0 milliwatts up to 300 watts, the rated power output of the MC7300; the additional indications to the right of the 300 watts mark, are 600 and 1200 watts. While the MC7300 cannot reach this power level continuously it is possible for short interval peaks to considerably exceed the 300 watts continuous rating.

**HOLD**

In the HOLD position, the meter needle locks to the highest power peak in a sequence of peaks. The meter is driven to maximum power, electronically held there until a higher peak passes through the amplifier, which moves the meter needle to a new indication. If no further peaks are reached the meter needle will very slowly return to its rest position (decay rate: 6dB per minute).

**POWER**

The POWER switch turns the MC7300 ON or OFF. The switch does not control the power outlet on the back panel. If you wish to control the AC power from a preamplifier control center, leave the switch in the ON position. Be sure the AC cord of the MC7300 is plugged into the switched outlets on the rear of the preamplifier control center.

**POWER GUARD****OPERATION - McIntosh Exclusive Digital Dynamic Protection Circuit**

Improved recordings and recording techniques have imposed higher power demands on today's amplifiers. Poorly designed amplifiers can present music listeners with a form of harsh unpleasant distortion due to amplifier overload (hard clipping). Clipping, which looks and acts like non musical square waves, is caused when the amplifier is asked to produce more power output with low distortion than it is capable of or designed to deliver. Amplifiers, when driven to clipping, can deliver up to 40% harmonic and intermodulation distortion that

decreases the pleasure and enjoyment you get from listening. This form of distortion (clipping signal) also produces extra heat energy which will damage most speakers. McIntosh leadership in engineering has developed the Power Guard circuit which - (1) dynamically prevents power amplifiers from being overdriven into hard clipping - (2) assures that the amplifier will produce its maximum output without increased distortion - (3) protects your speaker from excessive heating. Power Guard is a patented McIntosh design (U.S. patent #4048573).

The MC7300 has a circuit that compares the wave shape of the output signal to the input signal. If the disparity between the two signals, due to overdrive, exceeds an average of 0.3% (equivalent to 0.3% total harmonic distortion) an amber POWER GUARD indicator illuminates. With any further increase in distortion the POWER GUARD circuit operates to limit the amplifier input dynamically so that the amplifier cannot be overdriven. POWER GUARD eliminates amplifier output clipping. POWER GUARD only operates when the amplifier is asked to deliver more power than that for which it was designed. While the power output remains within these limits the POWER GUARD indicators do not illuminate.

**REAR PANEL INFORMATION****MODE SWITCH**

The MC7300 will operate in three modes, Stereo, Mono Bridge, and Mono Parallel.

**INPUT LEVEL**

The input sensitivity of the MC7300 is 1.4 volts or 2.5V depending on the position of the INPUT sensitivity switch. For the best signal to noise ratio when using McIntosh source equipment, place the INPUT sensitivity switch in the 2.5V position and the front panel LEFT GAIN and RIGHT/MONO GAIN controls in the fully clockwise position. If more gain is desired, the 1.4V position may be used. All McIntosh preamplifiers have been designed to deliver 2.5 volts output with rated input. For source equipment other than McIntosh, set the switch in the position nearest to stated output rating of the source equipment.

**INPUT**

Both LEFT and RIGHT UNBALANCED and BALANCED input connectors function in the stereo mode of operation. In the mono mode of operation only the RIGHT/MONO input in either UNBALANCED or BALANCED accepts signal. In mono the LEFT channel input connectors are disconnected.

Modern technology has made it possible to build preamps and amplifiers with the high signal to noise ratio necessary to reproduce the sound quality present on compact discs. The interconnecting cables can pick up electrical interference from other equipment or appliances. The balanced inputs on the MC7300 provide a minimum of 40dB more protection against such noise pick-up.

**LEFT AND RIGHT OUTPUT TERMINALS**

McIntosh 50 ampere gold plated output terminals will deliver full output power to speaker wires from 18GA to wire that is 1/4 of an inch in diameter. The MC7300 has greater than 85 amperes peak output current to drive speakers whose impedance varies from 16 ohms to 1 ohm over the speaker's frequency range. Wire can be connected directly to the output terminal. Special lugs or pins that can cause power loss are not required.

**AC POWER**

The input to the MC7300 is 120 volts 50/60Hz at up to 13 amps. The primary circuit is protected by a 13 amp fuse. The AC auxiliary outlet is not fused nor switched.

**TECHNICAL DESCRIPTION**

The MC7300 is a stereo power amplifier designed to operate with loudspeakers having a nominal impedance of 2, 4 or 8 ohms. In mono operation 1,2,4 8 or 16 ohms.

It features a new circuit design that holds harmonic distortion far below the amplifiers remarkably low noise floor. Only by using special spectrum analysis measuring techniques is the distortion measurable at all.

**DESIGN PHILOSOPHY**

The secret to this performance will sound very simple, but it is more difficult to carry out than it may

seem. The principle used in the design of the MC7300 was to arrange every stage of voltage or current amplification to be as linear as possible.

This linear operation is accomplished by using several different techniques.

- 1 Each transistor is selected to have nearly constant current gain (Beta) over the entire range of currents at which the transistor must operate.
- 2 The load impedance presented to each amplification stage is made to be as uniform as possible for all signal levels.
- 3 The input impedance of stages is increased and linearized where possible by using emitter degeneration.
- 4 Resistors and capacitors in the signal path are carefully selected to have exceedingly low voltage coefficients (low change of resistance or reactance with applied voltage). Precision metal film resistors and low dielectric absorption film capacitors are used in all critical circuit locations.
- 5 Output transistors have matched uniform current gain, high current gain-bandwidth product, low output capacitance, and large active-region safe operating area. These characteristics and the automatic tracking bias system eliminates cross-over distortion. The distortion graphs show clearly that distortion does not increase at low power output levels.

**OVER 227 JOULES OF ENERGY STORAGE**

Huge main filter capacitors are used to guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

**ILLUMINATED, PEAK RESPONDING OUTPUT WATTMETERS**

The MC7300 is the first high power amplifier to have REAL OUTPUT WATTMETERS. The power output in WATTS of any amplifier is determined by multiplying the output voltage (E) by the output current (I),  $EI = W$ . Output meters on other amplifiers are only voltmeters. Output current is not considered. Calibration is in watts and is based on the false

premise that all speakers have a fixed impedance regardless of frequency. In fact, the impedance of many poor speakers designs varies by as much as 4 to 1. For a specific output voltage the current varies inversely to the speaker impedance. So if the speaker impedance is lower, the output current and power are higher. Since McIntosh can not control other manufacturers speakers, we decided to provide extra output current to drive these mismatched low impedances and to indicate the REAL output power required to drive them. Therefore the meter circuit in the MC7300 electronically measures both voltage and current, multiplies them and displays the REAL OUTPUT POWER IN WATTS.

Another important feature of these output wattmeters is their ability to respond 95% full scale to a single cycle tone burst at 2kHz. After voltage and current are measured and multiplied, the product is fed to a special circuit that accelerates the meter pointer in the upward direction. When it reaches its peak, it pauses only long enough for the human eye to perceive its position then returns to 0. Response is almost 10 times faster than a professional VU meter.

A front panel switch is provided to change the meters to the WATTS HOLD mode of operation fast upward movement of the pointer but greatly increased HOLD time at the peak of its travel. The highest power output of the source material is thus recorded.

#### OUTPUT AUTOFORMERS

The unequalled expertise of McIntosh in the design and manufacture of output transformers is legendary in the Hi FI industry. In the MC7300 they provide proper matching for 2, 4 and 8 ohm loads in stereo and 1, 2, 4, 8 and 18 ohms in mono. They protect your speakers from damage in the event of an output transistor failure, provide low distortion power transfer at frequencies well beyond human hearing and deliver peak output currents in excess of 85 amperes.

#### PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertised that their products do not require or use protection circuits and that such circuits compromise performance. McIntosh Laboratory agrees that diligent measures are required to allow unrestricted performance, but we also insist that protection

circuits are desirable and necessary to prevent amplifier or loudspeaker damage due to abnormal circumstance and that they actually enhance performance. The MC7300 incorporates seven protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

#### POWER GUARD

Power Guard, a unique feature of McIntosh amplifiers, assures that each channel of the MC7300 will deliver full power free of clipping distortion. Clipping is caused when an amplifier is asked to produce more power output than its design is capable of delivering with low distortion. Amplifiers that are overdriven may deliver large quantities of power when they are clipping but they have more than 40% harmonic distortion. In this mode, the sound is grossly distorted and the extra energy content of the clipped signal will damage most loudspeakers. The McIntosh Power Guard circuit protects your ears and your speakers from this kind of damage.

The Power Guard circuit consists of a waveform comparator which monitors the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparator produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.3% (equivalent to 0.3% total harmonic distortion) the comparator output causes the amber power guard indicator to light. If there is a further increase in the disparity the comparator output controls an electronic attenuator at the amplifier input to reduce the amplifier gain, thus holding the amplifier output to a low distortion value. Overdrive by 14dB is possible before the output distortion exceeds 2%.

#### SENTRY MONITOR

All power transistors have limits for the maximum amount of power they can handle. The MC7300 output transistors and power supply have been designed to allow very high current flow into properly matched load impedances. If, however, a short circuit or very low value of load impedance is applied to the output of the MC7300, destructive current levels could be reached if it was not controlled by the Sentry Monitor circuit. This circuit senses the dynamic operating time, voltage, and current of the amplifier output stage and controls the current flow confining it to nondestructive limits. Sentry Monitor does not limit the power output available.

from the amplifier

#### **THERMAL CONTROL**

All power transistors have limits for the maximum amount of heat they can tolerate. The MC7300 uses a highly efficient amplifying circuit which produces relatively little heat for the output power produced. The amplifier has 4 oversized heatsinks to dissipate transistor generated heat. Natural convection air flow is sufficient for cool operation. Should the cooling air be blocked or should the amplifier operating temperature become too high, thermal cutouts within the amplifier will turn off the power to the amplifier. When the amplifier has cooled, it will automatically turn on again.

#### **TURN-ON DELAY**

The MC7300 has a turn-on delay circuit that delays amplifier operation for about 2 seconds after power turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers.

#### **DIRECT CURRENT FAILURE PROTECTION**

The autotransformer protects speakers from damage in the event of amplifier failure. Should a direct current component appear in the output it is shunted by the autotransformer and DC cannot reach the speaker.

#### **POWER LINE INRUSH PROTECTION**

Turn on inrush current is cushioned by thermistors in the power transformer primary circuit. A soft start is achieved that eliminates component stress during turn-on.

#### **CIRCUIT OPERATION**

The audio input passes through the gain control to a preamplifier. The output amplifier is driven by the preamplifier.

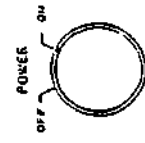
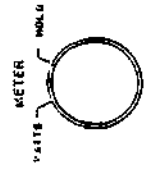
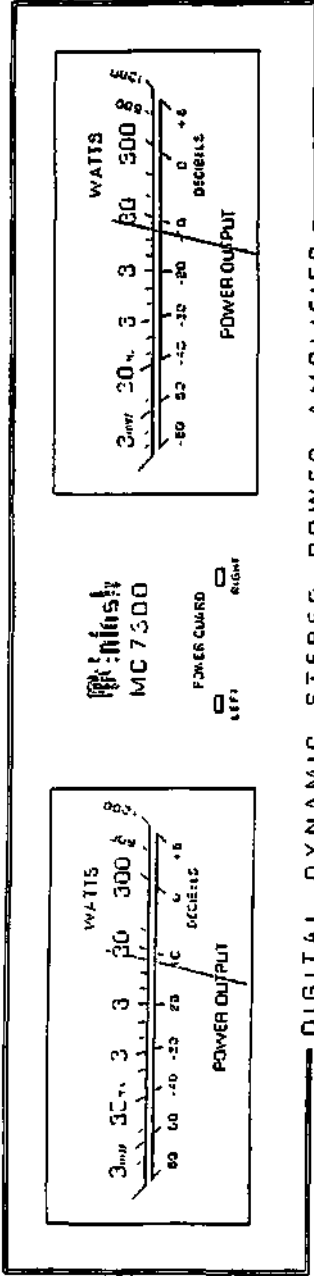
The power output amplifier uses two stages of voltage amplification followed by three stages of current amplification. All stages are complimentary balanced. Even number harmonics are cancelled by the balanced circuits. This means that the amplifying stages have less total harmonic distortion and less negative feedback is required to achieve ultra low distortion.

The signal is fed to one input of the balanced differential stage. Feedback from the amplifier output is applied to the other input. The differential amplifiers drive a balanced cascode connected voltage amplifier stage. Current mirrors are also used to improve bandwidth and linearity.

The cascode voltage amplifier output feeds complementary Darlington connected driver transistors. These supply the signal to 10 complementary connected output transistors per channel. Ancillary components for Power Guard, Sentry Monitor, Power Output Meters and other protection circuits interconnect with the amplifier circuits. The power supply uses a massive power transformer, full wave bridge rectifiers. Large filter capacitors having 227 joules of energy storage. Four large heatsinks provide cooling for the 20 output power transistors.

The mechanical and electrical design of the MC7300 is the result of the many years of engineering and manufacturing experience held by the staff at McIntosh. This "know how", the meticulous attention to design and production details, makes the MC7300 one of the finest amplifiers ever produced by McIntosh Laboratory.

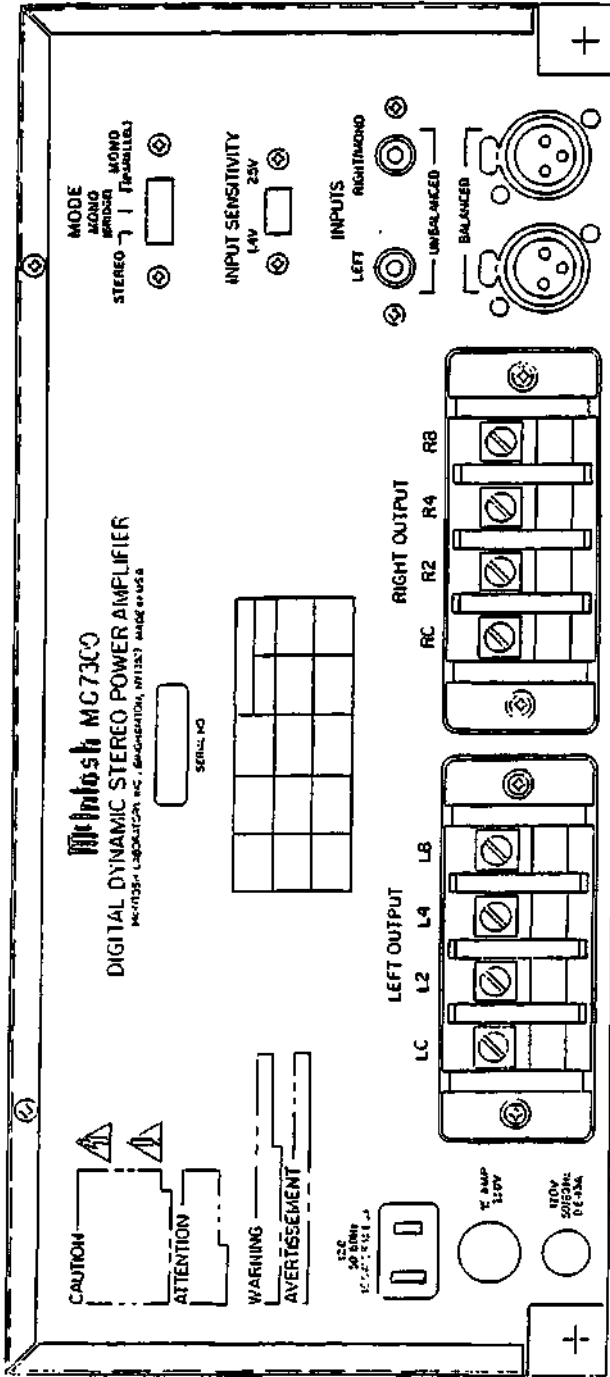
Issued by Engineering Department  
May 1991



PA 14C

PA 14C

Front Panel Layout  
 MC7300 POWER AMPLIFIER  
 McIntosh Laboratory, Inc. November 14, 1991



Rear Panel Layout  
 MC7300 POWER AMPLIFIER  
 McIntosh Laboratory Inc. November 14, 1991

PRODUCT PREVIEW

**MC7106**  
**Six Channel**  
**Power Amplifier**

Project 697

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## Promotional Highlights

- Certified For Home THX Audio Systems\*
- High Output Current Capability
- Over 150 Joules of Energy Storage
- Gold Plated Output Terminals
- Toroid Power Transformer
- Ultra Low Distortion
- Wide Power Bandwidth
- Power Guard
- Thermal Protection
- DC Output Protection
- Turn On Delay
- Remote Turn "ON"

• THX is a trade mark of Lucas Arts Entertainment Company.

- Modular Construction

## Features and Benefits

### HIGH OUTPUT CURRENT

Greater than 25 amperes peak output current to drive uneven speaker loads. Some poor speaker designs have input impedances that dip to 1 or 2 ohms at various frequencies. The MC7106 has the output current reserve to drive them.

### OVER 150 JOULES OF ENERGY STORAGE

Huge main filter capacitors that guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

### GOLD PLATED OUTPUT TERMINALS

McIntosh gold plated output terminals will deliver full output power to all speakers.

### ULTRA LOW DISTORTION

Distortion so low that it defies measurement, even with the finest distortion analyzers. At mid-frequencies, 8 ohm load, the distortion meter reads the residual distortion of the oscillator with or without the MC7106 in the circuit. This means the amplifier distortion is lower than the analyzer is capable of measuring.

### WIDE POWER BANDWIDTH

Full power output capability well above and below the frequencies that can be heard by humans.

### POWER GUARD

The exclusive McIntosh circuit that prevents harsh sounding clipping and protects your speakers from damage.

### THERMAL PROTECTION

Thermal sensors that turn off the speakers if improper loading or ventilation causes the amplifier to over heat.

### DC OUTPUT PROTECTION

A circuit that turns off the speakers if for any reason a DC voltage appears at the speaker terminals. This prevents speaker damage.



**TURN ON DELAY**

The MC7106 has a circuit that delays amplifier operation for about two seconds after turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your speakers.

**REMOTE TURN ON**

A rear panel power switch is provided with 2 positions, ON and REMOTE. In the remote position the amplifier can be turned "ON" by a 5V logic level signal to the THX connector or POWER CONTROL INPUT jack.

**MODULAR CONSTRUCTION**

If service should be required, modular construction makes repairs easier.

**TOROID POWER TRANSFORMER**

The toroid permits a design with low noise and cool operation.

## Performance Specifications

**POWER OUTPUT PER CHANNEL**

160 watts into 4 ohm loads or 100 watts into 8 ohm loads minimum sine wave continuous average power output per channel, all channels operating. The output RMS voltage is:

- 28.3 across 8 ohms
- 25.3 across 4 ohms

**BRIDGED**

320 watts into an 8 ohm load minimum sine wave continuous average power output, which is 50.6 volts RMS.

**OUTPUT LOAD IMPEDANCE**

NORMAL  
8 or 4 ohms.

**BRIDGED**

8 ohms.

**RATED POWER BAND**

20Hz to 20kHz

**TOTAL HARMONIC DISTORTION**

0.005% maximum harmonic distortion at any power level from 250 milliwatts to rated power per channel from 20Hz to 20,000Hz, all channels operating.

**DYNAMIC HEADROOM**

1.8dB

**FREQUENCY RESPONSE**

+0, -0.25dB from 20Hz to 20kHz  
+0, -3.0dB from 10Hz to 100kHz

**INPUT SENSITIVITY**

1 volt (2.5V at gain control center detent)

**INPUT IMPEDANCE**

20,000 ohms

**A WEIGHTED SIGNAL TO NOISE RATIO**

92dB (112dB below rated output)

**INTERMODULATION DISTORTION**

0.005% maximum if instantaneous peak per output does not exceed twice the output rating per channel, with all channels operating, for any combination of frequencies from 20Hz to 20,000Hz.

**WIDE BAND DAMPING FACTOR**

8 ohm, 200  
4 ohm, 100

**POWER REQUIREMENTS**

120 volts 50/60Hz, 9.5 amps

## Front Panel Information

The all glass front panel of the MC7106 has six vertical light columns, one per channel. A column consists of ten LEDs. Nine indicate percent of rated power output and the tenth, power guard operation.

## Rear Panel Information

**GAIN CONTROLS**

The input sensitivity of the MC7106 is 1V with the gain controls full CW. If one desires to match the 2.5V rating for McIntosh preamps simply turn each gain control CCW to the detent position on the control. The controls should be full CW for THX operation.

The number 1, 3, & 5 gain controls also control the gain in the BRIDGED mode of operation.

**INPUTS**

In the normal mode of operation all input jacks

accept signal. For BRIDGED operation use only the 1, 3, & 5 input jacks and place the MODE switch in the BRIDGED position.

The THX connector is used when the MC7106 is connected to a THX Surround Decoder. It contains all six channel inputs and AC power control.

#### OUTPUTS

For normal operation, output connections for impedances of 4 to 8 ohms are provided on secure, screw type, gold plated terminals. Connections for BRIDGED output are marked above the terminals.

#### AC POWER

The MC7106 is rated for 120 volts, 50/60 hertz. It uses .8 amperes when there is no signal output and up to 19 amperes with all channels delivering rated power. A 15 ampere fuse protects the MC7106 electrically.

#### AC POWER SWITCH

The POWER switch has two positions. ON and REMOTE. The REMOTE position provides a circuit that operates the power relay from a logic "1" (5V) signal. This signal can be applied between pin 13 (input) and pin 25 (control ground) of the THX connector or to the POWER CONTROL IN jack (tip-input, sleeve-control ground). The POWER CONTROL OUT jack provides a power ON signal for the NEXT power amplifier. This signal is delayed by approximately .2 seconds so that inrush current peaks are sequenced.

## Technical Description

The MC7106 is a six channel power amplifier designed to operate with loudspeakers having a nominal impedance of 4 or 8 ohms.

It features a new circuit design that holds harmonic distortion far below the amplifiers remarkably low noise floor. Only by using special spectrum analysis measuring techniques is the distortion measurable at all.

#### DESIGN PHILOSOPHY

The secret to this performance will sound very simple, but it is more difficult to carry out than it may seem. The principle used in the design of the MC7106 was to arrange every stage of voltage or current amplification to be as linear as possible.

This linear operation is accomplished by using

several different techniques.

1. Each transistor is selected to have nearly constant current gain (Beta) over the entire range of currents at which the transistor must operate.
2. The load impedance presented to each amplification stage is made to be as uniform as possible for all signal levels.
3. The input impedance of stages is increased and linearized where possible by using emitter degeneration.
4. Resistors and capacitors in the signal path are carefully selected to have exceedingly low voltage coefficients (low change of resistance or reactance with applied voltage). Precision metal film resistors and low dielectric absorption film capacitors are used in all critical circuit locations.
5. Output transistors have matched uniform current gain, high current gain-bandwidth product, low output capacitance, and large active-region safe operating area. These characteristics and the automatic tracking bias system eliminates cross-over distortion. The distortion graphs show clearly that distortion does not increase at low power output levels.

#### OVER 150 JOULES OF ENERGY STORAGE

Huge main filter capacitors are used to guarantee an excellent signal to noise ratio and the energy storage necessary for the wide dynamic range that "Digital Audio" demands.

#### PROTECTION CIRCUITS

Some manufacturers of power amplifiers advertised that their products do not require or use protection circuits and that such circuits compromise performance. McIntosh Laboratory agrees that diligent measures are required to allow unrestricted performance, but we also insist that protection circuits are desirable and necessary to prevent amplifier or loudspeaker damage due to abnormal circumstance and that they actually enhance performance. The MC7106 incorporates seven protection circuits to enhance its performance, assure its reliability and to protect loudspeakers.

#### POWER GUARD

Power Guard, a unique feature of McIntosh amplifiers, assures that each channel of the MC7106 will deliver full power free of clipping distortion. Clipping

is caused when an amplifier is asked to produce more power output than its design is capable of delivering with low distortion. Amplifiers that are overdriven may deliver large quantities of power when they are clipping but they have more than 40% harmonic distortion. In this mode, the sound is grossly distorted and the extra energy content of the clipped signal will damage most loudspeakers. The McIntosh Power Guard circuit protects your ears and your speakers from this kind of damage.

The Power Guard circuit consists of a waveform comparator which monitors the wave shape of the amplifier input and output signals. Normally there is no disparity between these signals and the comparator produces no output. When the amplifier is driven beyond its maximum power capacity a difference will develop. If the disparity exceeds 0.3% (equivalent to 0.3% total harmonic distortion) the comparator output causes the amber POWER GUARD indicator to light. If there is a further increase in the disparity the comparator output controls an electronic attenuator at the amplifier input to reduce the amplifier gain, thus holding the amplifier output to a low distortion value. Overdrive by 14dB is possible before the output distortion exceeds 2%.

#### SENTRY MONITOR

All power transistors have limits for the maximum amount of power they can handle. The MC7106 output transistors and power supply have been designed to allow very high current flow into properly matched load impedances. If, however, a short circuit or very low value of load impedance is applied to the output of the MC7106, destructive current levels could be reached if it was not controlled by the Sentry Monitor circuit. This circuit senses the dynamic operating time, voltage, and current of the amplifier output stage and controls the current flow confining it to nondestructive limits. Sentry Monitor does not limit the power output available from the amplifier.

#### THERMAL CONTROL

All power transistors have limits for the maximum amount of heat they can tolerate. The MC7106 uses a highly efficient amplifying circuit which produces relatively little heat for the output power produced. The amplifier has oversized heatsinks to dissipate transistor generated heat. Natural convection air flow is sufficient for cool operation. Should the cooling air be blocked or should the amplifier operating temperature become too high, thermal cutouts within the amplifier will turn off the speakers. POWER GUARD indicators will light continuously to show thermal protection is operating.

When the amplifier has cooled, it will automatically turn on again.

#### TURN-ON DELAY

The MC7106 has a turn-on delay circuit that delays amplifier operation for about 2 seconds after power turn on. This prevents pops or thumps generated in other equipment from causing annoying noises or damaging your loudspeakers.

#### DIRECT CURRENT FAILURE PROTECTION

A circuit is provided that turns off the speakers if for any reason a DC voltage appears at the speaker terminals. This prevents speaker damage.

#### POWER LINE INRUSH PROTECTION

Turn on inrush current is cushioned by a thermistor in the power transformer primary circuit. A soft start is achieved that eliminates component stress during turn-on.

#### CIRCUIT OPERATION

The audio input passes through the gain control to the power guard attenuator. A preamplifier follows the attenuator.

The preamplifier also includes inversion for bridged mode and supplies low impedance drive to the output amplifier.

The power output amplifier uses two stages of voltage amplification followed by three stages of current amplification. All stages are complimentary balanced. Even number harmonics are canceled by the balanced circuits. This means that the amplifying stages have less total harmonic distortion and less negative feedback is required to achieve ultra low distortion.

The signal is fed to one input of the balanced differential stage. Feedback from the amplifier output is applied to the other input. The differential amplifiers drive a balanced cascode connected voltage amplifier stage. Current mirrors are also used to improve bandwidth and linearity.

The cascode voltage amplifier output feeds complementary Darlington connected driver transistors. These supply the signal to 6 complementary connected output transistors per channel. Ancillary components for Power Guard, Sentry Monitor and other protection circuits interconnect with the amplifier circuits. The power supply uses a massive power transformer, full wave bridge rectifiers and large filter capacitors having 150 joules of energy storage. Large heatsinks provide

cooling for the 36 output power transistors.

The mechanical and electrical design of the MC7106 is the result of the many years of engineering and manufacturing experience held by the staff at McIntosh. This "know how", the meticulous attention to design and production details, makes the MC7106 one of the finest amplifiers ever produced by McIntosh Laboratory.

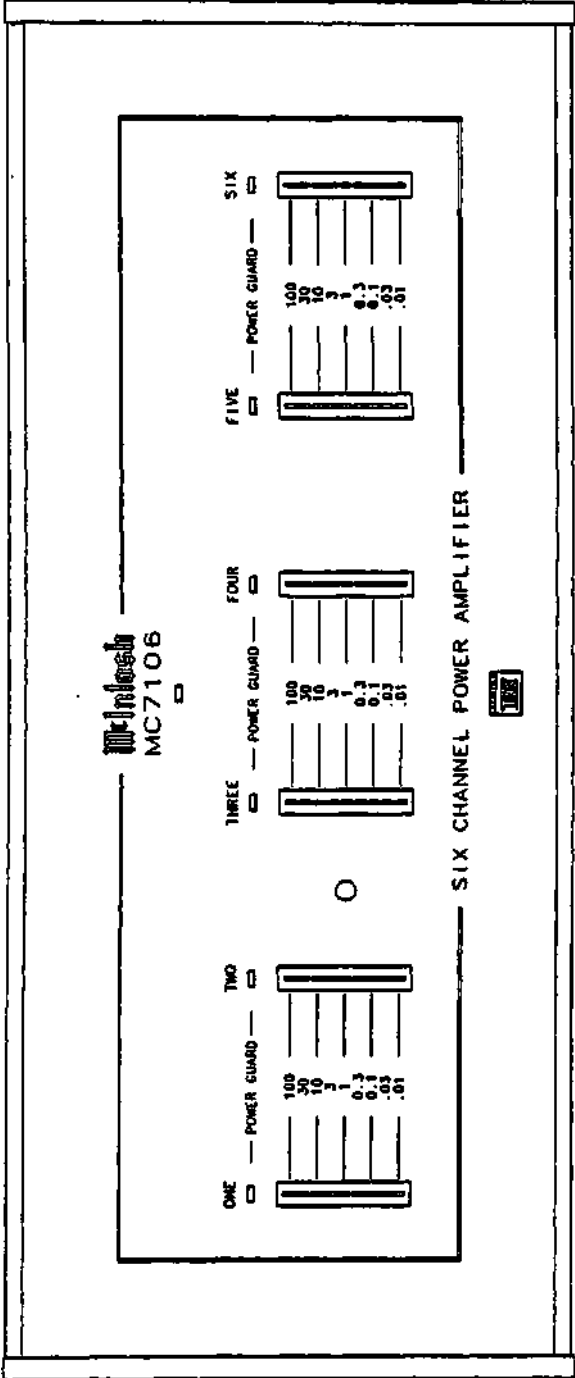
Issued by Engineering Department:

May 5, 1992

Revised: May 26, 1992

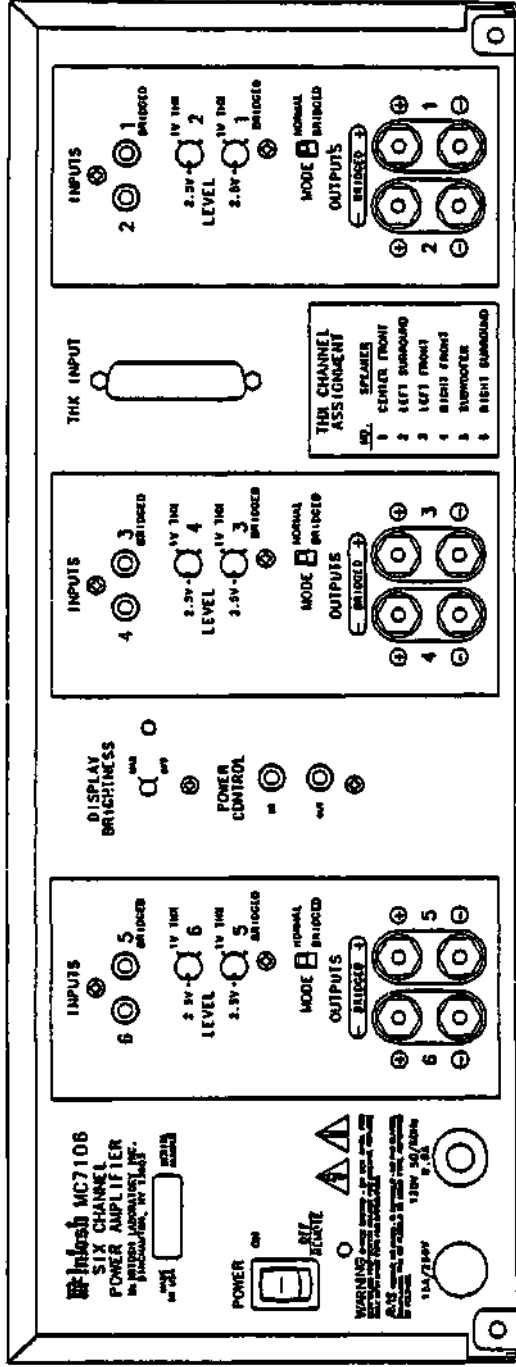
October 2, 1992

June 8, 1993



Front Panel Layout  
 MC7106 SIX CHANNEL POWER AMPLIFIER  
 McIntosh Laboratory/Inc. October 1, 1992

# MC7106



# MC7106

Rear Panel Layout  
 MC7106 SIX CHANNEL POWER AMPLIFIER  
 McIntosh Laboratory, Inc. January 11, 1993

PRODUCT PREVIEW

**C712**  
**Audio Control Center**

Project 776

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## Promotional Highlights

- Logic Driven Electro Magnetic Switching
- Eight Program Source Selections
- All Glass Front Panel
- Balanced Audio Outputs
- Exclusive McIntosh Tone Control Circuit
- Serial Data Output Ports
- Active Variable Loudness Compensation
- Processor Loop
- Precision Volume Control
- Double Shielded Power Transformer
- Electronically Regulated Power Supply
- One Switched and One Unswitched AC Outlet

- Auto Muting
- Remote Power ON and Mute Indication
- Audio/Video Switching for 5 More Sources with MVS-3
- Headphone Jack
- Parallel Data Output Ports for Tuner and two CD Players

## Features and Benefits

### LOGIC DRIVEN ELECTROMAGNETIC SWITCHING

DIGITAL LOGIC integrated circuits drive ELECTROMAGNETIC SWITCHES for the most reliable, lowest distortion signal switching available today.

### EXPANDABLE A/V SWITCHING

Five more AUDIO/VIDEO inputs can be added and controlled through the use of the MVS-3.

### GOLD PLATED INPUT AND OUTPUT JACKS

Gold plating is chosen because of superior corrosion resistance.

### EIGHT PROGRAM SOURCE SELECTIONS

PHONO/AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2, and VIDEO.

### ALL GLASS FRONT PANEL

The front panel is glass with all control nomenclature illuminated, even the push buttons.

### EXCLUSIVE McINTOSH TONE CONTROL CIRCUIT

The tone control circuit provides 12dB of BASS and TREBLE boost or cut. However, at the center position of the control, it automatically and completely removes all tone circuit components from the signal path.

### ACTIVE VARIABLE LOUDNESS COMPENSATION

Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW.

### SERIAL DATA OUTPUT PORTS

A serial data output port is provided for each input selection. These ports can be used to transfer control data to compatible equipment.

**PRECISION VOLUME CONTROL**

Left and Right sections for the volume control are trimmed for superior tracking.

**DOUBLE SHIELDED POWER TRANSFORMER**

Copper and steel shielding eliminate hum pickup from the power transformer.

**REMOTE POWER ON AND MUTE INDICATION**

On each keypad and remote sensor there is an LED that lights when that area is POWERED and blinks on and off when the area is MUTED.

**ELECTRONICALLY REGULATED POWER SUPPLY**

Regulators maintain stable operation even during "Brown Outs" or low line voltage.

**AUTO MUTING**

The outputs are muted for 1 second during power up to prevent hearing annoying clicks and pops generated by other equipment.

**NEW REMOTE SENSOR POWER SUPPLY**

The design of the remote sensor power supply has been changed to provide power to operate up to four sensors or keypads wired in parallel on the same coax.

**HEADPHONE JACK**

A HEADPHONE JACK and amplifier are provided for private listening.

**PARALLEL DATA OUTPUTS**

Two parallel data output connectors for McIntosh CD player and CD changer control plus a connector for tuner control.

## PERFORMANCE SPECIFICATIONS

**PERFORMANCE LIMITS**

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new C712 from a McIntosh franchised dealer, it will be capable of or can be made capable of performance at or exceeding these limits or you can return the unit and get your money back.

**FREQUENCY RESPONSE**

+0, -0.5dB from 20Hz to 20,000Hz

**RATED OUTPUT**

2.5V at MAIN and BALANCED Outputs.

**OUTPUT IMPEDANCE**

Main 600 ohms  
Balanced 600 ohms

**MAXIMUM VOLTAGE OUTPUT**

Main and Switched 1 and 2 outputs, 8V from 20Hz to 20,000Hz.

**TOTAL HARMONIC DISTORTION**

0.002% maximum from 20Hz to 20,000Hz at rated output.

**SENSITIVITY**

Phono: 2.5mV for 2.5V rated output, (0.5mV IHF).  
High Level: 250mV for 2.5V rated output (50mV IHF).

**SIGNAL TO NOISE RATIO, A-WEIGHTED**

Phono: 90dB below 10mV input, (84dB IHF).  
High Level: 105dB below rated output (95dB IHF).

**MAXIMUM INPUT SIGNAL**

Phono: 90mV.  
High Level: 10V.

**INPUT IMPEDANCE**

Phono: 47K ohm and 65pF capacitance.  
High Level: 22K ohms

**VOLTAGE GAIN**

Phono to Tape: 40dB.  
Phono to Main: 60dB.  
High Level to Tape: 0dB.  
High Level to Main: 20dB.

**TONE CONTROLS**

Bass and Treble variable 12dB boost to 12dB cut.

**AC POWER OUTPUTS**

1 Switched, and 1 unswitched.

**POWER REQUIREMENTS**

120 Volts, 50/60Hz, 15 watts.

## MECHANICAL INFORMATION

**SIZE**

Front panel measures 16-1/8 inches wide (41 cm) by 3-9/16 inches high (9 cm). Depth is 17.5 inches (44.5 cm) including connectors. Knob clearance required in front of the mounting panel is 1-3/8 inches (3.5 cm).



**FINISH**

The front panel is all glass with gold/teal nomenclature illumination. The chassis is black.

**WEIGHT**

17 pounds (7.7 kg) net, 29 pounds (13.2 kg) in shipping carton.

**FRONT PANEL CONTROLS**

The glass front panel contains 6 single shaft rotary controls. At the bottom of the glass are 6 push buttons and a HEADPHONE jack.

**TONE CONTROLS**

The TREBLE control can boost or cut the high frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position.

The BASS control can boost or cut the low frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position.

When either the TREBLE or BASS control is placed in the center FLAT or OFF position all tone control circuit elements are removed from the signal path.

**INPUT SELECTOR**

The 5 position switch selects the program source that feeds the power amp and speakers.

PHONO/AUX, CD1, CD2, TUNER and VIDEO are the input program sources.

**LOUDNESS**

The LOUDNESS control provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the LOUDNESS control or the preferred compensation.

**BALANCE**

The BALANCE control adjusts the volume of the channels relative to each other.  
L, (left): Turning the control to the left accents the left

channel by reducing the volume of the right channel.  
R, (right): Turning the control to the right accents by right channel by reducing the volume in the left channel.  
At the center detent position both channels are equal.

**VOLUME**

A motor driven precision VOLUME control is provided. Left and right sections are electronically trimmed for superior tracking over the operating range.

**PUSHBUTTON SWITCHES****TAPE MONitor AND TAPE COPY**

The C712 is designed to be used with two tape recorders, either audio or video, or one of each. The four buttons, TAPE MON 1, 2, TAPE COPY, 1 >2, 2 >1, control the signals in and out of the recorders.

**TAPE MON 1**

Depress this button to listen to a signal from the tape recorder connected to the TAPE 1 inputs. The LED indicator will illuminate above the button.

**TAPE MON 2**

Functions the same as the TAPE MON 1.

The MONITOR switches are electronically interlocked to prevent simultaneous monitoring from two tape recorders. They permit recordings to be monitored while recording or copying tapes. It is possible to listen to either recorder or a completely different program source during the recording process.

**TAPE/COPY**

The 1 >2 button connects the outputs from tape recorder 1 to the inputs of tape recorder 2 without affecting the program being heard from the speakers. The 1>2 indicator will light above the button. A copy of the program on tape recorder 1 will be made on tape recorder 2. To monitor the original program, press the TAPE MON 1 button. To monitor the copy, press TAPE MON 2 button.

The 2>1 button connects the outputs from tape recorder 2 to the inputs of tape recorder 1 without affecting the program being heard from the speakers. The 2>1 indicator will light above the button. A copy of the program on tape recorder 2 will be made on tape recorder 1. To monitor the original program, press TAPE MON 2. To monitor the copy, press TAPE MON 1.

**MONO**

The mono button adds the left and right program signals together to provide a monophonic signal at the MAIN or BALANCED OUTPUTS. MONO does not affect the TAPE outputs.

**POWER**

The red button turns the C712 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

**HEADPHONE JACK**

The C712 has sufficient built-in power capability to feed a low impedance dynamic headphone connected to the HEADPHONE jack.

**REAR PANEL INFORMATION**

The C712 has 3 groups of audio connectors on the rear panel, INPUTS, PROCESSOR and OUTPUTS.

The AUDIO INPUTS are PHONO, AUX, CD 1, CD 2, TUNER, TAPE 1, TAPE 2, and VIDEO.

PHONO and AUX are combined on one position of the selector switch. The user must decide which way he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The PROCESSOR connectors are for the PROCESSOR IN and OUT.

The OUTPUTS are TAPE 1, TAPE 2 and MAIN.

XLR connectors are provided for L & R BALANCED outputs.

One unswitched and one switched AC outlet is provided for program source equipment.

**REMOTE CONTROL**

An "F" connector is provided for an external sensor.

A 1/8 inch phone jack for each input selection provides serial data outputs for control of other equipment.

A 1/8 inch phone jack is provided for POWER CONTROL of high power McIntosh power amplifiers.

**TECHNICAL DESCRIPTION****ELECTRO-MAGNETIC SWITCHING**

All signal switching in the C712 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

**PHONO AMPLIFIER**

The phono amplifier uses a 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. The network uses 1% metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have 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 sensitivity of the phono amplifier is 2.5 millivolts. The gain of the amplifier is 40dB at 1000Hz. The phono amplifier has a very wide dynamic range. At 1000Hz, the phono input circuit will accept 90

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millivolts without overload, a voltage far greater than the output of any current magnetic phono cartridge. Phono input overload, therefore, is virtually impossible. A signal level of 10 millivolts at the phono input at 1000Hz will produce 1 volt at the tape output. The tape output has a source impedance of 100 ohms, designed to operate into a load impedance of 10,000 ohms or greater.

#### LOUDNESS AMPLIFIER

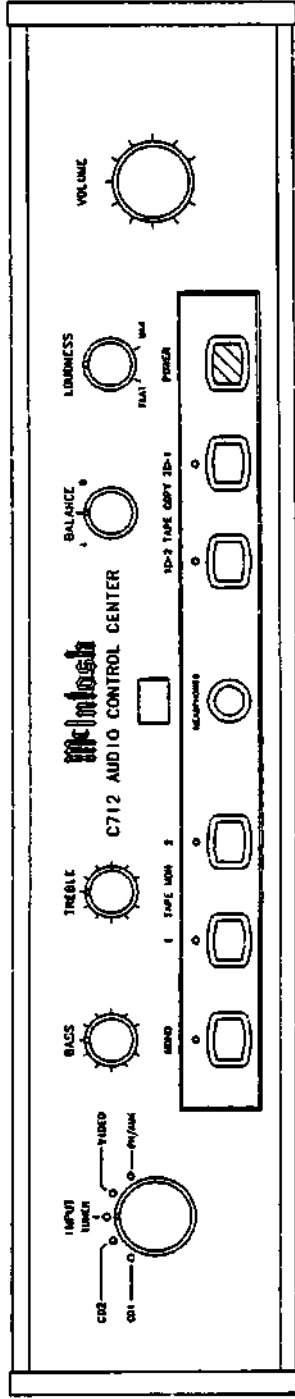
At the input to the high level or loudness amplifier, the signal passes through the mono switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The C712 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The overall gain of the loudness stages is 20dB and is not affected at mid frequencies by the position of the loudness control.

#### TONE CONTROL AMPLIFIER

The tone control amplifier uses high technology integrated circuit operational amplifiers. Its output stage has been optimized for the best transient performance and minimum distortion. Another operational amplifier is arranged in a circuit configuration that is equivalent of a series tuned circuit. The series tuned circuit is inserted via a control potentiometer into either the input or feedback circuit of the operational amplifier, thereby, providing a boost and cut capability of 12dB. The overall gain of the stage is 0dB. When the potentiometer is at its center detent position, the tone control elements are removed from the signal path.

#### CONTROL LOGIC

All inputs, outputs, and data ports are controlled by logic circuits in the C712. The logic is changed by front panel switches or by a microprocessor IR decoder. This microprocessor IR decoder is programmed with exclusive McIntosh software. It receives data from the front panel or external sensors and provides the command signals for input switching, data switching, and volume control.



Front Panel Layout  
 C712 AUDIO CONTROL CENTER  
 McIntosh Laboratory Inc. January 28, 1993

# C712



PRODUCT PREVIEW

**C36**  
**Audio Control Center**

Project 700

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**Promotional Highlights**

- Logic Driven Electro Magnetic Switching
- Separate LISTEN and RECORD Input Selection
- Nine Program Source Selections
- More Illuminated Glass Area on Front Panel
- Exclusive McIntosh Tone Control Circuit
- Active Variable Loudness Compensation
- Dual Processor Loops
- Precision Volume Control
- Double Shielded Power Transformer
- Electronically Regulated Power Supply
- Eight Switched and One Unswitched AC Outlet
- Auto Muting

- One Main and Two Switched Audio Outputs
- Speaker Switching Through SCR3
- Headphone Jacks

**Features and Benefits**

**LOGIC DRIVEN ELECTROMAGNETIC SWITCHING**  
DIGITAL LOGIC integrated circuits drive ELECTROMAGNETIC SWITCHES for the most reliable, lowest distortion signal switching available today.

**SEPARATE LISTEN AND RECORD INPUT SWITCHING**  
Two independent input selectors that allow for recording from one source while listening to another.

**GOLD PLATED INPUT AND OUTPUT JACKS**  
Gold plating is chosen because of superior corrosion resistance.

**NINE PROGRAM SOURCE SELECTIONS**  
PHONO/AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2, TAPE 3, and VIDEO for both LISTEN and RECORD.

**MORE ILLUMINATED GLASS AREA**  
Over 80% of the front panel is glass with all control nomenclature illuminated, even the push buttons.

**EXCLUSIVE McINTOSH TONE CONTROL CIRCUIT**  
The tone control circuit provides 12dB of BASS and TREBLE boost or cut. However, at the center position of the control, it automatically and completely removes all tone circuit components from the signal path.

**ACTIVE VARIABLE LOUDNESS COMPENSATION**  
Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW.

**DUAL PROCESSOR LOOPS**  
Separate processors can be used for RECORD and LISTEN.

**PRECISION VOLUME CONTROL**  
Left and Right sections for the volume control are trimmed for superior tracking.

**DOUBLE SHIELDED POWER TRANSFORMER**  
Copper and steel shielding eliminate hum pickup from the power transformer.

#### ELECTRONICALLY REGULATED POWER SUPPLY

Regulators maintain stable operation even during "Brown Outs" or low line voltage.

#### AUTO MUTING

The outputs are muted for 2 seconds during power up to prevent hearing annoying clicks and pops generated by other equipment.

#### EXTRA SWITCHED OUTPUTS

Extra switched audio outputs are provided to feed additional amplifiers for remote areas.

#### HEADPHONE JACK

A HEADPHONE JACK and amplifier are provided for private listening.

## PERFORMANCE SPECIFICATIONS

#### PERFORMANCE LIMITS

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new C36 from a McIntosh franchised dealer, it will be capable of or can be made capable of performance at or exceeding these limits or you can return the unit and get your money back.

#### FREQUENCY RESPONSE

+ 0, -0.5dB from 20Hz to 20,000Hz

#### RATED OUTPUT

2.5V at MAIN and SWITCHED 1 and 2 Outputs.

#### OUTPUT IMPEDANCE

Main 600 ohms

#### MAXIMUM VOLTAGE OUTPUT

Main and Switched 1 and 2 outputs, 8V from 20Hz to 20,000Hz.

#### TOTAL HARMONIC DISTORTION

0.002% maximum from 20Hz to 20,000Hz at rated output.

#### SENSITIVITY

Phono: 2.5mV for 2.5V rated output. (0.5mV IHF).  
High Level: 250mV for 2.5V rated output (50mV IHF).

#### SIGNAL TO NOISE RATIO. A-WEIGHTED

Phono: 90dB below 10mV input, (84dB IHF).  
High Level: 105dB below rated output (95dB IHF).

#### MAXIMUM INPUT SIGNAL

Phono: 90mV.  
High Level: 10V.

#### INPUT IMPEDANCE

Phono: 47K ohm and 65pF capacitance.  
High Level: 22K ohms

#### VOLTAGE GAIN

Phono to Tape: 40dB.  
Phono to Main: 60dB.  
High Level to Tape: 0dB.  
High Level to Main: 20dB.

#### TONE CONTROLS

Bass and Treble variable 12dB boost to 12dB cut.

#### AC POWER OUTPUTS

8 Switched, and 1 unswitched.

#### POWER REQUIREMENTS

120 Volts. 50/60Hz. 15 watts.

## MECHANICAL INFORMATION

#### SIZE

Front panel measures 16-1/8 inches wide (41 cm) by 5-7/16 inches high (13.8 cm). Depth is 13 inches (33 cm) including connectors. Knob clearance required in front of the mounting panel is 1-3/8 inches (3.5 cm).

#### FINISH

The top section of the front panel is glass with gold/teal nomenclature illumination. The bottom section is anodized black aluminum. The chassis is black.

#### MOUNTING

Exclusive McIntosh developed professional PANLOC.

#### WEIGHT

18 pounds (8.2 kg) net, 30 pounds (13.6 kg) in shipping carton.

## FRONT PANEL CONTROLS

The glass section of the front panel contains 5 single shaft rotary controls and 1 dual shaft concentric control. The narrow extrusion at the bottom of the glass contains 5 push buttons and a HEADPHONE jack.

**TONE CONTROLS**

The **TREBLE** control can boost or cut the high frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center **FLAT** or **OFF** position.

The **BASS** control can boost or cut the low frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center **FLAT** or **OFF** position.

When either the **TREBLE** or **BASS** control is placed in the center **FLAT** or **OFF** position all tone control circuit elements are removed from the signal path.

**INPUT SELECTORS**

Two input selector switches are provided. Each switch as eight positions. The **RECORD** switch selects which program source is fed to the **TAPE OUT** jacks. The **LISTEN** switch selects the program source that feeds the power amp and speakers. This allows one to **RECORD** one program while **LISTENING** to another.

**PHONO/AUX**, **CD1**, **CD2**, **TUNER**, **TAPE 1**, **TAPE 2**, **TAPE 3** and **VIDEO** are the input program sources.

## **LOUDNESS/BALANCE (concentric controls)**

**LOUDNESS**

The **LOUDNESS** control, (small center knob), provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the **LOUDNESS** control or the preferred compensation.

**BALANCE**

The **BALANCE** control, (large outer knob), adjusts the volume of the channels relative to each other. **L**, (left): Turning the control to the right accents the left channel by reducing the volume of the right channel. **R**, (right): Turning the control to the right accents by right channel by reducing the volume in the left channel. At the center detent position both channels are equal.

**VOLUME**

A precision ganged **VOLUME** control is provided. Left and right sections are electronically trimmed for superior tracking over the operating range.

## **PUSHBUTTON SWITCHES**

**MUTE**

Should you desire to silence the system briefly, touch the **MUTE** button. A red indicator next to the **MUTE** button will light, and the program will be silenced at the **MAIN**, **SWITCHED 1** and **2** outputs. Press the button again to un-mute. The mute does not affect the tape outputs.

**MONO**

The mono button adds the left and right program signals together to provide a monophonic signal at the **MAIN**, **SWITCHED 1** and **SWITCHED 2** **OUTPUTS**. **MONO** does not affect the **TAPE** outputs.

**POWER**

The red button turns the C36 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

**SPEAKER 1 AND 2**

The **SPEAKER 1** and **2** buttons switch on or off the program signals at the **SWITCHED 1** and **2** **AUDIO OUTPUT** jacks on the C36 rear panel. When the optional **SCR3** speaker relay is being used with the C36, the pairs of speakers connected to the relay terminals **1** and **2** will also be switched on or off. The **LED** indicators will light to show which switched output has been selected.

**HEADPHONE JACK**

The C36 has sufficient built-in power capability to feed a low impedance dynamic headphone connected to the **HEADPHONE** jack.

## **REAR PANEL INFORMATION**

The C36 has 3 groups of connectors on the rear panel, **AUDIO INPUTS**, **RECORD** and **LISTEN**.

The **AUDIO INPUTS** are **PHONO**, **AUX**, **CD 1**, **CD 2**, **TUNER**, **TAPE 1**, **TAPE 2**, **TAPE 3**, and **VIDEO**.

**PHONO** and **AUX** are combined on one position of the selector switches. The user must decide which way



he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The RECORD connectors are for the RECORD PROCESSOR IN and OUT and for the three tape recorder outputs.

The LISTEN connectors are for the LISTEN PROCESSOR IN and OUT, SWITCHED outputs 1 & 2, and the MAIN output.

A nine pin subminiature "D" connector is provided for the SCR3 speaker switching accessory.

One unswitched and eight switched AC outlets are provided for program source equipment.

## TECHNICAL DESCRIPTION

### ELECTRO-MAGNETIC SWITCHING

All signal switching in the C36 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

### PHONO AMPLIFIER

The phono amplifier uses a 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. The network uses 1 % metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have 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 sensitivity of the phono amplifier is 2.5 millivolts. The gain of the amplifier is 40dB at 1000Hz. The phono amplifier has a very wide dynamic range. At 1000Hz, the phono input circuit will accept 90 millivolts without overload, a voltage far greater than the output of any current magnetic phono cartridge. Phono input overload, therefore, is virtually impossible. A signal level of 10 millivolts at the phono input at 1000Hz will produce 1 volt at the tape output. The tape output has a source impedance of 100 ohms, designed to operate into a load impedance of 10,000 ohms or greater.

### LOUDNESS AMPLIFIER

At the input to the high level or loudness amplifier, the signal passes through the mono switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The C36 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The overall gain of the loudness stages is 20dB and is not affected at mid frequencies by the position of the loudness control.

### TONE CONTROL AMPLIFIER

The tone control amplifier uses high technology integrated circuit operational amplifiers. Its output stage has been optimized for the best transient performance and minimum distortion. Another operational amplifier

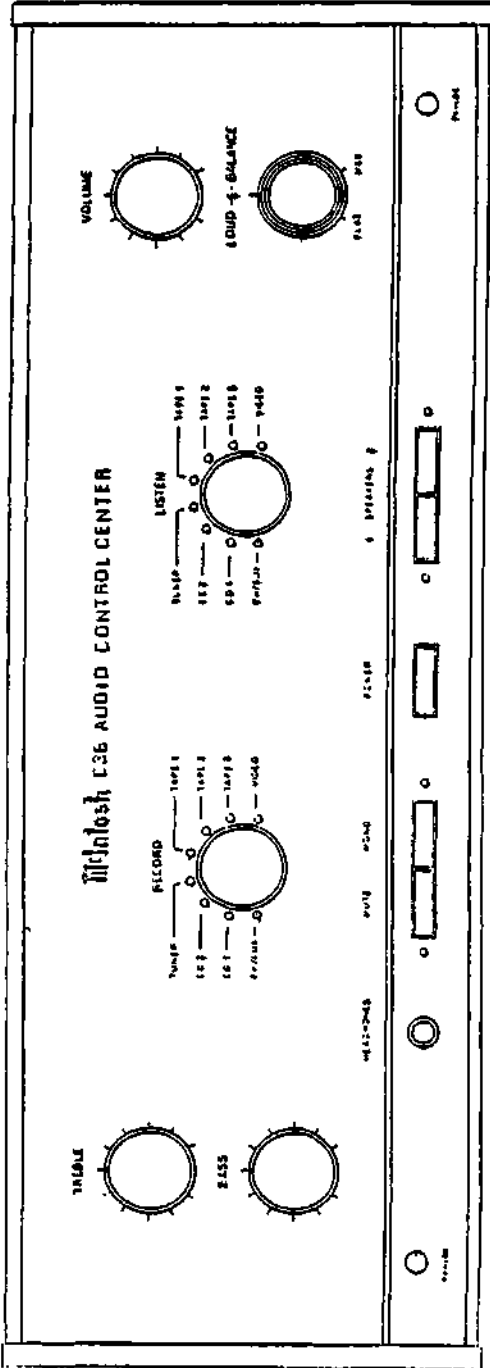
Is arranged in a circuit configuration that is equivalent of a series tuned circuit. The series tuned circuit is inserted via a control potentiometer into either the input or feedback circuit of the operational amplifier, thereby, providing a boost and cut capability of 12dB. The overall gain of the stage is 0dB. When the potentiometer is at its center detent position, the tone control elements are removed from the signal path.

#### CONTROL LOGIC

All inputs, outputs, CO, Tuner, SCR, and Video selector lines are controlled by logic circuits in the C36. The logic is changed by front panel switches.

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From Panel Layout  
**C36 AUDIO CONTROL CENTER**  
 McIntosh Laboratory Inc. January 8, 1992

**C36**



PRODUCT PREVIEW

**C38**  
**System Control Center**

Project 709

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## Promotional Highlights

- Infra Red Remote Control for Two Areas
- Expandable to More Than 20 Areas
- Separate LISTEN and RECORD Input Selection
- Record Lock
- Nine Program Source Selections
- Logic Driven Electro Magnetic Switching
- Serial Data Output Ports
- Parallel Data Outputs for Tuner and Two CD Players
- Active Variable Loudness Compensation
- Exclusive McIntosh Tone Control Circuit
- Dual Processor Loops
- Balanced Audio Outputs

- Precision Volume Control
- Double Shielded Power Transformer
- Electronically Regulated Power Supply
- AC Switching for Accessories and Area A and B Power Amps
- Power Control Output
- Auto Muting
- Remote Power ON and Mute Indication
- One Main and Two Switched Audio Outputs for AREA A
- Audio/Video Switching for 5 More Sources with MVS-3
- Home Control with the HC-1
- Speaker Switching Through SCR3
- Headphone Jack

## Features and Benefits

### IR REMOTE CONTROL FOR TWO AREAS

Two internal microprocessors, programmed by McIntosh, receive and decode signals from separate IR sensors. One sensor is located on the front panel for area A, the other connected to the area B external sensor input. These microprocessors control the volume and input selection logic of the LISTEN (A) and RECORD (B) circuits. The customer has the option of using RECORD circuits for tape recording or a second area by adding an external sensor and another power amp.

### RECORD LOCK

The front panel REC LOCK switch disables the area B sensor input and turns off the area B power amplifier. Recordings can not be interrupted.

### AREA EXPANSION

A rear panel connector is provided to interface the C38 with the CR10 Multi Room Remote Control System. All audio and data connections are made by one cable.

#### SERIAL DATA OUTPUT PORTS

A serial data output port is provided for each input selection and HOME control these ports can be used to transfer control data to compatible equipment.

#### PARALLEL DATA OUTPUTS

Two parallel data output connectors for McIntosh CD player and CD changer control plus a connector for tuner control.

#### BALANCED AUDIO OUTPUTS

XLR connectors are provided for balanced audio outputs.

#### REMOTE POWER ON AND MUTE INDICATION

On each keypad and remote sensor there is an LED that lights when that area is POWERED and blinks on and off when the area is MUTED

#### AC POWER CONTROL

Separate AC relays and outlets are provided for accessories, area A power amplifier and area B power amplifier

#### NEW REMOTE SENSOR POWER SUPPLY

The design of the remote sensor power supply has been changed to provide power to operate up to four sensors or keypads wired in parallel on the same coax

#### EXPANDABLE A/V SWITCHING

Five more AUDIO/VIDEO inputs can be added and controlled through the use of the MVS-3.

#### HOME CONTROL

The C38 provides for expanding your control to other devices in the home. With the use of the HC1 HOME CONTROL MODULE one has 6 circuit closures that are programmable for PUSH ON, PUSH OFF, or MOMENTARY (push and hold) type of operation, three circuit closures for PUSH ON, PUSH OFF only and 4 sequenced closures or openings operated from a single button. Also included in the HC1 is a 12VDC power supply capable of delivering 1.5 amperes to these contacts for operation of external relays etc.

#### LOGIC DRIVEN ELECTROMAGNETIC SWITCHING

DIGITAL LOGIC integrated circuits drive ELECTROMAGNETIC SWITCHES for the most reliable, lowest distortion signal switching available today.

#### SEPARATE LISTEN AND RECORD INPUT SWITCHING

Two independent input selectors that allow for recording from one source while listening to another.

#### GOLD PLATED INPUT AND OUTPUT JACKS

Gold plating is chosen because of superior corrosion resistance

#### NINE PROGRAM SOURCE SELECTIONS

PHONO/AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2, TAPE 3, and VIDEO for both LISTEN and RECORD.

#### MORE ILLUMINATED GLASS AREA

The front panel is all glass with control nomenclature illuminated, even for the push buttons.

#### EXCLUSIVE McINTOSH TONE CONTROL CIRCUIT

The tone control circuit provides 12dB of BASS and TREBLE boost or cut. However, at the center position of the control, it automatically and completely removes all tone circuit components from the signal path

#### ACTIVE VARIABLE LOUDNESS COMPENSATION

Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW

#### DUAL PROCESSOR LOOPS

Separate processors can be used for RECORD and LISTEN

#### PRECISION VOLUME CONTROL

Left and Right sections of the volume control are trimmed for superior tracking

#### DOUBLE SHIELDED POWER TRANSFORMER

Copper and steel shielding eliminate hum pickup from the power transformer

#### ELECTRONICALLY REGULATED POWER SUPPLY

Regulators maintain stable operation even during "Brown Outs" or low line voltage

#### AUTO MUTING

The outputs are muted for 2 seconds during power up to prevent hearing annoying clicks and pops generated by other equipment

#### EXTRA SWITCHED OUTPUTS

Extra switched audio outputs are provided to feed additional amplifiers for remote areas

#### HEADPHONE JACK

A HEADPHONE JACK and amplifier are provided for private listening.

High Level. 22K ohms

#### POWER CONTROL OUTPUT

The POWER CONTROL jack provides a logic 1 (+ 5V) for power ON/OFF control of the MC7106 and other McIntosh high power amplifiers.

#### VOLTAGE GAIN

Phono to Tape: 40dB  
Phono to Main 60dB.  
High Level to Tape. 0dB.  
High Level to Main 20dB.

## PERFORMANCE SPECIFICATIONS

#### PERFORMANCE LIMITS

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new C38 from a McIntosh franchised dealer, it will be capable of or can be made capable of performance at or exceeding these limits or you can return the unit and get your money back.

#### TONE CONTROLS

Bass and Treble variable 12dB boost to 12dB cut.

#### AC POWER OUTPUTS

1 Switched for accessories, 1 switched for AREA A power amplifier and 1 switched for AREA B power amplifier

#### POWER REQUIREMENTS

120 Volts, 50/60Hz, 15 watts.

#### FREQUENCY RESPONSE

+0, -0.5dB from 20Hz to 20,000Hz

## MECHANICAL INFORMATION

#### RATED OUTPUT

2.5V at MAIN and SWITCHED 1 and 2 Outputs

#### SIZE

Front panel measures 17-1/2 inches (44.4 cm) wide, by 5-3/8 inches (13.7 cm) high Depth behind front panel is 17-1/2 inches (44.5 cm) including clearance for connectors Knob clearance required in front of the mounting panel is 3/4 inches (1.9 cm)

#### OUTPUT IMPEDANCE

Main 600 ohms

#### FINISH

The front panel is all glass with gold/teal nomenclature illumination The chassis is black.

#### MAXIMUM VOLTAGE OUTPUT

Main and Switched 1 and 2 outputs, 8V from 20Hz to 20,000Hz.

#### WEIGHT

23 pounds (10.5 kg) net, 35 pounds (15.9 kg) in shipping carton

#### TOTAL HARMONIC DISTORTION

0.002% maximum from 20Hz to 20,000Hz at rated output.

#### SENSITIVITY

Phono: 2.5mV for 2.5V rated output, (0.5mV IHF).  
High Level. 250mV for 2.5V rated output (50mV IHF).

## FRONT PANEL CONTROLS

#### SIGNAL TO NOISE RATIO, A-WEIGHTED

Phono: 90dB below 10mV input, (84dB IHF)  
High Level 105dB below rated output (95dB IHF).

The glass front panel contains 5 single shaft rotary controls and 1 dual shaft concentric control. At the bottom of the glass there are 6 push buttons and a HEADPHONE jack.

#### MAXIMUM INPUT SIGNAL

Phono: 90mV  
High Level 10V.

#### TONE CONTROLS

The TREBLE control can boost or cut the high frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position

#### INPUT IMPEDANCE

Phono: 47K ohm and 65pF capacitance.

The BASS control can boost or cut the low frequencies by as much as 12dB. It has 21 detent positions: 10 for boost, 10 for cut and a center FLAT or OFF position.

When either the TREBLE or BASS control is placed in the center FLAT or OFF position all tone control circuit elements are removed from the signal path.

#### INPUT SELECTORS

Two input selector switches are provided. Each switch has eight positions. The RECORD switch selects which program source is fed to the TAPE OUT jacks and AREA B. The LISTEN switch selects the program source that feeds the AREA A power amp and speakers. This allows one to RECORD one program while LISTENING to another.

PHONO/AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2, TAPE 3 and VIDEO are the input program sources.

#### LOUDNESS

The LOUDNESS control, (small center knob), provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the LOUDNESS control for the preferred compensation.

#### BALANCE

The BALANCE control, (large outer knob), adjusts the volume of the channels relative to each other. L (left) Turning the control to the left accents the left channel by reducing the volume of the right channel. R, (right) Turning the control to the right accents the right channel by reducing the volume in the left channel. At the center detent position both channels are equal.

#### VOLUME

A motor driven precision VOLUME control is provided. Left and right sections are electronically trimmed for superior tracking over the operating range.

An electronic volume control is used for the AREA B output.

## PUSHBUTTON SWITCHES

#### RECORD LOCK

This button disables commands from other areas so recordings cannot be interrupted.

#### MUTE

Should you desire to silence the system briefly, touch the MUTE button. A red indicator next to the MUTE button will blink, and the program will be silenced at the MAIN, SWITCHED 1 and 2 outputs. Press the button again to un-mute. The mute does not affect the tape outputs or area B.

#### MONO

The mono button adds the left and right program signals together to provide a monophonic signal at the AREA A MAIN, SWITCHED 1 and SWITCHED 2 OUTPUTS. MONO does not affect the TAPE outputs or AREA B.

#### SPEAKER 1 AND 2

The SPEAKER 1 and 2 buttons switch on or off the program signals at the SWITCHED 1 and 2 AUDIO OUTPUT jacks on the C38 rear panel. When the optional SCR3 speaker relay is being used with the C38, the pairs of speakers connected to the relay terminals 1 and 2 will also be switched on or off. The LED indicators will light to show which switched output has been selected.

#### POWER

The red button turns the C38 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

#### HEADPHONE JACK

The C38 has sufficient built in power capability to feed a low impedance dynamic headphone connected to the HEADPHONE jack.

## REAR PANEL INFORMATION

#### AUDIO

The C38 has 3 groups of audio jacks on the rear panel, AUDIO INPUTS, RECORD and LISTEN.

The AUDIO INPUTS are PHONO, AUX, CD 1, CD 2, TUNER, TAPE 1, TAPE 2, TAPE 3, and VIDEO.



PHONO and AUX are combined on one position of the selector switches. The user must decide which way he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The RECORD connectors are for the RECORD PROCESSOR IN and OUT and for the three tape recorder outputs.

The LISTEN connectors are for the LISTEN PROCESSOR IN and OUT, SWITCHED outputs 1 & 2, and the MAIN output for AREA A.

There are a pair of AREA B outputs for its power amplifier.

#### SPEAKER

A nine pin subminiature "D" connector is provided for the SCR3 speaker switching accessory.

#### AC POWER

One unswitched and one switched AC outlet is provided for program source equipment. A third and fourth are for the AREA A and AREA B Power Amplifiers.

#### REMOTE CONTROL

Two "F" connectors are provided. One is for an AREA A external sensor and one for the AREA B sensor.

A 15 pin subminiature "D" connector is provided for parallel control of McIntosh tuner functions.

Two 7 pin DIN connectors are provided for parallel control of CD players or changers.

A 1/8 inch phone jack for HOME and each input selection provides serial data outputs for control of other equipment.

A 1/8 inch phone jack is provided for POWER CONTROL of high power McIntosh power amplifiers.

#### SYSTEM EXPANSION

Buffered audio outputs and the necessary data lines for system expansion are provided on a 25 pin subminiature "D" connector. One cable to a CR10 MULTI-ROOM CONTROLLER is the only connection required.

## TECHNICAL DESCRIPTION

### ELECTRO-MAGNETIC SWITCHING

All signal switching in the C38 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

### PHONO AMPLIFIER

The phono amplifier uses a 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. The network uses 1 % metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have a 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 sensitivity of the phono amplifier is 2.5 millivolts. The gain of the amplifier is 40dB at 1000Hz. The phono amplifier has a very wide dynamic range.

At 1000Hz, the phono input circuit will accept 90 millivolts without overload, a voltage far greater than the output of any current magnetic phono cartridge. Phono input overload, therefore, is virtually impossible. A signal level of 10 millivolts at the phono input at 1000Hz will produce 1 volt at the tape output. The tape output has a source impedance of 600 ohms, designed to operate into a load impedance of 10,000 ohms or greater.

#### LOUDNESS AMPLIFIER

At the input to the high level or loudness amplifier, the signal passes through the mono switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The C38 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The overall gain of the loudness stages is 20dB and is not affected at mid frequencies by the position of the loudness control.

#### TONE CONTROL AMPLIFIER

The tone control amplifier uses high technology integrated circuit operational amplifiers. Its output stage has been optimized for the best transient performance and minimum distortion. Another operational amplifier is arranged in a circuit configuration that is equivalent of a series tuned circuit. The series tuned circuit is inserted via a control potentiometer into either the input or feedback circuit of the operational amplifier, thereby, providing a boost and cut capability of 12dB. The overall gain of the stage is 0dB. When the potentiometer is at its center detent position, the tone control elements are removed from the signal path.

#### CONTROL LOGIC

All inputs, outputs, CD, Tuner, SCR, and Video selector lines are controlled by logic circuits in the C38. The logic is changed by front panel switches or by two microprocessor IR decoders, one for LISTEN (A) and one for RECORD (B). These microprocessor IR decoders are programmed with exclusive McIntosh software. They receive data from the front panel or external sensors and provide the command signals for input switching

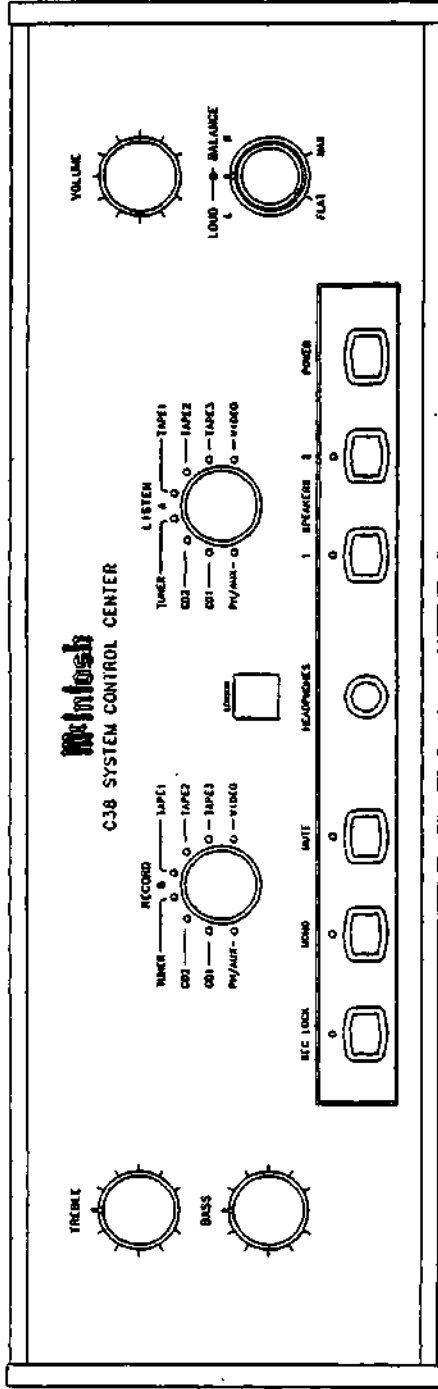
and volume control. A third microprocessor decodes the CD1, CD2 and TUNER function commands.

#### SYSTEM EXPANSION

Audio buffers and data switches feed a 25 pin subminiature "D" connector for system expansion through CR10s.

Issued by Engineering Department  
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Front Panel Layout  
 C38 SYSTEM CONTROL CENTER  
 McIntosh Laboratory Inc. October 1, 1992

C38



PRODUCT PREVIEW

**C39**  
**A/V Control Center**

Project 727

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## Promotional Highlights

- Internal LISTEN Processor for HALL and DOLBY PRO-LOGIC Surround Sound
- Digital Signal Processing for the TIME LINK Surround Channels
- Variable Surround Delay
- Provision for the addition of HOME THX CINEMA processing
- 14 Audio and Video Program source selections
- Simultaneous Audio, Video and SVHS Input Switching
- Front Panel Camcorder Inputs
- Separate LISTEN (A) and RECORD (B) input selection
- Logic Driven Electro Magnetic Switching
- RECORD LOCK

- Infra Red Remote Control for two areas
- Expandable to more than 20 areas
- Serial Data Output Ports for all inputs
- Parallel Data Output Ports for Tuner and two CD Players
- Active Variable Loudness Compensation for LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels
- Exclusive McIntosh tone control circuit for LEFT FRONT, CENTER, RIGHT FRONT, and SUBWOOFER channels
- Record Processor Loop
- 6 Channel Output LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND and SUBWOOFER
- Balanced Audio Outputs for LEFT FRONT, and RIGHT FRONT
- Independent AC outlet switching for accessories, area A and area B Power Amps
- Power Control output
- Auto Muting
- Remote Power On and Mute Indication
- Home Control with the HC-1
- Front Panel Headphone Jack

## Features and Benefits

### INTERNAL LISTEN PROCESSOR

The C39 contains an internal LISTEN (A) Surround Sound processor with 5 modes of operation, MONO, STEREO, HALL, CINEMA 1 (Dolby Pro-Logic), and CINEMA 2 (THX option).

### DIGITAL SIGNAL PROCESSING

The Surround channel delay processing is the digital TIME LINK system.

**HOME THX OPTION**

The C39 is designed to accept a dealer installed Home THX re-equalizer/decorrelation module.

**14 AUDIO AND VIDEO PROGRAM SOURCE SELECTIONS**

PHONO/AUX, CD1, CD2, TUNER, TAPE 1 and TAPE 2 for audio; SAT, TV, LV, VCR1, VCR2 and V-AUX/CAMCORDER video inputs.

**SIMULTANEOUS AUDIO, VIDEO and SVHS SWITCHING**

All video program source selections include switching for stereo audio, video and SVHS inputs.

**FRONT PANEL CAMCORDER INPUTS**

Hidden behind a motorized door are camcorder stereo audio, video and SVHS inputs. Press the ACCESS button, the door will open and V-AUX inputs are switched from the rear panel to the CAMCORDER inputs behind the door.

**VARIABLE SURROUND DELAY**

12 to 28mS for Dolby Pro-Logic and THX. 16 to 80mS for HALL.

**SEPARATE LISTEN AND RECORD INPUT SWITCHING**

Two independent input selectors that allow for recording from one source while listening to another.

**RECORD LOCK**

The front panel REC LOCK switch disables the area B sensor input and turns off the area B power amplifier. Recordings can not be interrupted.

**IR REMOTE CONTROL FOR TWO AREAS**

Two internal microprocessors, programmed by McIntosh, receive and decode signals from separate IR sensors. One sensor is located on the front panel for area A, the other connected to the area B external sensor input. These microprocessors control the volume and input selection logic of the LISTEN (A) and RECORD (B) circuits. The customer has the option of using RECORD circuits for tape recording or a second area by adding an external sensor and another power amp.

**AREA EXPANSION**

A rear panel connector is provided to interface the C39 with the CR10 Multi Room Remote Control System. All audio and data connections are made by one cable.

**SERIAL DATA OUTPUT PORTS**

A serial data output port is provided for each input selection and HOME control. These ports can be used

to transfer control data to compatible equipment.

**PARALLEL DATA OUTPUTS**

Two parallel data output connectors for McIntosh CD player and CD changer control plus a connector for tuner control.

**ACTIVE VARIABLE LOUDNESS COMPENSATION**

Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW.

**EXCLUSIVE MCINTOSH TONE CONTROL CIRCUIT**

The tone control circuit provides 12dB of BASS and TREBLE boost or cut. However, at the center position of the control, it automatically and completely removes all tone circuit components from the signal path.

**SIX CHANNEL. OUTPUT**

For MONO operation LEFT FRONT, RIGHT FRONT and SUBWOOFER are active with CENTER fill as an option.

For STEREO operation LEFT FRONT, RIGHT FRONT and SUBWOOFER are active with CENTER fill as an option.

For HALL operation LEFT FRONT, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND, and SUBWOOFER are active with CENTER fill as an option.

For CINEMA 1 (DOLBY PRO-LOGIC) operation LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND, and SUBWOOFER are all active.

For CINEMA 2 (THX) operation LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND and SUBWOOFER are all active.

**BALANCED AUDIO OUTPUTS**

XLR connectors are provided for balanced audio outputs on the LEFT FRONT, and RIGHT FRONT channels.

**AC POWER CONTROL**

Separate AC relays and outlets are provided for accessories, area A power amplifier and area B power amplifier.

**POWER CONTROL OUTPUT**

The POWER CONTROL jack provides a logic signal for power ON/OFF control of the MC7106 SIX CHANNEL

**THX POWER AMP** and other McIntosh high power amplifiers.

#### **AUTO MUTING**

The outputs are muted for 2 seconds during power up to prevent hearing annoying clicks and pops generated by other equipment.

#### **REMOTE POWER ON AND MUTE INDICATION**

On each keypad and remote sensor there is an LED that lights when that area is POWERED and blinks on and off when the area is MUTED.

#### **NEW REMOTE SENSOR POWER SUPPLY**

The design of the remote sensor power supply has been changed to provide power to operate up to four sensors or keypads wired in parallel on the same coax.

#### **HOME CONTROL**

The C39 provides for expanding your control to other devices in the home. With the use of the HC1 HOME CONTROL MODULE one has 6 circuit closures that are programmable for PUSH ON, PUSH OFF, or MOMENTARY (push and hold) type of operation; three circuit closures for PUSH ON, PUSH OFF only and 4 sequenced closures or openings operated from a single button. Also included in the HC1 is a 12VDC power supply capable of delivering 1.5 amperes to these contacts for operation of external relays etc.

#### **DOUBLE SHIELDED POWER TRANSFORMER**

Copper and steel shielding eliminate hum pickup from the power transformer.

#### **ELECTRONICALLY REGULATED POWER SUPPLY**

Regulators maintain stable operation even during "Brown Outs" or low line voltage.

#### **HEADPHONE JACK**

A HEADPHONE JACK and amplifier are provided for private listening. The jack is located behind the motorized door.

#### **MORE ILLUMINATED GLASS AREA**

The front panel is all glass with control nomenclature illuminated, even for the push buttons.

#### **GOLD PLATED INPUT AND OUTPUT JACKS**

Gold plating is chosen because of superior corrosion resistance.

## **PERFORMANCE SPECIFICATIONS**

#### **FREQUENCY RESPONSE**

##### **MONO and STEREO MODES**

LEFT, CENTER and RIGHT FRONT channels, +0, -0.5dB from 20Hz to 20kHz

##### **HALL MODE**

LEFT, CENTER and RIGHT FRONT channels, +0, -0.5dB from 20Hz to 20kHz

LEFT and RIGHT SURROUND channels, +0, -0.5dB from 100Hz to 10kHz

##### **DOLBY PRO LOGIC MODE**

LEFT, CENTER and RIGHT FRONT channels,  $\pm .5$ dB 30Hz to 16kHz

LEFT and RIGHT SURROUND channels,  $\pm 1$  dB from 100Hz to 6.3kHz

##### **DOLBY PRO-LOGIC and THX MODES COMBINED**

LEFT, CENTER and RIGHT FRONT channels,  $\pm .5$ dB from 30Hz to 1kHz and  $\pm .8$ dB from 1kHz to 16kHz

LEFT and RIGHT SURROUND channels,  $\pm 1$  dB from 100Hz to 6.3kHz and +1 -5dB to 8kHz

##### **ALL MODES**

SUBWOOFER channel, low pass, 10Hz to a corner frequency of 80Hz with a 24dB per octave roll off.

With the rear panel HIGH PASS switch in the ON position, the LEFT, CENTER and RIGHT FRONT channels employ a high pass filters with a 12dB per octave rolloff and a corner frequency of 80Hz.

#### **RATED OUTPUT**

2.5V at LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND and SUBWOOFER unbalanced

2.5V at LEFT FRONT, CENTER and RIGHT FRONT balanced.

#### **OUTPUT IMPEDANCE**

600 ohms all outputs

#### **MAXIMUM VOLTAGE OUTPUT**

6VRMS from all outputs

**TOTAL HARMONIC DISTORTION**  
**MONO, STEREO and HALL MODES**

LEFT, CENTER and RIGHT FRONT channels, 0.002% from 20Hz to 20kHz

**HALL MODE**

LEFT and RIGHT SURROUND channels, 0.1 % from 125Hz to 8kHz

**DOLBY PRO-LOGIC and THX MODES**

LEFT, CENTER and RIGHT FRONT channels, 0.1 % from 80Hz to 16kHz

LEFT and RIGHT SURROUND channels, 0.1 % from 125Hz to 8kHz

**SENSITIVITY**

Phono: 2.5mV for 2.5V output, (0.5mV IHF).  
 High Level: 250mV for 2.5V output (50mV IHF).  
 Dolby Level: 200mV input

**SIGNAL TO NOISE RATIO. A-WEIGHTED**

**MONO STEREO and HALL MODES**

LEFT, CENTER and RIGHT FRONT channels.  
 Phono: 90dB below 10mV input, (84dB IHF).  
 High Level: 100dB below rated output (95dB IHF).

**DOLBY PRO-LOGIC and THX MODES**

All outputs greater than 70dB below reference level.

**MAXIMUM INPUT SIGNAL**

Phono: 60mV  
 High Level: 5V Mono and Stereo, 2.1V HALL, DOLBY PRO LOGIC and THX

**INPUT IMPEDANCE**

Phono: 47K ohm and 65pF capacitance.  
 High Level: 22K ohms

**VOLTAGE GAIN**

Phono to Tape: 40dB.  
 Phono to Main: 60dB.  
 High Level to Tape: 0dB.  
 High Level to Main: 20dB.

**TONE CONTROLS**

Bass and Treble variable 12dB boost to 12dB cut.

**AC POWER OUTPUTS**

1 Switched for accessories, 1 switched for AREA A power amplifier and 1 switched for AREA B power amplifier.

**POWER REQUIREMENTS**

120 Volts, 50/60HZ, 35 watts.

## MECHANICAL INFORMATION

**SIZE**

Front panel measures 17-1/2 inches (44.4 cm) wide, by 7-1/8 inches (17.9 cm) high. Depth behind front panel is 17-1/2 inches (44.5 cm) including clearance for connectors. Knob clearance required in front of the mounting panel is 3/4 inches (1.9 cm).

**FINISH**

The front panel is all glass with gold/teal nomenclature illumination. The chassis is black.

**WEIGHT**

30 pounds (13.6 kg) net, 42 pounds (19 kg) in shipping carton.

## FRONT PANEL CONTROLS

The glass front panel contains 7 single shaft rotary controls and 1 dual shaft concentric control. At the bottom of the glass there are 8 push buttons and an ACCESS door for the CAMCORDER inputs and HEADPHONE jack.

**TONE CONTROLS**

The TREBLE control can boost or cut the high frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position. It effects the LEFT FRONT, CENTER and RIGHT FRONT channels.

The BASS control can boost or cut the low frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position. It effects the LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels.

When either the TREBLE or BASS control is placed in the center FLAT or OFF position all tone control circuit elements are removed from the signal path.

**INPUT SELECTORS**

Two input selector switches are provided. Each switch has twelve positions. The RECORD switch selects which program source is fed to the TAPE OUT jacks and AREA B. The LISTEN switch selects the



program source that feeds the AREA A power amp and speakers. This allows one to RECORD one program source while LISTENING to another.

The input selections are PH/AUX, CD1, CD2, TUNER, TAPE 1 and TAPE 2 for Audio. The Video inputs are SAT, TV, LV, VCR1, VCR2 and V-AUX.

### LOUDNESS

The LOUDNESS control, (small center knob), provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the LOUDNESS control for the preferred compensation. It effects the LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels.

### BALANCE

The BALANCE control, (large outer knob), adjusts the volume of the channels relative to each other. L, (left): Turning the control to the left accents the left channel by reducing the volume of the right channel. R, (right): Turning the control to the right accents the right channel by reducing the volume in the left channel. At the center detent position both channels are equal.

### VOLUME CONTROL (Area "A")

A super precision volume control is required for superior surround sound performance. Tracking over its entire range must be almost perfect or the audio image will shift. Therefore, McIntosh Engineers have designed a volume control system that retains the familiar VOLUME CONTROL KNOB but provides "state of the art" performance. Tracking accuracy for all six channels is within one quarter of a dB throughout most of its range. It provides  $\pm 12$ dB of trim to all six channels for accurate matching of amplifiers and speakers. It has 256 steps for excellent resolution and % of volume and the amount of trim are digitally displayed on the front panel.

The volume control for area B is a 2 channel version of area A without trim and display.

### MODE SELECTOR

Five operating modes are provided, MONO STEREO, HALL, CINEMA 1 (DOLBY PRO-LOGIC) and CINEMA 2 (THX). The CINEMA 1 and CINEMA 2 positions have illuminated logos to indicate what surround processors are in use. Since DOLBY PRO-LOGIC decoding is necessary to generate the 4 channels for THX processing the DOLBY logo remains ON in THX.

LEFT and RIGHT FRONT and SUBWOOFER outputs are active in the MONO and STEREO modes.

LEFT and RIGHT FRONT, LEFT and RIGHT SURROUND, and SUBWOOFER outputs are active in the HALL mode.

LEFT, CENTER and RIGHT FRONT, LEFT and RIGHT SURROUND, and SUBWOOFER outputs are all active in CINEMA 1 and CINEMA 2 modes.

CENTER FILL is provided in MONO, STEREO, and HALL by placing the CENTER FILL switch on the rear panel in the "ON" position.

### DELAY SELECTOR

The delay selector provides variable surround delay. The center position is the recommended setting for all surround modes. In the CINEMA 1 (DOLBY PRO-LOGIC) and CINEMA 2 (THX) modes the actual delay in milliseconds is:

- 1 = 12.3mS
- 2 = 16.4mS
- 3 = 20.5mS
- 4 = 24.6mS
- 5 = 28.7mS

Any deviation from the center setting should be determined by the listing position.

In the HALL mode the delay range is increased to emulate the acoustics of various MUSIC HALLS, from a night club to a stadium. The actual delay in milliseconds is:

- 1 = 16.4mS
- 2 = 32.8mS
- 3 = 49.2mS
- 4 = 65.5mS
- 5 = 81.9mS

## PUSHBUTTON SWITCHES

### **SUR CAL** (Surround Calibrate)

The C39 has an integrated surround sound calibrate system. Its mode of operation, MANUAL or AUTOMATIC, is determined by a rear panel switch. In the MAN mode each push of the button switches a noise generator to a specific channel, LEFT FRONT, CENTER, RIGHT FRONT, RIGHT SURROUND, LEFT SURROUND, and SUBWOOFER in order. In the AUTO mode the noise generator cycles through the channels until the button is pushed a second time. If the MAIN VOLUME CONTROL is changed during either mode, calibrate is canceled. CALIBRATE operation is indicated by an LED above the SUR CAL button.

### **SUR CAL ▲ OR ▼**

The SUR CAL ▲ (up) button increases the level of the selected channel during CALIBRATE operation. The SUR CAL ▼ (dwn) decreases the level. In the AUTO mode the cycle is interrupted by pushing the SUR CAL ▲ or SUR CAL ▼ button. However, 1 second after release of the button the cycle will continue until the SUR CAL button is pushed again or the MAIN VOLUME CONTROL is changed.

### **SUR PRO** (Surround Processor)

The SUR PRO push button is for switching the surround processor in or out. When the MODE SELECTOR SWITCH is in one of the surround sound positions, the push button toggles the MODE between standard STEREO and the selected surround operation.

### **ACCESS**

The ACCESS push button operates the motor driven door for ACCESS to the CAMCORDER INPUTS. When the door is opened the V-AUX inputs are switched from the rear to the front panel CAMCORDER inputs.

### **RECORD LOCK**

This button disables commands from other areas so recordings cannot be interrupted.

### **MUTE**

Should you desire to silence the system briefly, touch the MUTE button. A red indicator next to the MUTE button will light, and the program will be silenced at the 6 MAIN outputs. Press the button again to un-mute. The mute does not affect the tape or area B outputs.

### **POWER**

The red button turns the C39 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

### **HEADPHONE JACK**

The C39 has sufficient built-in power capability to feed a low impedance dynamic headphone connected to the HEADPHONE jack. The headphone jack is located behind the motorized ACCESS door.

## REAR PANEL INFORMATION

The rear panel of the C39 has 3 groups of RCA jacks for audio, AUDIO INPUTS, RECORD PROCESSOR, and AUDIO OUTPUTS. In addition there are two XLR connectors for LEFT FRONT, and RIGHT FRONT balanced outputs.

The AUDIO INPUTS are PHONO, AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2, SAT, TV, LV, VCR1, VCR2, and V-AUX.

PHONO and AUX are combined on one position of the selector switches. The user must decide which way he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The RECORD PROCESSOR jacks are for TO and FROM the processor.

The AUDIO OUTPUTS are TAPE 1, TAPE 2, VCR1, VCR2, L&R FRONT, CENTER, SUBWOOFER and L&R SURROUND.

There are a pair of AREA B outputs for its power amplifier.

All six SURROUND SOUND audio outputs and a power ON/OFF control signal are brought to a male 25 pin subminiature "D" connector. A mating female connector is provided on the MC7106 six channel power amplifier. One cable is all that's necessary for a surround sound interconnect.

There are two groups of VIDEO INPUT and VIDEO OUTPUT jacks. The RCA jacks are for composite video and the mini-DINs are for SVHS.

The VIDEO INPUTS are SAT, TV, LV, VCR1, VCR2 and V-AUX. The V-AUX inputs are switched to the front panel CAMCORDER inputs when the ACCESS door is opened.

The VIDEO OUTPUTS are VCR-1, VCR-2 MONITOR A and MONITOR B. VCR-1, VCR-2 and MONITOR B outputs are fed from the RECORD (B) input selector and the MONITOR A output is fed from the LISTEN (A) input selector. This allows one to be watching and listing to one VIDEO source while taping another or to feed two different VIDEO sources to a monitor equipped for "Picture in a Picture" viewing.

A TV modulator is provided for a TV channel 3 or 4 output. The input to the modulator can be selected (A or B) by a rear panel switch. It switches both composite video and audio. Mono audio is provided and its level may be adjusted by the TV AUDIO potentiometer.

Several Surround Sound functions are provided by rear panel switches. The HIGH PASS switch switches high pass filters in the LEFT FRONT, CENTER and RIGHT FRONT channels ON or OFF. When large full range speakers are used for the front channels the switch should be in the OFF position.

Compact speaker systems that utilize a separate SUBWOOFER require the HIGH PASS switch to be in the ON position. Low frequency sound at high levels can overload compact speakers.

The CENTER SPEAKER switch position is again determined by speaker type. If no CENTER speaker is used, the switch should be placed in the NONE position. This position feeds CENTER (L&R) information to the LEFT FRONT and RIGHT FRONT channels to create a PHANTOM CENTER channel. A small compact speaker for the CENTER channel requires that the switch be placed in the SMALL position. Here the switch places a high pass filter in the CENTER channel and diverts the low frequency sound to the LEFT and RIGHT FRONT speakers. A LARGE full range CENTER speaker requires that the switch be placed in the LARGE position for full response in LEFT, CENTER and RIGHT FRONT channels. This switch is only active in CINEMA 1 (DOLBY PRO LOGIC). In CINEMA 2 (THX) and other modes it is electronically locked in the LARGE position.

The SUR CAL switch selects an AUTOMATIC or MANUAL mode for calibration of the surround system. See SUR CAL push button explanation under Front Panel Controls, page 5 & 6.

#### REMOTE CONTROL

Two "F" connectors are provided. One is for an AREA A external sensor and one for the AREA B sensor.

A 15 pin subminiature "D" connector is provided for parallel control of McIntosh tuner functions.

Two 7 pin DIN connectors are provided for parallel control of CD players or changers.

A 1/8 inch phone jack for HOME and each input selection provides serial data outputs for control of other equipment.

A 1/8 inch phone jack for POWER CONTROL of high power McIntosh amplifiers is also provided.

#### SYSTEM EXPANSION

Buffered audio outputs and the necessary data lines for system expansion are provided on a female 25 pin subminiature "D" connector. One cable to a CR10 MULTI-ROOM CONTROLLER is the only connection required.

#### AC POWER

One switched AC outlet is provided for program source equipment. A second and third are for the AREA A and AREA B Power Amplifiers.

## TECHNICAL DESCRIPTION

#### ELECTRO-MAGNETIC SWITCHING

All audio signal switching in the C39 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form

of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

#### SURROUND SOUND PROCESSOR

The internal surround sound processor is made up of three sections. First is an LSI integrated circuit that takes a DOLBY SURROUND signal and decodes it to 4 channels, LEFT FRONT, CENTER, RIGHT FRONT and SURROUND. The signal from the LEFT, CENTER and RIGHT are added together then put through a low pass filter to form the SUBWOOFER channel. The SURROUND signal is fed to a digital TIME LINK delay circuit, a 7kHz low pass filter and finally to a DOLBY B type noise reduction section. It is then split into L & R surround channels. Connectors are provided for the future addition of THX processing.

#### PHONO AMPLIFIER

The phono amplifier uses a high technology integrated circuit operational amplifier. Its differential input stage has been optimized for low noise and low distortion performance. The feedback network provides precision RIAA frequency compensation. The network uses 1 % metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have a 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 sensitivity of the phono amplifier is 2.5 millivolts and the gain is 40dB at 1000Hz. It has a very wide dynamic range. The phono input circuit will accept 60 millivolts without overload.

#### VOLUME CONTROL

A superior surround sound system requires a super precision volume control. Tracking accuracy must be near perfect or the audio image will shift as the control is moved. McIntosh engineers have designed a micro processor controlled volume system that retains the familiar VOLUME CONTROL KNOB but provides "State of the Art" performance. All SIX channels track within one quarter of a dB throughout most of their range. 256 steps are provided for excellent resolution and each

channel has  $\pm 12$ dB of trim. The control microprocessor also drives a two digit display that indicates % of volume and the amount of trim used for system calibration. The gain of the volume control section is 20dB.

#### LOUDNESS AMPLIFIER

At the input to the high level or loudness amplifier, the signal passes through the mono stereo switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The C39 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The gain of the loudness amplifier is 0dB.

#### TONE CONTROL AMPLIFIER

The tone control amplifier uses high technology integrated circuit operational amplifiers. Its output stage has been optimized for the best transient performance and minimum distortion. Another operational amplifier is arranged in a circuit configuration that is the equivalent of a series tuned circuit. The series tuned circuit is inserted via a control potentiometer into either the input or feedback circuit of the operational amplifier, thereby, providing a boost and cut capability of 12dB. The overall gain of the stage is 0dB. When the potentiometer is at its center detent position, the tone control elements are removed from the signal path.

#### CONTROL LOGIC

All inputs, outputs, CD, Tuner, and Video selector lines are controlled by logic circuits in the C39. The logic is changed by front panel switches or by two microprocessor IR decoders, one for LISTEN (A) and one for RECORD (B). These microprocessor IR decoders are programmed with exclusive McIntosh software. They receive data from the front panel or external sensors and provide the command signals for input switching and volume control. A third microprocessor decodes the CD1, CD2 and TUNER function commands.

#### SYSTEM EXPANSION

Audio buffers and data switches feed a 25 pin subminiature "D" connector for system expansion through CR10s.

#### VIDEO SWITCHING

All video signal switching is done by MOSFET switches.

#### VIDEO BUFFER AMPLIFIERS

Video buffer amplifiers feed the video outputs to assure perfect matching and no loss in picture quality. The response of the video section is 1 Hz to 12MHz so high resolution signals present no problem to the C39.

#### RF OUTPUT

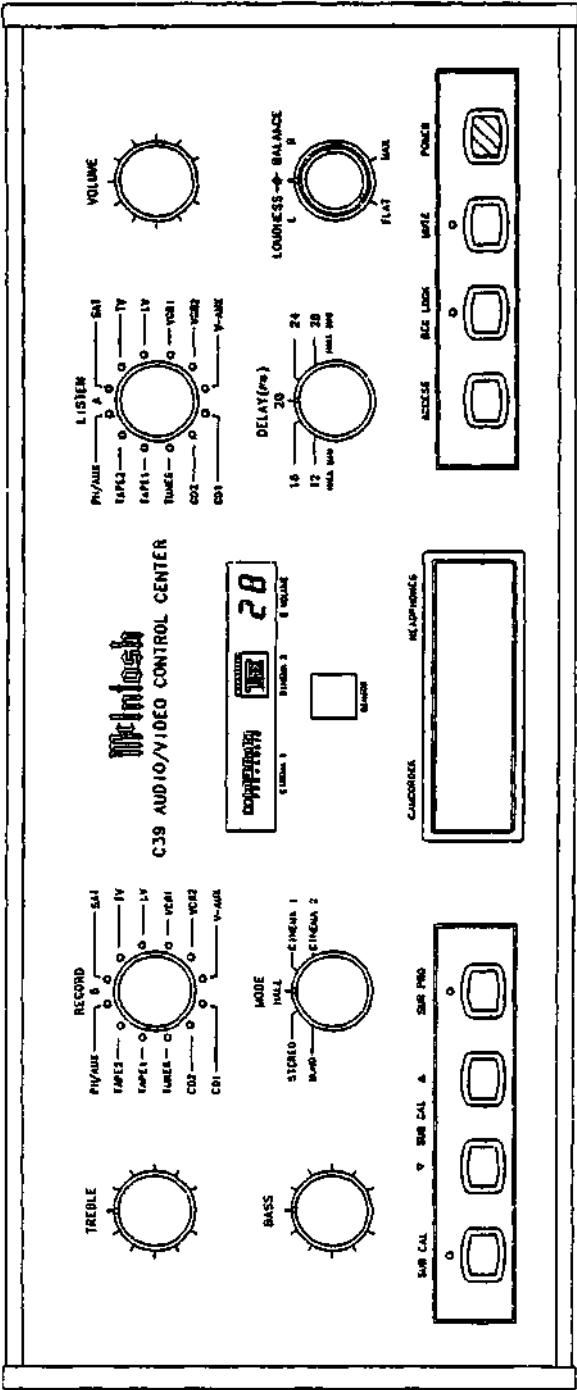
TV channel 3 or 4 output is provided by an internal modulator. This signal can be used to feed remote areas over a 75 ohm coaxial cable.

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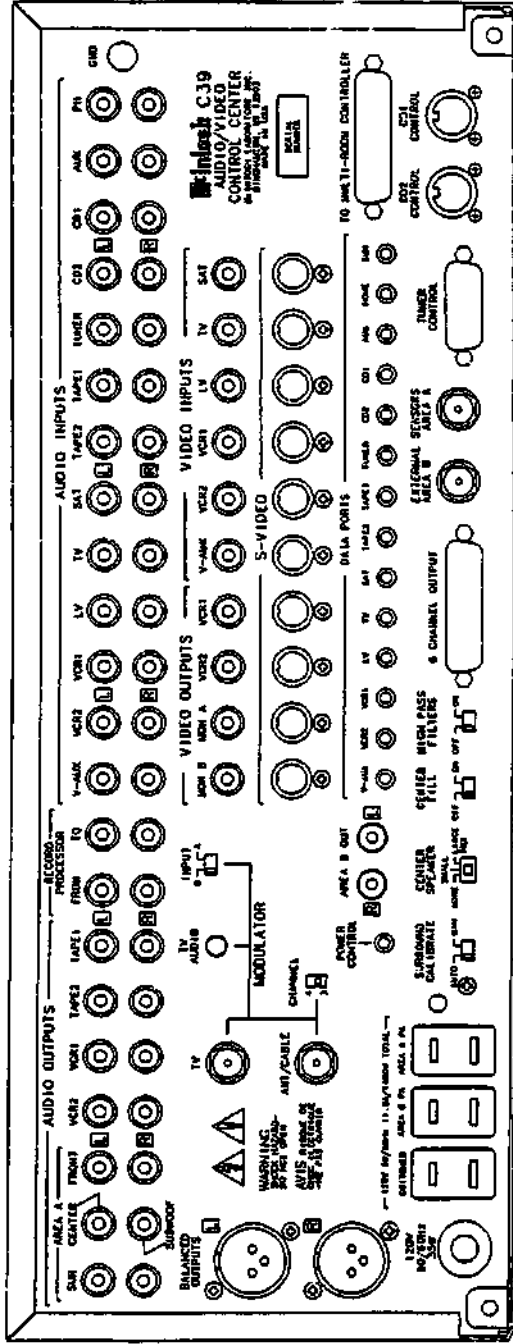
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From Panel Layout  
 C39 AUDIO/VIDEO CONTROL CENTER  
 McIntosh Laboratory Inc. January 26, 1993

C39



Real Panel Layout  
 C-39 AUDIO/VIDEO CONTROL CENTER  
 McIntosh Laboratory Inc. January 26, 1993

C39

PRODUCT PREVIEW

# C40 Audio Control Center

Project 653

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## Promotional Highlights

- Logic Driven Electro Magnetic Switching
- Separate LISTEN and RECORD Input Selection
- Nine Program Source Selections
- More Illuminated Glass Area on Front Panel
- Exclusive McIntosh Five Frequency Equalizer Circuit
- Active Variable Loudness Compensation
- Dual Processor Loops
- Precision Volume Control
- Double Shielded Power Transformer
- Electronically Regulated Power Supply
- Four Switched and One Unswitched AC Outlet
- Auto Muting

- One Main and Two Switched Audio Outputs
- Speaker Switching Through SCR3
- Headphone Jack
- Balanced Audio Output
- Balanced Audio Input
- Internal Comporand
- Internal 20 Watt Monitor Power Amplifier

## Features and Benefits

**LOGIC DRIVEN ELECTROMAGNETIC SWITCHING**  
DIGITAL LOGIC integrated circuits drive ELECTROMAGNETIC SWITCHES for the most reliable, lowest distortion signal switching available today.

**SEPARATE LISTEN AND RECORD INPUT SWITCHING**  
Two independent input selectors that allow for recording from one source while listening to another.

**GOLD PLATED INPUT AND OUTPUT JACKS**  
Gold plating is chosen because of superior corrosion resistance.

**NINE PROGRAM SOURCE SELECTIONS**  
LINE, PHONO/AUX, CD1, CD2, TUNER, TAPE 1 TAPE 2, TAPE 3 for both LISTEN and RECORD.

**MORE ILLUMINATED GLASS AREA**  
The front panel is all glass with control nomenclature illuminated, even for the push buttons.

**EXCLUSIVE McINTOSH EQUALIZER CIRCUIT**  
The equalizer circuit provides 12dB of boost or cut at 30, 150, 500, 1500 and 10,000Hz. However, at the center position of the control, it automatically and completely removes all equalizer circuit components from the signal path.

**ACTIVE VARIABLE LOUDNESS COMPENSATION**  
Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW.

**DUAL PROCESSOR LOOPS**  
Separate processors can be used for RECORD and LISTEN.



**PRECISION VOLUME CONTROL**

Left and Right sections of the volume control are trimmed for superior tracking.

**DOUBLE SHIELDED POWER TRANSFORMER**

Copper and steel shielding eliminate hum pickup from the power transformer.

**ELECTRONICALLY REGULATED POWER SUPPLY**

Regulators maintain stable operation even during "Brown Outs" or low line voltage.

**AUTO MUTING**

The outputs are muted for 2 seconds during power up to prevent hearing annoying clicks and pops generated by other equipment.

**EXTRA SWITCHED OUTPUTS**

Extra switched audio outputs are provided to feed additional amplifiers for remote areas.

**HEADPHONE JACK**

A HEADPHONE JACK and amplifier are provided for private listening.

**BALANCED INPUTS AND OUTPUTS**

XLR connectors are provided for balanced audio inputs and outputs.

**COMPANDOR SYSTEM**

The McIntosh COMPANDOR System can be used to control the dynamic range of program material. It can be used in two different ways: to function as an expander or as a compressor. Expansion can restore the dynamic range of records tapes or broadcast music. Compression decreases dynamic range. It can be used for making tape recordings or for listening to background music. The Compandor can be switched to either the RECORD or LISTEN lines, by means of the REC COMPAND pushbutton.

**MONITOR AMPLIFIER**

The MONITOR AMPLIFIER provides power to headphones or speakers. It will furnish 20 watts per channel across 8 ohms.

The input to the MONITOR AMPLIFIER can be selected from either the RECORD program, the LISTEN program, or from a third source connected to the EXTERNAL INPUT jacks on the rear panel. The input selector switch is on the rear panel of the C40.

**PERFORMANCE SPECIFICATIONS****PERFORMANCE LIMITS**

Performance limits are the maximum deviation from perfection permitted for a McIntosh instrument. We promise you that when you purchase a new C40 from a McIntosh franchised dealer, it will be capable of or can be made capable of performance at or exceeding these limits or you can return the unit and get your money back.

**PREAMP SECTION****FREQUENCY RESPONSE**

+ 0, -0.25dB from 20Hz to 20,000Hz

**RATED OUTPUT**

2.5V at MAIN and SWITCHED 1 and 2 Outputs.  
2.5V at BALANCED Output.

**OUTPUT IMPEDANCE**

Main and switched 600 ohms unbalanced. Balanced 600 ohms.

**MAXIMUM VOLTAGE OUTPUT**

Main, switched 1 and 2 and balanced, 8V from 20Hz to 20,000Hz.

**TOTAL HARMONIC DISTORTION**

0.002% maximum from 20Hz to 20,000Hz at rate output.

**SENSITIVITY**

Phono: 2.5mV for 2.5V rated output, (0.5mV IHF).  
High Level: 250mV for 2.5V rated output (50mV IHF).

**SIGNAL TO NOISE RATIO, A-WEIGHTED**

Phono: 90dB below 10mV input, (84dB IHF).  
High Level: 105dB below rated output (95dB IHF).

**MAXIMUM INPUT SIGNAL**

Phono: 90mV.  
High Level: 10V.

**INPUT IMPEDANCE**

Phono: 47K ohm and 65pF capacitance.  
High Level: 22K ohms

**VOLTAGE GAIN**

Phono to Tape: 40dB.  
Phono to Main: 60dB.

High Level to Tape: 0dB.  
High Level to Main: 20dB.

#### EQUALIZER CONTROLS

Variable 12dB boost to 12dB cut at 30, 150, 500, 1500, and 10,000Hz.

## MONITOR AMPLIFIER SECTION

#### CONTINUOUS AVERAGE POWER OUTPUT

20 Watts per channel into 8 ohms from 20Hz to 20,000Hz at .005% maximum harmonic distortion.

#### FREQUENCY RESPONSE

+ 0-0.25dB from 20Hz to 20,000Hz

#### SENSITIVITY

750mV for rated output (170mV IHF), input impedance is 27K ohms.

#### SIGNAL TO NOISE RATIO. A-WEIGHTED

100dB below rated output (87dB IHF)

#### AC POWER OUTPUTS

4 Switched for accessories, and 1 unswitched.

#### POWER REQUIREMENTS

120 Volts, 50/60Hz, 25 to 85 watts.

## MECHANICAL INFORMATION

#### SIZE

Front panel measures 17-1/2 inches (44.4 cm) wide, by 5-3/8 inches (13.7 cm) high. Depth behind front panel is 17-1/2 inches (44.5 cm) including clearance for connectors. Knob clearance required in front of the mounting panel is 3/4 inches (1.9 cm).

#### FINISH

The front panel is glass with gold/teal nomenclature illumination. The chassis is black.

#### WEIGHT

23 pounds (10.5 kg) net, 35 pounds (15.9 kg) in shipping carton.

## FRONT PANEL CONTROLS

The glass front panel contains 9 single shaft rotary controls and 2 dual shaft concentric controls. At the

bottom of the glass there are 8 push buttons and a HEADPHONE jack.

#### EQUALIZER FREQUENCY CONTROLS

Each of the five EQUALIZER FREQUENCY controls raises or lowers the amplitude of a band of frequencies centered on the frequency marked above the control. Both left and right channels are affected. The center, or flat position of the control has a detent for easy reference. In the center or detent position, the entire circuit for that control is removed from the program circuit by grounding the control electronically. The result is the "straight wire with gain" or the flexibility of complete musical balancing to your taste.

#### INPUT SELECTORS

Two input selector switches are provided. Each switch has eight positions. The RECORD switch selects which program source is fed to the TAPE OUT jacks. The LISTEN switch selects the program source that feeds the power amp and speakers. This allows one to RECORD one program while LISTENING to another.

LINE, PHONO/AUX, CD1, CD2, TUNER, TAPE 1, TAPE 2 and TAPE 3 are the input program sources.

#### VOLUME

A precision VOLUME control is provided. Left and right sections are electronically trimmed for superior tracking over the operating range.

#### MODE SELECTOR

The MODE SELECTOR allows you to identify each stereo channel, create monophonic program material, and direct program material to one channel or the other. The MODE SELECTOR operates only in the LISTEN program line.

It controls the program in seven ways:  
L TO L&R: Connects the left input to both left and right output circuits.

R TO L&R: Connects the right input to both left & right output circuits.

STEREO REV: Connects the left input to the right output circuit and the right input to the left output circuit.

STEREO: Connects the left input to the left output circuit and the right input to the right output circuit. Use the STEREO position for normal listening.

MONO (L + R): Adds the left to the right input and

connects the composite to both left and right output circuits.

L + R TO L: Connects the left plus right program to the left output circuit only.

L + R TO R: Connects the left plus right program to the right output circuit only.

## CONCENTRIC CONTROLS

### LOUDNESS

The LOUDNESS control, (small center knob), provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the LOUDNESS control for the preferred compensation.

### BALANCE

The BALANCE control, (large outer knob), adjusts the volume of the channels relative to each other.

L, (left): Turning the control to the left accents the left channel by reducing the volume of the right channel.

R, (right): Turning the control to the right accents the right channel by reducing the volume in the left channel. At the center detent position both channels are equal.

### COMPANDOR SELECTOR

The outer COMPANDOR knob can be set to EXPAND, OFF, or COMPRESS. In the center OFF position, the Compandor System is switched out of the circuit. When the Compandor is not used, the selector should be placed in the OFF position.

### RATIO CONTROL

The inner RATIO knob is used to control the amount of expansion of compression.

## PUSHBUTTON SWITCHES

### POWER

The red button turns the C40 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

### SPEAKER 1 AND 2

The SPEAKER 1 and 2 buttons switch on or off the program signals at the SWITCHED 1 and 2 AUDIO OUTPUT jacks on the C40 rear panel. When the optional SCR3 speaker relay is being used with the C40, the pairs of speakers connected to the relay terminals 1 and 2 will also be switched on or off. The LED indicators will light to show which switched output has been selected.

### MUTE

Should you desire to silence the system briefly, touch the MUTE button. A red indicator next to the MUTE button will light, and the program will be silenced at the MAIN, SWITCHED 1 and 2 outputs. Press the button again to un-mute. The mute does not affect the tape outputs.

### PROCESSOR

The PROCESSOR button switches the external LISTEN processor in or out. If a processor is not connected there is no action and the indicator LED does not illuminate. However, if a processor is plugged into the jacks the RED LED indicates when the processor is in the circuit.

### REC MONITOR

The RECord MONITOR button switches the LISTEN circuit to the program material that has been selected by the RECORD input switch. This allows one to instantly MONITOR the signal going to the tape recorders. If one wishes to listen to the recorded signal on a three head tape recorder, he must leave the REC MONITOR button in the normal (OFF) position and select the desired TAPE position on the LISTEN input switch.

### REC COMPAND

The REC COMPAND pushbutton switches the COMPANDOR circuits between the LISTEN and RECORD program lines a red light emitting diode (LED) illuminates to indicate when the circuit is connected to RECord.

### REC EQUAL

The REC EQUAL pushbutton switches the EQUALIZER FREQUENCY controls between the LISTEN and RECORD program lines. A red LED illuminates to indicate when the circuit is connected to RECord.

### HEADPHONE JACK

The C40 has sufficient built-in power capability to feed a low impedance dynamic headphone connected to the HEADPHONE jack.

## REAR PANEL INFORMATION

### AUDIO CONNECTORS

The C40 has four groups of audio jacks on the rear panel, AUDIO INPUTS, RECORD PROCESSOR, LISTEN PROCESSOR and AUDIO OUTPUTS.

The AUDIO INPUTS are LINE (balanced with XLR connectors) PHONO, AUX, CD 1, CD 2, TUNER, TAPE 1, TAPE 2 and TAPE 3.

PHONO and AUX are combined on one position of the selector switches. The user must decide which way he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The RECORD PROCESSOR jacks are for the TO and FROM processor connecting cables. When the cable plugs are inserted a switch is activated that puts the external processor in the RECORD circuit.

The LISTEN PROCESSOR jacks are for the TO and FROM processor connecting cables. The LISTEN processor is switched in or out of the circuit by the front panel PROCESSOR button.. The red LED above the button indicates that the processor is in the circuit.

The AUDIO OUTPUTS are TAPE 1, TAPE 2, TAPE 3, MAIN (unbalanced), SWITCHED 1 & 2 and BALANCED (main, with XLR connectors).

### MONITOR AMPLIFIER

The C40 contains a 20 watt per channel MONITOR AMPLIFIER. It can be used to drive headphones or 8 ohm loudspeakers.

A rear panel input switch selects the input for the MONITOR AMPLIFIER. The sources are the LISTEN program line, the RECORD program line, or any high level EXTERNAL source. When using headphones plugged into the front panel jacks, the normal position is LISTEN.

The monitor amplifier LEFT and RIGHT GAIN controls are located to the left of the INPUT switch. When the switch is in the LISTEN position, the LEFT and RIGHT GAIN controls regulate the monitor volume along with the main front panel VOLUME control. When the INPUT switch is in the RECORD or EXT position, only the LEFT and RIGHT GAIN controls regulate the monitor amplifier

volume.

### COMPANDOR LEVEL MATCH

The LEVEL MATCH control on the rear panel is used to adjust the listening level when the expander or compressor is switched in or out of the circuit.

### COMPANDOR SPEED

The SPEED selector on the rear panel is used to control the rate at which the Compandor System responds to signals. By switching from FAST to NORMAL to SLOW, a more gradual rate of change in expansion or compression occurs. For music with percussive instruments, such as piano, drums, guitar, etc., use NORMAL or FAST. In the FAST mode, the Compandor System follows changes quickly but will track low frequencies less accurately. Non-percussive music and voice requires slower speed. At SLOW speed the low frequency tracking is accurate, but the rate of response is slower. The NORMAL position is best suited for most program material.

### SPEAKER SWITCHING

A nine pin subminiature "D" connector is provided for the SCR3 speaker switching accessory.

### AC POWER

One unswitched and four switched AC outlets are provided.

## TECHNICAL DESCRIPTION

### LOGIC DRIVEN ELECTRO-MAGNETIC SWITCHING

All signal switching in the C40 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

All signal switching in the C40 is done with ELECTROMAGNETIC switches driven from DIGITAL LOGIC.

#### PHONO AMPLIFIER

The phono amplifier uses a 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. The network uses 1 % metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have a 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 sensitivity of the phono amplifier is 2.5 millivolts. The gain of the amplifier is 40dB at 1000Hz. The phono amplifier has a very wide dynamic range. At 1000Hz, the phono input circuit will accept 90 millivolts without overload, a voltage far greater than the output of any current magnetic phono cartridge. Phono input overload, therefore, is virtually impossible. A signal level of 10 millivolts at the phono input at 1000Hz will produce 1 volt at the tape output. The tape output has a source impedance of 100 ohms, designed to operate into a load impedance of 10,000 ohms or greater.

#### LISTEN PROGRAM LINE

The listen program signal from the LISTEN input switch goes to the COMPANDOR control switching where the COMPANDOR can be inserted in either the listen or the record program path. The COMPANDOR circuit is described later.

The listen program then goes to the LISTEN EXTERNAL Processor jacks. When an EXTERNAL PROCESSOR is used, the listen program leaves the C40 through the EXTERNAL processor TO jack and returns

via the FROM jack.

The volume control is next in the listen path. It is a step attenuator with left to right tracking accuracy better than 1dB through its entire range. Such extremely accurate matching is achieved through electronically controlled trimming of the resistance material deposited on pairs of printed circuits within the control. Since the switch commutator touches only contact pads and not the actual resistance element, tracking accuracy is not degraded with use as in ordinary volume controls.

#### LOUDNESS AMPLIFIER

At the input to the high level or loudness amplifier, the signal passes through the mode switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The C40 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The overall gain of the loudness stages is 20dB and is not affected at mid frequencies by the position of the loudness control.

The listen program signals next pass to the balance control and then to the equalizer amplifier composed of a low noise operational amplifier with flat response and unity gain. Four other operational amplifiers are arranged in circuit configurations that are equivalent to four series tuned circuits, each at one of the equalizer frequencies. These series tuned circuits are inserted via control potentiometers into either the input circuit or feedback circuit of the equalizer amplifier to provide a boost or cut capability of 12dB for each equalizer band of frequencies. A passive circuit is used for the fifth frequency. A pushbutton switch allows the equalizer circuit to be switched from the LISTEN program line to the RECORD program line.

After the equalizer section are the MAIN, SWITCHED 1 and 2 and BALANCED OUTPUT connectors.

#### RECORD PROGRAM LINE

The RECORD program signal from the RECORD input switch goes first through a unity gain amplifier and then

to the COMPANDOR switching where the Compondor can be inserted into the record program path. The Compondor circuit is described later. The record program then goes to the RECORD EXTERNAL PROCESSOR jacks.

When an external processor is used, the record program leaves the C40 through the EXTERNAL PROCESSOR TO jack and returns via the FROM jack. When a processor is not connected, the signal passes directly through the jacks.

An equalizer amplifier with unity gain follows. A pushbutton switch allows the 5 band equalizer controls to be switched from the Listen program line to the Record program line. This feature allows equalizing the record signal before it is fed to a recorder.

The equalizer amplifier feeds to electronic interlock switching and then finally to the record output jacks. The switching is arranged so that if the Record input selector is positioned to select the output of a recorder, the Record program line will not feed the record output jack connected to that recorder. This prevents recorder feedback.

### **COMPANDOR**

The Compondor will expand or compress the dynamic range of the program material. The Compondor can be switched to the Listen or Record program lines or turned off. Program to the Compondor is applied to a voltage controlled amplifier (VCA) which operates as a variable gain block. Control voltages for this VCA are developed from a sample taken from the left and right channel input signals to the VCA. The electronic processing of this sample is detailed. It includes band shaping, logarithmic conversion, full wave rectification, level setting, expansion or compression ratio regulation, attack timing, and DC amplification. The resulting processed voltage controls the gain of the VCA to cause logarithmic gain expansion when expanding the program, or the opposite, logarithmic gain compression when compressing the program.

### **MONITOR AMPLIFIER**

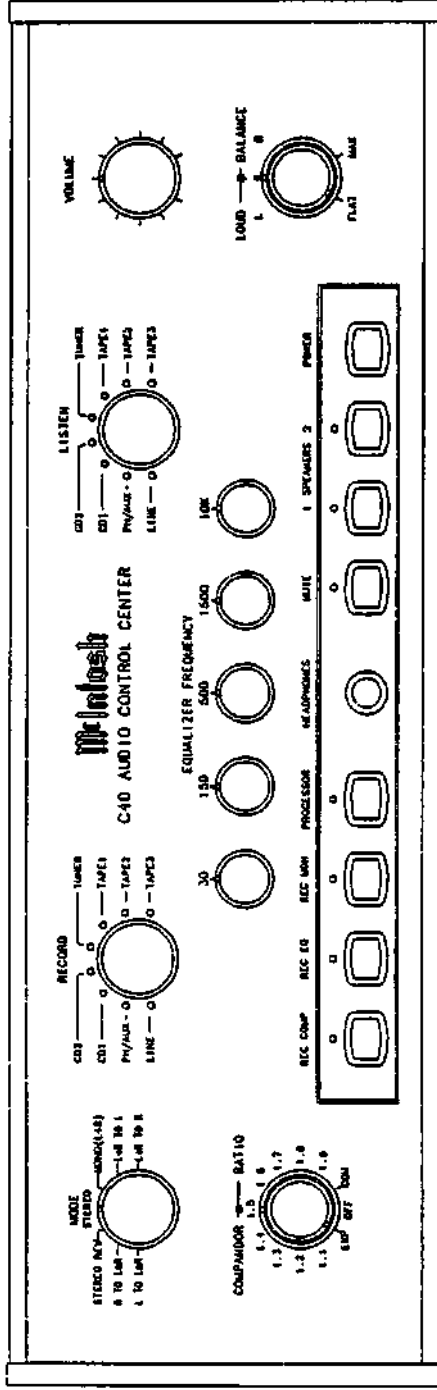
The monitor amplifier is a 20 watt per channel stereo power amplifier. The monitor input selector switch allows the amplifier to be driven from the LISTEN or RECORD program lines or from an external input. It is a push pull complementary class AB amplifier using a differential input stage. The amplifier includes the McIntosh Power Guard\* protection circuit. The Power Guard circuit compares the amplifier output signal with its input signal. If there is a difference between the

waveforms of these signals, Power Guard activates an electronic attenuator at the input of the amplifier which reduces the amplifier input level. This automatic control system makes it impossible to drive the monitor amplifier into clipping. Thus, clipping distortion and loudspeaker damage due to clipping are eliminated.

(\*protected by US Patent #4048573)

Issued by Engineering Department  
May 4, 1992

Revised: May 26, 1992  
October 6, 1992



Front Panel Layout  
C40 AUDIO CONTROL CENTER  
McIntosh Laboratory Inc. October 1, 1992

C40





PRODUCT PREVIEW

# THX-M THX Module

Project 779

## Promotional Highlights

- Converts DOLBY PRO-LOGIC audio in the C39 and MX130 to HOME THX AUDIO
- Contains Re-equalization *Filters for* Left Front, Center, Right Front, and Surround Channels
- Digital Signal Processing for Decorrelation of the Surround Channels
- Bypass Switching
- Plug In Module

## Features and Benefits

### C39 AND MX130 CONVERSION

The ThX-M printed circuit board module converts DOLBY PRO-LOGIC audio to the HOME THX AUDIO SYSTEM.

### RE-EQUALIZATION

Two types of re-equalization are required for HOME THX.

The first is for the Left Front, Center and Right Front channels. These three equalizers, all identical, are designed to compensate from the acoustical differences between the monitoring environment standards specified by the Motion Picture Industry and a home audio system.

The second type is for the Surround Channels. As sounds pan off the screen into the Surround Channels the timbre changes because the response of the human ear is different for frontal and side fields. Also, the various elements of the surround decoder cause differences in response. The surround equalizer compensates for all these differences.

### DSP DECORRELATION

After passing through the re-equalization filters, the surround audio is fed to a 16 bit A to D converter. Then it is split into two channels by means of a decorrelation process done by the ADSP2105 digital signal processor. Two 16 bit D to A converters bring the signals back to analog audio.

### BYPASS SWITCHING

FET analog switches are used to switch the THX-M out of the signal path in other modes of operation.

### PLUG IN MODULE

The printed circuit board has 5 connectors that mate with cables already provided in the C39 and MX130. It mounts on spacers and replaces a small JUMPER PCB.

### HOME THX AUDIO SYSTEM

The HOME THX AUDIO SYSTEM is a licensing program of LucasArts Entertainment Company, which defines new technologies and quality standards for accuracy in home theaters.

Issued by Engineering Department:  
December 31, 1992

Manufactured under license from Dolby Laboratories Licensing Corporation. Additionally licensed under one or more of the following patents: U.S. number 3,959,590; Canadian numbers 1,004,603 and 1,037,877. "Dolby", "Pro Logic" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

Manufactured under license from Lucas Arts Entertainment Company. Additionally licensed under the following patent: U.S. number 5,043,970. Foreign patents pending. Lucasfilm THX Audio and Home ThX Cinema are trademarks of LucasArts Entertainment Company. Lucasfilm is a trademark of Lucasfilm Ltd.

PRODUCT PREVIEW

# RCT-1 Remote Control Translator

Project 718

## Promotional Highlights

- Translates 20 McIntosh Infra-red Commands to most Foreign Codes
- Controls Up to Eight Foreign Devices
- Individual IR Emitter Outputs
- Operates From McIntosh Keypads or Hand Held IR Transmitter
- Easy to Program

## Features and Benefits

### CONTROL EIGHT DEVICES

Eight memory locations for SATelite, TV, Laser Vision, VCR1, V-AUX. CD2, TAPE 1 and PHono/AUX Commands.

### TRANSLATES 20 COMMANDS

Each of the eight memory locations will accommodate 20 commands. They are the numerals 1 thru 0, SEEK UP, SEEK DOWN, REVIEW, E for enter, PLAY, FF or NEXT, REW or BACK, STOP. ACCESSory ON and ACCESSory OFF.

### INDIVIDUAL IR EMITTER OUTPUTS

1/8 inch phone jacks provide 8 outputs to drive IR emitters for each device.

### OPERATES FROM KEYPADS AND TRANSMITTERS

The RCT-1 will translate 20 McIntosh commands for each device either from a keypad or a hand held transmitter.

### EASY TO PROGRAM

To program the RCT-1 you only need a C39/MX130 handheld IR transmitter and the transmitter from the device you wish to control.

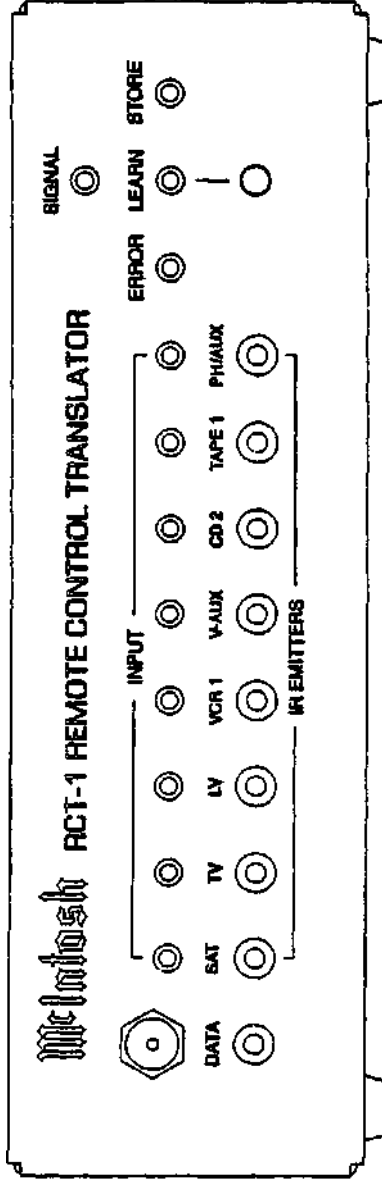
As an example, say you wish to operate a BRAND X VCR from the C39 IR transmitter.

1. Plug the RCT-1 AC line cord into an outlet.
2. Push the LEARN button on the RCT-1 front panel. The LEARN LED will flash.
3. Place the McIntosh C39 transmitter about 6 inches away from the SENSOR window on the left side of the RCT-1. Push the VCR1 button on the C39 transmitter. On the RCT-1 the VCR1 LED will light and the LEARN LED will continue to flash.
4. Push the PLAY button on the McIntosh transmitter. The LEARN LED will light continuously.
5. Place the BRAND X transmitter beside the McIntosh (in front of the window) and push the PLAY button on the BRAND X transmitter. The STORE LED will flash for about two seconds to indicate the command has been memorized. The LEARN LED will start flashing again.
6. Use the McIntosh transmitter again and push the next command you wish to memorize. Then push the equivalent command on the BRAND X transmitter. Repeat this process for up to 20 commands.
7. If a BRAND X command can not be learned the ERROR LED will flash for about two seconds.
8. Repeat steps 3, 4 and 5 for each device you wish to control.
9. When programming is complete, push the LEARN button on the RCT-1. The LEARN LED will stop flashing and remain OFF.
10. To use the RCT-1 in a system only a few connections are required. The DATA INPUT is connected to the UNSWITCHED (CR10) or SUM (C39/MX130) DATA PORT and the IR emitter outputs to emitters placed in front of the sensors on the foreign devices.

To operate the BRAND X VCR from any zone in the system use the McIntosh transmitter and push the following buttons:

- A. POWER ON
- B. VCR1
- C. ACC ON
- D. PLAY

Issued by Engineering Department:  
December 31, 1992



Chassis Layout  
 RCT-1 REMOTE CONTROL TRANSLATOR  
 McIntosh Laboratory Inc. January 11, 1993

**RCT-1**

PRODUCT PREVIEW

## **MSI-1 Multiple Unit Serial Interface**

Project 796

### **Promotional Highlights**

- Three Serial Data Inputs
- Parallel Data Output for McIntosh TUNERS
- Parallel Data Output for McIntosh CD Players
- Parallel Data Output for Nakamichi TAPE DECKS
- Compatible With McIntosh Remote Control Systems

### **Features and Benefits**

#### **THREE SERIAL DATA INPUTS**

The MSI-1 Provides three serial data inputs that can be driven from any DATA PORT on the CR10, C38, C39, MX120 or the MX130.

#### **PARALLEL DATA OUTPUT FOR McINTOSH TUNERS**

A 15 pin subminiature "D" connector is provided for remote control of the McIntosh MR510, MR7082 and MR7083 tuners.

#### **PARALLEL DATA OUTPUT FOR McINTOSH CD PLAYERS**

A seven pin DIN connector is provided for remote control of the MCD7000, MCD7005, MCD7007 and the MCD7008 CD Players.

#### **PARALLEL DATA OUTPUT FOR NAKAMICHI TAPE DECKS**

An eight pin DIN connector is provided for remote control of at least 12 different Nakamichi tape deck models; CR2, 3, 4, 5 and 7; CR20, 30, 40, 50 and 70; RX303 and 505 DRAGON. Older Nakamichi units that have the 8 pin DIN connector for remote can also be controlled.

#### **COMPATIBLE WITH McINTOSH REMOTE CONTROL SYSTEMS**

The MSI-1 can be used with the CR10, C38, C39, MX120 and MX130 to control additional TUNERS, CD players and Nakamichi TAPE decks.

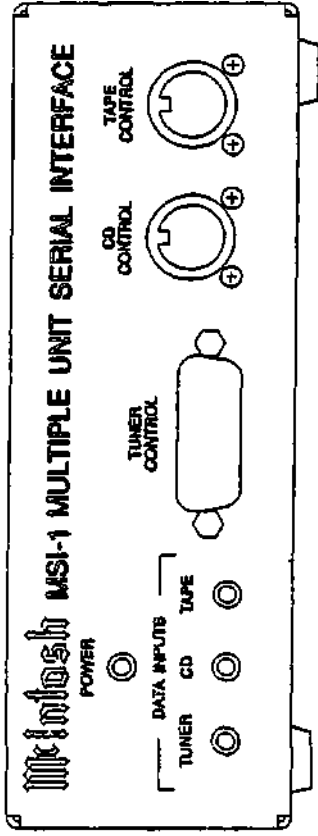
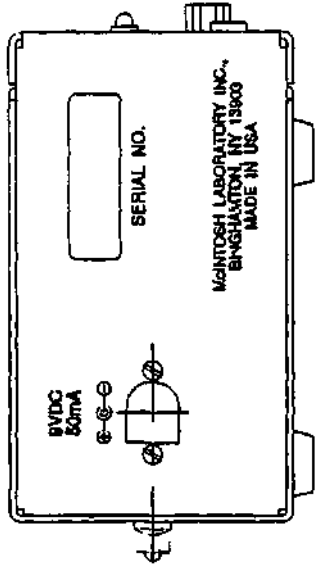
#### **TECHNICAL DESCRIPTION**

A 1/8" "mini" phone jack accepts serial data from the DATA PORTS on the CR10, C38, C39, MX120 or MX130. They are convened to parallel data control signals for McIntosh CD players, TUNERS and Nakamichi TAPE decks.

The three DATA inputs are constantly monitored for input signals. If a signal is detected on the TUNER input it enables the tuner output. Commands are decoded by the McIntosh Micro Processor and delivered to the TUNER connector. The CD and TAPE commands are handled the same way.

The MSI-1 makes it possible for the customer to utilize more than one TUNER, CD or TAPE deck in his remote control system. It also provides a means of controlling Nakamichi tape decks from McIntosh Keypads and hand held remote transmitters.

Issued by Engineering Department:  
September 28, 1992



Chassis Layout  
 MSI 1 MULTIPLE UNIT SERIAL INTERFACE  
 McIntosh Laboratory Inc. October 8, 1992

**MSI-1**

PRODUCT PREVIEW

**MR7083  
AM/FM TUNER**

Project 616

Contents

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**PROMOTIONAL HIGHLIGHTS**

- New Tuning System Featuring Electronic Memory for Eight FM and Eight AM Stations, Digital Frequency Display and Scan, yet retains the familiar tuning knob.
- Double-Diffused Metal Oxide Field Effect Transistor (DMOS-FET) RF Amplifier.
- Double Balance Mixer
- Ultra Stable - Linear Phase - Piezoelectric IF Filters for FM/AM
- Phase Locked Loop FM Multiplex Decoder
- 19kHz Pilot and 38kHz Carrier Suppression Circuitry
- LED Tuning Indicator
- Electronically Regulated Power Supply
- Modular Construction

- Internal Audio Processor
- Memory Search
- Wide Band AM
- New AM Input Circuit with a Low Impedance Loopstick Antenna
- Remote Control Interface
- New 7000 Series Styling
- Horizontal and Vertical Scope Outputs

**FEATURES AND BENEFITS**

**NEW TUNING SYSTEM**

1. Scan or Manual Tuning in the FM or AM band.
2. Electronic memory for 8 FM or AM stations.
3. Mode memory - returns to last selected mode of operation when power switch is turned on.
4. Exact digital display of tuned frequency.
5. Each time a frequency change takes place it locks on the center of the channel.
6. Automatic muting when changing stations.

**DMOS-FET RF AMPLIFIER**

1. Better Sensitivity
2. Better Cross Modulation rejection

**DOUBLE BALANCED MIXER**

1. Better spurious response rejection.
2. Better local oscillator isolation.

**LINEAR PHASE. PIEZOELECTRIC IF FILTER**

1. Never require adjustment.
2. Lower distortion.

**PLL MPX**

1. Better separation.
2. Lower noise.

### 3. Lower distortion.

#### 19kHz PILOT AND 38kHz CARRIER SUPPRESSION CIRCUITS

1. Noise free tape recording.

#### AUTOMATIC STEREO NOISE SUPPRESSION

1. On only when FM stereo signal is weak, turns off on strong station.

#### LED TUNING INDICATOR

1. Solid State for long life.
2. Greater reliability.
3. Tuning ease.

#### ELECTRONICALLY REGULATED

1. Proper operation of tuner even during "Brown Out".

#### MODULAR CONSTRUCTION

1. If service should ever be required, it can be accomplished quickly and easily.

#### INTERNAL AUDIO PROCESSOR

1. A circuit that makes a mono signal sound like stereo.
2. Weak FM Stereo station can have the improved S/N of mono and still sound like stereo.
3. All AM stations can sound like stereo stations.
4. Enhances FM stereo sound.

#### MEMORY SEARCH

1. Audition each preset station for 5 seconds automatically • either FM or AM.

#### WIDE BAND AM

1. Improved frequency response.
2. Tuning ease.

#### NEW AM INPUT CIRCUIT WITH LOW IMPEDANCE LOOPSTICK ANTENNA

1. The new Low Impedance Loopstick provided on the rear panel is adequate for most locations. It receives AM stations while rejecting noise and other interference.
2. Use shielded loop for weak signal locations.

#### REMOTE CONTROL INTERFACE

1. Complete remote control from any of the McIntosh Infrared Remote Control Systems.

#### 7000 SERIES STYLING

1. Styling matches the MCD7007 Compact Disc, the MC7270 Power Amplifier and the C35 System Control Center.

#### SCOPE OUTPUTS

1. Allows connection of an oscilloscope for viewing multipath, signal strength, center tuning, output and other waveforms.

## PERFORMANCE SPECIFICATION

### FM SECTION

#### USABLE SENSITIVITY

11.25dB which is 1uV across 75 ohms

#### 50dB QUIETING SENSITIVITY

Mono - 15dB which is 1.6uV across 75 ohms  
Stereo - 37dB which is 20uV across 75 ohms

#### SIGNAL TO NOISE RATIO

Mono 80dB  
Stereo 75dB

#### FREQUENCY RESPONSE

Mono +0 -1 dB 20Hz to 15,000Hz  
Stereo +0 -1 dB 20Hz to 15,000Hz

#### HARMONIC DISTORTION

Mono 0.08% at 100Hz  
0.08% at 1000Hz  
0.12% at 10,000Hz

Stereo 0.08% at 100Hz  
0.08% at 1000Hz  
0.12% at 10,000Hz

#### INTERMODULATION DISTORTION

Mono 0.08%  
Stereo 0.12%

#### CAPTURE RATIO

1.5dB

#### ALTERNATE CHANNEL SELECTIVITY

70dB

#### SPURIOUS RESPONSE

100dB



**IMAGE RESPONSE**

80dB

**RF INTERMODULATION**

65dB

**STEREO SEPARATION**

45dB at 100Hz  
 50dB at 1000Hz  
 35dB at 10,000Hz

**SCA REJECTION**

65dB

**AM SECTION****SENSITIVITY**

20uV External Antenna Input, 50 ohm generator

**SIGNAL TO NOISE**

50dB at 30% modulation  
 60dB at 100% modulation

**HARMONIC DISTORTION**

.5% Maximum at 50% modulation

**FREQUENCY RESPONSE**

50Hz to 6kHz NRSC

**ADJACENT CHANNEL SELECTIVITY**

45dB Minimum IHF

**IMAGE REJECTION**

75dB Minimum from 540 to 1600kHz

**IF REJECTION**

68dB Minimum

**GENERAL INFORMATION****AUDIO OUTPUTS**

Fixed: 1.2V RMS at 100% modulation  
 Variable: 1.2mV to 1.2VRMS at 100% modulation

**POWER**

120VAC at 10 watts

**SEMICONDUCTOR COMPLIMENT**

28 IC's  
 37 Transistors  
 8 Varactors  
 53 LED's  
 74 Diodes

**FRONT PANEL INFORMATION****TUNING KEYBOARD**

Buttons 1 thru 8 are for recall of the stations in the electronic memory. The enter button is used to put a station into memory. SCAN ▲ and ▼ are to electronically search up or down the band for the next station.

To place a station into the electronic memory you must first tune to the desired station by using the tuning knob or the SCAN ▲ or ▼ buttons, press the ENTER button, then within 5 seconds select and press the number you wish to represent that particular station. Upon release of the button the station will be memorized. This process is repeated for each of the 8 memory locations on both FM & AM.

You may change the station assigned to any of the memory locations simply by tuning to the new station with the tuning knob or SCAN, then following the ENTER procedure described above.

**MODE KEYBOARD**

The FM and AM buttons put the tuner in either the FM or AM mode. When FM is selected the audio processor circuits automatically switch to STEREO operation and when AM is selected MONO operation. To change the audio processor mode simply press the desired button. Note that full stereo operation is not possible in AM. The unit does not contain an AM stereo decoder.

The SEARCH button starts the automatic 5 second audition of each of the preset stations. It operates in either FM or AM. The SEARCH mode may be canceled in 2 ways, by pressing the SEARCH button again or by making some other station selection.

**DISPLAYS**

In the CENTER section of the display window are four LED digits that display the frequency to which

the Tuner is tuned MHz for FM and kHz for AM. Below 100MHz or 1000kHz the first or L.H. digit is blanked. Below the digits and above its button are 8 LEDs that indicate which of the memory locations is in use.

The right side of the window is occupied by the solid state tuning indicator. Twelve LEDs make up the display, 9 bars, one little dot, and 2 triangles.

The bar next to the digits indicates reception of a stereo station. The 9 bars arranged in a horizontal column indicate the relative signal strength. The two triangles and one little dot at the top right of the display indicate if you tuned are above, below, or right on station. All the information required to properly tune a station in one spot.

The left side of the window has LEDs that light indicating the mode of operation.

#### **TUNING KNOB**

The tuning knob changes the tuned frequency when in the MANUAL mode. Operation is automatic, simply turn the knob and the circuits switch to MANUAL. A green LED dot above the knob lights when it is used.

## **REAR PANEL INFORMATION**

#### **AC LINE CORD**

120VAC 50-60HZ input 10 watts

#### **AM ANTENNA CONNECTOR BLOCK**

Ground (Black) AM Antenna input (red)  
AM Low Impedance Loopstick Antenna

#### **FM ANTENNA JACK**

75 ohm type F Antenna Connector

#### **REMOTE CONTROL CONNECTOR**

Connector for McIntosh Remote Control System

#### **FIXED OUTPUTS**

L and R 1.2V RMS audio output

#### **VARIABLE OUTPUTS**

L and R 1.2MV to 1.2VRMS audio output

#### **SCOPE OUTPUTS**

Vertical and horizontal outputs for an oscilloscope

## **TECHNICAL DESCRIPTION**

#### **TUNING SYSTEM**

The MR7083 provides three modes of tuning, MANUAL, SCAN, and PRESET.

In the MANUAL mode two photo electric sensors sense the direction and degree that the tuning knob is rotated and move the tuned frequency accordingly. The smoothness and ease of tuning provided by this system is a result of only light coming in contact with small metal veins attached to the tuning shaft. Therefore friction is almost non-existent and flywheel action is tremendous.

When a SCAN push button is pressed, a ramped tuning voltage is generated, increasing in voltage for SCAN up, decaying for SCAN down. The ramp continues until the zero crossing of the detectors S curve is sensed at the input of the controller. It then stops and maintains that voltage with any necessary correction added.

Once a station has been tuned by either the MANUAL or SCAN mode you may ENTER it into any of the eight memory locations. Simply press ENTER then within 5 seconds, the desired STATION button, 1 through 8. The station is then stored in the tuning controller's memory.

A momentary press of a preset STATION push button will instantaneously recall the station from memory. A lithium battery maintains the memory for 10 years. Each time a push button is pressed, a mute pulse suppresses any noise that might occur during the tuning process. During the scan mode, an output from the controller lowers the tuner sensitivity. This prevents weak noisy stations from being heard. If one wishes to listen to weak stations, they may tune them manually.

#### **FM TUNER**

A type F connector is provided on the rear panel for connections of a 75 ohm antenna or cable system.

Following the antenna matching circuit is an RF tuner of exceptional performance. It uses a

D MOSFET RF amplifier, Double Balanced Mixer and 4 RF circuits that are tuned by matched varactor diodes. The results are high spurious rejection and great sensitivity. This circuitry and high tuning voltage eliminate RF inter modulation distortion caused by diode nonlinearities.

The FM IF section uses 2 transistors, 3 linear phase piezoelectric filters, and 2 integrated circuits. They combine to provide over 120dB of gain and a selectivity greater than 70dB. Limiting, muting, signal strength drive, and FM detection are all functions of the LA 1235 integrated circuit.

A phase locked loop (PLL) stereo decoder integrated circuit, the TCA 4500A, is the heart of the multiplex section. It has a high signal to noise ratio, low distortion, high channel separation, and high SAC rejection. The PLL MPX IC eliminates inductors to minimize drift, provides integral lamp driving capability for stereo indication, and has transient free mono/stereo switching.

Following the PLL MPX decoder an LC tuned notch filter is used to prevent tape recorder bias interference. The LC filter is driven from the MPX output amplifier and is terminated by an operational amplifier. This provides the necessary filter input and output impedances for proper phase response.

#### AM TUNER

Push terminals are provided for the AM antenna. Due to the unusual design of the AM RF input section, almost any type of antenna can be used.

The first element in the input section is a new Low Impedance Loopstick Antenna. It receives all the AM stations and rejects noise and other interference. J FET-Transistor cascode amplifier follows. This amplifier, with its J FET inputs stage, provides excellent sensitivity and spurious response rejection. It also has a delayed AGC system that does not degrade the overload performance margin.

Two varactor tuned circuits, a second RF amplifier and a double balanced mixer are next. This type of mixer has excellent image and IF rejection.

The mixer's 450kHz output feeds a matching transformer for the wide band linear phase piezoelectric 4 element lattice filter, then the IF

amplifier, another transformer, and finally the AM detectors, filter and muting circuits.

#### AUDIO PROCESSOR

The MR7083 contains an audio processor that looks at L + R and L • R information and ENHANCES the sound.

If the tuner is in the MONO mode, AM or a weak FM station, it introduces frequency and phase differences between the two channels giving a stereo effect. Since this is done at audio frequencies, it does not influence the signal to noise ratio. When receiving a strong FM station in stereo, it ENHANCES apparent separation giving a wider stereo image.

#### ANTENNA INPUTS

##### FM

The MR7083 is provided with a 75 ohm coaxial antenna input. It is a standard "F" connector that mates with most common antenna and cable service feedlines. This type of input combines low loss with interference rejecting shielding.

A matched dipole antenna is provided for average reception. However, optimum performance is obtained with an outdoor highly directional beam antenna and rotator.

Although a 75 ohm coaxial feedline offers the best noise and multipath rejection, many antennas use 300 ohm twinlead. If this is the case, a matching transformer (balun) can be used. They are inexpensive and available at most radio and TV store (i.e., Radio Shack, part number 15-1140 or 15-1253).

##### AM

The AM antenna input on the MR7083 is unusual in that it will accept almost any type of antenna. In a location of moderate signal strength and little interference (few fluorescent lights, motors, TV sets, etc.) the new Low Impedance Loopstick will give good performance. In a rural area, an outdoor long-wire might be desirable. However, the best overall performance in a weak signal area can be obtained by using a shielded loop antenna.

To construct a shielded loop antenna, one must take 25 to 50 feet of single conductor shielded wire, microphone cable, coaxial cable, etc., and arrange it

in a single turn loop. The loop may be attached around the frame of a window under the curtain or on the back of the equipment cabinet or table. Signal strength is proportional to the size of the loop. The larger the loop the stronger the signal. The center conductor (wire) and the shield are stripped of insulation, tied together at one end, and connected to the GROUND push connector. At the other end of the loop, the insulation is removed and ONLY the center conductor is connected to the antenna push terminal. The shield must NOT be connected to anything at this end.

The shielded loop is a bi-directional antenna. Its maximum signal pickup occurs when the station lies in the same plane as the loop. Minimum signal is perpendicular to the loop. This characteristic can be used to advantage by arranging the loop so that an unwanted signal, noise or interfering station, is in the pickup null.

Issued by Engineering Department:  
September 11, 1989

Revised: September 15, 1989  
December 27, 1989  
August 26, 1992

McIntosh

MR7083 AM/FM TUNER

AM FM SONG STEREO NORMAL SEEK-CH  
0 0 0 0 0 0 0 0 0

102.9

FM MP3

TUNING

SIGNAL

0 1 2 3 4

0 1 2 3 4

SEARCH SEEK Δ

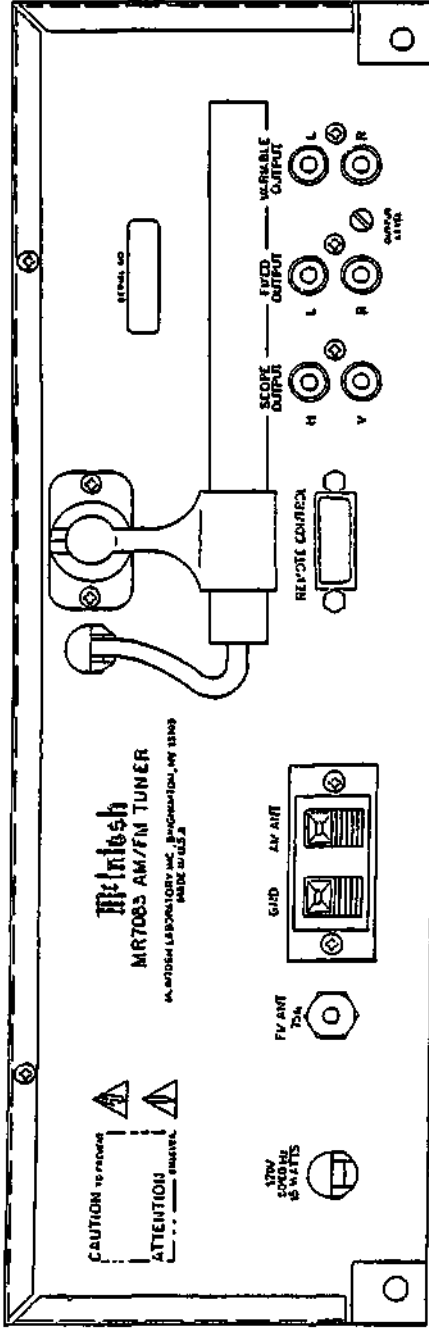
ENTER EJECT Δ



POWER

POWER

Front Panel Layout  
MR7083 AM/FM TUNER  
McIntosh Laboratory Inc October 26, 1991



Rear Panel Layout  
 MR7083 AM/FM TUNER  
 McIntosh Laboratory Inc. October 31, 1991

PRODUCT PREVIEW

# MX130 A/V Control Center

Project 741

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## Promotional Highlights

- Internal LISTEN Processor for HALL and DOLBY PRO-LOGIC Surround Sound
- Digital Signal Processing for the TIME LINK Surround Channels
- Variable Surround Delay
- Provision for the addition of HOME THX CINEMA processing
- 14 Audio and Video Program source selections
- Simultaneous Audio, Video and SVHS Input Switching
- Front Panel Camcorder Inputs
- Separate LISTEN (A) and RECORD (B) input selection
- Logic Driven Electro Magnetic Switching
- RECORD LOCK

- Infra Red Remote Control for two areas
- Expandable to more than 20 areas
- Serial Data Output Ports for all inputs
- Parallel Data Output Ports for two CD Players
- Active Variable Loudness Compensation for LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels
- Exclusive McIntosh tone control circuit for LEFT FRONT, CENTER, RIGHT FRONT, and SUBWOOFER channels
- Record Processor Loop
- 6 Channel Output LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND and SUBWOOFER
- Balanced Audio Outputs for LEFT FRONT, and RIGHT FRONT
- Independent AC outlet switching for accessories, area A and area B Power Amps
- Power Control output
- Auto Muting
- Remote Power On and Mute Indication
- Home Control with the HC-1
- Front Panel Headphone Jack
- Phase Locked Loop AM/FM Tuner with Electronic Memory for Eight FM and Eight AM Stations, Digital Frequency Display.
- Double-Diffused Metal Oxide Field Effect Transistor (DMOS-FET) RF Amplifier.
- Double Balance Mixer
- Ultra Stable - Linear Phase • Piezoelectric IF Filters for FM/AM
- Phase Locked Loop FM Multiplex Decoder
- 19kHz Pilot and 38kHz Carrier Suppression Circuitry
- LED Tuning Indicator

- Memory Search
- Wide Band AM
- New AM Input Circuit with a Low Impedance Loopstick Antenna

## Features and Benefits

### INTERNAL LISTEN PROCESSOR

The MX130 contains an internal LISTEN (A) Surround Sound processor with 5 modes of operation, MONO, STEREO, HALL, CINEMA 1 (Dolby Pro-Logic), and CINEMA 2 (THX option).

### DIGITAL SIGNAL PROCESSING

The Surround channel delay processing is the digital TIME LINK system.

### HOME THX OPTION

The MX130 is designed to accept a dealer installed Home THX re-equalizer/decorrelation module.

### 14 AUDIO AND VIDEO PROGRAM SOURCE SELECTIONS

PHONO/AUX, CD1, CD2, TUNER, TAPE 1 and TAPE 2 for audio; SAT, TV, LV, VCR1, VCR2 and V-AUX/CAMCORDER video inputs.

### SIMULTANEOUS AUDIO, VIDEO and SVHS SWITCHING

All video program source selections include switching for stereo audio, video and SVHS inputs.

### FRONT PANEL CAMCORDER INPUTS

Hidden behind a motorized door are camcorder stereo audio, video and SVHS inputs. Press the ACCESS button, the door will open and V-AUX inputs are switched from the rear panel to the CAMCORDER inputs behind the door.

### VARIABLE SURROUND DELAY

12 to 28mS for Dolby Pro-Logic and THX. 16 to 80mS for HALL.

### SEPARATE LISTEN AND RECORD INPUT SWITCHING

Two independent input selectors that allow for recording from one source while listening to another.

### RECORD LOCK

The front panel REC LOCK switch disables the area B sensor input and turns off the area B power amplifier.

Recordings can not be interrupted.

### IR REMOTE CONTROL FOR TWO AREAS

Two internal microprocessors, programmed by McIntosh, receive and decode signals from separate IR sensors. One sensor is located on the front panel for area A, the other connected to the area B external sensor input. These microprocessors control the volume and input selection logic of the LISTEN (A) and RECORD (B) circuits. The customer has the option of using RECORD circuits for tape recording or a second area by adding an external sensor and another power amp.

### AREA EXPANSION

A rear panel connector is provided to interface the MX130 with the CR10 Multi Room Remote Control System. All audio and data connections are made by one cable.

### SERIAL DATA OUTPUT PORTS

A serial data output port is provided for each input selection and HOME control. These ports can be used to transfer control data to compatible equipment.

### PARALLEL DATA OUTPUTS

Two parallel data output connectors for McIntosh CD player and CD changer control.

### ACTIVE VARIABLE LOUDNESS COMPENSATION

Loudness compensation can be added at any setting of the VOLUME control making it independent of program level. Its circuit elements are removed from the signal path when the control is full CCW.

### EXCLUSIVE MCINTOSH TONE CONTROL CIRCUIT

The tone control circuit provides 12dB of BASS and TREBLE boost or cut. However, at the center position of the control, it automatically and completely removes all tone circuit components from the signal path.

### SIX CHANNEL. OUTPUT

For MONO operation LEFT FRONT, RIGHT FRONT and SUBWOOFER are active with CENTER fill as an option.

For STEREO operation LEFT FRONT, RIGHT FRONT and SUBWOOFER are active with CENTER fill as an option.

For HALL operation LEFT FRONT, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND, and SUBWOOFER are active with CENTER fill as an option.



For CINEMA 1 (DOLBY PRO-LOGIC) operation LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND, and SUBWOOFER are all active.

For CINEMA 2 (THX) operation LEFT FRONT, CENTER, RIGHT FRONT, LEFT SURROUND, RIGHT SURROUND and SUBWOOFER are all active.

#### BALANCED AUDIO OUTPUTS

XLR connectors are provided for balanced audio outputs on the LEFT FRONT, and RIGHT FRONT channels.

#### AC POWER CONTROL

Separate AC relays and outlets are provided for accessories, area A power amplifier and area B power amplifier.

#### POWER CONTROL OUTPUT

The POWER CONTROL jack provides a logic signal for power ON/OFF control of the MC7106 SIX CHANNEL THX POWER AMP and other McIntosh high power amplifiers.

#### AUTO MUTING

The outputs are muted for 2 seconds during power up to prevent hearing annoying clicks and pops generated by other equipment.

#### REMOTE POWER ON AND MUTE INDICATION

On each keypad and remote sensor there, is an LED that lights when that area is POWERED and blinks on and off when the area is MUTED.

#### NEW REMOTE SENSOR POWER SUPPLY

The design of the remote sensor power supply has been changed to provide power to operate up to four sensors or keypads wired in parallel on the same coax.

#### HOME CONTROL

The MX130 provides for expanding your control to other devices in the home. With the use of the HC1 HOME CONTROL MODULE one has 6 circuit closures that are programmable for PUSH ON, PUSH OFF, or MOMENTARY (push and hold) type of operation; three circuit closures for PUSH ON, PUSH OFF only and 4 sequenced closures or openings operated from a single button. Also included in the HC1 is a 12VDC power supply capable of delivering 1.5 amperes to these contacts for operation of external relays etc.

#### DOUBLE SHIELDED POWER TRANSFORMER

Copper and steel shielding eliminate hum pickup from

the power transformer.

#### ELECTRONICALLY REGULATED POWER SUPPLY

Regulators maintain stable operation even during "Brown Outs" or low line voltage.

#### HEADPHONE JACK

A HEADPHONE JACK and amplifier are provided for private listening. The jack is located behind the motorized door.

#### MORE ILLUMINATED GLASS AREA

The front panel is all glass with control nomenclature illuminated, even for the push buttons.

#### GOLD PLATED INPUT AND OUTPUT JACKS

Gold plating is chosen because of superior corrosion resistance.

#### NEW TUNING SYSTEM

Seek or Manual Tuning in the FM or AM band.

Electronic memory for 8 FM or AM stations.

Exact digital display of tuned frequency.

Automatic muting when changing stations.

#### DMOS-FET RF AMPLIFIER

Better sensitivity and better cross modulation rejection

#### DOUBLE BALANCED MIXER

Better spurious response rejection and better local oscillator isolation.

#### LINEAR PHASE, PIEZOELECTRIC IF FILTERS

Never require adjustment and provide lower distortion.

#### PLL MPX

Better separation lower noise and lower distortion.

#### 19kHz PILOT AND 38kHz CARRIER SUPPRESSION CIRCUITS

Noise free tape recording.

#### LED TUNING INDICATOR

Solid State for long life.

#### MEMORY SEARCH

Auditions each preset station for 5 seconds automatically - either FM or AM.

**WIDE BAND AM**

Improved frequency response and tuning ease.

**NEW AM INPUT CIRCUIT WITH LOW IMPEDANCE LOOPSTICK ANTENNA**

New Low Impedance Loopstick is provided on the rear panel.

**PERFORMANCE SPECIFICATIONS****FREQUENCY RESPONSE**MONO and STEREO MODES

LEFT, CENTER and RIGHT FRONT channels. +0, -0.5dB from 20Hz to 20kHz

HALL MODE

LEFT, CENTER and RIGHT FRONT channels, +0, -0.5dB from 20Hz to 20kHz

LEFT and RIGHT SURROUND channels, +0, -0.5dB from 100Hz to 10kHz

DOLBY PRO LOGIC MODE

LEFT, CENTER and RIGHT FRONT channels,  $\pm 0.5$ dB 30Hz to 16kHz

LEFT and RIGHT SURROUND channels,  $\pm 1$  dB from 100Hz to 6.3kHz

DOLBY PRO-LOGIC and THX MODES COMBINED

LEFT, CENTER and RIGHT FRONT channels,  $\pm 0.5$ dB from 30Hz to 1kHz and  $\pm 0.8$ dB from 1kHz to 16kHz

LEFT and RIGHT SURROUND channels,  $\pm 1$  dB from 100Hz to 6.3kHz and +1 -0.5dB to 8kHz

ALL MODES

SUBWOOFER channel, low pass, 10Hz to a corner frequency of 80Hz with a 24dB per octave roll off.

With the rear panel HIGH PASS switch in the ON position, the LEFT, CENTER and RIGHT FRONT channels employ a high pass filters with a 12dB per octave rolloff and a corner frequency of 80Hz.

**RATED OUTPUT**

2.5V at LEFT FRONT, CENTER, RIGHT FRONT. LEFT SURROUND, RIGHT SURROUND and SUBWOOFER unbalanced

2.5V at LEFT FRONT, CENTER and RIGHT FRONT balanced.

**OUTPUT IMPEDANCE**

600 ohms all outputs

**MAXIMUM VOLTAGE OUTPUT**

6VRMS from all outputs

**TOTAL HARMONIC DISTORTION**MONO, STEREO and HALL MODES

LEFT, CENTER and RIGHT FRONT channels, 0.002% from 20Hz to 20kHz

HALL MODE

LEFT and RIGHT SURROUND channels, 0.1 % from 125Hz to 8kHz

DOLBY PRO-LOGIC and THX MODES

LEFT, CENTER and RIGHT FRONT channels, 0.1 % from 80Hz to 16kHz

LEFT and RIGHT SURROUND channels, 0.1 % from 125Hz to 8kHz

**SENSITIVITY**

Phono: 2.5mV for 2.5V output, (0.5mV IHF).  
High Level: 250mV for 2.5V output (50mV IHR).  
Dolby Level: 200mV input

**SIGNAL TO NOISE RATIO, A-WEIGHTED**MONO STEREO and HALL MODES

LEFT, CENTER and RIGHT FRONT channels.  
Phono: 90dB below 10mV input. (84dB IHR).  
High Level: 100dB below rated output (95dB IHF).

DOLBY PRO-LOGIC and THX MODES

All outputs greater than 70dB below reference level.

**MAXIMUM INPUT SIGNAL**

Phono: 60mV  
High Level: 5V Mono and Stereo, 2.1 V HALL, DOLBY PRO LOGIC and THX

**INPUT IMPEDANCE**

Phono: 47K ohm and 65pF capacitance.  
High Level: 22K ohms

**VOLTAGE GAIN**

Phono to Tape: 40dB.  
Phono to Main: 60dB.  
High Level to Tape: 0dB.  
High Level to Main: 20dB.

**TONE CONTROLS**

Bass and Treble variable 12dB boost to 12dB cut.

**FM SECTION**

**USABLE SENSITIVITY**

11.25dB which is 1uV across 75 ohms

**50dB QUIETING SENSITIVITY**

Mono - 15dB which is 1.6uV across 75 ohms

Stereo - 37dB which is 20uV across 75 ohms

**SIGNAL TO NOISE RATIO**

Mono 80dB

Stereo 75dB

**FREQUENCY RESPONSE**

Mono +0-1 dB 20Hz to 15,000Hz

Stereo +0 -1dB 20Hz to 15,000Hz

**HARMONIC DISTORTION**

Mono 0.08% at 100Hz

0.08% at 1000Hz

0.12% at 10,000Hz

Stereo

0.08% at 100Hz

0.08% at 1000Hz

0.12% at 10,000Hz

**INTERMODULATION DISTORTION**

Mono 0.08%

Stereo 0.12%

**CAPTURE RATIO**

1.5dB

**ALTERNATE CHANNEL SELECTIVITY**

70dB

**SPURIOUS RESPONSE**

100dB

**IMAGE RESPONSE**

80dB

**RF INTERMODULATION**

65dB

**STEREO SEPARATION**

45dB at 100Hz

50dB at 1000Hz

35dB at 10,000Hz

**SCA REJECTION**

65dB

**AM SECTION**

**SENSITIVITY**

20uV External Antenna Input, 50 ohm generator

**SIGNAL TO NOISE**

50dB at 30% modulation

60dB at 100% modulation

**HARMONIC DISTORTION**

.5% Maximum at 50% modulation

**FREQUENCY RESPONSE**

50Hz to 6kHz NRSC

**ADJACENT CHANNEL SELECTIVITY**

45dB Minimum IHF

**IMAGE REJECTION**

75dB Minimum from 540 to 1600kHz

**IF REJECTION**

68dB Minimum

**AC POWER OUTPUTS**

1 Switched for accessories, 1 switched for AREA A power amplifier and 1 switched for AREA B power amplifier.

**POWER REQUIREMENTS**

120 Volts, 50/60Hz, 35 watts.

**MECHANICAL INFORMATION**

**SIZE**

Front panel measures 17-1/2 inches (44.4 cm) wide, by 7-1/8 inches (17.9 cm) high. Depth behind front panel is 17-1/2 inches (44.5 cm) including clearance for connectors. Knob clearance required in front of the mounting panel is 3/4 inches (1.9 cm).

**FINISH**

The front panel is all glass with gold/teal nomenclature illumination. The chassis is black.

**WEIGHT**

31 pounds (14.1 kg) net, 43 pounds (19.5 kg) in shipping carton.

## FRONT PANEL CONTROLS

The glass front panel contains 7 single shaft rotary controls and 1 dual shaft concentric control. At the bottom of the glass there are 8 push buttons and an ACCESS door for the CAMCORDER inputs and HEADPHONE jack.

### STONE CONTROLS

The TREBLE control can boost or cut the high frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position. It effects the LEFT FRONT, CENTER and RIGHT FRONT channels.

The BASS control can boost or cut the low frequencies by as much as 12dB. It has 21 detent positions. 10 for boost, 10 for cut and a center FLAT or OFF position. It effects the LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels.

When either the TREBLE or BASS control is placed in the center FLAT or OFF position all tone control circuit elements are removed from the signal path.

### INPUT SELECTORS

Two input selector switches are provided. Each switch has twelve positions. The RECORD switch selects which program source is fed to the TAPE OUT jacks and AREA B. The LISTEN switch selects the program source that feeds the AREA A power amp and speakers. This allows one to RECORD one program source while LISTENING to another.

The input selections are PH/AUX, CD1, CD2, TUNER, TAPE 1 and TAPE 2 for Audio. The Video inputs are SAT, TV, LV, VCR1, VCR2 and V-AUX.

### LOUDNESS

The LOUDNESS control, (small center knob), provides frequency response contoured to compensate for the behavior of the human ear at lower listening levels. At the fully counterclockwise position, the loudness contour is electrically flat. As the control is turned clockwise, selected frequencies increase in the correct proportion for proper listening at softer volume levels. The frequency balance is not affected by changes in the volume control settings. First adjust the volume for the desired listening level. Then adjust the LOUDNESS control for the preferred compensation. It effects the LEFT FRONT, CENTER, RIGHT FRONT and SUBWOOFER channels.

### BALANCE

The BALANCE control, (large outer knob), adjusts the volume of the channels relative to each other. L, (left): Turning the control to the left accents the left channel by reducing the volume of the right channel. R, (right): Turning the control to the right accents the right channel by reducing the volume in the left channel. At the center detent position both channels are equal.

### VOLUME CONTROL (Area "A")

A super precision volume control is required for superior surround sound performance. Tracking over its entire range must be almost perfect or the audio image will shift. Therefore, McIntosh Engineers have designed a volume control system that retains the familiar VOLUME CONTROL KNOB but provides "state of the art" performance. Tracking accuracy for all six channels is within one quarter of a dB throughout most of its range. It provides  $\pm 12$ dB of trim to all six channels for accurate matching of amplifiers and speakers. It has 256 steps for excellent resolution and % of volume and the amount of trim are digitally displayed on the front panel.

The volume control for area B is a 2 channel version of area A without trim and display.

### MODE SELECTOR

Five operating modes are provided, MONO STEREO, HALL, CINEMA 1 (DOLBY PRO-LOGIC) and CINEMA 2 (THX). The CINEMA 1 and CINEMA 2 positions have illuminated logos to indicate what surround processors are in use. Since DOLBY PRO-LOGIC decoding is necessary to generate the 4 channels for THX processing the DOLBY logo remains ON in THX.

LEFT and RIGHT FRONT and SUBWOOFER outputs are active in the MONO and STEREO modes.

LEFT and RIGHT FRONT, LEFT and RIGHT SURROUND, and SUBWOOFER outputs are active in the HALL mode.

LEFT, CENTER and RIGHT FRONT, LEFT and RIGHT SURROUND, and SUBWOOFER outputs are all active in CINEMA 1 and CINEMA 2 modes.

CENTER FILL is provided in MONO, STEREO, and HALL by placing the CENTER FILL switch on the rear panel in the "ON" position.

### DELAY SELECTOR

The delay selector provides variable surround delay.

The center position is the recommended setting for all surround modes. In the CINEMA 1 (DOLBY PRO-LOGIC) and CINEMA 2 (THX) modes the actual delay in milliseconds is:

- 1 = 12.3mS
- 2 = 16.4mS
- 3 = 20.5mS
- 4 = 24.6mS
- 5 = 28.7mS

Any deviation from the center setting should be determined by the listing position.

In the HALL mode the delay range is increased to emulate the acoustics of various MUSIC HALLS, from a night club to a stadium. The actual delay in milliseconds is:

- 1 = 16.4mS
- 2 = 32.8mS
- 3 = 49.2mS
- 4 = 65.5mS
- 5 = 81.9mS

## PUSHBUTTON SWITCHES

### SUR CAL (Surround Calibrate)

The MX 130 has an integrated surround sound calibrate system. Its mode of operation, MANUAL or AUTOMATIC, is determined by a rear panel switch. In the MAN mode each push of the button switches a noise generator to a specific channel, LEFT FRONT, CENTER, RIGHT FRONT, RIGHT SURROUND, LEFT SURROUND, and SUBWOOFER in order. In the AUTO mode the noise generator cycles through the channels until the button is pushed a second time. If the MAIN VOLUME CONTROL is changed during either mode, calibrate is canceled. CALIBRATE operation is indicated by an LED above the SUR CAL button.

### SUR CAL ▲ OR ▼

The SUR CAL ▲(up) button increases the level of the selected channel during CALIBRATE operation. The SUR CAL ▼(dwn) decreases the level. In the AUTO mode the cycle is interrupted by pushing the SUR CAL ▲ or SUR CAL ▼ button. However, 1 second after release of the button the cycle will continue until the SUR CAL button is pushed again or the MAIN VOLUME CONTROL is changed.

### SUR PRO (Surround Processor)

The SUR PRO push button is for switching the

surround processor in or out. When the MODE SELECTOR SWITCH is in one of the surround sound positions, the push button toggles the MODE between standard STEREO and the selected surround operation.

### ACCESS

The ACCESS push button operates the motor driven door for ACCESS to the CAMCORDER INPUTS. When the door is opened the V-AUX inputs are switched from the rear to the front panel CAMCORDER inputs.

### RECORD LOCK

This button disables commands from other areas so recordings cannot be interrupted.

### TUNE ▲(UP) or ▼(down)

Push ▲(up) momentarily to tune up in frequency, 10kHz steps for AM or 100kHz steps for FM.

Push ▲(up) and hold to tune up continuously. Release the button when the desired frequency is reached.

Push ▼(down) in the same manner to tune down in frequency.

### AM/FM

Push the AM/FM button to change bands. The band in use is indicated by an LED to the left of the frequency display.

### PRESET

Push momentarily to go to the next preset station. Push and hold to scroll through the presets. The preset station number is displayed on the left side of the lower window.

### ENTER

Push to select the preset station ENTER mode. The MX130 will remain in this mode for 10 seconds. ENTER mode is indicated by the LED above the pushbutton.

Follow the procedure described below for ENTERING a station into memory.

1. Select band, AM or FM.
2. Using the TUNE buttons, TUNE to the desired station frequency.
3. Push the ENTER button. The LED above the button will turn ON.

4. Push the PRESET button and scroll to the desired station number.
5. Push the ENTER button again to activate the memory. The LED above the button will turn OFF and the station will be memorized.
6. Repeat the above steps for each of the eight preset numbers.

#### POWER

The red button turns the MX130 on. The panel will illuminate to indicate the program source that has been selected and special operating modes.

#### HEADPHONE JACK

The MX130 has sufficient built-in power capability to feed a low impedance dynamic headphone connected to the HEADPHONE jack. The headphone jack is located behind the motorized ACCESS door.

## REAR PANEL INFORMATION

The rear panel of the MX130 has 3 groups of RCA jacks for audio, AUDIO INPUTS, RECORD PROCESSOR, and AUDIO OUTPUTS. In addition there are two XLR connectors for LEFT FRONT, and RIGHT FRONT balanced outputs.

The AUDIO INPUTS are PHONO, AUX, CD1, CD2, TAPE 1, TAPE 2, SAT, TV, LV, VCR1, VCR2, and V-AUX.

PHONO and AUX are combined on one position of the selector switches. The user must decide which way he will use the inputs. A moving magnet phono cartridge may be plugged into the PHONO input or any high level source into the AUX. However the insertion of an RCA plug into the AUX jack switches the phono preamp off. Only one input may be used at a time.

The RECORD PROCESSOR jacks are for TO and FROM the processor.

The AUDIO OUTPUTS are TAPE 1, TAPE 2, VCR1, VCR2, L&R FRONT, CENTER, SUBWOOFER and L&R SURROUND.

There are a pair of AREA B outputs for its power amplifier.

All six SURROUND SOUND audio outputs and a power ON/OFF control signal are brought to a male 25 pin subminiature "D" connector. A mating female connector is provided on the MC7106 six channel power amplifier. One cable is all that's necessary for a surround sound interconnect.

There are two groups of VIDEO INPUT and VIDEO OUTPUT jacks. The RCA jacks are for composite video and the mini-DINs are for SVHS.

The VIDEO INPUTS are SAT, TV, LV, VCR1, VCR2 and V-AUX. The V-AUX inputs are switched to the front panel CAMCORDER inputs when the ACCESS door is opened.

The VIDEO OUTPUTS are VCR-1, VCR-2 MONITOR A and MONITOR B. VCR-1, VCR-2 and MONITOR B outputs are fed from the RECORD (B) input selector and the MONITOR A output is fed from the LISTEN (A) input selector. This allows one to be watching and listening to one VIDEO source while taping another or to feed two different VIDEO sources to a monitor equipped for "Picture in a Picture" viewing.

A TV modulator is provided for a TV channel 3 or 4 output. The input to the modulator can be selected (A or B) by a rear panel switch. It switches both composite video and audio. Mono audio is provided and its level may be adjusted by the TV AUDIO potentiometer.

Several Surround Sound functions are provided by rear panel switches. The HIGH PASS switch switches high pass filters in the LEFT FRONT, CENTER and RIGHT FRONT channels ON or OFF. When large full range speakers are used for the front channels the switch should be in the OFF position.

Compact speaker systems that utilize a separate SUBWOOFER require the HIGH PASS switch to be in the ON position. Low frequency sound at high levels can overload compact speakers.

The CENTER SPEAKER switch position is again determined by speaker type. If no CENTER speaker is used, the switch should be placed in the NONE position. This position feeds CENTER (L&R) information to the LEFT FRONT and RIGHT FRONT channels to create a PHANTOM CENTER channel. A small compact speaker for the CENTER channel requires that the switch be placed in the SMALL position. Here the switch places a high pass filter in the CENTER channel and diverts the

low frequency sound to the LEFT and RIGHT FRONT speakers. A LARGE full range CENTER speaker requires that the switch be placed in the LARGE position for full response in LEFT, CENTER and RIGHT FRONT channels. This switch is only active in CINEMA 1 (DOLBY PRO LOGIC) and CINEMA 2 (THX).

The SUR CAL switch selects an AUTOMATIC or MANUAL mode for calibration of the surround system. See SUR CAL push button explanation under Front Panel Controls, page 5 & 6.

#### REMOTE CONTROL

Two "F" connectors are provided. One is for an AREA A external sensor and one for the AREA B sensor.

Two 7 pin DIN connectors are provided for parallel control of CD players or changers.

A 1/8 inch phone jack for HOME and each input selection provides serial data outputs for control of other equipment.

A 1/8 inch phone jack for POWER CONTROL of high power McIntosh amplifiers is also provided.

#### SYSTEM EXPANSION

Buffered audio outputs and the necessary data lines for system expansion are provided on a female 25 pin subminiature "D" connector. One cable to a CR10 MULTI-ROOM CONTROLLER is the only connection required.

#### AC POWER

One switched AC outlet is provided for program source equipment. A second and third are for the AREA A and AREA B Power Amplifiers.

#### EXTERNAL ANTENNAS

A type "F" 75 ohm connector is provided for an external FM antenna.

In addition to the AM low impedance loopstick antenna, a seven pin DIN connector is provided for an external AM antenna.

Note: The MX 130 is an AUDIO/VIDEO control center and will have many pieces of VIDEO equipment connected to it. VIDEO equipment generates large amounts of AM interference. Since the MX130 is also a multi zone unit it is possible that one zone may want to listen to AM while another watches TV. In this case AM performance would be terrible so McIntosh is

developing a shielded AM antenna that can plug into the DIN connector and be placed some distance away from the interfering VIDEO equipment.

## TECHNICAL DESCRIPTION

#### ELECTRO-MAGNETIC SWITCHING

All audio signal switching in the MX130 is done by ELECTRO-MAGNETIC methods. ELECTRO-MAGNETIC switching is an old and proven technology that has been blessed with modern materials and manufacturing methods.

Each switch consists of a glass tube that is filled with an inert oxygen-free atmosphere and sealed with tiny leads protruding from either end. These leads extend into the tube and overlap one another with a separation of a few thousandths of an inch. The leads are made from a ferrous material that is influenced by a magnetic field. They are first plated with gold as a base material, then with rhodium and ruthenium. Ruthenium is the best contact material known. The glass assembly is then placed in the center of a multi-layer coil of copper wire. The entire assembly is molded together in a tough shock absorbing plastic. The switch and coil connectors extend from the bottom in the form of printed circuit board terminals.

When a DC voltage is applied to the coil, current flows and creates a magnetic field. The force of the field causes the leads to bend and contact one another inside the sealed glass tube. The inert gas eliminates corrosion of the contacts, which insures a low resistance, distortion free switch.

#### SURROUND SOUND PROCESSOR

The internal surround sound processor is made up of three sections. First is an LSI integrated circuit that takes a DOLBY SURROUND signal and decodes it to 4 channels. LEFT FRONT, CENTER, RIGHT FRONT and SURROUND. The signal from the LEFT, CENTER and RIGHT are added together then put through a low pass filter to form the SUBWOOFER channel. The SURROUND signal is fed to a digital TIME LINK delay circuit, a 7kHz low pass filter and finally to a DOLBY B type noise reduction section. It is then split into L & R surround channels. Connectors are provided for the future addition of THX processing.

## PHONO AMPLIFIER

The phono amplifier uses a high technology integrated circuit operational amplifier. Its differential input stage has been optimized for low noise and low distortion performance. The feedback network provides precision RIAA frequency compensation. The network uses 1 % metal film resistors and 5% polypropylene film capacitors. To achieve low-noise performance it is essential that the feedback network have a 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 sensitivity of the phono amplifier is 2.5 millivolts and the gain is 40dB at 1000Hz. It has a very wide dynamic range. The phono input circuit will accept 60 millivolts without overload.

## VOLUME CONTROL

A superior surround sound system requires a super precision volume control. Tracking accuracy must be near perfect or the audio image will shift as the control is moved. McIntosh engineers have designed a micro processor controlled volume system that retains the familiar VOLUME CONTROL KNOB but provides "State of the Art" performance. All SIX channels track within one quarter of a dB throughout most of their range. 256 steps are provided for excellent resolution and each channel has  $\pm 12$ dB of trim. The control microprocessor also drives a two digit display that indicates % of volume and the amount of trim used for system calibration. The gain of the volume control section is 20dB.

## LOUDNESS AMPLIFIER

At the input to the high level or loudness amplifier, the signal passes through the mono stereo switch, then through the volume control, and into the loudness amplifier. In the past, loudness controls have typically used simple passive circuits connected to a tap on the volume control. As a consequence, compensation accuracy was dependent on many variables such as volume control position and differences in input level. The MX130 uses active loudness control circuitry. An integrated circuit operational amplifier is used here. It has two feedback loops. One feedback loop has flat response. The other feedback loop has loudness compensation. A potentiometer is placed between these two feedback loops making it possible to select any combination of the two from a flat response to full loudness compensation. The gain of the loudness

amplifier is 0dB.

## TONE CONTROL AMPLIFIER

The tone control amplifier uses high technology integrated circuit operational amplifiers. Its output stage has been optimized for the best transient performance and minimum distortion. Another operational amplifier is arranged in a circuit configuration that is the equivalent of a series tuned circuit. The series tuned circuit is inserted via a control potentiometer into either the input or feedback circuit of the operational amplifier, thereby, providing a boost and cut capability of 12dB. The overall gain of the stage is 0dB. When the potentiometer is at its center detent position, the tone control elements are removed from the signal path.

## CONTROL LOGIC

All inputs, outputs, CD, Tuner, and Video selector lines are controlled by logic circuits in the MX130. The logic is changed by front panel switches or by two microprocessor IR decoders, one for LISTEN (A) and one for RECORD (B). These microprocessor IR decoders are programmed with exclusive McIntosh software. They receive data from the front panel or external sensors and provide the command signals for input switching and volume control. A third microprocessor decodes the CD1, CD2 and TUNER function commands.

## SYSTEM EXPANSION

Audio buffers and data switches feed a 25 pin subminiature "D" connector for system expansion through CR10s.

## VIDEO SWITCHING

All video signal switching is done by MOSFET switches.

## VIDEO BUFFER AMPLIFIERS

Video buffer amplifiers feed the video outputs to assure perfect matching and no loss in picture quality. The response of the video section is 1 Hz to 12MHz so high resolution signals present no problem to the MX130.

## RF OUTPUT

TV channel 3 or 4 output is provided by an internal modulator. This signal can be used to feed remote areas over a 75 ohm coaxial cable.



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December 22, 1992

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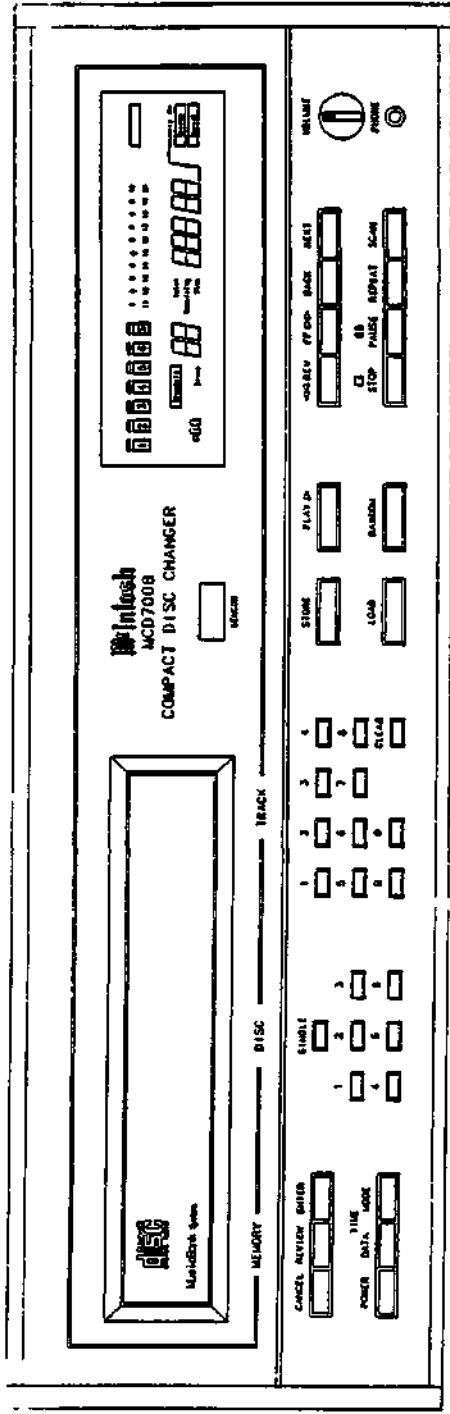


## MCD7008 CD CHANGER

The MCD7008 uses the 7 disc "MUSIC BANK" mechanism. Control circuits have been modified to provide front panel control of all major changer functions. An interface has been designed that makes the basic functions, DISC selection, TRACK selection, PLAY, NEXT, BACK and STOP accessible from any McIntosh remote control system. A motorized control is used for the variable output so there is no degradation of the output signal and overall performance is improved.

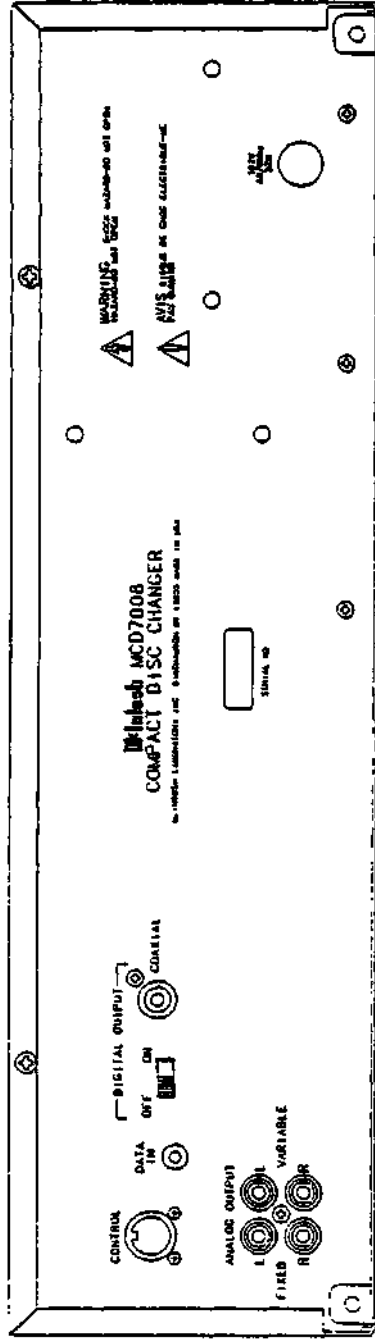
### **Promotional Highlights**

- High Quality 6 Disc Changer and Single Disc Player in One Package
- 20 Bit D to A Converters
- Full Front Panel Control
- Serial and Parallel Data Control Ports
- Precision Motor Driven Pot for Variable Output
- Digital Output for External D to As
- 8 Times Oversampling Digital Filters
- High Order Active Analog Filters
- Regulated Power Supplies
- 50 Track Programmable Memory
- Shock Mounted Disc Drive
- Large Florescent Display
- Disc Calendar Display
- 3 Inch Disc Play Without Adaptor
- Magnetic Disc Clamp



Front Panel Layout  
 MCD7008 COMPACT DISC CHANGER  
 McIntosh Laboratory Inc August 5, 1992

MCD7008



Rear Panel Layout  
MCD7008 COMPACT DISC CHANGER

# MCD7008



PRODUCT PREVIEW

# CR10 Remote Control System

Project 629

## Contents

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## Promotional Highlights

- The CR10 is an Expansion of the CR7 and CR8 Remote Control System. House wiring remains the same. One 75 ohm coax for Data & Video and 2 speaker pairs.
- 6 Program Sources Provided
- 4 Independent Control Areas
- Illuminated Glass Panel
- LED Status Indicators for All 4 Areas
- Pre-Programming for Each Area
- Electro Magnetic Switching
- Separate Serial Data Output Ports for each Program Source
- Remote Power ON and MUTE Indication for all 4 areas

- New Remote Sensor Power Supply that will operate up to 4 sensors or Keypads Per Area
- Tape Output for the Main Area
- Parallel Control for McIntosh Tuners
- Parallel Control for McIntosh CD Players
- Parallel Control for McIntosh PC-1 Power Controller
- Cascading Controller Connectors for Adding Up to 20 more areas
- Controller Input Connector for Connecting Master Preamp
- Video, Super VHS and Audio Input Expansion (5) through the MVS-3
- Home Control, Control Drapes, Screens and Lighting

## Features and Benefits

### EXPANSION OF THE CR7-8 SYSTEM

Customers who have invested in the CR7-8 system can expand their system capability without major renovation to their home. No new wiring is required.

### SIX PROGRAM SOURCES

Six inputs CD, TUNER, TAPE 1, TAPE 2, VIDEO and AUX for each area.

### FOUR INDEPENDENT CONTROL AREAS

Four preamps in one package. Each with its own input selector and volume control. You can listen to CD in the main area, tuner in area 2, tape in area 3 and so on.

### ILLUMINATED GLASS PANEL

The McIntosh signature, a glass panel filled with lights provides a means of custom mounting.

### LED STATUS INDICATORS

Long life LED indicators that show what areas are ON, what program source is being used in each area and what the volume level is in each area.

### PRE-PROGRAMMING

The program source and volume can be preselected before an area is turned ON.



**ELECTRO MAGNETIC SWITCHING**

Zero distortion, high reliability Electro Magnetic Switches are used for all audio switching.

**SERIAL DATA OUTPUT PORTS**

A Serial Data Output Port is provided for each input selection. In many instances this output can be connected directly to a foreign piece of equipment allowing it to be controlled through the McIntosh system.

**REMOTE POWER ON AND MUTE INDICATION**

On each keypad and remote sensor there is an LED that lights when that area is POWERED and blinks on and off when the area is MUTED.

**NEW REMOTE SENSOR POWER SUPPLY**

The design of the remote sensor power supply has been changed to provide power to operate up to four sensors or keypads wired in parallel on the same coax line.

**CONTROL CONNECTOR FOR POWER**

In addition to the AC outlet that is powered when any area is turned ON, there is a DIN connector that provides parallel data to the McIntosh PC-1 POWER CONTROLLER. This POWER CONTROLLER provides remote control of 5 AC outlets for AUDIO program source equipment, 2 for VIDEO equipment, 3 unswitched and 4 for the four area POWER AMPLIFIERS. The five outlets for the AUDIO equipment come on when any area is powered, the VIDEO when any area selects VIDEO and each POWER AMPLIFIER only when that specific area is turned ON.

**CASCADING CONTROLLER CONNECTORS**

Two 25 pin subminiature "D" connectors are provided. One is for the input of audio and control signals, the other for output. This permits the extension of the system to include more CR10s for additional areas or for the inclusion of a full featured "MASTER" preamp.

**VIDEO EXTENSION**

For small systems the CR10 has a VIDEO input that can be used for the audio from a stereo TV or VCR. If more VIDEO capability is desired the McIntosh MVS3 VIDEO AUDIO SELECTOR can be added. The MVS3 has Super VHS, normal VIDEO and AUDIO input switching for 5 more program sources. Its audio output is fed to the VIDEO input on the CR10. The VIDEO Serial Data Output from the CR10 is fed to the MVS3 for switching control. With is arrangement one can select TV, LASER, VCR1, VCR2 OR V-AUX from any area. VIDEO signals or TV channel 3 or 4 can be sent

to other areas via coax cable. VIDEO switching is arranged so that one can be recording or dubbing while listening to any of the audio sources.

**HOME CONTROL .**

The CR10 System provides for expanding your control to other devices in the home. With the use of MHC1 HOME CONTROL MODULE one has 6 circuit closures that are programmable for PUSH ON, PUSH OFF, or MOMENTARY (push and hold) type of operation; three circuit closures for PUSH ON, PUSH OFF only and 4 sequenced closures or openings operated from a single button. Also included in the MHC1 is a 12VDC power supply capable of delivering 1.5 amperes to these contacts for operation of external relays etc. The internal relays are sealed and have 20A, 240VAC contacts.

Not only can one access the MHC1 from the CR10, he can also operate it from up to eight keypads.

**PERFORMANCE SPECIFICATIONS****FREQUENCY RESPONSE**

+0, -0.5dB from 20Hz to 20kHz

**RATED OUTPUT VOLTAGE**

2.5V

**SENSITIVITY**

All input, 0.250V for 2.5V rated output

**TOTAL HARMONIC DISTORTION**

0.004% maximum from 20Hz to 20kHz at rated output

**SIGNAL TO NOISE RATIO**

-85dB below rated output

-96dB below rated output (A-Weighted)

**MAXIMUM VOLTAGE OUTPUT**

8 volts from 20Hz to 20kHz

**MAXIMUM INPUT SIGNAL**

8 volts

**INPUT IMPEDANCE**

22K ohms

**VOLTAGE GAIN**

Input to tape: -0.5dB

Input to main: 20dB

in a single turn loop. The loop may be attached around the frame of a window under the curtain or on the back of the equipment cabinet or table. Signal strength is proportional to the size of the loop. The larger the loop the stronger the signal. The center conductor (wire) and the shield are stripped of insulation, tied together at one end, and connected to the GROUND push connector. At the other end of the loop, the insulation is removed and ONLY the center conductor is connected to the antenna push terminal. The shield must NOT be connected to anything at this end.

The shielded loop is a bi-directional antenna. Its maximum signal pickup occurs when the station lies in the same plane as the loop. Minimum signal is perpendicular to the loop. This characteristic can be used to advantage by arranging the loop so that an unwanted signal, noise or interfering station, is in the pickup null.

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Revised: September 15, 1989  
December 27, 1989  
August 26, 1992

**3. WAKE UP PRECONDITIONING**

- a. All Area Controllers may be programmed for specific "Wake Up" conditions by the installer.
- b. Jumpers can select either the last used or TUNER input for "Wake Up."
- c. Jumpers can select either the last used or a present VOLUME LEVEL.

**REMOTE OPERATION (SENSOR)**

The front panel contains an IR sensor for operation within the room.

An F connector is provided on the rear panel for a second Main sensor.

Each "Plug In" AREA CONTROLLER has its own F connector for a remote sensor.

The electrical design of the remote sensor has been changed (no mechanical change) to indicate four conditions.

1. Area "ON" - Red LED illuminated.
2. Area MUTE - Red LED flashing off and on at uniform 1 second rate (.5 ON, .5 OFF).
3. Receiving Transmission - Red LED flashing rapidly and irregular.
4. Area OFF - Red LED off.

The design of the current source that supplies the 75 ohm cable has been changed so that up to 4 sensors or keypads can be operated in parallel.

**NOTE:** R649 sensors must be used. The obsolete R607 will not work with the CR10.

**KEYPADS**

A wall mounted (dual electrical box) Keypads will be an available option. It will contain a sensor and the status LED defined above. Power will be supplied by the 75 ohm cable.

**EXPANSION OF BASIC CR10 SYSTEM****AC POWER CONTROL**

AC power control is provided in a separate unit, the PC1. Control information from the CR10 is passed on to the control via a 7 conductor cable. Power input to the controller is 120VAC at 15 amps. A 3 conductor

14GA line cord with heavy duty plug is provided.

**VIDEO EXPANSION**

Expansion of the VIDEO and AUDIO capability for the CR10 system is supplied by the MVS3. It provides 5 more audio inputs switched simultaneously with 5 VIDEO and 5 Super VHS inputs.

**HOME CONTROL**

The MHC1, HOME CONTROL MODULE provides switching to control lighting, drapery motors, screen motors, and other appliances.

**MASTER CONTROL**

A CONTROLLER INPUT CONNECTOR is provided on the rear panel for connection of a full featured McIntosh CONTROL CENTER (preamp). All the audio input and data connections are made through this connector.

**ADDITIONAL REMOTE CONTROL AREAS**

Up to 20 more AREAS can be added to the system. The NEXT CONTROLLER CONNECTOR on the rear of CR10 number one can be connected to the CONTROLLER INPUT CONNECTOR on CR10 number two. Two to three in the same fashion and so on for up to six CR10s. Since each CR10 contains buffer amplifiers for each input the chain can go on and on. A small decrease in Signal to Noise Ratio would be the only penalty.

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March 16, 1992  
March 26, 1993



AREA CODE 607 723-3S12

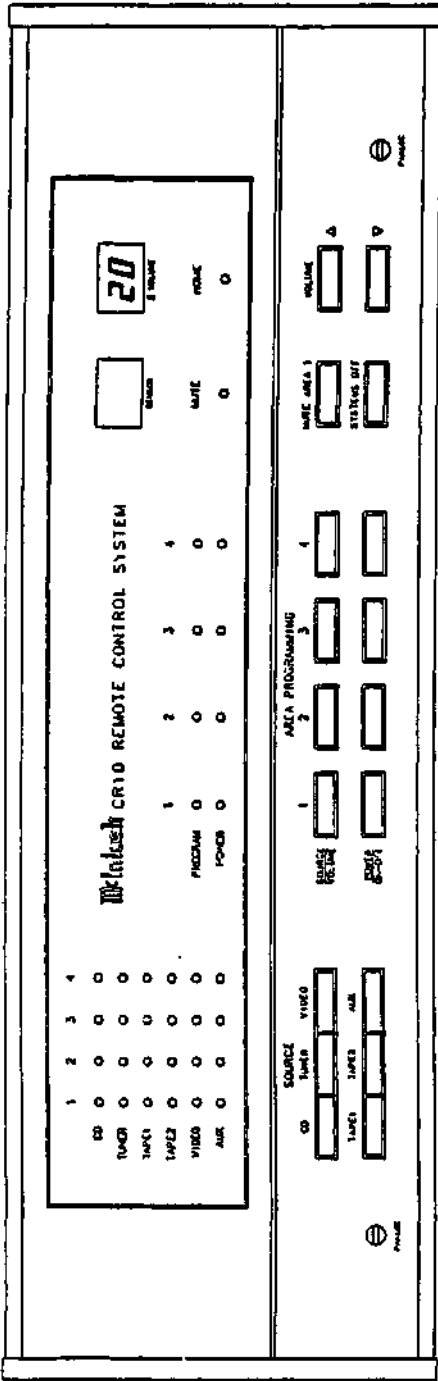
*McINTOSH LABORATORY INC.*  
2 CHAMBERS STREET  
BINGHAMTON, N.Y. 13903-2699

## **IMPORTANT INFORMATION ON THE CR10 REMOTE CONTROL SYSTEM**

The McIntosh Model CR10 Remote Control system has the ultimate capability of controlling up to four separate remote areas.

Each CR10 is shipped from the factory with two area modules already installed for area one and two. An out of the box unit is therefore equipped and ready to operate two areas. To increase the control capability to the full four areas, two additional ACM-1 Modules must be installed.

This information will be added to the CR10 literature sheet immediately in order to clarify the CR10 product status.



Front Panel Layout  
 CR10 REMOTE CONTROL SYSTEM  
 McIntosh Laboratory Inc October 22, 1991

**CR10**





McINTOSH LABORATORY INC.  
2 CHAMBERS STREET, BINGHAMTON, NEW YORK 13903-2699

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